Appendix C (1 of 3)
Predesign Investigation

October 2, 2018

Ms. Abby Mazza
City of Chicago
Department of Fleet and Facility Management
30 North LaSalle, Suite 300
Chicago, Illinois 60606

Subject: **Pre-Design Investigation Summary Report**
Former Carnotite Reduction Company Site
434 East 26th Street
Chicago, Illinois

Dear Ms. Mazza:

Tetra Tech, Inc. (Tetra Tech) has prepared this pre-design investigation report for the City of Chicago Department of Fleet and Facility Management (2FM) under Task Order Request 14-2FMEHS-00018. The pre-design investigation accorded with Tetra Tech's abbreviated pre-design investigation sampling and analysis plan (SAP) dated June 6, 2018 (Tetra Tech 2018a). Purposes of the investigation were to further delineate radium, thorium-230, and uranium contamination in soil; confirm depth to a confining clay layer for evaluating shoring requirements; and acquire groundwater data for design of dewatering and pre-treatment systems. In addition, Tetra Tech performed X-ray fluorescence (XRF) screening of soil samples to evaluate effectiveness of on-site XRF field screening in measuring uranium (and possibly thorium) concentrations in soil. This pre-design investigation also included a thorium-230 background study required by the Illinois Emergency Management Agency (IEMA) to establish thorium-230 remediation objectives.

On June 29, 2018, IEMA provided 2FM with two suggestions. IEMA first suggested that it would be helpful to examine all boring samples retrieved at a boring location before selecting soil samples to be submitted for analysis. IEMA also suggested including a provision for collection of additional soil samples if warranted based on field observations (IEMA 2018). IEMA's suggestions were implemented during the investigation.

The pre-design investigation occurred during two separate sampling phases. During Phase 1 (July 9 through 13, 2018), existing groundwater monitoring wells were sampled, a new groundwater monitoring well (MW-1) was installed and sampled, and 12 investigative and three waste characterization soil borings were advanced. During Phase 2 (July 26, 27, and 30, 2018), six investigative soil borings and seven background soil borings were advanced, and XRF screening of select soil samples occurred. In addition, Stan A. Huber Consultants, Inc. (SAHCI) conducted radiological field screening of soil cores, air monitoring, and screening of equipment and coolers before removal from the site. The following

sections discuss the site background, soil boring activities, monitoring well installation, soil and groundwater sampling and analytical results, XRF screening, and air monitoring.

Appendices are as follows:

- **Appendix A:** figures showing sampling locations and exceedances of site-specific concentrations of concern
- **Appendix B:** soil boring and analytical results summary tables
- **Appendix C:** soil boring logs
- **Appendix D:** photographic log
- **Appendix E:** field notes
- **Appendix F:** SAHCI data package
- **Appendix G:** data verification report and laboratory data packages.

SITE BACKGROUND

The site is located at 434 East 26th Street in Chicago, Illinois (see Figure 1 in Appendix A). The site formerly operated as an elemental radium separation and refining facility. Tetra Tech (and others) previously acquired information at the site and provided investigative reports. 2FM obtained a site-specific radioactive materials license (Number IL-02467-01) issued by IEMA. Investigations at the site since 2009 have identified the presence of gamma activity. A subsurface investigation in June 2012 confirmed the presence of elevated levels of radium and uranium in subsurface soil. Based on the data collected at the site, the horizontal and vertical extent of the uranium and thorium-230 contamination required further refinement to facilitate remedial design and cost estimating. During previous investigations, the vertical extent of uranium had not been delineated, and thorium-230 had not been evaluated. Other information related to water management, waste characterization, and thorium-230 background concentrations were also considered data gaps that required additional assessment.

SOIL BORING ACTIVITIES

The pre-design investigation included installing soil borings for (1) delineating the extent of radium, uranium, and thorium-230 contamination; (2) acquiring waste characterization soil analytical results; and (3) providing supplemental data for design of a shoring system if needed. In addition, soil borings were advanced outside the licensed area to establish background for thorium-230.

Nineteen investigative soil borings were advanced using direct-push technology (DPT) with a Geoprobe DT325 to a maximum depth of 36 feet below ground surface (bgs). Investigative soil boring locations are shown on Figure 2 in Appendix A. Borings B-1, B-4, B-5, B-7, and B-17 were advanced to characterize depth to clay for potential shoring system design, and to delineate the vertical and horizontal extent of radium, thorium-230, and uranium. Gray silty clay was first encountered at depths ranging from 31 to

33 feet bgs in soil borings B-1, B-4, B-5, and B-7 in the north contaminated area, and at 34 feet bgs in boring B-17 advanced within the south contaminated area. Soil lithology was characterized in all soil borings by logging continuous soil samples in accordance with the Unified Soil Classification System (see soil boring logs in Appendix C).

Borings B-6, B-11, B-14, B-17, and B-20 were advanced within the assumed central portion of the area of soil contamination to delineate the vertical extent of contamination. The remaining borings were advanced to delineate the horizontal extent of the contaminated areas.

There were some deviations from the proposed sampling activities as described below. Planned boring B-2, proposed at the northwestern edge of the plume along 26th Street, south and east of B-1, could not be installed due to presence of utilities, including a gas main and sewers beneath 26th Street, and limited accessibility of the larger drill rig along the 26th Street sidewalk. Location B-2 was initially relocated inside the site boundary fence southeast of the intersection of 26th Street and Martin Luther King Drive. However, refusal due to thick concrete was encountered at this location and at offset locations. Therefore, this boring was not advanced. In addition, soil sampling had been planned at the MW-1 location, designated as soil boring B-8 in the SAP; however, no soil sampling occurred at this location because it was approximately 10 feet south of B-20 and the data at B-20 was considered adequate for design purposes. No soil samples were collected for analysis at soil boring location B-10, where the soil boring encountered refusal at 8 feet bgs, and the material in the boring appeared to be fill contained within former truck docks adjacent to the former Building 1 that had been backfilled during building demolition. Similar fill material and refusal were encountered at offset locations. Tetra Tech also modified and added locations used for waste characterization sampling due to poor recovery and insufficient soil volumes. These added borings were B-21, 22, and 23.

Seven soil borings (see Figure 3 in Appendix A) were advanced to determine thorium-230 background concentrations. These borings were advanced to a maximum depth of 6 feet bgs outside of the licensed area for collection of soil samples. The planned background sample locations and depths were identical to those during the 2014 subsurface gamma screening investigation at the site but outside the licensed area (AECOM 2014). However, sampling could not occur at three locations sampled during the 2014 investigation because (1) access issues prevented sample collection in the parking lot west of the site along 31st Street, (2) refusal was encountered at location BK-5 (as designated in the SAP) at the intersection of 29th Street and South Ellis Avenue, and (3) location BK-10 was within the licensed area and deemed inappropriate for use as background.

During soil boring installation, poor recovery generally occurred in the urban fill between 0 and 6 feet bgs. Dense to very dense native sand was encountered below the urban fill. Heaving sands were encountered at approximately 16 feet bgs. Soil cores from each location were placed on plastic sheeting for screening and observation before selection of soil sample intervals. SAHCI screened the soil cores using (1) a Ludlum Model 2221 Scaler/Ratemeter with attached Ludlum Model 44-10 2-inch by 2-inch sodium iodide (NaI) detector, (2) a Ludlum Model 2241 Scaler/Ratemeter with attached Ludlum Model

44-40 shielded pancake detector, and (3) a Ludlum Model 3 Scaler/Ratemeter with attached Ludlum Model 44-21 beta and low energy gamma scintillation detector. Typically, these field radiation screening devices can detect only high concentrations of radionuclides in soil cores with limited soil volume. Most screening results were indistinguishable from background. However, where detected, contamination was primarily within the 2- to 4-foot bgs interval within the known plume area (see soil screening data sheets in Appendix F). The soil cores were also visually characterized to identify source material. Where soil cores exhibited no evidence of contamination and no instrumental detection of contamination, soil samples were collected from a range of depth intervals in each soil boring and across the site. Typically, at least three soil samples were collected from each soil boring, with sampling at additional depth intervals at several boring locations.

MONITORING WELL INSTALLATION

Tetra Tech installed one monitoring well, MW-1 at the center of the area where deep excavation may be required (Figure 2 in Appendix A). Groundwater samples from this monitoring well were analyzed for radionuclides and other contaminants for groundwater treatability study purposes; this location should provide worst-case conditions of groundwater that might require treatment during excavation dewatering activities. The monitoring well installation is summarized as follows:

- MW-1 was installed to a depth of 20.9 feet bgs.
- The well was constructed of 2-inch-diameter polyvinyl chloride (PVC) pipe with 10-foot-long machine-slotted screen installed at the base of the well.
- The well was developed by purging at least three volumes of water from the well by use of a disposable hand bailer, and pertinent observations were recorded in field notes (see Appendix E). The well was allowed to stabilize for 24 hours before sampling groundwater.
- Well installation followed procedures outlined in the abbreviated pre-design investigation SAP and site-specific Environmental Monitoring Plan (EMP) (Tetra Tech 2015, 2018).

SOIL AND GROUNDWATER SAMPLING ACTIVITIES AND ANALYTICAL RESULTS

Tetra Tech collected 65 investigative soil samples within varying depth intervals from 0 to 30 feet bgs in 19 soil borings (see Table 1 in Appendix B). Most samples were analyzed for radium-226 and -228, isotopic uranium, and thorium-230 to further evaluate nature and extent of contamination at the site. However, six of the 65 samples were not analyzed for radium in areas where radium contamination previously had been well documented (see Table 2 in Appendix B). Tetra Tech also collected nine samples from seven background soil borings for determination of thorium-230 background concentrations (see Table 3 in Appendix B). A Tetra Tech chemist verified the analytical results. The data verification report and laboratory analytical reports are in Appendix G.

Investigative soil analytical results were compared to site-specific concentrations of concern (COC), which are soil remediation criteria outlined by IEMA in the radioactive materials license. The COC for

total radium is 7.1 picocuries per gram (pCi/g), COCs for total uranium are 22 pCi/g to depth of 5 meters and 52 pCi/g below 5 meters, and the COC for thorium-230 is 5.8 pCi/g based on the average thorium-230 background concentration of 0.834 pCi/g (see Table 3) (Tetra Tech 2018b). Exceedances of COCs were detected in nine soil samples collected between 0 and 6 feet bgs within previously identified contaminated areas (see Table 2). No radium, uranium, or thorium-230 soil concentration above a COC was detected outside of or deeper than the contaminated areas identified during prior investigations (see Figure 4). Also, no contaminant concentration above a COC was detected in the 33 soil samples collected below the water table (see Table 2). The water table was observed in soil borings at depths between 8 and 13 feet bgs (see Appendix C).

The extent of contamination above remediation objectives as shown on Figures 2, 3, and 4 are based on soil results from previous investigations. Tetra Tech utilized the 3D visualization software Earth Volumetric Studio, created by CTech, to estimate and visualize the extent of soil contamination. The contaminated areas will be updated to reflect the pre-design investigation data in the revised decommissioning plan for the Carnotite site.

Tetra Tech also collected soil samples for waste characterization purposes. Due to poor sample recovery and large sample volume requirements, waste characterization soil samples were collected from four separate borings advanced in known contaminated areas (B20, 21, 22, and 23). Borings B21, 22, and 23 were advanced solely for obtaining adequate soil sample volume for waste characterization purposes. These results will be evaluated based on landfill waste acceptance criteria during site decommissioning planning and are not evaluated as part of this investigation. Soil waste characterization analytical results are in Appendix G.

Tetra Tech collected groundwater samples from three existing monitoring wells previously sampled by Tetra Tech during quarterly sampling activities. No groundwater analytical result exceeded a site-specific COC (see Table 4), and the analytical results were consistent with previous results from these wells. Tetra Tech also sampled groundwater from the newly installed MW-1 for groundwater treatment system design and discharge purposes. The treatment system design and discharge parameters will be evaluated during site decommissioning planning (see Appendix G for analytical results). Results from this well did not exceed site-specific COCs for radium, uranium, or thorium (see Table 4).

All samples were shipped to TestAmerica, Inc., in Earth City, Missouri, for analysis.

All tools and equipment were monitored for radiological contamination prior to release for unrestricted use in accordance with procedures outlined in the site-specific EMP. All equipment was decontaminated to levels As Low As Reasonably Achievable (ALARA) by application of decontamination procedures outlined in the site-specific EMP (Tetra Tech 2015).

Investigation-derived wastes were containerized in drums and securely stored in the on-site Conex box for management and disposal during site remediation.

XRF SOIL SCREENING AND EVALUTION

Using an XRF analyzer, Tetra Tech field-screened 12 unsaturated soil samples from on-site areas of expected contamination; these samples were also submitted for laboratory analysis. The purpose of the XRF screening was to evaluate effectiveness of on-site XRF field screening in determining uranium (and possibly thorium) concentrations in soil. Tetra Tech used a Niton XRF analyzer, Model XL3t 600, in accordance with procedures outlined in the abbreviated pre-design investigation SAP (Tetra Tech 2018a). Soil drying was not required because no free water was present in the soil. The soil samples underwent analysis via the XRF unit five times for 45 seconds per 8-ounce bag. Averages of the five uranium XRF screening results and associated laboratory results are summarized as follows:

Sample No.	Average Uranium XRF Result (ppm)	Average Uranium XRF Result[1] (pCi/g)	Total Uranium Laboratory Result (pCi/g)
CRC-B1-0406	ND	ND	6.24
CRC-B4-0608	ND	ND	0.449
CRC-B5-0204	ND	ND	3.39
CRC-B5-0608	ND	ND	0.431
CRC-B6-0204	24	16.1	10.2
CRC-B7-0204	168	113	116
CRC-B7-0406	29	19.4	15.3
CRC-B9-0406	ND	ND	1.15
CRC-B11-0204	ND	ND	3.03
CRC-B14-0204	ND	ND	3.57
CRC-B17-0204	54	36.2	38.1
CRC-B22-0506	ND	ND	1.25

Notes:

[1] To facilitate comparison of XRF results to laboratory results, results were converted to pCi/g by multiplying by a conversion factor of 0.67 pCi/g.

ND = Not detected
pCi/g = Picocuries per gram
ppm = Parts per million
XRF = X-ray fluorescence

No regression analysis was performed to evaluate correlation between XRF and laboratory results because of the small number of uranium concentrations detected via the XRF analyzer. However, relative percent differences (RPD) were 5 percent or less between uranium concentrations detected by the XRF analyzer exceeding 50 parts per million (ppm) and total uranium detected in counterpart laboratory results. For uranium concentrations near the XRF detection limit range of 15 to 25 ppm, the RPDs between the XRF and laboratory results were greater, 24 to 45 percent, but remain within the acceptable range of difference between soil duplicate samples. Also, the uranium COC at depths less than 5 meters is 22 pCi/g, which is less than or within the XRF detection range. Therefore, uranium concentrations near

the COC may not be detected by the XRF. Thorium XRF and laboratory results differed significantly, likely because of presence of natural thorium in the environment, which consists of 98% thorium-232. Therefore, thorium concentrations were not presented in the table above because accurate determination of thorium-230 concentrations in soil by use of an XRF analyzer is not advised based on the data.

AIR MONITORING

Continuous passive gamma radiation and radon monitoring is ongoing at the site in accordance with the site-specific EMP and radioactive material license requirements (Tetra Tech 2015). For the pre-design investigation, air monitoring also included personnel air monitoring over the duration of each phase of investigation at both drilling and sample logging work areas, in accordance with Safe Work Practice No. 112 submitted to IEMA on June 15, 2018 (Tetra Tech 2018c). No work area monitoring result exceeded 10 percent of the annual limit on intake of 3E-13 microcuries per milliliter (see Appendix F).

SUMMARY

Of 65 investigative soil samples collected within 0 and 30 feet bgs, nine contained radium, uranium, or thorium-230 above site-specific COCs at depths between 0 and 6 feet bgs. These exceedances were detected only within previously identified contaminated areas. No radium, uranium, or thorium-230 soil concentrations exceeded COCs outside of the horizontal or vertical footprint of the established contamination area. In addition, no COCs were exceeded in the 33 soil samples collected below the water table.

Contamination has been identified at the north license/property boundary along 26th Street; however, the extent of contamination north of the license/property boundary is uncertain because no borings were installed outside the license/property boundary. Also, boring B-2 could not be installed along 26th Street east of Martin Luther King Drive due to presence of utilities beneath 26th Street (including a gas main), limited accessibility of the larger drill rig along the 26th Street sidewalk, and subsurface refusal at alternate locations within the site boundary. However, the extent of contamination in this area was defined during the 2012 subsurface investigation. In 2012, no contamination was detected above site-specific concentrations of concern in soil analytical or gamma screening results collected west of the contaminated area (see 2012 soil boring locations B-4, D-4, E-3 and F-5 on Figure 4) (AECOM 2012). Also, the results of this investigation indicate that uranium and thorium are not likely present outside the previously delineated areas of contamination.

Most field radiation screening results were indistinguishable from background. However, where detected, contamination was primarily within the 2- to 4-foot bgs depth interval within the known plume area.

Regarding XRF soil screening and evaluation, XRF and laboratory analytical results were similar for uranium concentrations detected by the XRF analyzer above 50 ppm. For uranium concentrations near the XRF detection limit range of 15 to 25 ppm, the difference between XRF and laboratory analytical results was greater but remained within the acceptable range of difference between soil duplicate samples.

However, the uranium COC at depths less than 5 meters is 22 pCi/g, which is less than or within the XRF detection range. Therefore, uranium concentrations near the COC may not be detected by the XRF. Accurate determination of thorium-230 concentrations in soil by use of field screening with an XRF was found to be impractical.

Other study objectives achieved included: (1) confirmation of the depth to clay at 31 to 33 feet bgs; (2) establishment of thorium-230 background concentration of 0.842 pCi/g and, as a result, a thorium-230 remediation objective of 5.8 pCi/g; (3) acquisition of groundwater analytical results for wastewater treatment design and discharge purposes; and (4) confirmation that groundwater analytical results do not exceed site-specific COCs.

REFERENCES

AECOM. 2012. "Final Subsurface Gamma Screening Report, Former Carnotite Reduction Company." Prepared for the Public Building Commission of Chicago. June 11.

AECOM. 2014. "Subsurface Gamma Screening Report, Former Michael Reese Hospital Campus, Chicago, Illinois." May 22.

Illinois Emergency Management Agency (IEMA). 2018. Correspondence Regarding Abbreviated Pre-Design Investigation Sampling and Analysis Plan Comments and Suggestions, Former Carnotite Reduction Company Site. From Kelly Horn, Section Head, Environmental Management Bureau of Radiation Safety. To Abby Mazza, P.E., City of Chicago Department of Fleet and Facility Management. June 29.

Tetra Tech, Inc. (Tetra Tech). 2015. "Environmental Monitoring Plan, Former Carnotite Reduction Company Site, 434 East 26th Street, Chicago, Illinois." May 28.

Tetra Tech. 2018a. "Abbreviated Pre-Design Investigation Sampling and Analysis Plan, Former Carnotite Reduction Company Site, 434 East 26th Street, Chicago, Illinois." June 6.

Tetra Tech. 2018b. "Decommissioning Plan, Former Carnotite Reduction Company Site, 434 East 26th Street, Chicago, Illinois." June.

Tetra Tech. 2018c. Correspondence Regarding Submittal of Safe Work Practice No. 112, Health and Safety and Radiation Protection Plan Amendment, Former Carnotite Reduction Company Site. From Kristine Schnoes, Project Manager. To Kelly Horn, IEMA. June 15.

If you have any questions about this investigation report, please contact me at (312) 201-7480.

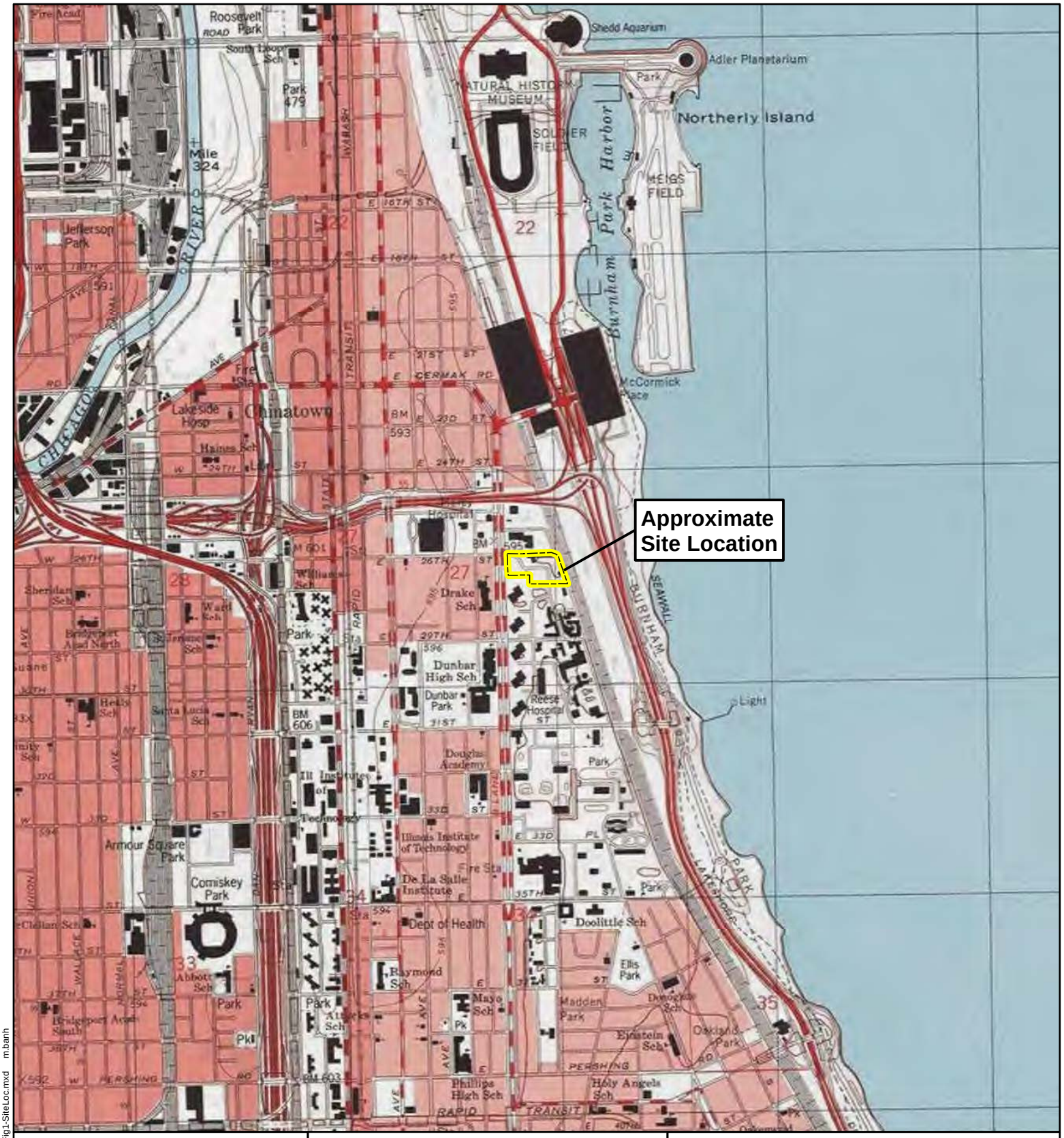
Sincerely,

Kristine Schnoes
Project Manager

CC: Stacey Durley, Tetra Tech
Carol Nissen, Tetra Tech
Glenn Huber, Stan A. Huber Consultants, Inc.

Appendices:
A – Figures
B – Tables
C – Soil Boring Logs
D – Photo Log
E – Field Notes
F – SAHCI Data Package
G – Data Verification and Laboratory Data Packages

APPENDIX A
FIGURES



REFERENCE MAP

N

0 2,000 4,000

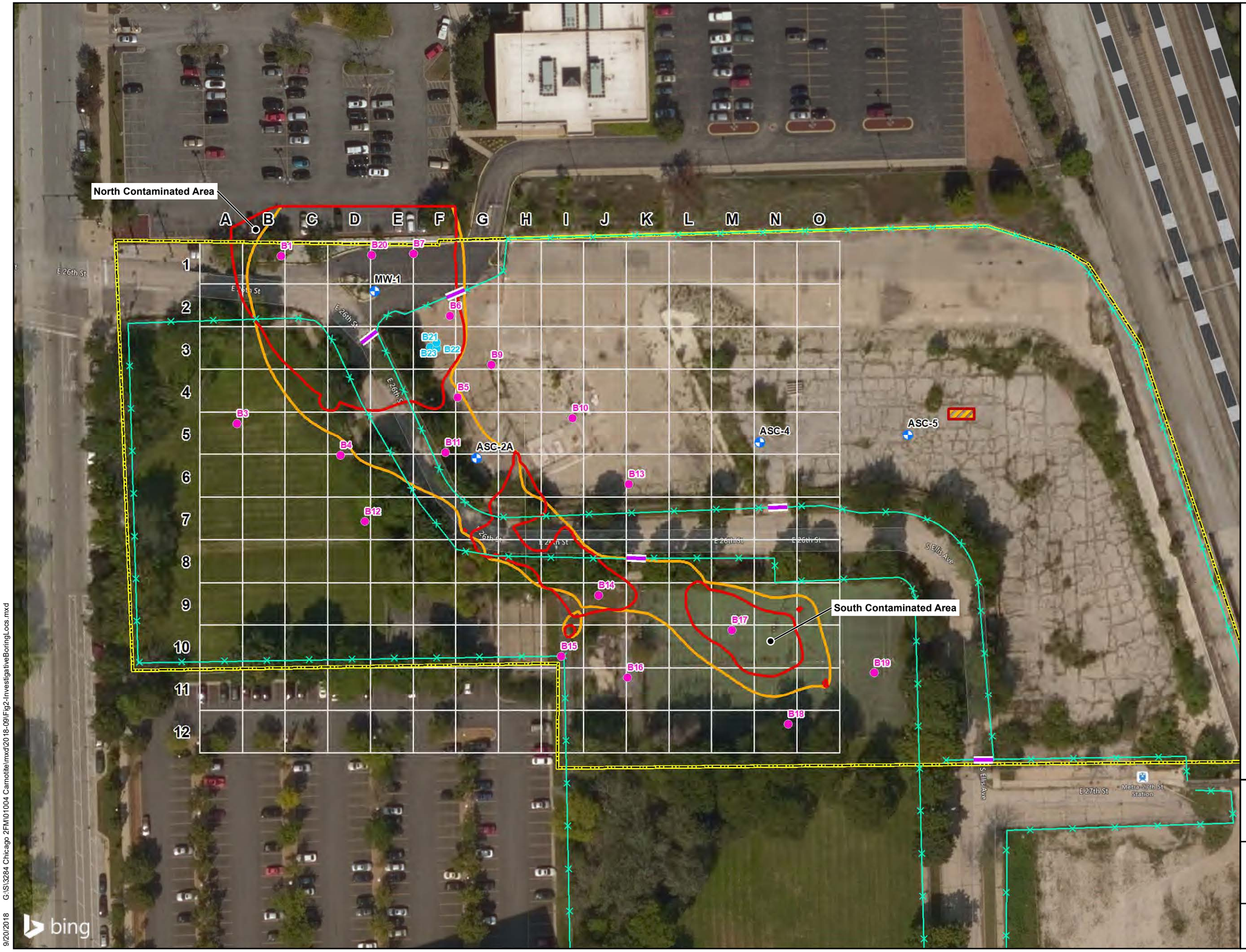
Feet

FORMER CARNOTITE REDUCTION COMPANY SITE
434 E. 26th STREET
CHICAGO, ILLINOIS

FIGURE 1
SITE LOCATION MAP

TETRA TECH

4/6/2015 G:\S\3284 Chicago 2FM01004 Carnotite\mxd\Fig1-SiteLoc.mxd m.banh



Legend

- Investigative Boring Location
- Waste Characterization Boring Location
- Monitoring Well Location
- Fence
- Gate
- Total uranium in soil above 22 pCi/g above 5 meters bgs & 52 pCi/g below 5 meters bgs
- Total radium in soil above 7.1 pCi/g
- Cargo Storage Container
- Radioactive Facility License Boundary
- 33' x 33' Grid

bgs = below ground surface
pCi/g = picoCuries per gram

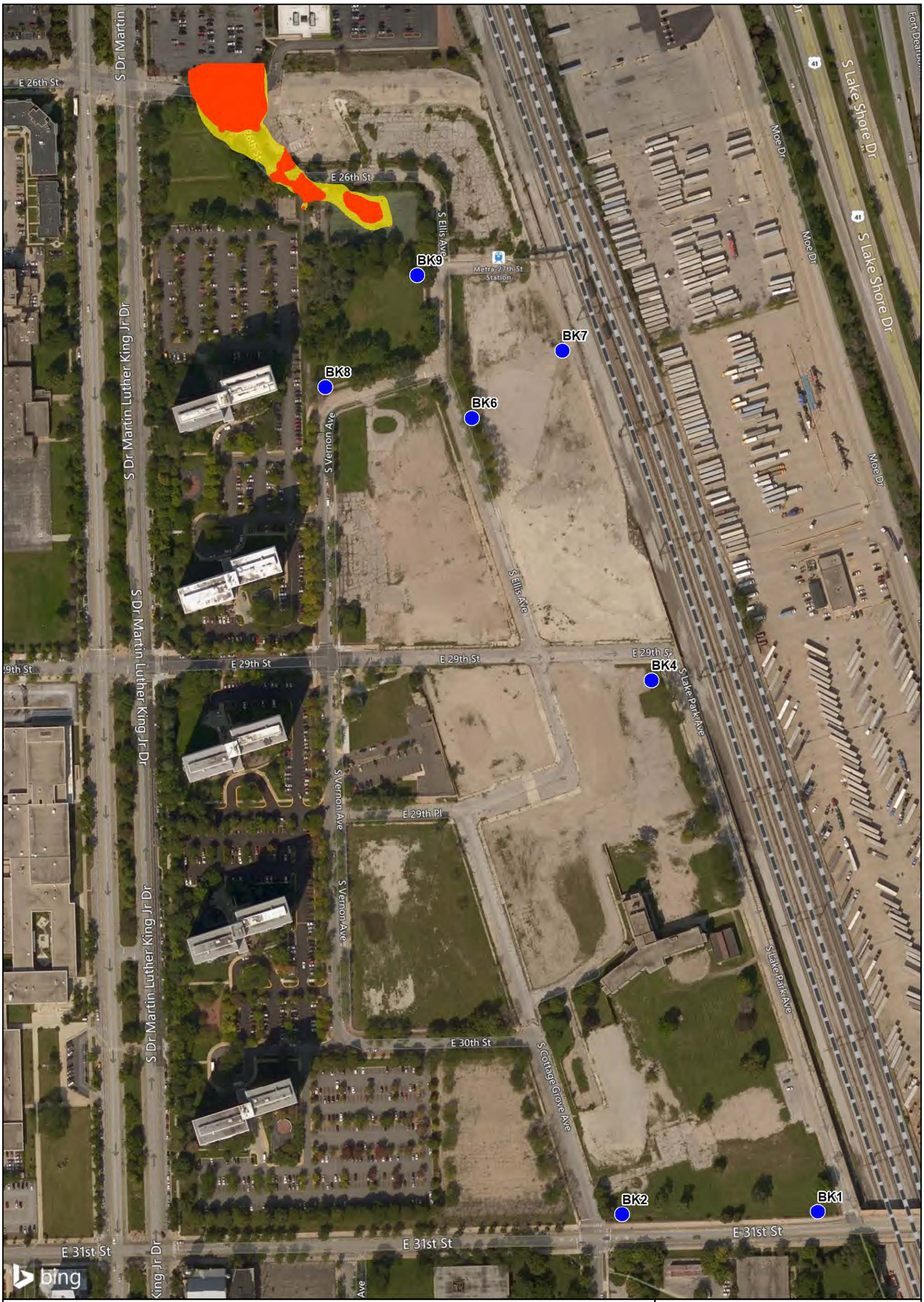
N

0 50 100
Feet

FORMER CARNOTITE REDUCTION COMPANY SITE
434 E. 26th STREET
CHICAGO, ILLINOIS

FIGURE 2
SOIL BORING AND MONITORING WELL LOCATIONS

9/20/2018 G:\S\3284 Chicago 2FM\01004 Carnotite\mxd\2018-09\Fig2-InvestigativeBoringLocs.mxd



Legend

- Background Sample Location
- Total radium in soil above 7.1 pCi/g
- Total uranium in soil above 22 pCi/g above 5 meters bgs & 52 pCi/g below 5 meters bgs

bgs = below ground surface
pCi/g = picoCuries per gram

N

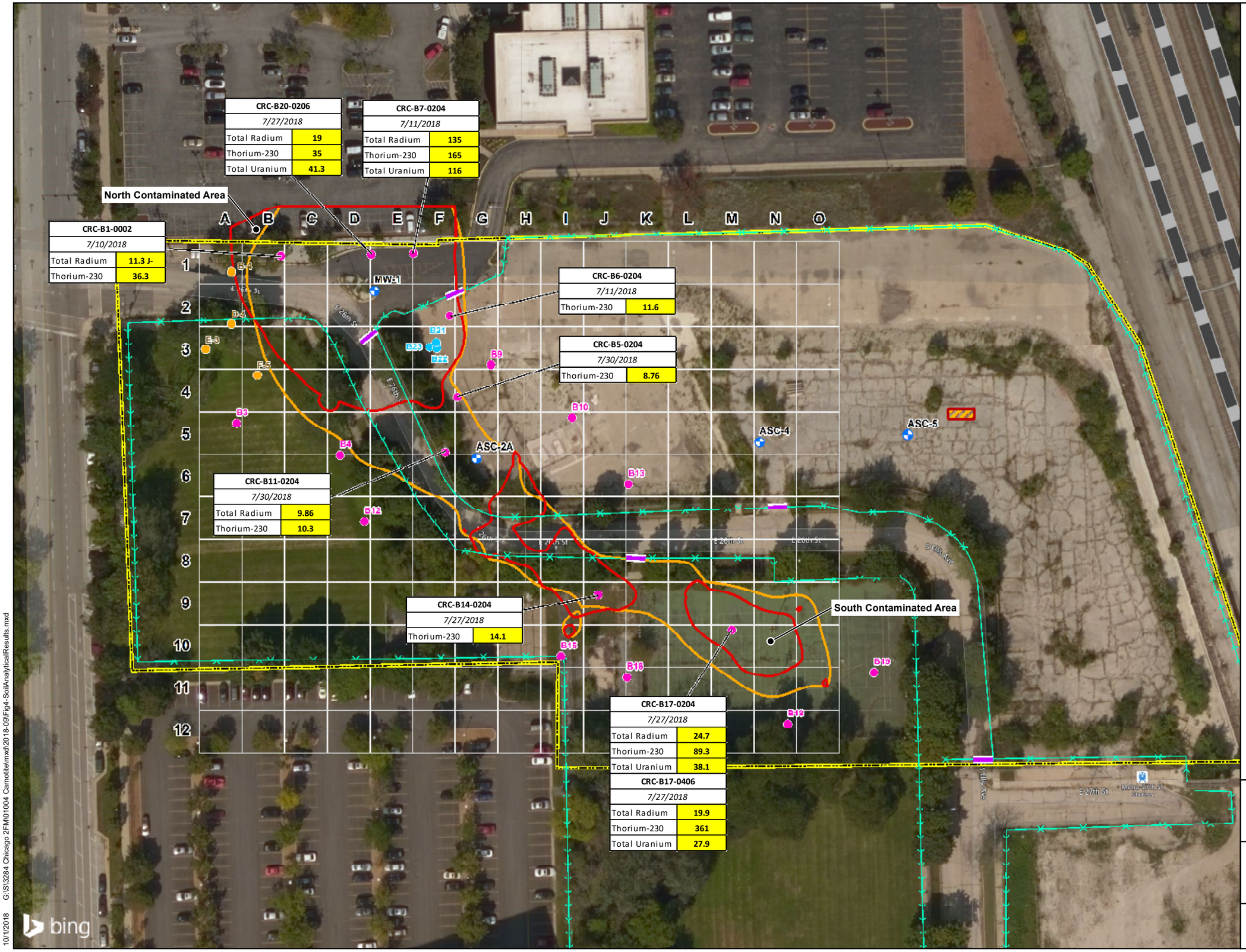
0 200 400

Feet

FORMER CARNOTITE REDUCTION COMPANY SITE
434 E. 26th STREET
CHICAGO, ILLINOIS

FIGURE 3
BACKGROUND SOIL BORING LOCATIONS

9/7/2018 G:\S\3284 Chicago 2FM\01004 Carnotite\mxd\2018-09\Fig3-BackgroundSoilBoringLocations.mxd



Legend

- Former Investigation Boring Location From 2012 Final Subsurface Gamma Screening Report (AECOM 2012)
- Investigative Boring Location
- Waste Characterization Boring Location
- Monitoring Well Location
- Fence
- Gate
- Total uranium in soil above 22 pCi/g above 5 meters bgs
- Total radium in soil above 7.1 pCi/g
- Cargo Storage Container
- Radioactive Facility License Boundary
- 33' x 33' Grid
- XXX — Result is greater than the site-specific concentration of concern

All results presented in units of pCi/g

bgs = below ground surface
"J-" = Analyte detected, but concentration is estimated and may be biased low.
pCi/g = picoCuries per gram

N

0 50 100
Feet

FORMER CARNOTITE REDUCTION COMPANY SITE
434 E. 26th STREET
CHICAGO, ILLINOIS

FIGURE 4
SOIL ANALYTICAL RESULTS ABOVE CONCENTRATIONS OF CONCERN

10/1/2018 G:\S\3284 Chicago 2FMI01004 Carnotite\mxd\2018-09\Fig4-SoilAnalyticalResults.mxd

APPENDIX B
TABLES

Table 1
Soil Borings and Analyses
Former Carnotite Reduction Company Site

Soil Boring	Sample Location	Sample Date	Sample Depth (feet bgs)	Laboratory Analyses			XRF Field Screening
				Radium[1]	Uranium[2]	Thorium-230[3]	
B-1	CRC-B1-0002	7/10/2018	0 to 2	●	●	●	
	CRC-B1-0406	7/10/2018	4 to 6		●	●	●
	CRC-B1-1214	7/10/2018	12 to 14	●	●	●	
	CRC-B1-1820	7/10/2018	18 to 20	●	●	●	
B-3	CRC-B3-0204	7/12/2018	2 to 4	●	●	●	
	CRC-B3-0608	7/12/2018	6 to 8	●	●	●	
	CRC-B3-1618	7/12/2018	16 to 18	●	●	●	
B-4	CRC-B4-0608	7/26/2018	6 to 8		●	●	●
	CRC-B4-1012	7/26/2018	10 to 12	●	●	●	
	CRC-B4-1820	7/26/2018	18 to 20	●	●	●	
	CRC-B4-2628	7/26/2018	26 to 28	●	●	●	
B-5	CRC-B5-0204	7/30/2018	2 to 4		●	●	●
	CRC-B5-0608	7/30/2018	6 to 8		●	●	●
	CRC-B5-1214	7/30/2018	12 to 14	●	●	●	
	CRC-B5-1618	7/30/2018	16 to 18	●	●	●	
	CRC-B5-2224	7/30/2018	22 to 24	●	●	●	
	CRC-B5-2830	7/30/2018	28 to 30	●	●	●	
B-6	CRC-B6-0204	7/11/2018	2 to 4		●	●	●
	CRC-B6-1618	7/11/2018	16 to 18	●	●	●	
	CRC-B6-2426	7/11/2018	24 to 26	●	●	●	
B-7	CRC-B7-0204	7/11/2018	2 to 4	●	●	●	●
	CRC-B7-0406	7/11/2018	4 to 6		●	●	●
	CRC-B7-1416	7/11/2018	14 to 16	●	●	●	
	CRC-B7-2224	7/11/2018	22 to 24	●	●	●	
	CRC-B7-2628	7/11/2018	26 to 28	●	●	●	
B-9	CRC-B9-0406	7/12/2018	4 to 6	●	●	●	●
	CRC-B9-1416	7/12/2018	14 to 16	●	●	●	
	CRC-B9-2022	7/12/2018	20 to 22	●	●	●	
B-11	CRC-B11-0204	7/30/2018	2 to 4	●	●	●	●
	CRC-B11-1214	7/30/2018	12 to 14	●	●	●	
	CRC-B11-2022	7/30/2018	20 to 22	●	●	●	
	CRC-B11-2628	7/30/2018	26 to 28	●	●	●	
B-12	CRC-B12-0002	7/26/2018	0 to 2	●	●	●	
	CRC-B12-0406	7/26/2018	4 to 6	●	●	●	
	CRC-B12-1214	7/26/2018	12 to 14	●	●	●	
B-13	CRC-B13-0305	7/12/2018	3 to 5	●	●	●	
	CRC-B13-0608	7/12/2018	6 to 8	●	●	●	

Table 1
Soil Borings and Analyses
Former Carnotite Reduction Company Site

Soil Boring	Sample Location	Sample Date	Sample Depth (feet bgs)	Laboratory Analyses			XRF Field Screening
				Radium[1]	Uranium[2]	Thorium-230[3]	
B-14	CRC-B14-0204	7/27/2018	2 to 4	●	●	●	●
	CRC-B14-0608	7/27/2018	6 to 8	●	●	●	
	CRC-B14-1012	7/27/2018	10 to 12	●	●	●	
	CRC-B14-1618	7/27/2018	16 to 18	●	●	●	
	CRC-B14-2426	7/27/2018	24 to 26	●	●	●	
B-15	CRC-B15-0204	7/13/2018	2 to 4	●	●	●	
	CRC-B15-0608	7/13/2018	6 to 8	●	●	●	
	CRC-B15-1214	7/13/2018	12 to 14	●	●	●	
B-16	CRC-B16-0204	7/13/2018	2 to 4	●	●	●	
	CRC-B16-0608	7/13/2018	6 to 8	●	●	●	
	CRC-B16-1416	7/13/2018	14 to 16	●	●	●	
B-17	CRC-B17-0204	7/27/2018	2 to 4	●	●	●	●
	CRC-B17-0406	7/27/2018	4 to 6	●	●	●	
	CRC-B17-0810	7/27/2018	8 to 10	●	●	●	
	CRC-B17-1820	7/27/2018	18 to 20	●	●	●	
	CRC-B17-2628	7/30/2018	26 to 28	●	●	●	
B-18	CRC-B18-0204	7/13/2018	2 to 4	●	●	●	
	CRC-B18-0608	7/13/2018	6 to 8	●	●	●	
	CRC-B18-0809	7/13/2018	8 to 9	●	●	●	
B-19	CRC-B19-0204	7/13/2018	2 to 4	●	●	●	
	CRC-B19-0810	7/13/2018	8 to 10	●	●	●	
	CRC-B19-1618	7/13/2018	16 to 18	●	●	●	
	CRC-B19-2224	7/13/2018	22 to 24	●	●	●	
B-20	CRC-B20-0206	7/11/2018	2 to 6	●	●	●	
	CRC-B20-1214	7/11/2018	12 to 14	●	●	●	
	CRC-B20-1820	7/11/2018	18 to 20	●	●	●	
	CRC-B20-2628	7/11/2018	26 to 28	●	●	●	
B-22	CRC-B22-0506	7/12/2018	5 to 6	●	●	●	●

Notes:

[1] Radium analyses included radium-226 and radium-228 by gamma spectroscopy (EPA Method 901.1M)

[2] Uranium analyses included uranium-234, uranium-235, and uranium-238 by alpha spectroscopy (HASL 300 and laboratory SOP U-02/ A-01-R)

[3] Thorium-230 analysis by alpha spectroscopy (HASL 300 and laboratory SOP Th-01/ A-01-R)

bgs = below ground surface
EPA = U.S. Environmental Protection Agency
HASL 300 = U.S. Department of Energy, Environmental Measurements Laboratory (formerly health and safety laboratory) procedures manual
SOP = Standard operating procedures
XRF = X-ray fluorescence

Table 2
Soil Analytical Results Summary
Former Carnotite Reduction Company Site

Predesign Investigation Analytical Results

Sample Location	Sample Date	Units	Radium-226 Result			Radium-226 Uncertainty	Radium-228 Result			Radium-228 Uncertainty	Total Radium	Radium COC	Thorium-230 Result		Thorium-230 Uncertainty	Thorium-230 COC	Uranium-234 Result		Uranium-234 Uncertainty	Uranium-235 Result		Uranium-235 Uncertainty	Uranium-238 Result		Uranium-238 Uncertainty	Total Uranium	Uranium COC <5 meters bgs	Uranium COC ≥5 meters bgs
CRC-B1-0002	7/10/2018	pCi/g	11.3	J-	±	1.29	0.341	U	±	0.579	**11.3 J-**	7.1	**36.3**	±	3.32	5.8	5.07	±	0.617	1.27	±	0.708	5.38	±	0.644	11.7	22	52
CRC-B1-0406	7/10/2018	pCi/g	NA			NA	NA			NA	NA	7.1	1.11	±	0.227	5.8	3.05	±	0.424	0.0986	±	0.0705	3.09	±	0.427	6.24	22	52
CRC-B1-1214	7/10/2018	pCi/g	0.338	±		0.126	0.442		±	0.162	0.78	7.1	0.32	±	0.16	5.8	0.322	±	0.124	0.0596	U	± 0.137	0.617	U	± 1.02	0.322	22	52
CRC-B1-1820	7/10/2018	pCi/g	0.329	±		0.138	0.272	U	±	0.267	0.329	7.1	0.343	±	0.158	5.8	0.229	±	0.106	0.0228	U	± 0.0405	0.667	U	± 0.509	0.229	22	52
CRC-B3-0204	7/12/2018	pCi/g	1.19	±		0.250	0.411		±	0.305	1.60	7.1	0.803	±	0.226	5.8	0.700	±	0.182	0.151	U	± 0.295	0.795	±	0.195	1.50	22	52
CRC-B3-0608	7/12/2018	pCi/g	0.26	±		0.115	0.182	U	±	0.193	0.260	7.1	0.326	±	0.156	5.8	0.222	±	0.108	0.000	U	± 0.00567	1.4	±	0.860	1.62	22	52
CRC-B3-1618	7/12/2018	pCi/g	0.594	±		0.207	0.227	U	±	0.305	0.594	7.1	0.536	±	0.190	5.8	0.415	±	0.141	-0.323	U	± 0.44	0.462	±	0.149	0.877	22	52
CRC-B4-0608	7/26/2018	pCi/g	NA			NA	NA			NA	NA	7.1	0.451	±	0.162	5.8	0.229	±	0.091	0.0000	U	± 0.00532	0.220	±	0.089	0.449	22	52
CRC-B4-1012	7/26/2018	pCi/g	0.304	±		0.0999	0.164		±	0.131	0.468	7.1	0.204	±	0.120	5.8	0.265	±	0.100	0.0111	U	± 0.034	0.115	±	0.0648	0.380	22	52
CRC-B4-1820	7/26/2018	pCi/g	0.457	±		0.181	0.549		±	0.176	1.01	7.1	0.458	±	0.153	5.8	0.417	±	0.130	0.0459		± 0.046	0.493	±	0.142	0.956	22	52
CRC-B4-2628	7/26/2018	pCi/g	0.703	±		0.192	0.495		±	0.261	1.20	7.1	0.429	±	0.152	5.8	0.389	±	0.122	0.0421		± 0.0423	0.454	±	0.130	0.885	22	52
CRC-B5-0204	7/30/2018	pCi/g	NA			NA	NA			NA	NA	7.1	**8.76**	±	0.920	5.8	1.72	±	0.289	0.0536	U	± 0.051	1.67	±	0.283	3.39	22	52
CRC-B5-0608	7/30/2018	pCi/g	NA			NA	NA			NA	NA	7.1	0.182	±	0.118	5.8	0.244	±	0.0963	0.00845	U	± 0.0232	0.187	±	0.084	0.431	22	52
CRC-B5-1214	7/30/2018	pCi/g	0.294	±		0.128	0.234		±	0.150	0.528	7.1	0.256	±	0.127	5.8	0.277	±	0.101	0.0215	U	± 0.136	0.215	±	0.089	0.492	22	52
CRC-B5-1618	7/30/2018	pCi/g	0.437	±		0.157	0.181	U	±	0.330	0.437	7.1	0.545	±	0.178	5.8	0.294	±	0.0999	0.00975	U	± 0.0195	0.422	±	0.120	0.716	22	52
CRC-B5-2224	7/30/2018	pCi/g	0.344	±		0.0925	0.193	U	±	0.240	0.344	7.1	0.543	±	0.172	5.8	0.310	±	0.114	0.0986	U	± 0.155	0.261	±	0.104	0.571	22	52
CRC-B5-2830	7/30/2018	pCi/g	0.912	±		0.238	0.656		±	0.271	1.57	7.1	0.515	±	0.165	5.8	0.489	±	0.132	0.0298		± 0.0345	0.382	±	0.115	0.901	22	52
CRC-B6-0204	7/11/2018	pCi/g	NA			NA	NA			NA	NA	7.1	**11.6**	±	1.17	5.8	5.07	±	0.604	0.214	±	0.0998	4.88	±	0.587	10.2	22	52
CRC-B6-1618	7/11/2018	pCi/g	0.405	±		0.139	0.432		±	0.149	0.837	7.1	0.406	±	0.17	5.8	0.347	±	0.125	0.150	U	± 0.455	0.317	±	0.119	0.664	22	52
CRC-B6-2426	7/11/2018	pCi/g	0.885	±		0.223	0.530		±	0.217	1.42	7.1	0.391	±	0.165	5.8	0.339	±	0.124	0.0488	U	± 0.196	2.01	±	1.18	2.35	22	52
CRC-B7-0204	7/11/2018	pCi/g	135	±		14.2	0.877	U	±	1.95	**135**	7.1	**165**	±	14.1	5.8	56	±	5.03	5.4	±	3.07	54.6	±	4.91	**116**	22	52
CRC-B7-0406	7/11/2018	pCi/g	NA			NA	NA			NA	NA	7.1	2.65	±	0.393	5.8	7.39	±	0.817	0.414	±	0.144	7.5	±	0.826	15.3	22	52
CRC-B7-1416	7/11/2018	pCi/g	0.422	±		0.168	0.335		±	0.154	0.757	7.1	0.385	±	0.172	5.8	0.315	±	0.123	0.0778	U	± 0.198	0.312	±	0.12	0.627	22	52
CRC-B7-2224	7/11/2018	pCi/g	0.671	±		0.189	0.16	U	±	0.286	0.671	7.1	0.491	±	0.175	5.8	0.582	±	0.161	0.133	U	± 0.604	0.604	±	0.163	1.186	22	52
CRC-B7-2628	7/11/2018	pCi/g	0.47	±		0.153	0.657		±	0.214	1.127	7.1	0.34	±	0.165	5.8	1.14	±	0.236	0.219	U	± 0.187	1.42	±	0.269	2.56	22	52
CRC-B9-0406	7/12/2018	pCi/g	0.956	±		0.213	0.318	U	±	0.256	0.956	7.1	1.00	±	0.225	5.8	0.523	±	0.143	0.0653		± 0.0536	0.565	±	0.149	1.15	22	52
CRC-B9-1416	7/12/2018	pCi/g	0.342	±		0.110	0.140	U	±	0.189	0.342	7.1	0.408	±	0.172	5.8	0.276	±	0.114	0.135	U	± 0.294	0.340	±	0.127	0.616	22	52
CRC-B9-2022	7/12/2018	pCi/g	0.592	±		0.172	0.356		±	0.267	0.948	7.1	0.382	±	0.165	5.8	0.259	±	0.107	0.128	U	± 0.320	0.356	±	0.124	0.615	22	52
CRC-B11-0204	7/30/2018	pCi/g	8.82	±		1.08	1.04		±	0.425	**9.86**	7.1	**10.3**	±	1.04	5.8	1.58	±	0.265	0.0621		± 0.0509	1.39	±	0.245	3.03	22	52
CRC-B11-1214	7/30/2018	pCi/g	0.435	±		0.133	0.204	U	±	0.206	0.435	7.1	0.297	±	0.129	5.8	0.296	±	0.108	0.191	U	± 0.441	0.264	±	0.100	0.560	22	52
CRC-B11-2022	7/30/2018	pCi/g	0.632	±		0.17	0.339		±	0.265	0.971	7.1	0.335	±	0.139	5.8	0.351	±	0.114	0.0736		± 0.056	0.371	±	0.116	0.796	22	52
CRC-B11-2628	7/30/2018	pCi/g	0.501	±		0.185	0.562		±	0.201	1.06	7.1	0.455	±	0.16	5.8	0.334	±	0.114	0.00547	U	± 0.0232	0.27	±	0.102	0.604	22	52
CRC-B12-0002	7/26/2018	pCi/g	2.60	±		0.427	1.08		±	0.273	3.68	7.1	5.34	±	0.625	5.8	1.12	±	0.214	0.0591		± 0.0508	1.10	±	0.212	2.28	22	52
CRC-B12-0406	7/26/2018	pCi/g	0.295	±		0.104	0.227		±	0.105	0.522	7.1	0.438	±	0.161	5.8	0.17	±	0.0795	0.0108	U	± 0.0217	0.311	±	0.108	0.481	22	52
CRC-B12-1214	7/26/2018	pCi/g	0.301	±		0.111	0.177	U	±	0.218	0.301	7.1	0.129	±	0.109	5.8	0.18	±	0.0829	0.00849	U	± 0.0234	0.225	±	0.0929	0.405	22	52
CRC-B13-0305	7/12/2018	pCi/g	0.433	±		0.149	0.304		±	0.245	0.737	7.1	0.402	±	0.179	5.8	0.339	±	0.139	0.0467	U	± 0.0579	0.485	±	0.167	0.824	22	52
CRC-B13-0608	7/12/2018	pCi/g	0.207	±		0.121	0.0817	U	±	0.158	0.207	7.1	0.25	±	0.143	5.8	0.197	±	0.0953	0.119	U	± 0.24	0.172	±	0.0896	0.369	22	52
CRC-B14-0204	7/27/2018	pCi/g	2.51	±		0.374	0.921		±	0.256	3.43	7.1	**14.1**	±	1.4	5.8	1.75	±	0.289	0.104		± 0.0705	1.72	±	0.286	3.57	22	52
CRC-B14-0608	7/27/2018	pCi/g	0.195	±		0.103	0.146	U	±	0.188	0.195	7.1	0.149	±	0.117	5.8	0.144	±	0.0734	0.131	U	± 0.467	0.154	±	0.0728	0.298	22	52
CRC-B14-1012	7/27/2018	pCi/g	0.0312	U	±	0.166	0.282		±	0.195	0.282	7.1	0.177	±	0.118	5.8	0.205	±	0.0867	0.0079	U	± 0.0217	0.167	±	0.0770	0.372	22	52
CRC-B14-1618	7/27/2018	pCi/g	0.463	±		0.117	0.346		±	0.197	0.809	7.1	0.315	±	0.139	5.8	0.313	±	0.110	0.00552	U	± 0.0234	0.370	±	0.119	0.683	22	52
CRC-B14-2426	7/27/2018	pCi/g	0.519	±		0.148	0.493		±	0.200	1.01	7.1	0.320	±	0.136	5.8	0.281	±	0.0993	0.169	U	± 0.318	0.331	±	0.108	0.612	22	52
CRC-B15-0204	7/13/2018	pCi/g	1.06	±		0.244	0.699		±	0.220	1.76	7.1	1.61	±	0.329	5.8	0.695	±	0.182	0.178	U	± 0.802	0.722	±	0.185	1.42	22	52
CRC-B15-0608	7/13/2018	pCi/g	0.244	±		0.107	0.328		±	0.141	0.572	7.1	0.321	±	0.158	5.8	0.250	±	0.107	0.126	U	± 0.322	0.262	±	0.107	0.512	22	52
CRC-B15-1214	7/13/2018	pCi/g	0.396	±		0.148	0.112	U	±	0.203	0.396	7.1	0.176	±	0.133	5.8	0.174	±	0.095	0.141	U	± 0.280	0.277	±	0.118	0.451	22	52
CRC-B16-0204	7/13/2018	pCi/g	1.09	±		0.286	0.293	U	±	0.370	1.09	7.1	1.25	±	0.289	5.8	0.860	±	0.210	0.0394	U	± 0.0489	0.814	±	0.204	1.67	22	52
CRC-B16-0608	7/13/2018	pCi/g	0.429	±		0.148	0.345		±	0.188	0.774	7.1	0.197	±	0.141	5.8	0.205	±	0.104	0.0256	U	± 0.0991	0.308	±	0.127	0.513	22	52
CRC-B16-1416	7/13/2018	pCi/g	0.191	±		0.0863	0.112	U	±	0.192	0.191	7.1	0.240	±	0.145	5.8	0.308	±	0.121	0.181	U	± 0.281	0.262	±	0.111	0.570	22	52
CRC-B17-0204	7/27/2018	pCi/g	24.7	±		2.73	0.775	U	±	0.498	**24.7**	7.1	**89.3**	±	7.69	5.8	18.3	±	1.84	0.874		± 0.257	18.9	±	4.37	**38.1**	22	52
CRC-B17-0406	7/27/2018	pCi/g	19.0	±		2.08	0.908		±	0.321	**19.9**	7.1	**361**	±	42.2	5.8	13.1	±	1.28	2.04		± 0.884	12.8	±	1.26	**27.9**	22	52
CRC-B17-0810	7/27/2018	pCi/g	1.19	±		0.263	0.915		±	0.259	2.11	7.1	1.56	±	0.277	5.8	4.46	±	0.555	0.216		± 0.104	4.37	±	0.546	9.05	22	52
CRC-B17-1820	7/27/2018	pCi/g	0.377	±		0.146	0.0725	U	±	0.212	0.377	7.1	0.415	±	0.145	5.8	0.44	±	0.139	0.0503		± 0.051	0.429	±	0.137	0.919	22	52
CRC-B17-2628	7/30/2018	pCi/g	0.684	±		0.212	0.575		±	0.212	1.26	7.1	0.496	±	0.157	5.8	0.462	±	0.137	0.0606	U	± 0.176	0.403	±	0.125	0.865	22	52
CRC-B18-0204	7/13/2018	pCi/g	1.54	J-	±	0.301	1.08	J-	±	0.260	2.62 J-	7.1	1.56	±	0.305	5.8	1.46	±	0.284	0.214	U	± 0.455	1.43	±	0.281	2.89	22	52
CRC-B18-0608	7/13/2018	pCi/g	1.54	±		0.310	0.758		±	0.254	2.30	7.1	1.29	±	0.278	5.8	0.985	±	0.221	0.221	U	± 0.836	0.897	±	0.210	1.88	22	52
CRC-B18-0809	7/13/2018	pCi/g	0.719	±		0.205	0.526		±	0.165	1.25	7.1	0.909	±	0.246	5.8	0.642	±	0.173	0.0364	U	± 0.0452	0.509	±	0.152	1.15	22	52
CRC-B19-0204	7/13/2018	pCi/g	1.39	±		0.302	1.02		±	0.321	2.41	7.1	1.26	±	0.286	5.8	1.43	±	0.278	0.0452	U	± 0.168	1.21	±	0.251	2.64	22	52
CRC-B19-0810	7/13/2018	pCi/g	1.78	±		0.318	1.08		±	0.296	2.86	7.1	1.15	±	0.267	5.8	0.935	±	0.217	0.0542		± 0.0544	1.00	±	0.225	1.99	22	52
CRC-B19-1618	7/13/2018	pCi/g	0.362	±		0.149	0.404		±	0.234	0.766	7.1	0.281	±	0.139	5.8	0.278	±	0.113	0.0404		± 0.0468	0.389	±	0.134	0.707	22	52
CRC-B19-2224	7/13/2018	pCi/g	0.524	±		0.138	0.288		±	0.177	0.812	7.1	0.366	±	0.153	5.8	0.263	±	0.110	0.0274	U	± 0.0389	0.484	±	0.152	0.747	22	52
CRC-B20-0206	7/11/2018	pCi/g	17.6	±		2.03	1.37		±	0.562	**19.0**	7.1	**35**	±	3.16	5.8	19.2	±	1.84	2.18		± 1.03	19.9	±	1.89	**41.3**	22	52
CRC-B20-1214	7/11/2018	pCi/g	0.305	±		0.145	0.366		±	0.237	0.671	7.1	0.621	±	0.207	5.8	1.22	±	0.246	0.0587	U	± 0.0574	1.51	U	± 0.677	1.22	22	52
CRC-B20-1820	7/11/2018	pCi/g	0.357	±		0.151	0.386		±	0.137	0.743	7.1	0.679	±	0.213	5.8	0.749	±	0.185	0.0226	U	± 0.0357	1.55	U	± 1.21	0.749	22	52
CRC-B20-2628	7/11/2018	pCi/g	0.65	±		0.21	0.554		±	0.206	1.204	7.1	0.383	±	0.166	5.8	3.88	±	0.526	0.556		± 0.31	4.16	±	1.14	8.596	22	52
CRC-B22-0506	7/12/2018	pCi/g	NA			NA	NA			NA	NA	7.1	0.311	±	0.136	5.8	0.579	±	0.152	0.0635		± 0.0547	0.609	±	0.156	1.25	22	52

Notes:

COC = Concentration of concern
NA = Not applicable
pCi/g = Picocuries per gram
U = Result is less than the sample detection limit.
J- = Isotope is present at an estimated concentration and may be biased low.
XXX Result is greater than the site-specific concentration of concern

Table 3
Background Soil Analytical Results Summary
Former Carnotite Reduction Company Site

Predesign Investigation Analytical Results

Sample Location	Sample Date	Units	Thorium-230		
			Result		Uncertainty
CRC-BK1-0203	7/26/2018	pCi/g	1.03	±	0.23
CRC-BK2-0102	7/26/2018	pCi/g	1.05	±	0.23
CRC-BK2-0304	7/26/2018	pCi/g	0.509	±	0.167
CRC-BK4-0102	7/26/2018	pCi/g	0.753	±	0.193
CRC-BK6-0002	7/26/2018	pCi/g	1.22	±	0.243
CRC-BK6-0406	7/26/2018	pCi/g	0.876	±	0.2160
CRC-BK7-0405	7/26/2018	pCi/g	0.654	±	0.177
CRC-BK8-0102	7/26/2018	pCi/g	1.09	±	0.238
CRC-BK9-0506	7/26/2018	pCi/g	0.397	±	0.157
Average Thorium-230 Concentration			0.842	pCi/g	

Note:
pCi/g = Picocuries per gram

Table 4
Groundwater Analytical Results Summary
Former Carnotite Reduction Company Site

Predesign Investigation Analytical Results

Isotope	Units	Concentration of Concern	GW-ASC-5-070918				GW-ASC-4-070918				GW-ASC-4-070918-D				GW-ASC-2A-070918				MW-1-071118			
			Concentration[a]		Uncertainty		Concentration[a]		Uncertainty		Concentration[a]		Uncertainty		Concentration[a]		Uncertainty		Concentration[b]		Uncertainty	
Radium-226[c]	pCi/L	20[f]	3.70E-01		±	1.35E-01	6.34E-01		±	1.75E-01	7.09E-01		±	1.82E-01	2.42E-01		±	1.08E-01	3.56E-01	J+	±	1.09E-01
Radium-228[c]	pCi/L	20[f]	3.44E-01	U	±	2.88E-01	2.20E-01	U	±	2.28E-01	5.96E-01		±	2.84E-01	6.83E-01	U	±	5.25E-01	5.33E-01		±	2.77E-01
Thorium-230[d]	pCi/L	N/A	8.06E-02	U	±	2.04E-01	6.60E-02	U	±	1.97E-01	8.75E-03	U	±	2.03E-01	8.78E-03	U	±	1.83E-01	1.97E-01	U	±	2.48E-01
Uranium-233[e]	µg/L	N/A	2.00E-02	U		N/A	2.00E-02	U		N/A	2.00E-02	U		N/A	2.00E-02	U		N/A	N/A			N/A
	µCi/ml	3.00E-07[g]	1.34E-11	U		N/A	1.34E-11	U		N/A	1.34E-11	U		N/A	1.34E-11	U		N/A	N/A			N/A
Uranium-234[e]	µg/L	N/A	2.00E-02	U		N/A	2.00E-02	U		N/A	2.00E-02	U		N/A	2.00E-02	U		N/A	1.83E+02	J-		1.61E+01
	µCi/ml	3.00E-07[g]	1.34E-11	U		N/A	1.34E-11	U		N/A	1.34E-11	U		N/A	1.34E-11	U		N/A	1.83E-07	J-		1.61E-08
Uranium-235[e]	µg/L	N/A	1.80E-01			N/A	4.10E-02	J		N/A	3.90E-02	J		N/A	2.00E-02	U		N/A	9.10E+00	J-		1.38E+00
	µCi/ml	3.00E-07[g]	1.21E-10			N/A	2.75E-11	J		N/A	2.61E-11	J		N/A	1.34E-11	U		N/A	9.10E-09	J-		1.38E-09
Uranium-236[e]	µg/L	N/A	2.00E-02	U		N/A	2.00E-02	U		N/A	2.00E-02	U		N/A	2.00E-02	U		N/A	N/A			N/A
	µCi/ml	3.00E-07[g]	1.34E-11	U		N/A	1.34E-11	U		N/A	1.34E-11	U		N/A	1.34E-11	U		N/A	N/A			N/A
Uranium-238[e]	µg/L	N/A	2.30E+01			N/A	5.60E+00			N/A	5.50E+00			N/A	2.00E+00			N/A	1.85E+02	J-		1.62E+01
	µCi/ml	3.00E-07g	1.54E-08			N/A	3.75E-09			N/A	3.69E-09			N/A	1.34E-09			N/A	1.85E-07	J-		1.62E-08

Notes:

CFR = Code of Federal Regulations

EPA = U.S. Environmental Protection Agency

IAC = Illinois Administrative Code

µCi/ml = MicroCuries per milliliter

µg/L = Micrograms per liter

N/A = Not applicable

pCi/L = picoCuries per liter

J = Isotope is present at an estimated concentration.

J+ = Isotope is present at an estimated concentration and may be biased high.

J- = Isotope is present at an estimated concentraiton and may be biased low.

U = Analyzed but not detected above the minimum detectable activity.

[a] Groundwater sample concentrations for Uranium reported by the laboratory in µg/L for wells ASC-2a, 4, and 5. To facilitate comparison to concentrations of concern, the results were converted to pCi/L by multiplying by a conversion factor of 0.67; pCi/L then converted to µCi/ml by multiplying by a conversion factor of 1E-09.

[b] Groundwater sample concentrations for Uranium reported by the laboratory in pCi/L for well MW-1. To facilitate comparison to concentrations of concern, the results were converted to µCi/ml by multiplying by a conversion factor of 1E-09.

[c] Radium-226 and Radium-228 analyzed by TestAmerica, Inc. (TestAmerica), in Earth City, Missouri, according to SW-846 Methods 9315 and 9320, respectively.

[d] Thorium-230 analyzed by TestAmerica by alpha spectrometry. Thorium-230 results are reported by the laboratory in pCi/L.

[e] Uranium-234, Uranium-235, amd Uranium-238 analyzed by TestAmerica according to SW-846 Method 6020A for wells ASC-2A, 4 and 5 and by alpha spectrometery for well MW-1. Uranium results are reported by the laboratory in µg/L for wells ASC-2A, 4 and 5 and pCi/L for well MW-1.

[f] Illinois Environmental Protection Agency groundwater quality standards for Class I: Potable Resource Groundwater from 35 IAC 620.410; quarterly analytical results will be compared with this value for screening purposes, but action will be required only if the average of four consecutive quarterly analytical results exceeds the groundwater quality standard.

[g] Effluent concentration listed in 10 CFR 20, Appendix B, Table 2 (equivalent to the concentration that, if inhaled or ingested continuously over the course of a year, would produce a total effective dose equivalent of 50 mRem); quarterly analytical results will be compared with this value for screening purposes, but action will be required only if the average analytical result over four consecutive calendar quarters exceeds the effluent concentration limit.

TETRA TECH

APPENDIX C
SOIL BORING LOGS

Tetra Tech

BORING NUMBER B-1

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/10/18 **COMPLETED** 7/10/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING 13.00 ft
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			GP		Gravel
		63		1.0	Urban fill (sand with brick). Red bricks and gravel.
				2.5	Urban fill (slag, black/brown sand)
5		63	SW	4.0	Dark brown, fine-grained sand. Well sorted, well rounded, dry, dense.
				6.0	Virgin sand, yellow, fine-grained, well rounded, well sorted, dense, dry to wet (13 ft bgs)
10		75			
		83	SW		
15		100			
		100			
20		100		22.0	
		100	SW	24.0	Gray sand, well sorted, fine-grained, well rounded, wet, dense
25		100			Silty sand, dense, wet, fine- to coarse-grained, gray
		100			
		100	SM		
30		100			
		100		32.0	
35		100	CL-ML	36.0	Gray silty clay, wet, soft

Bottom of borehole at 36.0 feet.

Tetra Tech

BORING NUMBER B-3

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/12/18 **COMPLETED** 7/12/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
▽ **AT TIME OF DRILLING** 8.00 ft
LOGGED BY Kris Schnoes
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0		75			Black topsoil, some red brick and sand.
					4.0
5		75	SW		Yellow sand, trace silt, loose, dry to moist
					8.0 ▽
10		75	SW		Fine-grained sand, well sorted, wet
					12.0
15		100	SW		Coarse- to fine-grained sand, wet, some silt and trace clay 16-18 ft bgs
		100			18.0

Bottom of borehole at 18.0 feet.

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BORING NUMBER B-4

Tetra Tech

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/26/18 **COMPLETED** 7/27/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING 12.00 ft
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0				1.0	Topsoil
		67		4.0	Urban fill (brown sand, red brick), loose, dry.
5		85		6.5	Brown/black sand, some gravel, some brick. Urban fill.
			SW	10.0	Virgin sand (yellow, fine-grained, rounded, well sorted). Loose, dry.
10		92			Virgin sand (yellow, coarse- to fine-grained, rounded, well sorted). Dense, moist to wet (12 ft bgs)
		92	SW		
15		100		18.0	
		100	ML	20.0	Gray sandy silt, stiff, wet.
20		100	ML	22.0	Sandy silt, trace of clay, soft, wet.
		100	ML		Gray silty loam, soft, wet.
25		100		25.0	
			SP	26.0	Coarse-grained sand, very loose.
		100	SM	27.0	Gray silty sand, trace of clay
		100	ML		Silty loam. Gray, soft, wet.
30		100			
				33.0	
35		100	CL	36.0	Gray clay, medium stiff, moist.

Bottom of borehole at 36.0 feet.

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BORING NUMBER B-5

Tetra Tech

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/30/18 **COMPLETED** 7/30/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
▽ **AT TIME OF DRILLING** 12.00 ft
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					Gray gravel, concrete, gray silt (soft). Pieces of asphalt. Dry.
		67			2.0 Urban fill. Black/brown silt with trace of clay, soft.
5		69			5.0 Yellow sand, medium- to fine-grained, well sorted, well rounded, dense to very dense, dry to moist. Loose 12-14 ft bgs. Dense 14-16 ft bgs. Becomes wet at 12 ft bgs.
10		77	SW		
		92			▽
15					16.0
		100	SM		Yellow/gray silty sand, very dense, wet
20		100	ML		20.0 Gray silty loam, soft, wet.
		100	SM		22.0 Brown and gray silty sand, trace gravel. Dense, wet.
25		100			26.0 Gray silty loam with trace of clay. Soft, wet.
		100	ML		
30					31.0
			CH		32.0 Gray clay, high plasticity, medium stiff, wet.

Bottom of borehole at 32.0 feet.

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Tetra Tech

BORING NUMBER B-6

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/11/18 **COMPLETED** 7/11/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
▽ **AT TIME OF DRILLING** 11.50 ft
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					0.1 Asphalt 0.4 Concrete
		63	GM		2.0 Gray silty gravel, dry Urban fill (black sand, sludge). Brown, dry, soft. Some rebar.
5		67			5.5 Well rounded, well sorted, fine-grained, yellow sand, loose to dense, dry to wet (11.5 ft bgs), some silt
10		79	SW		▽
15		100			
		100			19.0 Gray silty sand, very dense, wet, trace of clay.
20		100	SM		22.0 Gray silty sand, loose, wet. Medium- to coarse-grained, poorly sorted, angular.
		83	SM		
25		100			25.0
			ML		26.0 Gray silty loam, stiff, wet.

Bottom of borehole at 26.0 feet.

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Tetra Tech

BORING NUMBER B-7

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/11/18 **COMPLETED** 7/11/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
▽ **AT TIME OF DRILLING** 13.00 ft
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					0.2 Asphalt
			GM		0.3 Concrete
		63			1.5 Gray silty gravel
					Urban fill (red brick, slag, black/brown silty sand). Dry, dense.
5					5.5
		58			Fine, well rounded, well sorted, yellow sand, dry to moist, dense to very dense
			SW		
10		67			12.0
					▽ Yellow sand, rounded, well sorted, wet, dense
		100			
15			SW		
		100			
20					20.0
		100			Gray silty sand, soft, wet.
			SM		
		100			24.0
25					Coarse-grained sand, gray, poorly sorted, angular, with silt
		100			
			SP		
		83			28.0
		67			Silty loam with clay and sand, gray, soft, wet
30					
		67	ML		
					33.0
		100			Gray silty clay, increasing silt content with depth.
35			CL-ML		
					36.0

Bottom of borehole at 36.0 feet.

BORING NUMBER B-9

Tetra Tech

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/12/18 **COMPLETED** 7/12/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
▽ **AT TIME OF DRILLING** 11.00 ft
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
			GM		0.2 Topsoil Gray silty gravel, dry, loose
		50			2.0 Urban fill (black/brown sand, some sludge, some red brick and gravel). Dry, loose.
5		42			7.0
			SW		Virgin sand, rounded. Well sorted, fine-grained, dry to wet (11 ft bgs), loose to dense. Some silt and trace clay at 17 ft bgs.
10		63			▽
		100			
15		100			18.0
			ML		Gray silty loam with some clay, soft, wet
20		100			22.0

Bottom of borehole at 22.0 feet.

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Tetra Tech

BORING NUMBER B-10

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/12/18 **COMPLETED** 7/12/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING ---
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					Urban fill (Gray/Brown sand coarse- to fine-grained, red brick, gravel, concrete). Poorly sorted, loose, dry.
		54			
5		27			
8.0					

Refusal at 8.0 feet.
Bottom of borehole at 8.0 feet.

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Tetra Tech

BORING NUMBER B-11

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/30/18 **COMPLETED** 7/30/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
▽ **AT TIME OF DRILLING** 12.00 ft
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION
0				Brown topsoil
		96		1.0 Urban fill (Brown/black silty sand, some brick, slag, and gravel), loose, dry.
5		83		6.0 Yellow, medium- to fine-grained sand, well rounded, well sorted, loose to very dense, dry to wet (12 ft bgs)
10		67		▽
15		71		16.0 Brown silty sand, loose, wet.
		75		18.0 Gray silty loam, very stiff, wet.
20		100		23.0 Gray, coarse-grained sand, poorly sorted, angular, dense, wet.
25		88		26.8 Gray silty loam, some clay, medium dense, wet.
				28.0 Bottom of borehole at 28.0 feet.

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Tetra Tech

BORING NUMBER B-12

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/26/18 **COMPLETED** 7/26/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING 12.00 ft
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
				1.0	Topsoil
		88			Urban fill (Brown sand, some brick, gravel, trace of slag, trace of red brick, dry, stiff)
5				5.0	
		79	SW		Yellow sand with gravel, dry, loose
				7.0	
					Yellow sand, medium- to fine-grained, well rounded to angular, dry to wet (12 ft bgs), loose to very dense
10		96	SW		▽
		100			
15				16.0	

Bottom of borehole at 16.0 feet.

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BORING NUMBER B-13

Tetra Tech

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/12/18 **COMPLETED** 7/12/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING ---
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					Gray gravel, gray fine sand, gray silt, limestone chalk, trace of red brick, loose, dry
		54			2.0 Urban fill (Black/Brown silty sand, trace of clay, some brick and gravel, loose, dry.
5		75	SW		6.0 Yellow fine-grained, rounded, well sorted sand, soft, dry. 8.0
10		0			No Recovery 12.0

Bottom of borehole at 12.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

BORING NUMBER B-14

Tetra Tech

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/27/18 **COMPLETED** 7/27/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
▽ **AT TIME OF DRILLING** 13.50 ft
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					Brown sand, some silt, gravel, red brick, broken asphalt, loose, dry.
		83			
5		77			
					6.0
					Yellow, fine- to medium-grained sand, well rounded, well sorted, dense to very dense, dry to wet (13.5 ft bgs), trace gravel.
10		92	SW		
					▽
15		100			
					16.0
		100	SM		Gray to brown silty sand, dense, wet.
					18.0
		100			Gray silty loam, very stiff, wet, trace gravel, some clay and soft at 23 ft bgs. Medium-stiff at 25 ft bgs.
20		100			
			ML		
		100			
25		100			
					26.0
					Bottom of borehole at 26.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

Tetra Tech

BORING NUMBER B-15

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/13/18 **COMPLETED** 7/13/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING 11.50 ft
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					0.2 Topsoil
		46			Black/brown sand, red brick, urban fill, gray gravel, loose, dry
5		48			6.0
			SW		Yellow fine- to medium-grained virgin sand, rounded, well sorted, loose to dense, dry to wet (11.5 ft bgs).
10		50			
		69			14.0
15			SM		Gray/brown silty sand, medium dense, wet, well sorted, trace of clay
					16.0

Bottom of borehole at 16.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

Tetra Tech

BORING NUMBER B-16

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/13/18 **COMPLETED** 7/13/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
▽ **AT TIME OF DRILLING** 12.00 ft
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION
0						
			GP		1.0	Brown/gray gravel. dry, loose
		54				Urban fill (black and brown sand)
					4.0	
5			GP			Gravel, dense, dry, trace of clay
		48			7.0	
						Yellow, fine- to medium-grained, rounded, well sorted sand, loose to dense, dry to wet (12 ft bgs).
10		63	SW		▽	
15		83				
					16.0	

Bottom of borehole at 16.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

BORING NUMBER B-17

Tetra Tech

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/27/18 **COMPLETED** 7/30/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
▽ **AT TIME OF DRILLING** 13.00 ft
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
		63			Urban fill (black/brown silty sand, gray gravel, loose, dry)
					2.0 Black slag / black sand, dense, dry
5		58			6.0 Red and brown brick, brown sand, dense, dry to wet (13 ft bgs), some clay and gravel
10		40			
		46			▽ 14.0
15			SP		Brown coarse-grained sand, dense, wet.
					16.0
		0			No Recovery
					18.0
		100			Gray silty loam, stiff to soft, wet
20		100	ML		
		100			24.0
25		0			No Recovery
					26.0
		100	ML		Gray silty loam, soft, wet
					28.0
		0			No Recovery
30		0			
		0			
					34.0
35		100	CL		Gray clay, hard, wet.
					35.5

Bottom of borehole at 35.5 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

BORING NUMBER B-18

Tetra Tech

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/13/18 **COMPLETED** 7/13/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING ---
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					Urban Fill (CA-6, gray gravel, black/brown sand, red brick)
		79			2.0
					Slag, brown clay, gray silty sand, very dense, dry.
5		88			
					8.0
		100			Brown/black sand, some gravel, some slag, soft, dry
					9.0

Refusal at 9.0 feet.
Bottom of borehole at 9.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

BORING NUMBER B-19

Tetra Tech

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/13/18 **COMPLETED** 7/13/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
▽ **AT TIME OF DRILLING** 12.00 ft
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION
0		56		Urban fill (Black/brown sand, red brick, gray gravel, CA-6). Dense, dry
5		27		
10		48		10.0 Yellow, fine- to medium-grained sand, rounded, well sorted, moist to wet (12 ft bgs), soft to very dense
15		94		▽ 16.0
20		100		Gray/brown silty sand, well rounded, stiff, wet, trace of clay.
		100		24.0

Bottom of borehole at 24.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

BORING NUMBER B-20

Tetra Tech

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/11/18 **COMPLETED** 7/11/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING 13.00 ft
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					0.2 Asphalt 0.3 Concrete Gray gravel, brown/black sand, slag, and asphalt pieces, dry
5		56			
		63			6.0 Yellow fine-grained sand, well rounded, well sorted, dry to wet (13 ft bgs), loose to dense
10		83			
15		100	SW		
		100			
20		100			20.0
		100	SM		Brown/gray silty sand. Trace of clay, dense, wet.
		100			24.0
25		100	SP		Gray sand, medium- to coarse-grained, some silt, poorly sorted, angular, dense and wet.
		100	SM		26.0 Gray silty sand, well sorted, well rounded, dense, wet.
					28.0

Bottom of borehole at 28.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM\01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

Tetra Tech

BORING NUMBER B-21

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/12/18 **COMPLETED** 7/12/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING ---
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					0.2 Asphalt
		72			0.3 Concrete
					Urban fill (Black/Brown sand, gravel,some slag, trace of red brick, loose dry)
5		73			6.0
			SW		7.0 Yellow fine-grained sand, well sorted, rounded, medium dense, dry

Bottom of borehole at 7.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

BORING NUMBER B-22

Tetra Tech

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/12/18 **COMPLETED** 7/12/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING ---
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0				1.0	Asphault, concrete, and gray gravel
		54			Black/Brown sand, some slag, trace of red brick, loose, dry
5		67		6.0	
			SW	8.0	Yellow fine-grained sand, rounded, well sorted, loose, dry

Bottom of borehole at 8.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

Tetra Tech

BORING NUMBER B-23

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/12/18 **COMPLETED** 7/12/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING ---
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
				1.0	Asphault, concrete, and gravel
		54			Urban fill (black/brown sand, some slag, trace of red brick, loose, dry)
5				5.5	
		63	SW		Yellow fine-grained sand, rounded, well sorted, loose, dry
				8.0	

Bottom of borehole at 8.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

Tetra Tech

BORING NUMBER BK-1

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/26/18 **COMPLETED** 7/26/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING ---
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					
		100			Topsoil
1.0					Brown sand and gravel, silt, dry, loose, with red brick
		100			
4.0					

Bottom of borehole at 4.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

Tetra Tech

BORING NUMBER BK-2

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/26/18 **COMPLETED** 7/26/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING ---
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION
0				
				1.0 Topsoil
		38		Black/Brown silty sand, trace of clay, red brick, gravel, dry, loose.
				4.0

Bottom of borehole at 4.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

Tetra Tech

BORING NUMBER BK-4

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/26/18 **COMPLETED** 7/26/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING ---
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION
0		50		Urban Fill (brown/black silty sand, some brick, some gravel, loose, dry)
4.0				Bottom of borehole at 4.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

Tetra Tech

BORING NUMBER BK-6

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/26/18 **COMPLETED** 7/26/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING ---
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION
0				
		58		0.5 Topsoil Urban fill (black/brown/gray silty sand, some brick and gravel, loose, dry)
5		71		6.0

Bottom of borehole at 6.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

Tetra Tech

BORING NUMBER BK-7

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/26/18 **COMPLETED** 7/26/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING ---
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION
0				
		71		Urban fill (gravel, black/brown/gray silty sand, some gravel, red brick, dense, dry)
5		100	5.0	

Bottom of borehole at 5.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

Tetra Tech

BORING NUMBER BK-8

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/26/18 **COMPLETED** 7/26/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING ---
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION
0				
			1.0	Topsoil
		35		Urban fill (black/brown silty sand, red brick, some gravel, dry, loose)
			4.0	

Bottom of borehole at 4.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:47 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

Tetra Tech

BORING NUMBER BK-9

CLIENT City of Chicago Department of Fleet and Facility Management
PROJECT NAME Former Carnotite Reduction Company Site
PROJECT NUMBER 103S328401004.009f
PROJECT LOCATION Chicago, IL
DATE STARTED 7/26/18 **COMPLETED** 7/26/18
SURFACE ELEVATION
DRILLING CONTRACTOR Raimonde Drilling Corporation
GROUND WATER LEVELS:
DRILLING METHOD Direct-Push
AT TIME OF DRILLING ---
LOGGED BY Artur Pacyga
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION
0				Topsoil
1.0				Urban Fill (brown/black silty sand, red brick, gray gravel, loose)
		63		
		100		
4.5				Fine-grained virgin sand, rounded, well sorted, loose, dry
5				
6.0				Bottom of borehole at 6.0 feet.

GENERAL BH / TP / WELL - GINT STD US.GDT - 8/30/18 12:48 - L:\S-STATE\S3284 - CHICAGO 2FM01004 - CARNOTITE REDUCTION\TASK 009F - PREDESIGN INVESTIGATION REPORT\SOIL BORING LOGS\GINT\CDFF CARNOTITE RADIATION SITE.GPJ

APPENDIX D
PHOTOGRAPHIC LOG

Photo Log

Site Name: Former Carnotite Reduction Company Site
Location: Chicago, Illinois

Photograph No. 1 **Date:** 07/10/2018 **Description:** Geoprobe at soil boring location B1**.** **Direction:** East	
Photograph No. 2 **Date:** 07/11/2018 **Description:** Soil cores from location B20. Each core includes a 4-foot interval of soil. Note poor recovery in shallow intervals on right side of photo. **Direction:** NA	

Photo Log

Site Name: Former Carnotite Reduction Company Site
Location: Chicago, Illinois

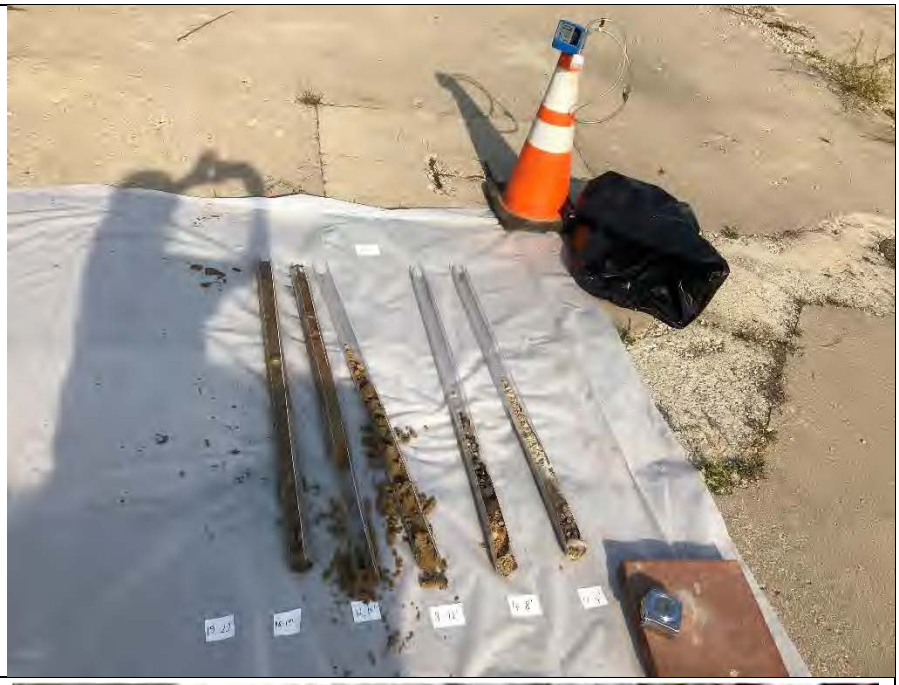
Photograph No. 3 **Date:** 07/12/2018 **Description:** Soil cores from location B9, note work area air monitor on orange cone. **Direction:** East	
Photograph No. 4 **Date:** 07/13/2018 **Description:** SAHCI screening soil cores. **Direction:** NA	

Photo Log

Site Name: Former Carnotite Reduction Company Site
Location: Chicago, Illinois

Photograph No. 5 **Date:** 07/13/2018 **Description:** Soil cores from location B15. **Direction:** NA	
Photograph No. 6 **Date:** 07/13/2018 **Description:** Soil cores from location B19. Note urban fill and rubble in shallow intervals on right. **Direction:** NA	

Photo Log

Site Name: Former Carnotite Reduction Company Site
Location: Chicago, Illinois

Photograph No. 7 **Date:** 07/26/2018 **Description:** Soil cores from location B4, 0 to 26 feet below ground surface. **Direction:** NA	
Photograph No. 8 **Date:** 07/25/2018 **Description:** Soil cores from location B17. Note urban fill in shallow intervals. Most significant concentrations of radionuclides were detected in the black fill located between 2 and 6 feet below ground surface. **Direction:** NA	

TETRA TECH

APPENDIX E
FIELD NOTES

Location 434 E. 26TH ST. Chicago Date 7/9/18

Project / Client Carnotite / 2FM

0810 Tim Sekinoes onsite
Dave Franc already onsite
Glenn Huber, SAHCI - also onsite

Conduct brief H+S meeting

0845 Setting up at ASC-5 for sampling

Depth to Water: 11'2"
Total Depth: 21'4.5"

ASC-5 Parameters

Time	900	905	910	915
Temp °C	16.7	16.5	16.5	16.4
pH	7.23	7.09	7.04	7.02
SpCond mS/cm	1.943	1.915	1.899	1.892
DO mg/L	1.68	1.04	0.92	0.87
ORP mV	75.2	72.4	68.9	65.3
Turbidity NTU	7.5	5.5	7.4	6

Purge volume = 1 gallon

0915 ASC-5 sample collected

1005 Finish sampling ASC-5
move to ASC-4

Location Date 7/9/18

Project / Client Carnotite

ASC-4
DTW: 10'6"
Total Depth: 19'7"

ASC-4 Parameters

Time	1015	1020	1025	1030	1035
Temp °C	15.2	15	15	15	15
pH	7.70	7.60	7.53	7.49	7.47
SpCond mS/cm	0.942	0.894	0.877	0.876	0.876
DO mg/L	1.38	1.03	0.93	0.86	0.85
ORP mV	-45.4	-59.3	-58.4	-57.5	-57.3
Turbidity NTU	16.1	11.0	9.5	7.4	6

Purge Volume = 1.25 gallon (speed 3.84)
1035 ASC-4 Sample collected

1200 Move to ASC-2A'
DTW: 8'1" 12.5
Total Depth: 18'9'

ASC-2A Parameters

Time	1220	1225	1230	1235	1240
Temp	13.8	13.8	13.7	13.6	13.5
pH	8.00	7.71	7.62	7.59	7.56
SpCond	.464	.479	.496	.493	0.498
DO	5.77	5.57	5.38	5.48	5.47
ORP	50.9	57.3	61.1	63.1	65
Turb	50	22.5	7.7	7.2	5.8

Location _____ Date 7/9/18

Project / Client Carnotite

1245 Sample collected at ASC-2A

1315 Glenn screens coolers and conducts wipe samples Kris + Dave also screened out

1330 Kris + Dave stake boring locations and collect gps coordinates

1045 ~~Peers~~ Matt from Earth Solutions
-1400 onsite conducting private utility locate.

1500 Tetra Tech offsite

K. Schnoes 7/9/18

Location _____ Date 7/10/18

Project / Client Carnotite

0700 Kris Schnoes onsite
Glenn Huber, SAIC, onsite
Dave Franc onsite

0710 Artur Freyda, EDF onsite

0725 Jeff Linsel, Raimonde Dudley onsite

0730 Conduct health + safety tailgate meeting
Glenn conducts brief radiation training

Dave completes gps location of background locations

0830 Raimonde gets ~~gets~~ started at B-1 with Geoprobe 7822DT

Recovery poor in top 8 feet only half of core recovered
8-16 ~3/4 recovery
Sand bearing ~16. Cores stuck 16-18

1000 Collect sample CRC-B1-0002 for Th-230 analysis only due to low volume recovery

Location _____ Date 7/10/18

Project / Client Carnotite

1030	Collect sample CRC-B1-0406 for uranium XF and subsequent lab analysis
1040	Collect sample CRC-B1-1820
1045	Collect sample CRC-B1-1214
	Clay observed at 33 ft bgs in B1
1130	Complete B1 to 36 ft bgs
1200	Begin B8- Installing monitoring well at this location first
1320	Abby Mazza, SFM, onsite
1335	Kelly Grahn, IEMA, onsite
	Monitoring well installation continuing at B8/MW-1
1515	Kelly Grahn offsite
1530	Abby Mazza offsite
	Monitoring well B8/MW-1

Location _____ Date 7/10/18

Project / Client Carnotite

Installed at 23.3 ft bgs with 10 foot screen and sand pack with bentonite seal and flush mount at surface.

Drillers placed cuttings in 55-gallon drum and moved drum to Corex box.

SAHC1 screened soil cores with GM Pancake, 2x2 NaI detector shielded, and Model 3 w/44-2 | beta and low energy gamma scintillator detector. Will provide readings to TC. For B1, some elevated readings detected at 0-2 and 4-6 when samples collected.

SAHC1 also conducting air monitoring during working hours at 2 locations, at drill rig and at soil logging area.

46

Location _____ Date 7/10/18

Project / Client Carnotite

~~1445~~ 1450 Kris Johnson offsite to return
1540-1635 sample equipment & pick up coolers from Tetra Tech office

Upon return packed up supplies in Corex Box

~~1645~~ 1650 RDC and SAHC offsite

~~1700~~ 1709 Tetra Tech & EDI offsite

K. Johnson 7/10/18

47

Location _____ Date 7/11/18

Project / Client Carnotite

0650 Kris Johnson, Tetra Tech onsite
Glenn Huber, SAHC previously onsite
Security gate at Lake Park Ave. & 3rd st. Street locked No security present
0700 Jeff Kirk, RDC onsite.
0720 Tetra Tech called All Points Security. They will call guard and alert him that we are onsite.
0740 Called All Points again who called back with guards cell number. Kris Johnson called guard. He is getting out prepared.
0810 All Points manager and guard arrive and unlock gate. Guard indicated he thought we would be arriving 8-830 AM. Yesterday guard did not

Location _____ Date 7/14/18

Project / Client Carnotite

pass along information regarding our protocol at 7AM. This schedule reiterated to All Points and guard that we will be onsite everyday this week at 7AM, likely including Saturday.

0840 Begin drilling B7, laying out 4 ft cores for screening and logging before sampling.

SAHCI set up air monitoring devices at drill rig and logging area, in accordance with SWP. 112. Will be analyzed at conclusion of the weeks work.

Profile of B7 nearly identical to B1 Clay also observed at 33' bgs

1130 Complete B7

1145 Collect sample CRC-B7-0204 due to elevated readings also for XRF

Location _____ Date 7/14/18

Project / Client Carnotite

1155 Collect CRC-B7-1416 ~~also for centrifuges~~

1200 Collect CRC-B7-2224 also for centrifuge

1145 Begin drilling B20

1215 Carol Nissen, Tetra Tech, onsite B7 ~~B5~~

1230 Collect CRC-~~B7~~-2628 ~~B20~~

MW-1

DTW 9.65 Ft - From TOC

20.90 Ft - Total depth

1330 Begin purging MW-1

MW-1 Purge Data

Time	1335	1340	1345	1350
Temp °C	17.7	16.9	17.0	17.0
pH	8.05	7.70	7.63	7.58
Cond	0.648	0.643	0.648	0.650
DO	~~20.91~~ mg/L	1.12	0.98	0.87
ORP	51.7	44.3	38.5	28.7
Turb	33.9	28.6	22.2	20.2
		Purge volume ~1 gallon		

Location _____ Date 7/11/18

Project / Client Casmalia

1340 Collect CRC-B20-1214 also for centrifuge

1355 Collect sample at MW-1 for water treatment parameters

1430 Collect CRC-B20-1820

1505 Collect CRC-B20-2628

1508 Collect CRC-B20-0206 for Gross alpha/beta

1525 Collect CRC-B7-0406 for XRF

1550 Begin B6.

1600 Carol Nissen & Kris Schnoes offsite

1630 Collect sample CRC-B6-0304

1640 Collect sample CRC-B6-1414 7/18

1705 Collect sample CRC-B6-2426

1700 Complete drilling B6 to 26 ft

1745 Glenn Huber + Jeff Findt offsite

1800 Kris Schnoes + Artur Pacyga

K. Schnoes

Location _____ Date 7/12/18

Project / Client Casmalia

0650 Kris Schnoes onsite Jeff Findt, ROC already onsite

0655 Glenn Huber, SAHC I onsite

0715 Begin drilling B9
SAHCI Begins air monitoring locations at drilling + sample station

0750 Collect sample CRC-B9-0406 +XRF

0800 Collect sample CRC-B9-1416

0705 Artur Pacyga, EDI, onsite

0830 Collect sample CRC-B9-2022 also for centrifuge

0830 Complete B9 to 22 feet and move to B5.
No recovery 0-4 ft bgs; attempted moving west about 1 foot but driller noted significant hydraulic leak from winch.

0930 Attempt moving to B21 located ~10 feet SW of B6 to install

Location _____ Date 7/12/18

Project / Client Cannotte

shallow boring for waste soil analysis. However, leak to great. Stop wait for owner to arrive with hydraulic plugs so winch can be removed for repair and shallow borings can continue.

1100 Anne Leslie, Raimonde, arrives onsite. Hydraulic plugs installed & winch removed.

1125 Drilling resumes at B21

1140 Collect waste characterization sample CRC-B21-0205 for TCLP VOA, Cyanide, ph, phenol, paint filter and PCBs

Not enough volume. Driller moved ~6 inches east & started new hole - B22 for additional volume.

1150 Collect waste characterization sample CRC-B22-0105

Location _____ Date 7/12/18

Project / Client Cannotte

for TCLP metals, mercury, SVOA, herbicides, & pesticides

still not enough volume. Driller moved 6 inches SW for B23.

1210 Collect waste characterization sample CRC-B23-0104 highest pmpkm 70 cpm, bkgd = 40

1220 Move to B10

1235 Starts drilling Refusal at 8 ft at original location. Refusal at 2 ft at about 3 feet west of original location. Refusal at 6 ft on concrete loading dock. Abandon location

1400 Move to B13 No recovery 8-12', move over to west ~14 inches, no recovery 4-12'.

1510 Collect sample CRC-B13-0305 at original location (4 containers)

Location _____ Date 7/12/18

Project / Client Carnotite

1520	Collect sample CRC-B13-0608 (2 containers)
1530	Moving to B2 on north side of park. New location is about 10 ft SE of original location on 26th St sidewalk
1600	Refusal - Concrete at 1.5 ft bgs
1615	Begin B3
1705	Complete B3 to 18 ft
1710	Collect sample CRC-B3-0204
1720	Collect sample CRC-B3-0608
1730	Collect sample CRC-B3168
1800	Move over to tennis court to set up for tomorrow morning. Winch should be repaired and onsite by 8-830 tomorrow morning. So we will begin on shallower location first thing.
1800	All offsite

T Jackson 7/12/18

Location _____ Date 7/13/18

Project / Client Carnotite

0655	Tim Schnoes onsite Glenn Huber, SAHCI, and Jeff Kindt, RDC, already onsite and setting up at tennis court.
0700	Arturo Pacyga, EDI, onsite
0725	Begin drilling at B16, moved north about 3 feet due to overhead wire
0805	Complete B16
0740	Collect sample CRC-B160204
0750	Collect sample CRC-B16-0608
0800	Collect sample CRC-B16-1416
0815	Begin drilling at B15 Refusal at 10' and poor recovery at initial location Moved about 1 foot to east
1015	Complete B15
1010	Collect sample CRC-B15-0204
1015	Collect sample CRC-B15-0608
1020	Collect sample CRC-B15-12[illegible]
	Move to B18.
1035	Begin drilling B18

Location _____ Date 7/13/18

Project / Client Carnotite

At B18, Refusal at 8 ft at original location. Put no recovery after 4 ft bgs. Moved 55 inches west ABO obtained refusal at 8 ft with very little recovery throughout. Moved 188 inches south and met refusal at 9 ft bgs but good recovery to that depth.

1315 Begin B19. Refusal at 4' bgs. Move ~3 ft west. Refusal at 8' bgs. Move ~5 ft east. Refusal at 8' bgs. Move ~25 ft east.

XRF unit obtained was not capable of detecting uranium. The following samples will remain onsite in cooler in conex box until sampling continues:

CRC-B9-0406
CRC-B22-0506
CRC-B6-0204
CRC-B1-0406
CRC-B7-0204
CRC-B7-0406

Location _____ Date 7/13/18

Project / Client Carnotite

1550 Collect sample CRC-B19-0204
1600 Collect sample CRC-B19-0810
1610 Collect sample CRC-B19-1618
1620 Collect sample CRC-B19-2224
1648 Boring B19 Complete

SAIC screening out drilling equipment.

SAIC also conducted air monitoring at drill rig and at sampling station throughout day.

1 cooler containing soil samples shipped to TestAmerica in Earth City, MO.

Geoprobe sampling sleeves drummed.

1745 Tetra Tech, EDI, SAIC, & RDC Offsite

K Dobson 7/13/18

Location _____ Date 7/26/18

Project / Client Carnotite

0700 D. Franc (Tetra Tech), J. Lindt (RISE), A. Lacy (FEDI) + G. Huber (SAIC) on site
0800 Began drilling @ B4
0900 Inner rods + sleeves jammed @ 16-18'. Will blind drill to 18 + resume sampling
1110 Saw 'sand' 24-26' - EOB today. Will attempt to get deeper using smaller tooling tomorrow
1100 Collect sample CRC-B4-0608 (bag)
1110 ↓ CRC-B4-1012
1120 ↓ CRC-B4-1820
1130 Began drilling B12
1210 Collected sample CRC-B12-0002
1220 ↓ CRC-B12-0406
1230 ↓ CRC-B12-1214
1300 Began drilling @ BK-1 (2 0-4 holes) 24" roc
0-1' topsoil
1-3 brown silt, gravel fill
3-4 red brick
1310 Collected sample CRC-BK1-0203
1320 Began drilling BK-2
1330 Collected CRC-BK2-0102
1335 CRC-BK2-0304

Location _____ Date 7/26/18

Project / Client Carnotite

1350 Began drilling BK-4
1400 Collected CRC-BK4-0102
1410 Began drilling BK-5
Refusal @ 6" bgs at 3 locations
No sample collected
1430 Began drilling BK-6
1435 Collected CRC-BK6-0002
1440 ↓ CRC-BK6-0406
1450 Began drilling BK-7
Refusal @ 3.5' bgs - moved 5' NW
1510 Collected CRC-BK7-0405
1540 Began drilling BK-9
1545 Collected CRC-BK9-0506
1555 Began drilling BK-8
1600 Collected CRC-BK8-0102
1620 All personnel offsite

7/26/18

Location _____ Date 7/27/18

Project / Client Carnotite

0700 D. Frame (Tetra Tech) J. Lindt (CRDL)
G. Hibra (SAIC-TE), + Al. Pacyga (CRDL) on site
0730 Setting up on B4 - will blind drill to 26' + begin continuous sampling
0740 Began drilling at B4
0900 Pulled 26-28'. Because of sand/water issues, no sample 28-32. Will attempt to collect 32-32 to identify depth of clay
0920 Collected CRC-B4-2628
Completed clay identified @ 33' bgs
1000 Began drilling B14
1210 Collected CRC-B14-0204 (bag)
1215 CRC-B14-0608
1220 CRC-B14-1012
1225 CRC-B14 1618
1230 CRC-B14 2426
1235 Began drilling B17
1315 Elevated readings from Glen's instruments between 2-4' + 4-6' bgs
1350 Encountered refusal ~16' bgs offset + switched to smaller tooling
1430 Encountered same issue. Offset again
1500 Pushed past 16-18' because of dark within

Location _____ Date 7/27/18

Project / Client Carnotite

1530 24-26' sample disconnected from rods. Had to pull entire outer out to retrieve. Sample stuck in sampler + unable to remove. Offset again
1605 Collected CRC-B17-0204 (bag)
1620 CRC-B17 0406
1625 CRC-B17 0810
1630 CRC-B17 1820
1640 Unable to advance past 26' + driller had prior engagement to attend. Will attempt to finish hole on Monday, 7/30
1645 All personnel off site

7/27/18

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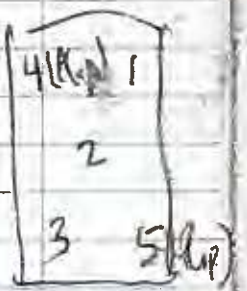
Location _____ Date 7/30/18

Project / Client Carnoustie

0700 D. Fram (Tidal Tech) J. Lindt (REAC)
A. Pacyga (EDI) + Brian (SAIC) on site
0730 Rosmidt drilling @ B17
0845 Collected CRC-B17-2628
0850 Advanced to B4-35.5 + Vertical clay present
1000 Driller got 32' of outer rod stuck in hole. Unable to retrieve
1015 Began drilling B5 using smaller tooling
1135 Collected CRC-B5-0204 (bag)
1140 -0608 (bag)
1145 -1214
1150 -1618
1155 -2224
1200 -2830
1300 Began drilling B11

XRF Readings 45 seconds

		Th	U
CRC-B9-0406	(1)	<17.2	<20
	(2)	<18	<19.5
	(3)	<16.3	<17.5
	(4)	<15.3	<17.0
	(5)	<13.7	<15.3



63

Location _____ Date 7/30/18

Project / Client Carnoustie

		Th	U
CRC-B6-0204	(1)	<29.4	<24.2
	(2)	-2±18	24±15
	(3)	<35.6	<25.3
	(4)	<23.9	<18.6
	(5)	<22.3	<20.9
CRC-B1-0406	(1)	<11.2	<18.8
	(2)	<9.3	<16.9
	(3)	<12	<16.6
	(4)	<10.8	<16.5
	(5)	<9.5	<16.8
CRC-B7-0204	(1)	<18.4	128±22
	(2)	30±15	141±25
	(3)	<17.3	194±25
	(4)	<18.8	253±28
	(5)	<15.9	123±21
CRC-B22-0506	(1)	<9.4	<14.5
	(2)	<10.4	<14.7
	(3)	<9.4	<15.5
	(4)	<10	<14.9
	(5)	<8.9	<15.4

Location _____ Date 7/30/18

Project / Client Carnotite

		Th	U
CRC-B7-0406	(1)	<11.6	25 ± 13
	(2)	<12	32 ± 14
	(3)	<12.7	33 ± 14
	(4)	<11.1	29 ± 13
	(5)	<11.2	26 ± 13
CRC-B4-0608	(1)	<10	<15.3
	(2)	<11.6	<17.1
	(3)	<9.9	<16.6
	(4)	<9.9	<14.1
	(5)	<9.5	<15.4
CRC-B14-0204	(1)	<24.2	<17.7
	(2)	<23.1	<18.9
	(3)	29 ± 15	<16
	(4)	<21	<17.5
	(5)	<17.8	<16.3
CRC-B7-0204	(1)	<20.6	64 ± 17
	(2)	<27.3	54 ± 19
	(3)	<28.1	25 ± 14
	(4)	<43.1	42 ± 19
	(5)	<22.3	85 ± 20

Location _____ Date 7/30/18

Project / Client Carnotite

		Th	U
CRC-B5-0204	(1)	<17.4	<17.6
	(2)	<13.4	<14.4
	(3)	<15.7	<15.9
	(4)	<17.7	<14.5
	(5)	<19.1	<15.7
CRC-B5-0608	(1)	<9.7	<14
	(2)	<8.7	<14.7
	(3)	<9.6	<13.9
	(4)	<9.7	<15.1
	(5)	<10.9	<14.9

1410 Collected CRC-B11-0204 (bag)

1420 1214

1435 2022

1450 2623

		Th	U
CRC-B11-0204	(1)	<25.1	<19.8
	(2)	<24.7	<17.2
	(3)	<19.8	<16.4
	(4)	<25.3	<18.8
	(5)	<21.6	<18.6

1530 All personal effects to [illegible] 7/30/18

TETRA TECH

APPENDIX F
SAHCI DATA PACKAGE

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-1

Date: 7/10/18

HP: Glenn Huber

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	1600	105	220	
2-4	1800	96	270	
4-6	1400	90	240	
6-8	1700	84	200	
8-10	1200	84	220	
10-12	1000	63	240	
12-14	1200	74	200	
14-16	1100	69	180	
16-18	1100	48	230	
18-20	1000	57	240	
20-22	1400	63	220	
22-24	1300	44	230	
24-26	1600	44	240	
26-28	1300	55	230	
28-30	1200	56	200	
30-32	1200	32	240	
32-34	1400	48	230	
34-36	1100	40	250	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-6

Date: 7/11/18

HP: Glen Hoke

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	1400	33	180	
2-4	1800	48	220	
4-6	1500	50	230	
6-8	1700	42	220	
8-10	1500	51	240	
10-12	1500	47	230	
12-14	1700	34	220	
14-16	1300	42	220	
16-18	1400	51	220	
18-20	1300	42	180	
20-22	1500	38	230	
22-24	1400	44	220	
24-26	1800	37	250	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-7

Date: 7/11/18

HP: Glenn Huber

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	1900	48	190	
2-4	6300	521	1200	
4-6	2700	60	240	
6-8	2300	62	290	
8-10	2100	46	250	
10-12	2000	50	280	
12-14	1800	41	240	
14-16	2000	30	250	
16-18				
18-20				
20-22	2000	52	260	
22-24	1800	49	270	
24-26	1600	54	250	
26-28	1700	35	260	
28-30	1700	47	220	
30-32	1800	44	180	
32-34	2000	43	230	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-20

Date: 7/11/18

HP: Glenn Huber

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	1800	53	240	
2-4	3100	161	800	
4-6	1900	84	250	
6-8	1700	54	230	
8-10	1700	61	230	
10-12	1400	48	240	
12-14	1800	42	260	
14-16	1600	50	230	
16-18	1700	44	270	
18-20	1800	45	270	
20-22	1600	42	220	
22-24	1500	54	220	
24-26	1800	61	240	
26-28	1500	48	260	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-3

Date: 7/12/18

HP: Glen Huser

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	3400	60	340	
2-4	3600	58	340	
4-6	3500	54	360	
6-8	3500	64	350	
8-10	3300	71	410	
10-12	3300	~~89~~ clr 69	400	
12-14	2800	55	380	
14-16	2900	49	360	
16-18	3300	48	390	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-13

Date: 7/12/18

HP: Glenn Huber

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	1300	33	230	
2-4	1500	40	240	
4-6	1800	48	200	
6-8	1600	52	220	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-23

Date: 7/12/18

HP: Glenn Huber

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	1800	42	200	
2-4	2100	70	360	
4-6	1900	71	230	
6-8	2100	44	250	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-21

Date: 7/12/18

HP: Glenn Huber

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-3	1500	38	230	
3-5	1700	32	250	
5-7	1700	34	250	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-22

Date: 7/12/18

HP: Glenn Huber

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	1700	38	220	
2-4	1900	56	240	
4-6	1800	48	250	
6-8	1600	43	250	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-9

Date: 7/12/18

HP: Glenn Huber

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	1500	38	240	
2.0-4	1400	37	230	
4-6	1600	41	240	
6-8	1300	43	220	
8-10	1500	37	220	
10-12	1400	46	240	
12-14	1900	41	230	
14-16	2000	42	250	
16-19	1600	31	240	
19-22	1700	33	270	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-16

Date: 7/13/18

HP: Glenn Huber

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	3800	53	350	
2-4	3700	65	370	
4-6	3200	57	340	
6-8	3300	48	360	
8-10	3400	53	290	
10-12	3100	45	320	
12-14	3200	70	340	
14-16	3000	65	320	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-15

Date: 7/13/18

HP: Glen Huber

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	3200	64	320	
2-4	3500	62	330	
4-6	3400	71	350	
6-8	3600	78	390	
8-10	2900	55	360	
10-12	2500	48	340	
12-14	3100	61	360	
14-16	3300	74	380	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-18

Date: 7/13/18

HP: Glenn Huber

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	3100	52	340	
2-4	3300	69	390	
4-6	3200	80	370	
6-8	3300	72	400	
8-~~10~~ CH 9'	3500	77	380	ref-s1 @ 9'
10-12				

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-19

Date: 7/13/18

HP: Glenn Hulse

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	2800	42	320	
2-4	3200	58	366	
4-6	2900	69	390	
6-8	3000	72	400	
8-10	3200	49	340	
10-12	3000	58	350	
12-14	2900	67	330	
14-16	2606	61	340	
16-18	2700	64	350	
18-20	2500	62	370	
20-22	2500	71	360	
22-24	2600	75	370	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-4

Date: 7/26/18 (7/27/18 26'-36')

HP: Glenn Hust.

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	2900	41	240	
2-4	2600	58	320	
4-6	2700	55	340	
6-8	2900	57	340	
8-10	3100	51	360	
10-12	2600	47	330	
12-14	2500	40	350	
14-16	2300	43	320	
16-18	2400	47	320	
18-20	2800	46	380	
20-22	2600	47	360	
22-24	3200	53	340	
24-26	2600	48	330	
26-28	2400	44	300	
—				
32-34	2600	46	340	
34-36	2700	50	320	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-12

Date: 7/26/18

HP: Glenn Huber

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	3000	38	390	
2-4	3200	39	370	
4-6	2800	27	340	
6-8	2700	24	350	
8-10	2600	60	380	
10-12	2800	49	420	
12-14	3100	50	380	
14-16	3000	46	340	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-17

Date: 7/27/18 & 7/30/18

HP: Glenn Huber & Brian Schmidt

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	3200	48	320	
2-4	4000	63	400	
4-6	3900	51	420	
6-8	3500	49	360	
8-10	3300	53	360	
10-12	3000	51	330	
12-14	2600	58	240	
14-16	2200	42	280	
16-18	—	—	—	no signal
18-20	3900	80	350	
20-22	3500	75	320	
22-24	3400	58	340	
24-26	-	-	-	NO SAMPLE
26-28	3700	67	390	
28-30	-	-	-	NO SAMPLE
30-32	-	-	-	NO SAMPLE
32-34	-	-	-	NO SAMPLE
34-35.5	3100	49	310	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-14

Date: 7/27/18

HP: Glenn Huber

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	2400	77	220	
2-4	2800	105 ~~72~~	270	
4-6	3200	72	290	
6-8	3100	78	280	
8-10	3100	59	320	
10-12	3000	44	360	
12-14	2600	70	300	
14-16	2400	61	290	
16-18	2400	46	320	
18-20	2700	42	300	
20-22	2500	51	340	
22-24	3200	42	360	
24-26	3100	40	360	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-5

Date: 7/30/2018

HP: Brian Schmidt

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	1600	51	250	
2-4	1400	56	200	
4-6	1300	49	200	
6-8	1300	45	220	
8-10	1700	63	210	
10-12	1500	52	200	
12-14	1400	60	200	
14-16	1300	56	210	
16-18	1500	40	250	
18-20	1900	42	210	
20-22	1400	48	220	
22-24	1600	46	250	
24-26	1800	51	250	
26-28	2000	48	210	
28-30	1400	50	220	
30-32	1600	36	210	

Pre-Design Investigation Surveys

Former Carnotite Reduction Company

Boring ID: B-11

Date: 7/30/2018

HP: Brian Schmidt

Sampling Interval	Ludlum 2221 w/ 44-10 2x2 NaI	Ludlum 2241 w/ 44-40 Shielded Pancake	Ludlum 3 w/ 44-21 Beta/ Low-E Gamma	Comments
0-2	1900	63	280	
2-4	2100	74	290	
4-6	2000	44	260	
6-8	2200	41	260	
8-10	1900	49	260	
10-12	1500	41	250	
12-14	1900	43	210	
14-16	1700	39	220	
16-18	1500	46	210	
18-20	1500	35	200	
20-22	1600	56	200	
22-24	1500	52	230	
24-26	1500	44	220	
26-28	1700	47	210	

FORM SWP-212-11
RADIOLOGICAL AIR SAMPLE DATA FORM – PAM'S

Equation:

Volume (V) = (Pump liters/min.)(Total Sample Time in minutes)(1000 ml/liter)

Sample Collection

Sample ID	Person Wearing/ Work Area	Sampling Pump Serial No.	Collection Period (start – end date)	Total Sample Time (minutes)	Average Flow Rate (LPM)	Total Sample Volume (ml)
CA001	Geologist Area	1112	7/10/18 - 7/13/18	2286	1844	4.22×10^6
CA002	Driller Area	7073	7/10/18 - 7/13/18	2286	1.878	4.29×10^6

Equation:

$$\text{Activity (A)} = \frac{\text{Gross CPM} - \text{Background CPM}}{(\text{Sample Volume})(\text{Eff})(2.22\text{ E} + 6\text{ dpm/uCi})(1\text{-SA})(\text{FR})}$$

4-Day Sample Analysis

Sample ID	Analyzed By	Analysis Date	Gross Counts	Net CPM	Sample Volume Analyzed (ml)	Sample Concentration (A)µCi/ml	< 10% DAC 3E-13 uCi/ml
CA001	GAH	7/17/18	6	0	4.22×10^6	0	(Yes) / No
CA002	GAH	7/17/18	5	0	4.29×10^6	0	(Yes) / No
							Yes / No
							Yes / No

Note: If 4-day air sample > 3E-13 uCi/ml, contact RSO immediately. Offsite isotopic analysis required

Filter Retention Factor (FR) = 0.7 for Staplex 8x10 ashless paper filter ☐
= 1.0 for 37mm PAM membrane filter ☒

Self-Adsorption Factor (SA) = 0.5 for alpha emitters and low-energy beta emitters <150 keV ☒
= 1.0 for beta emitters >150 keV ☐

50 minute background count for 7/17/18 (date) is 10 counts = 0.2 cpm

Alpha counting efficiency for 7/17/18 (date) is 0.367 cpm/dpm

FORM SWP-212-11
RADIOLOGICAL AIR SAMPLE DATA FORM – PAM'S

Equation:

Volume (V) = (Pump liters/min.)(Total Sample Time in minutes)(1000 ml/liter)

Sample Collection

Sample ID	Person Wearing/ Work Area	Sampling Pump Serial No.	Collection Period (start – end date)	Total Sample Time (minutes)	Average Flow Rate (LPM)	Total Sample Volume (ml)
CA003	Geologist Area	1112	7/26/18 - 7/30/18	1222	1.868	2.28×10^6
CA004	Driller Area	7073	7/26/18 - 7/31/18	1182	1.839	2.17×10^6

Equation:

$$\text{Activity (A)} = \frac{\text{Gross CPM} - \text{Background CPM}}{(\text{Sample Volume})(\text{Eff})(2.22 \text{ E} + 6 \text{ dpm/uCi})(1\text{-SA})(\text{FR})}$$

4-Day Sample Analysis

Sample ID	Analyzed By	Analysis Date	Gross Counts	Net CPM	Sample Volume Analyzed (ml)	Sample Concentration (A)µCi/ml	< 10% DAC 3E-13 uCi/ml
CA003	CAH	8/3/18	16	0.13	2.28×10^6	5.27×10^{-14}	(Yes) / No
CA004	CAH	8/3/18	12	0	2.17×10^6	0	(Yes) / No
							Yes / No
							Yes / No

Note: If 4-day air sample > 3E-13 uCi/ml, contact RSO immediately. Offsite isotopic analysis required

Filter Retention Factor (FR) = 0.7 for Staplex 8x10 ashless paper filter ☐
= 1.0 for 37mm PAM membrane filter ☐

Self-Adsorption Factor (SA) = 0.5 for alpha emitters and low-energy beta emitters <150 keV ☐
= 1.0 for beta emitters >150 keV ☐

50 minute background count for 8/3/18 (date) is 20 counts = 0.4 cpm

Alpha counting efficiency for 8/3/18 (date) is 0.367 cpm/dpm

Personal Air Monitor Log Sheet

Form SWP 112-10

Sample ID: CA001

Name / Work Area	Sampling Pump Serial No.	Date	Start Time	Start Flow (cc/min)	End Time	End Flow (cc/min)	INIT	
Geologist/Supt.	1112	7/10/18	7:58A	1906	4:45P	—	CAH	527
		7/11/18	8:24A	1851	5:14P	—	CAH	530
		7/12/18	7:07A	1842	5:17P	—	CAH	610
		7/13/18	6:56A	1823	5:15P	1798	CAH	619

Average Flow Rate: 1844

Total Sampling Time: 2286 min

Sample ID: CA002

Name / Work Area	Sampling Pump Serial No.	Date	Start Time	Start Flow (cc/min)	End Time	End Flow (cc/min)	INIT	
Drill Rig Area	7073	7/10/18	8:00A	1924	4:43P	—	CAH	527
		7/11/18	8:22A	1899	5:11P	—	CAH	529
		7/12/18	7:02A	1862	5:18P	—	CAH	616
		7/13/18	6:54A	1865	5:12P	1840	CAH	618

Average Flow Rate: 1878

Total Sampling Time: 2286

Personal Air Monitor Log Sheet

Form SWP 112-10

Sample ID: CA003

Name / Work Area	Sampling Pump Serial No.	Date	Start Time	Start Flow (cc/min)	End Time	End Flow (cc/min)	INIT	
Geologist / Sample Area	1112	7/26/18	8:22A	1899	12:28P	–	CAH	246
		7/27/18	7:31A	1873	4:22P	–	CAH	531
		7/30/18	7:25A	1856	2:50P	1846	CAH	445

Average Flow Rate: 1868

Total Sampling Time: 1222 min

Sample ID: CA004

Name / Work Area	Sampling Pump Serial No.	Date	Start Time	Start Flow (cc/min)	End Time	End Flow (cc/min)	INIT	
Drill Rig Area	7073	7/26/18	8:18A	1898	12:30P	–	CAH	252
		7/27/18	7:34A	1864	4:24P	–	CAH	530
		7/30/18	8:20A	1812	3:00P	1781	CAH	401

Average Flow Rate: 1839

Total Sampling Time: 1182 min

RADIATION SURVEY FORM

SURVEY REFERENCE #: **Carnotite PDI-001**

DATE OF SURVEY: **7/9/18**

NAME OF SURVEYOR: **Glenn Huber**

SURVEY METER IDENTIFICATION	Mfg: **Ludlum**
Background Count Rate: **60 cpm**	Model: **14C**
	Serial: **154125**
REMOVABLE ANALYSIS INSTRUMENT ID	Mfg: **Ludlum**
Efficiency: **36.7** % alpha **26.6** %beta	Model: **2929 (scaler) / 43-10-1 (alpha/beta)**
MDC_{alpha}: **9.50** dpm /100 cm^2	Serial: **147753 / PR354629**
MDC_{beta}: **83.87** dpm /100 cm^2	
Background Count Time: **10** min	Sample Count Time: **2** min
Alpha Background Count Rate: **0.7** cpm	Beta Background Count Rate: **67.6** cpm

Description (attached sketch if needed) (equipment, vehicle, materials, etc.)	Smear ID #	Direct Survey Gross cpm	Removable Alpha Gross 2 min Counts	Removable Beta Gross 2 min Counts	Removable Alpha dpm/100 cm^2	Removable Beta dpm/100 cm^2
Water Sampling Equipment / Tools	**1**	**<100**	**1**	**127**	**<9.50**	**<83.87**

RADIATION SURVEY FORM

SURVEY REFERENCE #: **Carnotite PDI-002**

DATE OF SURVEY: **7/11/18**

NAME OF SURVEYOR: **Glenn Huber**

SURVEY METER IDENTIFICATION	Mfg: **Ludlum**
Background Count Rate: **60 cpm**	Model: **14C**
	Serial: **154125**
REMOVABLE ANALYSIS INSTRUMENT ID	Mfg: **Ludlum**
Efficiency: **36.7** % alpha **26.6** %beta	Model: **2929 (scaler) / 43-10-1 (alpha/beta)**
MDC_{alpha}: **7.50** dpm /100 cm^2	Serial: **147753 / PR354629**
MDC_{beta}: **77.55** dpm /100 cm^2	
Background Count Time: **10** min	Sample Count Time: **2** min
Alpha Background Count Rate: **0.3** cpm	Beta Background Count Rate: **57.2** cpm

Description (attached sketch if needed) (equipment, vehicle, materials, etc.)	Smear ID #	Direct Survey Gross cpm	Removable Alpha Gross 2 min Counts	Removable Beta Gross 2 min Counts	Removable Alpha dpm/100 cm^2	Removable Beta dpm/100 cm^2
5 Large Geoprobe Augers	**1**	**<100**	**1**	**114**	**<7.50**	**<77.55**
	2	**<100**	**3**	**116**	**<7.50**	**<77.55**
	3	**<100**	**3**	**124**	**<7.50**	**<77.55**
Sample Coolers	**1**	**<100**	**0**	**108**	**<7.50**	**<77.55**
	2	**<100**	**1**	**117**	**<7.50**	**<77.55**
	3	**<100**	**2**	**122**	**<7.50**	**<77.55**

RADIATION SURVEY FORM

SURVEY REFERENCE #: **Carnotite PDI-003**

DATE OF SURVEY: **7/12/18**

NAME OF SURVEYOR: **Glenn Huber**

SURVEY METER IDENTIFICATION	Mfg: **Ludlum**
Background Count Rate: **60 cpm**	Model: **14C**
	Serial: **154125**
REMOVABLE ANALYSIS INSTRUMENT ID	Mfg: **Ludlum**
Efficiency: **36.7** % alpha **26.6** %beta	Model: **2929 (scaler) / 43-10-1 (alpha/beta)**
MDC_{alpha}: **10.27** dpm /100 cm^2	Serial: **147753 / PR354629**
MDC_{beta}: **79.49** dpm /100 cm^2	
Background Count Time: **10** min	Sample Count Time: **2** min
Alpha Background Count Rate: **0.9** cpm	Beta Background Count Rate: **60.3** cpm

Description (attached sketch if needed) (equipment, vehicle, materials, etc.)	Smear ID #	Direct Survey Gross cpm	Removable Alpha Gross 2 min Counts	Removable Beta Gross 2 min Counts	Removable Alpha dpm/100 cm^2	Removable Beta dpm/100 cm^2
Sample Coolers (8 uRem surface)	**1**	**<100**	**2**	**138**	**<7.50**	**<79.49**

RADIATION SURVEY FORM

SURVEY REFERENCE #: **Carnotite PDI-004**

DATE OF SURVEY: **7/13/18**

NAME OF SURVEYOR: **Glenn Huber**

SURVEY METER IDENTIFICATION	Mfg: **Ludlum**
Background Count Rate: **60 cpm**	Model: **14C**
	Serial: **154125**
REMOVABLE ANALYSIS INSTRUMENT ID	Mfg: **Ludlum**
Efficiency: **36.7** % alpha **26.6** %beta	Model: **2929 (scaler) / 43-10-1 (alpha/beta)**
MDC_{alpha}: **6.79** dpm /100 cm^2	Serial: **147753 / PR354629**
MDC_{beta}: **82.57** dpm /100 cm^2	
Background Count Time: **10** min	Sample Count Time: **2** min
Alpha Background Count Rate: **0.2** cpm	Beta Background Count Rate: **65.4** cpm

Description (attached sketch if needed) (equipment, vehicle, materials, etc.)	Smear ID #	Direct Survey Gross cpm	Removable Alpha Gross 2 min Counts	Removable Beta Gross 2 min Counts	Removable Alpha dpm/100 cm^2	Removable Beta dpm/100 cm^2
Geoprobe Sample Rods	**1**	**<100**	**1**	**157**	**<6.79**	**<82.57**
	2	**<100**	**3**	**164**	**<6.79**	**<82.57**
	3	**<100**	**1**	**133**	**<6.79**	**<82.57**
Geoprobe Sample Table	**4**	**<100**	**0**	**134**	**<6.79**	**<82.57**
Geoprobe – Left Tread	**5**	**<100**	**6**	**164**	**7.62**	**<82.57**
Geoprobe – Right Tread	**6**	**<100**	**3**	**162**	**<6.79**	**<82.57**
Geoprobe Controls	**7**	**<100**	**0**	**158**	**<6.79**	**<82.57**
Geoprobe Body	**8**	**<100**	**5**	**136**	**<6.79**	**<82.57**
Used Sample Liners	**9**	**<100**	**2**	**141**	**<6.79**	**<82.57**
	10	**<100**	**2**	**124**	**<6.79**	**<82.57**
	11	**<100**	**0**	**140**	**<6.79**	**<82.57**
	12	**<100**	**2**	**128**	**<6.79**	**<82.57**

RADIATION SURVEY FORM

SURVEY REFERENCE #: **Carnotite PDI-005**

DATE OF SURVEY: **7/30/18**

NAME OF SURVEYOR: **Brian Schmidt (analyzed 8/2/18 G. Huber)**

SURVEY METER IDENTIFICATION	Mfg: **Ludlum**
Background Count Rate: **60 cpm**	Model: **14C**
	Serial: **154125**
REMOVABLE ANALYSIS INSTRUMENT ID	Mfg: **Ludlum**
Efficiency: **36.7** % alpha **26.6** %beta	Model: **2929 (scaler) / 43-10-1 (alpha/beta)**
MDC_{alpha}: **11.30** dpm /100 cm^2	Serial: **147753 / PR354629**
MDC_{beta}: **83.51** dpm /100 cm^2	
Background Count Time: **10** min	Sample Count Time: **2** min
Alpha Background Count Rate: **1.2** cpm	Beta Background Count Rate: **67.0** cpm

Description (attached sketch if needed) (equipment, vehicle, materials, etc.)	Smear ID #	Direct Survey Gross cpm	Removable Alpha Gross 2 min Counts	Removable Beta Gross 2 min Counts	Removable Alpha dpm/100 cm^2	Removable Beta dpm/100 cm^2
Geoprobe Rig	**1**	**<100**	**4**	**157**	**<11.30**	**<83.51**
	2	**<100**	**0**	**155**	**<11.30**	**<83.51**
Geoprobe Drill Casings	**3**	**<100**	**2**	**131**	**<11.30**	**<83.51**
	4	**<100**	**7**	**161**	**<11.30**	**<83.51**
Geoprobe Drill Rods	**5**	**<100**	**3**	**152**	**<11.30**	**<83.51**
	6	**<100**	**3**	**148**	**<11.30**	**<83.51**
Sample Table	**7**	**<100**	**2**	**147**	**<11.30**	**<83.51**
	8	**<100**	**0**	**152**	**<11.30**	**<83.51**
Sample Coolers	**9**	**<100**	**1**	**144**	**<11.30**	**<83.51**
	10	**<100**	**0**	**159**	**<11.30**	**<83.51**

TETRA TECH

APPENDIX G
DATA VERIFICATION REPORT AND LABORATORY DATA PACKAGES

September 2018 Carnotite Pre-Design Investigation Report

Data Verification Report

This is a brief verification (not a full validation) of the radioanalytical data included in the September 2018 report on the predesign investigation of the Carnotite Reduction Site. The summary data (incuding that for quality control (QC) samples) was examined, but not the calibrations, raw sample data, etc. The data packages are discussed below.

J29426 includes three groundwater samples and a field duplicate collected on 9 July. There were no problems with the analyses. Although Ra-226 activities are identical, the field duplicate sample does yield more Ra-228 than the primary sample. The isotopic uranium results are consistent with natural uranium (neither enriched nor depleted), as one would expect from the presumed origin of the radionuclide contamination.

J29476 includes one monitoring well sample collected on 11 July. The laboratory blank for Ra-226 showed low-level contamination, so the groundwater result is qualified as estimated, possibly biased high, and flagged "J+". The tracer recovery for the isotopic uranium analysis was quite low, so those results should be qualified as estimated, possibly biased low, and flagged "J-". As long as the concentration of uranium is high enough, SW-846 Method 6020 will probably continue to be more reliable for determination of isotopic uranium. For the non-radioanalytical procedures, holding time violations mean that the hexavalent chromium and BOD results should be qualified as estimated and flagged "UJ" due to possibly loss of analyte between sampling and analysis.

J29479 includes nine soil samples collected on 10 and 11 July. Due to insufficient sample volume, the Ra-226 (and other gamma emitters) results in sample CRC-B1-0002 should be considered estimated, possibly bised low, and flagged "J-" or "UJ". On the other hand, there is good evidence of secular equilibrium in all samples, including this one. The laboratory noted problems homogenizing these samples, due to the presence of multiple chunks of solid material in the urban fill at the site.

J29498 includes four soil samples collected on 11 and 12 July. There were no significant problems with the radioanalytical results. Some irregularities in some of chemical analyses were not evaluated.

J29521 includes 22 soil samples collected on 12 and 13 July. Due to insufficient sample volume, the Ra-226 (and other gamma emitters) results in sample CRC-B18-0204 should be considered estimated, possibly biased low, and flagged "J-" or "UJ". And there is good evidence of secular equilibrium in this and the other samples. As before, the laboratory noted homogenization problems with these samples.

J29881 includes 42 soil samples collected on various dates from 11 through 30 July. In two cases, a sample contained such relatively high activity that the laboratory could not obtain the requested MDC and reported a "G" flag. These were Ra-226 (and other gamma emitters) in sample CRC-B7-0204 and Th-230 in sample CRC-B17-0406. No qualifications are applicable for these situations. There was one blank with measurable activity, for Th-230. But the only sample analyzed with that blank was CRC-B17-0406, whose Th-230 activity was well above that of the blank. Again, no qualification is applieable. One laboratory duplicate analysis for gamma emitters yielded an excessive relative error ration (RER), but the associated isotopes were below their MDC (minimum detectable concentration), so no qualifications were applied. Again, there is good evidence for secular equilibrium in the various decay chains. Again, the laboratory noted homogenization problems due to the presence of multiple chunks of solid material in the urban fill at the site.

Overall:

No significant problems were seen in these analyses. In a few cases (as described above) results should be qualifeid as estimated, but none require rejection.

The most consistent problem was the nature of the "soil" samples, with numerous pieces of various sizes of various solid materials. These made it difficult, if not impossible, to homogenize a sample before removing an aliquot for analysis. As long as the large pieces are not very porous, they are unlikely to include significant site-related contamination.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

Job Number: 160-29426-1

Job Description: Former Carnotite Site - Non-Rad Analysis

For:
Tetra Tech, Inc.
1 South Wacker Dr.
Suite 3700
Chicago, IL 60606

Attention: Ms. Kristine Schnoes

Approved for release.
Chenise Y Lambert-Sykes
Project Manager I
8/9/2018 9:18 AM

Chenise Y Lambert-Sykes, Project Manager I
13715 Rider Trail North, Earth City, MO, 63045
(314)298-8566
chenise.lambert-sykes@testamericainc.com
08/09/2018

The test results in this report meet NELAP requirements for parameters for which accreditation is required or available. Any exceptions to the NELAP requirements are noted. Results pertain only to samples listed in this report. Pursuant to NELAP, this report shall not be reproduced, except in full, without the written approval of the laboratory. This report is confidential and is intended for the sole use of TestAmerica and its client. All questions regarding this report should be directed to the TestAmerica Project Manager.

Louisiana Lab Certification ID (Non-Potable, Solid/Haz. Material): 106151
Florida Lab Certification ID (Drinking Water): E87689.

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Definitions/Glossary

Client: Tetra Tech, Inc. TestAmerica Job ID: 160-29426-1
Project/Site: Former Carnotite Site - Non-Rad Analysis

Qualifiers

Metals

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

CASE NARRATIVE

Client: Tetra Tech, Inc.

Project: Former Carnotite Site - Non-Rad Analysis

Report Number: 160-29426-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 07/10/2018; the samples arrived in good condition, properly preserved. The temperatures of the 2 coolers at receipt time were 19.0º C and 19.0º C.

ICP-MS

Samples GW-ASC-5-070918 (160-29426-1), GW-ASC-4-070918 (160-29426-2), GW-ASC-2A-070918 (160-29426-3) and GW-ASC-4-070918-D (160-29426-4) were analyzed for ICP-MS in accordance with EPA SW-846 Method 6020. The samples were prepared on 07/31/2018 and analyzed on 08/01/2018.

For ICPMS Metals, a 2X dilution was performed. This is a standard dilution that is performed by TestAmerica St. Louis on all samples analyzed by method SW-846 6020A. The dilution is performed in order to have the matrix of the samples (i.e. the concentration of acids) match the matrix of the standards used for calibration and instrument quality control purposes. The MDL studies analyzed by this method undergo the same 2X dilution, and all detection limits are based on this. As such, MDLs and RLs are not affected by the dilution.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM 226 (21 DAY INGROWTH)

Samples GW-ASC-5-070918 (160-29426-1), GW-ASC-4-070918 (160-29426-2), GW-ASC-2A-070918 (160-29426-3) and GW-ASC-4-070918-D (160-29426-4) were analyzed for Radium 226 (21 day ingrowth) in accordance with SW- 846 Method 9315. The samples were prepared on 07/12/2018 and analyzed on 08/03/2018.

Prep Batch: 375093

Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: GW-ASC-5-070918 (160-29426-1), GW-ASC-4-070918 (160-29426-2), GW-ASC-2A-070918 (160-29426-3) and GW-ASC-4-070918-D (160-29426-4). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-228 (GFPC)

Samples GW-ASC-5-070918 (160-29426-1), GW-ASC-4-070918 (160-29426-2), GW-ASC-2A-070918 (160-29426-3) and GW-ASC-4-070918-D (160-29426-4) were analyzed for Radium-228 (GFPC) in accordance with SW-846 Method 9320. The samples were prepared on 07/12/2018 and analyzed on 07/30/2018.

Prep Batch: 375099

Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: GW-ASC-5-070918 (160-29426-1), GW-ASC-4-070918 (160-29426-2), GW-ASC-2A-070918 (160-29426-3) and GW-ASC-4-070918-D (160-29426-4). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Samples GW-ASC-5-070918 (160-29426-1), GW-ASC-4-070918 (160-29426-2), GW-ASC-2A-070918 (160-29426-3) and GW-ASC-4-070918-D (160-29426-4) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with DOE. The samples were prepared on 07/12/2018 and analyzed on 07/30/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Client Sample ID: GW-ASC-5-070918 — Lab Sample ID: 160-29426-1

Date Collected: 07/09/18 09:15 — **Matrix: Water**
Date Received: 07/10/18 09:15

Method: 6020A - Metals (ICP/MS), Isotopic Uranium

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
U-233	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:35	2
U-234	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:35	2
U-235	**0.18**		0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:35	2
U-236	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:35	2
U-238	**23**		0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:35	2

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.370**		0.131	0.135	1.00	0.104	pCi/L	07/12/18 09:48	08/03/18 07:11	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.8*		*40 - 110*	*07/12/18 09:48*	*08/03/18 07:11*	*1*

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.344	U	0.287	0.288	1.00	0.457	pCi/L	07/12/18 10:40	07/30/18 09:26	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.8*		*40 - 110*	*07/12/18 10:40*	*07/30/18 09:26*	*1*
Y Carrier	*87.1*		*40 - 110*	*07/12/18 10:40*	*07/30/18 09:26*	*1*

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	0.0806	U	0.203	0.204	1.00	0.292	pCi/L	07/12/18 18:07	07/30/18 16:53	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*92.2*		*30 - 110*	*07/12/18 18:07*	*07/30/18 16:53*	*1*

Client Sample ID: GW-ASC-4-070918 — Lab Sample ID: 160-29426-2

Date Collected: 07/09/18 10:35 — **Matrix: Water**
Date Received: 07/10/18 09:15

Method: 6020A - Metals (ICP/MS), Isotopic Uranium

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
U-233	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:40	2
U-234	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:40	2
U-235	**0.041**	**J**	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:40	2
U-236	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:40	2
U-238	**5.6**		0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:40	2

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.634**		0.165	0.175	1.00	0.0959	pCi/L	07/12/18 09:48	08/03/18 07:11	1

Client Sample ID: GW-ASC-4-070918 — Lab Sample ID: 160-29426-2

Date Collected: 07/09/18 10:35 — **Matrix: Water**
Date Received: 07/10/18 09:15

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	106		40 - 110	07/12/18 09:48	08/03/18 07:11	1

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.220	U	0.227	0.228	1.00	0.371	pCi/L	07/12/18 10:40	07/30/18 09:26	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	106		40 - 110	07/12/18 10:40	07/30/18 09:26	1
Y Carrier	85.2		40 - 110	07/12/18 10:40	07/30/18 09:26	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	0.0660	U	0.197	0.197	1.00	0.284	pCi/L	07/12/18 18:07	07/30/18 16:53	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Thorium-229	92.6		30 - 110	07/12/18 18:07	07/30/18 16:53	1

Client Sample ID: GW-ASC-2A-070918 — Lab Sample ID: 160-29426-3

Date Collected: 07/09/18 12:45 — **Matrix: Water**
Date Received: 07/10/18 09:15

Method: 6020A - Metals (ICP/MS), Isotopic Uranium

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
U-233	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:59	2
U-234	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:59	2
U-235	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:59	2
U-236	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:59	2
U-238	**2.0**		0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:59	2

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.242**		0.106	0.108	1.00	0.0958	pCi/L	07/12/18 09:48	08/03/18 07:12	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	104		40 - 110	07/12/18 09:48	08/03/18 07:12	1

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.683	U	0.522	0.525	1.00	0.824	pCi/L	07/12/18 10:40	07/30/18 09:26	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	104		40 - 110	07/12/18 10:40	07/30/18 09:26	1
Y Carrier	41.5		40 - 110	07/12/18 10:40	07/30/18 09:26	1

Client Sample ID: GW-ASC-2A-070918 — Lab Sample ID: 160-29426-3

Date Collected: 07/09/18 12:45 **Matrix: Water**
Date Received: 07/10/18 09:15

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	0.00878	U	0.183	0.183	1.00	0.284	pCi/L	07/12/18 18:07	07/30/18 16:53	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*87.4*		*30 - 110*	*07/12/18 18:07*	*07/30/18 16:53*	*1*

Client Sample ID: GW-ASC-4-070918-D — Lab Sample ID: 160-29426-4

Date Collected: 07/09/18 10:35 **Matrix: Water**
Date Received: 07/10/18 09:15

Method: 6020A - Metals (ICP/MS), Isotopic Uranium

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
U-233	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 14:03	2
U-234	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 14:03	2
U-235	**0.039**	**J**	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 14:03	2
U-236	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 14:03	2
U-238	**5.5**		0.050	0.020	ug/L		07/31/18 17:34	08/01/18 14:03	2

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.709**		0.170	0.182	1.00	0.113	pCi/L	07/12/18 09:48	08/03/18 07:12	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*103*		*40 - 110*	*07/12/18 09:48*	*08/03/18 07:12*	*1*

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.596**		0.279	0.284	1.00	0.403	pCi/L	07/12/18 10:40	07/30/18 09:26	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*103*		*40 - 110*	*07/12/18 10:40*	*07/30/18 09:26*	*1*
Y Carrier	*78.1*		*40 - 110*	*07/12/18 10:40*	*07/30/18 09:26*	*1*

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	0.00875	U	0.203	0.203	1.00	0.325	pCi/L	07/12/18 18:07	07/30/18 16:53	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*85.1*		*30 - 110*	*07/12/18 18:07*	*07/30/18 16:53*	*1*

Default Detection Limits

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29426-1

Method: 6020A - Metals (ICP/MS), Isotopic Uranium

Prep: 3010A

Analyte	RL	MDL	Units	Method
U-233	0.050	0.020	ug/L	6020A
U-234	0.050	0.020	ug/L	6020A
U-235	0.050	0.020	ug/L	6020A
U-236	0.050	0.020	ug/L	6020A
U-238	0.050	0.020	ug/L	6020A

Tracer/Carrier Summary

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29426-1

Method: 9315 - Radium-226 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Ba Carrier (40-110)
160-29426-1	GW-ASC-5-070918	83.8
160-29426-2	GW-ASC-4-070918	106
160-29426-3	GW-ASC-2A-070918	104
160-29426-4	GW-ASC-4-070918-D	103
LCS 160-375093/1-A	Lab Control Sample	104
LCSD 160-375093/2-A	Lab Control Sample Dup	104
MB 160-375093/13-A	Method Blank	103

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Method: 9320 - Radium-228 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Ba Carrier (40-110)	Y Carrier (40-110)
160-29426-1	GW-ASC-5-070918	83.8	87.1
160-29426-2	GW-ASC-4-070918	106	85.2
160-29426-3	GW-ASC-2A-070918	104	41.5
160-29426-4	GW-ASC-4-070918-D	103	78.1
LCS 160-375099/1-A	Lab Control Sample	104	77.0
LCSD 160-375099/2-A	Lab Control Sample Dup	104	79.3
MB 160-375099/13-A	Method Blank	103	84.9

Tracer/Carrier Legend

Ba Carrier = Ba Carrier
Y Carrier = Y Carrier

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	horium-22 (30-110)
160-29426-1	GW-ASC-5-070918	92.2
160-29426-1 DU	GW-ASC-5-070918	88.8
160-29426-2	GW-ASC-4-070918	92.6
160-29426-3	GW-ASC-2A-070918	87.4
160-29426-4	GW-ASC-4-070918-D	85.1
LCS 160-375260/2-A	Lab Control Sample	82.7
MB 160-375260/1-A	Method Blank	74.8

Tracer/Carrier Legend

Thorium-229 = Thorium-229

Method: 6020A - Metals (ICP/MS), Isotopic Uranium

Lab Sample ID: MB 160-379520/1-A ^2
Matrix: Water
Analysis Batch: 379766

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 379520

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
U-233	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:26	2
U-234	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:26	2
U-235	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:26	2
U-236	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:26	2
U-238	0.020	U	0.050	0.020	ug/L		07/31/18 17:34	08/01/18 13:26	2

Lab Sample ID: LCS 160-379520/2-A ^2
Matrix: Water
Analysis Batch: 379766

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 379520

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
U-234	0.0838	0.0840		ug/L		100	80 - 120
U-235	4.91	5.01		ug/L		102	80 - 120
U-238	5.03	5.10		ug/L		101	80 - 120

Lab Sample ID: 160-29426-2 MS
Matrix: Water
Analysis Batch: 379766

Client Sample ID: GW-ASC-4-070918
Prep Type: Total/NA
Prep Batch: 379520

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
U-234	0.020	U	0.0838	0.0847		ug/L		101	75 - 125
U-235	0.041	J	4.91	5.10		ug/L		103	75 - 125
U-238	5.6		5.03	10.8		ug/L		103	75 - 125

Lab Sample ID: 160-29426-2 MSD
Matrix: Water
Analysis Batch: 379766

Client Sample ID: GW-ASC-4-070918
Prep Type: Total/NA
Prep Batch: 379520

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
U-234	0.020	U	0.0838	0.0847		ug/L		101	75 - 125	0	20
U-235	0.041	J	4.91	5.11		ug/L		103	75 - 125	0	20
U-238	5.6		5.03	10.6		ug/L		101	75 - 125	1	20

Method: 9315 - Radium-226 (GFPC)

Lab Sample ID: MB 160-375093/13-A
Matrix: Water
Analysis Batch: 380132

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 375093

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.2190		0.103	0.105	1.00	0.116	pCi/L	07/12/18 10:32	08/03/18 07:13	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*103*		*40 - 110*	*07/12/18 10:32*	*08/03/18 07:13*	*1*

Method: 9315 - Radium-226 (GFPC) (Continued)

Lab Sample ID: LCS 160-375093/1-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 380133 — **Prep Batch: 375093**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-226			11.4	9.846		1.06	1.00	0.107	pCi/L	87	68 - 137		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*104*		*40 - 110*

Lab Sample ID: LCSD 160-375093/2-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 380133 — **Prep Batch: 375093**

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-226			11.4	8.755		0.963	1.00	0.102	pCi/L	77	68 - 137	0.54	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*104*		*40 - 110*

Method: 9320 - Radium-228 (GFPC)

Lab Sample ID: MB 160-375099/13-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 378627 — **Prep Batch: 375099**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.1992	U	0.232	0.232	1.00	0.381	pCi/L	07/12/18 10:40	07/30/18 09:27	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*103*		*40 - 110*	*07/12/18 10:40*	*07/30/18 09:27*	*1*
Y Carrier	*84.9*		*40 - 110*	*07/12/18 10:40*	*07/30/18 09:27*	*1*

Lab Sample ID: LCS 160-375099/1-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 378627 — **Prep Batch: 375099**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-228			8.10	9.774		1.16	1.00	0.501	pCi/L	121	56 - 140		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*104*		*40 - 110*
Y Carrier	*77.0*		*40 - 110*

Method: 9320 - Radium-228 (GFPC) (Continued)

Lab Sample ID: LCSD 160-375099/2-A **Client Sample ID: Lab Control Sample Dup**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 378627 **Prep Batch: 375099**

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-228			8.10	9.096		1.08	1.00	0.427	pCi/L	112	56 - 140	0.30	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*104*		*40 - 110*
Y Carrier	*79.3*		*40 - 110*

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-375260/1-A **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 379233 **Prep Batch: 375260**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	0.04158	U	0.199	0.199	1.00	0.299	pCi/L	07/12/18 18:07	07/30/18 16:53	1

Tracer	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*74.8*		*30 - 110*	*07/12/18 18:07*	*07/30/18 16:53*	*1*

Lab Sample ID: LCS 160-375260/2-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 379234 **Prep Batch: 375260**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Thorium-230			8.03	7.878		1.13	1.00	0.300	pCi/L	98	81 - 125		

Tracer	*LCS %Yield*	*LCS Qualifier*	*Limits*
Thorium-229	*82.7*		*30 - 110*

Lab Sample ID: 160-29426-1 DU **Client Sample ID: GW-ASC-5-070918**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 379236 **Prep Batch: 375260**

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Thorium-230	0.0806	U		-0.03177	U	0.181	1.00	0.303	pCi/L			0.29	1

Tracer	*DU %Yield*	*DU Qualifier*	*Limits*
Thorium-229	*88.8*		*30 - 110*

Metals

Prep Batch: 379520

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29426-1	GW-ASC-5-070918	Total/NA	Water	3010A	
160-29426-2	GW-ASC-4-070918	Total/NA	Water	3010A	
160-29426-3	GW-ASC-2A-070918	Total/NA	Water	3010A	
160-29426-4	GW-ASC-4-070918-D	Total/NA	Water	3010A	
MB 160-379520/1-A ^2	Method Blank	Total/NA	Water	3010A	
LCS 160-379520/2-A ^2	Lab Control Sample	Total/NA	Water	3010A	
160-29426-2 MS	GW-ASC-4-070918	Total/NA	Water	3010A	
160-29426-2 MSD	GW-ASC-4-070918	Total/NA	Water	3010A	

Analysis Batch: 379766

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29426-1	GW-ASC-5-070918	Total/NA	Water	6020A	379520
160-29426-2	GW-ASC-4-070918	Total/NA	Water	6020A	379520
160-29426-3	GW-ASC-2A-070918	Total/NA	Water	6020A	379520
160-29426-4	GW-ASC-4-070918-D	Total/NA	Water	6020A	379520
MB 160-379520/1-A ^2	Method Blank	Total/NA	Water	6020A	379520
LCS 160-379520/2-A ^2	Lab Control Sample	Total/NA	Water	6020A	379520
160-29426-2 MS	GW-ASC-4-070918	Total/NA	Water	6020A	379520
160-29426-2 MSD	GW-ASC-4-070918	Total/NA	Water	6020A	379520

Rad

Prep Batch: 375093

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29426-1	GW-ASC-5-070918	Total/NA	Water	PrecSep-21	
160-29426-2	GW-ASC-4-070918	Total/NA	Water	PrecSep-21	
160-29426-3	GW-ASC-2A-070918	Total/NA	Water	PrecSep-21	
160-29426-4	GW-ASC-4-070918-D	Total/NA	Water	PrecSep-21	
MB 160-375093/13-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-375093/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
LCSD 160-375093/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep-21	

Prep Batch: 375099

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29426-1	GW-ASC-5-070918	Total/NA	Water	PrecSep_0	
160-29426-2	GW-ASC-4-070918	Total/NA	Water	PrecSep_0	
160-29426-3	GW-ASC-2A-070918	Total/NA	Water	PrecSep_0	
160-29426-4	GW-ASC-4-070918-D	Total/NA	Water	PrecSep_0	
MB 160-375099/13-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-375099/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-375099/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Prep Batch: 375260

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29426-1	GW-ASC-5-070918	Total/NA	Water	ExtChrom	
160-29426-2	GW-ASC-4-070918	Total/NA	Water	ExtChrom	
160-29426-3	GW-ASC-2A-070918	Total/NA	Water	ExtChrom	
160-29426-4	GW-ASC-4-070918-D	Total/NA	Water	ExtChrom	
MB 160-375260/1-A	Method Blank	Total/NA	Water	ExtChrom	
LCS 160-375260/2-A	Lab Control Sample	Total/NA	Water	ExtChrom	

Rad (Continued)

Prep Batch: 375260 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29426-1 DU	GW-ASC-5-070918	Total/NA	Water	ExtChrom	

Client Sample ID: GW-ASC-5-070918 — Lab Sample ID: 160-29426-1

Date Collected: 07/09/18 09:15 **Matrix: Water**
Date Received: 07/10/18 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			379520	07/31/18 17:34	LAM	TAL SL
Total/NA	Analysis	6020A		2	379766	08/01/18 13:35	DAS	TAL SL
Total/NA	Prep	PrecSep-21			375093	07/12/18 09:48	JLC	TAL SL
Total/NA	Analysis	9315		1	380133	08/03/18 07:11	ALS	TAL SL
Total/NA	Prep	PrecSep_0			375099	07/12/18 10:40	JLC	TAL SL
Total/NA	Analysis	9320		1	378627	07/30/18 09:26	RTM	TAL SL
Total/NA	Prep	ExtChrom			375260	07/12/18 18:07	CMM	TAL SL
Total/NA	Analysis	A-01-R		1	379235	07/30/18 16:53	ALS	TAL SL

Client Sample ID: GW-ASC-4-070918 — Lab Sample ID: 160-29426-2

Date Collected: 07/09/18 10:35 **Matrix: Water**
Date Received: 07/10/18 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			379520	07/31/18 17:34	LAM	TAL SL
Total/NA	Analysis	6020A		2	379766	08/01/18 13:40	DAS	TAL SL
Total/NA	Prep	PrecSep-21			375093	07/12/18 09:48	JLC	TAL SL
Total/NA	Analysis	9315		1	380133	08/03/18 07:11	ALS	TAL SL
Total/NA	Prep	PrecSep_0			375099	07/12/18 10:40	JLC	TAL SL
Total/NA	Analysis	9320		1	378627	07/30/18 09:26	RTM	TAL SL
Total/NA	Prep	ExtChrom			375260	07/12/18 18:07	CMM	TAL SL
Total/NA	Analysis	A-01-R		1	379237	07/30/18 16:53	ALS	TAL SL

Client Sample ID: GW-ASC-2A-070918 — Lab Sample ID: 160-29426-3

Date Collected: 07/09/18 12:45 **Matrix: Water**
Date Received: 07/10/18 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			379520	07/31/18 17:34	LAM	TAL SL
Total/NA	Analysis	6020A		2	379766	08/01/18 13:59	DAS	TAL SL
Total/NA	Prep	PrecSep-21			375093	07/12/18 09:48	JLC	TAL SL
Total/NA	Analysis	9315		1	380133	08/03/18 07:12	ALS	TAL SL
Total/NA	Prep	PrecSep_0			375099	07/12/18 10:40	JLC	TAL SL
Total/NA	Analysis	9320		1	378627	07/30/18 09:26	RTM	TAL SL
Total/NA	Prep	ExtChrom			375260	07/12/18 18:07	CMM	TAL SL
Total/NA	Analysis	A-01-R		1	379238	07/30/18 16:53	ALS	TAL SL

Client Sample ID: GW-ASC-4-070918-D — Lab Sample ID: 160-29426-4

Date Collected: 07/09/18 10:35 **Matrix: Water**
Date Received: 07/10/18 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			379520	07/31/18 17:34	LAM	TAL SL

Lab Chronicle

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29426-1

Client Sample ID: GW-ASC-4-070918-D

Date Collected: 07/09/18 10:35
Date Received: 07/10/18 09:15

Lab Sample ID: 160-29426-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	6020A		2	379766	08/01/18 14:03	DAS	TAL SL
Total/NA	Prep	PrecSep-21			375093	07/12/18 09:48	JLC	TAL SL
Total/NA	Analysis	9315		1	380133	08/03/18 07:12	ALS	TAL SL
Total/NA	Prep	PrecSep_0			375099	07/12/18 10:40	JLC	TAL SL
Total/NA	Analysis	9320		1	378627	07/30/18 09:26	RTM	TAL SL
Total/NA	Prep	ExtChrom			375260	07/12/18 18:07	CMM	TAL SL
Total/NA	Analysis	A-01-R		1	379239	07/30/18 16:53	ALS	TAL SL

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: Tetra Tech, Inc. TestAmerica Job ID: 160-29426-1
Project/Site: Former Carnotite Site - Non-Rad Analysis

Laboratory: TestAmerica St. Louis

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Louisiana	NELAP	6	04080	06-30-19

The following analytes are included in this report, but accreditation/certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
6020A	3010A	Water	U-233
6020A	3010A	Water	U-234
6020A	3010A	Water	U-235
6020A	3010A	Water	U-236
6020A	3010A	Water	U-238

Method Summary

Client: Tetra Tech, Inc. TestAmerica Job ID: 160-29426-1
Project/Site: Former Carnotite Site - Non-Rad Analysis

Method	Method Description	Protocol	Laboratory
6020A	Metals (ICP/MS), Isotopic Uranium	SW846	TAL SL
9315	Radium-226 (GFPC)	SW846	TAL SL
9320	Radium-228 (GFPC)	SW846	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
3010A	Preparation, Total Metals	SW846	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL
PrecSep_0	Preparation, Precipitate Separation	None	TAL SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

None = None

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29426-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-29426-1	GW-ASC-5-070918	Water	07/09/18 09:15	07/10/18 09:15
160-29426-2	GW-ASC-4-070918	Water	07/09/18 10:35	07/10/18 09:15
160-29426-3	GW-ASC-2A-070918	Water	07/09/18 12:45	07/10/18 09:15
160-29426-4	GW-ASC-4-070918-D	Water	07/09/18 10:35	07/10/18 09:15

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
108347_00001	01/23/68		Eckert & Ziegler, Lot 108347		(Purchased Reagent)		Am-241	8.643 Bq
							Pu-239	8.035 Bq
							Thorium-230	8.101 Bq
108348_00001	01/23/68		Eckert & Ziegler, Lot 108348		(Purchased Reagent)		Am-241	7.497 Bq
							Pu-239	7.067 Bq
							Thorium-230	6.956 Bq
82232-334_00001	06/03/60		Eckert & Ziegler, Lot 82232-334		(Purchased Reagent)		Am-241	7.281 Bq
							Pu-239	7.137 Bq
							Thorium-230	7.63 Bq
82233-334_00001	06/03/60		Eckert & Zigler, Lot 82233-334		(Purchased Reagent)		Am-241	5.114 Bq
							Pu-239	6.064 Bq
							Thorium-230	4.95 Bq
82236-334_00001	06/02/60		Eckert & Ziegler, Lot 82236-334		(Purchased Reagent)		Am-241	6.891 Bq
							Pu-239	6.664 Bq
							Thorium-230	7.107 Bq
82237-334_00003	06/01/60		Eckert & Ziegler, Lot 82237-334		(Purchased Reagent)		Am-241	5.608 Bq
							Pu-239	6.424 Bq
							Thorium-230	5.856 Bq
82240-334_00001	06/08/60		Eckert & Ziegler, Lot 82240-334		(Purchased Reagent)		Am-241	8.298 Bq
							Pu-239	7.163 Bq
							Thorium-230	6.304 Bq
82241-334_00001	06/08/60		Eckert & Ziegler, Lot 82241-334		(Purchased Reagent)		Am-241	6.638 Bq
							Pu-239	6.797 Bq
							Thorium-230	6.629 Bq
82243-334_00001	06/09/60		Eckert & Ziegler, Lot 82243-334		(Purchased Reagent)		Am-241	6.39 Bq
							Pu-239	5.979 Bq
							Thorium-230	5.856 Bq
82244-334_00001	06/09/60		Eckert & Zigler, Lot 82244-334		(Purchased Reagent)		Am-241	6.897 Bq
							Pu-239	6.717 Bq
							Thorium-230	7.352 Bq
82246-334_00001	06/09/60		Eckert & Ziegler, Lot 82246-334		(Purchased Reagent)		Am-241	6.002 Bq
							Pu-239	5.353 Bq
							Thorium-230	5.57 Bq
Ba Carrier_00038	07/09/19		CPI, Lot 1104033		(Purchased Reagent)		Ba Carrier	20000 ug/mL
ISOU Cal 1_00153	08/01/18	07/25/18	2%HCL 2%HNO3, Lot 1511758	50 mL	ISOU CCV_00102	0.25 mL	U-233	0.000533962 ug/L
							U-236	0.00126989 ug/L
							U-234	0.000837849 ug/L
							U-235	0.0491215 ug/L
							U-238	0.0502631 ug/L

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
.ISOU CCV_00102	08/01/18	07/25/18	2% Nitric Acid, Lot 1511758	100 mL	ISOU Cal Int_00033	1 mL	U-233	0.106792 ug/L
							U-236	0.253977 ug/L
							U-234	0.16757 ug/L
							U-235	9.8243 ug/L
							U-238	10.0526 ug/L
..ISOU Cal Int_00033	10/10/18	04/26/18	2%HCL 2%HNO3, Lot 143500	100 mL	ISOU-I 233CAL_00009	10 mL	U-233	10.6792 ug/L
					ISOU-I 236_00008	1.5 mL	U-236	25.3977 ug/L
					ISOU-I Enrich_00006	1 mL	U-234	16.757 ug/L
							U-235	982.43 ug/L
							U-236	25.3977 ug/L
							U-238	1005.26 ug/L
					STD U_00012	0.1 mL	U-238	1005.26 ug/L
...ISOU-I 233CAL_00009	04/25/19	04/26/18	2%HCL 2% HN03, Lot 1425128	100 mL	ISOU-C 233CAL_00010	5.1841 g	U-233	106.792 ug/L
....ISOU-C 233CAL_00010	04/25/19	Eckert & Ziegler Analytics, Lot 108075			(Purchased Reagent)		U-233	2.06 ug/g
...ISOU-I 236_00008	04/25/19	04/26/18	2%HCL 2% HN03, Lot 1425128	100 mL	ISOU-C 236_00006	4.9581 g	U-236	1593.04 ug/L
....ISOU-C 236_00006	04/25/19	Eckert & Ziegler Isotope Products, Lot 1999-41			(Purchased Reagent)		U-236	32.13 ug/g
...ISOU-I Enrich_00006	12/06/18	12/06/17	2%HCL 2% HN03, Lot 1333564	100 mL	ISOU-C Enrich_00004	5.1799 g	U-234	1675.7 ug/L
							U-235	98243 ug/L
							U-236	150.217 ug/L
							U-238	526.278 ug/L
....ISOU-C Enrich_00004	10/19/22	Eckert & Ziegler Analytics, Lot 107557			(Purchased Reagent)		U-234	32.35 ug/g
							U-235	1896.62 ug/g
							U-236	2.9 ug/g
							U-238	10.16 ug/g
...STD U_00012	10/10/18	INORGANIC VENTURES, Lot M2-U658309			(Purchased Reagent)		U-238	1000 ug/mL
ISOU Cal 2_00136	08/01/18	07/25/18	2% Nitric Acid, Lot 1511758	50 mL	ISOU Cal Int_00033	0.1 mL	U-233	0.0213585 ug/L
							U-236	0.0507955 ug/L
							U-234	0.033514 ug/L
							U-235	1.96486 ug/L
							U-238	2.01053 ug/L
.ISOU Cal Int_00033	10/10/18	04/26/18	2%HCL 2%HNO3, Lot 143500	100 mL	ISOU-I 233CAL_00009	10 mL	U-233	10.6792 ug/L
					ISOU-I 236_00008	1.5 mL	U-236	25.3977 ug/L
					ISOU-I Enrich_00006	1 mL	U-234	16.757 ug/L
							U-235	982.43 ug/L
							U-236	25.3977 ug/L
							U-238	1005.26 ug/L
					STD U_00012	0.1 mL	U-238	1005.26 ug/L
..ISOU-I 233CAL_00009	04/25/19	04/26/18	2%HCL 2% HN03, Lot 1425128	100 mL	ISOU-C 233CAL_00010	5.1841 g	U-233	106.792 ug/L
...ISOU-C 233CAL_00010	04/25/19	Eckert & Ziegler Analytics, Lot 108075			(Purchased Reagent)		U-233	2.06 ug/g

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
..ISOU-I 236_00008	04/25/19	04/26/18	2%HCL 2% HN03, Lot 1425128	100 mL	ISOU-C 236_00006	4.9581 g	U-236	1593.04 ug/L
...ISOU-C 236_00006	04/25/19	Eckert & Ziegler Isotope Products, Lot 1999-41			(Purchased Reagent)		U-236	32.13 ug/g
..ISOU-I Enrich_00006	12/06/18	12/06/17	2%HCL 2% HN03, Lot 1333564	100 mL	ISOU-C Enrich_00004	5.1799 g	U-234	1675.7 ug/L
							U-235	98243 ug/L
							U-236	150.217 ug/L
							U-238	526.278 ug/L
...ISOU-C Enrich_00004	10/19/22	Eckert & Ziegler Analytics, Lot 107557			(Purchased Reagent)		U-234	32.35 ug/g
							U-235	1896.62 ug/g
							U-236	2.9 ug/g
							U-238	10.16 ug/g
..STD U_00012	10/10/18	INORGANIC VENTURES, Lot M2-U658309			(Purchased Reagent)		U-238	1000 ug/mL
ISOU Cal 3_00114	08/01/18	07/25/18	2% Nitric Acid, Lot 1511758	50 mL	ISOU Cal Int_00033	0.5 mL	U-233	0.106792 ug/L
							U-236	0.253977 ug/L
							U-234	0.16757 ug/L
							U-235	9.8243 ug/L
							U-238	10.0526 ug/L
.ISOU Cal Int_00033	10/10/18	04/26/18	2%HCL 2%HNO3, Lot 143500	100 mL	ISOU-I 233CAL_00009	10 mL	U-233	10.6792 ug/L
					ISOU-I 236_00008	1.5 mL	U-236	25.3977 ug/L
					ISOU-I Enrich_00006	1 mL	U-234	16.757 ug/L
							U-235	982.43 ug/L
							U-236	25.3977 ug/L
							U-238	1005.26 ug/L
					STD U_00012	0.1 mL	U-238	1005.26 ug/L
..ISOU-I 233CAL_00009	04/25/19	04/26/18	2%HCL 2% HN03, Lot 1425128	100 mL	ISOU-C 233CAL_00010	5.1841 g	U-233	106.792 ug/L
...ISOU-C 233CAL_00010	04/25/19	Eckert & Ziegler Analytics, Lot 108075			(Purchased Reagent)		U-233	2.06 ug/g
..ISOU-I 236_00008	04/25/19	04/26/18	2%HCL 2% HN03, Lot 1425128	100 mL	ISOU-C 236_00006	4.9581 g	U-236	1593.04 ug/L
...ISOU-C 236_00006	04/25/19	Eckert & Ziegler Isotope Products, Lot 1999-41			(Purchased Reagent)		U-236	32.13 ug/g
..ISOU-I Enrich_00006	12/06/18	12/06/17	2%HCL 2% HN03, Lot 1333564	100 mL	ISOU-C Enrich_00004	5.1799 g	U-234	1675.7 ug/L
							U-235	98243 ug/L
							U-236	150.217 ug/L
							U-238	526.278 ug/L
...ISOU-C Enrich_00004	10/19/22	Eckert & Ziegler Analytics, Lot 107557			(Purchased Reagent)		U-234	32.35 ug/g
							U-235	1896.62 ug/g
							U-236	2.9 ug/g
							U-238	10.16 ug/g
..STD U_00012	10/10/18	INORGANIC VENTURES, Lot M2-U658309			(Purchased Reagent)		U-238	1000 ug/mL
ISOU Cal 4_00125	08/01/18	07/25/18	2% Nitric Acid, Lot 1511758	50 mL	ISOU Cal Int_00033	1.5 mL	U-233	0.320377 ug/L
							U-236	0.761932 ug/L

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							U-234	0.502709 ug/L
							U-235	29.4729 ug/L
							U-238	30.1579 ug/L
.ISOU Cal Int_00033	10/10/18	04/26/18	2%HCL 2%HNO3, Lot 143500	100 mL	ISOU-I 233CAL_00009	10 mL	U-233	10.6792 ug/L
					ISOU-I 236_00008	1.5 mL	U-236	25.3977 ug/L
					ISOU-I Enrich_00006	1 mL	U-234	16.757 ug/L
							U-235	982.43 ug/L
							U-236	25.3977 ug/L
							U-238	1005.26 ug/L
					STD U_00012	0.1 mL	U-238	1005.26 ug/L
..ISOU-I 233CAL_00009	04/25/19	04/26/18	2%HCL 2% HN03, Lot 1425128	100 mL	ISOU-C 233CAL_00010	5.1841 g	U-233	106.792 ug/L
...ISOU-C 233CAL_00010	04/25/19	Eckert & Ziegler Analytics, Lot 108075			(Purchased Reagent)		U-233	2.06 ug/g
..ISOU-I 236_00008	04/25/19	04/26/18	2%HCL 2% HN03, Lot 1425128	100 mL	ISOU-C 236_00006	4.9581 g	U-236	1593.04 ug/L
...ISOU-C 236_00006	04/25/19	Eckert & Ziegler Isotope Products, Lot 1999-41			(Purchased Reagent)		U-236	32.13 ug/g
..ISOU-I Enrich_00006	12/06/18	12/06/17	2%HCL 2% HN03, Lot 1333564	100 mL	ISOU-C Enrich_00004	5.1799 g	U-234	1675.7 ug/L
							U-235	98243 ug/L
							U-236	150.217 ug/L
							U-238	526.278 ug/L
...ISOU-C Enrich_00004	10/19/22	Eckert & Ziegler Analytics, Lot 107557			(Purchased Reagent)		U-234	32.35 ug/g
							U-235	1896.62 ug/g
							U-236	2.9 ug/g
							U-238	10.16 ug/g
..STD U_00012	10/10/18	INORGANIC VENTURES, Lot M2-U658309			(Purchased Reagent)		U-238	1000 ug/mL
ISOU CCV_00102	08/01/18	07/25/18	2% Nitric Acid, Lot 1511758	100 mL	ISOU Cal Int_00033	1 mL	U-233	0.106792 ug/L
							U-236	0.253977 ug/L
							U-234	0.16757 ug/L
							U-235	9.8243 ug/L
							U-238	10.0526 ug/L
.ISOU Cal Int_00033	10/10/18	04/26/18	2%HCL 2%HNO3, Lot 143500	100 mL	ISOU-I 233CAL_00009	10 mL	U-233	10.6792 ug/L
					ISOU-I 236_00008	1.5 mL	U-236	25.3977 ug/L
					ISOU-I Enrich_00006	1 mL	U-234	16.757 ug/L
							U-235	982.43 ug/L
							U-236	25.3977 ug/L
							U-238	1005.26 ug/L
					STD U_00012	0.1 mL	U-238	1005.26 ug/L
..ISOU-I 233CAL_00009	04/25/19	04/26/18	2%HCL 2% HN03, Lot 1425128	100 mL	ISOU-C 233CAL_00010	5.1841 g	U-233	106.792 ug/L
...ISOU-C 233CAL_00010	04/25/19	Eckert & Ziegler Analytics, Lot 108075			(Purchased Reagent)		U-233	2.06 ug/g
..ISOU-I 236_00008	04/25/19	04/26/18	2%HCL 2% HN03, Lot 1425128	100 mL	ISOU-C 236_00006	4.9581 g	U-236	1593.04 ug/L
...ISOU-C 236_00006	04/25/19	Eckert & Ziegler Isotope Products, Lot 1999-41			(Purchased Reagent)		U-236	32.13 ug/g

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
..ISOU-I Enrich_00006	12/06/18	12/06/17	2%HCL 2% HN03, Lot 1333564	100 mL	ISOU-C Enrich_00004	5.1799 g	U-234	1675.7 ug/L
							U-235	98243 ug/L
							U-236	150.217 ug/L
							U-238	526.278 ug/L
...ISOU-C Enrich_00004	10/19/22	Eckert & Ziegler Analytics, Lot 107557			(Purchased Reagent)		U-234	32.35 ug/g
							U-235	1896.62 ug/g
							U-236	2.9 ug/g
							U-238	10.16 ug/g
..STD U_00012	10/10/18	INORGANIC VENTURES, Lot M2-U658309			(Purchased Reagent)		U-238	1000 ug/mL
ISOU ICSAB_00121	08/01/18	07/25/18	2% Nitric Acid, Lot 1511758	50 mL	ISOU Cal Int_00033	0.25 mL	U-233	0.0533962 ug/L
							U-236	0.126989 ug/L
							U-234	0.0837849 ug/L
							U-235	4.91215 ug/L
							U-238	5.02631 ug/L
.ISOU Cal Int_00033	10/10/18	04/26/18	2%HCL 2%HNO3, Lot 143500	100 mL	ISOU-I 233CAL_00009	10 mL	U-233	10.6792 ug/L
					ISOU-I 236_00008	1.5 mL	U-236	25.3977 ug/L
					ISOU-I Enrich_00006	1 mL	U-234	16.757 ug/L
							U-235	982.43 ug/L
							U-236	25.3977 ug/L
							U-238	1005.26 ug/L
					STD U_00012	0.1 mL	U-238	1005.26 ug/L
..ISOU-I 233CAL_00009	04/25/19	04/26/18	2%HCL 2% HN03, Lot 1425128	100 mL	ISOU-C 233CAL_00010	5.1841 g	U-233	106.792 ug/L
...ISOU-C 233CAL_00010	04/25/19	Eckert & Ziegler Analytics, Lot 108075			(Purchased Reagent)		U-233	2.06 ug/g
..ISOU-I 236_00008	04/25/19	04/26/18	2%HCL 2% HN03, Lot 1425128	100 mL	ISOU-C 236_00006	4.9581 g	U-236	1593.04 ug/L
...ISOU-C 236_00006	04/25/19	Eckert & Ziegler Isotope Products, Lot 1999-41			(Purchased Reagent)		U-236	32.13 ug/g
..ISOU-I Enrich_00006	12/06/18	12/06/17	2%HCL 2% HN03, Lot 1333564	100 mL	ISOU-C Enrich_00004	5.1799 g	U-234	1675.7 ug/L
							U-235	98243 ug/L
							U-236	150.217 ug/L
							U-238	526.278 ug/L
...ISOU-C Enrich_00004	10/19/22	Eckert & Ziegler Analytics, Lot 107557			(Purchased Reagent)		U-234	32.35 ug/g
							U-235	1896.62 ug/g
							U-236	2.9 ug/g
							U-238	10.16 ug/g
..STD U_00012	10/10/18	INORGANIC VENTURES, Lot M2-U658309			(Purchased Reagent)		U-238	1000 ug/mL
ISOU ICV_00163	08/02/18	08/01/18	2% Nitric Acid, Lot 1511758	10 mL	ISOU QC Int_00035	0.1 mL	U-233	0.106792 ug/L
							U-236	0.253977 ug/L
							U-234	0.16757 ug/L
							U-235	9.8243 ug/L
							U-238	10.0526 ug/L

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
.ISOU QC Int_00035	12/06/18	04/26/18	2%HCL 2%HNO3, Lot 1434500	50 mL	ISOU-I 233CAL_00009	5 mL	U-233	10.6792 ug/L
					ISOU-I 236_00008	0.75 mL	U-236	25.3977 ug/L
					ISOU-I Enrich_00006	0.5 mL	U-234	16.757 ug/L
							U-235	982.43 ug/L
							U-236	25.3977 ug/L
							U-238	1005.26 ug/L
					STD U-SPEX_00001	0.05 mL	U-238	1005.26 ug/L
..ISOU-I 233CAL_00009	04/25/19	04/26/18	2%HCL 2% HN03, Lot 1425128	100 mL	ISOU-C 233CAL_00010	5.1841 g	U-233	106.792 ug/L
...ISOU-C 233CAL_00010	04/25/19	Eckert & Ziegler Analytics, Lot 108075			(Purchased Reagent)		U-233	2.06 ug/g
..ISOU-I 236_00008	04/25/19	04/26/18	2%HCL 2% HN03, Lot 1425128	100 mL	ISOU-C 236_00006	4.9581 g	U-236	1593.04 ug/L
...ISOU-C 236_00006	04/25/19	Eckert & Ziegler Isotope Products, Lot 1999-41			(Purchased Reagent)		U-236	32.13 ug/g
..ISOU-I Enrich_00006	12/06/18	12/06/17	2%HCL 2% HN03, Lot 1333564	100 mL	ISOU-C Enrich_00004	5.1799 g	U-234	1675.7 ug/L
							U-235	98243 ug/L
							U-236	150.217 ug/L
							U-238	526.278 ug/L
...ISOU-C Enrich_00004	10/19/22	Eckert & Ziegler Analytics, Lot 107557			(Purchased Reagent)		U-234	32.35 ug/g
							U-235	1896.62 ug/g
							U-236	2.9 ug/g
							U-238	10.16 ug/g
..STD U-SPEX_00001	04/10/19	SPEX, Lot CL10-28UM			(Purchased Reagent)		U-238	1000 ug/mL
ISOU PRP SPK_00015	10/10/18	04/26/18	2%HCL 2%HNO3, Lot 1434500	100 mL	ISOU-I 233CAL_00009	1 mL	U-233	1.06792 ug/L
					ISOU-I Enrich_00006	1 mL	U-234	16.757 ug/L
							U-235	982.43 ug/L
							U-236	1.50217 ug/L
							U-238	1005.26 ug/L
					STD U_00012	0.1 mL	U	1000 ug/L
							U-238	1005.26 ug/L
.ISOU-I 233CAL_00009	04/25/19	04/26/18	2%HCL 2% HN03, Lot 1425128	100 mL	ISOU-C 233CAL_00010	5.1841 g	U-233	106.792 ug/L
..ISOU-C 233CAL_00010	04/25/19	Eckert & Ziegler Analytics, Lot 108075			(Purchased Reagent)		U-233	2.06 ug/g
.ISOU-I Enrich_00006	12/06/18	12/06/17	2%HCL 2% HN03, Lot 1333564	100 mL	ISOU-C Enrich_00004	5.1799 g	U-234	1675.7 ug/L
							U-235	98243 ug/L
							U-236	150.217 ug/L
							U-238	526.278 ug/L
..ISOU-C Enrich_00004	10/19/22	Eckert & Ziegler Analytics, Lot 107557			(Purchased Reagent)		U-234	32.35 ug/g
							U-235	1896.62 ug/g
							U-236	2.9 ug/g
							U-238	10.16 ug/g
.STD U_00012	10/10/18	INORGANIC VENTURES, Lot M2-U658309			(Purchased Reagent)		U	1000 ug/mL
							U-238	1000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
Ra-226_00022	08/03/18	08/24/16	1M HNO3, Lot n/a	100 mL			Ra	7534.61 dpm/mL
					Ra-226_00021	5.0595 g	Radium-226	7534.61 dpm/mL
							Rn-222	7534.61 dpm/mL
							Total Alpha Emitting Radium Isotopes	7534.61 dpm/mL
.Ra-226_00021	09/01/53		NIST, Lot 4967A		(Purchased Reagent)		Radium-226	2482 Bq/g
							Rn-222	2482 Bq/g
							Total Alpha Emitting Radium Isotopes	2482 Bq/g
Ra-226_00025	10/19/18	12/08/16	0.1M HCl, Lot N/A	100 mL	Ra-226_00024	4.9774 g	Ra	8409.79 dpm/mL
							Radium-226	8409.79 dpm/mL
							Rn-222	8409.79 dpm/mL
							Total Alpha Emitting Radium Isotopes	8409.79 dpm/mL
.Ra-226_00024	12/05/66		Eckert & Ziegler, Lot 104858		(Purchased Reagent)		Ra	2815.99 Bq/g
							Radium-226	2815.99 Bq/g
							Rn-222	2815.99 Bq/g
							Total Alpha Emitting Radium Isotopes	2815.99 Bq/g
Ra-226_00027	10/19/18	08/02/17	0.1M HCl, Lot N/A	500 mL	Ra-226_00025	1.5 mL	Ra	25.2294 dpm/mL
							Radium-226	25.2294 dpm/mL
							Total Alpha Emitting Radium Isotopes	25.2294 dpm/mL
.Ra-226_00025	10/19/18	12/08/16	0.1M HCl, Lot N/A	100 mL	Ra-226_00024	4.9774 g	Ra	8409.79 dpm/mL
							Radium-226	8409.79 dpm/mL
							Total Alpha Emitting Radium Isotopes	8409.79 dpm/mL
..Ra-226_00024	12/05/66		Eckert & Ziegler, Lot 104858		(Purchased Reagent)		Ra	2815.99 Bq/g
							Radium-226	2815.99 Bq/g
							Total Alpha Emitting Radium Isotopes	2815.99 Bq/g
Ra-228_00026	09/11/18	09/11/17	1M HNO3, Lot n/a	100 mL	Ra-228_00018	5.0709 g	Radium-228	226.435 dpm/mL
.Ra-228_00018	09/01/56		Eckert & Ziegler, Lot 1895-48		(Purchased Reagent)		Radium-228	74.423 Bq/g
Sr-90_00004	09/17/59	06/21/11	0.1M HCL, Lot 0	100 mL	Sr-90_00001	5.0139 g	Gross Beta	45120.6 dpm/mL
							Sr	22560.3 dpm/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Sr-90	22560.3 dpm/mL
.Sr-90_00001	09/17/59	Eckert & Ziegler, Lot 80573-334			(Purchased Reagent)		Gross Beta	14998.5 Bq/g
							Sr	7499.25 Bq/g
							Sr-90	7499.25 Bq/g
Sr-90_00018	03/12/19	11/28/12	0.1M HCL, Lot 0	100 mL	Sr-90_00017	4.9997 g	Gross Beta	44774.2 dpm/mL
							Sr-90	22387.1 dpm/mL
.Sr-90_00017	11/29/62	Analytics, Lot 92352			(Purchased Reagent)		Gross Beta	14925.6 Bq/g
							Sr-90	7462.82 Bq/g
Th-229_00023	12/20/18	12/15/17	0.1M HNO3, Lot n/a	500 mL	Th-229_00017	15 mL	At-217	67.2296 dpm/mL
							Thorium-229	67.2296 dpm/mL
.Th-229_00017	12/20/18	08/20/14	0.1M HNO3, Lot n/a	100 mL	Th-229_00016	5.0464 g	At-217	2240.99 dpm/mL
							Thorium-229	2240.99 dpm/mL
..Th-229_00016	08/06/64	Analytics, Lot 97790			(Purchased Reagent)		At-217	740.127 Bq/g
							Thorium-229	740.127 Bq/g
Th-230_00016	11/29/62	11/28/12	0.5M HNO3, Lot 0	100 mL	Th-230_00015	5.0489 g	Gross Alpha	2374.49 dpm/mL
							Thorium-230	2374.49 dpm/mL
.Th-230_00015	11/29/62	Analytics, Lot 92523			(Purchased Reagent)		Gross Alpha	783.829 Bq/g
							Thorium-230	783.829 Bq/g
Th-230_00019	08/28/18	08/13/13	1M HNO3, Lot n/a	100 mL	Th-230_00018	5.0731 mL	Gross Alpha	2228.23 dpm/mL
							Thorium-230	2228.23 dpm/mL
.Th-230_00018	08/08/63	Eckert & Ziegler Analytics, Lot 92776			(Purchased Reagent)		Gross Alpha	43922.5 dpm/g
							Thorium-230	43922.5 dpm/g
Th-230_00036	08/28/18	08/30/16	1M HNO3, Lot 0	200 mL	Th-230_00019	4 mL	Gross Alpha	44.5646 dpm/mL
							Thorium-230	44.5646 dpm/mL
.Th-230_00019	08/28/18	08/13/13	1M HNO3, Lot n/a	100 mL	Th-230_00018	5.0731 mL	Gross Alpha	2228.23 dpm/mL
							Thorium-230	2228.23 dpm/mL
..Th-230_00018	08/08/63	Eckert & Ziegler Analytics, Lot 92776			(Purchased Reagent)		Gross Alpha	43922.5 dpm/g
							Thorium-230	43922.5 dpm/g
Y Carrier_00032	04/16/19	CPI, Lot 10064660-5			(Purchased Reagent)		Y Carrier	50000 mg/L

Reagent

108347_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 108347
Source Description: 24.1 mm Diameter x 0.77 mm Thick Stainless Steel Disk
Product Code: MIX-EAB-FOIL
Customer: TestAmerica Laboratories - St. Louis
P.O. Number: 2702184, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities (if detected) were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectrometry. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 23-January-2018 12:00 PM EST

Isotope	Activity, Bq	Energy Range, keV	Half-Life, d	Uncertainty u_A, %	u_B, %	U, %*
Pu-239	8.035E+00	4950-5240	8.806E+06	1.0	1.5	3.6
Am-241	8.643E+00	5280-5600	1.580E+05	1.0	1.5	3.6
Th-230	8.101E+00	4470-4760	2.753E+07	1.0	1.5	3.6
Total Activity	2.480E+01	3000-8000		0.5	1.5	3.2

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

SRS Number: 108347

Comments:

Diameter of active area: 19 mm

Mounted on customer supplied 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION:

Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Calibrated by: _____

A. Chen, Spectroscopist

QC Approved by: _____ Date: 29-JAN-18

J. Lahr, Spectroscopist

Reagent

108348_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 108348
Source Description: 24.1 mm Diameter x 0.77 mm Thick Stainless Steel Disk
Product Code: MIX-EAB-FOIL
Customer: TestAmerica Laboratories - St. Louis
P.O. Number: 2702184, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities (if detected) were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectrometry. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 23-January-2018 12:00 PM EST

Isotope	Activity, Bq	Energy Range, keV	Half-Life, d	Uncertainty u_A, %	u_B, %	U, %*
Pu-239	7.067E+00	4950-5240	8.806E+06	1.1	1.5	3.7
Am-241	7.497E+00	5280-5600	1.580E+05	1.1	1.5	3.7
Th-230	6.956E+00	4470-4760	2.753E+07	1.1	1.5	3.7
Total Activity	2.154E+01	3000-8000		0.7	1.5	3.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

SRS Number: 108348

Comments:

Diameter of active area: 19 mm

Mounted on customer supplied 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION:

Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Calibrated by: _____

A. Chen, Spectroscopist

QC Approved by: _____ Date: 29-JAN-18

J. Lahr, Spectroscopist

Reagent

82232-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82232-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 3-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	7.630E+00	4420-4800	7.540E+04	0.7	1.1	2.6
Pu-239	7.137E+00	4950-5240	2.410E+04	0.7	1.1	2.6
Am-241	7.281E+00	5280-5600	4.326E+02	0.7	1.1	2.6
Total Activity	2.210E+01	3000-8000		0.4	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82233-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82233-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 3-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	4.950E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	6.064E+00	4950-5240	2.410E+04	0.7	1.1	2.6
Am-241	5.114E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	1.616E+01	3000-8000		0.1	1.1	2.2

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82236-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
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Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82236-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 2-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	7.107E+00	4420-4800	7.540E+04	0.7	1.1	2.6
Pu-239	6.664E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	6.891E+00	5280-5600	4.326E+02	0.7	1.1	2.6
Total Activity	2.071E+01	3000-8000		0.4	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.46 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82237-334_00003

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82237-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 1-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	5.856E+00	4420-4800	7.540E+04	1.0	1.1	3.0
Pu-239	6.424E+00	4950-5240	2.410E+04	0.9	1.1	2.8
Am-241	5.608E+00	5280-5600	4.326E+02	1.0	1.1	3.0
Total Activity	1.793E+01	3000-8000		0.6	1.1	2.5

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82240-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82240-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 8-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	6.304E+00	4420-4800	7.540E+04	0.9	1.1	2.8
Pu-239	7.163E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	8.298E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	2.182E+01	3000-8000		0.5	1.1	2.4

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82241-334_00001

Eckert & Ziegler
Analytics

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Atlanta, Georgia 30318
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Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82241-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 8-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	6.629E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	6.797E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	6.638E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	2.011E+01	3000-8000		0.4	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82243-334_00001

Eckert & Ziegler
Analytics

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Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82243-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 9-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	5.856E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	5.979E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	6.390E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	1.827E+01	3000-8000		0.3	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1966

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82244-334_00001

Eckert & Ziegler
Analytics

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Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82244-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 9-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	7.352E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	6.717E+00	4950-5240	2.410E+04	0.9	1.1	2.8
Am-241	6.897E+00	5280-5600	4.326E+02	0.9	1.1	2.8
Total Activity	2.101E+01	3000-8000		0.6	1.1	2.5

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82246-334_00001

Eckert & Ziegler
Analytics

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www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82246-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 9-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	5.570E+00	4420-4800	7.540E+04	1.0	1.1	3.0
Pu-239	5.353E+00	4950-5240	2.410E+04	1.0	1.1	3.0
Am-241	6.002E+00	5280-5600	4.326E+02	1.0	1.1	3.0
Total Activity	1.696E+01	3000-8000		0.7	1.1	2.6

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06.24.2010
E. A. Taskaev, QA Manager Alternate

Reagent

Ba Carrier_00038

REPORT OF ANALYSIS

Single-Element Aqueous RM

Custom Barium Standard

Product #: 4400-132859

Matrix: 2% HNO_3

Lot #: 10079154-1

Element	Certified Concentration
Ba	20,000 µg/mL

Intended Use: This solution is intended for use as a reference material (RM) or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), flame or furnace atomic absorption spectroscopy (AA or GFAA), and other techniques for elemental analysis.

Certification & Traceability: This RM was manufactured, processed, and/or certified under a quality management system that is registered/accredited to **ISO 9001**, **ISO Guide 34**, and **ISO/IEC 17025**. This RM was prepared to a nominal concentration of 20,000 µg/mL by gravimetric methods using single-element concentrate dissolved in high purity nitric acid (HNO_3) and diluted with filtered (0.22 µm), 18 M-ohm deionized water. The balances used in the preparation of this RM are calibrated regularly with traceability to NIST, using a calibration provider that is accredited to ISO/IEC 17025 by a mutually recognized accreditation body. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentration was determined based upon gravimetric procedures. Secondary verification of the certified concentration was performed using ICP-OES and is traceable to **NIST SRM 3104a**. The uncertainty associated with the certified concentration is ±0.5% relative, which is the sum of the estimated errors due to the purity of the raw materials, the gravimetric preparation of the solution, and transpiration through the container. This represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Instructions for Use: We recommend that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy, the analyst should: (1) use only pre-cleaned containers and transferware, (2) not pipette directly from the RM's original container, (3) never pour used product back into the original container, (4) make dilutions using calibrated balances or certified class A volumetric flasks and pipettes, (5) use a minimum sub-sample size of 500 µL, and (6) dilute with the same matrix as the original RM or other chemically suitable matrix. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or immerse the bottle or its contents, and avoid exposure to direct sunlight or moisture.

Period of Validity: CPI International ensures the accuracy of this solution for **18 months** from the certification date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Chuck Goudreau

Chuck Goudreau, Certifying Officer

May 1, 2018
Certification Date

CPI International waives all responsibility for any damages resulting from the usage and/or implementation of the products/data described herein.

USA
5580 Skylane Boulevard P: 707.525.5788
Santa Rosa, CA 95403 P: 800.878.7654
F: 707.545.7901

Europe
Nieuwe Hemweg 7P P: +31 20 638 05 97
1013BG Amsterdam F: +31 20 420 28 36
The Netherlands

www.cpiinternational.com

Reagent

ISOU-C 233CAL_00010

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
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Tel 404·352·8677
Fax 404·352·2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 108075
Source Description: 5 mL Liquid in Flame Sealed Ampoule
Product Code: 8233
Customer: TestAmerica Laboratories - St. Louis
P.O. Number: 2701588, Item 1

1342732
ID ISOU-C 233CAL 00010
Exp 12/11/22 Prpd cb
233 CAL

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics (EZA). The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. EZA maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 08-December-2017 12:00 PM EST

Isotope	Half-Life, d	Activity, Bq	Uncertainty u_A, %	Uncertainty u_B, %	Uncertainty U, %*	Calibration Method**
U-233	5.815E+07	3.682E+03	0.1	1.0	2.0	4π LS

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results." ****Calibration Methods:** 4π LS - 4π Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber.

(Certificate continued on reverse side)

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

SRS Number: 108075

Comments:

5.21367 g of 1 M HNO_3 solution, carrier free.

Impurities:

γ-impurities < 0.1%

α-impurities: U-232 4.59 Bq, U-234 4.42 Bq, other α-impurities < 0.001%

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Prepared by: A. Herron

A. Herron, Radiochemist

QC Approved by: _____ Date: 04-DEC-17

J. Lahr, Spectroscopist

Reagent

ISOU-C 236_00006

Eckert & Ziegler
Isotope Products

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661•309•1010
Fax 661•257•8303

1410269
ID: ISOU-C 236_00006
Exp 04/27/18 Prpd cb
236 CAL

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

Radionuclide:	U-236	**Customer:**	TESTAMERICA
Half-life:	(2.342 ± 0.003)E+07 years	**P.O. No.:**	2711266
Catalog No.:	7336	**Reference Date:**	1-Apr-18 12:00 PST
Source No.:	1999-41	**Contained Radioactivity:**	0.01041 **µCi** 385.2 **Bq**

Physical Description:

A. Mass of solution:	5.00569 g in 5 mL V-Vial
B. Chemical form:	$UO_2(NO_3)_2$ in dilute HNO_3
C. Carrier content:	None
D. Density:	0.9982 g/mL @ 20°C

Radioimpurities:

See Technical Data Sheet (EZIP Lot # 30130.01)

Radionuclide Concentration: 0.002080 µCi/g, 76.96 Bq/g

32.13 ug/g

Method of Calibration:

This source was prepared from a weighed aliquot of solution whose activity in µCi/g was determined using a liquid scintillation counter.

Uncertainty of Measurement:

A. Type A (random) uncertainty:	± 0.2 %
B. Type B (systematic) uncertainty:	± 3.0 %
C. Uncertainty in aliquot weighing:	± 0.4 %
D. Total uncertainty at the 99% confidence level:	± 3.0 %

Notes:

- See reverse side for leak test(s) performed on this source.
- EZIP participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (as in NRC Regulatory Guide 4.15).
- Nuclear data was taken from "Table of Radioactive Isotopes", edited by Virginia Shirley, 1986.
- This solution has a recommended working life of 5 years.

Daniel James Van Dalsem
Quality Control

10-Mar-18
Date

EZIP Ref. No.: 1999-41

THE LEAK TEST(S) INDICATED BY THE CHECKED BOX(ES) WAS(WERE) APPLIED TO DETERMINE THE INTEGRITY OF THE SOURCE DESCRIBED ON THE FRONT SIDE. THE LEAK TESTS INDICATED BELOW WERE EITHER TAKEN DIRECTLY FROM ISO 9978:1992 OR DERIVED FROM THE LEAK TEST METHODS LISTED IN ISO 9978:1992. THE REGULATORY LIMIT FOR LEAK TEST RESULTS IS <5 nCi (185 Bq) FOR BOTH ALPHA AND BETA-GAMMA ACTIVITY. LEAK TEST RESULTS MARKED BELOW CONTAINED <5 nCi (185 Bq) OF REMOVABLE ACTIVITY UNLESS OTHERWISE STATED ON THIS CERTIFICATE.

☑ **Standard Wipe Test**

The source was wiped over its entire surface with a moistened filter paper disk. After drying, the disk was checked for activity using a scintillation detector.

☐ **Special Wipe Test**

The source was wiped over its entire surface with moistened polystyrene. The polystyrene was then dissolved in a liquid scintillation cocktail and counted in a liquid scintillation counter.

☐ **Distilled Water Soak Test**

The source was immersed in distilled water and maintained at (50 ± 5)°C for a minimum of four hours or room temperature (20 ± 5)°C for 24 hours. After removal of the source, the liquid was a) checked for activity using a liquid scintillation counter, or b) evaporated in a planchet and the residue checked for activity using a windowless proportional counter or end-window G.M. tube.

☐ **Liquid Scintillation Soak Test**

The source was immersed for a minimum of 3 hours at room temperature(20 ± 5)°C in a liquid scintillation cocktail, which does not attack the source's outer surface material. The source was stored away from light to avoid photoluminescence. The sealed source was then removed and the activity of the liquid scintillation cocktail was measured.

☐ **Gas Source Test**

The source was placed in a vacuum desiccator and maintained at a pressure of <10 mm Hg for not less than 12 hours. The activity was checked by introducing air into the desiccator and monitoring the air with an end-window G.M. tube.

☐ **Ampoule Leak Test**

The ampoule was kept in an inverted position on a filter paper disk or polystyrene wipe for a minimum of 16 hours. The wipe was then checked for activity using a scintillation detector or liquid scintillation counter.

☐ **Bubble Leak Test**

The container was pressurized to its fill pressure; then soapy water was applied over its valve and neck or, the valve and neck of the vessel were immersed in water. If no growing bubbles were observed, the container was considered leak free.

☐ **Wipe Test for Industrial Ni-63 Sources**

The sources were wipe tested by an approved sampling plan, which called for either 100% of the batch to be individually wipe tested, or, a subset thereof. The wipe test(s) used to test for removable contamination and the results of those tests are recorded on the front of this form.

☐ **Pressure Test for Triotech Kr-85 Sources**

Prior to filling the vessel with Kr-85 gas, the vessel was evacuated to <5 mm Hg, the gas manifold system shut off and the system allowed to stand for a minimum of 30 minutes. A vacuum difference not greater than the known vacuum loss of the manifold system itself signified the vessel did not leak.

☐ **Leak Test Not Applicable**

The active area of the source is uncovered or is protected by a very thin coating. Although the deposit is adherent, it is not designed or certified to pass a standard leak test. The inactive portions of the source have been checked using the standard wipe test or special wipe test depending on the nuclide.

☐ **Other Leak Test**

Eckert & Ziegler
Isotope Products

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661•309•1010
Fax 661•257•8303

U-236 Technical Data

The U-236 used to prepare your order was taken from Isotope Products Laboratories Lot #30130.01 and had the following composition as of 8 Jul 05:

Nuclide	Mass %	Activity %
U-235	0.046	0.0015
U-236	99.657	99.997
U-238	0.297	0.0015

Isotopic composition provided by Techsnabexport Co. Ltd.

If you have any question, please contact IPL Technical Service: (661) 309-1010.

THE LEAK TEST(S) INDICATED BY THE CHECKED BOX(ES) WAS(WERE) APPLIED TO DETERMINE THE INTEGRITY OF THE SOURCE DESCRIBED ON THE FRONT SIDE. THE LEAK TESTS INDICATED BELOW WERE EITHER TAKEN DIRECTLY FROM ISO 9978:1992 OR DERIVED FROM THE LEAK TEST METHODS LISTED IN ISO 9978:1992. THE REGULATORY LIMIT FOR LEAK TEST RESULTS IS <5 nCi (185 Bq) FOR BOTH ALPHA AND BETA-GAMMA ACTIVITY. LEAK TEST RESULTS MARKED BELOW CONTAINED <5 nCi (185 Bq) OF REMOVABLE ACTIVITY UNLESS OTHERWISE STATED ON THIS CERTIFICATE.

☐ **Standard Wipe Test**

The source was wiped over its entire surface with a moistened filter paper disk. After drying, the disk was checked for activity using a scintillation detector.

☐ **Special Wipe Test**

The source was wiped over its entire surface with moistened polystyrene. The polystyrene was then dissolved in a liquid scintillation cocktail and counted in a liquid scintillation counter.

☐ **Distilled Water Soak Test**

The source was immersed in distilled water and maintained at (50 ± 5)°C for a minimum of four hours or room temperature (20 ± 5)°C for 24 hours. After removal of the source, the liquid was a) checked for activity using a liquid scintillation counter, or b) evaporated in a planchet and the residue checked for activity using a windowless proportional counter or end-window G.M. tube.

☐ **Liquid Scintillation Soak Test**

The source was immersed for a minimum of 3 hours at room temperature(20 ± 5)°C in a liquid scintillation cocktail, which does not attack the source's outer surface material. The source was stored away from light to avoid photoluminescence. The sealed source was then removed and the activity of the liquid scintillation cocktail was measured.

☐ **Gas Source Test**

The source was placed in a vacuum desiccator and maintained at a pressure of <10 mm Hg for not less than 12 hours. The activity was checked by introducing air into the desiccator and monitoring the air with an end-window G.M. tube.

☐ **Ampoule Leak Test**

The ampoule was kept in an inverted position on a filter paper disk or polystyrene wipe for a minimum of 16 hours. The wipe was then checked for activity using a scintillation detector or liquid scintillation counter.

☐ **Bubble Leak Test**

The container was pressurized to its fill pressure; then soapy water was applied over its valve and neck or, the valve and neck of the vessel were immersed in water. If no growing bubbles were observed, the container was considered leak free.

☐ **Wipe Test for Industrial Ni-63 Sources**

The sources were wipe tested by an approved sampling plan, which called for either 100% of the batch to be individually wipe tested, or, a subset thereof. The wipe test(s) used to test for removable contamination and the results of those tests are recorded on the front of this form.

☐ **Pressure Test for Triotech Kr-85 Sources**

Prior to filling the vessel with Kr-85 gas, the vessel was evacuated to <5 mm Hg, the gas manifold system shut off and the system allowed to stand for a minimum of 30 minutes. A vacuum difference not greater than the known vacuum loss of the manifold system itself signified the vessel did not leak.

☐ **Leak Test Not Applicable**

The active area of the source is uncovered or is protected by a very thin coating. Although the deposit is adherent, it is not designed or certified to pass a standard leak test. The inactive portions of the source have been checked using the standard wipe test or special wipe test depending on the nuclide.

☐ **Other Leak Test**

Reagent

ISOU-C Enrich_00004

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 107557
Source Description: 5 mL Liquid in Flame Sealed Ampoule
Product Code: 8235
Customer: TestAmerica Laboratories - St. Louis
P.O. Number: 2695031, Item 1

1303063
ID ISOU-C Enrich_00004
Exp 10/18/22 Prpd cb
U enriched (234 and 235)

See LIMS for open date CR

This standard radionuclide source was prepared using an aliquot measured gravimetrically from a master radionuclide solution. The master radionuclide solution was prepared by dissolution of Uranium Oxide in 2.5 M nitric acid. Isotopic activities were calculated based on NBL certificate for CRM U970 and verified by alpha spectroscopy for U-234. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 17-October-2017 12:00 PM EST

Isotope	Half-Life, d	Activity, Bq	Uncertainty u_A, %	Uncertainty u_B, %	Uncertainty U, %*	Calibration Method**
U-234	8.967E+07	3.727E+04	0.1	1.7	3.5	4π LS
U-235	2.571E+11	7.590E+02	0.5	1.7	3.6	4π LS
U-236	8.554E+09	3.470E+01	0.5	1.7	3.6	4π LS
U-238	1.632E+12	6.321E-01	0.5	1.5	3.1	4π LS

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results." ****Calibration Methods:** 4π LS - 4π Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber.

(Certificate continued on reverse side)

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

SRS Number: 107557

Comments:

5.19997 g of 1 M HNO_3 solution with Uranium 1.87 mg/g.

Original material certified by New Brunswick Laboratory as CRM U970.

Impurities:

γ-impurities < 0.1%

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Prepared by: _____

K. Eardley, Radiochemist

QC Approved by: _____ Date: 09-OCT-17

J. Mahr, Spectroscopist

Reagent

Ra-226_00021

National Institute of Standards & Technology

Certificate

Standard Reference Material® 4967A

Radium-226 Radioactivity Standard

This Standard Reference Material (SRM) consists of a solution of a standardized and certified quantity of radioactive radium-226 in a suitably stable and homogeneous matrix. It is intended primarily for the calibration of instruments that are used to measure radioactivity and for the monitoring of radiochemical procedures. A unit of SRM 4967A consists of approximately 5 mL of a hydrochloric acid and barium chloride solution, whose composition is specified in Table 1 and 2, contained in a flame-sealed borosilicate-glass ampoule [1].

The certified **radium-226** massic activity value, at a **Reference Time of 1200 EST, 01 September 2003**, is:

$$(2482 \pm 30)\ \mathrm{Bq \cdot g^{-1}}$$

A NIST certified value, as used within the context of this certificate, is a value for which NIST has the highest confidence in its uncertainty assessment. It is a "measurement result" [2] obtained directly or indirectly from a "primary reference measurement procedure" [3]. The certified value is traceable to the derived SI unit, becquerel (Bq).

Additional physical, chemical, and radiological properties for this SRM, as well as details on the standardization method, are given in Table 1 and 2. Uncertainties for the certified quantities are expanded ($k = 2$). The uncertainties are calculated according to the ISO and NIST Guides [4,5]. Table 3 contains a specification of the components that comprise the uncertainty analyses.

Expiration of Certification: The certification of **SRM 4967A** is valid indefinitely, within the measurement uncertainty specified, provided that the SRM is handled and stored properly and that no evaporation or change in composition has occurred. The solution matrix, in an unopened ampoule, is homogeneous and stable within its half-life-dependent useful lifetime provided the SRM is handled in accordance with instructions given in this certificate (see "Instructions for Handling and Storage"). Periodic recertification of this SRM is not required. The certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

Radiological and chemical hazard: Consult the Safety Data Sheet (SDS), enclosed with the SRM shipment, for radiological and chemical hazard information.

This SRM was prepared in the NIST Physical Measurement Laboratory, Radiation Physics Division, under the direction of M.P. Unterweger, Group Leader of the Radioactivity Group. The overall production, technical direction, and physical measurement leading to certification were provided by R. Collé and P. Volkovitsky of the NIST Radiation Physics Division, Radioactivity Group. Statistical consultation was provided by S.D. Leigh of the NIST Statistical Engineering Division.

Support aspects involved in the issuance of this SRM were coordinated through the NIST Office of Reference Materials.

Lisa R. Karam, Chief
Radiation Physics Division

Gaithersburg, Maryland 20899
Certificate Issue Date: 03 September 2013
See Certificate Revision History on Last Page

Robert L. Watters, Jr., Director
Office of Reference Materials

Table 3. Uncertainty Evaluation for the Massic Activity of SRM 4967A

	Uncertainty component	Assessment Type[a]	Relative standard uncertainty contribution on massic activity of ^{226}Ra (%)
1	Calibration of the "1947 (1967 recalibrated) series" of radium-226 solution standards in terms of mass of radium-226[b]	B	0.34
2	Ratio of the mass of radium-226 in SRM 4967A to the mass of radium-226 in the "1947 (1967 recalibrated) series" of radium-226 solution standards. Weighted mean of the ratios obtained using seven different comparisons.	B	0.15
3	Corrections for the decay of radium-226. Standard uncertainty of the radium-226 half-life.	A	0.007
4	Gravimetric measurements	B	0.10
5	Conversion of radium-226 mass to activity. Standard uncertainty of the radium-226 half-life.[c]	A	0.44
6	Photon emitting impurities. Limit of detection.	B	0.01
Relative combined standard uncertainty			**0.6**
Relative expanded uncertainty ($k = 2$)			**1.2**

[a] Letter A denotes evaluation by statistical methods; B denotes evaluation by other methods.

[b] For further details on NBS/NIST radium series calibrations refer to reference [8]. The 1967 recalibrations of the "1947 series" and of the "1957 series" were made using pressurized "4π"γ ionization chamber (PIC) "A". The master solution for SRM 4967A was directly compared with the "1947 (1967 recalibrated) series" of radium-226 solution standards using PIC "A", and was compared with the solutions of the "1992 series" of radium solution standards (SRM 4967) using PIC "A", pulse-ionization-chamber radon analyses (see references [9] and [10]), and germanium photon spectrometry. The radium-226 in SRM 4967A was chemically purified approximately 55 years from the reference time. The lead-210 and its daughter radionuclides are still not in equilibrium as of the 2013 certificate issue date.

[c] The U.S National Standards for radium-226 are certified in terms of mass of radium-226, as were all radium-226 SRMs prior to the "1992 series". Beginning with "1992 series", radium-226 solution SRMs are now certified in terms of the massic activity of radium-226. The relative standard uncertainty of the activity of radium-226 per unit mass of radium-226 is determined by the relative standard uncertainty of λ (i.e., of the half-life). The relative standard uncertainties of the atomic weight of radium-226 and of Avogadro's number are negligible.

Table 1. Certified Massic Activity of SRM 4967A

Radionuclide	**Radium-226**
Reference time	**1200 EST, 01 September 2003**
Massic activity of the solution	**2482 Bq•g^{-1}**
Relative expanded uncertainty ($k = 2$)	**1.20 %**

Table 2. Uncertified Information of SRM 4967A

Source description	Liquid in a flame-sealed 5 mL borosilicate-glass ampoule [1]
Solution composition	1.0 mol•L^{-1} HCl with 80μg of $BaCl_2$ per gram of solution
Solution density	(1.017 ± 0.002) g•mL^{-1} at 21 °C[(a)]
Solution mass	(5.086 ± 0.003) g[(a)]
Photon-Emitting Impurities	None detected[(b)]
Half-lives used	^{226}Ra: (1600 ± 7) a [6][(c)] ^{222}Ra: (3.8235 ± 0.0003) d [7][(c)]
Calibration methods (and instruments)	Gravimetric dilution of SRM 4963, confirmed by comparison with solution standards, and derivatives thereof, from the NBS/NIST "1947 (1967 recalibrated) series" of radium-226 solution standards. The mass of radium-226 in these solution standards had previously been determined by comparison with the U.S. National Standards for radium-226. Conversion from mass of radium-226 to activity of radium-226 was done using the half-life of radium-226 shown above.[(d)]

[(a)] The stated uncertainty is two times the standard uncertainty. See reference 5.

[(b)] The estimated lower limits of detection for photon-emitting impurities, as of September 2003, expressed as massic photon mission rate, are:

6×10^{0} s^{-1}•g^{-1} for energies between 22 keV and 182 keV,
3×10^{0} s^{-1}•g^{-1} for energies between 190 keV and 347 keV,
8×10^{-1} s^{-1}•g^{-1} for energies between 356 keV and 1455 keV, and
3×10^{-1} s^{-1}•g^{-1} for energies between 1465 keV and 2750 keV,

provided that the photons are separated in energy by 4 keV or more from photons emitted in the decay of ^{226}Ra and progeny.

[(c)] The stated uncertainty is the standard uncertainty. See reference 5.

[(d)] For further details on NBS/NIST radium series calibrations refer to reference [8]. The 1967 recalibrations of the "1947 series" and of the "1957 series" were made using pressurized "4π"γ ionization chamber (PIC) "A". The master solution for SRM 4967A was directly compared with the "1947 (1967 recalibrated) series" of radium-226 solution standards using PIC "A", and was compared with the solutions of the "1992 series" of radium solution standards (SRM 4967) using PIC "A", pulse-ionization-chamber radon analyses (see references [9] and [10]), and germanium photon spectrometry. The radium-226 in SRM 4967A was chemically purified approximately 55 years from the reference time. The lead-210 and its daughter radionuclides are still not in equilibrium as of the 2013 certificate issue date.

INSTRUCTIONS FOR HANDLING AND STORAGE

Handling: If the ampoule is transported, it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) because of both the radioactivity and the strong acid. Only persons qualified to handle both radioactive material and alkaline and/or acidic solutions should open the ampoule. To minimize personnel exposure, appropriate shielding and/or distance should be used. Refer to the SDS for further information.

Storage: SRM 4967A should be stored and used at a temperature between 5 °C and 65 °C. The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material.

REFERENCES

[1] NIST Physical Measurement Laboratory; *Storage and Handling of Radioactive Standard Reference Materials, Ampoule Specifications and Opening Procedure*, available at http://www.nist.gov/pml/div682/grp04/srm.cfm (accessed Sep 2013). Note: This SRM is contained in a generic borosilicate-glass ampoule and not in the standard NIST ampoule.

[2] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 19 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Sep 2013).

[3] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 18 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Sep 2013).

[4] JCGM 100:2008; *Guide to the Expression of Uncertainty in Measurement;* (GUM 1995 with Minor Corrections), Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France (2008); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_100_2008_E.pdf (accessed Sep 2013).

[5] Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297, U.S. Government Printing Office: Washington, DC (1994); available at http://www.nist.gov/pml/pubs/index.cfm (accessed Sep 2013).

[6] Chisté, V; Bé, M.M.; *January 2007,* ^{226}Ra; LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ra-226_tables.pdf (accessed Sep 2013).

[7] Chisté, V; Bé, M.M.; *July 2010,* ^{222}Rn; LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Rn-222_tables.pdf (accessed Sep 2013).

[8] Mann, W.B.; Stockman, L.L.; Youden, W.J.; Schwebel, A.; Mullen, P.A.; Garfinkel, S.B.; Preparation of New Solution Standards of Radium, *Journal of Research of the National Bureau of Standards* 62 (1959) 21-26.

[9] Collé, R.; Hutchinson, J.M.R.; Unterweger, M.P.; The NIST Primary Radon-222 Measurement System, *Journal of Research of the National Institute of Standards and Technology* 95 (1990) 155-165.

[10] Hutchinson J.M.R; Cessna, J.; Collé R.; Hodge P.; An International Radon-In-Air Measurement Intercomparison Using a New Transfer Standard, *Applied Radiation Isotopes* 43 (1992) 175-189.

Certificate Revision History: September 2013 (Text and expiration date revised); December 2004 (Original certification date).

Users of this SRM should ensure that the Certificate in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.

Reagent

Ra-226_00024

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404 352 8677
Fax 404 352 2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 104858
Source Description: 5 mL Liquid in Flame Sealed Vial
Product Code: 8226
Customer: TestAmerica St. Louis
P.O. Number: 2665998, Item 1

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics (EZA) using a germanium gamma-ray spectrometer system. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. EZA maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 05-December-2016 12:00 PM EST

Isotope	Half-Life, d	Activity, Bq	Uncertainty u_A, %	Uncertainty u_B, %	Uncertainty U, %*	Calibration Method**
Ra-226	5.844E+05	1.408E+04	1.0	2.1	4.7	HPGe

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results." ****Calibration Methods:** 4π LS - 4π Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber.

(Certificate continued on reverse side)

SRS Number: 104858

Comments:
5.00002 g 0.1 M HCl solution with approximately 30 µg/g Ba carrier.

Impurities:
γ-impurities (other than decay products) < 0.1%

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QC Approved by: _____ Date: 05-DEC-16
J. Lahr, Spectroscopist

Reagent

Ra-226_00025

SRS Number: 104858

Comments:
5.00002 g 0.1 M HCl solution with approximately 30 µg/g Ba carrier.

Impurities:
γ-impurities (other than decay products) < 0.1%

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QC Approved by: _____ Date: 05-DEC-16
J. Lahr, Spectroscopist

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 104858
Source Description: 5 mL Liquid in Flame Sealed Vial
Product Code: 8226
Customer: TestAmerica St. Louis
P.O. Number: 2665998, Item 1

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics (EZA) using a germanium gamma-ray spectrometer system. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. EZA maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 05-December-2016 12:00 PM EST

Isotope	Half-Life, d	Activity, Bq	Uncertainty u_A, %	Uncertainty u_B, %	Uncertainty U, %*	Calibration Method**
Ra-226	5.844E+05	1.408E+04	1.0	2.1	4.7	HPGe

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results." ****Calibration Methods:** 4π LS - 4π Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber.

(Certificate continued on reverse side)

Reagent

Ra-226_00027

Standard ID Number:	Ra-226_00027		Radionuclide:
True Value =	11360	pCi/L or g	Ra-226
Date Analyzed:	10/19/2017		

	Replicates	
#1	11590	pCi/L or g
#2	10870	pCi/L or g
#3	10690	pCi/L or g
#4	11320	pCi/L or g
#5	10440	pCi/L or g
#6	11270	pCi/L or g

Mean = 11030

1 sigma = 434.649284 1.96 sigma = 851.9126

True Value minus 5% = 10792 (True Value - 5%)
True Value plus 5% = 11928 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

1st Reviewed By/Date: RM 10.20.17

2nd Reviewed By/Date: ALD 10/20/17

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Total Alpha-Emitting Radium

Batch: 332805 **Operator:**

SampID / Analyte	WRKNO	Ts	Aliquot Tb	Cs	Ba Mass Cb	Ba Yield CPMs	Trunc Yield CPMb	Ingrowth	Ba Precip Time	InstrID	Eff	Cal Type	Cnt Date Time	Sigma
								Activity	UncCount	UncTotal	MDA	DLC	MQO	
LCS 160-332805/2-A	LCS		1.0000mL		0.0324	95.58%	False	1.0420	10/19/17 17:40	Orange9	0.1948	2	10/19/17 18:41	1.00
Total Alpha Emitting		100.00	1000.00	501	19	5.01	0.02	1.159E+004pCi/L	5.198E+002	7.363E+002	1.801E+002	5.522E+001	736.3182	
LCS 160-332805/3-A	LCS		1.0000mL		0.0308	90.86%	False	1.0421	10/19/17 17:40	Orange14	0.1968	2	10/19/17 18:42	1.00
Total Alpha Emitting		100.00	1000.00	456	64	4.56	0.06	1.087E+004pCi/L	5.166E+002	7.114E+002	2.835E+002	1.055E+002	711.3722	
LCS 160-332805/4-A	LCS		1.0000mL		0.0317	93.51%	False	1.0421	10/19/17 17:40	Orange15	0.1906	2	10/19/17 18:42	1.00
Total Alpha Emitting		100.00	1000.00	447	61	4.47	0.06	1.069E+004pCi/L	5.130E+002	7.033E+002	2.794E+002	1.033E+002	703.3033	
LCS 160-332805/5-A	LCS		1.0000mL		0.0318	93.81%	False	1.0421	10/19/17 17:40	Orange17	0.1926	2	10/19/17 18:42	1.00
Total Alpha Emitting		100.00	1000.00	479	60	4.79	0.06	1.132E+004pCi/L	5.241E+002	7.308E+002	2.741E+002	1.011E+002	730.8393	
LCS 160-332805/6-A	LCS		1.0000mL		0.0304	89.68%	False	1.0421	10/19/17 17:40	Orange19	0.1983	2	10/19/17 18:42	1.00
Total Alpha Emitting		100.00	1000.00	440	103	4.40	0.10	1.044E+004pCi/L	5.105E+002	6.939E+002	3.421E+002	1.346E+002	693.8952	
LCS 160-332805/7-A	LCS		1.0000mL		0.0324	95.58%	False	1.0422	10/19/17 17:40	Orange22	0.1944	2	10/19/17 18:42	1.00
Total Alpha Emitting		100.00	1000.00	491	68	4.91	0.07	1.127E+004pCi/L	5.159E+002	7.234E+002	2.792E+002	1.047E+002	723.3587	

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity		StdAdded	Recovery		LCL	UCL	ZFactor
LCS 160-332805/2-A	LCS 160-332805/2-A	Total Alpha	1.159E+004	pCi/L	1.136E+004	102.01	%			0.2216
LCS 160-332805/3-A	LCS 160-332805/3-A	Total Alpha	1.087E+004	pCi/L	1.136E+004	95.67	%			-0.4779
LCS 160-332805/4-A	LCS 160-332805/4-A	Total Alpha	1.069E+004	pCi/L	1.136E+004	94.11	%			-0.6522
LCS 160-332805/5-A	LCS 160-332805/5-A	Total Alpha	1.132E+004	pCi/L	1.136E+004	99.64	%			-0.0395
LCS 160-332805/6-A	LCS 160-332805/6-A	Total Alpha	1.044E+004	pCi/L	1.136E+004	91.94	%			-0.8930
LCS 160-332805/7-A	LCS 160-332805/7-A	Total Alpha	1.127E+004	pCi/L	1.136E+004	99.17	%			-0.0912

Sample Duplicate Information

SampID	SampDupID	Analyte	Activity	DupActivity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	WRKNO	Analyte	Activity	MSActivity	StdAdded	Recovery	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal

Ref. 12/5/16

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Reagent ID: Ra-226_00027

Description:	Ra-226 Spike	Expiration Date:	02/16/2018
No. of Bottles:	2	Laboratory:	TestAmerica St. Louis
Storage Location:	RAD Separations Reagents - Rm 131	Prepared By:	Bernsen, Sarah C
Reagent Volume:	500.000 mL	Solvent:	0.1M HCl
Creation Date:	08/02/2017	Solvent Lot:	N/A
Open Date:			
Container(s):	1240776, 1240777		
Comment:			

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
Ra	Ra-226_00025	02/16/2018	8409.78500	dpm/mL	25.22936	dpm/mL
Ra-226	Ra-226_00025	02/16/2018	8409.78500	dpm/mL	25.22936	dpm/mL
Total Alpha Emitting Radium Isotopes	Ra-226_00025	02/16/2018	8409.78500	dpm/mL	25.22936	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Ra-226_00025	Ra-226 Parent		02/16/18				1.50000	mL

PrecSep_0 Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-332805 Analyst: Mueller, Rachel T

Batch Open: 10/19/2017 2:20:00PM

Batch End: 10/19/2017 6:30:00PM

Preparation, Precipitate Separation

	Input Sample Lab ID (Analytical Method)	SDG (Job #)	Matrix	Initial Amount	Final Amount	Due Date	Analytical TAT	Dlv Rank	Comments	Output Sample Lab ID
1	160-25099-A-1 (903.0_TAR)	N/A (160-25099-1)	Water	1 mL		10/30/17	8_Days	2	dummy- do not count	
2	LCS~160-332805/2 N/A	N/A		1 mL		N/A	N/A	N/A	bottle a orange 9	
3	LCS~160-332805/3 N/A	N/A		1 mL		N/A	N/A	N/A	bottle a 14	
4	LCS~160-332805/4 N/A	N/A		1 mL		N/A	N/A	N/A	bottle a 15	
5	LCS~160-332805/5 N/A	N/A		1 mL		N/A	N/A	N/A	bottle b 17	
6	LCS~160-332805/6 N/A	N/A		1 mL		N/A	N/A	N/A	bottle b 19	
7	LCS~160-332805/7 N/A	N/A		1 mL		N/A	N/A	N/A	bottle b 22	
8	N/A	N/A				N/A	N/A	N/A		
9	N/A	N/A				N/A	N/A	N/A		
10	N/A	N/A				N/A	N/A	N/A		

Ra-226 - 00027 verification

08/09/2018

PrecSep_0 Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-332805 Analyst: Mueller, Rachel T Batch Open: 10/19/2017 2:20:00PM

Batch End: 10/19/2017 6:30:00PM

Batch Notes

Manually Enter Results? (0=NO, 1=YES)	No
EiChrom Used (Y/N)?	no
Radium Batch (Y/N)?	yes
Balance ID	n/a
Analyst ID - Reagent Drop	RTM
Analyst ID - Reagent Drop Witness	SCB per RTM
Pipette ID	CR-001
SOP Number	ST-RC-0040
Carrier ID for Barium	Ba
Strontium Carrier ID	
Yttrium Carrier ID	
Batch Comment	Ra-226_00027 Verification- bottle a and bottle b

Comments

PrecSep_0 Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-332805 Analyst: Mueller, Rachel T

Batch Open: 10/19/2017 2:20:00PM

Batch End: 10/19/2017 6:30:00PM

Reagent Additions Worksheet

Lab ID	Reagent Code	Amount Added	Final Amount	By	Witness
160-25099-A-1	Ba Carrier_00030	1 mL			
LCS 160-332805/2	Ba Carrier_00030	1 mL			
LCS 160-332805/2	Ra-226_00027	1 mL			
LCS 160-332805/3	Ba Carrier_00030	1 mL			
LCS 160-332805/3	Ra-226_00027	1 mL			
LCS 160-332805/4	Ba Carrier_00030	1 mL			
LCS 160-332805/4	Ra-226_00027	1 mL			
LCS 160-332805/5	Ba Carrier_00030	1 mL			
LCS 160-332805/5	Ra-226_00027	1 mL			
LCS 160-332805/6	Ba Carrier_00030	1 mL			
LCS 160-332805/6	Ra-226_00027	1 mL			
LCS 160-332805/7	Ba Carrier_00030	1 mL			
LCS 160-332805/7	Ra-226_00027	1 mL			

Rad Worksheet

Batch Number: 160-332805
Method: PrecSep_0
Analyst: Mueller, Rachel T

Date Open: Oct 19 2017 2:20PM
Batch End: Oct 19 2017 6:30PM

Lab ID	Client ID	Method Chain	Basis	Initial weight/volume of sample	Tare Weight of Barium Planchette	Gross Weight of Barium Planchette	Barium Mass Added	Ingrowth/Decay Date1	Ingrowth/Decay Date2
160-25099-A-1	Ra-226 Verification	PrecSep_0, 903.0_TAR	T	1 mL			0.0339 g	10/19/2017 16:21	10/19/2017 17:40
LCS~160-332805/2				1 mL	8.6284 g	8.6608 g	0.0339 g	10/19/2017 16:21	10/19/2017 17:40
LCS~160-332805/3				1 mL	8.7340 g	8.7648 g	0.0339 g	10/19/2017 16:21	10/19/2017 17:40
LCS~160-332805/4				1 mL	8.6106 g	8.6423 g	0.0339 g	10/19/2017 16:21	10/19/2017 17:40
LCS~160-332805/5				1 mL	8.7237 g	8.7555 g	0.0339 g	10/19/2017 16:21	10/19/2017 17:40
LCS~160-332805/6				1 mL	8.8151 g	8.8455 g	0.0339 g	10/19/2017 16:21	10/19/2017 17:40
LCS~160-332805/7				1 mL	8.7377 g	8.7701 g	0.0339 g	10/19/2017 16:21	10/19/2017 17:40

Reagent

Ra-228_00018

Eckert & Ziegler
Isotope Products

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661·309·1010
Fax 661·257·8303

CERTIFICATE OF CALIBRATION
BETA STANDARD SOLUTION

Radionuclide:	Ra-228	**Customer:**	TESTAMERICA
Half-life:	5.75 ± 0.03 years	**P.O. No.:**	2652999
Catalog No.:	7328	**Reference Date:**	1-Sep-16 12:00 PST
Source No.:	1895-48	**Contained Radioactivity: (Ra-228 only)**	10.27 **nCi** 380.0 **Bq**

Physical Description:

A. Mass of solution:	5.10594 g in 5 mL flame-sealed ampoule
B. Chemical form:	$Ra(NO_3)_2$ in 1M HNO_3
C. Carrier content:	None
D. Density:	1.0318 g/mL @ 20°C

Radioimpurities:

None detected (Ac-228 in equilibrum; Th-228 not in equilibrium)

Radionuclide Concentration: 2.011 nCi/g, 74.41 Bq/g

Method of Calibration:

This source was prepared from a weighed aliquot of solution whose activity in µCi/g was determined using gamma ray spectrometry.

Peak energy used for integration:	338.4, 911.1 keV
Branching ratio used:	0.113, 0.266 gammas per decay

Uncertainty of Measurement:

A. Type A (random) uncertainty:	± 1.6 %
B. Type B (systematic) uncertainty:	± 3.0 %
C. Uncertainty in aliquot weighing:	± 0.1 %
D. Total uncertainty at the 99% confidence level:	± 3.4 %

Notes:

- See reverse side for leak test(s) performed on this source.
- EZIP participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (as in NRC Regulatory Guide 4.15).
- Nuclear data was taken from NCRP Report No. 58, 1985.
- This solution has a recommended working life of 5 years.

Daniel James VanDalsem
Quality Control

2-Aug-16
Date

EZIP Ref. No.: 1895-48

Reagent

Ra-228_00026

Standard ID Number: Ra-228_00026
True Value = 90047 pCi/L or g
Date Analyzed: 9/14/2017

Radionuclide: Ra-228

	Replicates	
#1	86900	pCi/L or g
#2	85900	pCi/L or g
#3	84200	pCi/L or g

Mean = 85666.6667

1 sigma = 1365.03968

1.96 sigma = 2675.478

True Value minus 5% = 85544.65 (True Value - 5%)
True Value plus 5% = 94549.35 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: RTM 9/15/17 9.15.17

2nd Reviewed By/Date: 9-15-17

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	9/1/2016 0:00		
Decayto Date/Time (t):	9/14/17 0:00		
Initial Activity (A_0):	226.46	dpm	
Initial Aliquot:	1	mL	
Initial Conc:	226.4649544	dpm/mL	
***Soln. Density:**	1	g/mL	
Nuclide:	Ra-228		
Half-Life (days):	2100.1875	decay days	fraction
****Decay Factor:**	0.8827	378.00	0.17998
Decay Corr Activity:	1.9990E+02	dpm	
Decay Corr Conc:	1.9990E+02	dpm/mL	

Conversion/Calculations

Final Activity Unit:	pCi	
Activity Unit Factor:	0.45045	
Final Volume Unit:	L	
Volume Unit Factor:	0.001	
Final Concentration:	9.0047E+04	pCi/L
Aliquot Volume:	1.0000E+00	L
Final Activity (A):	9.0047E+04	pCi

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gamma Spectroscopy

Batch: 326940 **Operator:**

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
160-24418-A-1-A	160-24418-A-1-	100.00mL	1.00	GammaVision	GV17	9 / 14 / 17 17:14	60

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	8.689E+004pCi/L	4.284E+003	8.854E+002	1.071E+003	5.105E+002	81.17	4,283.9915
AG-108M	10982	1.111E+002pCi/L	1.375E+002	1.374E+002	3.478E+002	1.694E+002	0.32	137.4863
AG-110M	10973	1.262E+002pCi/L	9.356E+001	9.336E+001	7.705E+002	3.756E+002	0.16	93.5550
AM-241	10818	2.795E+002pCi/L	4.038E+002	4.035E+002	1.335E+003	6.629E+002	0.21	403.7662
BA-133	10469	-1.532E+002pCi/L	2.072E+002	2.071E+002	6.885E+002	3.387E+002	-0.22	207.2134
BA-140	10463	9.611E+002pCi/L	6.222E+002	6.204E+002	1.258E+003	6.099E+002	0.76	622.1527
BE-7	10435	9.068E+002pCi/L	1.229E+003	1.229E+003	4.093E+003	2.006E+003	0.22	1,229.4017
BI-207	10195	1.133E+002pCi/L	1.027E+002	1.026E+002	4.221E+002	2.060E+002	0.27	102.7108
BI-210M	10173	-2.380E+002pCi/L	7.539E+002	7.538E+002	6.260E+002	3.074E+002	-0.38	753.9469
BI-212	10160	5.578E+004pCi/L	3.548E+003	2.285E+003	4.770E+003	2.306E+003	11.69	3,547.6552
BI-214	10154	5.271E+002pCi/L	2.881E+002	2.870E+002	6.756E+002	3.265E+002	0.78	288.1201
CD-109	9254	2.394E+003pCi/L	5.544E+003	5.543E+003	1.833E+004	9.121E+003	0.13	5,544.3131
CD-113M	17462	-4.568E+004pCi/L	1.791E+006	1.791E+006	5.993E+006	2.950E+006	-0.01	1,790,914.4118
CE-139	9241	1.214E+002pCi/L	1.337E+002	1.335E+002	4.421E+002	2.185E+002	0.27	133.7413
CE-141	9235	1.280E+002pCi/L	1.204E+002	1.203E+002	3.990E+002	1.956E+002	0.32	120.4128
CE-144	9221	0.000E+000pCi/L	4.251E+002	4.251E+002	4.501E+003	2.234E+003	0.00	425.0656
CF-249	9215	7.870E+001pCi/L	2.652E+002	2.651E+002	8.828E+002	4.358E+002	0.09	265.1743
CF-251	13690	6.051E+002pCi/L	6.362E+002	6.350E+002	1.676E+003	8.257E+002	0.36	636.2372
CO-56	8704	1.114E+002pCi/L	1.008E+002	1.006E+002	2.978E+002	1.421E+002	0.37	100.7585
CO-57	13694	1.011E+002pCi/L	9.527E+001	9.513E+001	3.149E+002	1.554E+002	0.32	95.2656
CO-58	8698	1.571E+002pCi/L	1.435E+002	1.433E+002	4.765E+002	2.317E+002	0.33	143.5350
CO-60	8692	-2.668E+001pCi/L	1.714E+002	1.714E+002	3.699E+002	1.751E+002	-0.07	171.3841
CR-51	8604	0.000E+000pCi/L	5.644E+002	5.644E+002	4.378E+003	2.157E+003	0.00	564.3605
CS-134	8553	-2.988E+001pCi/L	2.442E+001	2.438E+001	9.049E+002	4.472E+002	-0.03	24.4202
CS-136	8546	-1.751E+002pCi/L	1.631E+002	1.628E+002	5.410E+002	2.639E+002	-0.32	163.1026
CS-137	8539	0.000E+000pCi/L	3.918E+001	3.918E+001	6.384E+002	3.127E+002	0.00	39.1850
EU-152	7145	2.847E+002pCi/L	2.310E+002	2.306E+002	3.463E+003	1.719E+003	0.08	230.9639
EU-154	7138	1.271E+003pCi/L	8.981E+002	8.960E+002	2.965E+003	1.426E+003	0.43	898.1246
EU-155	7131	4.466E+003pCi/L	3.996E+002	3.249E+002	9.480E+002	4.663E+002	4.71	399.5505
FE-59	7073	-3.557E+002pCi/L	2.871E+002	2.866E+002	6.546E+002	3.125E+002	-0.54	287.1053
GA-68	18005	1.356E+004pCi/L	5.462E+003	5.413E+003	1.147E+004	5.393E+003	1.18	5,462.3318
GD-153	6824	-2.819E+002pCi/L	5.290E+002	5.288E+002	1.750E+003	8.695E+002	-0.16	529.0279
HF-181	6495	1.154E+002pCi/L	1.733E+002	1.732E+002	5.770E+002	2.831E+002	0.20	173.2594
HG-203	6466	1.368E+002pCi/L	1.605E+002	1.604E+002	5.319E+002	2.624E+002	0.26	160.5429
I-131	6380	1.420E+002pCi/L	1.449E+002	1.447E+002	3.652E+002	1.783E+002	0.39	144.8950
IR-192	6303	1.602E+001pCi/L	1.874E+001	1.871E+001	5.007E+002	2.467E+002	0.03	18.7353
K-40	6148	1.908E+003pCi/L	1.290E+003	1.287E+003	2.839E+003	1.319E+003	0.67	1,290.3863
LA-140	6096	2.428E+002pCi/L	2.699E+002	2.696E+002	1.050E+003	5.127E+002	0.23	269.9076
MN-54	5382	1.358E+003pCi/L	1.290E+002	1.110E+002	2.603E+002	1.234E+002	5.22	129.0115
NA-22	5201	-2.198E+002pCi/L	1.272E+002	1.268E+002	4.163E+002	1.987E+002	-0.53	127.2466
NB-94	5160	-1.119E+002pCi/L	1.983E+002	1.983E+002	5.035E+002	2.458E+002	-0.22	198.3438
NB-95	5154	3.471E+001pCi/L	1.544E+002	1.544E+002	5.197E+002	2.536E+002	0.07	154.4449
ND-147	5083	4.552E+002pCi/L	6.258E+002	6.254E+002	2.689E+003	1.308E+003	0.17	625.8439
NP-237	4757	0.000E+000pCi/L	1.655E+003	1.655E+003	5.478E+003	2.727E+003	0.00	1,655.1438
NP-239	4751	3.634E+002pCi/L	5.311E+002	5.307E+002	1.757E+003	8.714E+002	0.21	531.1382
PA-231	4541	-4.188E+003pCi/L	6.395E+003	6.391E+003	2.119E+004	1.049E+004	-0.20	6,394.5691
PA-233	4535	-4.608E+000pCi/L	3.574E+002	3.574E+002	1.716E+003	8.491E+002	0.00	357.4157
PA-234	4528	6.677E+002pCi/L	6.191E+002	6.183E+002	2.745E+003	1.363E+003	0.24	619.1456
PA-234M	19453	-7.163E+003pCi/L	2.003E+004	2.003E+004	4.819E+004	2.317E+004	-0.15	20,031.1079
PB-210	4467	-1.365E+003pCi/L	2.164E+003	2.163E+003	6.122E+003	3.019E+003	-0.22	2,164.4189

PB-212	4454	5.710E+004pCi/L	3.119E+003	5.323E+002	5.870E+002	2.875E+002	97.27	3,118.5568
PB-214	4448	4.024E+002pCi/L	3.223E+002	3.217E+002	1.063E+003	5.223E+002	0.38	322.2633
PM-144	19585	2.116E+002pCi/L	1.947E+002	1.944E+002	4.502E+002	2.193E+002	0.47	194.7005
PM-146	2464	2.325E+002pCi/L	5.495E+002	5.494E+002	1.284E+003	6.239E+002	0.18	549.5123
RH-106	1882	2.477E+003pCi/L	2.346E+003	2.343E+003	9.284E+003	4.589E+003	0.27	2,345.8726
RU-103	1828	-1.692E+002pCi/L	1.625E+002	1.623E+002	3.915E+002	1.909E+002	-0.43	162.4983
SB-124	1784	-1.967E+002pCi/L	2.748E+002	2.746E+002	9.107E+002	4.501E+002	-0.22	274.7665
SB-125	1777	-1.221E+001pCi/L	1.346E+001	1.344E+001	1.082E+003	5.275E+002	-0.01	13.4578
SC-46	1739	1.431E+002pCi/L	1.167E+002	1.165E+002	5.583E+002	2.721E+002	0.26	116.7084
SN-113	1570	2.080E+002pCi/L	2.622E+002	2.620E+002	8.691E+002	4.288E+002	0.24	262.1642
SN-126	17459	1.032E+003pCi/L	1.520E+003	1.519E+003	5.026E+003	2.496E+003	0.21	1,520.1596
TA-182	1301	4.320E+002pCi/L	3.570E+002	3.564E+002	1.407E+003	6.789E+002	0.31	357.0432
TC-99M	17412	-1.112E+002pCi/L	1.409E+002	1.408E+002	4.662E+002	2.309E+002	-0.24	140.9341
TH-227	1058	4.744E+001pCi/L	1.176E+003	1.176E+003	3.297E+003	1.627E+003	0.01	1,175.8170
TH-229	1046	3.732E+002pCi/L	4.400E+002	4.394E+002	7.064E+003	3.481E+003	0.05	439.9987
TH-234	1027	6.533E+002pCi/L	3.769E+003	3.769E+003	1.249E+004	6.202E+003	0.05	3,769.1617
TL-208	929	1.804E+004pCi/L	9.406E+002	3.400E+002	4.192E+002	2.036E+002	43.04	940.5733
U-235	281	1.168E+003pCi/L	1.395E+003	1.394E+003	3.480E+003	1.723E+003	0.34	1,394.9519
Y-88	74	1.478E+002pCi/L	1.091E+002	1.089E+002	3.025E+002	1.437E+002	0.49	109.0944
ZN-65	31	3.128E+002pCi/L	2.681E+002	2.677E+002	8.915E+002	4.290E+002	0.35	268.1281
ZR-95	7	2.520E+001pCi/L	3.540E+002	3.540E+002	8.302E+002	4.037E+002	0.03	354.0085

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
160-24418-A-1-B	160-24418-A-1-	100.00mL	1.00	GammaVision	GV03	9 / 14 / 17 15:59	60

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	8.586E+004pCi/L	4.242E+003	9.170E+002	1.053E+003	5.027E+002	81.56	4,241.8502
AG-108M	10982	-1.532E+002pCi/L	8.451E+001	8.418E+001	3.682E+002	1.799E+002	-0.42	84.5061
AG-110M	10973	5.965E+001pCi/L	1.206E+002	1.206E+002	6.785E+002	3.301E+002	0.09	120.5950
AM-241	10818	2.628E+002pCi/L	2.862E+002	2.859E+002	9.457E+002	4.687E+002	0.28	286.1950
BA-133	10469	6.866E+001pCi/L	1.943E+002	1.943E+002	6.485E+002	3.190E+002	0.11	194.3172
BA-140	10463	-1.510E+002pCi/L	4.159E+002	4.159E+002	1.532E+003	7.477E+002	-0.10	415.9357
BE-7	10435	7.399E+002pCi/L	1.531E+003	1.531E+003	5.100E+003	2.511E+003	0.15	1,531.3783
BI-207	10195	2.568E+002pCi/L	1.109E+002	1.102E+002	4.135E+002	2.019E+002	0.62	110.8764
BI-210M	10173	0.000E+000pCi/L	1.013E+002	1.013E+002	1.108E+003	5.487E+002	0.00	101.2941
BI-212	10160	5.730E+004pCi/L	3.554E+003	2.205E+003	4.406E+003	2.127E+003	13.01	3,554.0661
BI-214	10154	1.423E+002pCi/L	9.748E+001	9.723E+001	1.833E+003	9.058E+002	0.08	97.4779
CD-109	9254	2.346E+003pCi/L	5.270E+003	5.269E+003	1.742E+004	8.670E+003	0.13	5,270.1424
CD-113M	17462	1.421E+006pCi/L	2.752E+006	2.751E+006	9.125E+006	4.518E+006	0.16	2,752,160.9936
CE-139	9241	1.220E+002pCi/L	1.240E+002	1.237E+002	4.097E+002	2.024E+002	0.30	124.0353
CE-141	9235	4.187E+002pCi/L	1.281E+002	1.264E+002	4.089E+002	2.008E+002	1.02	126.0576
CE-144	9221	0.000E+000pCi/L	2.120E+002	2.120E+002	4.187E+003	2.078E+003	0.00	212.0290
CF-249	9215	1.992E+002pCi/L	2.216E+002	2.214E+002	7.427E+002	3.660E+002	0.27	221.6171
CF-251	13690	2.418E+002pCi/L	6.090E+002	6.088E+002	1.613E+003	7.948E+002	0.15	608.9716
CO-56	8704	-8.885E+001pCi/L	1.395E+002	1.395E+002	3.159E+002	1.515E+002	-0.28	139.5371
CO-57	13694	-3.926E+001pCi/L	1.005E+002	1.005E+002	3.340E+002	1.651E+002	-0.12	100.5051
CO-58	8698	4.617E+001pCi/L	1.486E+002	1.486E+002	4.998E+002	2.437E+002	0.09	148.6297
CO-60	8692	9.688E-001pCi/L	1.802E+000	1.801E+000	3.956E+002	1.884E+002	0.00	1.8021
CR-51	8604	-1.257E+003pCi/L	1.542E+003	1.541E+003	5.108E+003	2.523E+003	-0.25	1,541.9450
CS-134	8553	-1.064E+001pCi/L	9.456E+000	9.441E+000	8.476E+002	4.187E+002	-0.01	9.4557
CS-136	8546	5.283E+001pCi/L	1.153E+002	1.153E+002	5.187E+002	2.531E+002	0.10	115.3466
CS-137	8539	-1.825E+002pCi/L	2.016E+002	2.014E+002	6.691E+002	3.283E+002	-0.27	201.5768
EU-152	7145	7.115E+002pCi/L	5.702E+002	5.692E+002	3.293E+003	1.634E+003	0.22	570.2384
EU-154	7138	2.482E+002pCi/L	2.334E+002	2.331E+002	3.137E+003	1.515E+003	0.08	233.3888
EU-155	7131	4.873E+003pCi/L	4.019E+002	3.117E+002	8.933E+002	4.394E+002	5.46	401.9133
FE-59	7073	2.048E+001pCi/L	2.200E+002	2.200E+002	4.793E+002	2.255E+002	0.04	220.0496
GA-68	18005	3.945E+003pCi/L	6.649E+003	6.645E+003	1.412E+004	6.739E+003	0.28	6,648.5369
GD-153	6824	3.069E+002pCi/L	3.912E+002	3.908E+002	1.560E+003	7.748E+002	0.20	391.1619
HF-181	6495	1.225E+002pCi/L	2.750E+002	2.750E+002	6.772E+002	3.334E+002	0.18	275.0248
HG-203	6466	-1.397E+002pCi/L	1.676E+002	1.674E+002	5.550E+002	2.741E+002	-0.25	167.5716
I-131	6380	8.303E+001pCi/L	1.491E+002	1.490E+002	3.734E+002	1.826E+002	0.22	149.0700

IR-192	6303	9.546E+000pCi/L	9.220E+000	9.205E+000	5.898E+002	2.914E+002	0.02	9.2201
K-40	6148	-3.788E+000pCi/L	1.506E+003	1.506E+003	3.301E+003	1.555E+003	0.00	1,505.9772
LA-140	6096	-3.953E+002pCi/L	1.832E+002	1.821E+002	5.967E+002	2.869E+002	-0.66	183.1801
MN-54	5382	1.287E+003pCi/L	1.311E+002	1.153E+002	2.929E+002	1.401E+002	4.39	131.0676
NA-22	5201	9.352E+001pCi/L	9.873E+001	9.862E+001	3.325E+002	1.572E+002	0.28	98.7255
NB-94	5160	8.153E+001pCi/L	5.348E+001	5.334E+001	4.995E+002	2.441E+002	0.16	53.4846
NB-95	5154	-8.661E+001pCi/L	2.183E+002	2.182E+002	7.281E+002	3.581E+002	-0.12	218.2669
ND-147	5083	4.487E+001pCi/L	7.139E+001	7.135E+001	2.878E+003	1.405E+003	0.02	71.3939
NP-237	4757	0.000E+000pCi/L	1.638E+003	1.638E+003	5.412E+003	2.695E+003	0.00	1,637.6233
NP-239	4751	-1.226E-003pCi/L	6.501E+002	6.501E+002	2.156E+003	1.071E+003	0.00	650.0646
PA-231	4541	-4.168E+003pCi/L	7.579E+003	7.576E+003	2.510E+004	1.245E+004	-0.17	7,579.0386
PA-233	4535	2.994E+002pCi/L	5.366E+002	5.364E+002	1.778E+003	8.808E+002	0.17	536.5560
PA-234	4528	-5.098E+002pCi/L	7.812E+002	7.808E+002	2.584E+003	1.283E+003	-0.20	781.2136
PA-234M	19453	0.000E+000pCi/L	8.346E+003	8.345E+003	4.598E+004	2.211E+004	0.00	8,345.6678
PB-210	4467	-2.335E+003pCi/L	1.141E+003	1.131E+003	8.203E+003	4.065E+003	-0.28	1,140.8475
PB-212	4454	5.765E+004pCi/L	3.147E+003	5.243E+002	5.959E+002	2.922E+002	96.75	3,146.8284
PB-214	4448	-1.358E+002pCi/L	5.671E+002	5.671E+002	1.117E+003	5.500E+002	-0.12	567.1110
PM-144	19585	4.939E+001pCi/L	4.332E+001	4.325E+001	4.661E+002	2.275E+002	0.11	43.3161
PM-146	2464	2.700E+002pCi/L	2.473E+002	2.469E+002	1.275E+003	6.205E+002	0.21	247.2717
RH-106	1882	2.279E+003pCi/L	2.265E+003	2.263E+003	8.050E+003	3.974E+003	0.28	2,265.3849
RU-103	1828	-9.974E+001pCi/L	1.588E+002	1.587E+002	3.845E+002	1.876E+002	-0.26	158.7992
SB-124	1784	2.472E+002pCi/L	1.215E+002	1.209E+002	3.027E+002	1.464E+002	0.82	121.5066
SB-125	1777	6.682E+002pCi/L	3.686E+002	3.672E+002	6.860E+002	3.302E+002	0.97	368.5644
SC-46	1739	-1.915E+002pCi/L	1.661E+002	1.659E+002	5.505E+002	2.685E+002	-0.35	166.1350
SN-113	1570	1.971E+002pCi/L	2.177E+002	2.175E+002	7.215E+002	3.552E+002	0.27	217.6712
SN-126	17459	1.026E+003pCi/L	8.407E+002	8.391E+002	2.334E+003	1.152E+003	0.44	840.6571
TA-182	1301	1.922E+002pCi/L	2.684E+002	2.683E+002	1.475E+003	7.143E+002	0.13	268.4300
TC-99M	17412	-1.105E+002pCi/L	1.294E+002	1.292E+002	4.278E+002	2.118E+002	-0.26	129.3764
TH-227	1058	-4.095E+002pCi/L	1.232E+003	1.231E+003	4.088E+003	2.025E+003	-0.10	1,231.7033
TH-229	1046	-3.150E+002pCi/L	2.221E+003	2.221E+003	6.613E+003	3.258E+003	-0.05	2,220.8599
TH-234	1027	4.878E+002pCi/L	2.221E+003	2.221E+003	8.295E+003	4.109E+003	0.06	2,221.2385
TL-208	929	1.756E+004pCi/L	9.260E+002	3.592E+002	4.624E+002	2.255E+002	37.97	926.0408
U-235	281	3.367E+002pCi/L	3.134E+002	3.130E+002	3.285E+003	1.627E+003	0.10	313.4281
Y-88	74	1.555E+002pCi/L	1.135E+002	1.132E+002	3.187E+002	1.521E+002	0.49	113.4918
ZN-65	31	3.377E+002pCi/L	2.777E+002	2.772E+002	9.215E+002	4.448E+002	0.37	277.6983
ZR-95	7	2.837E+002pCi/L	2.476E+002	2.472E+002	1.024E+003	5.013E+002	0.28	247.6329

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
160-24418-A-1-C	160-24418-A-1-	100.00mL	1.00	GammaVision	GV08	9 / 14 / 17 14:55	60

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	8.418E+004pCi/L	4.310E+003	1.446E+003	1.147E+003	5.456E+002	73.37	4,310.1283
AG-108M	10982	-1.281E+002pCi/L	1.704E+002	1.703E+002	3.952E+002	1.929E+002	-0.32	170.4396
AG-110M	10973	1.571E+002pCi/L	1.742E+002	1.740E+002	6.816E+002	3.299E+002	0.23	174.1832
AM-241	10818	2.592E+002pCi/L	4.051E+002	4.049E+002	1.339E+003	6.655E+002	0.19	405.1394
BA-133	10469	-2.512E+002pCi/L	2.349E+002	2.345E+002	7.768E+002	3.826E+002	-0.32	234.8511
BA-140	10463	2.107E+002pCi/L	6.864E+002	6.863E+002	1.603E+003	7.807E+002	0.13	686.3536
BE-7	10435	-9.045E+002pCi/L	1.710E+003	1.709E+003	5.692E+003	2.802E+003	-0.16	1,709.9561
BI-207	10195	2.352E+002pCi/L	1.017E+002	1.010E+002	5.339E+002	2.615E+002	0.44	101.6875
BI-210M	10173	-2.738E+002pCi/L	3.603E+002	3.600E+002	1.192E+003	5.905E+002	-0.23	360.2846
BI-212	10160	5.936E+004pCi/L	4.338E+003	3.237E+003	5.370E+003	2.597E+003	11.06	4,337.7879
BI-214	10154	1.154E+003pCi/L	2.484E+002	2.419E+002	7.613E+002	3.683E+002	1.52	248.3597
CD-109	9254	-3.070E+003pCi/L	8.975E+003	8.973E+003	2.963E+004	1.478E+004	-0.10	8,974.6409
CD-113M	17462	-2.264E+006pCi/L	3.010E+006	3.007E+006	9.959E+006	4.932E+006	-0.23	3,009,675.6113
CE-139	9241	-3.447E-006pCi/L	1.327E+002	1.327E+002	4.422E+002	2.186E+002	0.00	132.7074
CE-141	9235	4.340E+002pCi/L	1.857E+002	1.845E+002	4.486E+002	2.206E+002	0.97	185.7357
CE-144	9221	-9.934E+002pCi/L	1.574E+003	1.573E+003	5.203E+003	2.586E+003	-0.19	1,574.1858
CF-249	9215	-2.549E+002pCi/L	2.608E+002	2.605E+002	8.632E+002	4.257E+002	-0.30	260.8100
CF-251	13690	2.007E+002pCi/L	4.053E+002	4.050E+002	1.352E+003	6.637E+002	0.15	405.2600
CO-56	8704	-7.308E+001pCi/L	1.622E+002	1.622E+002	3.687E+002	1.767E+002	-0.20	162.1946
CO-57	13694	-1.369E+001pCi/L	9.012E+001	9.011E+001	3.003E+002	1.483E+002	-0.05	90.1168

CO-58	8698	1.833E+002pCi/L	1.527E+002	1.525E+002	5.062E+002	2.457E+002	0.36	152.7177
CO-60	8692	-1.233E+002pCi/L	1.907E+002	1.907E+002	4.352E+002	2.060E+002	-0.28	190.7421
CR-51	8604	-1.425E+001pCi/L	1.005E+003	1.005E+003	8.450E+003	4.192E+003	0.00	1,004.6425
CS-134	8553	2.106E+002pCi/L	2.732E+002	2.730E+002	9.057E+002	4.470E+002	0.23	273.1822
CS-136	8546	5.631E+001pCi/L	1.622E+002	1.622E+002	5.460E+002	2.656E+002	0.10	162.1940
CS-137	8539	-1.623E+001pCi/L	2.070E+002	2.070E+002	6.960E+002	3.408E+002	-0.02	207.0025
EU-152	7145	4.195E+002pCi/L	3.655E+002	3.649E+002	4.128E+003	2.051E+003	0.10	365.5112
EU-154	7138	3.669E+002pCi/L	3.015E+002	3.010E+002	3.280E+003	1.576E+003	0.11	301.5107
EU-155	7131	5.152E+003pCi/L	4.183E+002	3.181E+002	9.120E+002	4.489E+002	5.65	418.2944
FE-59	7073	-4.209E+002pCi/L	2.877E+002	2.870E+002	7.447E+002	3.552E+002	-0.57	287.6970
GA-68	18005	6.341E+003pCi/L	6.642E+003	6.633E+003	1.455E+004	6.882E+003	0.44	6,641.6840
GD-153	6824	-4.006E+002pCi/L	1.121E+003	1.121E+003	3.702E+003	1.846E+003	-0.11	1,121.4456
HF-181	6495	0.000E+000pCi/L	1.114E+002	1.114E+002	7.571E+002	3.728E+002	0.00	111.4436
HG-203	6466	-1.725E+002pCi/L	1.623E+002	1.621E+002	5.367E+002	2.647E+002	-0.32	162.3383
I-131	6380	2.084E+002pCi/L	2.127E+002	2.125E+002	3.934E+002	1.922E+002	0.53	212.7115
IR-192	6303	0.000E+000pCi/L	5.352E+001	5.352E+001	9.561E+002	4.743E+002	0.00	53.5219
K-40	6148	1.271E+003pCi/L	1.449E+003	1.447E+003	3.219E+003	1.491E+003	0.39	1,448.5158
LA-140	6096	2.227E+002pCi/L	2.151E+002	2.148E+002	1.045E+003	5.082E+002	0.21	215.0513
MN-54	5382	1.270E+003pCi/L	1.565E+002	1.439E+002	2.874E+002	1.362E+002	4.42	156.5248
NA-22	5201	3.820E+001pCi/L	1.084E+002	1.084E+002	3.745E+002	1.762E+002	0.10	108.4025
NB-94	5160	-2.655E+002pCi/L	2.680E+002	2.676E+002	5.958E+002	2.913E+002	-0.45	267.9540
NB-95	5154	5.287E+001pCi/L	2.406E+002	2.406E+002	8.049E+002	3.955E+002	0.07	240.6232
ND-147	5083	5.249E+002pCi/L	1.316E+003	1.316E+003	3.069E+003	1.496E+003	0.17	1,316.3915
NP-237	4757	0.000E+000pCi/L	2.639E+003	2.639E+003	8.712E+003	4.345E+003	0.00	2,638.8227
NP-239	4751	-5.518E+002pCi/L	1.527E+003	1.527E+003	5.041E+003	2.514E+003	-0.11	1,527.0505
PA-231	4541	0.000E+000pCi/L	1.915E+003	1.915E+003	2.786E+004	1.382E+004	0.00	1,915.0690
PA-233	4535	0.000E+000pCi/L	1.953E+002	1.953E+002	2.285E+003	1.133E+003	0.00	195.2983
PA-234	4528	-6.051E+002pCi/L	9.689E+002	9.684E+002	3.203E+003	1.592E+003	-0.19	968.9028
PA-234M	19453	1.434E+004pCi/L	1.707E+004	1.706E+004	5.910E+004	2.849E+004	0.24	17,073.7977
PB-210	4467	-2.336E+003pCi/L	2.374E+003	2.369E+003	7.836E+003	3.882E+003	-0.30	2,374.2871
PB-212	4454	5.937E+004pCi/L	3.239E+003	5.392E+002	5.602E+002	2.741E+002	105.98	3,239.3174
PB-214	4448	1.712E+003pCi/L	3.564E+002	3.466E+002	1.103E+003	5.418E+002	1.55	356.4149
PM-144	19585	1.198E+002pCi/L	2.294E+002	2.293E+002	5.139E+002	2.505E+002	0.23	229.3940
PM-146	2464	1.482E+002pCi/L	2.141E+002	2.140E+002	1.362E+003	6.608E+002	0.11	214.1412
RH-106	1882	3.047E+003pCi/L	1.726E+003	1.720E+003	5.689E+003	2.786E+003	0.54	1,726.1232
RU-103	1828	1.509E+002pCi/L	9.289E+001	9.260E+001	2.510E+002	1.203E+002	0.60	92.8913
SB-124	1784	1.744E+002pCi/L	2.237E+002	2.235E+002	8.863E+002	4.374E+002	0.20	223.6992
SB-125	1777	-2.618E+002pCi/L	6.145E+002	6.144E+002	1.144E+003	5.578E+002	-0.23	614.4929
SC-46	1739	-1.693E+002pCi/L	1.559E+002	1.557E+002	5.182E+002	2.512E+002	-0.33	155.8863
SN-113	1570	2.525E+002pCi/L	2.640E+002	2.638E+002	8.740E+002	4.309E+002	0.29	264.0316
SN-126	17459	1.189E+003pCi/L	1.495E+003	1.494E+003	4.937E+003	2.454E+003	0.24	1,494.9124
TA-182	1301	4.712E+002pCi/L	4.754E+002	4.749E+002	1.587E+003	7.652E+002	0.30	475.4278
TC-99M	17412	-1.359E+002pCi/L	2.109E+002	2.108E+002	6.972E+002	3.465E+002	-0.19	210.9424
TH-227	1058	9.085E+002pCi/L	1.201E+003	1.200E+003	3.973E+003	1.968E+003	0.23	1,200.9820
TH-229	1046	2.570E+002pCi/L	2.091E+002	2.085E+002	7.804E+003	3.852E+003	0.03	209.0597
TH-234	1027	1.528E+003pCi/L	3.794E+003	3.793E+003	1.255E+004	6.239E+003	0.12	3,793.8949
TL-208	929	1.734E+004pCi/L	8.990E+002	3.125E+002	4.131E+002	2.001E+002	41.98	899.0232
U-235	281	1.251E+003pCi/L	1.307E+003	1.305E+003	5.340E+003	2.654E+003	0.23	1,306.6043
Y-88	74	1.739E+002pCi/L	1.021E+002	1.018E+002	3.018E+002	1.423E+002	0.58	102.1311
ZN-65	31	3.280E+002pCi/L	2.984E+002	2.979E+002	9.939E+002	4.776E+002	0.33	298.3593
ZR-95	7	1.710E+002pCi/L	4.357E+002	4.356E+002	9.781E+002	4.764E+002	0.17	435.6628

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity	StdAdded	Recovery	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Ra - 228 _ 00026

Reagent ID: Ra-228_00026

Description:	Ra-228 spike	Expiration Date:	09/11/2018
No. of Bottles:	1	Laboratory:	TestAmerica St. Louis
Storage Location:	RAD Actinide STDs	Prepared By:	Bernsen, Sarah C
Reagent Volume:	100.000 mL	Solvent:	1M HNO3
Creation Date:	09/11/2017	Solvent Lot:	n/a
Open Date:			
Container(s):	1272440		
Comment:	parent standard used as spike use 0.1 mL		

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
Ra-228	Ra-228_00018	09/01/2056	74.42300	Bq/g	226.43495	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Ra-228_00018	Ra-228 Ampoule	ASTD	09/01/56	Eckert & Ziegler	1895-48	7328	5.07090	g

Fill_Geo_0 Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-326940 Analyst: Mueller, Rachel T

Batch Open: 9/12/2017 1:01:00PM

Batch End: 9/12/2017 1:15:00PM

Fill Geometry, No In-Growth

	Input Sample Lab ID (Analytical Method)	SDG (Job #)	Matrix	Initial Amount	Final Amount	Due Date	Analytical TAT	Dlv Rank	Comments	Output Sample Lab ID
1	160-24418-A-1 (901.1_Cs)	N/A (160-24418-1)	Water	100 mL		10/6/17	18_Days	2	Ra-228 Verification	
2	160-24418-A-1 (901.1_Cs)	N/A (160-24418-1)	Water	100 mL		10/6/17	18_Days	2	Ra-228 Verification	
3	160-24418-A-1 (901.1_Cs)	N/A (160-24418-1)	Water	100 mL		10/6/17	18_Days	2	Ra-228 Verification	

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gamma Barcode Report

low 1HR

Sample 326940_Gamma_160-24418-A-1-A

Instrument Operator: **Sample ID** 160-24418-A-1-A 160-24418- **Sample Title:** 160-24418-A-1-A

Sample Type: water **Batch ID:** 326940 RC: 17 **Geometry:** 100mL d=1 8 35 9-12-17 44

Sample 326940_Gamma_160-24418-A-1-B

Instrument Operator: **Sample ID** 160-24418-A-1-B 160-24418- **Sample Title:** 160-24418-A-1-B

Sample Type: water **Batch ID:** 326940 RC: 3 **Geometry:** 5

Sample 326940_Gamma_160-24418-A-1-C

Instrument Operator: **Sample ID** 160-24418-A-1-C 160-24418- **Sample Title:** 160-24418-A-1-C

Sample Type: water **Batch ID:** 326940 RC: 8 **Geometry:** RC: 3 NOT Sample 3 on 9-12-17

Ra 228 00026 verification

Reagent

Sr-90_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

80573-334
5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis
P.O. No.: 2324797, Item 1

This standard radionuclide source was prepared gravimetrically from a calibrated master solution. The master solution was calibrated by liquid scintillation counting. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry and liquid scintillation counting. The nuclear decay rate and assay date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Sr-90	10515.5	3.782E+04	0.1	0.9	1.8	09/17/2009

*Uncertainty: U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: γ-impurities <0.1%. 5.04317 grams 0.1M HCl solution with approximately 30 microg/g each of Sr and Y carriers. NOTE: This source also contains Y-90 in secular equilibrium with Sr-90. The Y-90 activity is equal to the Sr-90 activity. Since Sr-90 and Y-90 both decay 100% by beta emission, the total beta emission rate for the source is twice the certified Sr-90 activity. The half-life for Y-90 is 64.08 hours.

Source Prepared by: _____
W. Mao, Radiochemist

QA Approved: _____ Date: 9-22-09
D. M. Montgomery, QA Manager

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Corporate Office
Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia 30318

Reagent

Sr-90_00017

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

92352

Sr-90 5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2502682, Item 1 Product Code: 8090-5FSA-37kBq

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Sr-90	1.052E+04	3.749E+04	0.1	0.9	1.8	11/29/2012

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: γ-impurities<0.1%.
5.02357 g 0.1M HCl solution with approximately 30 µg/g each Sr and Y carriers.

NOTE: This source also contains Y-90 in secular equilibrium with Sr-90. The Y-90 activity is equal to the Sr-90 activity. Since Sr-90 and Y-90 both decay 100% by beta emission, the total activity for the source is twice the certified Sr-90 activity. The half-life for Y-90 is 64.08 hours.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 26 Nov 12
J.D. McCorvey, Counting Room Manager

RAD12-0042
Sr-90
hursts
None
Prep/Opened: 11/28/2012
Exp(1): 11/29/2062
Exp(2): 11/29/2062

51511
ID Sr-90_00017
Sr-90 Ampoule

ACCREDITED SOURCE CALIBRATION LABORATORY — HEALTH PHYSICS SOCIETY — FOUNDED 1956

Single Isotope Certificate Rev 3, 23 August 2012

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Sr-90_00018

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Reagent ID: Sr-90_00018

		Expiration Date:	11/29/2062
Description:	Sr-90 Calibration STD	Laboratory:	TestAmerica St. Louis
No. of Bottles:	1	Prepared By:	Hurst, Sarah
Storage Location:	RAD Separations Reagents - 1	Solvent:	0.1M HCL
Reagent Volume:	100.000 mL	Solvent Lot:	0
Creation Date:	11/28/2012		
Container(s):	51512		
Comment:	Rad12-0043		

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
Gross Beta	Sr-90_00017	11/29/2062	14925.64000	Bq/g	44774.23338	dpm/mL
Sr-90	Sr-90_00017	11/29/2062	7462.82000	Bq/g	22387.11669	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Sr-90_00017	Sr-90 Ampoule	ASTD	11/29/62	Analytics	92352		4.99970	g

St. Louis Radiological Standard Reverification Form

Standard ID Number: Sr-90_00018 (51512)
True Value = 1976.75 pCi/sample or g
Date Analyzed: 2/10/2014

Radionuclide: Sr-90 (Low mass)

	Replicates	
#1	1935	pCi/sample or g
#2	1941	pCi/sample or g
#3	1924	pCi/sample or g

Mean = 1933.333

1 sigma = 8.621678 1.96 sigma = 16.89849

True Value minus 5% = 1877.913 (True Value - 5%)
True Value plus 5% = 2075.588 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 2/10/14

SOP Reference: STL-QA-0002, Current Revision

St. Louis Radiological Standard Reverification Form

Standard ID Number: Sr-90_00018 (51512)
True Value = 1948.75 pCi/sample or g
Date Analyzed: 2/10/2014

Radionuclide: Sr-90 (Medium mass)

Replicates		
#1	1911	pCi/sample or g
#2	1945	pCi/sample or g
#3	1893	pCi/sample or g

Mean = 1916.333

1 sigma = 26.40707 1.96 sigma = 51.75786

True Value minus 5% = 1851.313 (True Value - 5%)
True Value plus 5% = 2046.188 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 2/10/14

SOP Reference: STL-QA-0002, Current Revision

St. Louis Radiological Standard Reverification Form

Standard ID Number: Sr-90_00018 (51512)
True Value = 1992 pCi/sample or g
Date Analyzed: 2/10/2014

Radionuclide: Sr-90 (High mass)

	Replicates	
#1	1907	pCi/sample or g
#2	1930	pCi/sample or g
#3	1937	pCi/sample or g

Mean = 1924.667

1 sigma = 15.69501 1.96 sigma = 30.76222

True Value minus 5% = 1892.4 (True Value - 5%)
True Value plus 5% = 2091.6 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 2/10/14

SOP Reference: STL-QA-0002, Current Revision

Protean Beta ICV-ACV recoveries from March 2013			
Protean Detector	**Low** pCi/sample	**Medium** pCi/sample	**High** pCi/sample
0	1962	1945	1971
1	2003	1947	1995
2	1960	1965	1998
3	1988	1942	1995
4	1977	1940	1997
5	1969	1949	2013
6	1986	1938	1986
7	1969	1964	1981
Average pCi/sample	1976.75	1948.75	1992

Protean Beta ICV-ACV recoveries from February 2014			
Protean Detector	**Low** pCi/sample	**Medium** pCi/sample	**High** pCi/sample
4	1935	1911	1907
5	1941	1945	1930
6	1924	1893	1937
Average pCi/sample	1933.33	1916.33	1924.67

Standard ID
Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122640 **Operator:** 63903

Sample ID	WRKNO	Aliquot		Mass	Instr ID	CountTime		Ts	Tb	Dilution	Sigma	
	Analyte	Cs	Cb	XT	CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC
ICVABT-51512;B1	NA	1.000E+000sample		0.0513 g	Protean4	2/10/14 22:54		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	49	0.00	0.000E+000	4.900E-002	0.1157	**-1.908E-001**pCi/sample	5.869E-002	5.452E-002	3.382E+000	8.968E-001
	Gross Beta	9072	417	0.00	1.814E+003	4.170E-001	0.4224	**1.935E+003**pCi/sample	1.977E+002	4.063E+001	1.594E+000	7.165E-001
ICVABT-51512;B2	NA	1.000E+000sample		0.1114 g	Protean4	2/10/14 23:19		5.00	1000.00	1.00	2.00	
	Gross Alpha	1	49	0.00	2.000E-001	4.900E-002	0.0830	**8.194E-001**pCi/sample	2.174E+000	2.172E+000	4.713E+000	1.250E+000
	Gross Beta	8432	417	0.00	1.686E+003	4.170E-001	0.3973	**1.911E+003**pCi/sample	1.956E+002	4.164E+001	1.694E+000	7.616E-001
ICVABT-51512;B3	NA	1.000E+000sample		0.1813 g	Protean4	2/10/14 23:04		5.00	1000.00	1.00	2.00	
	Gross Alpha	1	49	0.00	2.000E-001	4.900E-002	0.0540	**1.260E+000**pCi/sample	3.343E+000	3.340E+000	7.248E+000	1.922E+000
	Gross Beta	8054	417	0.00	1.611E+003	4.170E-001	0.3804	**1.907E+003**pCi/sample	1.954E+002	4.251E+001	1.770E+000	7.956E-001

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122640 **Operator:** 63903

Sample ID	WRKNO / Analyte	Aliquot Cs	Cb	Mass XT		Instr ID CPMs	CountTime CPMb	Eff	Activity	Ts	Tb UncTot	Dilution UncCnt	Sigma MDA	DLC
ICVABT-51512;B1	NA	1.000E+000	sample	0.0513	g	Protean5	2/10/14 23:04			5.00	1000.00	1.00	2.00	
	Gross Alpha	0	43	0.00	0.000E+000	4.300E-002	0.1145		**-1.692E-001** pCi/sample		5.510E-002	5.161E-002	3.337E+000	8.490E-001
	Gross Beta	9111	398	0.00	1.822E+003	3.980E-001	0.4228		**1.941E+003** pCi/sample		1.983E+002	4.068E+001	1.569E+000	6.992E-001
ICVABT-51512;B2	NA	1.000E+000	sample	0.1114	g	Protean5	2/10/14 22:54			5.00	1000.00	1.00	2.00	
	Gross Alpha	0	43	0.00	0.000E+000	4.300E-002	0.0823		**-2.353E-001** pCi/sample		7.661E-002	7.176E-002	4.639E+000	1.180E+000
	Gross Beta	8552	398	0.00	1.710E+003	3.980E-001	0.3960		**1.945E+003** pCi/sample		1.990E+002	4.207E+001	1.675E+000	7.465E-001
ICVABT-51512;B3	NA	1.000E+000	sample	0.1813	g	Protean5	2/10/14 23:19			5.00	1000.00	1.00	2.00	
	Gross Alpha	2	43	0.00	4.000E-001	4.300E-002	0.0532		**3.022E+000** pCi/sample		4.802E+000	4.790E+000	7.178E+000	1.826E+000
	Gross Beta	8046	398	0.00	1.609E+003	3.980E-001	0.3755		**1.930E+003** pCi/sample		1.977E+002	4.304E+001	1.766E+000	7.873E-001

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122640 **Operator:** 63903

Sample ID	WRKNO	Aliquot		Mass		Instr ID	CountTime		Ts	Tb	Dilution	Sigma	
	Analyte	Cs	Cb	XT		CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC
ICVABT-51512;B1	NA	1.000E+000	sample	0.0513	g	Protean6	2/10/14 23:19		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	87	0.00	0.000E+000	8.700E-002	0.1165		**-3.362E-001** pCi/sample	8.166E-002	7.210E-002	3.776E+000	1.186E+000
	Gross Beta	8992	520	0.00	1.798E+003	5.200E-001	0.4209		**1.924E+003** pCi/sample	1.966E+002	4.059E+001	1.718E+000	8.029E-001
ICVABT-51512;B2	NA	1.000E+000	sample	0.1114	g	Protean6	2/10/14 23:04		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	87	0.00	0.000E+000	8.700E-002	0.0842		**-4.657E-001** pCi/sample	1.131E-001	9.985E-002	5.230E+000	1.642E+000
	Gross Beta	8356	520	0.00	1.671E+003	5.200E-001	0.3976		**1.893E+003** pCi/sample	1.937E+002	4.142E+001	1.819E+000	8.499E-001
ICVABT-51512;B3	NA	1.000E+000	sample	0.1813	g	Protean6	2/10/14 22:54		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	87	0.00	0.000E+000	8.700E-002	0.0559		**-7.014E-001** pCi/sample	1.703E-001	1.504E-001	7.877E+000	2.474E+000
	Gross Beta	8127	520	0.00	1.625E+003	5.200E-001	0.3778		**1.937E+003** pCi/sample	1.985E+002	4.300E+001	1.914E+000	8.945E-001

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica St. Louis

Standards Preparation Logbook Record

Nov-28-2012

Logbook: \\Qstlmo01\Stdslog\RAD_STD.std

RAD12-0042, Sr-90 Sr-90_00017 #51511 Analyst: hursts

Vendor: Analytics Lot No.: 92352
Solvent: None
Date Prep./Opened: 11-28-2012
Date Expires(1): 11-29-2062 (50 Years)
Date Expires(2): 11-29-2062 (50 Years)
Cert: 92352 Activity: 37490Bq Mass: 5.02357 Ref. Date: 11/29/12

Component	Initial Conc (dpm/g)	Final Conc (dpm/g)
Sr-90	447,769	447,769

RAD12-0043, Sr-90 Calibration STD Sr-90_00018 #51512 Analyst: hursts

Solvent: None Volume (ml): 100.00
Date Prep./Opened: 11-28-2012
Date Expires(1): 11-29-2062 (50 Years)
Date Expires(2): 11-29-2062 (50 Years)

Parent Std No.: RAD12-0042, Sr-90 Aliquot Amount (g): 4.9997
Parent Date Expires(1): 11-29-2062 Parent Date Expires(2): 11-29-2062

Component	Initial Conc (dpm/g)	Final Conc (dpm/mL)
Sr-90	447,769	22,387

Reviewed By: SR

St. Louis Radiological Standard Reverification Form

Standard ID Number: Rad12-0043
True Value = 2016.7 pCi/L or g
Date Analyzed: 11/30/2012

Radionuclide: Sr90

	Replicates	
#1	1964	pCi/L or g
#2	1958	pCi/L or g
#3	2015	pCi/L or g

Mean = 1979

1 sigma = 31.32092 1.96 sigma = 61.389

True Value minus 5% = 1915.865 (True Value - 5%)
True Value plus 5% = 2117.535 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: 11/30/12

SOP Reference: STL-QA-0002, Current Revision

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122629 **Operator:** 63903

Sample ID	WRKNO	Aliquot		Mass		Instr ID	CountTime		Ts	Tb	Dilution	Sigma	
	Analyte	Cs	Cb	XT		CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC
verification-1b	NA	1.000E+000sample		0.0536	g	Purple16	11/30/12 10:42		8.00	1000.00	1.00	1.00	
	Gross Alpha	123	175	0.00		1.538E+001	1.750E-001	0.4314	**1.587E+001**pCi/sample	1.707E+000	1.448E+000	8.638E-001	3.593E-001
	Gross Beta	14954	485	0.00		1.869E+003	4.850E-001	0.4285	**1.964E+003**pCi/sample	9.953E+001	1.607E+001	1.211E+000	6.021E-001
verification-2b	NA	1.000E+000sample		0.0529	g	Purple17	11/30/12 10:43		8.00	1000.00	1.00	1.00	
	Gross Alpha	53	87	0.00		6.625E+000	8.700E-002	0.1306	**2.254E+001**pCi/sample	3.391E+000	3.138E+000	2.356E+000	8.365E-001
	Gross Beta	15152	362	0.00		1.894E+003	3.620E-001	0.4356	**1.958E+003**pCi/sample	9.919E+001	1.591E+001	1.077E+000	5.117E-001
verification-3b	NA	1.000E+000sample		0.0528	g	Purple18	11/30/12 10:43		8.00	1000.00	1.00	1.00	
	Gross Alpha	85	62	0.00		1.063E+001	6.200E-002	0.1313	**3.624E+001**pCi/sample	4.462E+000	3.954E+000	2.160E+000	7.027E-001
	Gross Beta	15378	395	0.00		1.922E+003	3.950E-001	0.4296	**2.015E+003**pCi/sample	1.020E+002	1.625E+001	1.125E+000	5.420E-001

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery	LCL	UCL	ZFactor
					%			

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery	ZFactor
						%	

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Prep Report for Gross Alpha/Beta

Batch: M122629 **Prep Analyst:** 250

SampID	WRKNO	Aliquot		Gross	Tare	Mass	Dilution
verification-1b	NA	1.000E+000	sample	8.7067 g	8.6531 g	0.0536 g	1.00
verification-2b	NA	1.000E+000	sample	8.6615 g	8.6086 g	0.0529 g	1.00
verification-3b	NA	1.000E+000	sample	8.6935 g	8.6407 g	0.0528 g	1.00

purple 16 17 18

Spike Information

Sample ID	Standard ID	Analyte	Std Conc	Aliquot	Ref Date	StdAdded
	Rad12-0043	SR-90	22.387 dpm/mL	0.1 mL	11-29-12	

MS — Spiked By

LM — Spike Verified By

11-28-12 — Spike Date

Standard Operating Procedures

SOPNumber	Title	Revision
☐		

Reviewed By — 11/30/12 Review Date

MS — Analyst/Relenquished By — 11/28/12 Release Date

Received By — 11/28/12 Receipt Date

MS 11-30-12 ~~112~~ 112343897/MS/11-28-12

Balance ID / Initials / Date

Reagent

STD U-SPEX_00001

1401635
ID STD U SPEX_00001
Exp 04/10/19 Prpd Opn 04/10/18
STD U-SPEX

ACCREDITED
Reference Materials Producer
Cert #2495.01

SPEXertificate®

Certificate of Reference Material

ILAC-MRA ACCREDITED
Chemical Testing
Cert #2495.02

Catalog Number: CLU2-2M **Lot No.** CL10-28UM

Description: 1000 µg/mL Uranium

Matrix: 2% HNO_3

This **CLARITAS PPT®** Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1001 µg/mL ±5 µg/mL

Certified Value is Traceable to: 3164*

* - indicates NIST SRM † - indicates SPEX CertiPrep CRM (when NIST SRM is not available)

The CRM is prepared gravimetrically using high purity Uranyl(VI) Nitrate Hexahydrate, Lot# 02161E. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis.

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1001 µg/mL

Method: Evaporate to dryness. Ignite and weigh as U3O8.

Instrumental Analysis by ICP Spectrometer: 1000 µg/mL

Uncertified Properties

Density: 1.010 g/mL @ 20.0°C

Trace Metallic Impurities in the Actual Solution via ICP-MS Analysis:

Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L
Ag	<0.2	Cr	0.9	Hg	<0.4	Na	<3	Rh	<0.2	Te	<0.4
Al	6	Cs	0.06	Ho	<0.09	Nb	<0.1	Ru	<0.4	Th	<0.08
As	<0.3	Cu	<0.6	In	<0.07	Nd	<0.04	Sb	<0.2	Ti	<0.9
Au	<0.2	Dy	<0.02	Ir	<0.1	Ni	3	Sc	<0.3	Tl	<0.6
B	<2	Er	<0.04	K	10	P	<100	Se	<10	Tm	<0.04
Ba	0.08	Eu	<0.04	La	0.2	Pb	<0.06	Si	<100	V	<0.2
Be	<0.6	Fe	<2	Li	<0.2	Pd	<0.3	Sm	<0.04	W	<0.2
Bi	<0.02	Ga	<0.2	Lu	<0.8	Pr	<0.02	Sn	<0.3	Y	<0.09
Ca	4	Gd	<0.03	Mg	0.3	Pt	<0.2	Sr	<0.05	Yb	<0.04
Cd	<0.2	Ge	<4	Mn	<1	Rb	<0.3	Ta	<0.3	Zn	1
Ce	<0.06	Hf	<0.01	Mo	<0.3	Re	<0.05	Tb	<0.2	Zr	<0.3
Co	<0.3										

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32867 and others. This CRM is guaranteed stable and accurate to +/- 0.5% of the certified value. This includes uncertainty components due to preparation, homogeneity by the most precise method, and short-term and long-term stability. This guarantee is valid for a period of one year from the date of certification only when the material is unopened and stored under ambient laboratory conditions.

Date of Certification: APR -- 2018 Certifying Officer: Kathleen Cullin

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Report of Certification

This Certified Reference Material (CRM) has been prepared and certified under an ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 quality system consistent with the following guides:

- ISO 9001: Quality management systems – Requirements – certified by UL-DQS
- ISO 17025: General requirements for the competence of testing and calibration laboratories – accredited by A2LA
- ISO Guide 34: General requirements for the competence of reference material producers – accredited by A2LA
- ISO Guide 31: Reference Materials – Contents of certificates and labels
- ISO Guide 35: Reference Materials – General & Statistical Principals for Certification
- Guide To The Expression Of Uncertainty In Measurement 1997
- EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
- ASTM Guide D6362-98
- NIST Technical Note 1297
- ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
- ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

Instructions for Use:

Primary usage of this CRM is in neat form or diluted serially with matrix of a purity at or greater than the purity of the original matrix solution. If dilution is required the diluent must be compatible with all certified analytes and contain stabilizers appropriate for the period of intended use. The CRM can also be used as a spike or with a spike, again with appropriate compatibility considerations. All solutions should be thoroughly mixed, by shaking, prior to use and never pipetted directly from the bottle. All surfaces that come in contact with the solution must be thoroughly cleaned and leached prior to use. Dilutions should be performed only with Class A volumetric glassware.

Method of Preparation:

Clean laboratory procedures and techniques have been used throughout the preparation. All materials, equipment, analytical instrumentation and personnel have been qualified prior to use. The highest purity acids applicable, 18 megohm, double deionized water, acid-leached triple-rinsed bottles (where appropriate), and Class A/calibrated volumetrics have been used in all preparations.

Homogeneity:

The homogeneity of the CRM has been confirmed by procedures consistent with ISO 17025:2005, ISO Guide 34:2009, and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed to prove homogeneity in accordance with our internal procedure 4600-HOMOGEN-1A. Since the product is highly homogeneous, any sample size taken for analysis would be within the uncertainty budget. This is consistent with the intended use of the CRM.

Statistical Estimator and Confidence Limits:

The certified value 'X' listed on the reverse of this document is at the 95% level of confidence and can be expressed as:

- $X = x \pm U$ where X = certified value, U = expanded uncertainty, x = property value
- $U = ku_c$ where $k = 2$ is the coverage factor at the 95% confidence level
- u_c is obtained by combining the individual element standard uncertainty components u_i, and $u_c = \sqrt{\sum u_i^2}$

Certification Traveler Report:

All certified values reported were derived from the Traveler Report (SPEX CertiPrep's traceability documentation) identified by the lot number of this CRM. During the stated period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

Legal Notice:

SPEX CertiPrep reference materials are not for any cosmetic, drug or household application and are to be used only by qualified individuals who are trained in appropriate procedures. No claims against SPEX CertiPrep, LLC of any kind whatsoever, whether based on breach of warranty, alleged negligence, or otherwise, with respect to this Reference Material shall be greater than the purchase price. In no event shall SPEX CertiPrep, LLC be liable for any loss of profits or any incidental, special, or consequential damages.

SPEX CertiPrep®
Your Science is Our Passion.®

203 Norcross Ave, Metuchen, NJ 08840
www.spexcertiprep.com • Email: crmsales@spexcsp.com
Phone: 1-800-LAB-SPEX • Fax: 732-603-9647

Accredited to 17025 & Guide 34 ISO Certified to 9001

SPEX CertiPrep Group

April 10, 2018

Test America
13715 Rider Trail North
Earth City, MO 63045

Re: Catalog #: CLU2-2M

Dear Cory Buffington:

SPEX CertiPrep's products are prepared using depleted uranium. The current lot, Lot# CL10-28UM, of Part# CLU2-2M has isotope ratios of 99.806% U238 and 0.193% U235. We cannot guarantee the isotope ratios will be the same from lot to lot since it varies in the lot of raw material that we receive from our supplier.

Please feel free to contact me at +1 732 549-7144 ext.746 if you have any questions or concerns.

Sincerely,

Gael Miller
Vice President Quality Assurance and Regulatory Affairs
Certified Reference Materials
gmiller@spexcsp.com
+1 732 549-7144 ext. 746

Reagent

STD U_00012

INORGANIC VENTURES

CERTIFICATE OF ANALYSIS

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01 ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Single Analyte Custom Grade Solution
Catalog Number:	CGU1
Lot Number:	M2-U658309
Matrix:	2% (v/v) HNO3
Value / Analyte(s):	1 000 µg/mL ea: Uranium
Starting Material:	N2O8U.6H2O
Starting Material Lot#:	1897, R307UA1
Starting Material Purity:	99.9945%

1295329
ID: STD U_00012
Exp 10/10/19 Prpd cb Opn 10/10/17
U 1000PPM

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 998 ± 4 µg/mL

Certified Density: 1.010 g/mL (measured at 20 ± 1 °C)

Assay Information:

Assay Method #1 **997 ± 4 µg/mL**
ICP Assay NIST SRM 3164 Lot Number: 080521

Assay Method #2 **1000 ± 5 µg/mL**
Calculated NIST SRM Lot Number: See Sec. 4.2

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2 (u_{char\ a})^2 + (w_b)^2 (u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Certified Abundance:

IV's Certified Abundance

Isotope	Atom %
Uranium 238U	99.7 ± 0.1
Uranium 235U	0.28 ± 0.05

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

M	Ag	<	0.028004	M	Eu	<	0.000280	M	Na		0.076468	M	Se	<	0.028004	M	Zn		0.005513
O	Al	<	0.063780	M	Fe	<	0.117619	M	Nb	<	0.000280	i	Si	<		M	Zr	<	0.019603
M	As	<	0.011202	M	Ga	<	0.011202	M	Nd	<	0.000280	M	Sm	<	0.000560				
M	Au	<	0.000280	M	Gd	<	0.000840	M	Ni		0.004701	M	Sn	<	0.028004				
M	B	<	0.008401	M	Ge	<	0.002800	n	Os	<		M	Sr	<	0.005601				
M	Ba	<	0.014002	M	Hf	<	0.000280	i	P	<		M	Ta	<	0.000280				
M	Be	<	0.002800	i	Hg	<		M	Pb		0.000801	M	Tb	<	0.000280				
M	Bi	<	0.002800	M	Ho	<	0.000280	M	Pd	<	0.001120	M	Te	<	0.011202				
O	Ca		0.011844	M	In	<	0.001400	M	Pr	<	0.000280	M	Th		0.000572				
M	Cd	<	0.008401	M	Ir	<	0.000280	M	Pt	<	0.000280	M	Ti	<	0.028004				
M	Ce	<	0.004201	i	K	<		M	Rb	<	0.001680	M	Tl	<	0.002800				
M	Co	<	0.008401	M	La		0.000125	M	Re		0.001113	M	Tm	<	0.000280				
M	Cr		0.001248	M	Li	<	0.001120	M	Rh	<	0.000280	s	U	<					
M	Cs		0.000666	M	Lu	<	0.000280	M	Ru	<	0.002800	M	V	<	0.028004				
M	Cu		0.001779	M	Mg	<	0.168027	i	S	<		M	W	<	0.002800				
M	Dy	<	0.000280	M	Mn		0.005034	M	Sb	<	0.002800	M	Y	<	0.001680				
M	Er	<	0.000280	M	Mo		0.010391	M	Sc	<	0.002800	M	Yb	<	0.002800				

M - Checked by ICP-MS O - Checked by ICP-OES i - Spectral Interference
n - Not Checked For s - Solution Standard Element

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 238.03 +6 8 UO_2^{2+}(uranyl)
Chemical Compatibility - Soluble in HCl and HNO_3. Avoid H_3PO_4. H_2SO_4 and HF matrices should not be a problem depending upon [U]. Although the UO_2^{2+} ion is distinctly basic, any U^{+4} will precipitate in basic media. UO_2^{2+}salts are generally soluble in water and UO_2^{2+} is stable with most metals and inorganic anions. The uranyl phosphate is insoluble in water. UF_4 and UF_6 are water soluble.
Stability - 2-100 ppb levels stable for months in 1% HNO_3 / LDPE container. 1-10,000 ppm solutions chemically stable for years in 2-5% HNO_3 / LDPE container.
U Containing Samples (Preparation and Solution) -Metal (Dissolves rapidly in HCl and HNO_3); Oxide (Soluble in HNO_3); Ores (Digest for 1-2 hours with 1 gram of ore to 30 mL 1:1 HNO_3. Silica insolubles are removed by filtration after bringing the sample to fumes with conc. H_2SO_4.)
Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe)
ICP-MS 238 amu	2 ppt	N/A	206Pb16O2
ICP-OES 263.553 nm	0.3 / 0.01 µg/mL	1	Ce, Ir, Th, Rh, W, Zr, Ta, Ti, V, Hf, Fe, Re, Ru
ICP-OES 367.007 nm	0.3 / 0.02 µg/mL	1	Th, Ce
ICP-OES 385.958 nm	0.3 / 0.01 µg/mL	1	Th, Fe

Uranium Note: If uranium is present in this standard, it is natural abundance unless specified in Section 3

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

May 19, 2017

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- May 19, 2021

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

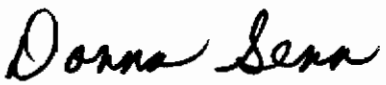
- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

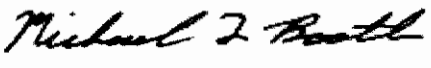
Certificate Prepared By:

Donna Senn
Product Documentation Technician



Certificate Approved By:

Michael Booth
Supervisor, Quality Control



Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Reagent

Th-229_00016

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

97790
Th-229 5 mL Liquid in Flame Sealed Vial

430569
ID: Th-229_00016
Exp:08/06/64 Prpd:SCB Opn:08/20/14
Th-229 Ampoule

Customer: TestAmerica - St. Louis
P.O. No.: 2573570, Item 1 Product Code: 8229

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Th-229	2.681E+06	3.761E+03	0.5	1.5	3.1	08/06/2014

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: α-impurities: Th-228 2.83E-01 Bq, Th-230 2.33E+01 Bq, Th-232 1.51E0 Bq; γ-impurities (other than decay products)<0.1%.
5.08156 g 0.5M HNO3 solution. Carrier free.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QC Approved: _____ Date: 06 AUG 14
A. Chen, Spectroscopist

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

ANA Form005 Rev. —

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

U.S. DEPARTMENT OF COMMERCE
National Institute of Standards & Technology
Gaithersburg, MD 20899

Certificate of Participation

Eckert & Ziegler Analytics
Atlanta, Georgia

is a participant for the period January 1, 2014, through December 31, 2014, in a radioactivity measurements assurance program conducted by the National Institute of Standards and Technology, in cooperation with NRMAP Incorporated. Continued participation is evidenced by dated Reports of Traceability issued for particular radionuclides, which indicate the deviation of the participant's reported value from that measured by the National Institute of Standards and Technology. The significance of these Reports is addressed below.*

For the Director,

Michael P. Unterweger, Leader
Radioactivity Group
Physical Measurement Laboratory

*As guidance for the proper use of Reports of Traceability, it should be emphasized that the National Institute of Standards and Technology is concerned only with fostering good measurements capability and consistency with the national measurements system. The assurance of the proper application of that capability to the ultimate consumer products is the responsibility of each manufacturer of these products and of the Federal regulatory agencies.

A continuing traceability program in radioactivity demonstrates, to the degree established by the periodic assays of calibrated radioactivity samples, a continuing competence to maintain the methods and standards necessary for accurate measurement. Such a program cannot, however, endorse each and every measurement nor the final product, any more than a spot check can vouch for every unchecked item. Care should be taken, therefore, not to imply such endorsement. The proper use of this Report is governed by section 200.114 of Title 15 of the Code of Federal Regulations. These regulations may be met if Reports are quoted only in their entirety. Excerpts out of context may be misleading.

1380 Seaboard Industrial Boulevard
Atlanta, Georgia 30318 USA
Phone (404) 352-8677 • Fax (404) 352-2837
Email: analytics@ezag.com (Tax EIN: 58-1406082)

Eckert & Ziegler
Analytics

Recommended Procedure for Opening the Flame Sealed Vial

1) If the solution is to be diluted, it is recommended that the diluting solution have a composition comparable to that of the standard.

2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood.

3) Shake the vial to wet the entire inside surface of the vial. Return the vial to the upright position.

4) Check that all of the liquid has drained out of the neck of the vial. If necessary, gently tap the neck to speed the process.

5) The Wheaton vials we use are pre-scored.

6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.

7) Hold the vial upright and wrap with soft tissue, such as Chem Wipes, around the tip of the vial and secure with tape (see picture). Snap off the top of the vial by pressing the pre-scored part of the neck away towards you while pulling the tip of the vial away from you.

8) Transfer the solution from the vial using a pycnometer or pipet with a dispenser handle. NEVER PIPETTE BY MOUTH.

9) Seal any unused solution in a flame sealed glass vial, if possible, to minimize the evaporation loss.

Reagent

Th-229_00023

Standard ID Number: Th-229_00023 (Coppt)
True Value = 67.21 dpm/mL
Date Analyzed: 12/20/2017

Radionuclide: Th-229

Replicates		
#1	69.18	dpm/mL
#2	67.64	dpm/mL
#3	64.07	dpm/mL

Mean = 66.9633333

1 sigma = 2.6213419 1.96 sigma = 5.13783

True Value minus 5% = 63.8495 (True Value - 5%)
True Value plus 5% = 70.5705 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: ALD 12/21/17

2nd Reviewed By/Date: RM 12.21.17

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	8/6/2014 0:00		
Decayto Date/Time (t):	12/20/17 0:00		
Initial Activity (A_0):	67.23 dpm		
Initial Aliquot:	1 mL		
Initial Conc:	67.22958 dpm/mL		
***Soln. Density:**	1 g/mL		
Nuclide:	Th-229		
Half-Life (days):	2897163	decay days	fraction
****Decay Factor:**	0.9997	1232.00	0.00043
Decay Corr Activity:	6.7210E+01 dpm		
Decay Corr Conc:	6.7210E+01 dpm/mL		

Conversion/Calculations

Final Activity Unit:	dpm
Activity Unit Factor:	1.00000
Final Volume Unit:	mL
Volume Unit Factor:	1.000
Final Concentration:	6.7210E+01 dpm/mL
Aliquot Volume:	1.0000E+00 mL
Final Activity (A):	6.7210E+01 dpm

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:43:30AM 12/21/2017

Sample

Sample Name: Ver1 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th 229 tracer
AnalysisResultsID: 206417
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

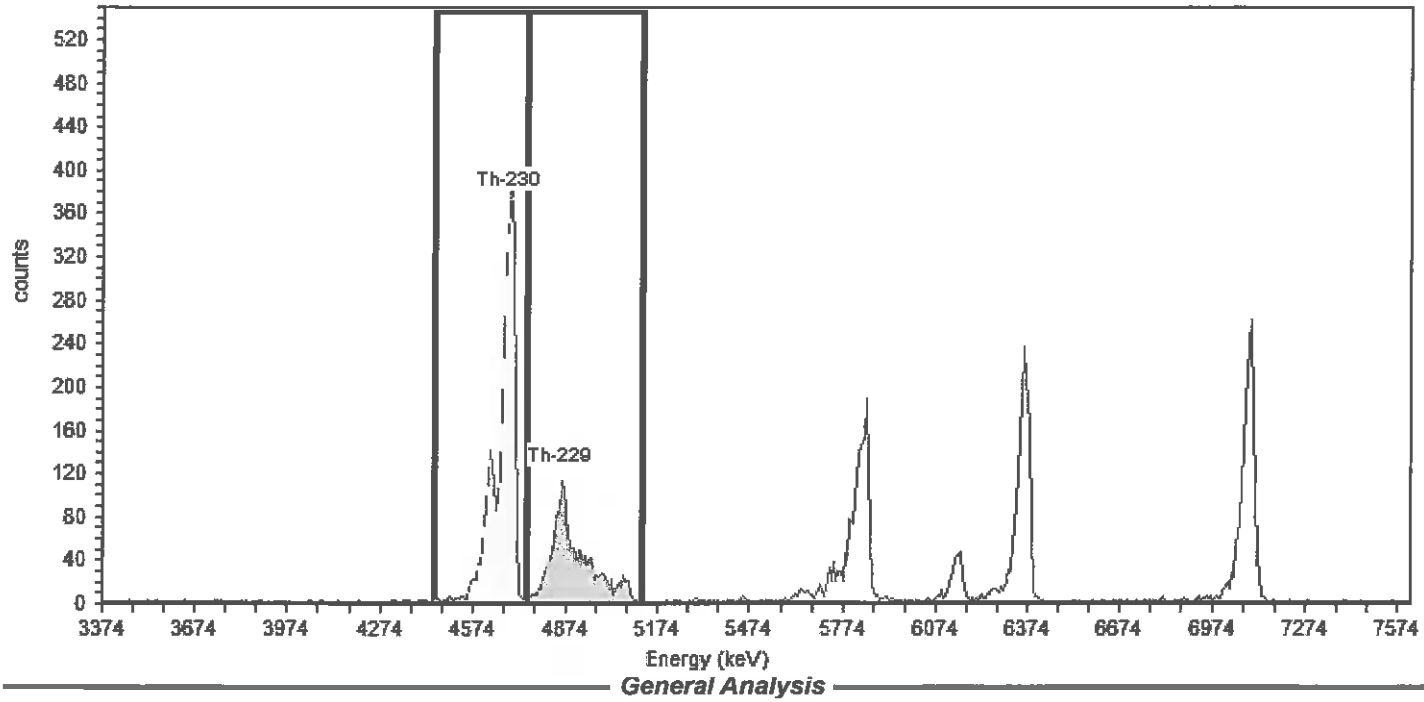
Tracer Name: Th-230_00036
Tracer Activity: 44.56 DPM / mL x (Vol.) 0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 11:41:20AM

Tracer Nuclide: Th-230
Tracer Recovery: 92.23%

Acquisition

Detector: AV210 SN: 50-119AA1
Acquisition Start Date: 12/20/2017 7:15:48PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/17/2017 3:28:10PM
Bkgd Info: Sample: ICB;AV210; Det: AV210; Spectrum #1; 11/17/2017 3:28:10 PM

Energy Calibration: IC-9795;AV210-20171114
Efficiency Calibration:IC-9795;AV210-20171114
Calibration Date: 11/14/2017 12:00:23PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 25.40% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: Absolute Interactive ROI Analysis
Decay Correction:12/20/2017 7:14:50PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-230	4688.0	4,687.5	0.5	4448.3	4746.6	50.8	99.7	3004	6.0000	2998.00	1.233E+002	DPM/mL
Th-229	4848.0	4,845.3	2.7	4746.6	5119.5	69.5	99.8	1554	1.0000	1553.00	6.918E+001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:44:04AM 12/21/2017

Sample

Sample Name: Ver2 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th 229 tracer
AnalysisResultsID: 206418
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

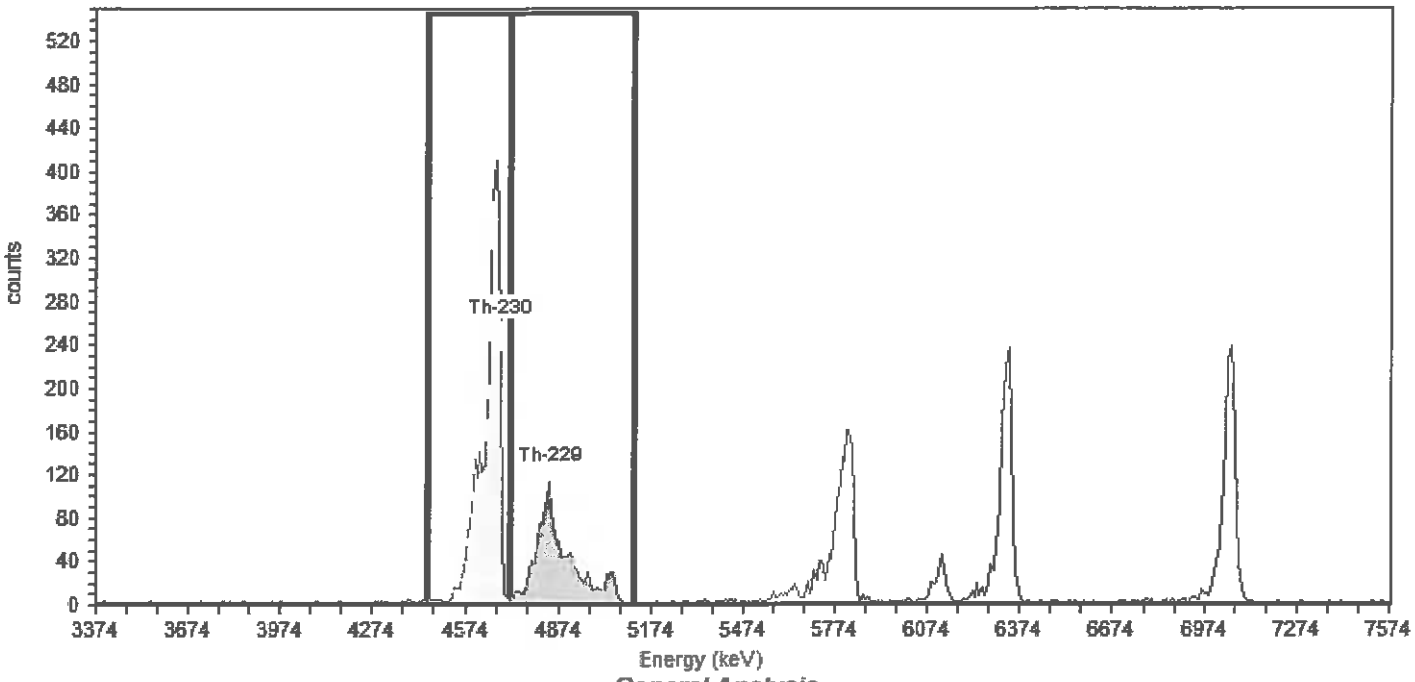
Tracer Name: Th-230_00036
Tracer Activity: 44.56 DPM / mL x (Vol.) 0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 11:41:20AM

Tracer Nuclide: Th-230
Tracer Recovery: 108.60%

Acquisition

Detector: AV211 SN: 50-117Z4
Acquisition Start Date: 12/20/2017 7:15:48PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/17/2017 3:28:10PM
Bkgd Info: Sample: ICB;AV211; Det: AV211; Spectrum #1; 11/17/2017 3:28:10 PM

Energy Calibration: IC-9817;AV211-20171114a
Efficiency Calibration:IC-9817;AV211-20171114a
Calibration Date: 11/14/2017 12:01:51PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.81% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th229_ROI_2010
Decay Correction:12/20/2017 7:14:50PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	22.9	99.7	3182	13.0310	3169.46	1.452E+002	DPM/mL
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	79.0	99.8	1615	10.0310	1605.15	6.764E+001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:45:14AM 12/21/2017

Sample

Sample Name: Ver3 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th 229 tracer
AnalysisResultsID: 206420
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

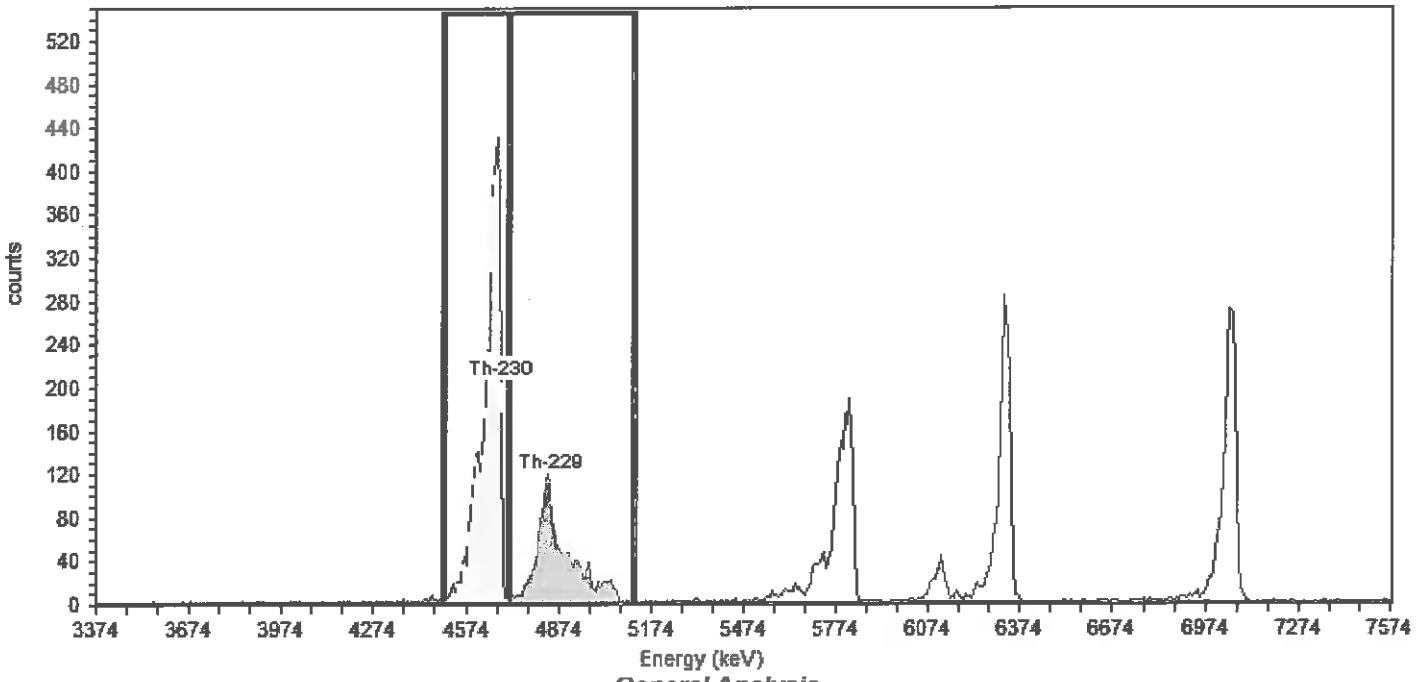
Tracer Name: Th-230_00036
Tracer Activity: 44.56 DPM / mL x (Vol.) 0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 11:41:20AM

Tracer Nuclide: Th-230
Tracer Recovery: 121.11%

Acquisition

Detector: AV212 SN: 49-155m5
Acquisition Start Date: 12/20/2017 7:15:48PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/17/2017 3:28:10PM
Bkgd Info: Sample: ICB;AV212; Det: AV212; Spectrum #1; 11/17/2017 3:28:10 PM

Energy Calibration: IC-9884;AV212-20171114
Efficiency Calibration:IC-9884;AV212-20171114
Calibration Date: 11/14/2017 12:01:41PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.41% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: Absolute Interactive ROI Analysis
Decay Correction:12/20/2017 7:14:50PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-230	4688.0	4,687.5	0.5	4500.5	4709.3	42.7	99.7	3475	2.0000	3473.00	1.619E+002	DPM/mL
Th-229	4848.0	4,845.3	2.7	4709.3	5119.5	67.0	99.8	1667	1.0000	1666.00	6.407E+001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Th-229 Tracer Verification (coppt.)

Standard Verification

Batch No. : _____

Balance ID : _____

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	VER. 1	0.1	210	
2	2	1	211	
3	3		212	
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A

Initials / Date

Isotope : Th-230
Std Sol'n No. : Th-230-00036
Vol (mL) : 0.3
Ref Activity (dpm/mL) : 44.5646
Act Ref Date : 08-08-13

Samples Spiked and Traced By:
SUB 12/19/17
Initials / Date

Verification Signature & Date:
RM 12/19/17
Initials / Date

LCS Standard ☐ N/A

Initials / Date

Isotope : Th-229
Std Sol'n ID. : Th-229.00023
Vol (mL) : 0.1
Ref Activity (dpm/mL) : 67.22958
Act Ref Date : 08-06-14

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐ ST-RC-0003 Rev.	☐ ST-RC-0040 Rev.	☐ ST-RC-0110 Rev.
☐ ST-RC-0004 Rev.	☐ ST-RC-0041 Rev.	☐ ST-RC-0120 Rev.
☐ ST-RC-0014 Rev.	☐ ST-RC-0050 Rev.	☐ ST-RC-0232 Rev.
☐ ST-RC-0020 Rev.	☐ ST-RC-0090 Rev.	☐ ST-RC-0238 Rev.
☐ ST-RC-0021 Rev.	☐ ST-RC-0100 Rev.	☐ ST-RC-0240 Rev.
		☐ ST-RC-0241 Rev.
		☐ ST-RC-0242 Rev.
		☐ ST-RC-5016 Rev.
		☐
		☐

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____
Date : _____

Reviewed by: _____
Date: _____

\\Slsvr01\RAD\MasterForms\RAD-0045 Rev(3)

08/09/2018

Th-229 Tracer ONLY VER.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Standard Verification (Coppt)

Batch No. : _____

Balance ID : _____

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	VER. 1 RC² = 1570	0.1	205	RC: 147
2	2 = 16496		207	RC: 149
3	3 = 15694		209	RC: 152
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A (Initials / Date)

Isotope : Th-229
Std Sol'n No. : Th-229.00023
Vol (mL) : 0.1
Ref Activity (dpm/mL) : 67.22958
Act Ref Date : 08-06-14

Samples Spiked and Traced By: SUB 12/19/17 (Initials / Date)

Verification Signature & Date: JDM 12/19/17 (Initials / Date)

LCS Standard ☐ N/A (Initials / Date)

Isotope : I
Std Sol'n ID. :
Vol (mL) :
Ref Activity (dpm/mL) :
Act Ref Date :

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐ ST-RC-0003 Rev.	☐ ST-RC-0040 Rev.	☐ ST-RC-0110 Rev.
☐ ST-RC-0004 Rev.	☐ ST-RC-0041 Rev.	☐ ST-RC-0120 Rev.
☐ ST-RC-0014 Rev.	☐ ST-RC-0050 Rev.	☐ ST-RC-0232 Rev.
☐ ST-RC-0020 Rev.	☐ ST-RC-0090 Rev.	☐ ST-RC-0238 Rev.
☐ ST-RC-0021 Rev.	☐ ST-RC-0100 Rev.	☐ ST-RC-0240 Rev.
		☐ ST-RC-0241 Rev.
		☐ ST-RC-0242 Rev.
		☐ ST-RC-5016 Rev.
		☐
		☐

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____
Date : _____

Reviewed by: _____
Date: _____

\\Slsvr01\RAD\MasterForms\RAD-0045 Rev(3)

08/09/2018

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:01:20AM 1/15/2018

Sample

Sample Name: Ver. 1
SampleType: Sample

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Sample Collection Date:

Batch

Batch Name: Th-229 Tracer Only
AnalysisID: 719841

Analyst: 60040

Tracer

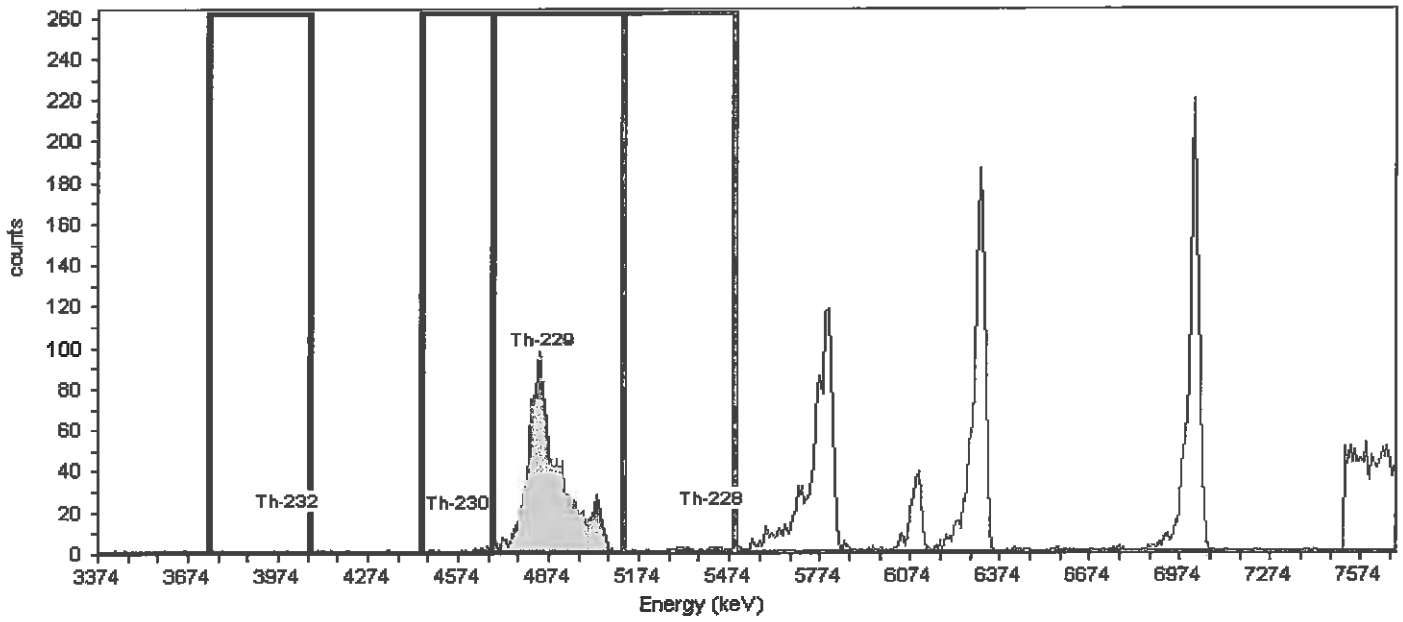
Tracer Name: Undefined
Tracer Activity:
Tracer Ref. Date:

Tracer Nuclide: External Recovery
Tracer Recovery: 100.00%

Acquisition

Detector: AV97
Serial Number: 76-03393
Acquisition Start Date: 1/12/2018 5:11:28PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 12/19/2017 12:16:50PM
Background Info: Sample: ICB;AV97; Det: AV97; Spectrum #1; Dec-19-2017 12:16

Calibration Name: IC-9886;AV97-20170802
Calibration Date: 8/2/2017 11:02:54AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.33% +/- 0.31% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 1/12/2018 5:08:17PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	11.9	100.2	3	1.0000	2.43	0.113	DPM/mL
Th-230	4567.6	4,687.5	-119.9	4448.3	4686.9	29.6	99.7	18	0.0000	18.00	0.842	DPM/mL
Th-229	4848.0	4,845.3	2.7	4686.9	5119.5	82.2	99.8	1538	1.0000	1537.00	71.851	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	140.5	99.8	37	17.9134	19.17	0.897	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:01:54AM 1/15/2018

Sample

Sample Name: Ver 2
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: Th-229 Tracer Only
AnalysisID: 719839

Analyst: 60040

Tracer

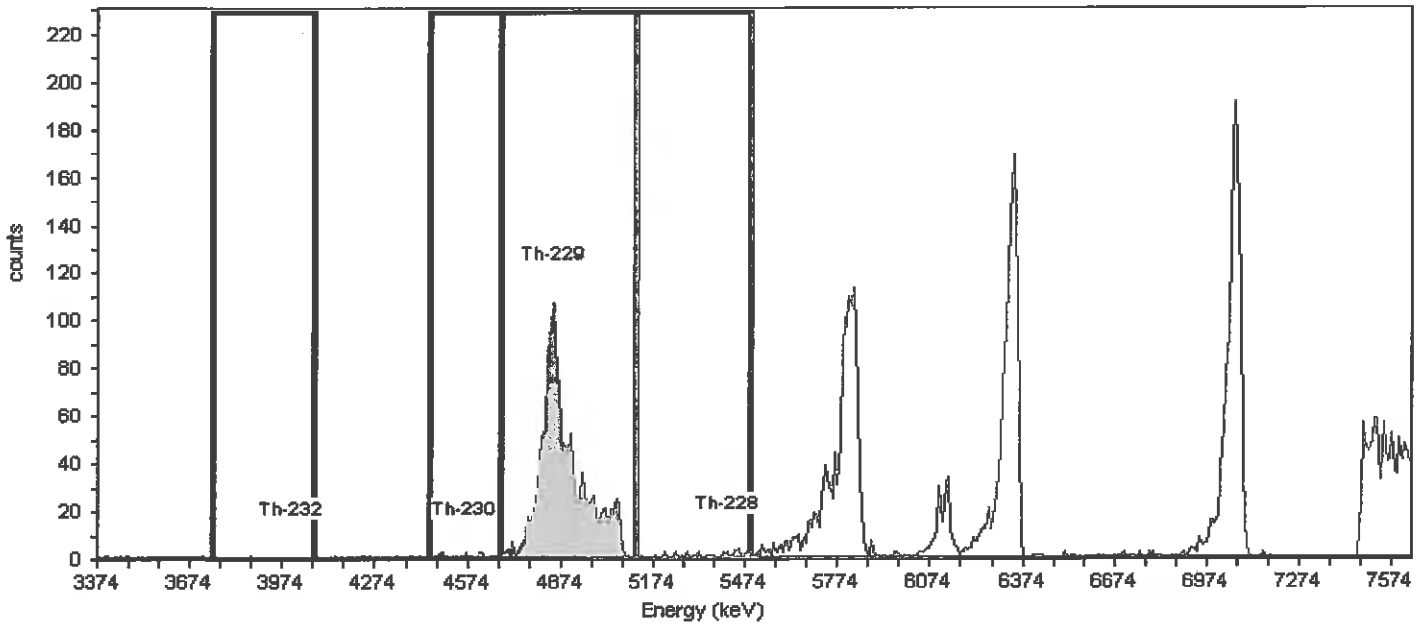
Tracer Name: Undefined
Tracer Activity:
Tracer Ref. Date:

Tracer Nuclide: External Recovery
Tracer Recovery: 100.00%

Acquisition

Detector: AV96
Serial Number: 46-033P1
Acquisition Start Date: 1/12/2018 5:11:26PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 12/19/2017 12:16:48PM
Background Info: Sample: ICB;AV96; Det: AV96; Spectrum #1; Dec-19-2017 12:16

Calibration Name: IC-9885;AV96-20170802
Calibration Date: 8/2/2017 11:02:35AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.24% +/- 0.36% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 1/12/2018 5:08:17PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	44.5	100.2	1	1.0000	0.00	0.000	DPM/mL
Th-230	4563.9	4,687.5	-123.6	4448.3	4679.5	196.1	99.7	23	0.0000	23.00	0.992	DPM/mL
Th-229	4848.0	4,845.3	2.7	4679.5	5119.5	76.5	99.8	1561	2.0000	1559.00	67.142	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	15.1	99.8	39	14.0000	25.00	1.077	DPM/mL

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:02:07AM 1/15/2018

Sample

Sample Name: Ver 3
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: Th-229 Tracer Only
AnalysisID: 719837

Analyst: 60040

Tracer

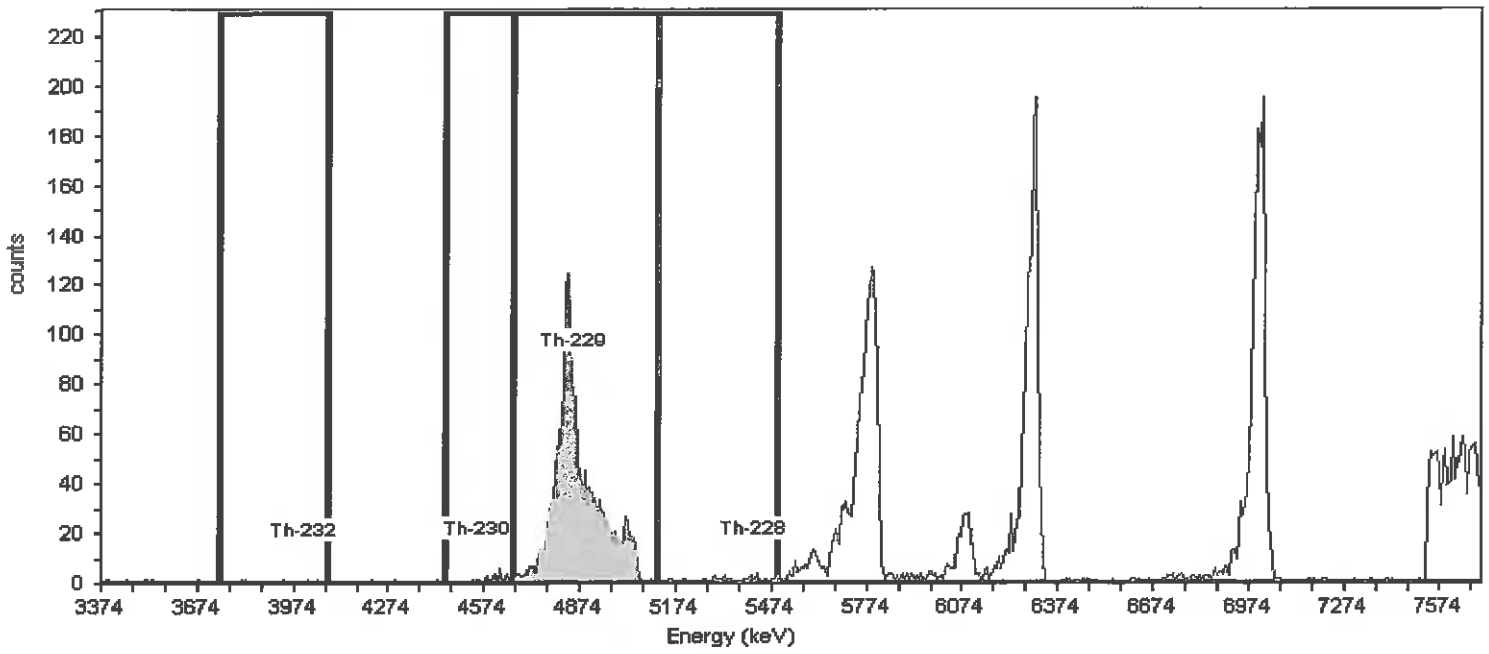
Tracer Name: Undefined
Tracer Activity:
Tracer Ref. Date:

Tracer Nuclide: External Recovery
Tracer Recovery: 100.00%

Acquisition

Detector: AV94
Serial Number: 49-203ff5
Acquisition Start Date: 1/12/2018 5:11:25PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 12/20/2017 2:53:21PM
Background Info: Sample: ICB;AV94; Det: AV94; Spectrum #1; Dec-20-2017 14:53

Calibration Name: IC-9817;AV94-20170802
Calibration Date: 8/2/2017 11:02:05AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 23.29% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 1/12/2018 5:08:17PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	10.8	100.2	6	1.0000	4.57	0.204	DPM/mL
Th-230	4556.4	4,687.5	-131.1	4448.3	4664.6	52.6	99.7	22	0.0000	22.00	0.987	DPM/mL
Th-229	4848.0	4,845.3	2.7	4664.6	5119.5	68.6	99.8	1596	3.0000	1593.00	71.396	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	181.0	99.8	27	14.0000	12.91	0.579	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Reagent ID: Th-229_00023

Description:	Th-229 Tracer	Expiration Date:	12/20/2018
No. of Bottles:	1	Laboratory:	TestAmerica St. Louis
Storage Location:	RAD Actinide STDs	Prepared By:	Bernsen, Sarah C
Reagent Volume:	500.000 mL	Solvent:	0.1M HNO3
Creation Date:	12/15/2017	Solvent Lot:	n/a
Open Date:			
Container(s):	1347365		
Comment:			

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
At-217	Th-229_00017	03/26/2018	2240.98600	dpm/mL	67.22958	dpm/mL
Th-229	Th-229_00017	03/26/2018	2240.98600	dpm/mL	67.22958	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Th-229_00017	Th-229 Parent		03/26/18				15.00000	mL

Reagent

Th-230_00015

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

92523
Th-230 5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2502650, Item 2 Product Code: 8230-5FSA-4kBq

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Th-230	2.753E+07	3.979E+03	0.1	0.9	1.8	11/29/2012

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: α-impurities 1.5915 Bq; γ-impurities (other than decay products)<0.1%.
5.07636 g 0.5M HNO3 solution. Carrier free.

Source Prepared by: M. I. Taskaeva, Radiochemist

QA Approved: J.D. McCorvey, Counting Room Manager Date: 27 Nov 12

51464
ID Th-230_00015
Th-230 Ampoule

RAD12-0040
Th-230 Ampoule
hursts
None
Prep/Opened: 11/28/2012
Exp(1): 11/28/2062
Exp(2): 11/28/2062

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Single Isotope Certificate Rev 3, 23 August 2012

Reagent

Th-230_00016

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

92523

Th-230 5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2502650, Item 2 Product Code: 8230-5FSA-4kBq

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty*, % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Th-230	2.753E+07	3.979E+03	0.1	0.9	1.8	11/29/2012

*Uncertainty: U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: α-impurities 1.5915 Bq; γ-impurities (other than decay products)<0.1%.
5.07636 g 0.5M HNO3 solution. Carrier free.

Source Prepared by: M. I. Taskaeva, Radiochemist

QA Approved: J.D. McCorvey, Counting Room Manager Date: 27 NOV 12

51464
ID Th-230_00015
Th-230 Ampoule

RAD12-0040
Th-230 Ampoule
hursts
None
Prep/Opened: 11/28/2012
Exp(1): 11/28/2062
Exp(2): 11/28/2062

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

TestAmerica St. Louis

Standards Preparation Logbook Record

Nov-28-2012

Logbook: \\Qstlmo01\Stdslog\RAD_STD.std

RAD12-0040, Th-230 Ampoule Th-230_00015 # 51464 Analyst: hursts

Vendor: Analytics Lot No.: 92523
Solvent: None
Date Prep./Opened: 11-28-2012 Date Consumed: 11-28-2012
Date Expires(1): 11-28-2062 (50 Years)
Date Expires(2): 11-28-2062 (50 Years)
Cert: 92523 Activity: 3979Bq Reference Date: 11/29/12 Mass: 5.07636

Component	Initial Conc (dpm/g)	Final Conc (dpm/g)
Th-230	47,030	47,030

RAD12-0041, Th-230 Calibration Standard Th-230_00016 # 51465 Analyst: hursts

Solvent: 0.5M HNO3 Volume (ml): 100.00
Date Prep./Opened: 11-28-2012
Date Expires(1): 11-29-2062 (50 Years)
Date Expires(2): 11-29-2062 (50 Years)

Parent Std No.: RAD12-0040, Th-230 Ampoule Aliquot Amount (g): 5.0489
Parent Date Expires(1): 11-28-2062 Parent Date Expires(2): 11-28-2062

Component	Initial Conc (dpm/g)	Final Conc (dpm/mL)
Th-230	47,030	2,374.5

Reviewed By: SH

St. Louis Radiological Standard Reverification Form

Standard ID Number: Rad12-0041
True Value = 1069.59 pCi/mL
Date Analyzed: 11/30/2012

Radionuclide: Th-230 Gross Alpha

	Replicates	
#1	1071	pCi/mL
#2	1027	pCi/mL
#3	1085	pCi/mL

Mean = 1061

1 sigma = 30.26549 1.96 sigma = 59.32036

True Value minus 5% = 1016.111 (True Value - 5%)
True Value plus 5% = 1123.07 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: JL 11/30/12

SOP Reference: STL-QA-0002, Current Revision

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122628 **Operator:** 63903

Sample ID	WRKNO	*Aliquot*		*Mass*	*Instr ID*	*CountTime*		*Ts*	*Tb*	*Dilution*	*Sigma*	
	Analyte	Cs	Cb	XT	CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC
verification 1a	NA	*1.000E+000mL*		*0.0546 g*	*Purple16*	*11/30/12 13:03*		*8.00*	*1000.00*	*1.00*	*1.00*	
	Gross Alpha	2528	175	0.00	3.160E+002	1.750E-001	0.1328	**1.071E+006**pCi/L	6.469E+004	2.132E+004	2.807E+003	1.167E+003
	Gross Beta	792	485	0.00	9.900E+001	4.850E-001	0.4280	**1.037E+005**pCi/L	6.370E+003	3.702E+003	1.212E+003	6.028E+002
verification 2a	NA	*1.000E+000mL*		*0.0536 g*	*Purple17*	*11/30/12 13:03*		*8.00*	*1000.00*	*1.00*	*1.00*	
	Gross Alpha	2364	87	0.00	2.955E+002	8.700E-002	0.1295	**1.027E+006**pCi/L	6.225E+004	2.113E+004	2.376E+003	8.436E+002
	Gross Beta	764	362	0.00	9.550E+001	3.620E-001	0.4353	**9.846E+004**pCi/L	6.084E+003	3.576E+003	1.078E+003	5.121E+002
verification 3a	NA	*1.000E+000mL*		*0.0531 g*	*Purple18*	*11/30/12 13:04*		*8.00*	*1000.00*	*1.00*	*1.00*	
	Gross Alpha	2521	62	0.00	3.151E+002	6.200E-002	0.1308	**1.085E+006**pCi/L	6.551E+004	2.161E+004	2.168E+003	7.052E+002
	Gross Beta	788	395	0.00	9.850E+001	3.950E-001	0.4295	**1.029E+005**pCi/L	6.325E+003	3.680E+003	1.125E+003	5.421E+002

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Prep Report for Gross Alpha/Beta

Batch: M122628 **Prep Analyst:** 250

SampID	WRKNO	Aliquot	Gross	Tare	Mass	Dilution
verification 1a	NA	6.500E-001 mL	8.6982 g	8.6436 g	0.0546 g	1.00
		Orange 5	protean 14		16	
verification 2a	NA	6.500E-001 mL	8.6698 g	8.6162 g	0.0536 g	1.00
		7	15		17	
verification 3a	NA	6.500E-001 mL	8.6466 g	8.5935 g	0.0531 g	1.00
		8			18	

Spike Information

Sample ID	Standard ID	Analyte	Std Conc	Aliquot	Ref Date	StdAdded
	Rad12-0041	Th-230	2374.5 dpm/mL	1.00 mL	11-29-12	

MS — Spiked By

LM per MS — Spike Verified By

11-28-12 — Spike Date

Standard Operating Procedures

SOPNumber	Title	Revision
☐		

Reviewed By — 11/30/12 Review Date

MS — Analyst/Relenquished By — 11-28-12 Release Date — Received By — 11/28/12 Receipt Date

1123433897/MS/11-28-12

Balance ID / Initials / Date

Reagent

Th-230_00019

TestAmerica St. Louis

Standards Preparation Logbook Record

Aug-13-2013

Logbook: \\Qstlmo01\Stdslog\RAD_STD.std

RAD13-0028, Th-230 Ampoule — Analyst: marrss

Vendor: Analytics Lot No.: 92776
Solvent: None
Date Prep./Opened: 08-13-2013
Date Expires(1): 08-08-2063 (50 Years)
Date Expires(2): 08-08-2063 (50 Years)
Activity: 3.728 E+03 Bq, Ref date: 08/08/2013, Solution mass: 5.09261g, Source ID: 92776

Component	Initial Conc (dpm/g)	Final Conc (dpm/g)
Th-230	43,922	43,922

Th-230-00019 #181198

RAD13-0029, Th-230 Parent — Analyst: marrss

Solvent: ~~None~~ 1M HNO3 SUB 8/13/13 Volume (ml): 100.00
Date Prep./Opened: 08-13-2013
Date Expires(1): 08-08-2063 (50 Years)
Date Expires(2): 08-08-2063 (50 Years)

Parent Std No.: RAD13-0028, Th-230 Ampoule Aliquot Amount (g): 5.0731
Parent Date Expires(1): 08-08-2063 Parent Date Expires(2): 08-08-2063

Component	Initial Conc (dpm/g)	Final Conc (dpm/mL)
Th-230	43,922	2,228.2

Reviewed By: SUB

Page 1 of 1

Th-230 Parent

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Reagent ID: Th-230_00019

		Expiration Date:	08/08/2063
Description:	Th-230 Parent	Laboratory:	TestAmerica St. Louis
No. of Bottles:	1	Prepared By:	Bernsen, Sarah C
Storage Location:	RAD Actinide STDs	Solvent:	1M HNO3
Reagent Volume:	100.000 mL	Solvent Lot:	n/a
Creation Date:	08/13/2013		
Container(s):	181198		
Comment:			

Reagent Analyte Information

Analyte	Source ID	Source Expiration Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
Th-230	Th-230_00018	08/08/2063	43922.46	dpm/g	2228.23072	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Th-230_00018	Th-230 Ampoule	ASTD	08/08/63	Eckert & Ziegler	92776		5.07310	mL

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

92776

Th-230 5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica
P.O. No.: 2532686, Item 1 Product Code: 8230-5FSA-4kBq

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Th-230	2.753E+07	3.728E+03	0.1	0.9	1.8	08/08/2013

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: α-impurities 0.04%; γ-impurities (other than decay products)<0.1%.
5.09261 g 0.5M HNO3 solution. Carrier free.

Source Prepared by: R. Ormsby
R. Ormsby, Radiochemist

QA Approved:
J.D. McCorvey, Counting Room Manager

Date: 6AUG13

RAD13-0029
Th-230 Parent
marrss
None
Prep/Opened: 8/13/2013
Exp(1): 8/8/2063
Exp(2): 8/8/2063

181198
ID: Th-230_00019
Exp: 08/08/63 Prpd: SH Cal. 08/13/13
Th-230 Parent

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Single Isotope Certificate Rev 3, 23 August 2012

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Th-230_00036

Standard ID Number: Th-230_00034
True Value = 44.563 dpm/mL
Date Analyzed: 8/28/2017

Radionuclide: Th-230

	Replicates	
#1	44.57	dpm/mL
#2	44.43	dpm/mL
#3	43.79	dpm/mL

Mean = 44.2633333

1 sigma = 0.41585254 1.96 sigma = 0.815071

True Value minus 5% = 42.33485 (True Value - 5%)
True Value plus 5% = 46.79115 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: ALD 8/29/17

2nd Reviewed By/Date: RM 8·29·17

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	8/8/2013 0:00		
Decayto Date/Time (t):	8/28/17 0:00		
Initial Activity (A_0):	44.56 dpm		
Initial Aliquot:	1 mL		
Initial Conc:	44.5646 dpm/mL		
***Soln. Density:**	1 g/mL		
Nuclide:	Th-230		
Half-Life (days):	27539850	decay days	fraction
****Decay Factor:**	1.0000	1481.00	0.00005
Decay Corr Activity:	4.4563E+01 dpm		
Decay Corr Conc:	4.4563E+01 dpm/mL		

Conversion/Calculations

Final Activity Unit:	dpm
Activity Unit Factor:	1.00000
Final Volume Unit:	mL
Volume Unit Factor:	1.000
Final Concentration:	4.4563E+01 dpm/mL
Aliquot Volume:	1.0000E+00 mL
Final Activity (A):	4.4563E+01 dpm

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:33:49AM 8/29/2017

Sample

Sample Name: Verification 1 Type: Sample
Spectrum #1 Analysis #1

Sample Collection Date:
Comment:

Sample Volume : 0.30 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th-230_00034
AnalysisResultsID: 199659
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

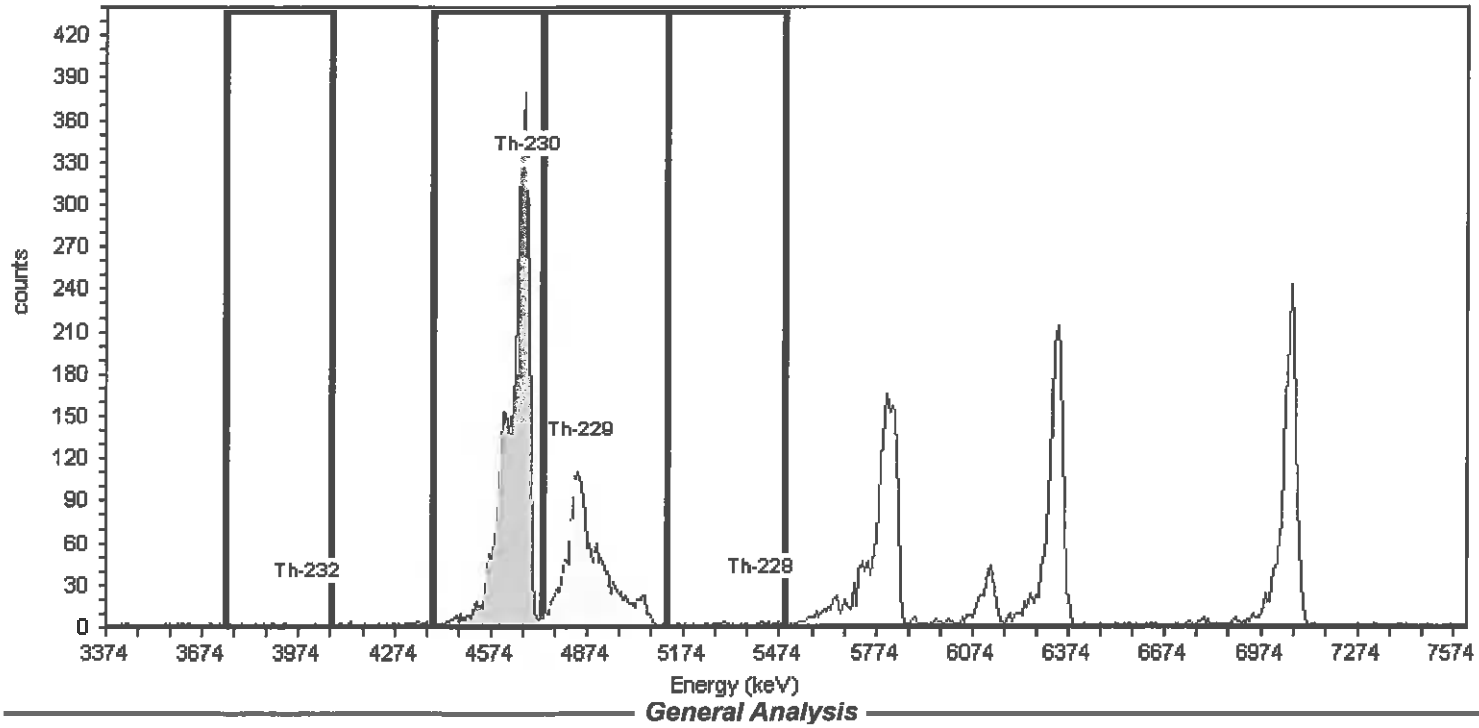
Tracer Name: Th-229_00022
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/6/2014 9:07:15AM

Tracer Nuclide: Th-229
Tracer Recovery: 107.32%

Acquisition

Detector: AV175 SN: 50-117H1
Acquisition Start Date: 8/28/2017 3:27:30PM
Live Time: 960.00 min.
Real Time: 960.23 min.
Background Date: 8/21/2017 10:26:15PM
Bkgd Info: Sample: ICB:AV175; Det: AV175; Spectrum #1; 8/21/2017 10:26:15 PM

Energy Calibration: IC-9885;AV175-20161111
Efficiency Calibration:IC-9885;AV175-20161111
Calibration Date: 11/14/2016 8:18:26AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.93% +/- 0.37% TPU(2 sigma)



General Analysis

Analysis Method: Absolute Interactive ROI Analysis
Decay Correction:8/28/2017 3:25:48PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	317.3	100.2	8	1.0000	6.88	8.917E-002	DPM/mL
Th-230	4688.0	4,687.5	0.5	4388.6	4731.7	62.5	99.7	3429	5.0000	3424.00	4.457E+001	DPM/mL
Th-229	4848.0	4,845.3	2.7	4731.7	5119.5	87.7	99.6	1723	3.0000	1720.00	2.405E+001	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	32.7	99.8	43	14.0866	28.80	3.748E-001	DPM/mL

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:33:17AM 8/29/2017

Sample

Sample Name: Verification 2 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.30 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th-230_00034
AnalysisResultsID: 199658
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

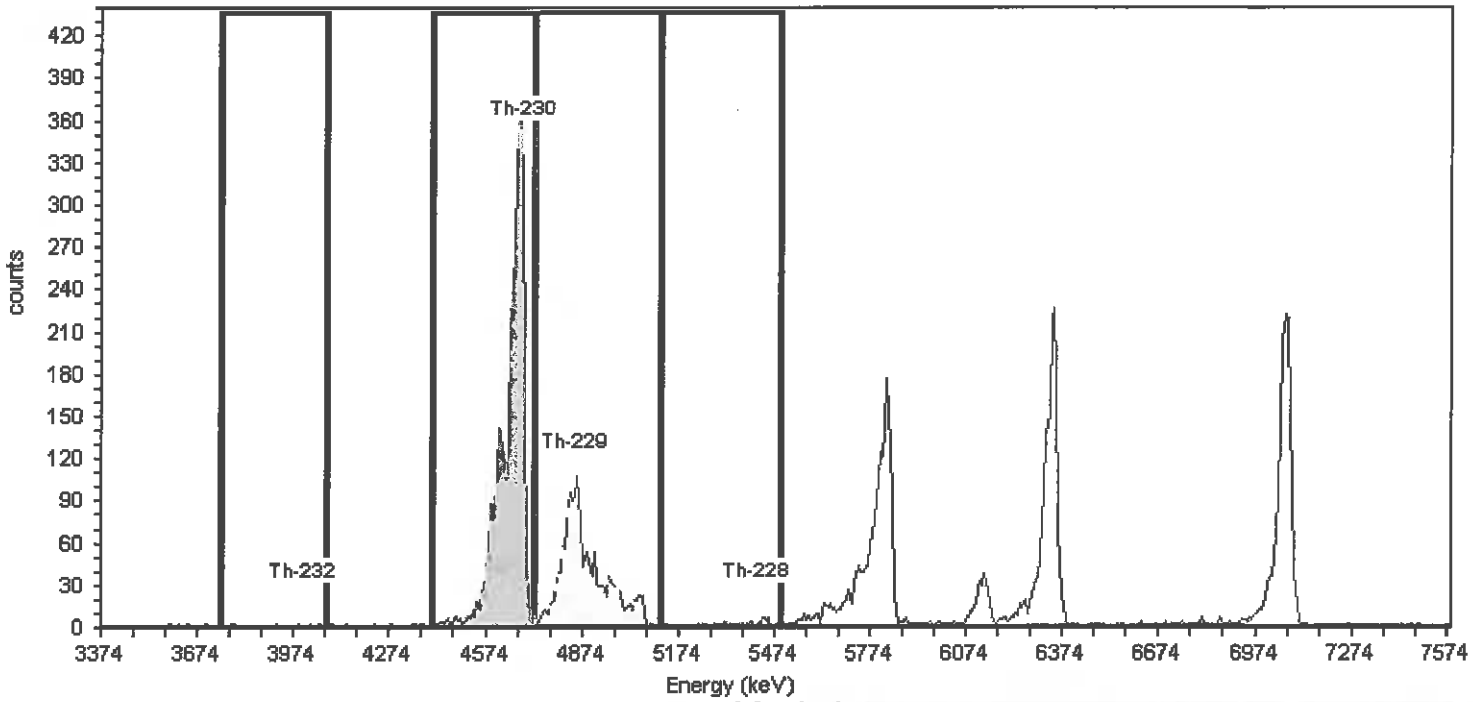
Tracer Name: Th-229_00022
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/6/2014 9:07:15AM

Tracer Nuclide: Th-229
Tracer Recovery: 96.37%

Acquisition

Detector: AV177 SN: 50-117H3
Acquisition Start Date: 8/28/2017 3:27:30PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 8/21/2017 10:26:16PM
Bkgd Info: Sample: ICB:AV177; Det: AV177; Spectrum #1; 8/21/2017 10:26:16 PM

Energy Calibration: IC-7107;AV177-20161206
Efficiency Calibration:IC-7107;AV177-20161206
Calibration Date: 12/16/2016 8:22:47AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 25.69% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute Interactive ROI Analysis
Decay Correction:8/28/2017 3:25:48PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	14.3	100.2	6	0.0000	6.46	9.039E-002	DPM/mL
Th-230	4688.0	4,687.5	0.5	4403.6	4724.2	33.5	99.7	3163	4.0000	3159.00	4.443E+001	DPM/mL
Th-229	4848.0	4,845.3	2.7	4724.2	5119.5	80.6	99.6	1598	6.0000	1592.00	2.160E+001	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	16.8	99.8	49	14.9361	33.72	4.740E-001	DPM/mL

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:32:40AM 8/29/2017

Sample

Sample Name: Verification 3 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.30 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th-230_00034
AnalysisResultsID: 199657
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

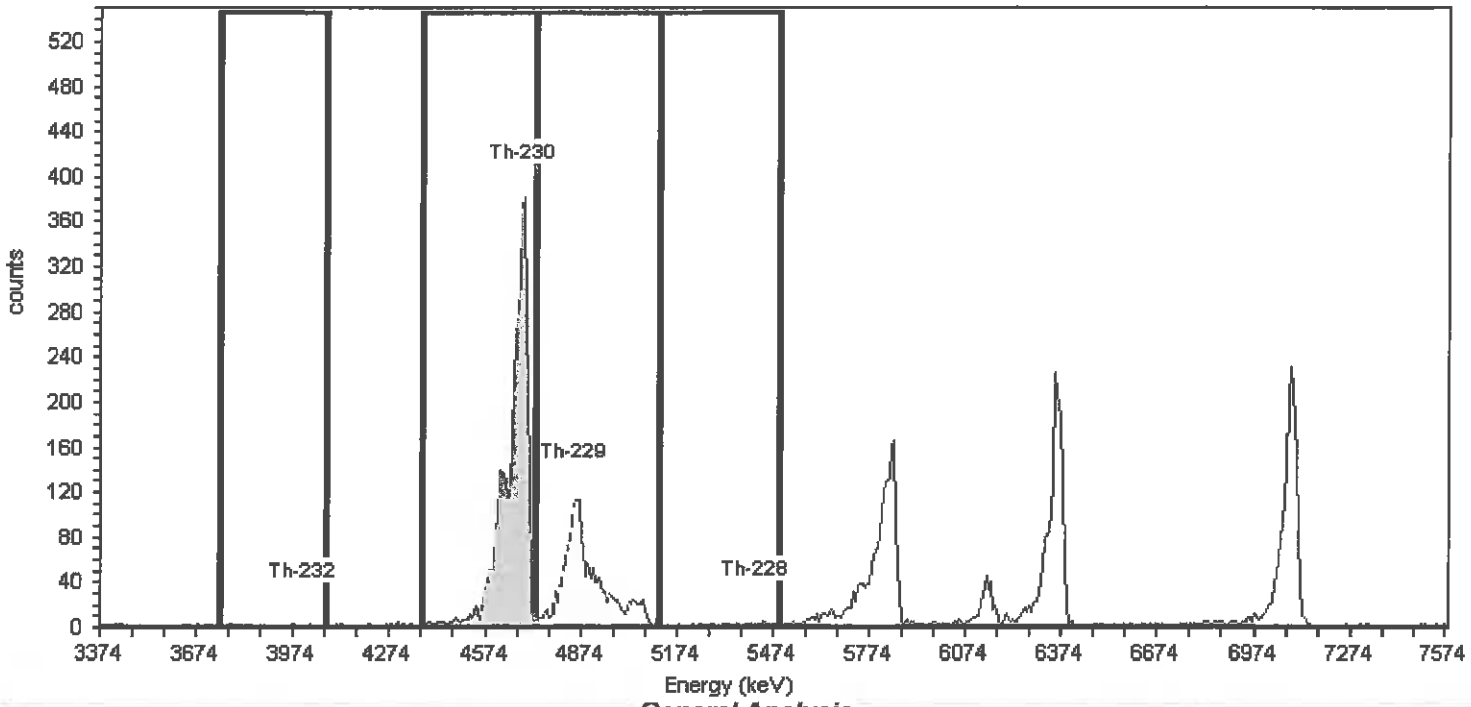
Tracer Name: Th-229_00022
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/6/2014 9:07:15AM

Tracer Nuclide: Th-229
Tracer Recovery: 99.84%

Acquisition

Detector: AV178 SN: 50-117H4
Acquisition Start Date: 8/28/2017 3:27:30PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 8/21/2017 10:26:16PM
Bkgd Info: Sample: ICB:AV178; Det: AV178; Spectrum #1; 8/21/2017 10:26:16 PM

Energy Calibration: IC-8874;AV178-20161206
Efficiency Calibration:IC-8874;AV178-20161206
Calibration Date: 12/16/2016 8:22:54AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.36% +/- 0.38% TPU(2 sigma)



General Analysis

Analysis Method: Absolute Interactive ROI Analysis
Decay Correction:8/28/2017 3:25:48PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	221.8	100.2	3	1.0000	2.00	2.634E-002	DPM/mL
Th-230	4688.0	4,687.5	0.5	4373.7	4731.7	20.0	99.7	3310	1.0000	3309.00	4.379E+001	DPM/mL
Th-229	4848.0	4,845.3	2.7	4731.7	5119.5	74.7	99.6	1693	1.0000	1692.00	2.237E+001	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	15.9	99.8	33	16.9134	15.91	2.105E-001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Th-230 spike (copper) Ver

Aliquot Only

Batch No. : —

Balance ID : —

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	Ver 1	0.3	175	
2	2	1	177	
3	3		178	
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A (Initials / Date)

Isotope : Th-229
Std Sol'n No. : Th-229.0022
Vol (mL) : 0.1
Ref Activity (dpm/mL) : 67.229
Act Ref Date : 08/01/14

Samples Spiked and Traced By: SUB 8/28/17 (Initials / Date)

Verification Signature & Date: NN 8.28.17 (Initials / Date)

LCS Standard ☐ N/A (Initials / Date)

Isotope : Th-230
Std Sol'n ID. : Th-230.00034
Vol (mL) : 0.3
Ref Activity (dpm/mL) : 44.5644
Act Ref Date : 08/08/13

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐ ST-RC-0003 Rev.	☐ ST-RC-0040 Rev.	☐ ST-RC-0110 Rev.
☐ ST-RC-0004 Rev.	☐ ST-RC-0041 Rev.	☐ ST-RC-0120 Rev.
☐ ST-RC-0014 Rev.	☐ ST-RC-0050 Rev.	☐ ST-RC-0232 Rev.
☐ ST-RC-0020 Rev.	☐ ST-RC-0090 Rev.	☐ ST-RC-0238 Rev.
☐ ST-RC-0021 Rev.	☐ ST-RC-0100 Rev.	☐ ST-RC-0240 Rev.
		☐ ST-RC-0241 Rev.
		☐ ST-RC-0242 Rev.
		☐ ST-RC-5016 Rev.
		☐
		☐

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☑	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : SUB
Date : 8/28/13

Reviewed by: _____
Date: _____

\\Slsvr01\RAD\MasterForms\RAD-0045 Rev(3)

08/09/2018

Reagent

Y Carrier_00032

REPORT OF ANALYSIS

Single-Element Aqueous RM

Yttrium Oxide

Product #: Z-067074-05-1L

Matrix: 10% HNO_3

Lot #: 10064660-5

Analyte	Certified Concentration
Y_2O_3	**50,000 µg/mL**

Intended Use: This solution is intended for use as a reference material (RM) or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), flame or furnace atomic absorption spectroscopy (AA or GFAA), and other techniques for elemental analysis.

Certification & Traceability: This RM was manufactured, processed, and/or certified under a quality management system that is registered/accredited to **ISO 9001**, **ISO Guide 34**, and **ISO/IEC 17025**. This RM was prepared to a nominal concentration of 50,000 µg/mL by gravimetric methods using single-element concentrate dissolved in high purity nitric acid (HNO_3) and diluted with filtered (0.22 µm), 18 M-ohm deionized water. The balances used in the preparation of this RM are calibrated regularly with traceability to NIST, using a calibration provider that is accredited to ISO/IEC 17025 by a mutually recognized accreditation body. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentration was determined based upon gravimetric procedures. Secondary verification of the certified concentration was performed using ICP-OES and is traceable to **NIST SRM 3167a**. The uncertainty associated with the certified concentration is ±0.5% relative, which is the sum of the estimated errors due to the purity of the raw materials, the gravimetric preparation of the solution, and transpiration through the container. This represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Instructions for Use: We recommend that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy, the analyst should: (1) use only pre-cleaned containers and transferware, (2) not pipette directly from the RM's original container, (3) never pour used product back into the original container, (4) make dilutions using calibrated balances or certified class A volumetric flasks and pipettes, (5) use a minimum sub-sample size of 500 µL, and (6) dilute with the same matrix as the original RM or other chemically suitable matrix. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or immerse the bottle or its contents, and avoid exposure to direct sunlight or moisture.

Period of Validity: CPI International ensures the accuracy of this solution for **18 months** from the certification date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Chuck Goudreau

Chuck Goudreau, Certifying Officer

April 6, 2018

Certification Date

CPI International waives all responsibility for any damages resulting from the usage and/or implementation of the products/data described herein.

USA
5580 Skylane Boulevard P: 707.525.5788
Santa Rosa, CA 95403 P: 800.878.7654
F: 707.545.7901

Europe
Nieuwe Hemweg 7P P: +31 20 638 05 97
1013BG Amsterdam F: +31 20 420 28 36
The Netherlands

www.cpiinternational.com

REPORT OF ANALYSIS

Single-Element Aqueous RM

Yttrium Oxide

Product #: Z-067074-05-1L

Matrix: 10% HNO_3

Lot #: 10064660-5

Analyte	Certified Concentration
Y_2O_3	**50,000 µg/mL**

Intended Use: This solution is intended for use as a reference material (RM) or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), flame or furnace atomic absorption spectroscopy (AA or GFAA), and other techniques for elemental analysis.

Certification & Traceability: This RM was manufactured, processed, and/or certified under a quality management system that is registered/accredited to **ISO 9001**, **ISO Guide 34**, and **ISO/IEC 17025**. This RM was prepared to a nominal concentration of 50,000 µg/mL by gravimetric methods using single-element concentrate dissolved in high purity nitric acid (HNO_3) and diluted with filtered (0.22 µm), 18 M-ohm deionized water. The balances used in the preparation of this RM are calibrated regularly with traceability to NIST, using a calibration provider that is accredited to ISO/IEC 17025 by a mutually recognized accreditation body. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentration was determined based upon gravimetric procedures. Secondary verification of the certified concentration was performed using ICP-OES and is traceable to **NIST SRM 3167a**. The uncertainty associated with the certified concentration is ±0.5% relative, which is the sum of the estimated errors due to the purity of the raw materials, the gravimetric preparation of the solution, and transpiration through the container. This represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Instructions for Use: We recommend that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy, the analyst should: (1) use only pre-cleaned containers and transferware, (2) not pipette directly from the RM's original container, (3) never pour used product back into the original container, (4) make dilutions using calibrated balances or certified class A volumetric flasks and pipettes, (5) use a minimum sub-sample size of 500 µL, and (6) dilute with the same matrix as the original RM or other chemically suitable matrix. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or immerse the bottle or its contents, and avoid exposure to direct sunlight or moisture.

Period of Validity: CPI International ensures the accuracy of this solution for **18 months** from the certification date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Chuck Goudreau

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April 6, 2018

Certification Date

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F: 707.545.7901

Europe
Nieuwe Hemweg 7P P: +31 20 638 05 97
1013BG Amsterdam F: +31 20 420 28 36
The Netherlands

www.cpiinternational.com

METALS

COVER PAGE
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29426-1

SDG No.:

Project: Former Carnotite Site - Non-Rad Analysis

Client Sample ID	Lab Sample ID
GW-ASC-5-070918	160-29426-1
GW-ASC-4-070918	160-29426-2
GW-ASC-2A-070918	160-29426-3
GW-ASC-4-070918-D	160-29426-4

Comments:

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: GW-ASC-5-070918 Lab Sample ID: 160-29426-1

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG ID.:

Matrix: Water Date Sampled: 07/09/2018 09:15

Reporting Basis: WET Date Received: 07/10/2018 09:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
13968-55-3	U-233	0.020	0.050	0.020	ug/L	U		2	6020A
13966-29-5	U-234	0.020	0.050	0.020	ug/L	U		2	6020A
15117-96-1	U-235	0.18	0.050	0.020	ug/L			2	6020A
13982-70-2	U-236	0.020	0.050	0.020	ug/L	U		2	6020A
7440-61-1	U-238	23	0.050	0.020	ug/L			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: GW-ASC-4-070918 Lab Sample ID: 160-29426-2

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG ID.:

Matrix: Water Date Sampled: 07/09/2018 10:35

Reporting Basis: WET Date Received: 07/10/2018 09:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
13968-55-3	U-233	0.020	0.050	0.020	ug/L	U		2	6020A
13966-29-5	U-234	0.020	0.050	0.020	ug/L	U		2	6020A
15117-96-1	U-235	0.041	0.050	0.020	ug/L	J		2	6020A
13982-70-2	U-236	0.020	0.050	0.020	ug/L	U		2	6020A
7440-61-1	U-238	5.6	0.050	0.020	ug/L			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: GW-ASC-2A-070918 Lab Sample ID: 160-29426-3

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG ID.:

Matrix: Water Date Sampled: 07/09/2018 12:45

Reporting Basis: WET Date Received: 07/10/2018 09:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
13968-55-3	U-233	0.020	0.050	0.020	ug/L	U		2	6020A
13966-29-5	U-234	0.020	0.050	0.020	ug/L	U		2	6020A
15117-96-1	U-235	0.020	0.050	0.020	ug/L	U		2	6020A
13982-70-2	U-236	0.020	0.050	0.020	ug/L	U		2	6020A
7440-61-1	U-238	2.0	0.050	0.020	ug/L			2	6020A

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: GW-ASC-4-070918-D
Lab Sample ID: 160-29426-4
Lab Name: TestAmerica St. Louis
Job No.: 160-29426-1
SDG ID.:
Matrix: Water
Date Sampled: 07/09/2018 10:35
Reporting Basis: WET
Date Received: 07/10/2018 09:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
13968-55-3	U-233	0.020	0.050	0.020	ug/L	U		2	6020A
13966-29-5	U-234	0.020	0.050	0.020	ug/L	U		2	6020A
15117-96-1	U-235	0.039	0.050	0.020	ug/L	J		2	6020A
13982-70-2	U-236	0.020	0.050	0.020	ug/L	U		2	6020A
7440-61-1	U-238	5.5	0.050	0.020	ug/L			2	6020A

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

ICV Source: ISOU ICV_00163 Concentration Units: ug/L

CCV Source: ISOU CCV_00102

Analyte	ICV 160-379766/6 08/01/2018 12:49				CCV 160-379766/12 08/01/2018 13:17				CCV 160-379766/23 08/01/2018 14:08			
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
U-233	0.107		0.107	100	0.110		0.107	103	0.109		0.107	102
U-234	0.169		0.168	101	0.172		0.168	102	0.173		0.168	103
U-235	9.89		9.82	101	10.1		9.82	102	10.2		9.82	104
U-236	0.249		0.254	98	0.254		0.254	100	0.252		0.254	99
U-238	10.1		10.1	100	10.3		10.1	102	10.4		10.1	104

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2B-IN
CRQL CHECK STANDARD
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Method: 6020A Instrument ID: ICPMS6100

Lab Sample ID: CRI 160-379766/8 Concentration Units: ug/L

CRQL Check Standard Source: ISOU Cal 1_00153

Analyte	CRQL Check Standard				
	True	Found	Qualifiers	%R(1)	Limits
U-235	0.0491	0.0500		102	70-130
U-238	0.0503	0.0505		100	70-130

Lab Sample ID: CRI 160-379766/9 Concentration Units: ug/L

CRQL Check Standard Source: ISOU Cal 2_00136

Analyte	CRQL Check Standard				
	True	Found	Qualifiers	%R(1)	Limits
U-233	0.0214	0.0208	J	97	70-130
U-234	0.0335	0.0338	J	101	70-130
U-236	0.0508	0.0497	J	98	70-130

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM IIB-IN

3-IN
INSTRUMENT BLANKS
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Concentration Units: ug/L

Analyte	RL	ICB 160-379766/7 08/01/2018 12:53		CCB 160-379766/13 08/01/2018 13:21		CCB 160-379766/24 08/01/2018 14:13			
		Found	C	Found	C	Found	C	Found	C
U-233	0.050	0.020	U	0.020	U	0.020	U		
U-234	0.050	0.020	U	0.020	U	0.020	U		
U-235	0.050	0.020	U	0.020	U	0.020	U		
U-236	0.050	0.020	U	0.020	U	0.020	U		
U-238	0.050	0.020	U	0.020	U	0.020	U		

Italicized analytes were not requested for this sequence.

3-IN
METHOD BLANK
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Concentration Units: ug/L Lab Sample ID: MB 160-379520/1-A ^2

Instrument Code: ICPMS6100 Batch No.: 379766

CAS No.	Analyte	Concentration	C	Q	Method
13968-55-3	U-233	0.020	U		6020A_U
13966-29-5	U-234	0.020	U		6020A_U
15117-96-1	U-235	0.020	U		6020A_U
13982-70-2	U-236	0.020	U		6020A_U
7440-61-1	U-238	0.020	U		6020A_U

4A-IN
INTERFERENCE CHECK STANDARD
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Lab Sample ID: ICSAB 160-379766/11 Instrument ID: ICPMS6100

Lab File ID: 080118m2.rep ICS Source: ISOU ICSAB_00121

Concentration Units: ug/L

Analyte	True Solution AB	Found Solution AB	Percent Recovery
U-233	**0.0534**	**0.0560**	**105**
U-234	**0.0838**	**0.0864**	**103**
U-235	**4.91**	**5.13**	**104**
U-236	**0.127**	**0.129**	**101**
U-238	**5.03**	**5.22**	**104**

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM IVA-IN

5A-IN
MATRIX SPIKE SAMPLE RECOVERY
METALS

Client ID: GW-ASC-4-070918 MS
Lab ID: 160-29426-2 MS
Lab Name: TestAmerica St. Louis
Job No.: 160-29426-1
SDG No.:
Matrix: Water
Concentration Units: ug/L
% Solids:

Analyte	SSR	C	Sample Result (SR)	C	Spike Added (SA)	%R	Control Limit %R	Q	Method
U-234	0.0847		0.020	U	0.0838	101	75-125		6020A
U-235	5.10		0.041	J	4.91	103	75-125		6020A
U-238	10.8		5.6		5.03	103	75-125		6020A

SSR = Spiked Sample Result

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VA - IN

5A-IN
MATRIX SPIKE DUPLICATE SAMPLE RECOVERY
METALS

Client ID: GW-ASC-4-070918 MSD
Lab ID: 160-29426-2 MSD
Lab Name: TestAmerica St. Louis
Job No.: 160-29426-1
SDG No.:
Matrix: Water
Concentration Units: ug/L
% Solids:

Analyte	(SDR)	C	Spike Added (SA)	%R	Control Limit %R	RPD	RPD Limit	Q	Method
U-234	0.0847		0.0838	101	75-125	0	20		6020A
U-235	5.11		4.91	103	75-125	0	20		6020A
U-238	10.6		5.03	101	75-125	1	20		6020A

SDR = Sample Duplicate Result

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VD - IN

7A-IN
LAB CONTROL SAMPLE
METALS

Lab ID: LCS 160-379520/2-A ^2

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

Sample Matrix: Water LCS Source: ISOU PRP SPK_00015

Analyte	Water(ug/L)							
	True	Found	C	%R	Limits		Q	Method
U-234	0.0838	0.0840		100	80	120		6020A
U-235	4.91	5.01		102	80	120		6020A
U-238	5.03	5.10		101	80	120		6020A

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIIA - IN

8-IN
ICP-AES AND ICP-MS SERIAL DILUTIONS
METALS

Lab ID: 160-29426-2

SDG No:

Lab Name: TestAmerica St. Louis Job No: 160-29426-1

Matrix: Water Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	Method
U-233	0.020	U	0.10	U	NC		6020A
U-234	0.020	U	0.10	U	NC		6020A
U-235	0.041	J	0.10	U	NC		6020A
U-236	0.020	U	0.10	U	NC		6020A
U-238	5.6		5.61		0.54		6020A

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIII-IN

9-IN
DETECTION LIMITS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29426-1

SDG Number:

Matrix: Water Instrument ID: ICPMS6100

Method: 6020A MDL Date: 09/09/2015 09:40

Prep Method: 3010A

Analyte	Wavelength/ Mass	RL (ug/L)	MDL (ug/L)
U-233		0.05	0.02
U-234		0.05	0.02
U-235		0.05	0.02
U-236		0.05	0.02
U-238		0.05	0.02

9-IN
CALIBRATION BLANK DETECTION LIMITS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29426-1

SDG Number:

Matrix: Water Instrument ID: ICPMS6100

Method: 6020A XMDL Date: 09/09/2015 09:37

Analyte	Wavelength/ Mass	XRL (ug/L)	XMDL (ug/L)
U-233		0.05	0.02
U-234		0.05	0.02
U-235		0.05	0.02
U-236		0.05	0.02
U-238		0.05	0.02

11-IN
LINEAR RANGES
METALS

Lab Name: TestAmerica St. Louis Job No: 160-29426-1

SDG No.:

Instrument ID: ICPMS6100 Date: 03/07/2018 15:17

Analyte	Integ. Time (Sec.)	Concentration (ug/L)	Method
U-233		1.487	6020A
U-234		1.676	6020A
U-235		98.243	6020A
U-236		2.449	6020A
U-238		100.526	6020A

12-IN
PREPARATION LOG
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Prep Method: 3010A

Lab Sample ID	Preparation Date	Prep Batch	Initial Weight	Initial Volume (mL)	Final Volume (mL)
MB 160-379520/1-A ^2	07/31/2018 17:34	379520		50	50
LCS 160-379520/2-A ^2	07/31/2018 17:34	379520		50	50
160-29426-1	07/31/2018 17:34	379520		50	50
160-29426-2	07/31/2018 17:34	379520		50	50
160-29426-2 MS	07/31/2018 17:34	379520		50	50
160-29426-2 MSD	07/31/2018 17:34	379520		50	50
160-29426-3	07/31/2018 17:34	379520		50	50
160-29426-4	07/31/2018 17:34	379520		50	50

13-IN
ANALYSIS RUN LOG
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Instrument ID: ICPMS6100 Analysis Method: 6020A

Start Date: 08/01/2018 12:23 End Date: 08/01/2018 14:13

Lab Sample Id	D/F	Type	Time	Analytes																										
				U-233	U-234	U-235	U-236	U-238																						
ICIS 160-379766/1			12:23	X	X	X	X	X																						
IC 160-379766/2	1		12:30	X	X	X	X	X																						
IC 160-379766/3	1		12:35	X	X	X	X	X																						
IC 160-379766/4	1		12:39	X	X	X	X	X																						
IC 160-379766/5	1		12:44	X	X	X	X	X																						
ICV 160-379766/6	1		12:49	X	X	X	X	X																						
ICB 160-379766/7	1		12:53	X	X	X	X	X																						
CRI 160-379766/8	1		12:58			X		X																						
CRI 160-379766/9	1		13:03	X	X		X																							
ICSA 160-379766/10	1		13:07	X	X	X	X	X																						
ICSAB 160-379766/11	1		13:12	X	X	X	X	X																						
CCV 160-379766/12	1		13:17	X	X	X	X	X																						
CCB 160-379766/13	1		13:21	X	X	X	X	X																						
MB 160-379520/1-A ^2	2	T	13:26	X	X	X	X	X																						
LCS 160-379520/2-A ^2	2	T	13:31		X	X		X																						
160-29426-1	2	T	13:35	X	X	X	X	X																						
160-29426-2	2	T	13:40	X	X	X	X	X																						
160-29426-2 SD	10	T	13:45	X	X	X	X	X																						
160-29426-2 MS	2	T	13:49		X	X		X																						
160-29426-2 MSD	2	T	13:54		X	X		X																						
160-29426-3	2	T	13:59	X	X	X	X	X																						
160-29426-4	2	T	14:03	X	X	X	X	X																						
CCV 160-379766/23	1		14:08	X	X	X	X	X																						
CCB 160-379766/24	1		14:13	X	X	X	X	X																						

Prep Types:
T = Total/NA

FORM XIII-IN

15-IN
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

ICP-MS Instrument ID: ICPMS6100 Start Date: 08/01/2018 End Date: 08/01/2018

Lab Sample ID	Time	Internal Standards %RI For:									
		Element Ho	Q	Element	Q	Element	Q	Element	Q	Element	Q
IC 160-379766/2	12:30										
IC 160-379766/3	12:35										
IC 160-379766/4	12:39										
IC 160-379766/5	12:44										
ICV 160-379766/6	12:49	100									
ICB 160-379766/7	12:53	100									
CRI 160-379766/8	12:58	99									
CRI 160-379766/9	13:03	99									
ICSA 160-379766/10	13:07	92									
ICSAB 160-379766/11	13:12	93									
CCV 160-379766/12	13:17	98									
CCB 160-379766/13	13:21	99									
MB 160-379520/1-A ^2	13:26	102									
LCS 160-379520/2-A ^2	13:31	102									
160-29426-1	13:35	98									
160-29426-2	13:40	101									
160-29426-2 SD	13:45	100									
160-29426-2 MS	13:49	100									
160-29426-2 MSD	13:54	100									
160-29426-3	13:59	101									
160-29426-4	14:03	100									
CCV 160-379766/23	14:08	98									
CCB 160-379766/24	14:13	99									

METALS BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Batch Number: 379520 Batch Start Date: 07/31/18 17:34 Batch Analyst: Mazariegos, Leonel A

Batch Method: 3010A Batch End Date: 08/01/18 08:30

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	ISOU PRP SPK 00015			
MB 160-379520/1		3010A, 6020A		50 mL	50 mL				
LCS 160-379520/2		3010A, 6020A		50 mL	50 mL	0.25 mL			
160-29426-B-1	GW-ASC-5-070918	3010A, 6020A	T	50 mL	50 mL				
160-29426-C-2	GW-ASC-4-070918	3010A, 6020A	T	50 mL	50 mL				
160-29426-C-2 MS	GW-ASC-4-070918	3010A, 6020A	T	50 mL	50 mL	0.25 mL			
160-29426-C-2 MSD	GW-ASC-4-070918	3010A, 6020A	T	50 mL	50 mL	0.25 mL			
160-29426-C-3	GW-ASC-2A-070918	3010A, 6020A	T	50 mL	50 mL				
160-29426-B-4	GW-ASC-4-070918-D	3010A, 6020A	T	50 mL	50 mL				

Batch Notes	
Balance ID	27150420
Batch Comment	Digestion started by LAM and completed by DAS
Temperature - Corrected - End	92.1 Degrees C
Temperature - Corrected - Start	92.5 Degrees C
Digestion End Time	08/01/2018 06:50
Digestion Start Time	07/31/2018 20:39
Digestion Unit ID	HOTBLOCK 1
Hydrochloric Acid ID	1510584
Nitric Acid ID	1510472
Pipette/Syringe/Dispenser ID	MET-11
Analyst ID - Spike Analyst	LAM
Sufficient Volume for Batch QC	YES
Thermometer ID	160612183, 160322360
Digestion Tube/Cup ID	306612-8166

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Instrument Tuning Report

File Name: EPA TUNING.tun
File Path: d:\Elandata\Tuning
Sample ID: Sample
Sample Date/Time: Wednesday, August 01, 2018 08:32:24

Analyte	Exact Mass	Meas. Mass	Mass DAC	Res. DAC	Meas. Pk. Width	Custom Res.
Li	7.016	7.025	1570	2065	0.645	
Mg	23.985	23.979	5688	2080	0.648	
Rh	102.905	102.879	24919	2080	0.685	
Ce	139.905	139.929	33931	2120	0.682	
Pb	207.977	207.977	50415	2310	0.704	

Replicates: 6

Daily Performance Report

Sample ID: Sample
Sample Date/Time: Wednesday, August 01, 2018 08:54:07
Sample Description:
Method File: d:\Elandata\Method\DAILY EPA.mth
Dataset File: d:\Elandata\Dataset\072718M1\Sample.023
Tuning File: d:\Elandata\Tuning\EPA TUNING.tun
Optimization File: d:\Elandata\Optimize\EPA2008.dac
Dual Detector Mode: Pulse
Acq. Dead Time(ns): 35
Current Dead Time (ns): 35

Summary

	Analyte	Mass	Meas. Intens. Mean	Net Intens. Mean	Net Intens. SD	Net Intens. RSD
	Li	7.0	3553.1	3553.054	144.087	4.1
	Mg	24.0	17228.7	17228.662	240.113	1.4
	Rh	102.9	165707.7	165707.705	1556.133	0.9
	Pb	208.0	215011.5	215011.543	1668.822	0.8
⌈>	Ba	137.9	212663.5	212663.525	1076.537	0.5
⌊	Ba++	69.0	1806.4	0.008	0.000	1.5
⌈>	Ce	139.9	261490.5	261490.451	2476.176	0.9
⌊	CeO	155.9	6108.3	0.023	0.000	1.3
	Bkgd	220.0	6.1	6.111	1.893	31.0

Current Optimization File Data

Current Value	Description
1.00	Nebulizer Gas Flow
6.60	Lens Voltage
1475.00	ICP RF Power
-2228.13	Analog Stage Voltage
1250.00	Pulse Stage Voltage
70.00	Discriminator Threshold
-6.00	AC Rod Offset
60.00	Service DAC 1
0.00	Quadrupole Rod Offset
0.00	Exit Lens
0.90	Makeup Gas Flow [MGAS]
0.90	DRC Mode MGAS

Current Autolens Data

Analyte	Mass	Num of Pts	DAC Value	Maximum Intensity
Be	9	29	7.5	3113.7
Mg	24	29	6.3	30779.1
Co	59	29	6.5	64859.6
Rh	103	29	7.3	219816.9
In	115	29	7.5	301151.8
Ba	138	29	7.5	301959.2
Ce	140	29	7.5	389095.3
Pb	208	29	9.0	273400.0

QUANTITATIVE ANALYSIS REPORT

Sample ID: Blank

Sample Date/Time: Wednesday, August 01, 2018 12:23:50
Autosampler Position: 1
Dataset File: D:\Elandata\Dataset\080118m2\Blank.001

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			674226.281	ug/L	
	233	**U**			8.200	ug/L	
	234	**U**			6.333	ug/L	
	235	**U**			28.200	ug/L	
	236	**U**			6.333	ug/L	
	238	**U**			27.267	ug/L	

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165		
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: Standard 1

Sample Date/Time: Wednesday, August 01, 2018 12:30:30

Autosampler Position: 191

Dataset File: D:\Elandata\Dataset\080118m2\Standard 1.002

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			656857.321	ug/L	674226.281
	233	**U**			21.733	ug/L	8.200
	234	**U**			18.133	ug/L	6.333
	235	**U**	**0.049120**	5.181	769.821	ug/L	28.200
	236	**U**			45.133	ug/L	6.333
	238	**U**	**0.050260**	3.681	704.351	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165		
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: Standard 2
Sample Date/Time: Wednesday, August 01, 2018 12:35:11
Autosampler Position: 192
Dataset File: D:\Elandata\Dataset\080118m2\Standard 2.003

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			690218.223	ug/L	674226.281
	233	**U**	**0.021360**	3.808	687.750	ug/L	8.200
	234	**U**	**0.033510**	4.372	605.613	ug/L	6.333
	235	**U**	**2.016989**	3.249	32084.754	ug/L	28.200
	236	**U**	**0.050800**	1.229	1519.281	ug/L	6.333
	238	**U**	**2.022331**	3.669	28683.588	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165		
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: Standard 3
Sample Date/Time: Wednesday, August 01, 2018 12:39:52
Autosampler Position: 193
Dataset File: D:\Elandata\Dataset\080118m2\Standard 3.004

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			678995.187	ug/L	674226.281
	233	**U**	**0.106769**	2.903	3333.723	ug/L	8.200
	234	**U**	**0.167625**	4.307	2978.711	ug/L	6.333
	235	**U**	**9.824303**	3.845	155160.085	ug/L	28.200
	236	**U**	**0.254124**	3.440	7549.463	ug/L	6.333
	238	**U**	**10.052596**	3.645	138009.458	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165		
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: Standard 4
Sample Date/Time: Wednesday, August 01, 2018 12:44:33
Autosampler Position: 194
Dataset File: D:\Elandata\Dataset\080118m2\Standard 4.005

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			675004.198	ug/L	674226.281
	233	**U**	**0.320042**	3.363	9825.714	ug/L	8.200
	234	**U**	**0.501532**	3.537	8675.035	ug/L	6.333
	235	**U**	**29.382118**	3.613	448885.852	ug/L	28.200
	236	**U**	**0.736387**	3.104	22147.908	ug/L	6.333
	238	**U**	**30.060807**	3.394	398738.183	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165		
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: QC Std 1

Sample Date/Time: Wednesday, August 01, 2018 12:49:14

Autosampler Position: 195

Dataset File: D:\Elandata\Dataset\080118m2\QC Std 1.006

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			676755.006	ug/L	674226.281
	233	**U**	**0.106816**	3.231	3293.580	ug/L	8.200
	234	**U**	**0.169195**	5.320	2935.568	ug/L	6.333
	235	**U**	**9.885366**	3.812	151411.518	ug/L	28.200
	236	**U**	**0.249348**	3.748	7520.047	ug/L	6.333
	238	**U**	**10.069384**	4.012	133881.418	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**100.375**	
	U	233		**100.024**
	U	234		**100.969**
	U	235		**100.622**
	U	236		**98.176**
	U	238		**100.167**

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: QC Std 2

Sample Date/Time: Wednesday, August 01, 2018 12:53:53

Autosampler Position: 1

Dataset File: D:\Elandata\Dataset\080118m2\QC Std 2.007

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			675527.876	ug/L	674226.281
	233	**U**	**-0.000035**	149.052	7.133	ug/L	8.200
	234	**U**	**0.000005**	777.097	6.400	ug/L	6.333
	235	**U**	**0.001418**	15.399	50.133	ug/L	28.200
	236	**U**	**0.000048**	21.678	7.800	ug/L	6.333
	238	**U**	**0.001563**	37.312	48.467	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**100.193**	
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: QC Std 3

Sample Date/Time: Wednesday, August 01, 2018 12:58:33
Autosampler Position: 191
Dataset File: D:\Elandata\Dataset\080118m2\QC Std 3.008

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			666699.147	ug/L	674226.281
	233	**U**	**0.000447**	16.763	21.600	ug/L	8.200
	234	**U**	**0.000878**	15.367	21.267	ug/L	6.333
	235	**U**	**0.049977**	3.000	782.288	ug/L	28.200
	236	**U**	**0.001206**	4.740	42.067	ug/L	6.333
	238	**U**	**0.050478**	2.927	688.483	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**98.884**	
	U	233		
	U	234		
	U	235		**101.744**
	U	236		
	U	238		**100.434**

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: QC Std 4

Sample Date/Time: Wednesday, August 01, 2018 13:03:14

Autosampler Position: 192

Dataset File: D:\Elandata\Dataset\080118m2\QC Std 4.009

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			666220.278	ug/L	674226.281
	233	**U**	**0.020814**	3.913	638.481	ug/L	8.200
	234	**U**	**0.033773**	4.894	582.145	ug/L	6.333
	235	**U**	**1.986547**	3.054	29990.806	ug/L	28.200
	236	**U**	**0.049657**	4.481	1479.143	ug/L	6.333
	238	**U**	**2.029496**	2.640	26606.580	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**98.813**	
	U	233		**97.445**
	U	234		**100.786**
	U	235		
	U	236		**97.750**
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: QC Std 5

Sample Date/Time: Wednesday, August 01, 2018 13:07:55

Autosampler Position: 196

Dataset File: D:\Elandata\Dataset\080118m2\QC Std 5.010

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			623046.305	ug/L	674226.281
	233	**U**	**-0.000047**	39.784	6.267	ug/L	8.200
	234	**U**	**-0.000004**	1799.599	5.733	ug/L	6.333
	235	**U**	**0.000301**	195.844	29.933	ug/L	28.200
	236	**U**	**0.000067**	76.032	7.667	ug/L	6.333
	238	**U**	**0.001074**	82.909	37.867	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**92.409**	
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: QC Std 6

Sample Date/Time: Wednesday, August 01, 2018 13:12:36

Autosampler Position: 197

Dataset File: D:\Elandata\Dataset\080118m2\QC Std 6.011

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			623453.703	ug/L	674226.281
	233	**U**	**0.055951**	4.087	1592.155	ug/L	8.200
	234	**U**	**0.086421**	3.574	1385.334	ug/L	6.333
	235	**U**	**5.127194**	3.835	72351.559	ug/L	28.200
	236	**U**	**0.128641**	3.284	3577.649	ug/L	6.333
	238	**U**	**5.219103**	3.409	63951.206	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**92.470**	
	U	233		**104.777**
	U	234		**103.153**
	U	235		**104.378**
	U	236		**101.300**
	U	238		**103.836**

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: QC Std 7

Sample Date/Time: Wednesday, August 01, 2018 13:17:16

Autosampler Position: 2

Dataset File: D:\Elandata\Dataset\080118m2\QC Std 7.012

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			661615.873	ug/L	674226.281
	233	**U**	**0.110402**	4.494	3325.321	ug/L	8.200
	234	**U**	**0.171754**	4.116	2914.898	ug/L	6.333
	235	**U**	**10.068728**	4.204	150728.814	ug/L	28.200
	236	**U**	**0.253754**	2.895	7484.229	ug/L	6.333
	238	**U**	**10.298115**	3.719	133867.508	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**98.130**	
	U	233		**103.382**
	U	234		**102.497**
	U	235		**102.488**
	U	236		**99.911**
	U	238		**102.469**

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: QC Std 8

Sample Date/Time: Wednesday, August 01, 2018 13:21:56

Autosampler Position: 1

Dataset File: D:\Elandata\Dataset\080118m2\QC Std 8.013

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			665862.059	ug/L	674226.281
	233	**U**	**-0.000015**	577.870	7.533	ug/L	8.200
	234	**U**	**-0.000030**	58.565	5.733	ug/L	6.333
	235	**U**	**0.000912**	48.452	41.333	ug/L	28.200
	236	**U**	**0.000017**	485.031	6.667	ug/L	6.333
	238	**U**	**0.001254**	29.645	43.200	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**98.759**	
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: 1528172 DF=2

Sample Date/Time: Wednesday, August 01, 2018 13:26:35

Autosampler Position: 11

Dataset File: D:\Elandata\Dataset\080118m2\1528172 DF=2.014

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			684533.345	ug/L	674226.281
	233	**U**	**-0.000031**	57.226	7.333	ug/L	8.200
	234	**U**	**0.000023**	177.477	6.800	ug/L	6.333
	235	**U**	**-0.000662**	19.491	18.267	ug/L	28.200
	236	**U**	**-0.000012**	248.052	6.067	ug/L	6.333
	238	**U**	**0.000275**	111.728	31.200	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**101.529**	
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: 1528173 DF=2

Sample Date/Time: Wednesday, August 01, 2018 13:31:15

Autosampler Position: 12

Dataset File: D:\Elandata\Dataset\080118m2\1528173 DF=2.015

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			684882.800	ug/L	674226.281
	233	**U**	**0.002673**	5.588	91.467	ug/L	8.200
	234	**U**	**0.041991**	4.025	742.953	ug/L	6.333
	235	**U**	**2.504968**	3.518	38860.889	ug/L	28.200
	236	**U**	**0.003452**	7.784	111.667	ug/L	6.333
	238	**U**	**2.550255**	3.398	34350.748	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**101.581**	
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: 160-29426-B-1-D DF=2

Sample Date/Time: Wednesday, August 01, 2018 13:35:55

Autosampler Position: 13

Dataset File: D:\Elandata\Dataset\080118m2\160-29426-B-1-D DF=2.016

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			660863.256	ug/L	674226.281
	233	**U**	**-0.000085**	40.287	5.533	ug/L	8.200
	234	**U**	**0.000693**	12.214	17.933	ug/L	6.333
	235	**U**	**0.089813**	2.780	1371.466	ug/L	28.200
	236	**U**	**0.000008**	421.574	6.400	ug/L	6.333
	238	**U**	**11.714226**	3.298	152149.653	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**98.018**	
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: 160-29426-C-2-C DF=2

Sample Date/Time: Wednesday, August 01, 2018 13:40:35

Autosampler Position: 14

Dataset File: D:\Elandata\Dataset\080118m2\160-29426-C-2-C DF=2.017

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			679032.314	ug/L	674226.281
	233	**U**	**-0.000052**	65.868	6.600	ug/L	8.200
	234	**U**	**0.000095**	44.303	8.000	ug/L	6.333
	235	**U**	**0.020603**	2.322	345.204	ug/L	28.200
	236	**U**	**-0.000023**	121.451	5.667	ug/L	6.333
	238	**U**	**2.792218**	3.462	37283.099	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**100.713**	
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: 160-29426-C-2-C SD DF=10

Sample Date/Time: Wednesday, August 01, 2018 13:45:15

Autosampler Position: 15

Dataset File: D:\Elandata\Dataset\080118m2\160-29426-C-2-C SD DF=10.018

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			674147.626	ug/L	674226.281
	233	**U**	**-0.000072**	86.027	5.933	ug/L	8.200
	234	**U**	**0.000028**	273.714	6.800	ug/L	6.333
	235	**U**	**0.003036**	16.438	74.267	ug/L	28.200
	236	**U**	**0.000022**	43.028	7.000	ug/L	6.333
	238	**U**	**0.561471**	2.914	7467.019	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**99.988**	
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: 160-29426-C-2-D MS DF=2

Sample Date/Time: Wednesday, August 01, 2018 13:49:55

Autosampler Position: 16

Dataset File: D:\Elandata\Dataset\080118m2\160-29426-C-2-D MS DF=2.019

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			673088.693	ug/L	674226.281
	233	**U**	**0.002780**	7.805	93.134	ug/L	8.200
	234	**U**	**0.042329**	3.928	735.819	ug/L	6.333
	235	**U**	**2.551978**	3.532	38907.687	ug/L	28.200
	236	**U**	**0.003500**	2.959	111.267	ug/L	6.333
	238	**U**	**5.385113**	3.047	71267.576	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**99.831**	
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: 160-29426-C-2-E MSD DF=2

Sample Date/Time: Wednesday, August 01, 2018 13:54:35

Autosampler Position: 17

Dataset File: D:\Elandata\Dataset\080118m2\160-29426-C-2-E MSD DF=2.020

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			674100.400	ug/L	674226.281
	233	**U**	**0.002662**	3.607	89.734	ug/L	8.200
	234	**U**	**0.042360**	2.024	738.086	ug/L	6.333
	235	**U**	**2.552918**	3.056	38990.313	ug/L	28.200
	236	**U**	**0.003464**	7.478	110.200	ug/L	6.333
	238	**U**	**5.318876**	2.695	70509.213	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**99.981**	
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: 160-29426-C-3-A DF=2

Sample Date/Time: Wednesday, August 01, 2018 13:59:16

Autosampler Position: 18

Dataset File: D:\Elandata\Dataset\080118m2\160-29426-C-3-A DF=2.021

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			677818.887	ug/L	674226.281
	233	**U**	**-0.000083**	63.510	5.600	ug/L	8.200
	234	**U**	**0.000097**	22.043	8.067	ug/L	6.333
	235	**U**	**0.007571**	7.182	144.334	ug/L	28.200
	236	**U**	**-0.000033**	65.137	5.333	ug/L	6.333
	238	**U**	**1.014173**	2.733	13539.687	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**100.533**	
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: 160-29426-B-4-B DF=2

Sample Date/Time: Wednesday, August 01, 2018 14:03:56

Autosampler Position: 19

Dataset File: D:\Elandata\Dataset\080118m2\160-29426-B-4-B DF=2.022

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			671371.835	ug/L	674226.281
	233	**U**	**-0.000085**	31.338	5.533	ug/L	8.200
	234	**U**	**0.000061**	196.408	7.267	ug/L	6.333
	235	**U**	**0.019552**	3.007	325.604	ug/L	28.200
	236	**U**	**-0.000059**	20.455	4.533	ug/L	6.333
	238	**U**	**2.765236**	3.520	36506.689	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**99.577**	
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: QC Std 7

Sample Date/Time: Wednesday, August 01, 2018 14:08:37

Autosampler Position: 2

Dataset File: D:\Elandata\Dataset\080118m2\QC Std 7.023

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			657576.381	ug/L	674226.281
	233	**U**	**0.108598**	2.299	3255.438	ug/L	8.200
	234	**U**	**0.173030**	4.043	2919.565	ug/L	6.333
	235	**U**	**10.216637**	3.677	152083.674	ug/L	28.200
	236	**U**	**0.251550**	3.214	7374.238	ug/L	6.333
	238	**U**	**10.437681**	3.301	134910.119	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**97.531**	
	U	233		**101.693**
	U	234		**103.258**
	U	235		**103.994**
	U	236		**99.043**
	U	238		**103.858**

QC Out Of Limits

Analyte Mass Out of Limits Message

QUANTITATIVE ANALYSIS REPORT

Sample ID: QC Std 8

Sample Date/Time: Wednesday, August 01, 2018 14:13:16

Autosampler Position: 1

Dataset File: D:\Elandata\Dataset\080118m2\QC Std 8.024

Sample Result Summary

	Mass	Analyte	Conc. Mean	Conc. RSD	Meas. Intens. Mean	Sample Unit	Blank Intensity
>	165	**Ho (IS)**			664210.004	ug/L	674226.281
	233	**U**	**0.000005**	496.184	8.200	ug/L	8.200
	234	**U**	**0.000007**	575.531	6.333	ug/L	6.333
	235	**U**	**0.003771**	5.692	84.667	ug/L	28.200
	236	**U**	**0.000056**	134.824	7.800	ug/L	6.333
	238	**U**	**0.004289**	10.776	82.867	ug/L	27.267

Internal Standard And QC Recoveries

	Analyte	Mass	Int Std % Recovery	QC Std % Recovery
>	**Ho (IS)**	165	**98.514**	
	U	233		
	U	234		
	U	235		
	U	236		
	U	238		

QC Out Of Limits

Analyte Mass Out of Limits Message

Quantitative Analysis Calibration Report

File Name: 080118m2.cal
File Path: D:\Elandata\System
Calibration Type: External Calibration

Analyte	Mass	Curve Type	Slope	Intercept	Corr. Coeff.
Ho (IS)	164.930	Linear Thru Zero	0.000000	0.00	0.000000
U	233.000	Linear Thru Zero	0.045515	0.00	0.999995
U	234.041	Linear Thru Zero	0.025648	0.00	0.999976
U	235.044	Linear Thru Zero	0.022669	0.00	0.999957
U	236.000	Linear Thru Zero	0.044606	0.00	0.999979
U	238.050	Linear Thru Zero	0.019680	0.00	0.999953

Sample/Batch Report

TA ST. LOUIS - PERKIN ELMER ELAN 6100 - METHOD 6020 / 200.8 QUANTITATIVE ANALYSIS REPORT

User Name: stlmetals
Computer Name: SLICP03
Sample File: D:\Elandata\Sample\TEMP.sam
Report Date/Time: Thursday, August 02, 2018 06:30:13
Method File: d:\Elandata\Method\2018 isou.mth
Tuning File: d:\Elandata\Tuning\epa tuning.tun
Optimization File: d:\Elandata\Optimize\epa2008.dac
Calibration File:
Calibration Type: External Calibration
Number of Replicates: 3
Number of Readings: 1
Number of Sweeps: 100
Dual Detector Mode: Dual

A/S Loc.	Batch ID	Sample ID	Description	Aliquot Vol.	Diluted Vol.
11	160-379520	1528172 DF=2			
12		1528173 DF=2			
13		160-29426-B-1-D DF=2			
14		160-29426-C-2-C DF=2			
15		160-29426-C-2-C SD DF=10			
16		160-29426-C-2-D MS DF=2			
17		160-29426-C-2-E MSD DF=2			
18		160-29426-C-3-A DF=2			
19		160-29426-B-4-B DF=2			

Sample/Batch Report

TA ST. LOUIS - PERKIN ELMER ELAN 6100 - METHOD 6020 / 200.8 QUANTITATIVE ANALYSIS REPORT

User Name: stlmetals
Computer Name: SLICP03
Sample File: D:\Elandata\Sample\TEMP.sam
Report Date/Time: Thursday, August 02, 2018 06:30:13
Method File: d:\Elandata\Method\2018 isou.mth
Tuning File: d:\Elandata\Tuning\epa tuning.tun
Optimization File: d:\Elandata\Optimize\epa2008.dac
Calibration File:
Calibration Type: External Calibration
Number of Replicates: 3
Number of Readings: 1
Number of Sweeps: 100
Dual Detector Mode: Dual

A/S Loc.	Batch ID	Sample ID	Description	Aliquot Vol.	Diluted Vol.
11	160-379520	1528172 DF=2			
12		1528173 DF=2			
13		160-29426-B-1-D DF=2			
14		160-29426-C-2-C DF=2			
15		160-29426-C-2-C SD DF=10			
16		160-29426-C-2-D MS DF=2			
17		160-29426-C-2-E MSD DF=2			
18		160-29426-C-3-A DF=2			
19		160-29426-B-4-B DF=2			

All

A. BATCH: 379766 File: 080118M2 DAS 8/2/18

ALPHA SPECTROSCOPY

Method A-01-R Th

Isotopic Thorium (Alpha Spectrometry) by Method A-01-R

Prep Batch: 375260

Preparation, Extraction Chromatography Resin Actinide Separation

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 375260

Lab ID: MB 160-375260/1-A
Client ID:
Sigma: 2
Analyzed: 07/30/18 16:53
Detector: AV16
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	0.04158	0.199	0.199	U	pCi/L	1.00	0.299	379233

Tracer	MB Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	9.053	0.822	1.12		pCi/L	0.0848	12.1	74.8	30 - 110

Lab ID: LCS 160-375260/2-A
Client ID:
Sigma: 2
Analyzed: 07/30/18 16:53
Detector: AV17
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	7.878	0.911	1.13		pCi/L	1.00	0.300	379234

Tracer	LCS Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	10.02	0.915	1.24		pCi/L	0.119	12.1	82.7	30 - 110

Lab ID: 160-29426-1
Client ID: GW-ASC-5-070918
Sigma: 2
Analyzed: 07/30/18 16:53
Detector: AV19
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	0.0806	0.203	0.204	U	pCi/L	1.00	0.292	379235

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	11.2	0.974	1.35		pCi/L	0.110	12.1	92.2	30 - 110

Lab ID: 160-29426-1 DU
Client ID: GW-ASC-5-070918
Sigma: 2
Analyzed: 07/30/18 16:53
Detector: AV20
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	-0.03177	0.181	0.181	U	pCi/L	1.00	0.303	379236

Tracer	DU Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	10.75	0.990	1.34		pCi/L	0.199	12.1	88.8	30 - 110

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 375260

Lab ID: 160-29426-2
Client ID: GW-ASC-4-070918
Sigma: 2
Analyzed: 07/30/18 16:53
Detector: AV21
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	0.0660	0.197	0.197	U	pCi/L	1.00	0.284	379237

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	11.2	0.980	1.36		pCi/L	0.138	12.1	92.6	30 - 110

Lab ID: 160-29426-3
Client ID: GW-ASC-2A-070918
Sigma: 2
Analyzed: 07/30/18 16:53
Detector: AV23
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	0.00878	0.183	0.183	U	pCi/L	1.00	0.284	379238

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	10.6	0.933	1.29		pCi/L	0.106	12.1	87.4	30 - 110

Lab ID: 160-29426-4
Client ID: GW-ASC-4-070918-D
Sigma: 2
Analyzed: 07/30/18 16:53
Detector: AV24
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	0.00875	0.203	0.203	U	pCi/L	1.00	0.325	379239

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	10.3	0.967	1.30		pCi/L	0.153	12.1	85.1	30 - 110

Quality Control Summary

Method Blank ID:	Analyte	Parent Result	Spike Added	MB Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
MB 160-375260/1-A	Thorium-230			0.04158	U	pCi/L							.4179087

Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-375260/2-A	Thorium-230		8.03	7.878		pCi/L	98	81 - 125					-.1881019 918

Duplicate ID:	Analyte	Parent Result	Spike Added	DU Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
160-29426-1	Thorium-230	0.0806		-0.03177	U	pCi/L			460	0.29	0.82	1	

Glossary:
Ts = Count Duration, Sample

ALPHA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Batch Number: 375260 Batch Start Date: 07/12/18 18:07 Batch Analyst: Mazariegos, Chelsea M

Batch Method: ExtChrom Batch End Date: 07/30/18 10:08

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	Th-229 00023	Th-230 00036			
MB 160-375260/1		ExtChrom, A-01-R		500 mL	0.2 mL				
LCS 160-375260/2		ExtChrom, A-01-R		500 mL	0.2 mL	0.2 mL			
160-29426-A-1	GW-ASC-5-070918	ExtChrom, A-01-R	T	500.37 mL	0.2 mL				
160-29426-A-1 DU	GW-ASC-5-070918	ExtChrom, A-01-R	T	500.32 mL	0.2 mL				
160-29426-A-2	GW-ASC-4-070918	ExtChrom, A-01-R	T	500.88 mL	0.2 mL				
160-29426-A-3	GW-ASC-2A-070918	ExtChrom, A-01-R	T	500.18 mL	0.2 mL				
160-29426-A-4	GW-ASC-4-070918-D	ExtChrom, A-01-R	T	500.26 mL	0.2 mL				

Batch Notes	
Balance ID	1125353055
Analyst ID - Column	nmn
Column Date	7/27/18
Analyst ID - CoPrecipitation	nmn
CoPrecipitation Date	7/30/18
Pipette ID	RAD117
Analyst ID - Reagent Drop Witness	CMM
Analyst ID - Reagent Drop	KNF per CMM
SOP Number	ST-RC-0100, ST-RC-0242

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:54:42PM 7/30/2018

Sample

Sample Name: MB 160-375260/1-A
SampleType: Blank
: MB 160-375260/1-A
Sample Collection Date: 7/30/2018 10:10:00AM

Spectrum #1 Analysis #1
Sample Volume : 0.5000L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 375260
AnalysisID: 735149

Analyst: 60040

Tracer

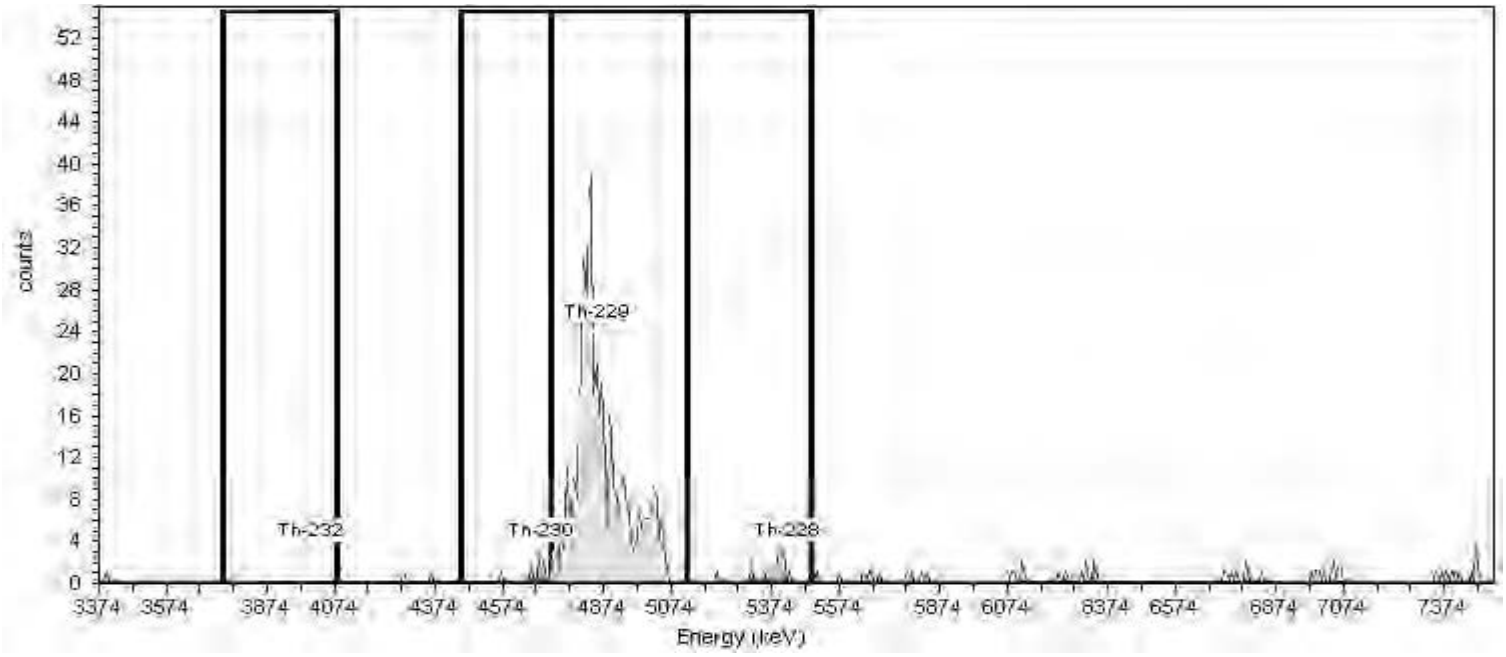
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 74.76%

Acquisition

Detector: AV16
Serial Number: 51-082B6
Acquisition Start Date: 7/30/2018 4:53:25PM
Live Time: 180.00 min.
Real Time: 180.01 min.
Background Date: 7/12/2018 1:39:32PM
Background Info: Sample: ICB;AV16; Det: AV16; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-137620;AV16-05142018
Calibration Date: 5/14/2018 6:28:17PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 26.96% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 7/30/2018 4:51:57PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	.0	100.2	0	0.3750	-0.38	-0.009	pCi/L
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	10.3	99.7	9	0.6203	8.44	0.210	pCi/L
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	66.3	99.6	486	0.1875	485.87	9.056	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	46.0	99.8	18	0.1875	17.81	0.443	pCi/L

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:55:27PM 7/30/2018

Sample

Sample Name: LCS 160-375260/2-A
SampleType: Control
: LCS 160-375260/2-A
Sample Collection Date: 7/30/2018 10:10:00AM

Spectrum #1 Analysis #1
Sample Volume : 0.5000L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 375260
AnalysisID: 735152

Analyst: 60040

Tracer

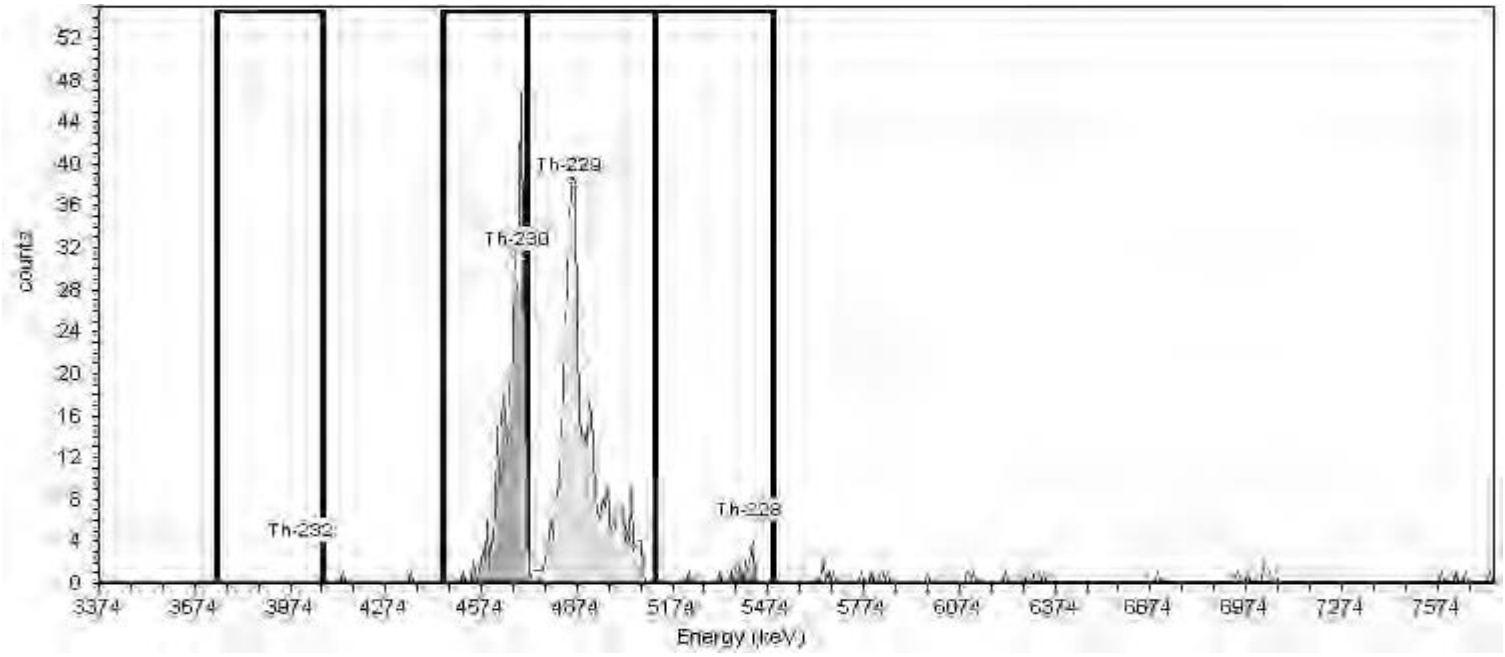
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 83.73%

Acquisition

Detector: AV17
Serial Number: 50-051C4
Acquisition Start Date: 7/30/2018 4:53:25PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/13/2018 12:11:23PM
Background Info: Sample: ICB;AV17; Det: AV17; Spectrum #2; Jul-13-2018 12:11

Calibration Name: IC-7107;AV17-05142018a
Calibration Date: 5/15/2018 12:29:12PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 24.09% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 7/30/2018 4:51:57PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	.0	100.2	0	0.1875	-0.19	-0.005	pCi/L
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	38.0	99.7	319	0.3750	318.44	7.926	pCi/L
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	63.6	99.6	487	0.5625	486.25	10.143	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	48.3	99.8	15	2.8125	12.19	0.303	pCi/L

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:33:15AM 7/31/2018

Sample

Sample Name: LCS 160-375260/2-A
SampleType: Control
: LCS 160-375260/2-A
Sample Collection Date: 7/30/2018 10:10:00AM

Spectrum #1 Analysis #1
Sample Volume : 0.5000L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 375260
AnalysisID: 735215

Analyst: 60040

Tracer

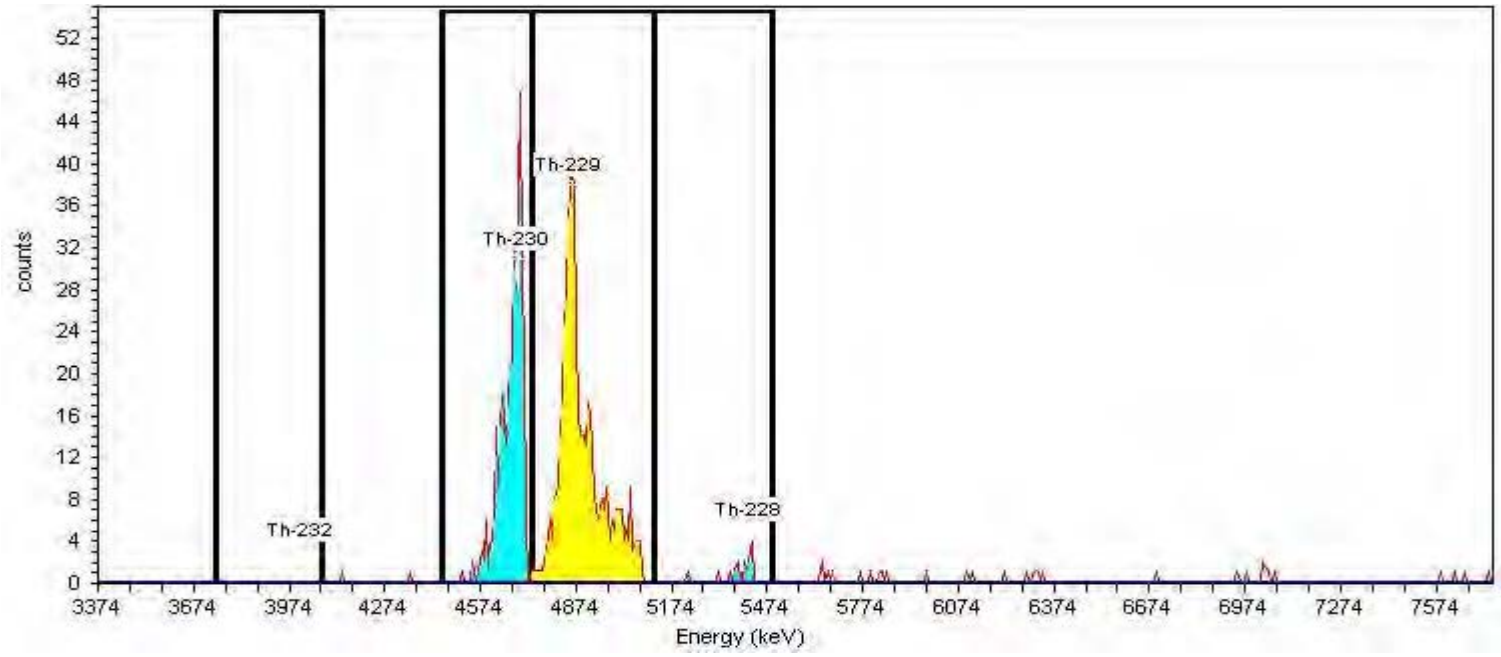
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 82.73%

Acquisition

Detector: AV17
Serial Number: 50-051C4
Acquisition Start Date: 7/30/2018 4:53:25PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/13/2018 12:11:23PM
Background Info: Sample: ICB;AV17; Det: AV17; Spectrum #2; Jul-13-2018 12:11

Calibration Name: IC-7107;AV17-05142018a
Calibration Date: 5/15/2018 12:29:12PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.09% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 7/30/2018 4:51:57PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	.0	100.2	0	0.1875	-0.19	-0.005	pCi/L
Th-230	4688.0	4,687.5	0.5	4448.3	4731.7	21.7	99.7	320	0.5625	319.44	8.047	pCi/L
Th-229	4848.0	4,845.3	2.7	4731.7	5119.5	63.6	99.6	481	0.5625	480.44	10.022	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	48.3	99.8	15	2.8125	12.19	0.307	pCi/L

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:55:09PM 7/30/2018

Sample

Sample Name: 160-29426-A-1-C
SampleType: Sample
: 160-29426-A-1-C
Sample Collection Date: 7/9/2018 9:15:00AM

Spectrum #1 Analysis #1
Sample Volume : 0.5004L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 375260
AnalysisID: 735150

Analyst: 60040

Tracer

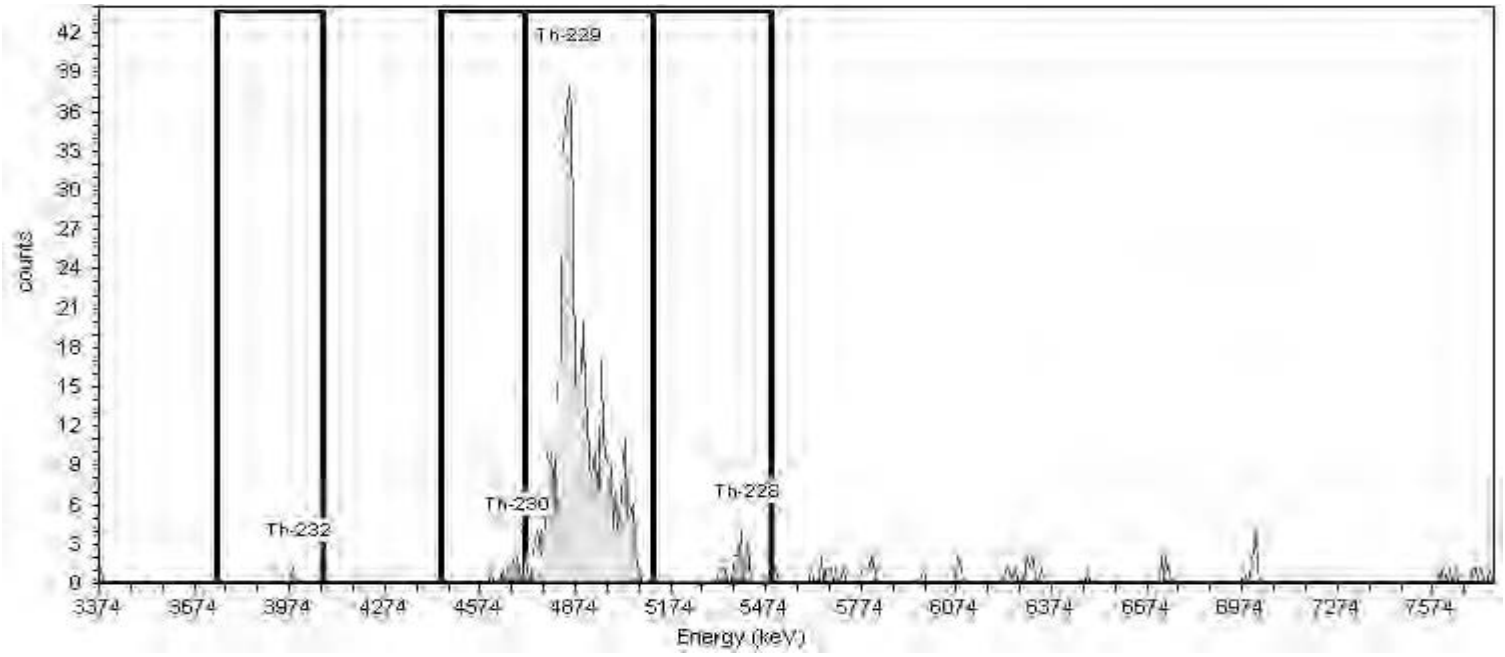
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 92.18%

Acquisition

Detector: AV19
Serial Number: 50-025FF5
Acquisition Start Date: 7/30/2018 4:53:27PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:36PM
Background Info: Sample: ICB;AV19; Det: AV19; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-8877;AV19-05142018
Calibration Date: 5/15/2018 12:27:55PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 23.60% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 7/30/2018 4:51:57PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Expected keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	44.5	100.2	1	0.6422	0.36	0.008	pCi/L
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	26.8	99.7	12	1.1250	10.81	0.249	pCi/L
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	67.2	99.6	525	0.3750	524.56	11.159	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	43.3	99.8	18	1.5000	16.50	0.380	pCi/L

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:55:18PM 7/30/2018

Sample

Sample Name: 160-29426-A-1-D DU
SampleType: Sample
: 160-29426-A-1-D DU
Sample Collection Date: 7/9/2018 9:15:00AM

Spectrum #1 Analysis #1
Sample Volume : 0.5003L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 375260
AnalysisID: 735151

Analyst: 60040

Tracer

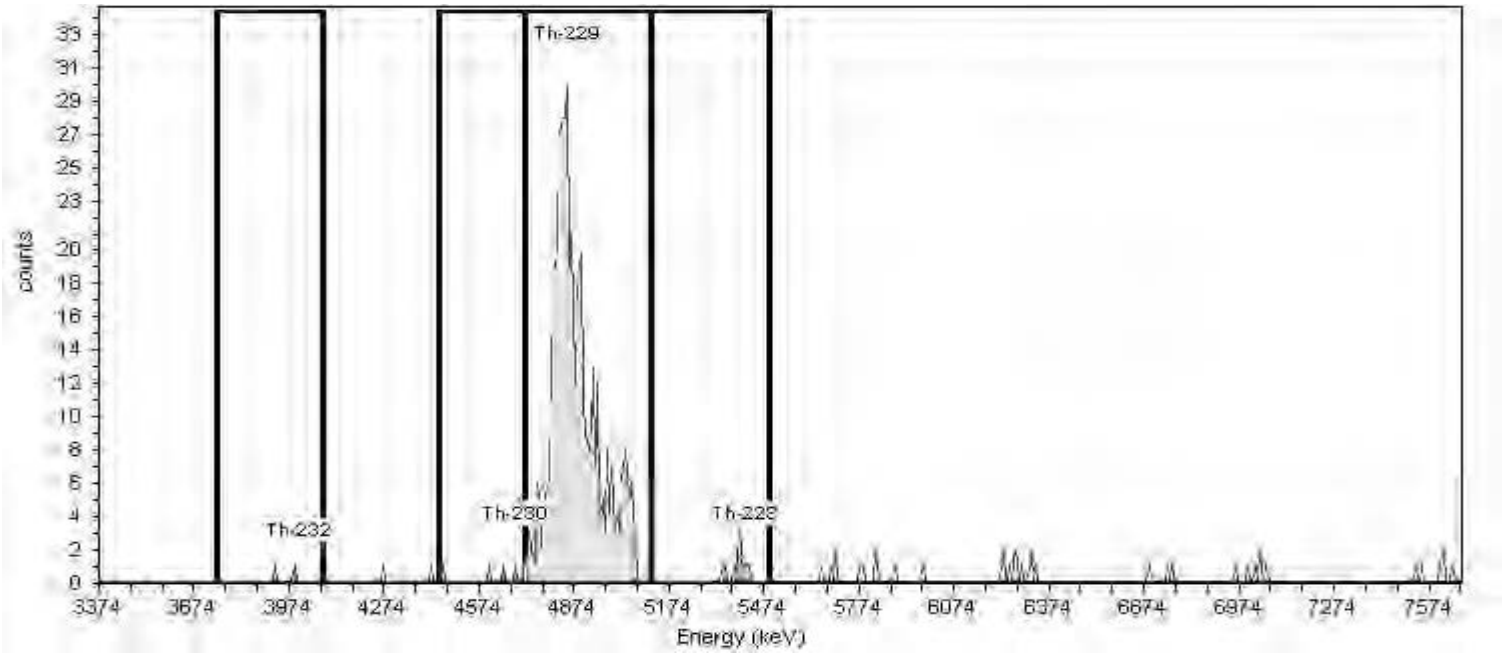
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 88.84%

Acquisition

Detector: AV20
Serial Number: 48-121A7
Acquisition Start Date: 7/30/2018 4:53:27PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:38PM
Background Info: Sample: ICB;AV20; Det: AV20; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-9520;AV20-05142018
Calibration Date: 5/15/2018 12:28:08PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 22.15% +/- 0.32% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 7/30/2018 4:51:57PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	39.9	100.2	2	0.3750	1.63	0.041	pCi/L
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	10.2	99.7	6	0.5683	5.37	0.137	pCi/L
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	96.5	99.6	477	2.6188	474.32	10.754	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	46.4	99.8	11	2.0505	8.95	0.228	pCi/L

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:55:36PM 7/30/2018

Sample

Sample Name: 160-29426-A-2-B
SampleType: Sample
: 160-29426-A-2-B
Sample Collection Date: 7/9/2018 10:35:00AM

Spectrum #1 Analysis #1
Sample Volume : 0.5009L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 375260
AnalysisID: 735153

Analyst: 60040

Tracer

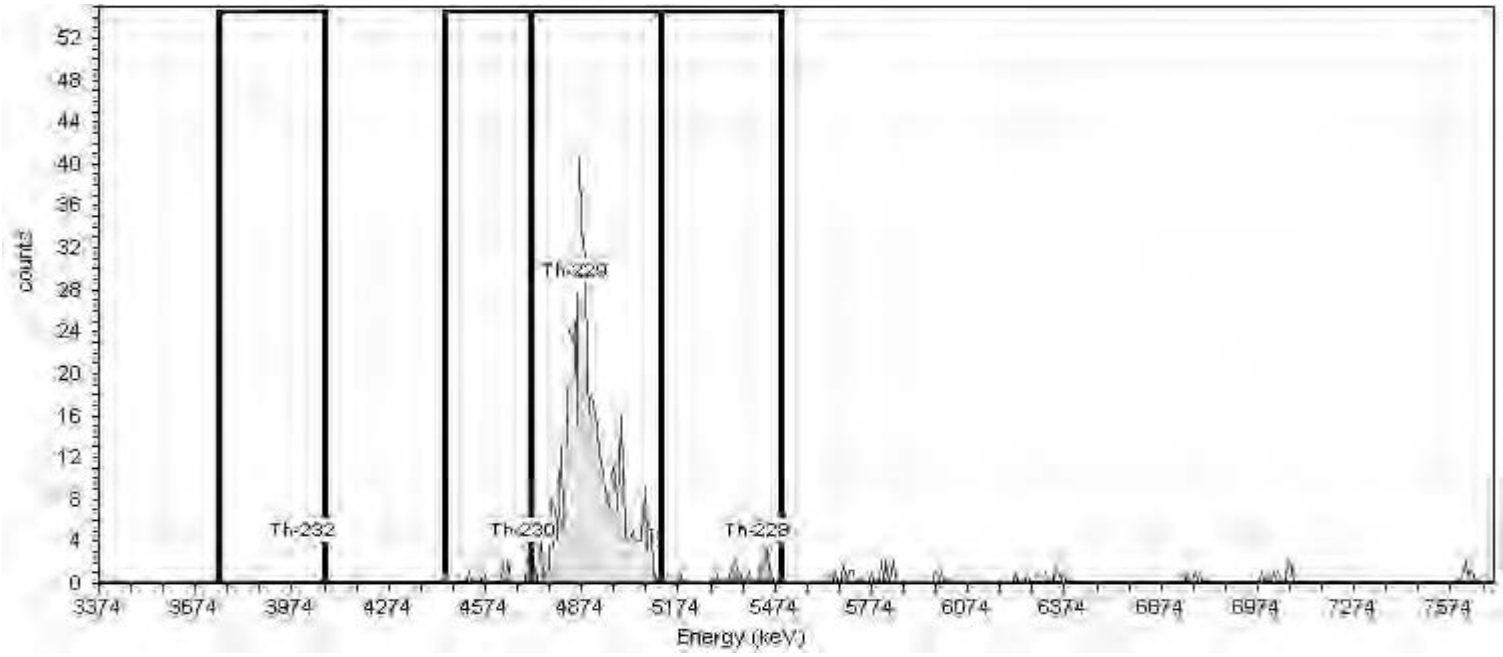
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 92.60%

Acquisition

Detector: AV21
Serial Number: 48-102BB6
Acquisition Start Date: 7/30/2018 4:53:29PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:41PM
Background Info: Sample: ICB;AV21; Det: AV21; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-9792;AV21-05142018
Calibration Date: 5/15/2018 12:28:21PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 23.43% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 7/30/2018 4:51:57PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	.0	100.2	0	0.3750	-0.38	-0.009	pCi/L
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	.0	99.7	11	0.5625	10.16	0.235	pCi/L
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	82.2	99.6	524	0.9375	523.09	11.197	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	15.0	99.8	22	1.1250	20.88	0.482	pCi/L

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:55:54PM 7/30/2018

Sample

Sample Name: 160-29426-A-3-B
SampleType: Sample
: 160-29426-A-3-B
Sample Collection Date: 7/9/2018 12:45:00PM

Spectrum #1 Analysis #1
Sample Volume : 0.5002L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 375260
AnalysisID: 735155

Analyst: 60040

Tracer

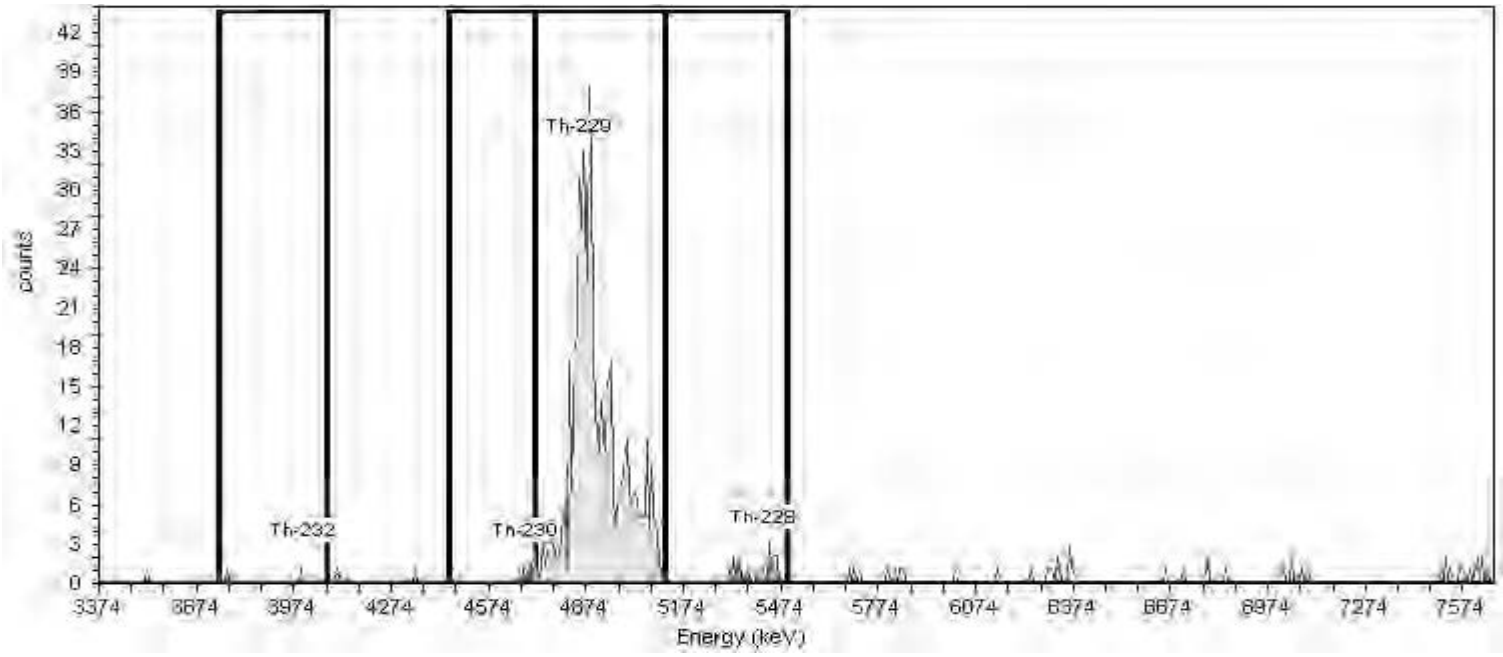
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 87.44%

Acquisition

Detector: AV23
Serial Number: 48-158FF3
Acquisition Start Date: 7/30/2018 4:53:31PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:44PM
Background Info: Sample: ICB;AV23; Det: AV23; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-9795;AV23-05142018
Calibration Date: 5/15/2018 12:28:43PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 24.46% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 7/30/2018 4:51:57PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	28.5	100.2	2	0.7500	1.25	0.029	pCi/L
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	.5	99.7	8	0.3750	7.56	0.177	pCi/L
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	72.4	99.6	516	0.3630	515.57	10.588	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	21.9	99.8	17	2.2380	14.76	0.346	pCi/L

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:55:45PM 7/30/2018

Sample

Sample Name: 160-29426-A-4-B
SampleType: Sample
: 160-29426-A-4-B
Sample Collection Date: 7/9/2018 10:35:00AM

Spectrum #1 Analysis #1
Sample Volume : 0.5003L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 375260
AnalysisID: 735154

Analyst: 60040

Tracer

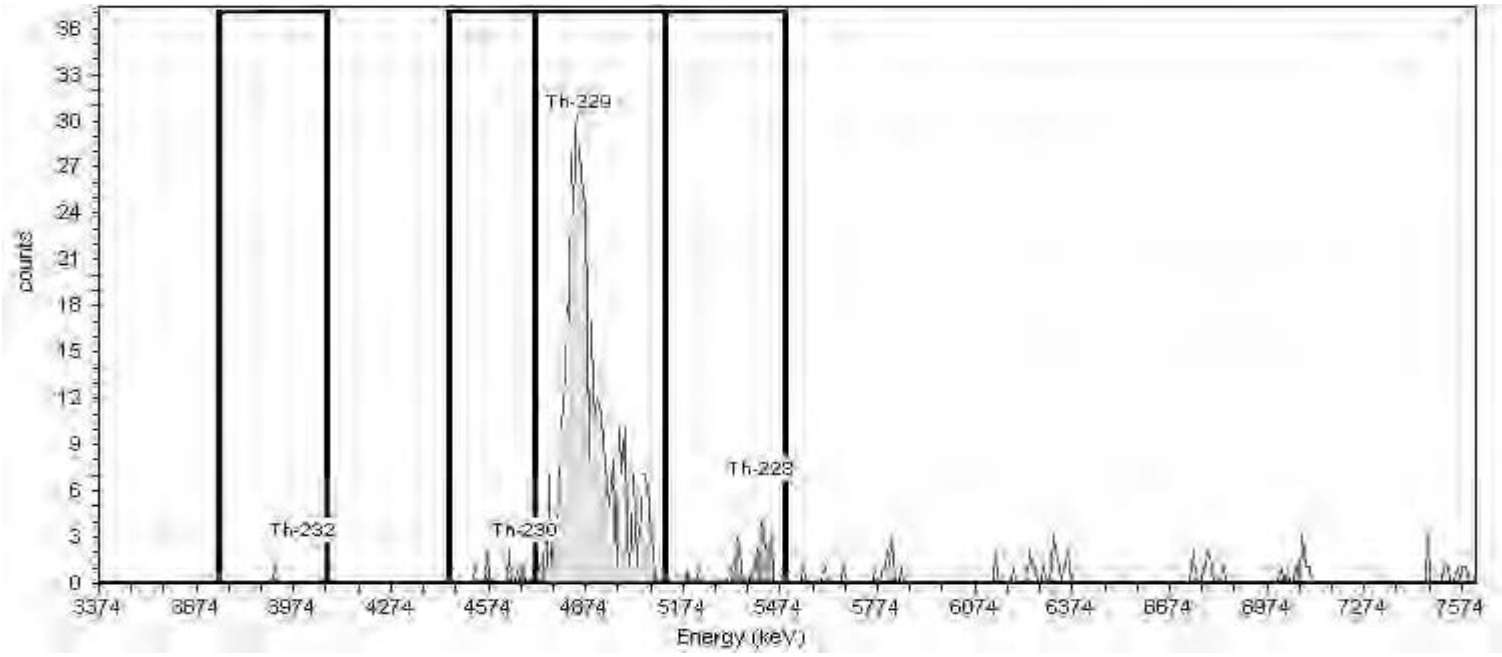
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 85.14%

Acquisition

Detector: AV24
Serial Number: 47-137Q4
Acquisition Start Date: 7/30/2018 4:53:33PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:46PM
Background Info: Sample: ICB;AV24; Det: AV24; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-9817;AV24-05142018
Calibration Date: 5/15/2018 12:28:57PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 22.21% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 7/30/2018 4:51:57PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	79.1	99.6	457	1.1130	455.89	10.308	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	32.4	99.8	25	2.0505	22.95	0.609	pCi/L
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	44.5	100.2	1	0.9375	0.06	0.002	pCi/L
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	16.7	99.7	8	1.3125	6.69	0.177	pCi/L

Daily Checks

Alpha Spectroscopy Daily Pulser Check

Analysis Date: 07/30/18

		Gross Counts			FWHM (keV)			Pulser Center			Energy (keV)		
Detector	**Analysis Date**	**Result**	**Criteria**	**P/F**	**Result**	**Criteria**	**P/F**	**Result**	**Criteria**	**P/F**	**Result**	**Criteria**	**P/F**
AV16	07/30/18 10:50	7476	7062.1 - 7805.5	Pass	12.5	10 - 20	Pass	220.0	216.7 - 226.7	Pass	5007	4980.2 - 5060.2	Pass
AV17	07/30/18 10:50	7565	7222.1 - 7982.3	Pass	11.8	10 - 20	Pass	226.0	222.0 - 232.0	Pass	5052	5020.1 - 5100.1	Pass
AV19	07/30/18 10:50	7597	7146.1 - 7898.3	Pass	11.8	10 - 20	Pass	223.0	219.0 - 229.0	Pass	5030	4997.6 - 5077.6	Pass
AV20	07/30/18 10:50	7668	7319.9 - 8090.4	Pass	14.7	10 - 20	Pass	223.0	218.0 - 228.0	Pass	5030	4990.3 - 5070.3	Pass
AV21	07/30/18 10:50	7668	7320.7 - 8091.3	Pass	13.9	10 - 20	Pass	224.9	222.0 - 232.0	Pass	5044	5019.9 - 5099.9	Pass
AV23	07/30/18 10:50	7623	7289.1 - 8056.3	Pass	15.9	10 - 20	Pass	224.9	220.5 - 230.5	Pass	5044	5008.6 - 5088.6	Pass
AV24	07/30/18 10:50	7653	7289.7 - 8057.0	Pass	15.4	10 - 20	Pass	218.1	214.6 - 224.6	Pass	4993	4964.4 - 5044.4	Pass

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:58:50AM 7/30/2018

Sample

Sample Name: Pulser;AV16
Comment:

Spectrum #15 Analysis #1

Batch

Batch Name: July2018a
Description:

Analyst: 60040

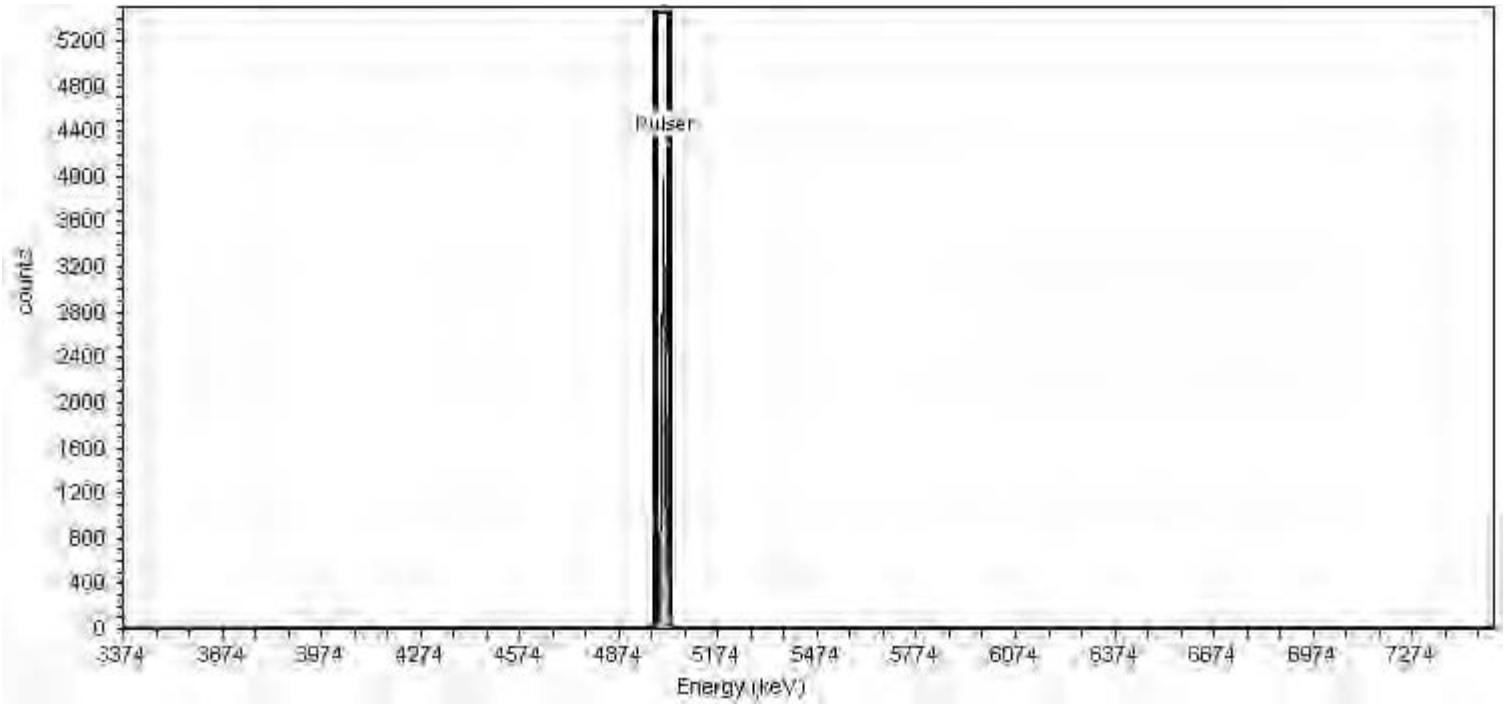
Acquisition

Detector: AV16 , SN: 51-082B6
Acquisition Start Date: 7/30/2018 10:50:19AM
Live Time: 1.00 min.
Real Time: 1.02 min.
Calibration Name: IC-137620;AV16-05142018
Calibration Date: 5/14/2018 6:28:17PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 26.96% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5007.377	4986.162	5028.593	12.46	7,099.48	7,475.95

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:58:59AM 7/30/2018

Sample

Sample Name: Pulser;AV17
Comment:

Spectrum #15 Analysis #1

Batch

Batch Name: July2018a
Description:

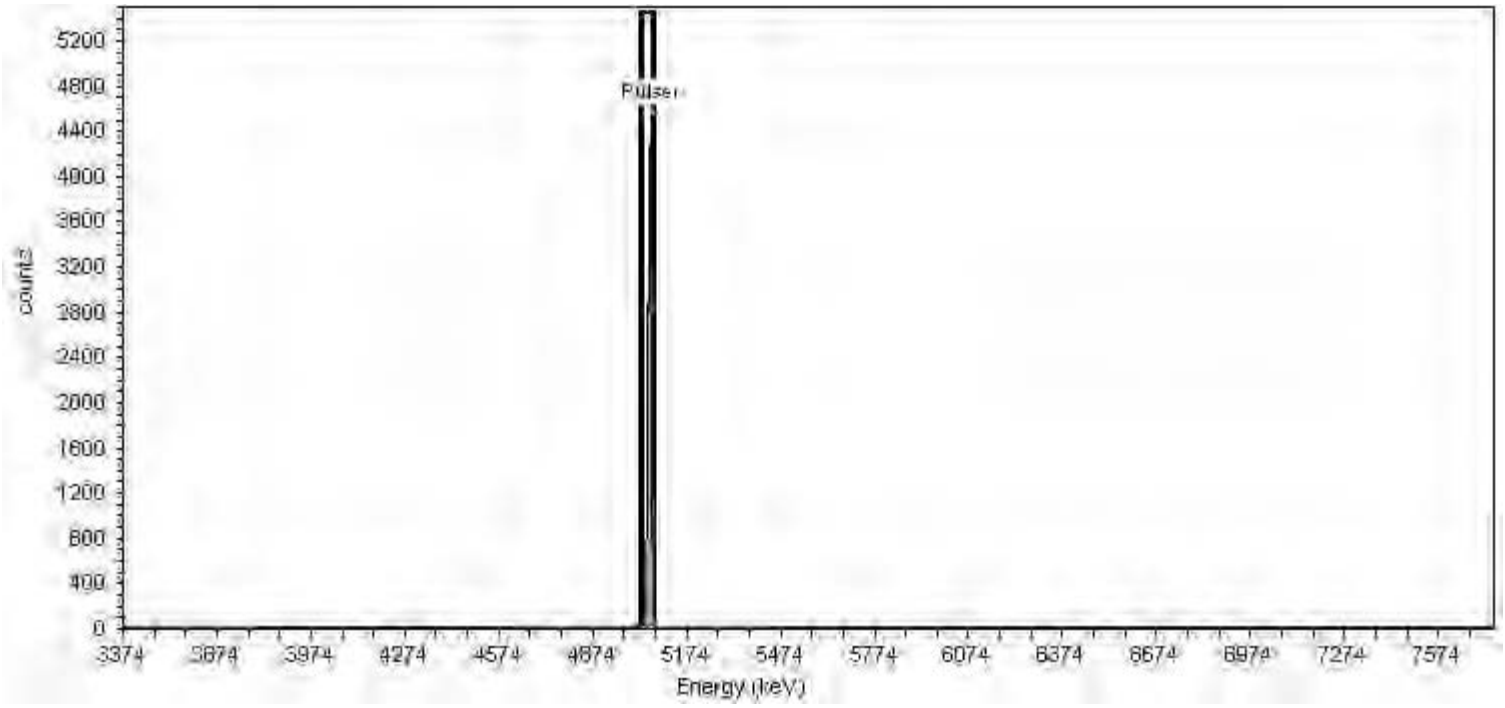
Analyst: 60040

Acquisition

Detector: AV17 , SN: 50-051C4
Acquisition Start Date: 7/30/2018 10:50:20AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-7107;AV17-05142018a
Calibration Date: 5/15/2018 12:29:12PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.09% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5052.190	5032.105	5072.274	11.80	7,210.27	7,565.16

TestAmerica
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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:59:08AM 7/30/2018

Sample

Sample Name: Pulser;AV19
Comment:

Spectrum #15 Analysis #1

Batch

Batch Name: July2018a
Description:

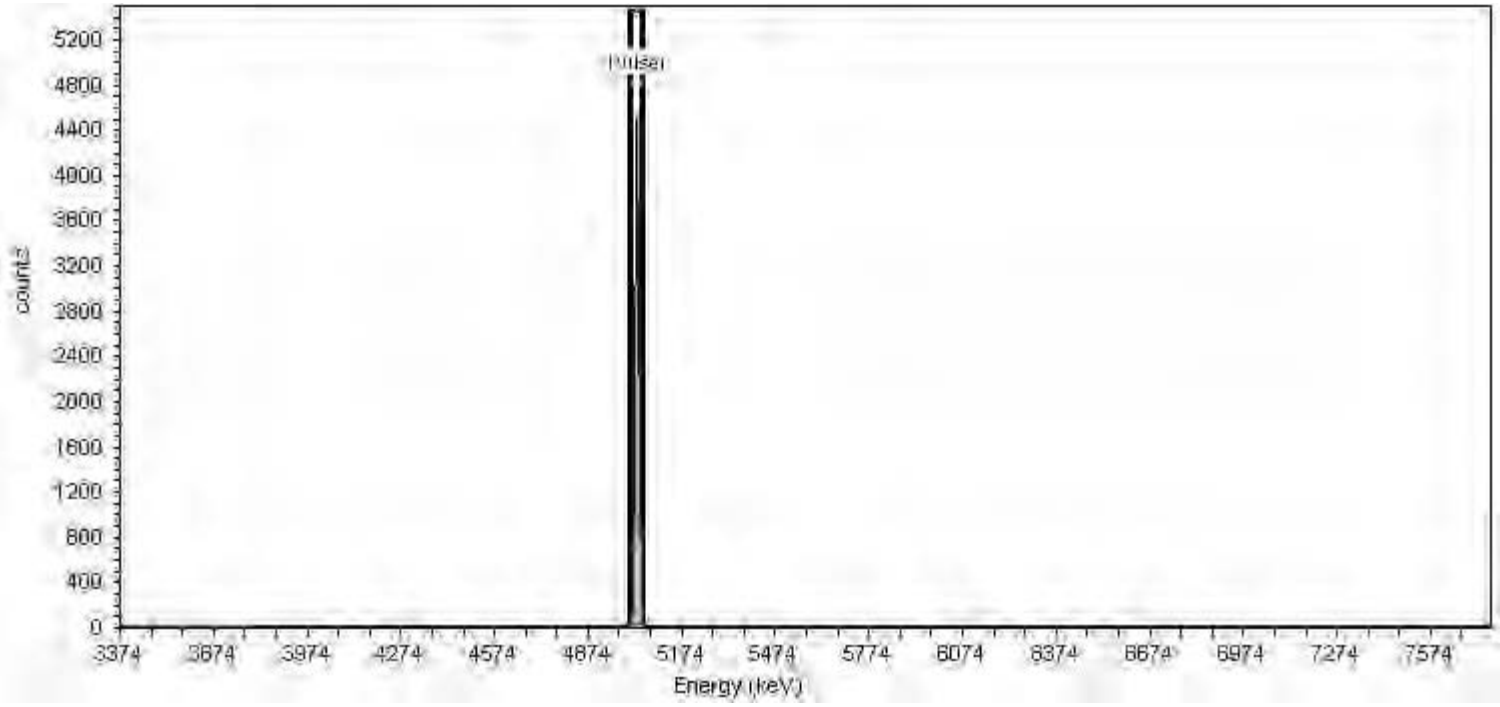
Analyst: 60040

Acquisition

Detector: AV19 , SN: 50-025FF5
Acquisition Start Date: 7/30/2018 10:50:21AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-8877;AV19-05142018
Calibration Date: 5/15/2018 12:27:55PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 23.60% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5029.940	5009.815	5050.065	11.82	7,637.51	7,596.84

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:59:18AM 7/30/2018

Sample

Sample Name: Pulser;AV20
Comment:

Spectrum #15 Analysis #1

Batch

Batch Name: July2018a
Description:

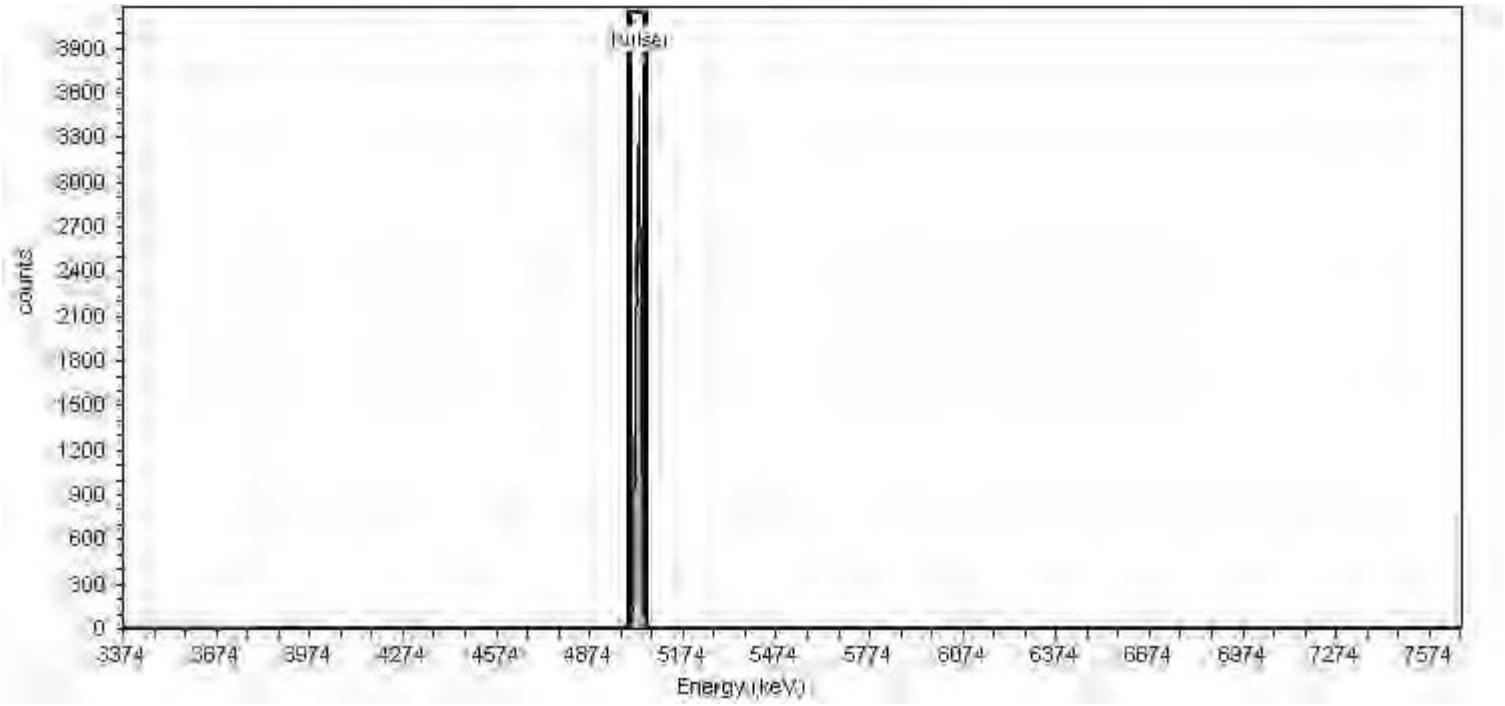
Analyst: 60040

Acquisition

Detector: AV20 , SN: 48-121A7
Acquisition Start Date: 7/30/2018 10:50:22AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-9520;AV20-05142018
Calibration Date: 5/15/2018 12:28:08PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 22.15% +/- 0.32% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5030.207	5005.192	5055.222	14.70	7,561.81	7,668.31

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:59:27AM 7/30/2018

Sample

Sample Name: Pulser;AV21
Comment:

Spectrum #15 Analysis #1

Batch

Batch Name: July2018a
Description:

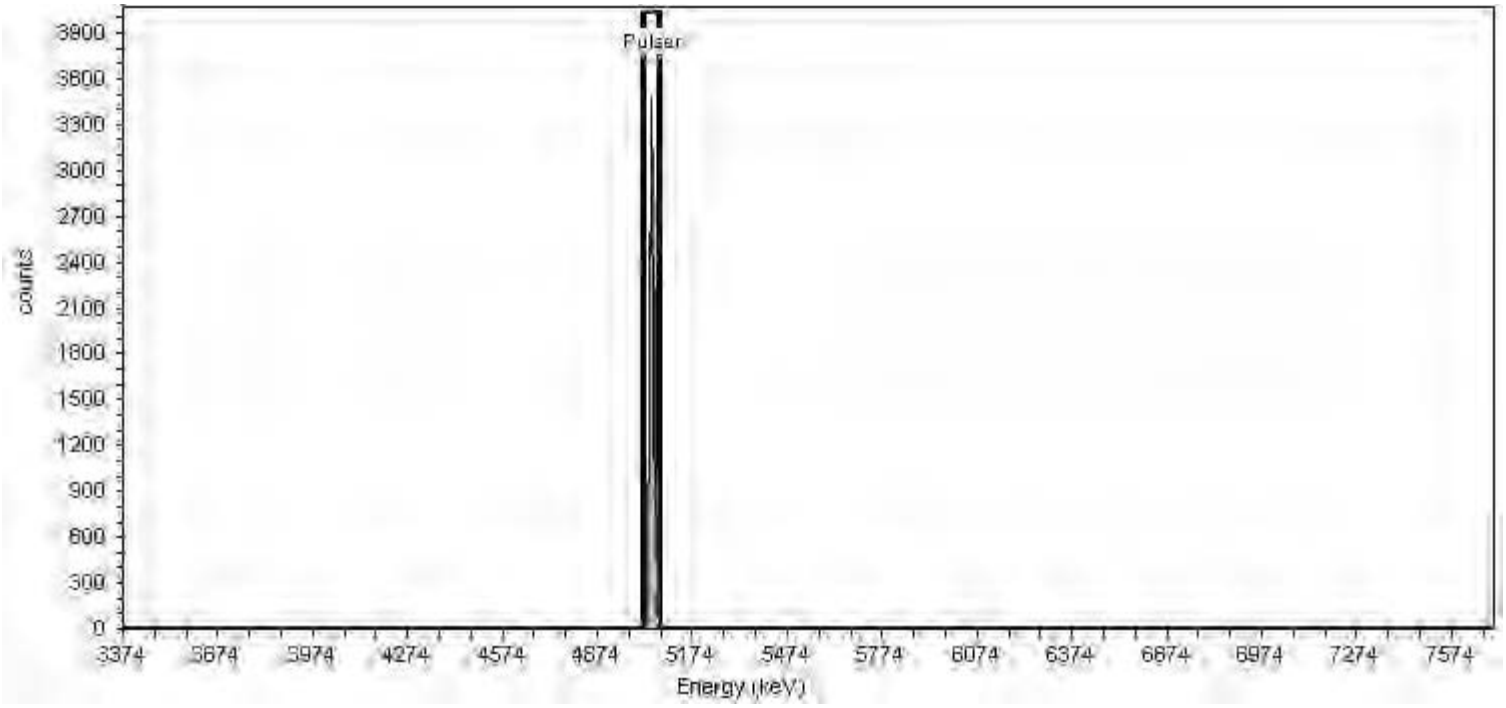
Analyst: 60040

Acquisition

Detector: AV21 , SN: 48-102BB6
Acquisition Start Date: 7/30/2018 10:50:24AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-9792;AV21-05142018
Calibration Date: 5/15/2018 12:28:21PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 23.43% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5044.458	5020.756	5068.160	13.92	6,945.81	7,667.58

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:56:00AM 7/30/2018

Sample

Sample Name: Pulser;AV23
Comment:

Spectrum #15 Analysis #1

Batch

Batch Name: July2018a
Description:

Analyst: 60040

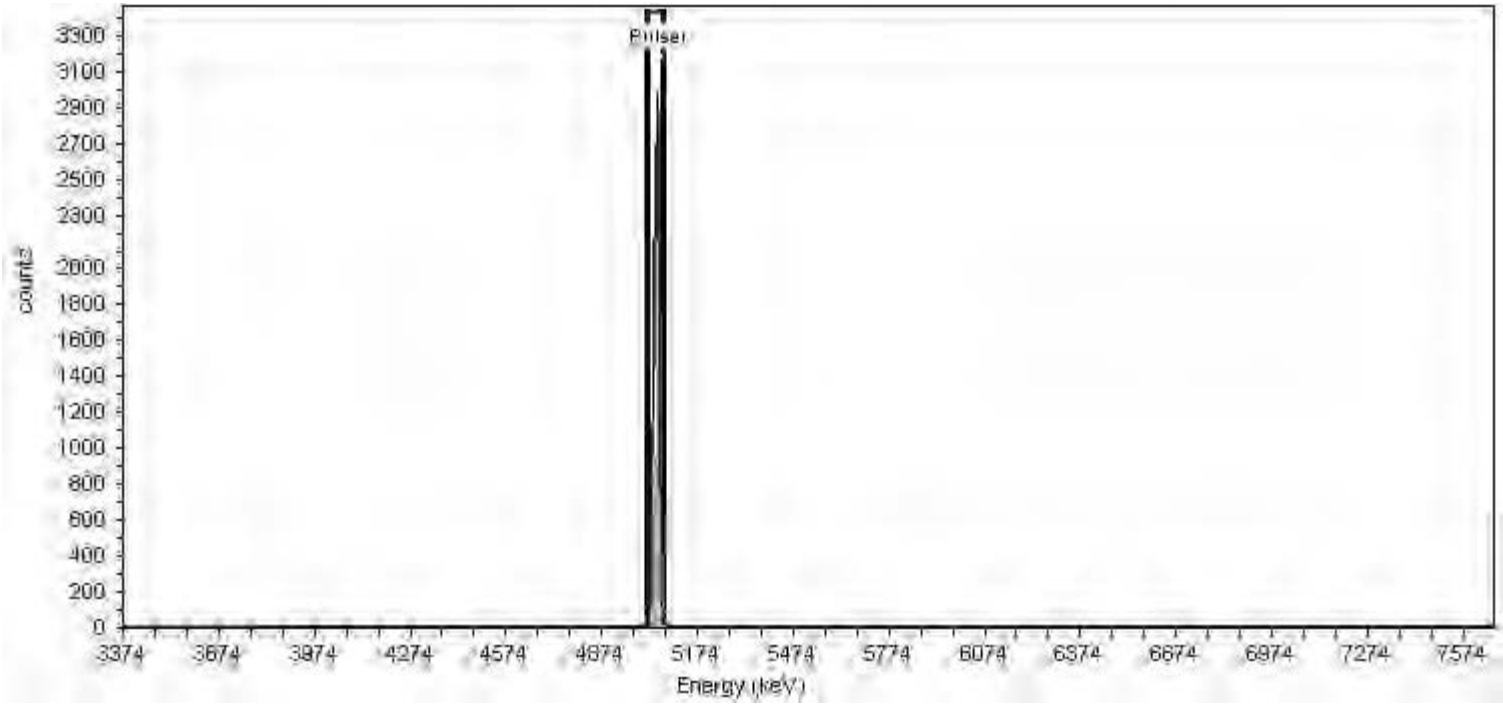
Acquisition

Detector: AV23 , SN: 48-158FF3
Acquisition Start Date: 7/30/2018 10:50:26AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-9795;AV23-05142018
Calibration Date: 5/15/2018 12:28:43PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.46% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5043.829	5016.747	5070.911	15.91	6,821.48	7,622.76

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:56:18AM 7/30/2018

Sample

Sample Name: Pulser;AV24
Comment:

Spectrum #16 Analysis #1

Batch

Batch Name: July2018a
Description:

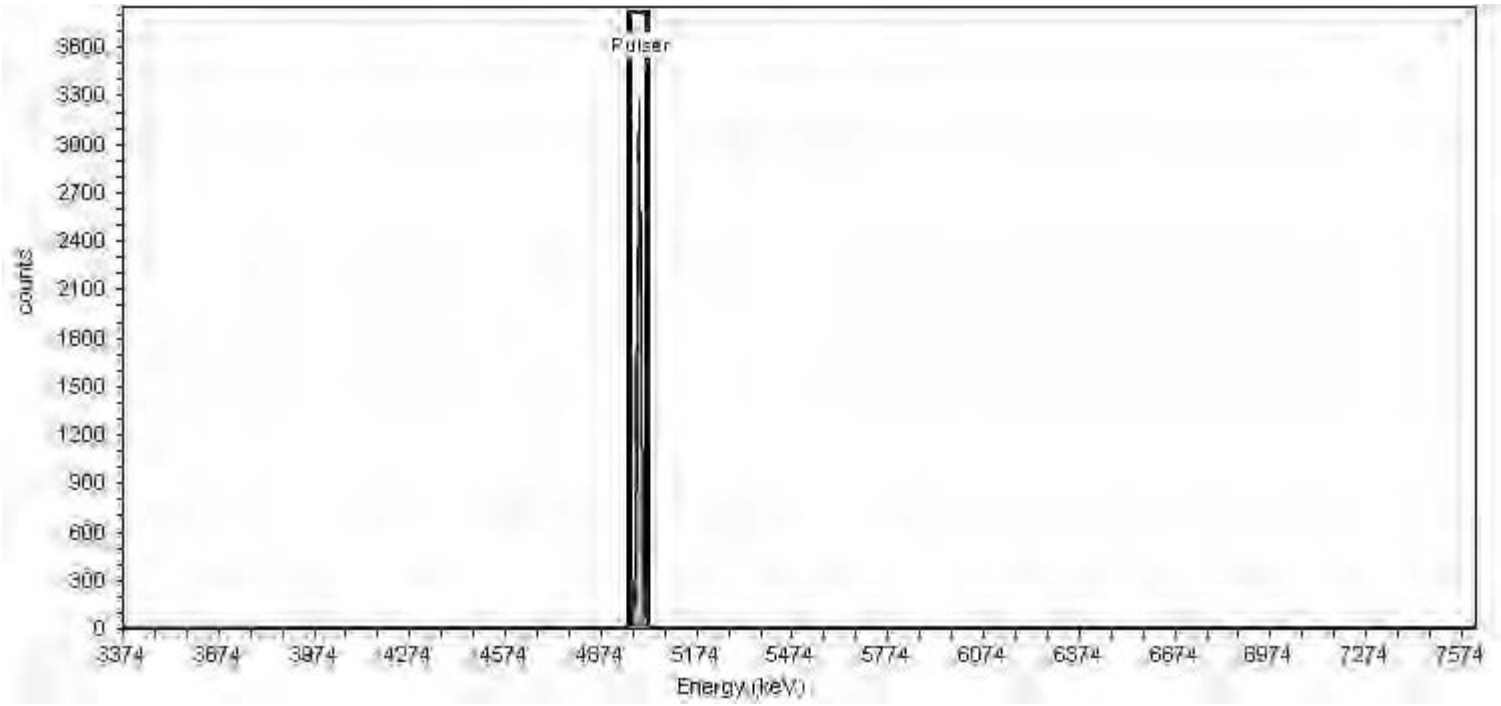
Analyst: 60040

Acquisition

Detector: AV24 , SN: 47-137Q4
Acquisition Start Date: 7/30/2018 10:50:26AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-9817;AV24-05142018
Calibration Date: 5/15/2018 12:28:57PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 22.21% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	4993.451	4967.263	5019.639	15.39	7,197.00	7,652.53

Initial Calibrations

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:28:21PM 5/14/2018

Calibration

Sample Name: IC-137620;AV16-05142018
Description:
Detector: AV16

Calibration Date: 5/14/2018 6:28:17PM
Analyst: 60040

Source Info

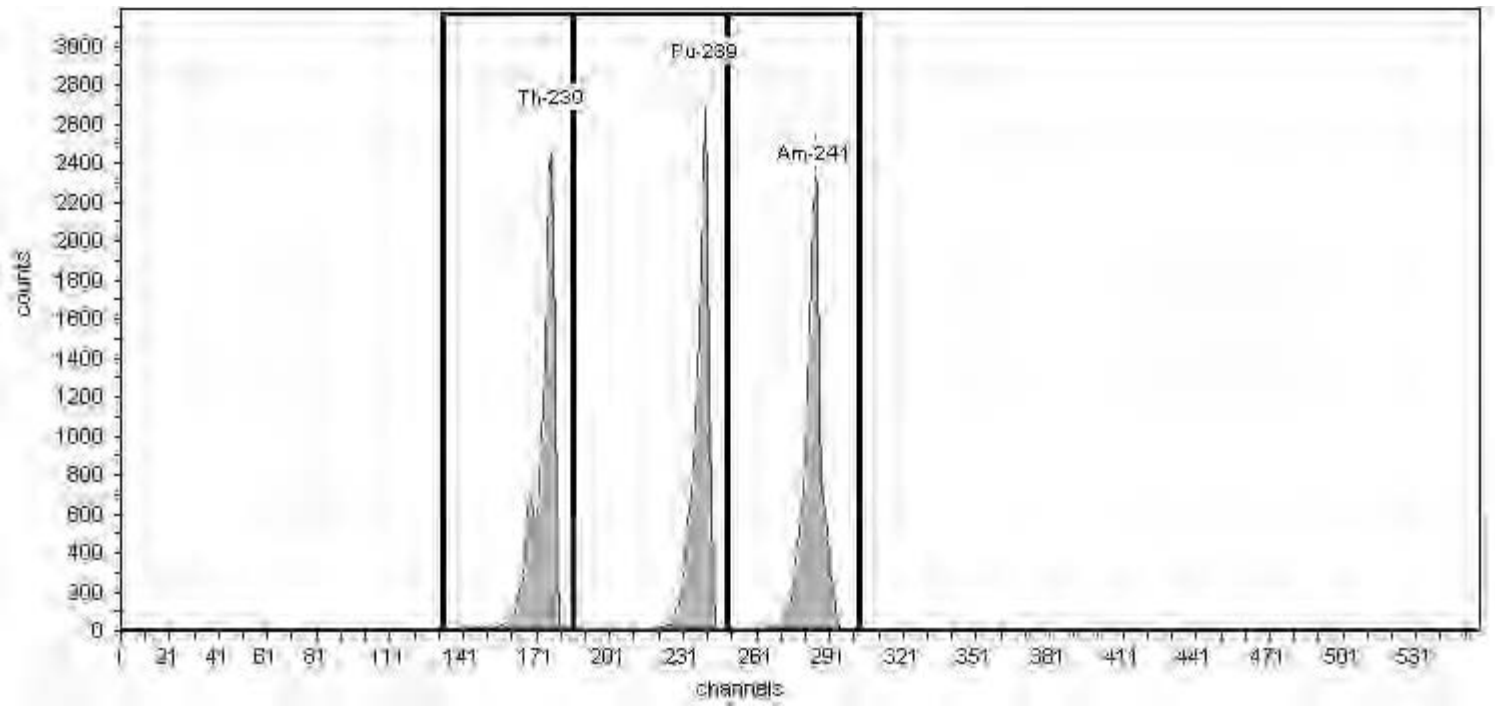
Certificate ID: 108348_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/23/2018 11:00:00PM
Description:

Acquisition

Detector: AV16 , SN: 51-082B6
Acquisition Start Date: 5/14/2018 3:59:51PM
Live Time: 140.00 min.
Real Time: 140.13 min.
Efficiency: 26.96% +/- 0.24% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	15,895.00	113.54
Pu-239	240	5.16	186	249	0.00	15,960.00	114.00
Am-241	284	5.49	249	303	0.00	16,886.00	120.61

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:29:16PM 5/15/2018

Calibration

Sample Name: IC-7107;AV17-05142018a
Description:
Detector: AV17

Calibration Date: 5/15/2018 12:29:12PM
Analyst: 60040

Source Info

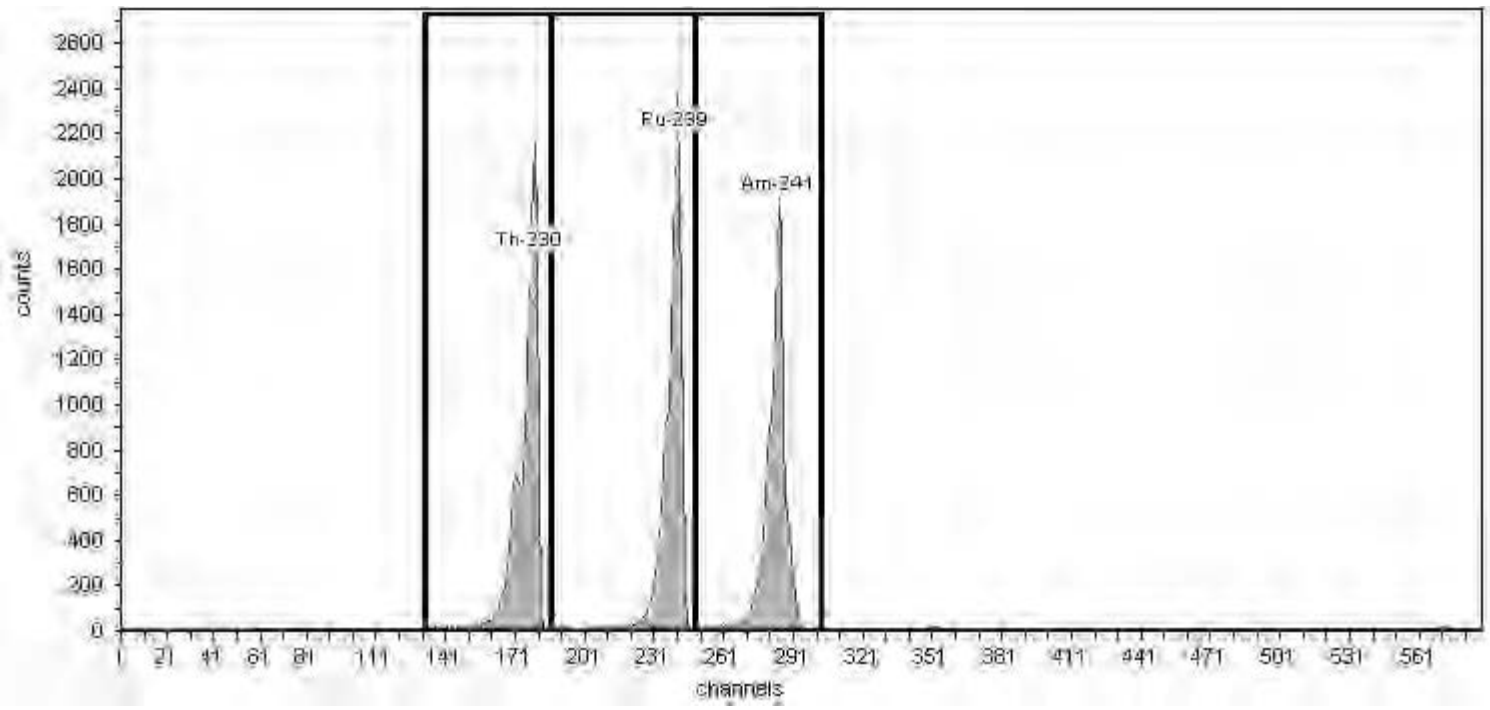
Certificate ID: 82232-334
Prepared by: Analytics

Certification Date: 6/3/2010 12:00:00PM
Description:

Acquisition

Detector: AV17 , SN: 50-051C4
Acquisition Start Date: 5/14/2018 6:47:26PM
Live Time: 140.00 min.
Real Time: 140.10 min.
Efficiency: 24.09% +/- 0.28% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	15,141.00	108.15
Pu-239	240	5.16	186	249	0.00	15,067.00	107.62
Am-241	284	5.49	249	303	0.00	14,291.00	102.08

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:28:01PM 5/15/2018

Calibration

Sample Name: IC-8877;AV19-05142018
Description:
Detector: AV19

Calibration Date: 5/15/2018 12:27:55PM
Analyst: 60040

Source Info

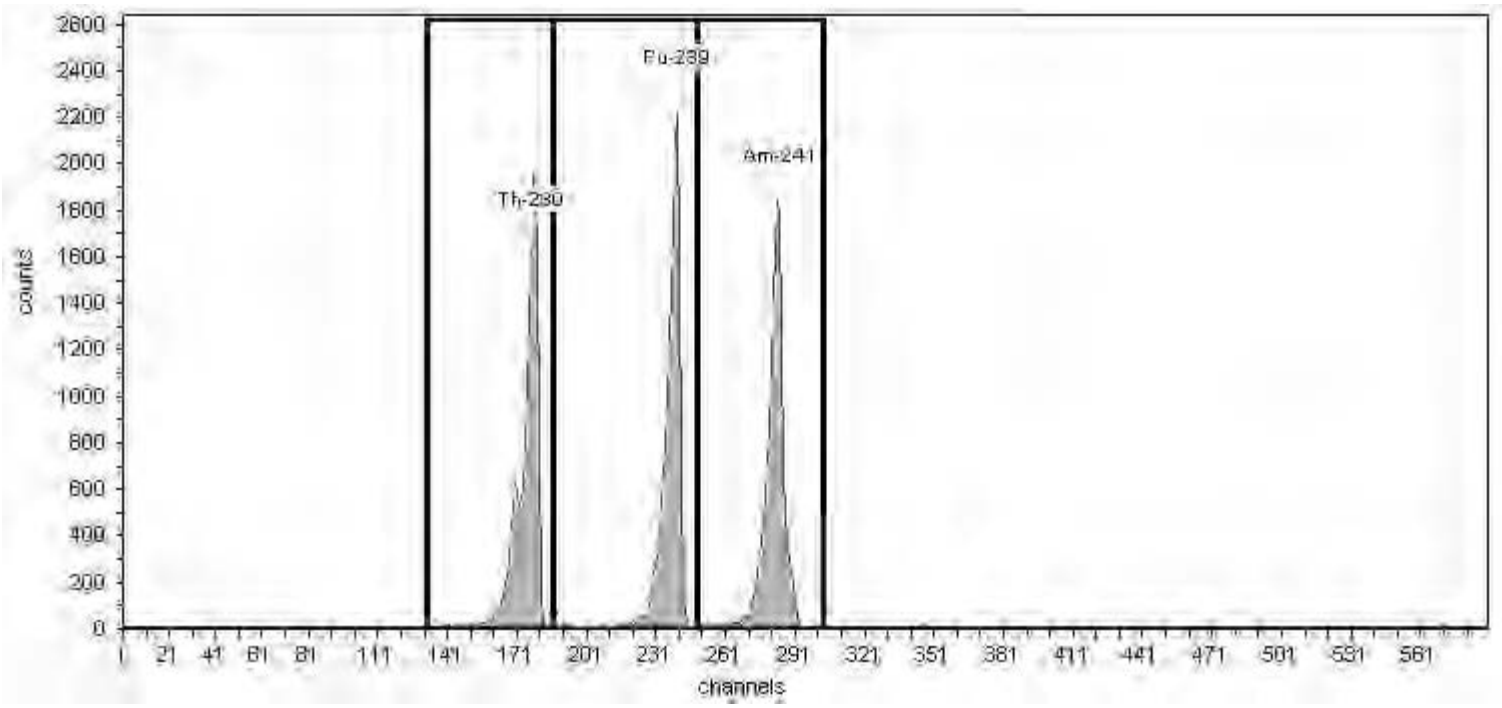
Certificate ID: 82236-334
Prepared by: Analytics

Certification Date: 6/2/2010 12:00:00PM
Description:

Acquisition

Detector: AV19 , SN: 50-025FF5
Acquisition Start Date: 5/14/2018 6:35:50PM
Live Time: 140.00 min.
Real Time: 140.11 min.
Efficiency: 23.60% +/- 0.29% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	13,623.00	97.31
Pu-239	240	5.16	186	249	0.00	13,975.00	99.82
Am-241	284	5.49	249	303	0.00	13,324.00	95.17

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:28:13PM 5/15/2018

Calibration

Sample Name: IC-9520;AV20-05142018
Description:
Detector: AV20

Calibration Date: 5/15/2018 12:28:08PM
Analyst: 60040

Source Info

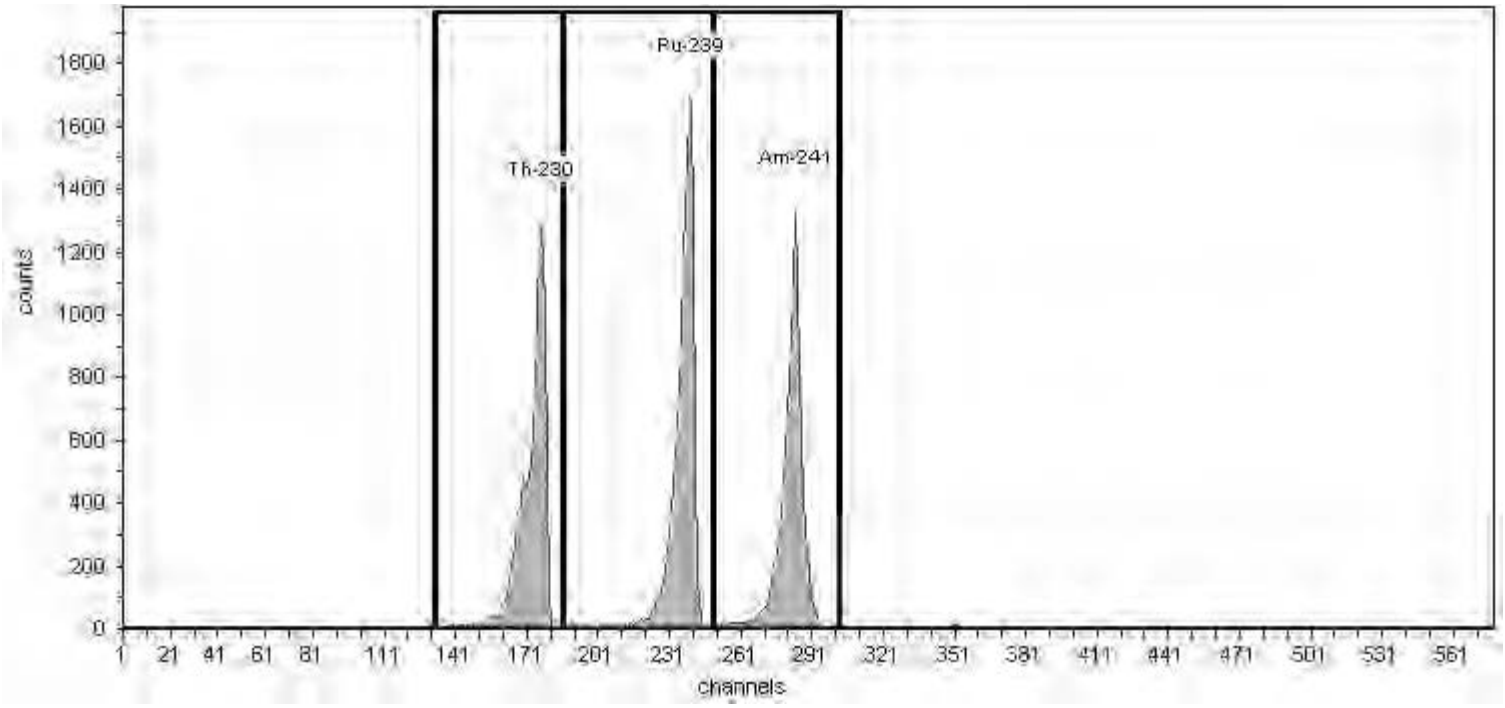
Certificate ID: 82237-334
Prepared by: Analytics

Certification Date: 6/1/2010 12:00:00PM
Description:

Acquisition

Detector: AV20 , SN: 48-121A7
Acquisition Start Date: 5/14/2018 6:36:08PM
Live Time: 140.00 min.
Real Time: 140.11 min.
Efficiency: 22.15% +/- 0.32% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	10,460.00	74.71
Pu-239	240	5.16	186	249	0.00	12,682.00	90.59
Am-241	284	5.49	249	303	0.00	10,037.00	71.69

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:28:24PM 5/15/2018

Calibration

Sample Name: IC-9792;AV21-05142018
Description:
Detector: AV21

Calibration Date: 5/15/2018 12:28:21PM
Analyst: 60040

Source Info

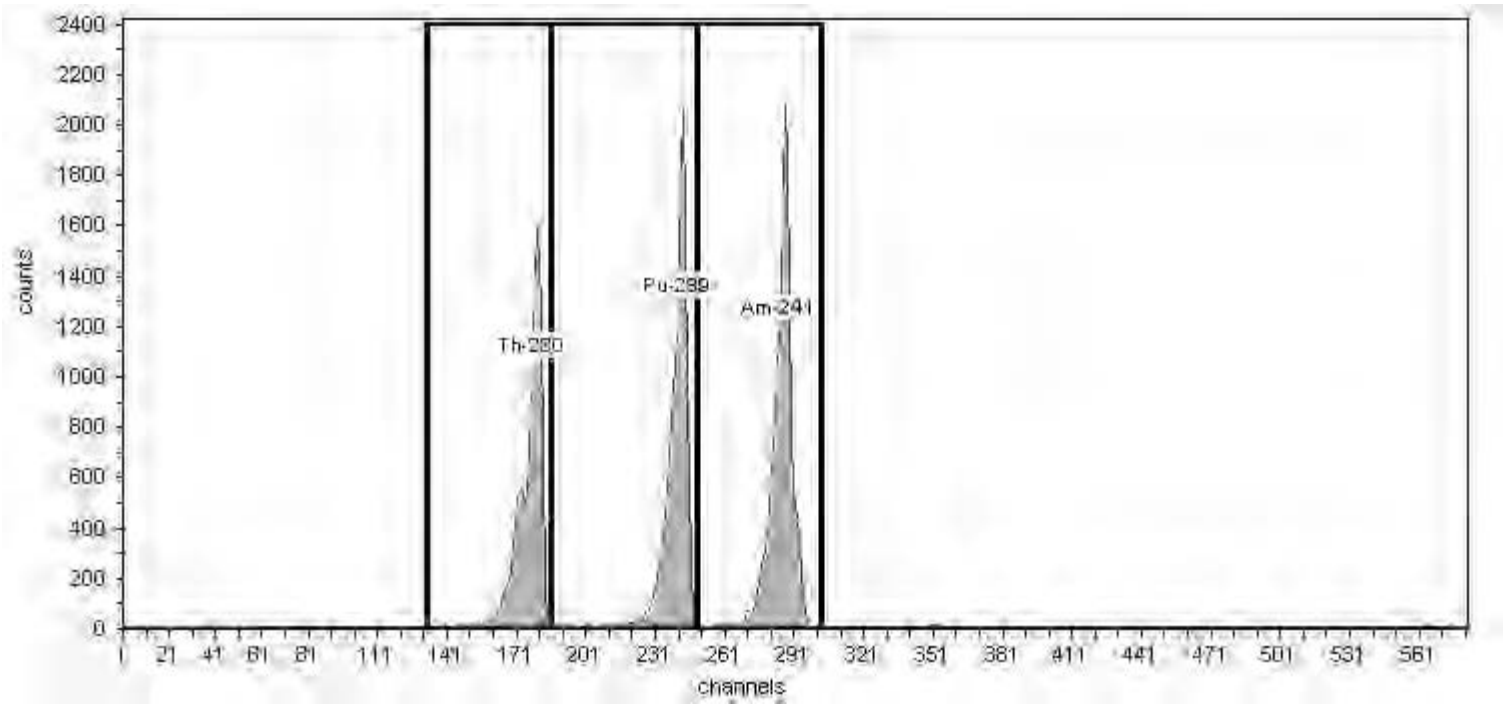
Certificate ID: 82240-334
Prepared by: Analytics

Certification Date: 6/8/2010 12:00:00PM
Description:

Acquisition

Detector: AV21 , SN: 48-102BB6
Acquisition Start Date: 5/14/2018 6:36:51PM
Live Time: 140.00 min.
Real Time: 140.11 min.
Efficiency: 23.43% +/- 0.28% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	12,248.00	87.49
Pu-239	240	5.16	186	249	0.00	14,254.00	101.81
Am-241	284	5.49	249	303	0.00	16,134.00	115.24

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:28:47PM 5/15/2018

Calibration

Sample Name: IC-9795;AV23-05142018
Description:
Detector: AV23

Calibration Date: 5/15/2018 12:28:43PM
Analyst: 60040

Source Info

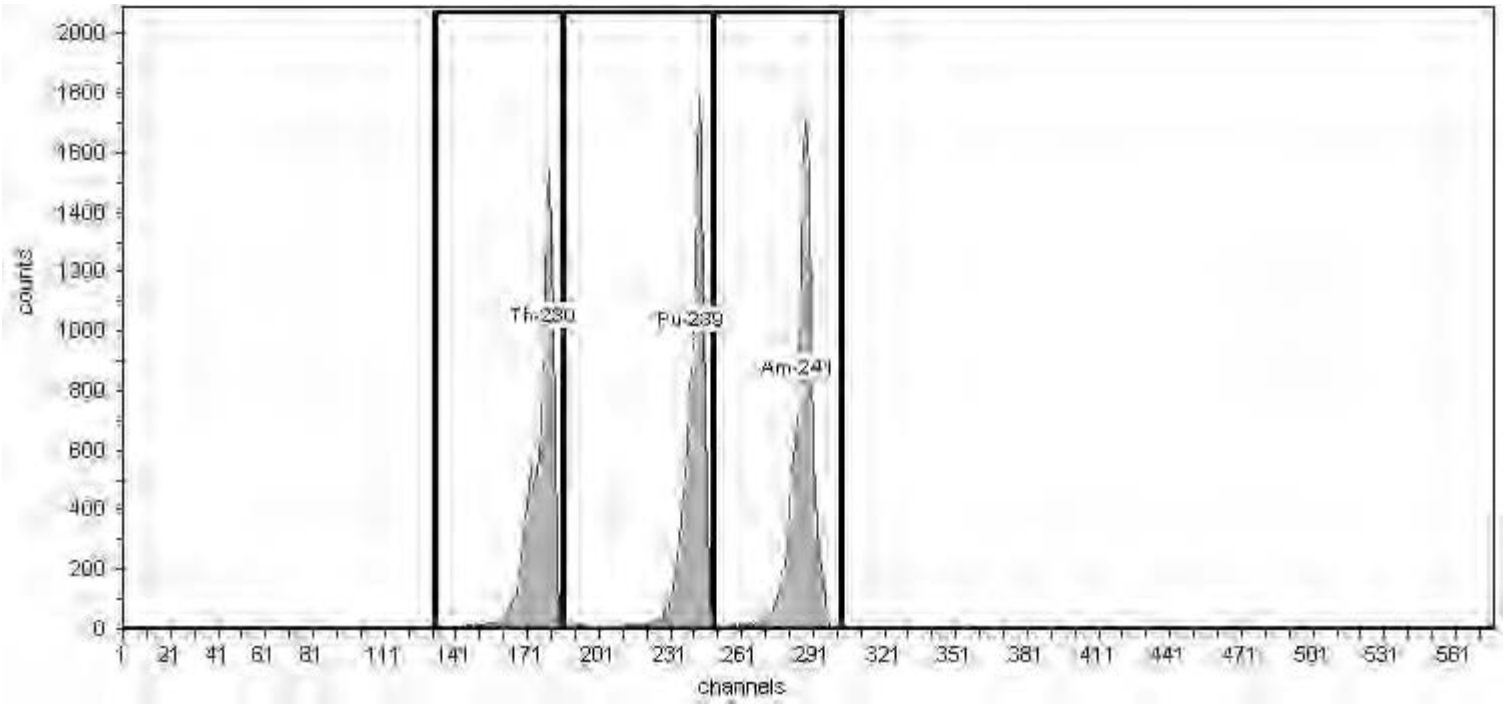
Certificate ID: 82243-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV23 , SN: 48-158FF3
Acquisition Start Date: 5/14/2018 6:37:31PM
Live Time: 140.00 min.
Real Time: 140.11 min.
Efficiency: 24.46% +/- 0.33% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	11,962.00	85.44
Pu-239	240	5.16	186	249	0.00	12,196.00	87.11
Am-241	284	5.49	249	303	0.00	13,128.00	93.77

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:29:00PM 5/15/2018

Calibration

Sample Name: IC-9817;AV24-05142018
Description:
Detector: AV24

Calibration Date: 5/15/2018 12:28:57PM
Analyst: 60040

Source Info

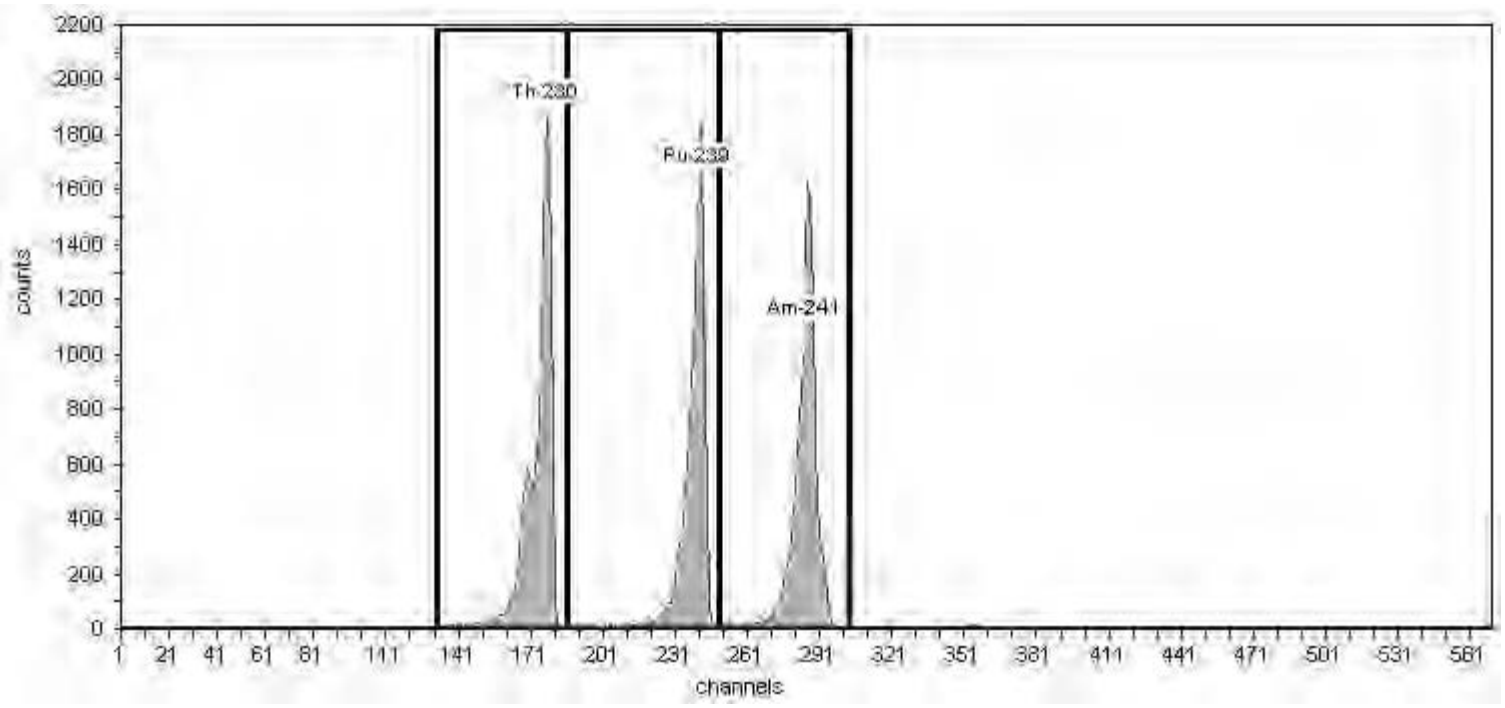
Certificate ID: 82244-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV24 , SN: 47-137Q4
Acquisition Start Date: 5/14/2018 6:37:42PM
Live Time: 140.00 min.
Real Time: 140.12 min.
Efficiency: 22.21% +/- 0.28% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	13,641.00	97.43
Pu-239	240	5.16	186	249	0.00	12,687.00	90.62
Am-241	284	5.49	249	303	0.00	12,649.00	90.35

Initial Calibration Verifications

Alpha Spectroscopy Calibration Summary

Detector: AV16

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371837/1	05/14/18 15:59		0.2696	0.20-0.32		
ICV 160-371940/1	05/18/18 19:35	108347_00001	0.2723	0.20-0.32	101.0	95-105
CCV 160-375341/1	07/10/18 17:04	108348_00001	0.2702	0.20-0.32	100.3	95-105

Detector: AV17

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371838/1	05/14/18 18:47	82232-334_00001	0.2409	0.20-0.32		
ICV 160-371950/1	05/20/18 16:10	82236-334_00001	0.2361	0.20-0.32	98.0	95-105
CCV 160-375374/1	07/11/18 11:07	82232-334_00001	0.2416	0.20-0.32	100.3	95-105

Detector: AV19

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371840/1	05/14/18 18:35	82236-334_00001	0.2360	0.20-0.32		
ICV 160-371952/1	05/20/18 16:11	82232-334_00001	0.2370	0.20-0.32	100.4	95-105
CCV 160-375375/1	07/11/18 11:08	82236-334_00001	0.2361	0.20-0.32	100.0	95-105

Detector: AV20

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371842/1	05/14/18 18:36	82237-334_00003	0.2215	0.20-0.32		
ICV 160-371953/1	05/20/18 16:11	82244-334_00001	0.2191	0.20-0.32	98.9	95-105
CCV 160-375376/1	07/11/18 11:08	82237-334_00003	0.2242	0.20-0.32	101.2	95-105

Detector: AV21

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371843/1	05/14/18 18:36	82240-334_00001	0.2343	0.20-0.32		
ICV 160-371954/1	05/20/18 16:11	82246-334_00001	0.2340	0.20-0.32	99.8	95-105
CCV 160-375377/1	07/11/18 11:08	82240-334_00001	0.2320	0.20-0.32	99.0	95-105

Detector: AV23

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371845/1	05/14/18 18:37	82243-334_00001	0.2446	0.20-0.32		
ICV 160-371956/1	05/20/18 16:12	82233-334_00001	0.2512	0.20-0.32	102.7	95-105
CCV 160-375379/1	07/11/18 11:09	82243-334_00001	0.2463	0.20-0.32	100.7	95-105

Detector: AV24

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371846/1	05/14/18 18:37	82244-334_00001	0.2221	0.20-0.32		
ICV 160-371957/1	05/20/18 16:12	82241-334_00001	0.2277	0.20-0.32	102.5	95-105
CCV 160-375380/1	07/11/18 11:09	82244-334_00001	0.2214	0.20-0.32	99.7	95-105

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
4:01:38PM 5/19/2018

Calibration

Sample Name: ICV-1370619;AV16-05182018
Description:
Detector: AV16

Calibration Date: 5/19/2018 4:01:34PM
Analyst: 60040

Source Info

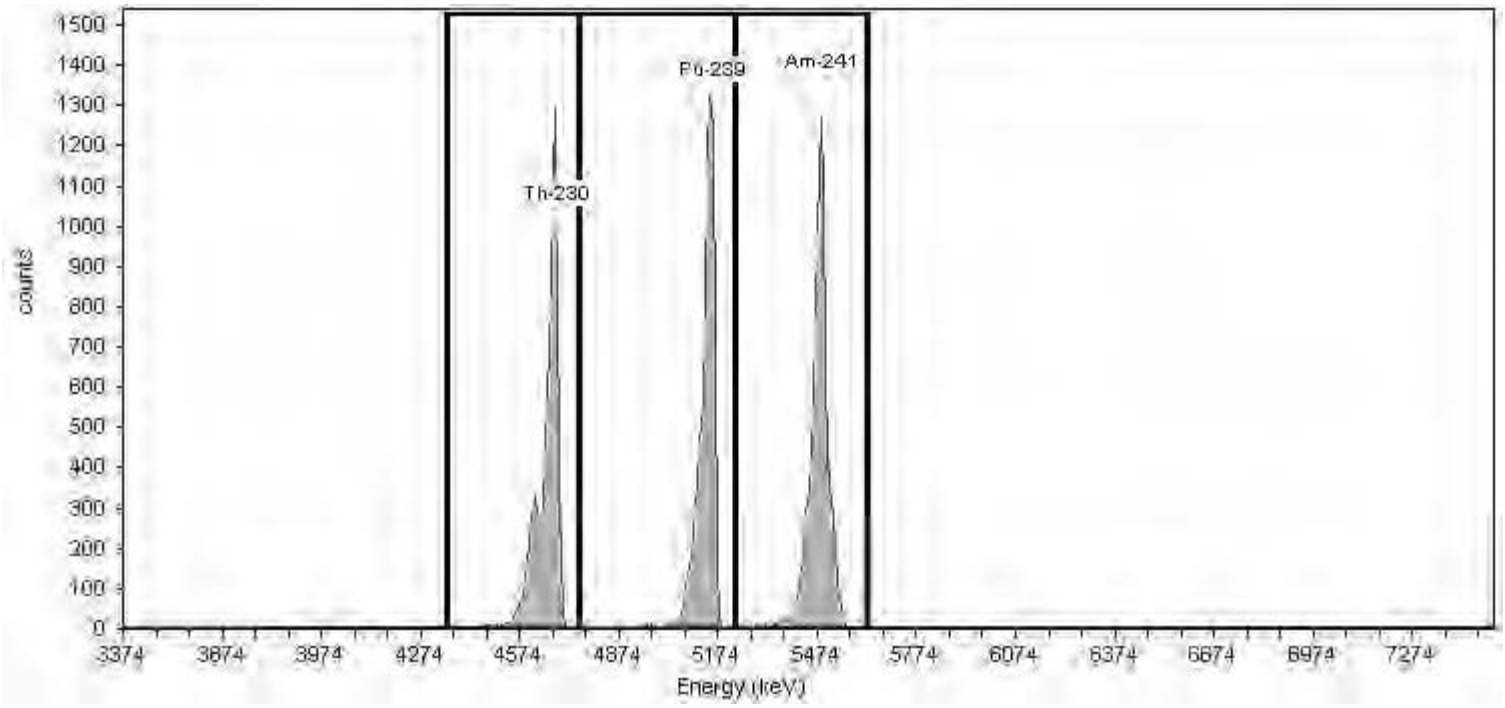
Certificate ID: 108347_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/23/2018 11:00:00AM
Description:

Acquisition

Detector: AV16 , SN: 51-082B6
Acquisition Start Date: 5/18/2018 7:35:32PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 27.23% +/- 0.35% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	7,922.00	132.03
Pu-239	240	5.16	186	249	0.00	7,874.00	131.23
Am-241	284	5.49	249	303	0.00	8,497.00	141.62

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:27:23AM 5/21/2018

Calibration

Sample Name: ICV-8877;AV17-05202018
Description:
Detector: AV17

Calibration Date: 5/21/2018 10:27:19AM
Analyst: 60040

Source Info

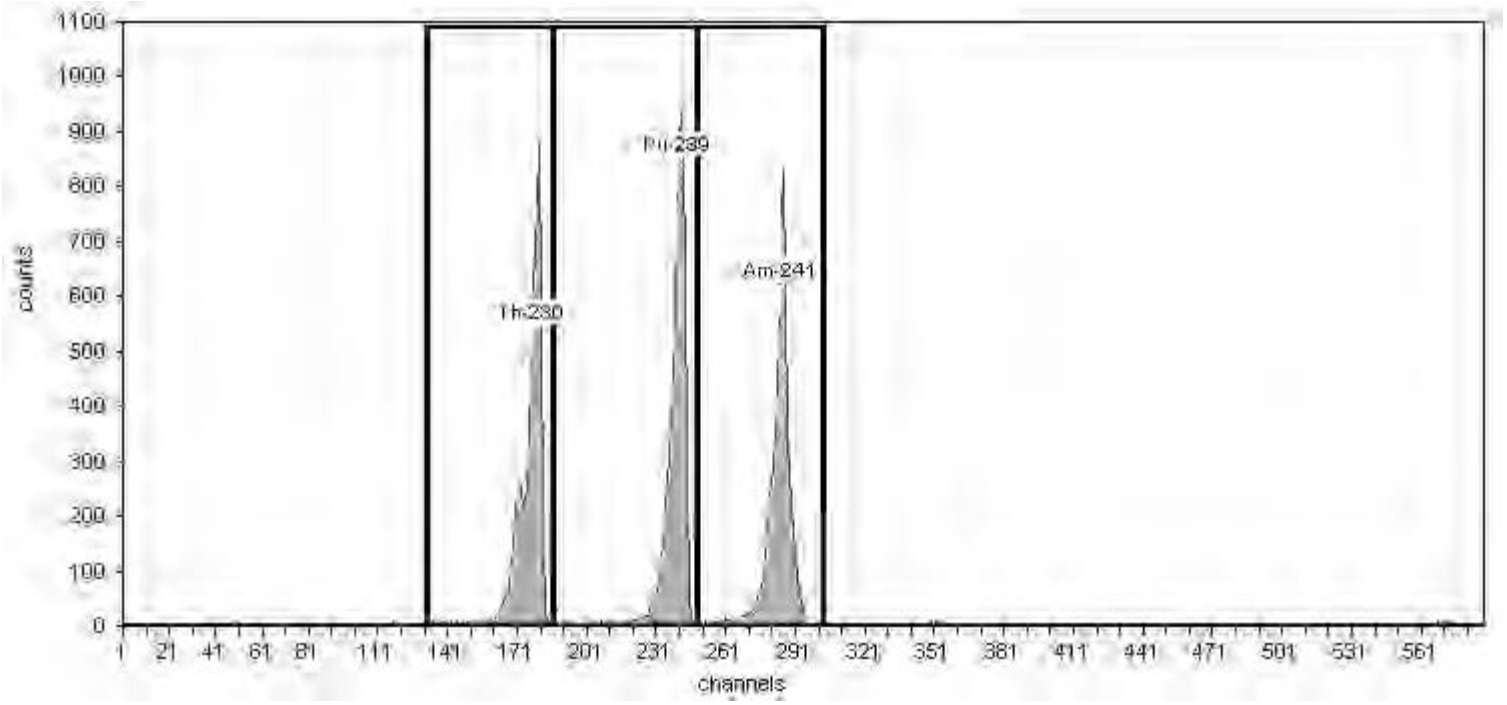
Certificate ID: 82236-334
Prepared by: Analytics

Certification Date: 6/2/2010 12:00:00PM
Description:

Acquisition

Detector: AV17 , SN: 50-051C4
Acquisition Start Date: 5/20/2018 4:10:39PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 23.61% +/- 0.40% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,761.00	96.02
Pu-239	240	5.16	186	249	0.00	6,066.00	101.10
Am-241	284	5.49	249	303	0.00	5,725.00	95.42

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:29:26AM 5/21/2018

Calibration

Sample Name: ICV-7107;AV19-05202018
Description:
Detector: AV19

Calibration Date: 5/21/2018 10:29:23AM
Analyst: 60040

Source Info

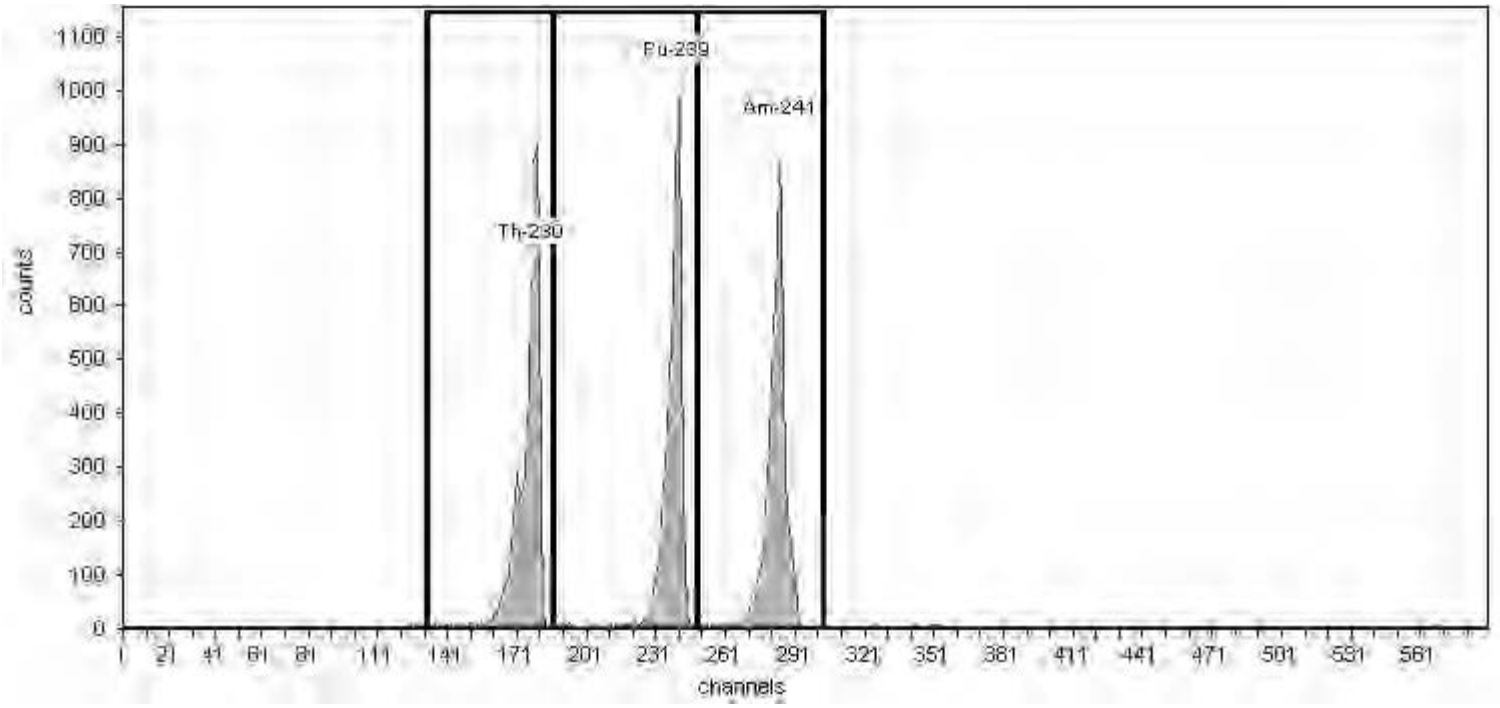
Certificate ID: 82232-334
Prepared by: Analytics

Certification Date: 6/3/2010 12:00:00PM
Description:

Acquisition

Detector: AV19 , SN: 50-025FF5
Acquisition Start Date: 5/20/2018 4:11:20PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 23.70% +/- 0.38% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,294.00	104.90
Pu-239	240	5.16	186	249	0.00	6,305.00	105.08
Am-241	284	5.49	249	303	0.00	6,161.00	102.68

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:29:50AM 5/21/2018

Calibration

Sample Name: ICV-9817;AV20-05202018
Description:
Detector: AV20

Calibration Date: 5/21/2018 10:29:46AM
Analyst: 60040

Source Info

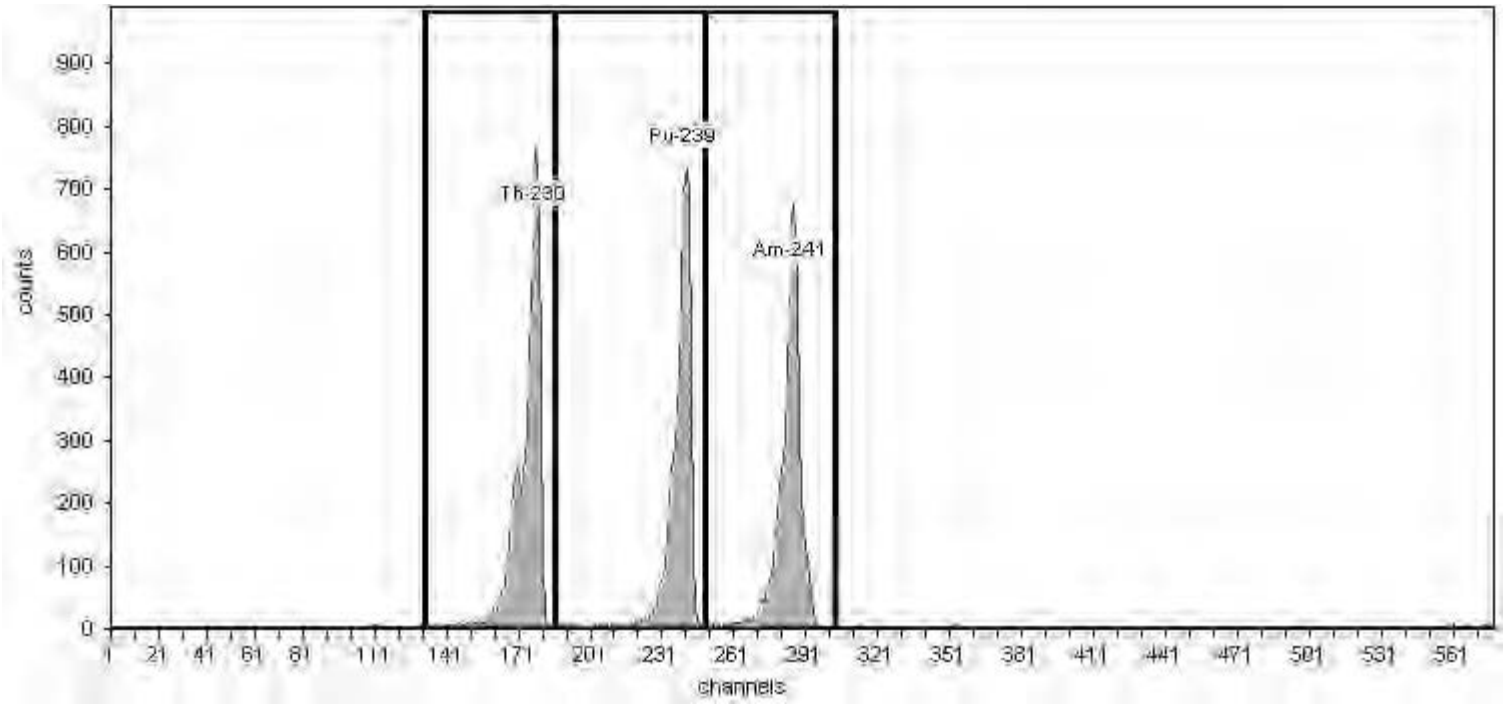
Certificate ID: 82244-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV20 , SN: 48-121A7
Acquisition Start Date: 5/20/2018 4:11:44PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 21.91% +/- 0.38% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,775.00	96.25
Pu-239	240	5.16	186	249	0.00	5,313.00	88.55
Am-241	284	5.49	249	303	0.00	5,386.00	89.77

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:30:02AM 5/21/2018

Calibration

Sample Name: ICV-9885;AV21-05202018
Description:
Detector: AV21

Calibration Date: 5/21/2018 10:29:58AM
Analyst: 60040

Source Info

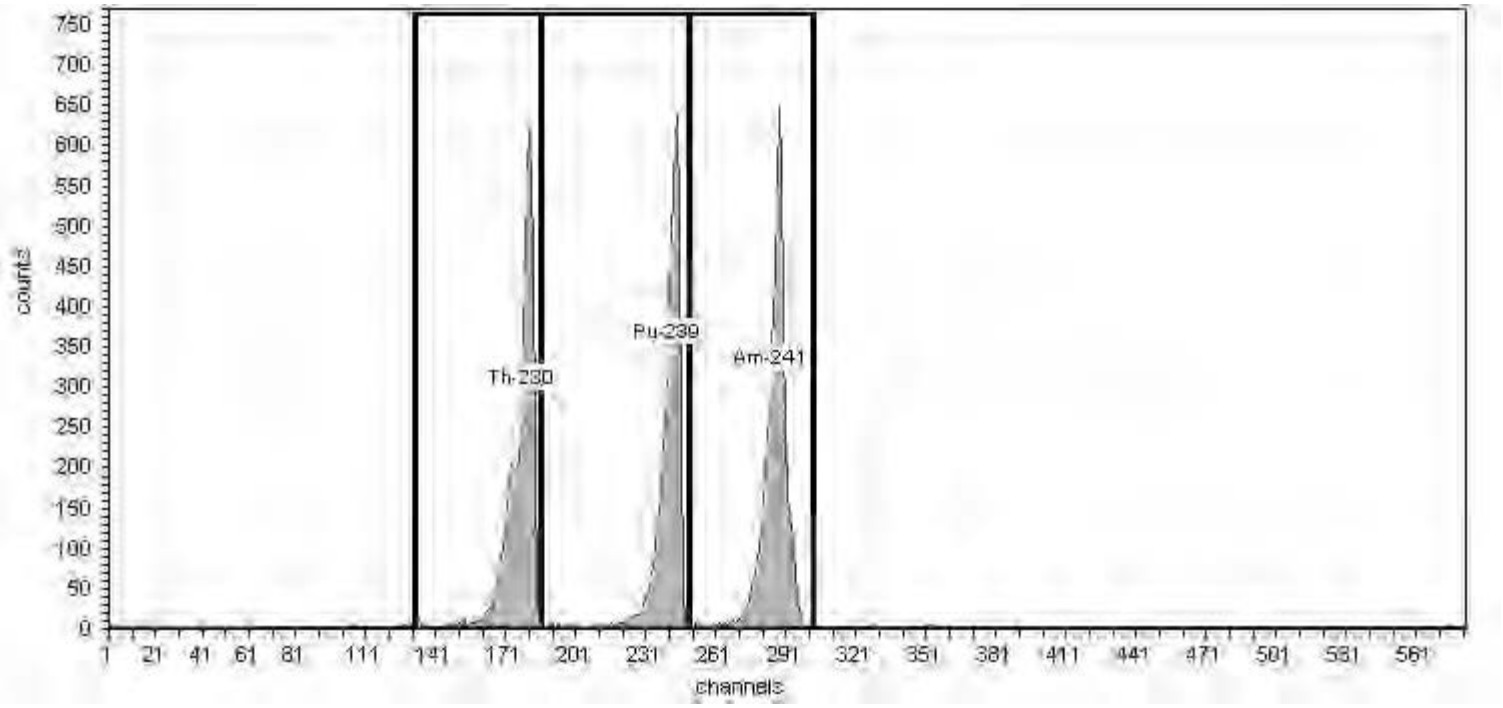
Certificate ID: 82246-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV21 , SN: 48-102BB6
Acquisition Start Date: 5/20/2018 4:11:59PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 23.40% +/- 0.46% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	4,645.00	77.42
Pu-239	240	5.16	186	249	0.00	4,501.00	75.02
Am-241	284	5.49	249	303	0.00	5,050.00	84.17

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:30:30AM 5/21/2018

Calibration

Sample Name: ICV-8874;AV23-05202018
Description:
Detector: AV23

Calibration Date: 5/21/2018 10:30:24AM
Analyst: 60040

Source Info

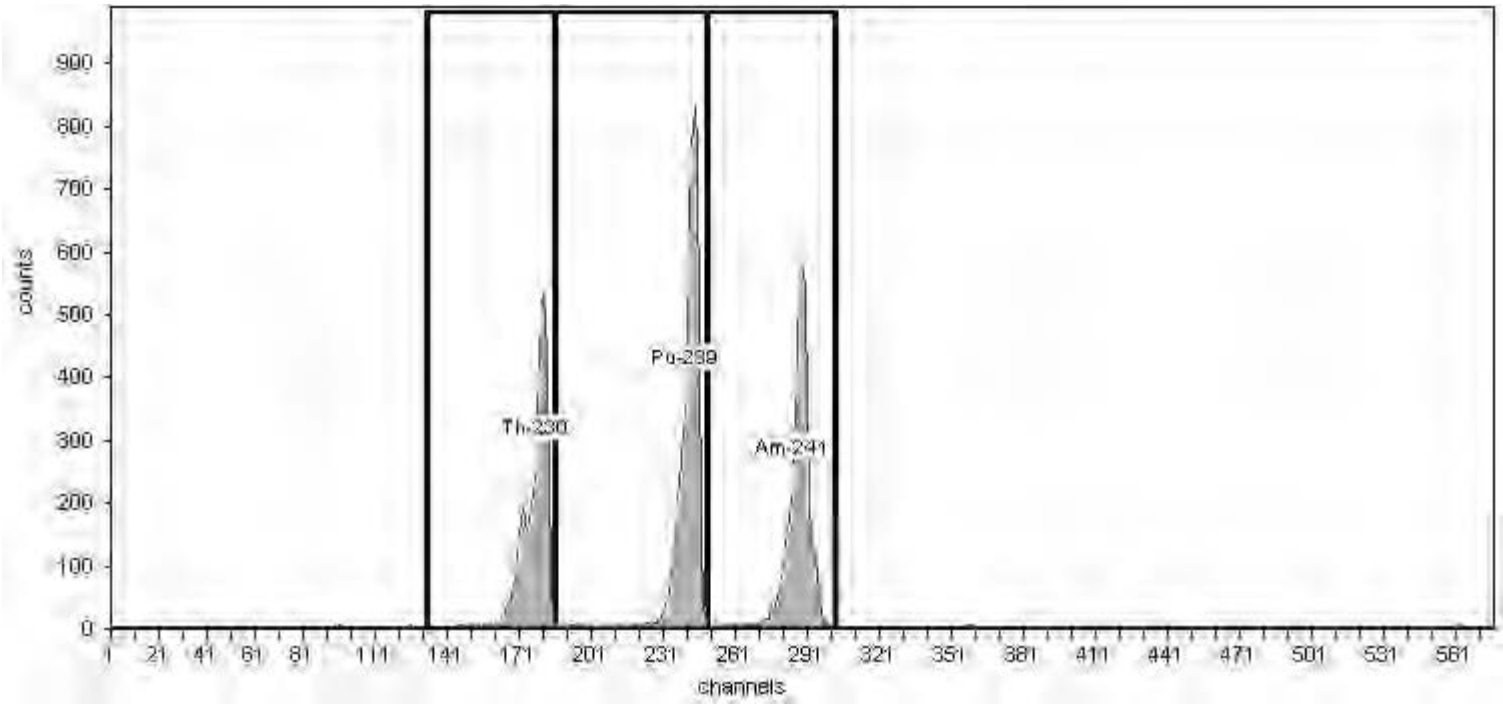
Certificate ID: 82233-334
Prepared by: Analytics

Certification Date: 6/3/2010 12:00:00PM
Description:

Acquisition

Detector: AV23 , SN: 48-158FF3
Acquisition Start Date: 5/20/2018 4:12:39PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 25.12% +/- 0.48% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	4,251.00	70.85
Pu-239	240	5.16	186	249	0.00	5,708.00	95.13
Am-241	284	5.49	249	303	0.00	4,582.00	76.37

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:30:44AM 5/21/2018

Calibration

Sample Name: ICV-9793;AV24-05202018
Description:
Detector: AV24

Calibration Date: 5/21/2018 10:30:40AM
Analyst: 60040

Source Info

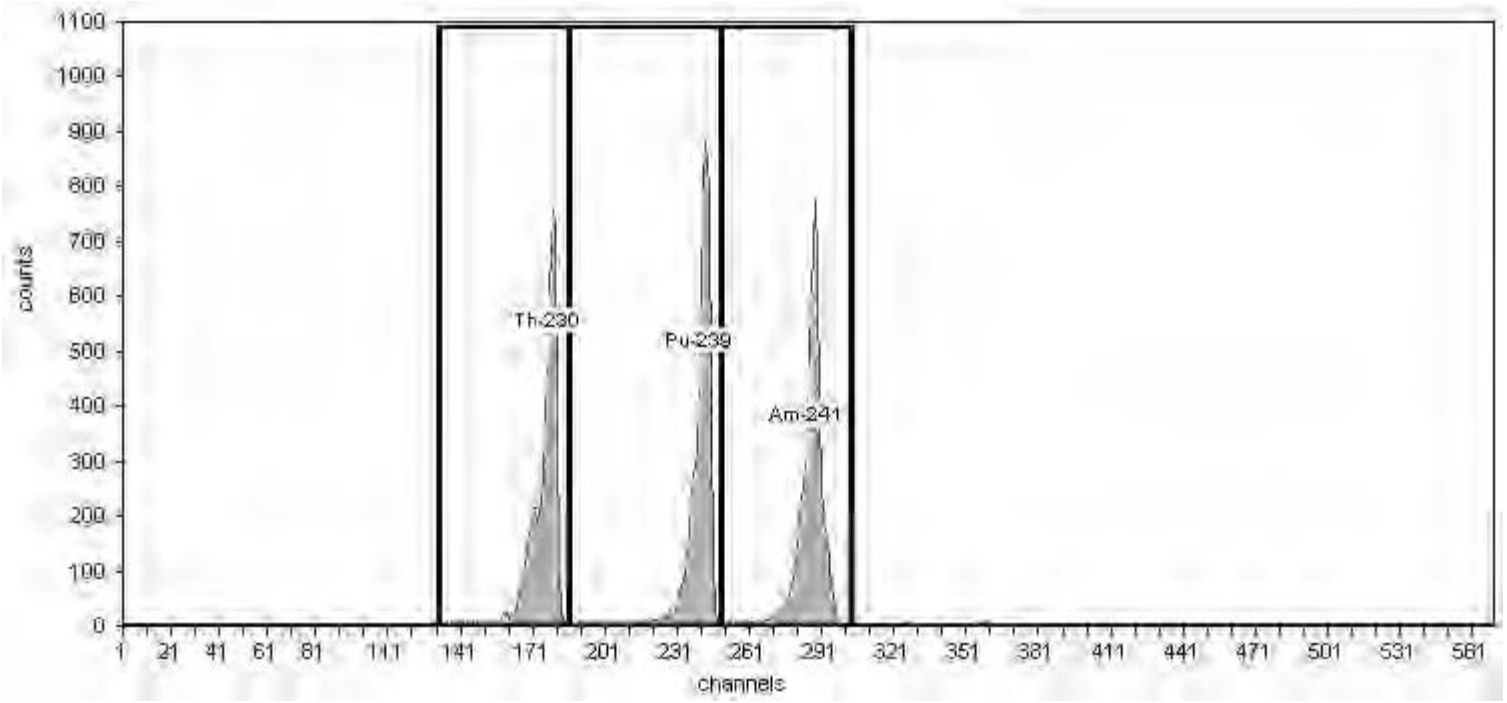
Certificate ID: 82241-334
Prepared by: Analytics

Certification Date: 6/8/2010 12:00:00PM
Description:

Acquisition

Detector: AV24 , SN: 47-137Q4
Acquisition Start Date: 5/20/2018 4:12:51PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 22.77% +/- 0.40% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,356.00	89.27
Pu-239	240	5.16	186	249	0.00	5,558.00	92.63
Am-241	284	5.49	249	303	0.00	5,475.00	91.25

Monthly Calibration Verifications

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:55:26AM 7/11/2018

Calibration

Sample Name: CCV-1370620;AV16-07102018
Description:
Detector: AV16

Calibration Date: 7/11/2018 10:55:23AM
Analyst: 60040

Source Info

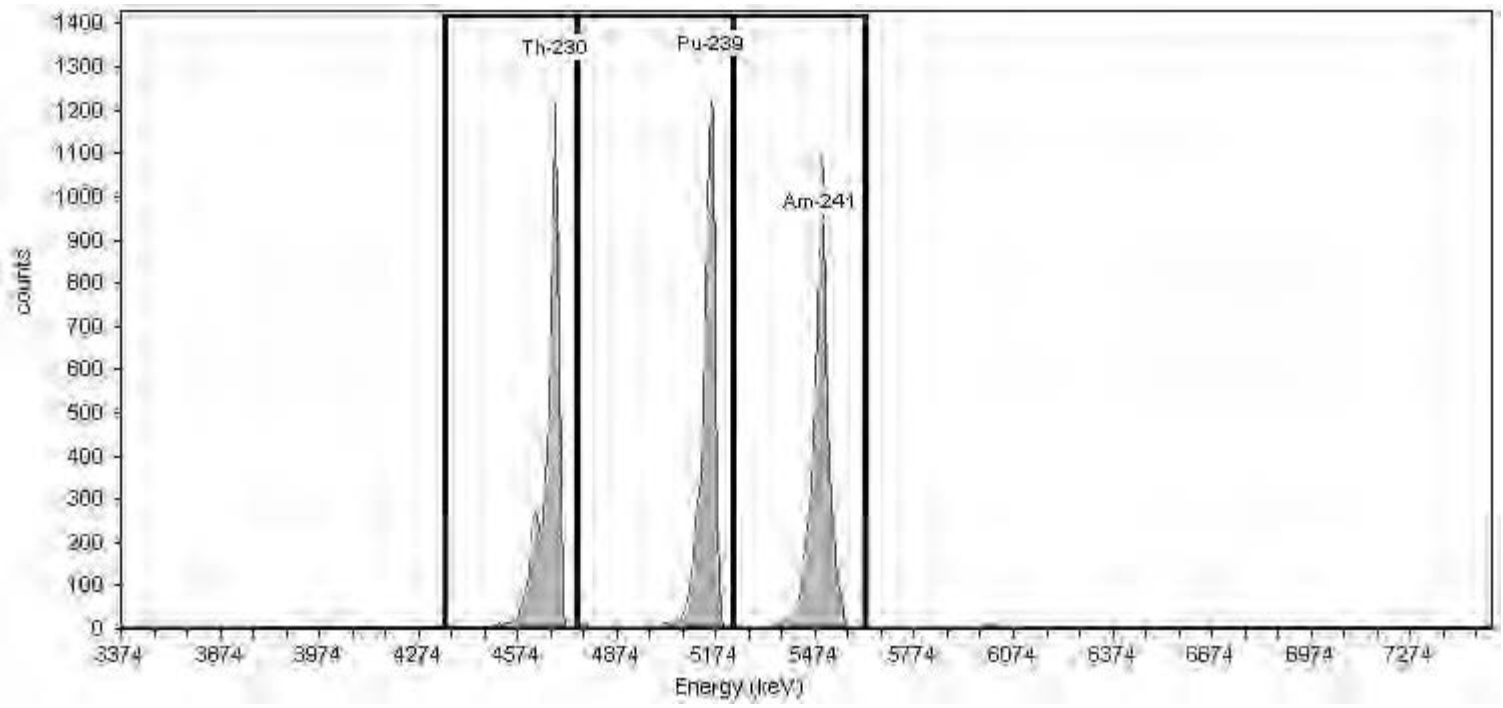
Certificate ID: 108348_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/23/2018 11:00:00PM
Description:

Acquisition

Detector: AV16 , SN: 51-082B6
Acquisition Start Date: 7/10/2018 5:04:30PM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 27.02% +/- 0.37% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,824.00	113.73
Pu-239	240	5.16	186	249	0.00	6,902.00	115.03
Am-241	284	5.49	249	303	0.00	7,214.00	120.23

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:27:08PM 7/11/2018

Calibration

Sample Name: CCV-7107;AV17-07112018
Description:
Detector: AV17

Calibration Date: 7/11/2018 12:27:05PM
Analyst: 60040

Source Info

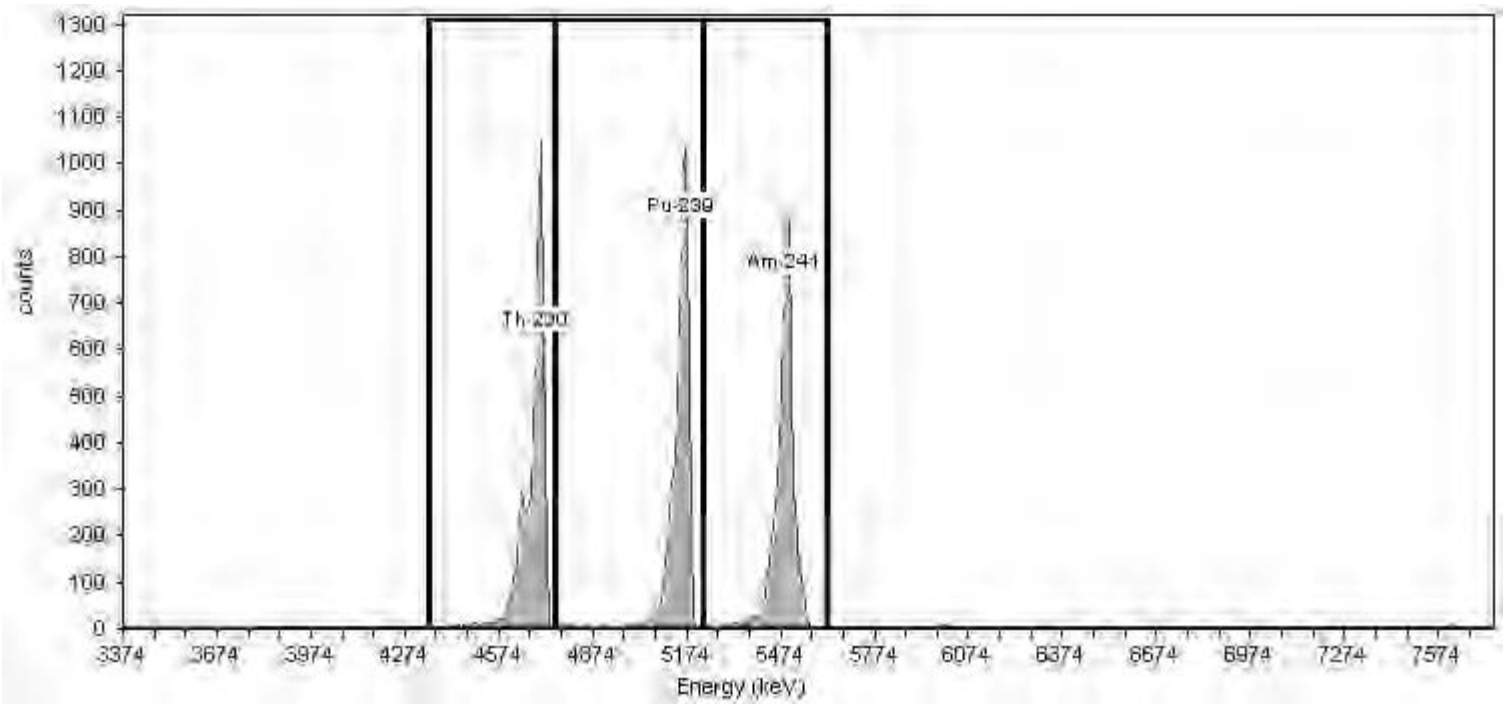
Certificate ID: 82232-334
Prepared by: Analytics

Certification Date: 6/3/2010 12:00:00PM
Description:

Acquisition

Detector: AV17 , SN: 50-051C4
Acquisition Start Date: 7/11/2018 11:07:59AM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 24.16% +/- 0.39% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,600.00	110.00
Pu-239	240	5.16	186	249	0.00	6,322.00	105.37
Am-241	284	5.49	249	303	0.00	6,185.00	103.08

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:27:32PM 7/11/2018

Calibration

Sample Name: CCV-8877;AV19-07112018
Description:
Detector: AV19

Calibration Date: 7/11/2018 12:27:29PM
Analyst: 60040

Source Info

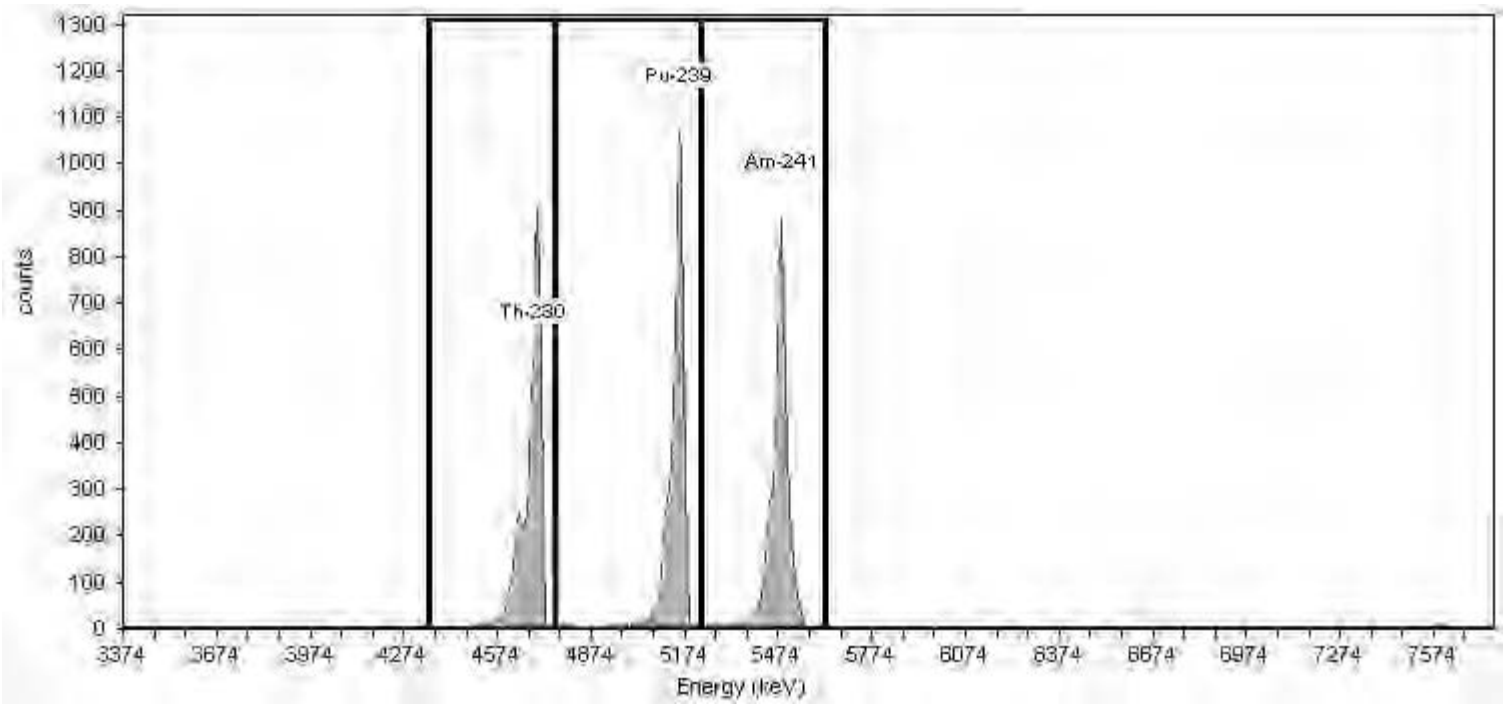
Certificate ID: 82236-334
Prepared by: Analytics

Certification Date: 6/2/2010 12:00:00PM
Description:

Acquisition

Detector: AV19 , SN: 50-025FF5
Acquisition Start Date: 7/11/2018 11:08:20AM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 23.61% +/- 0.40% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,681.00	94.68
Pu-239	240	5.16	186	249	0.00	6,119.00	101.98
Am-241	284	5.49	249	303	0.00	5,772.00	96.20

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:27:45PM 7/11/2018

Calibration

Sample Name: CCV-9520;AV20-07112018
Description:
Detector: AV20

Calibration Date: 7/11/2018 12:27:41PM
Analyst: 60040

Source Info

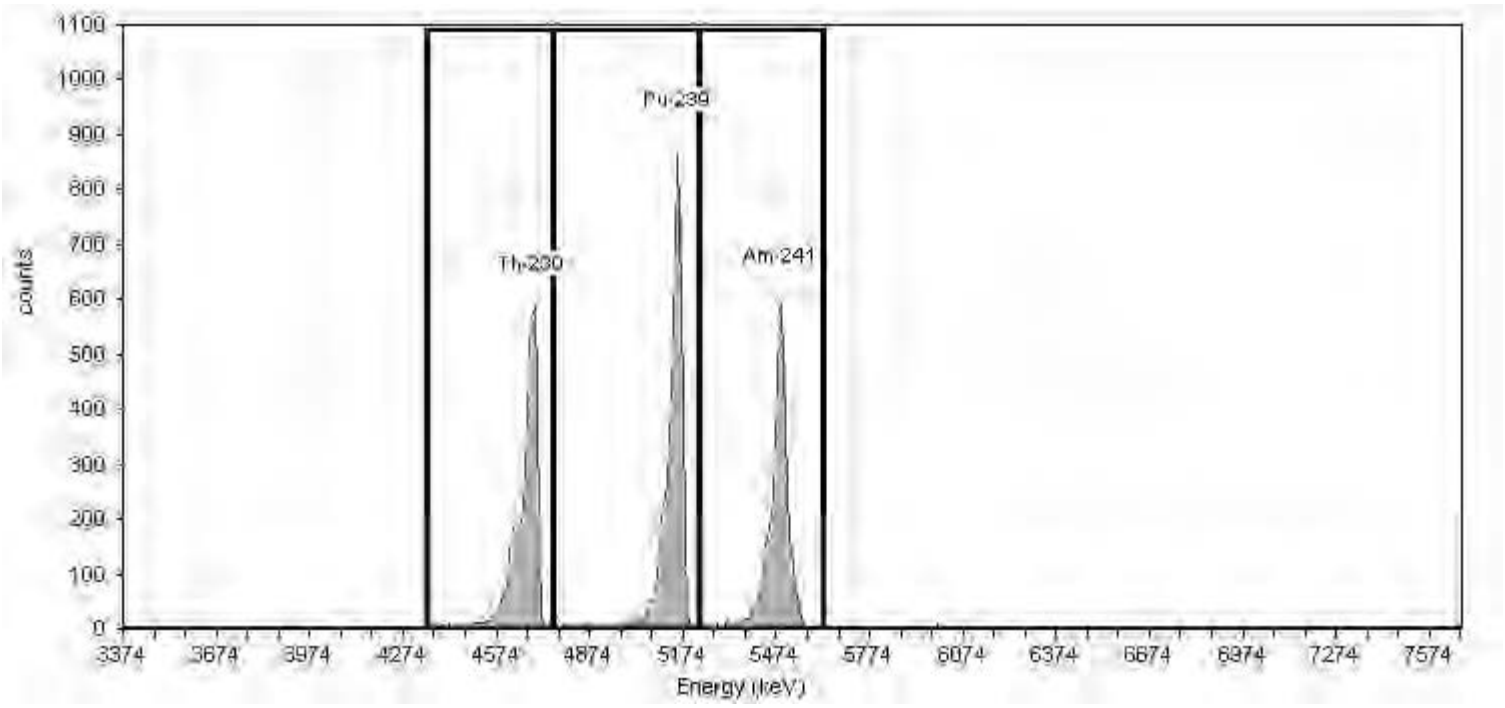
Certificate ID: 82237-334
Prepared by: Analytics

Certification Date: 6/1/2010 12:00:00PM
Description:

Acquisition

Detector: AV20 , SN: 48-121A7
Acquisition Start Date: 7/11/2018 11:08:38AM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 22.42% +/- 0.43% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	4,551.00	75.85
Pu-239	240	5.16	186	249	0.00	5,432.00	90.53
Am-241	284	5.49	249	303	0.00	4,410.00	73.50

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:27:58PM 7/11/2018

Calibration

Sample Name: CCV-9792;AV21-07112018
Description:
Detector: AV21

Calibration Date: 7/11/2018 12:27:54PM
Analyst: 60040

Source Info

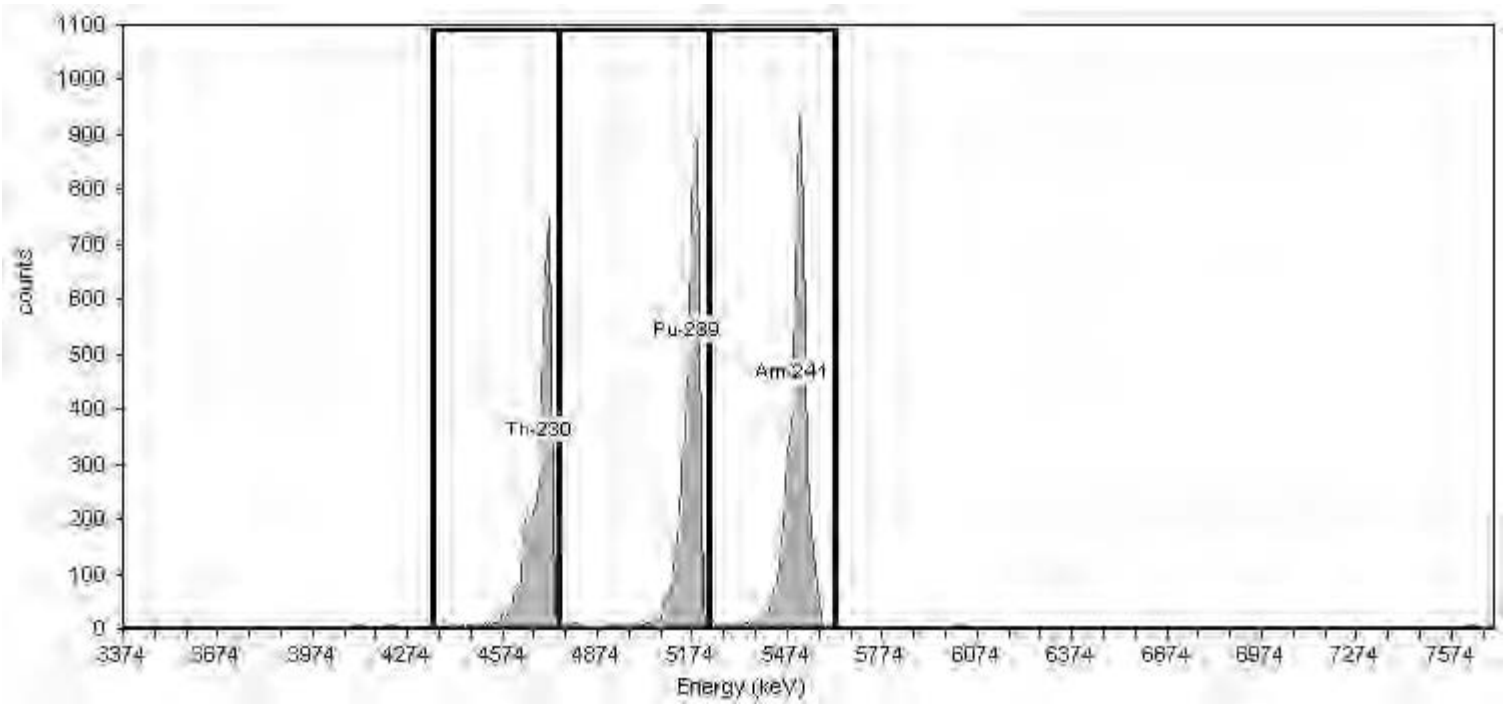
Certificate ID: 82240-334
Prepared by: Analytics

Certification Date: 6/8/2010 12:00:00PM
Description:

Acquisition

Detector: AV21 , SN: 48-102BB6
Acquisition Start Date: 7/11/2018 11:08:55AM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 23.20% +/- 0.38% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,224.00	87.07
Pu-239	240	5.16	186	249	0.00	6,035.00	100.58
Am-241	284	5.49	249	303	0.00	6,830.00	113.83

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:28:24PM 7/11/2018

Calibration

Sample Name: CCV-9795;AV23-07112018
Description:
Detector: AV23

Calibration Date: 7/11/2018 12:28:19PM
Analyst: 60040

Source Info

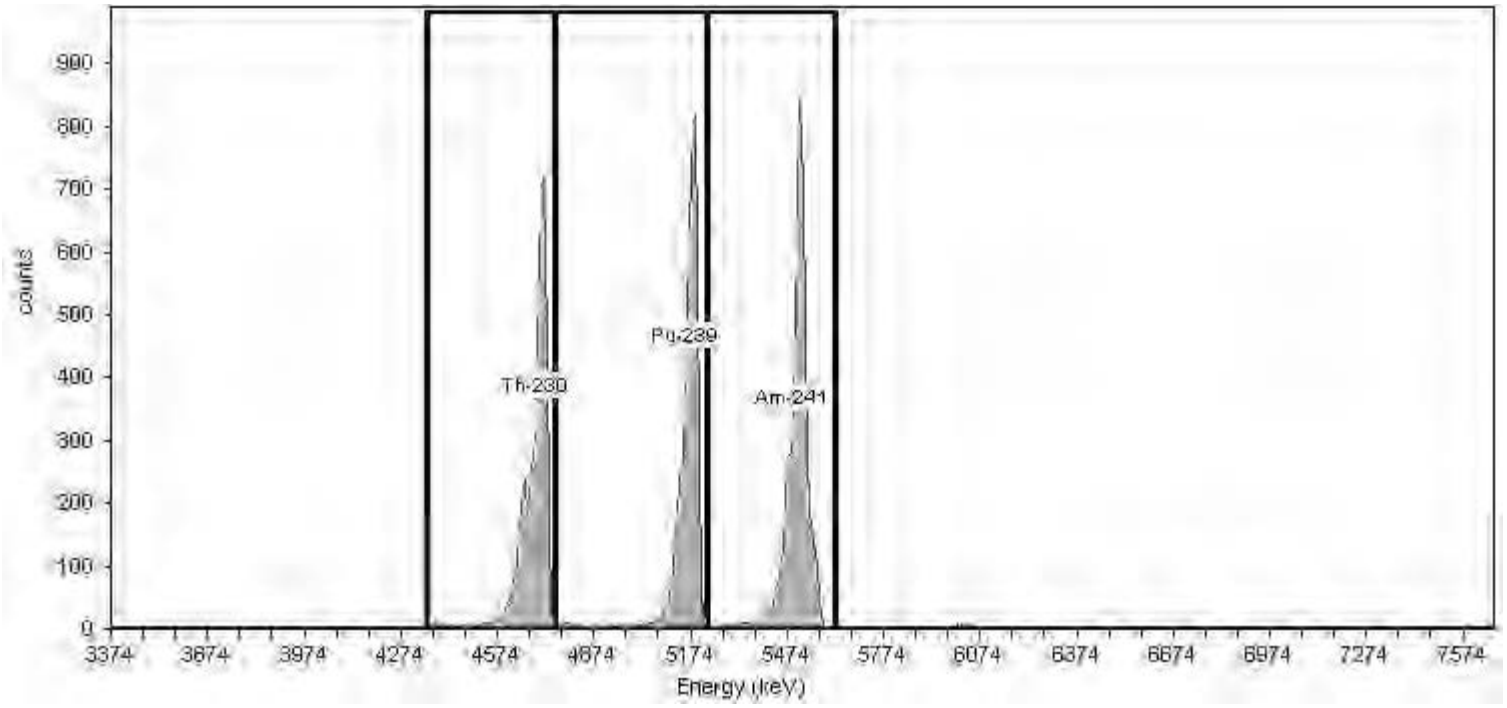
Certificate ID: 82243-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV23 , SN: 48-158FF3
Acquisition Start Date: 7/11/2018 11:09:23AM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 24.63% +/- 0.44% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,108.00	85.13
Pu-239	240	5.16	186	249	0.00	5,296.00	88.27
Am-241	284	5.49	249	303	0.00	5,687.00	94.78

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:28:45PM 7/11/2018

Calibration

Sample Name: CCV-9817;AV24-07112018
Description:
Detector: AV24

Calibration Date: 7/11/2018 12:28:40PM
Analyst: 60040

Source Info

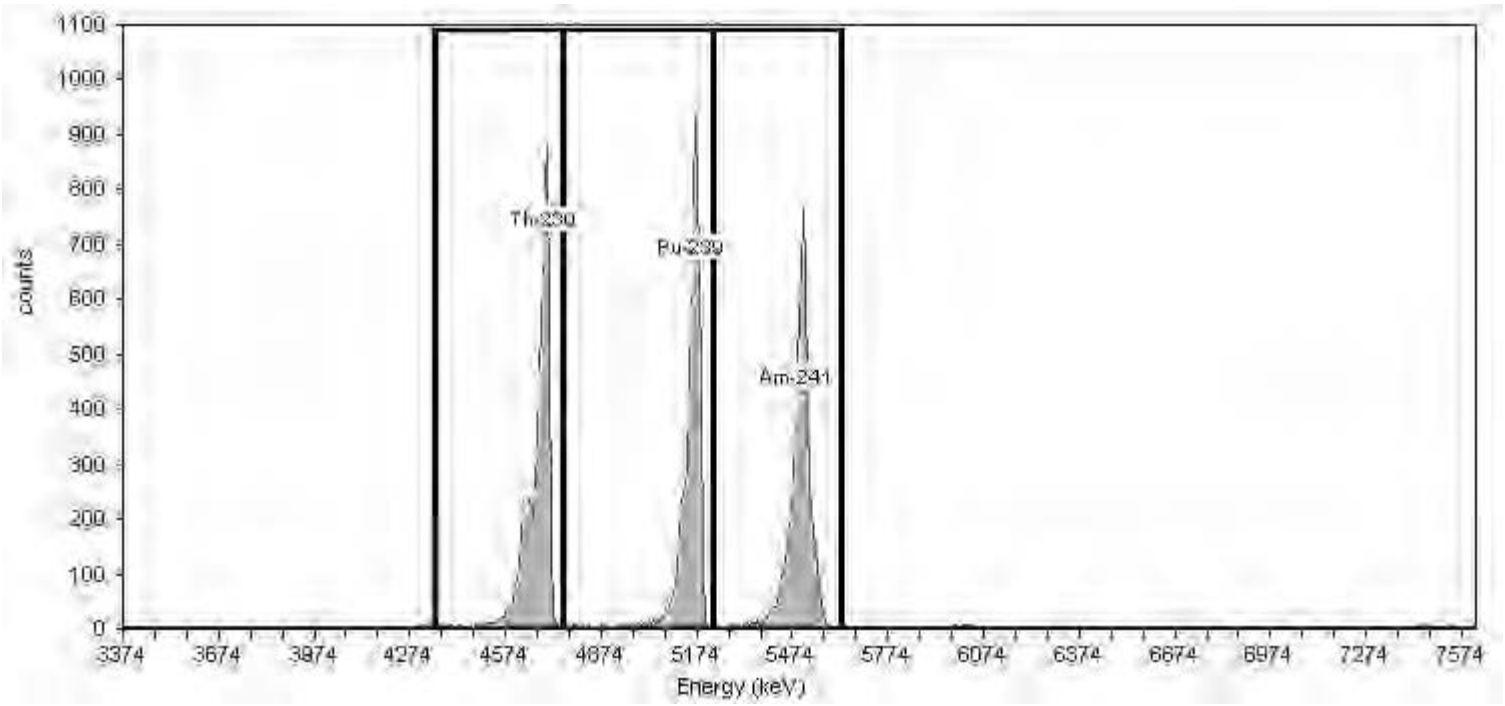
Certificate ID: 82244-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV24 , SN: 47-137Q4
Acquisition Start Date: 7/11/2018 11:09:36AM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 22.14% +/- 0.38% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,856.00	97.60
Pu-239	240	5.16	186	249	0.00	5,391.00	89.85
Am-241	284	5.49	249	303	0.00	5,400.00	90.00

Monthly Backgrounds

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:58:14AM 7/13/2018

Sample

Sample Name: ICB;AV16
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

Analyst: 60040

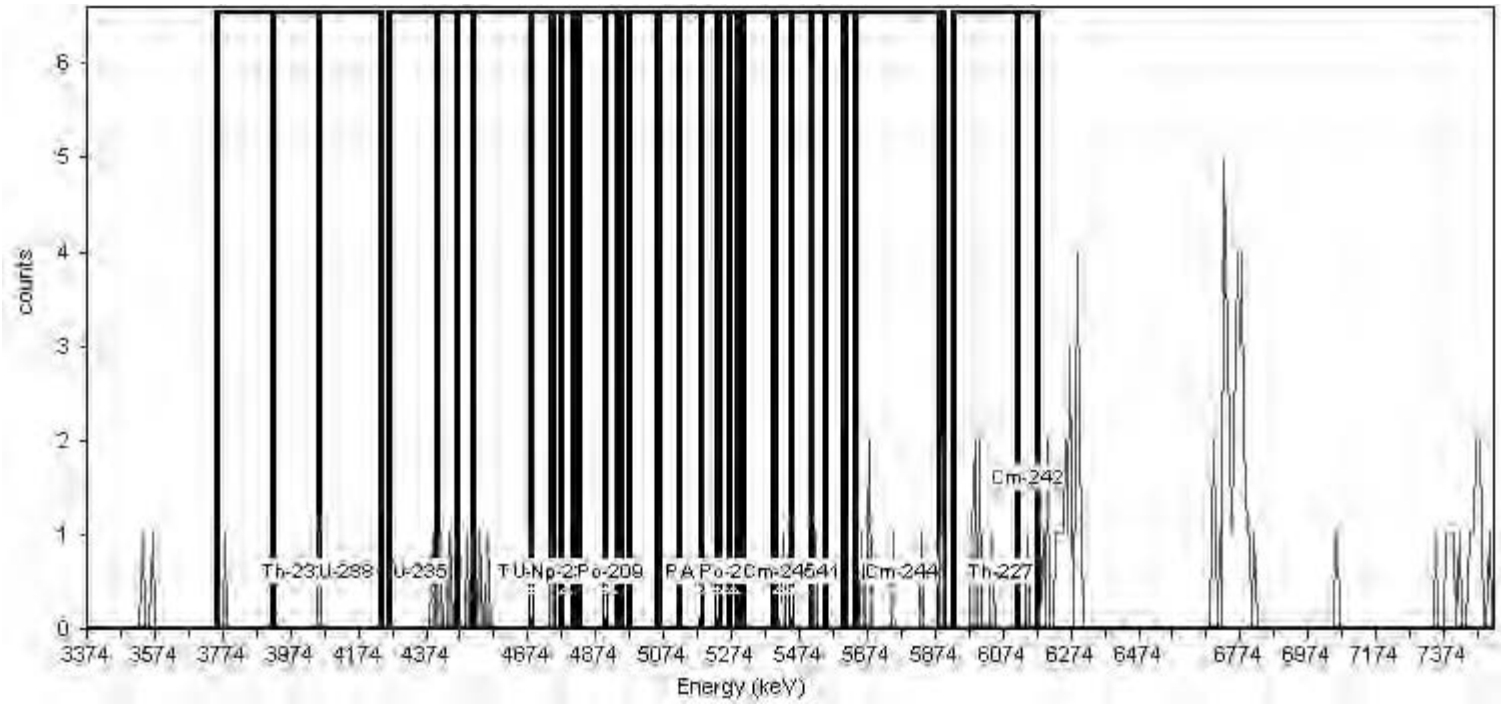
Acquisition

Detector: AV16 , SN: 51-082B6
Acquisition Start Date: 7/12/2018 1:39:32PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Calibration Name: IC-137620;AV16-05142018
Calibration Date: 5/14/2018 6:28:17PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 26.96% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 98.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-230	4.68	4.40	4.75	6.00	6.250E-003	2.756E-003
U-234	4.71	4.51	4.82	3.00	3.125E-003	2.083E-003
Pu-242	4.90	4.68	4.95	1.00	1.042E-003	1.473E-003
Th-229	4.86	4.74	5.12	1.00	1.042E-003	1.473E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	0.00	0.000E+000	1.473E-003
Am-243	5.23	5.05	5.31	0.00	0.000E+000	1.473E-003
U-232	5.25	5.06	5.40	0.00	0.000E+000	1.473E-003
Th-228	5.45	5.19	5.51	1.00	1.042E-003	1.473E-003
Po-210	5.28	5.23	5.29	0.00	0.000E+000	1.473E-003
Pu-238	5.47	5.27	5.55	2.00	2.083E-003	1.804E-003
Am-241	5.48	5.30	5.60	2.00	2.083E-003	1.804E-003
Cm-245	5.42	5.40	5.45	1.00	1.042E-003	1.473E-003
Pu-236	5.76	5.61	5.89	5.00	5.208E-003	2.552E-003
Cm-244	5.78	5.64	5.90	7.00	7.292E-003	2.946E-003
Th-227	6.07	5.93	6.18	7.00	7.292E-003	2.946E-003
Cm-242	6.15	6.12	6.18	1.00	1.042E-003	1.473E-003
Th-232	3.99	3.75	4.05	2.00	2.083E-003	1.804E-003
U-238	4.14	3.92	4.24	1.00	1.042E-003	1.473E-003
U-235	4.36	4.26	4.46	3.00	3.125E-003	2.083E-003

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
4:13:59AM 7/14/2018

Sample

Sample Name: ICB;AV17
Comment:

Spectrum #2 Analysis #1

Batch

Batch Name: July2018
Description:

Analyst: 60040

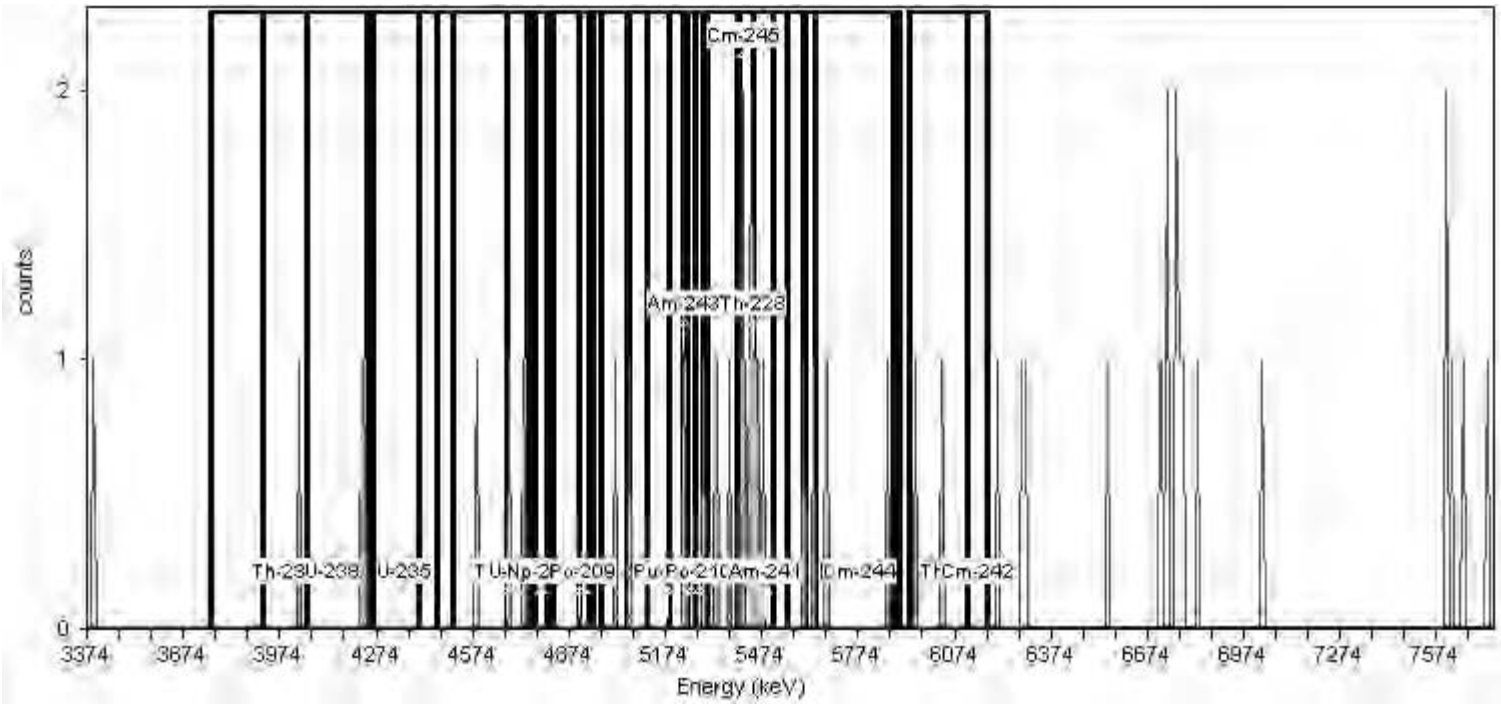
Acquisition

Detector: AV17 , SN: 50-051C4
Acquisition Start Date: 7/13/2018 12:11:23PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Calibration Name: IC-7107;AV17-05142018a
Calibration Date: 5/15/2018 12:29:12PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.09% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 52.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	1.00	1.042E-003	1.473E-003
U-238	4.14	3.92	4.24	3.00	3.125E-003	2.083E-003
U-235	4.36	4.26	4.46	0.00	0.000E+000	1.473E-003
Th-230	4.68	4.40	4.75	3.00	3.125E-003	2.083E-003
U-234	4.71	4.51	4.82	3.00	3.125E-003	2.083E-003
Pu-242	4.90	4.68	4.95	2.00	2.083E-003	1.804E-003
Th-229	4.86	4.74	5.12	2.00	2.083E-003	1.804E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	3.00	3.125E-003	2.083E-003
Am-243	5.23	5.05	5.31	3.00	3.125E-003	2.083E-003
U-232	5.25	5.06	5.40	6.00	6.250E-003	2.756E-003
Th-228	5.45	5.19	5.51	15.00	1.563E-002	4.167E-003
Po-210	5.28	5.23	5.29	2.00	2.083E-003	1.804E-003
Pu-238	5.47	5.27	5.55	14.00	1.458E-002	4.034E-003
Am-241	5.48	5.30	5.60	14.00	1.458E-002	4.034E-003
Cm-245	5.42	5.40	5.45	7.00	7.292E-003	2.946E-003
Pu-236	5.76	5.61	5.89	4.00	4.167E-003	2.329E-003
Cm-244	5.78	5.64	5.90	3.00	3.125E-003	2.083E-003
Th-227	6.07	5.93	6.18	2.00	2.083E-003	1.804E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:58:34AM 7/13/2018

Sample

Sample Name: ICB;AV19
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

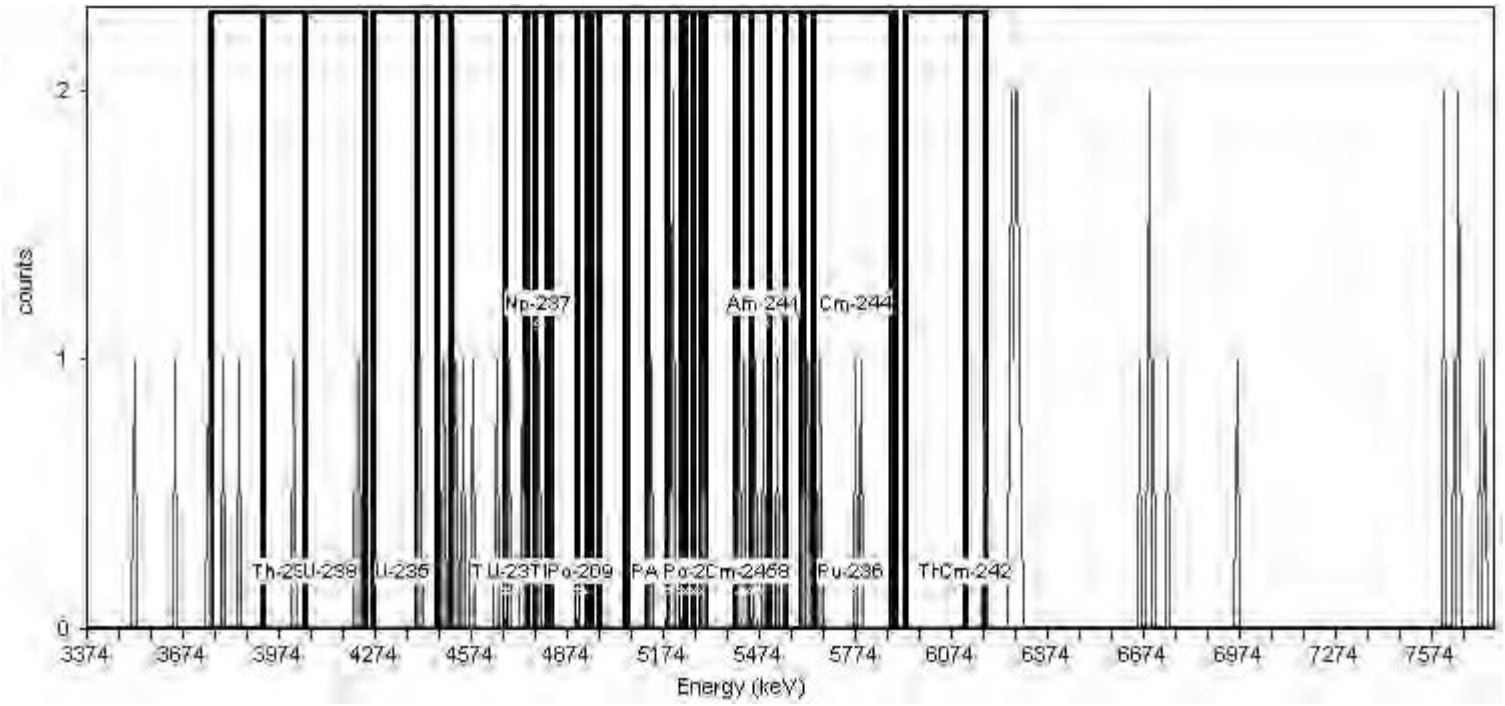
Analyst: 60040

Acquisition

Detector: AV19 , SN: 50-025FF5
Acquisition Start Date: 7/12/2018 1:39:36PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-8877;AV19-05142018
Calibration Date: 5/15/2018 12:27:55PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 23.60% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 53.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-230	4.68	4.40	4.75	8.00	8.333E-003	3.125E-003
U-234	4.71	4.51	4.82	7.00	7.292E-003	2.946E-003
Pu-242	4.90	4.68	4.95	3.00	3.125E-003	2.083E-003
Th-229	4.86	4.74	5.12	1.00	1.042E-003	1.473E-003
Np-237	4.78	4.77	4.81	1.00	1.042E-003	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	3.00	3.125E-003	2.083E-003
Th-232	3.99	3.75	4.05	3.00	3.125E-003	2.083E-003
U-238	4.14	3.92	4.24	3.00	3.125E-003	2.083E-003
U-235	4.36	4.26	4.46	1.00	1.042E-003	1.473E-003
Am-243	5.23	5.05	5.31	4.00	4.167E-003	2.329E-003
U-232	5.25	5.06	5.40	4.00	4.167E-003	2.329E-003
Th-228	5.45	5.19	5.51	7.00	7.292E-003	2.946E-003
Po-210	5.28	5.23	5.29	0.00	0.000E+000	1.473E-003
Pu-238	5.47	5.27	5.55	6.00	6.250E-003	2.756E-003
Am-241	5.48	5.30	5.60	6.00	6.250E-003	2.756E-003
Cm-245	5.42	5.40	5.45	2.00	2.083E-003	1.804E-003
Pu-236	5.76	5.61	5.89	5.00	5.208E-003	2.552E-003
Cm-244	5.78	5.64	5.90	3.00	3.125E-003	2.083E-003
Th-227	6.07	5.93	6.18	1.00	1.042E-003	1.473E-003
Cm-242	6.15	6.12	6.18	1.00	1.042E-003	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:58:43AM 7/13/2018

Sample

Sample Name: ICB;AV20
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

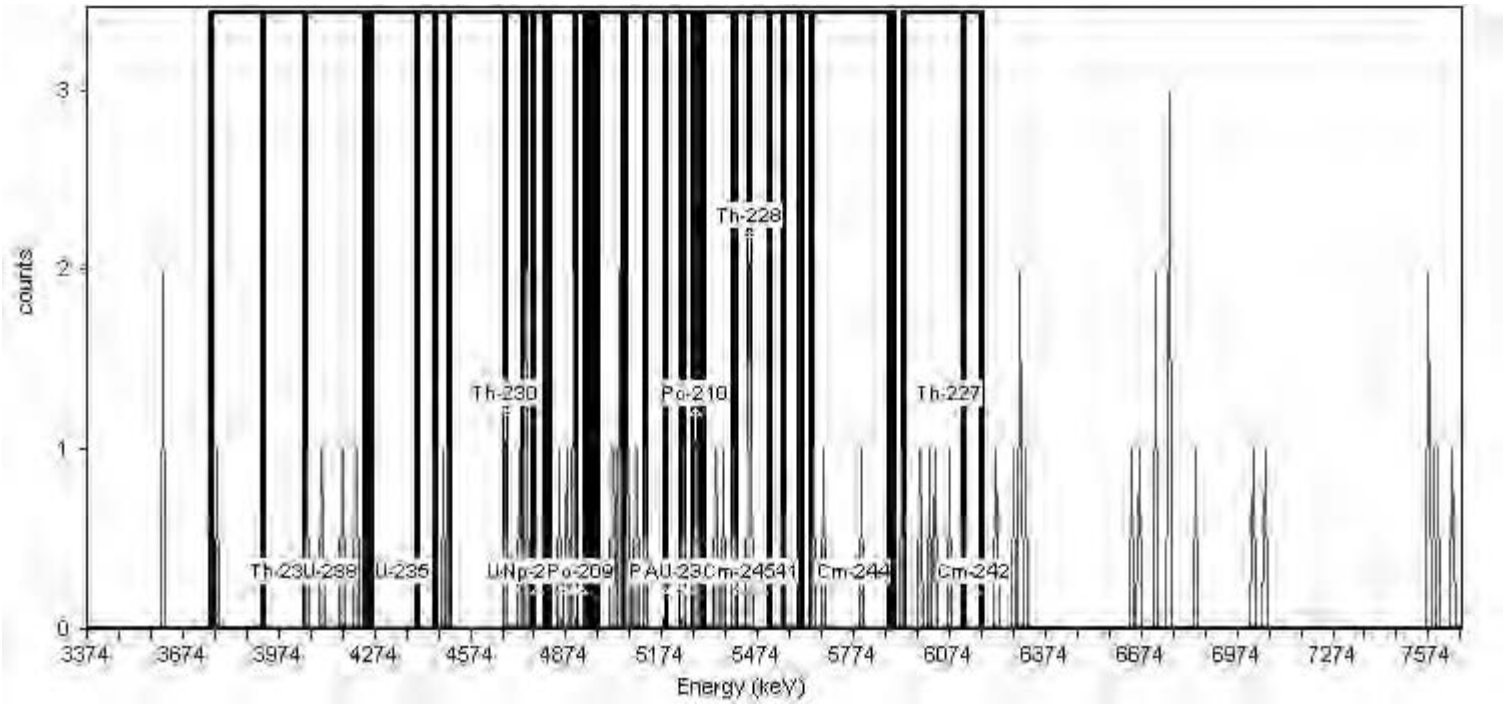
Analyst: 60040

Acquisition

Detector: AV20 , SN: 48-121A7
Acquisition Start Date: 7/12/2018 1:39:38PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-9520;AV20-05142018
Calibration Date: 5/15/2018 12:28:08PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 22.15% +/- 0.32% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 66.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	1.00	1.042E-003	1.473E-003
U-238	4.14	3.92	4.24	6.00	6.250E-003	2.756E-003
U-235	4.36	4.26	4.46	0.00	0.000E+000	1.473E-003
Th-230	4.68	4.40	4.75	6.00	6.250E-003	2.756E-003
U-234	4.71	4.51	4.82	4.00	4.167E-003	2.329E-003
Pu-242	4.90	4.68	4.95	8.00	8.333E-003	3.125E-003
Th-229	4.86	4.74	5.12	14.00	1.458E-002	4.034E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	9.00	9.375E-003	3.294E-003
Am-243	5.23	5.05	5.31	7.00	7.292E-003	2.946E-003
U-232	5.25	5.06	5.40	10.00	1.042E-002	3.455E-003
Th-228	5.45	5.19	5.51	10.00	1.042E-002	3.455E-003
Po-210	5.28	5.23	5.29	3.00	3.125E-003	2.083E-003
Pu-238	5.47	5.27	5.55	9.00	9.375E-003	3.294E-003
Am-241	5.48	5.30	5.60	7.00	7.292E-003	2.946E-003
Cm-245	5.42	5.40	5.45	4.00	4.167E-003	2.329E-003
Pu-236	5.76	5.61	5.89	3.00	3.125E-003	2.083E-003
Cm-244	5.78	5.64	5.90	3.00	3.125E-003	2.083E-003
Th-227	6.07	5.93	6.18	4.00	4.167E-003	2.329E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:58:52AM 7/13/2018

Sample

Sample Name: ICB;AV21
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

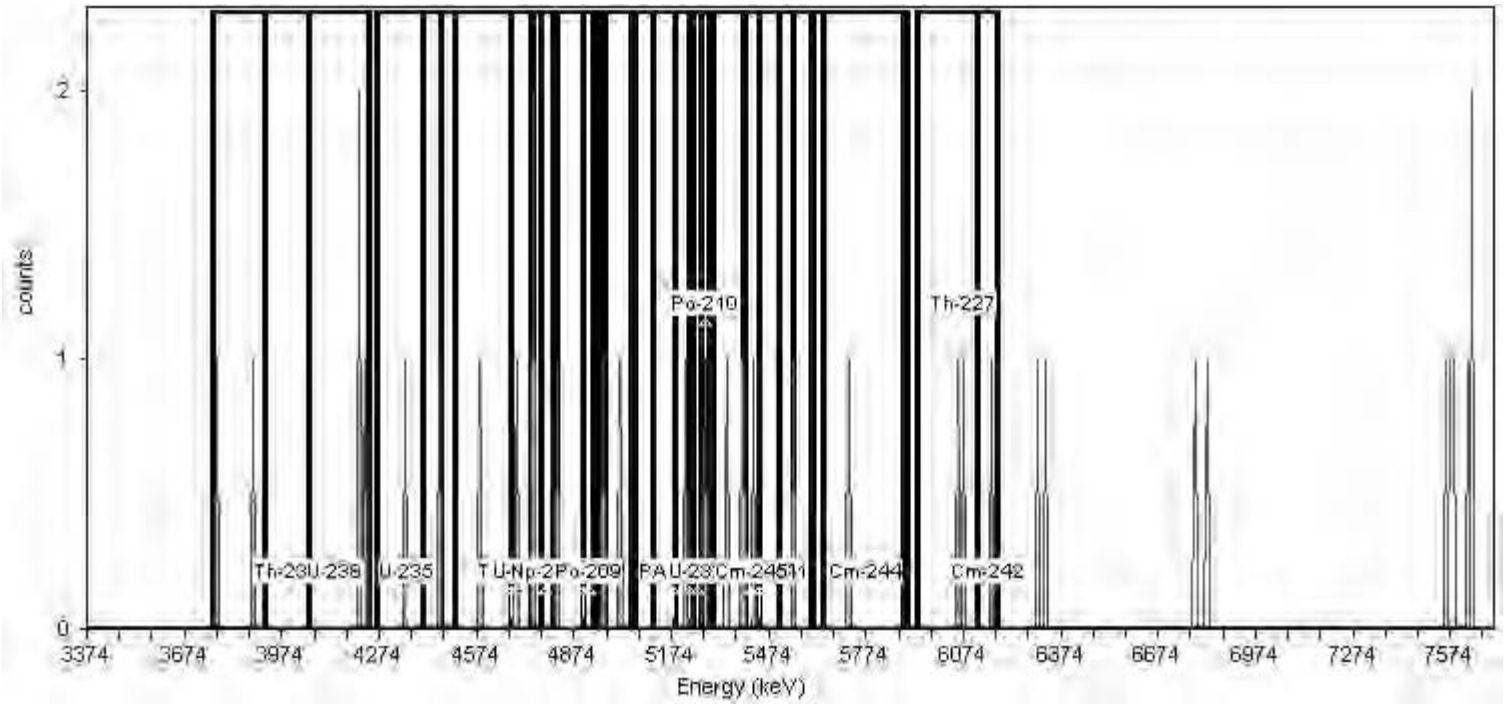
Analyst: 60040

Acquisition

Detector: AV21 , SN: 48-102BB6
Acquisition Start Date: 7/12/2018 1:39:41PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-9792;AV21-05142018
Calibration Date: 5/15/2018 12:28:21PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 23.43% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 36.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	2.00	2.083E-003	1.804E-003
U-238	4.14	3.92	4.24	3.00	3.125E-003	2.083E-003
U-235	4.36	4.26	4.46	2.00	2.083E-003	1.804E-003
Th-230	4.68	4.40	4.75	5.00	5.208E-003	2.552E-003
U-234	4.71	4.51	4.82	5.00	5.208E-003	2.552E-003
Pu-242	4.90	4.68	4.95	4.00	4.167E-003	2.329E-003
Th-229	4.86	4.74	5.12	5.00	5.208E-003	2.552E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	2.00	2.083E-003	1.804E-003
Am-243	5.23	5.05	5.31	2.00	2.083E-003	1.804E-003
U-232	5.25	5.06	5.40	5.00	5.208E-003	2.552E-003
Th-228	5.45	5.19	5.51	6.00	6.250E-003	2.756E-003
Po-210	5.28	5.23	5.29	1.00	1.042E-003	1.473E-003
Pu-238	5.47	5.27	5.55	6.00	6.250E-003	2.756E-003
Am-241	5.48	5.30	5.60	5.00	5.208E-003	2.552E-003
Cm-245	5.42	5.40	5.45	2.00	2.083E-003	1.804E-003
Pu-236	5.76	5.61	5.89	2.00	2.083E-003	1.804E-003
Cm-244	5.78	5.64	5.90	2.00	2.083E-003	1.804E-003
Th-227	6.07	5.93	6.18	3.00	3.125E-003	2.083E-003
Cm-242	6.15	6.12	6.18	1.00	1.042E-003	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:59:17AM 7/13/2018

Sample

Sample Name: ICB;AV23
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

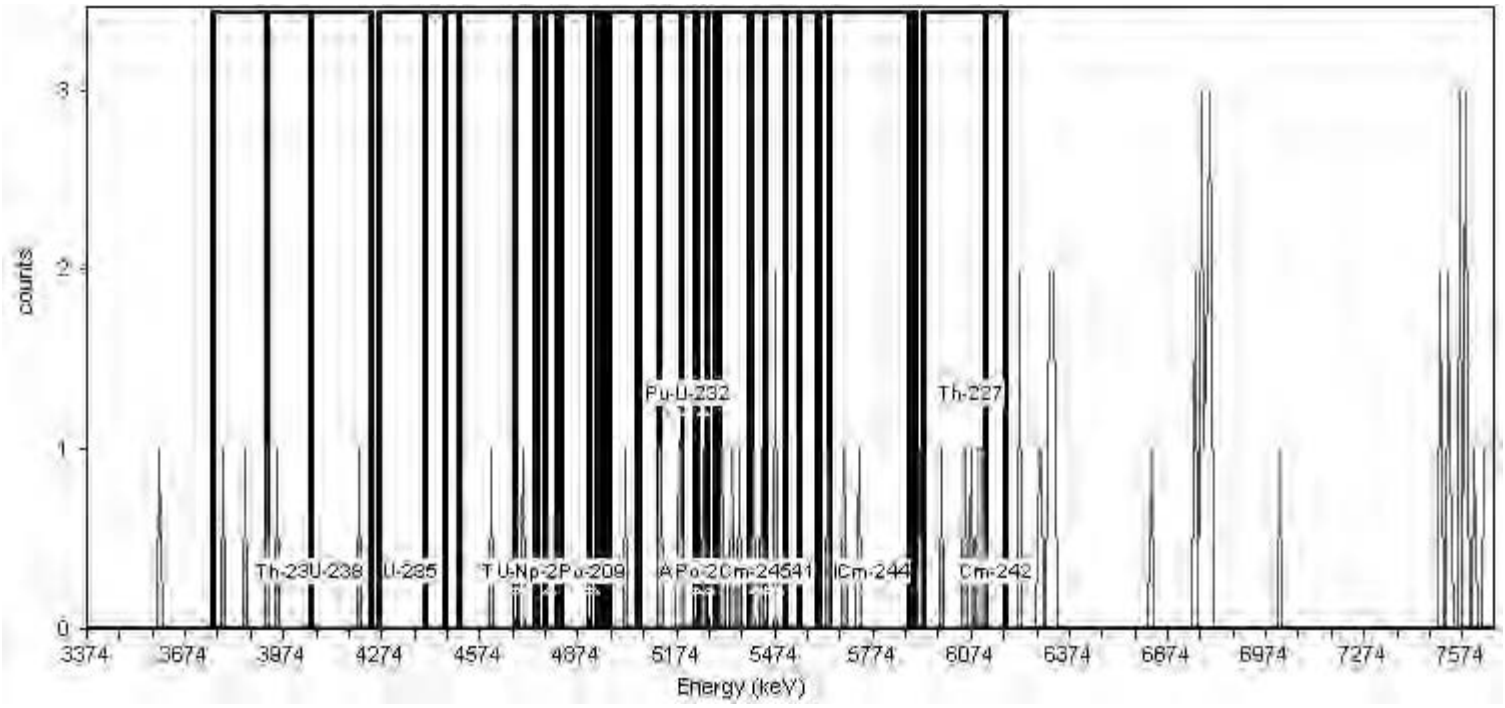
Analyst: 60040

Acquisition

Detector: AV23 , SN: 48-158FF3
Acquisition Start Date: 7/12/2018 1:39:44PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-9795;AV23-05142018
Calibration Date: 5/15/2018 12:28:43PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.46% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 76.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-230	4.68	4.40	4.75	2.00	2.083E-003	1.804E-003
U-234	4.71	4.51	4.82	2.00	2.083E-003	1.804E-003
Pu-242	4.90	4.68	4.95	1.00	1.042E-003	1.473E-003
Th-229	4.86	4.74	5.12	2.00	2.083E-003	1.804E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	5.00	5.208E-003	2.552E-003
Am-243	5.23	5.05	5.31	5.00	5.208E-003	2.552E-003
U-232	5.25	5.06	5.40	8.00	8.333E-003	3.125E-003
Th-228	5.45	5.19	5.51	9.00	9.375E-003	3.294E-003
Po-210	5.28	5.23	5.29	1.00	1.042E-003	1.473E-003
Pu-238	5.47	5.27	5.55	7.00	7.292E-003	2.946E-003
Am-241	5.48	5.30	5.60	7.00	7.292E-003	2.946E-003
Cm-245	5.42	5.40	5.45	2.00	2.083E-003	1.804E-003
Th-232	3.99	3.75	4.05	4.00	4.167E-003	2.329E-003
U-238	4.14	3.92	4.24	3.00	3.125E-003	2.083E-003
U-235	4.36	4.26	4.46	0.00	0.000E+000	1.473E-003
Pu-236	5.76	5.61	5.89	3.00	3.125E-003	2.083E-003
Cm-244	5.78	5.64	5.90	2.00	2.083E-003	1.804E-003
Th-227	6.07	5.93	6.18	7.00	7.292E-003	2.946E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:59:26AM 7/13/2018

Sample

Sample Name: ICB;AV24
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

Analyst: 60040

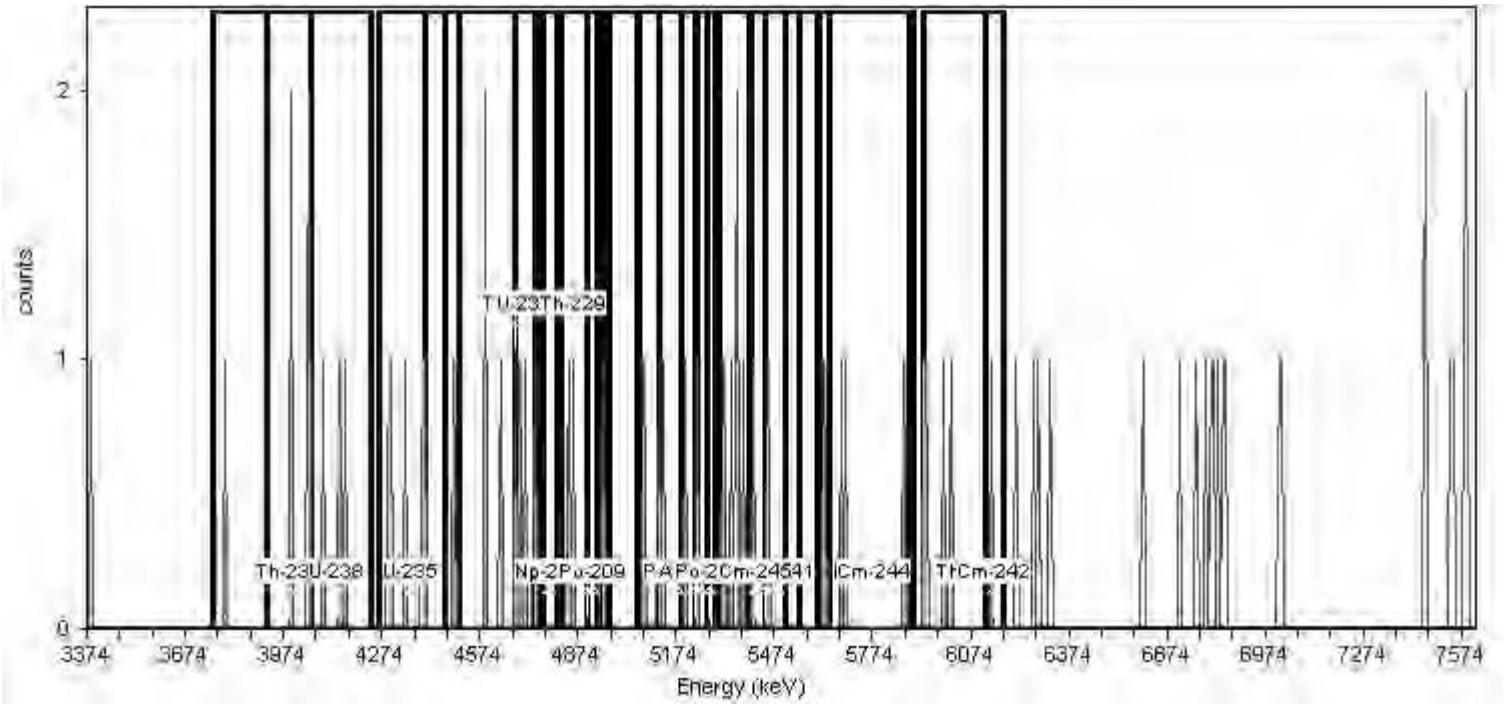
Acquisition

Detector: AV24 , SN: 47-137Q4
Acquisition Start Date: 7/12/2018 1:39:46PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-9817;AV24-05142018
Calibration Date: 5/15/2018 12:28:57PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 22.21% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 69.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	5.00	5.208E-003	2.552E-003
U-238	4.14	3.92	4.24	7.00	7.292E-003	2.946E-003
U-235	4.36	4.26	4.46	5.00	5.208E-003	2.552E-003
Th-230	4.68	4.40	4.75	9.00	9.375E-003	3.294E-003
U-234	4.71	4.51	4.82	7.00	7.292E-003	2.946E-003
Pu-242	4.90	4.68	4.95	7.00	7.292E-003	2.946E-003
Th-229	4.86	4.74	5.12	6.00	6.250E-003	2.756E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	5.00	5.208E-003	2.552E-003
Am-243	5.23	5.05	5.31	5.00	5.208E-003	2.552E-003
U-232	5.25	5.06	5.40	10.00	1.042E-002	3.455E-003
Th-228	5.45	5.19	5.51	9.00	9.375E-003	3.294E-003
Po-210	5.28	5.23	5.29	1.00	1.042E-003	1.473E-003
Pu-238	5.47	5.27	5.55	7.00	7.292E-003	2.946E-003
Am-241	5.48	5.30	5.60	7.00	7.292E-003	2.946E-003
Cm-245	5.42	5.40	5.45	1.00	1.042E-003	1.473E-003
Pu-236	5.76	5.61	5.89	4.00	4.167E-003	2.329E-003
Cm-244	5.78	5.64	5.90	3.00	3.125E-003	2.083E-003
Th-227	6.07	5.93	6.18	5.00	5.208E-003	2.552E-003
Cm-242	6.15	6.12	6.18	1.00	1.042E-003	1.473E-003

Run Logs

Alpha Spectroscopy Run Log

Detector: AV16

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 15:59	140	IC 160-371837/1		371837			RTM
05/18/18 19:35	60	ICV 160-371940/1		371940			PS
07/10/18 17:04	60	CCV 160-375341/1		375341			PS
07/12/18 13:39	960	ICB 160-375473/1		375473			PS
07/30/18 10:50	1	PULSER 160-379233/1		379233			ALS
07/30/18 16:53	180	MB 160-375260/1-A		379233	375260	A-01-R	ALS

Detector: AV17

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 18:47	140	IC 160-371838/1		371838			PS
05/20/18 16:10	60	ICV 160-371950/1		371950			PS
07/11/18 11:07	60	CCV 160-375374/1		375374			PS
07/13/18 12:11	960	ICB 160-375877/1		375877			PS
07/30/18 10:50	1	PULSER 160-379234/1		379234			ALS
07/30/18 16:53	180	LCS 160-375260/2-A		379234	375260	A-01-R	ALS

Detector: AV19

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 18:35	140	IC 160-371840/1		371840			PS
05/20/18 16:11	60	ICV 160-371952/1		371952			PS
07/11/18 11:08	60	CCV 160-375375/1		375375			PS
07/12/18 13:39	960	ICB 160-375475/1		375475			PS
07/30/18 10:50	1	PULSER 160-379235/1		379235			ALS
07/30/18 16:53	180	160-29426-1	GW-ASC-5-070918	379235	375260	A-01-R	ALS

Detector: AV20

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 18:36	140	IC 160-371842/1		371842			PS
05/20/18 16:11	60	ICV 160-371953/1		371953			PS
07/11/18 11:08	60	CCV 160-375376/1		375376			PS
07/12/18 13:39	960	ICB 160-375477/1		375477			PS
07/30/18 10:50	1	PULSER 160-379236/1		379236			ALS
07/30/18 16:53	180	160-29426-1 DU	GW-ASC-5-070918 DU	379236	375260	A-01-R	ALS

Detector: AV21

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 18:36	140	IC 160-371843/1		371843			PS
05/20/18 16:11	60	ICV 160-371954/1		371954			PS
07/11/18 11:08	60	CCV 160-375377/1		375377			PS
07/12/18 13:39	960	ICB 160-375478/1		375478			PS
07/30/18 10:50	1	PULSER 160-379237/1		379237			ALS
07/30/18 16:53	180	160-29426-2	GW-ASC-4-070918	379237	375260	A-01-R	ALS

Detector: AV23

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 18:37	140	IC 160-371845/1		371845			PS
05/20/18 16:12	60	ICV 160-371956/1		371956			PS

Alpha Spectroscopy Run Log

Detector: AV23 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/11/18 11:09	60	CCV 160-375379/1		375379			PS
07/12/18 13:39	960	ICB 160-375480/1		375480			PS
07/30/18 10:50	1	PULSER 160-379238/1		379238			ALS
07/30/18 16:53	180	160-29426-3	GW-ASC-2A-070918	379238	375260	A-01-R	ALS

Detector: AV24

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 18:37	140.003 336588 542	IC 160-371846/1		371846			PS
05/20/18 16:12	60	ICV 160-371957/1		371957			PS
07/11/18 11:09	60	CCV 160-375380/1		375380			PS
07/12/18 13:39	960	ICB 160-375481/1		375481			PS
07/30/18 10:50	1	PULSER 160-379239/1		379239			ALS
07/30/18 16:53	180	160-29426-4	GW-ASC-4-070918-D	379239	375260	A-01-R	ALS

GAS FLOW PROPORTIONAL COUNTER

Method 9315

Radium-226 (GFPC) by Method 9315

Prep Batch: 375093

Preparation, Precipitate Separation (21-Day In-Growth)

Gas Flow Proportional Counter Analysis Detail Report
Prep Batch: 375093

Lab ID: LCS 160-375093/1-A | Analyzed: 08/03/18 07:10 | Decay Corrected: No | Ts: 100
Client ID: | Detector: Blue5 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 2

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-226	9.846	0.590	1.06		pCi/L	1.00	0.107	1129	71	11.290	0.071	0.19496	380133

Carrier	LCS Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03510				g		0.0339	104	40 - 110

Lab ID: LCSD 160-375093/2-A | Analyzed: 08/03/18 07:10 | Decay Corrected: No | Ts: 100
Client ID: | Detector: Blue6 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 2

Analyte	LCSD Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-226	8.755	0.553	0.963		pCi/L	1.00	0.102	1015	64	10.150	0.064	0.19655	380133

Carrier	LCSD Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03520				g		0.0339	104	40 - 110

Lab ID: 160-29426-1 | Analyzed: 08/03/18 07:11 | Decay Corrected: No | Ts: 100
Client ID: GW-ASC-5-070918 | Detector: Blue13 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 2

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-226	0.370	0.131	0.135		pCi/L	1.00	0.104	40	42	0.400	0.042	0.20477	380133

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0284				g		0.0339	83.8	40 - 110

Lab ID: 160-29426-2 | Analyzed: 08/03/18 07:11 | Decay Corrected: No | Ts: 100
Client ID: GW-ASC-4-070918 | Detector: Blue14 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 2

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-226	0.634	0.165	0.175		pCi/L	1.00	0.0959	66	35	0.660	0.035	0.16399	380133

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0361				g		0.0339	106	40 - 110

Gas Flow Proportional Counter Analysis Detail Report
Prep Batch: 375093

Lab ID: 160-29426-3 | Analyzed: 08/03/18 07:12 | Decay Corrected: No | Ts: 100
Client ID: GW-ASC-2A-070918 | Detector: Blue15 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 2

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-226	0.242	0.106	0.108		pCi/L	1.00	0.0958	28	37	0.280	0.037	0.17098	380133

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0353				g		0.0339	104	40 - 110

Lab ID: 160-29426-4 | Analyzed: 08/03/18 07:12 | Decay Corrected: No | Ts: 100
Client ID: GW-ASC-4-070918-D | Detector: Blue17 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 2

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-226	0.709	0.170	0.182		pCi/L	1.00	0.113	84	72	0.840	0.072	0.18582	380133

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0350				g		0.0339	103	40 - 110

Lab ID: MB 160-375093/13-A | Analyzed: 08/03/18 07:13 | Decay Corrected: No | Ts: 100
Client ID: | Detector: Purple22 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 2

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-226	0.2190	0.103	0.105		pCi/L	1.00	0.116	34	89	0.340	0.089	0.19666	380132

Carrier	MB Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03500				g		0.0339	103	40 - 110

Quality Control Summary

Method Blank ID:	Analyte	Parent Result	Spike Added	MB Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
MB 160-375093/13-A	Radium-226			0.2190		pCi/L							4.173734 91

Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-375093/1-A	Radium-226		11.4	9.846		pCi/L	87	68 - 137	12				-1.859379 678

Lab Control Sample Duplicate	Analyte	Parent Result	Spike Added	LCSD Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCSD 160-375093/2-A	Radium-226		11.4	8.755		pCi/L	77	68 - 137	12	0.54	1.52	1	-3.299360 405

Gas Flow Proportional Counter Analysis Detail Report
Prep Batch: 375093

Glossary:

Ts = Count Duration, Sample
Tb = Count Duration, Background
Cs = Total Counts, Sample
Cb = Total Counts, Background
CPMs = Counts Per Minute, Sample
CPMb = Counts Per Minute, Background
Eff = Efficiency

GAS FLOW PROPORTIONAL COUNTER BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Batch Number: 375093 Batch Start Date: 07/12/18 09:48 Batch Analyst: Chapman, Jessica L

Batch Method: PrecSep-21 Batch End Date: 07/30/18 11:30

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	Ba_TareWt	Ba_GrossWt	Ba_Mass	IngDecDate1	IngDecDate2
LCS 160-375093/1		PrecSep-21, 9315		1000 mL	8.7248 g	8.7599 g	0.0339 g	07/13/2018 11:51	07/30/2018 08:25
LCSD 160-375093/2		PrecSep-21, 9315		1000 mL	8.8288 g	8.8640 g	0.0339 g	07/13/2018 11:51	07/30/2018 08:25
160-29426-B-1	GW-ASC-5-070918	PrecSep-21, 9315	T	1000.27 mL	8.7935 g	8.8219 g	0.0339 g	07/13/2018 11:51	07/30/2018 08:25
160-29426-B-2	GW-ASC-4-070918	PrecSep-21, 9315	T	1000.31 mL	8.7883 g	8.8244 g	0.0339 g	07/13/2018 11:51	07/30/2018 08:25
160-29426-B-3	GW-ASC-2A-070918	PrecSep-21, 9315	T	1000.33 mL	8.8265 g	8.8618 g	0.0339 g	07/13/2018 11:51	07/30/2018 08:25
160-29426-C-4	GW-ASC-4-070918-D	PrecSep-21, 9315	T	1000.08 mL	8.8131 g	8.8481 g	0.0339 g	07/13/2018 11:51	07/30/2018 08:25
MB 160-375093/13		PrecSep-21, 9315		1000 mL	8.7624 g	8.7974 g	0.0339 g	07/13/2018 11:51	07/30/2018 08:25

Lab Sample ID	Client Sample ID	Method Chain	Basis	IngDecDate3	NativeMassBa	Ba Carrier 00038	Ra-226 00027		
LCS 160-375093/1		PrecSep-21, 9315		08/03/2018	0 g	1 mL	1 mL		
LCSD 160-375093/2		PrecSep-21, 9315		08/03/2018	0 g	1 mL	1 mL		
160-29426-B-1	GW-ASC-5-070918	PrecSep-21, 9315	T	08/03/2018	0 g	1 mL			
160-29426-B-2	GW-ASC-4-070918	PrecSep-21, 9315	T	08/03/2018	0 g	1 mL			
160-29426-B-3	GW-ASC-2A-070918	PrecSep-21, 9315	T	08/03/2018	0 g	1 mL			
160-29426-C-4	GW-ASC-4-070918-D	PrecSep-21, 9315	T	08/03/2018	0 g	1 mL			
MB 160-375093/13		PrecSep-21, 9315		08/03/2018	0 g	1 mL			

Batch Notes	
Balance ID	1122021820, 1125330898
Batch Comment	In CPR, Out JTR
Pipette ID	RAD112, SEP009
Analyst ID - Reagent Drop Witness	CLP per JLC
Analyst ID - Reagent Drop	JLC
SOP Number	ST-RC-0041, ST-RC-0002

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GAS FLOW PROPORTIONAL COUNTER BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Batch Number: 375093 Batch Start Date: 07/12/18 09:48 Batch Analyst: Chapman, Jessica L

Batch Method: PrecSep-21 Batch End Date: 07/30/18 11:30

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - B

Addr: 5

Sample ID LCS 160-375093/1-A

Repeat 1

Carrier No. 0

Batch ID 375093

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/3/2018 7:10:48 AM

Count Ended 8/3/2018 8:50:56 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.071	1,129	11.290	11.219
sd	0.008	33.601	0.336	0.336
Beta	0.324	2,132	21.320	20.996
sd	0.018	46.174	0.462	0.462

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - C

Addr: 6

Sample ID LCSD 160-375093/2-A

Repeat 1

Carrier No. 0

Batch ID 375093

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/3/2018 7:10:54 AM

Count Ended 8/3/2018 8:51:03 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.064	1,015	10.150	10.086
sd	0.008	31.859	0.319	0.319
Beta	0.348	2,073	20.730	20.382
sd	0.019	45.530	0.455	0.456

Alpha/Beta Count Results

Sample Activity Report

Blue 12-15 - B

Addr: 13

Sample ID 160-29426-B-1-B

Repeat 1

Carrier No. 0

Batch ID 375093

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/3/2018 7:11:50 AM

Count Ended 8/3/2018 8:52:04 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.042	40	0.400	0.358
sd	0.006	6.325	0.063	0.064
Beta	0.300	72	0.720	0.420
sd	0.017	8.485	0.085	0.087

Alpha/Beta Count Results

Sample Activity Report

Blue 12-15 - C

Addr: 14

Sample ID 160-29426-B-2-A

Repeat 1

Carrier No. 0

Batch ID 375093

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/3/2018 7:11:57 AM

Count Ended 8/3/2018 8:52:08 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.035	66	0.660	0.625
sd	0.006	8.124	0.081	0.081
Beta	0.246	131	1.310	1.064
sd	0.016	11.446	0.114	0.116

Alpha/Beta Count Results

Sample Activity Report

Blue 12-15 - D

Addr: 15

Sample ID 160-29426-B-3-B

Repeat 1

Carrier No. 0

Batch ID 375093

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/3/2018 7:12:03 AM

Count Ended 8/3/2018 8:52:12 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.037	28	0.280	0.243
sd	0.006	5.292	0.053	0.053
Beta	0.359	58	0.580	0.221
sd	0.019	7.616	0.076	0.078

Alpha/Beta Count Results

Sample Activity Report

Blue 16-19 - B

Addr: 17

Sample ID 160-29426-C-4-A

Repeat 1

Carrier No. 0

Batch ID 375093

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/3/2018 7:12:09 AM

Count Ended 8/3/2018 8:52:18 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.072	84	0.840	0.768
sd	0.008	9.165	0.092	0.092
Beta	0.318	137	1.370	1.052
sd	0.018	11.705	0.117	0.118

Alpha/Beta Count Results

Sample Activity Report

Purple 20-23 - C

Addr: 22

Sample ID MB 160-375093/13-A

Repeat 1

Carrier No. 0

Batch ID 375093

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/3/2018 7:13:16 AM

Count Ended 8/3/2018 8:53:26 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.089	34	0.340	0.251
sd	0.009	5.831	0.058	0.059
Beta	0.301	50	0.500	0.199
sd	0.017	7.071	0.071	0.073

Method 9320

Radium-228 (GFPC) by Method 9320

Prep Batch: 375099

Preparation, Precipitate Separation

Gas Flow Proportional Counter Analysis Detail Report
Prep Batch: 375099

Lab ID: LCS 160-375099/1-A | Analyzed: 07/30/18 09:25 | Decay Corrected: No | Ts: 200
Client ID: | Detector: Protean0 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 1

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-228	9.774	0.726	1.16		pCi/L	1.00	0.501	986	645	4.930	0.645	0.43727	378627

Carrier	LCS Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03510				g		0.0339	104	40 - 110
Y Carrier	0.02060				g		0.0268	77.0	40 - 110

Lab ID: LCSD 160-375099/2-A | Analyzed: 07/30/18 09:25 | Decay Corrected: No | Ts: 200
Client ID: | Detector: Protean1 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 1

Analyte	LCSD Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-228	9.096	0.677	1.08		pCi/L	1.00	0.427	923	491	4.615	0.491	0.43822	378627

Carrier	LCSD Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03520				g		0.0339	104	40 - 110
Y Carrier	0.02120				g		0.0268	79.3	40 - 110

Lab ID: 160-29426-1 | Analyzed: 07/30/18 09:26 | Decay Corrected: No | Ts: 200
Client ID: GW-ASC-5-070918 | Detector: Protean5 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 1

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-228	0.344	0.287	0.288	U	pCi/L	1.00	0.457	115	437	0.575	0.437	0.43820	378627

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0284				g		0.0339	83.8	40 - 110
Y Carrier	0.0233				g		0.0268	87.1	40 - 110

Lab ID: 160-29426-2 | Analyzed: 07/30/18 09:26 | Decay Corrected: No | Ts: 200
Client ID: GW-ASC-4-070918 | Detector: Protean6 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 1

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-228	0.220	0.227	0.228	U	pCi/L	1.00	0.371	109	436	0.545	0.436	0.43400	378627

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0361				g		0.0339	106	40 - 110
Y Carrier	0.0228				g		0.0268	85.2	40 - 110

Gas Flow Proportional Counter Analysis Detail Report
Prep Batch: 375099

Lab ID: 160-29426-3 | Analyzed: 07/30/18 09:26 | Decay Corrected: No | Ts: 200
Client ID: GW-ASC-2A-070918 | Detector: Protean7 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 1

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-228	0.683	0.522	0.525	U	pCi/L	1.00	0.824	128	481	0.640	0.481	0.42888	378627

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0353				g		0.0339	104	40 - 110
Y Carrier	0.0111				g		0.0268	41.5	40 - 110

Lab ID: 160-29426-4 | Analyzed: 07/30/18 09:26 | Decay Corrected: No | Ts: 200
Client ID: GW-ASC-4-070918-D | Detector: Protean8 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 1

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-228	0.596	0.279	0.284		pCi/L	1.00	0.403	130	392	0.650	0.392	0.42749	378627

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0350				g		0.0339	103	40 - 110
Y Carrier	0.0209				g		0.0268	78.1	40 - 110

Lab ID: MB 160-375099/13-A | Analyzed: 07/30/18 09:27 | Decay Corrected: No | Ts: 200
Client ID: | Detector: Protean13 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 1

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-228	0.1992	0.232	0.232	U	pCi/L	1.00	0.381	107	439	0.535	0.439	0.43871	378627

Carrier	MB Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03500				g		0.0339	103	40 - 110
Y Carrier	0.02270				g		0.0268	84.9	40 - 110

Quality Control Summary

Method Blank ID:	Analyte	Parent Result	Spike Added	MB Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
MB 160-375099/13-A	Radium-228			0.1992	U	pCi/L							1.71496914

Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-375099/1-A	Radium-228		8.10	9.774		pCi/L	121	56 - 140	7				2.2247814061

Lab Control Sample Duplicate	Analyte	Parent Result	Spike Added	LCSD Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCSD 160-375099/2-A	Radium-228		8.10	9.096		pCi/L	112	56 - 140	7	0.30	0.86	1	1.3762881033

Gas Flow Proportional Counter Analysis Detail Report
Prep Batch: 375099

Glossary:

Ts = Count Duration, Sample
Tb = Count Duration, Background
Cs = Total Counts, Sample
Cb = Total Counts, Background
CPMs = Counts Per Minute, Sample
CPMb = Counts Per Minute, Background
Eff = Efficiency

GAS FLOW PROPORTIONAL COUNTER BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Batch Number: 375099 Batch Start Date: 07/12/18 10:40 Batch Analyst: Chapman, Jessica L

Batch Method: PrecSep_0 Batch End Date: 07/30/18 08:50

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	Ba_TareWt	Ba_GrossWt	Ba_Mass	Y_TareWt	Y_GrossWt
LCS 160-375099/1		PrecSep_0, 9320		1000 mL	8.7248 g	8.7599 g	0.0339 g	8.8468 g	8.8674 g
LCSD 160-375099/2		PrecSep_0, 9320		1000 mL	8.8288 g	8.8640 g	0.0339 g	8.8910 g	8.9122 g
160-29426-B-1	GW-ASC-5-070918	PrecSep_0, 9320	T	1000.27 mL	8.7935 g	8.8219 g	0.0339 g	8.7684 g	8.7917 g
160-29426-B-2	GW-ASC-4-070918	PrecSep_0, 9320	T	1000.31 mL	8.7883 g	8.8244 g	0.0339 g	8.7930 g	8.8158 g
160-29426-B-3	GW-ASC-2A-070918	PrecSep_0, 9320	T	1000.33 mL	8.8265 g	8.8618 g	0.0339 g	8.8069 g	8.8180 g
160-29426-C-4	GW-ASC-4-070918-D	PrecSep_0, 9320	T	1000.08 mL	8.8131 g	8.8481 g	0.0339 g	8.7762 g	8.7971 g
MB 160-375099/13		PrecSep_0, 9320		1000 mL	8.7624 g	8.7974 g	0.0339 g	8.8387 g	8.8614 g

Lab Sample ID	Client Sample ID	Method Chain	Basis	Y_Mass	IngDecDate1	IngDecDate2	NativeMassBa	NativeMassY	Ba Carrier 00038
LCS 160-375099/1		PrecSep_0, 9320		0.02675 g	07/13/2018 11:51	07/30/2018 06:00	0 g	0 g	1 mL
LCSD 160-375099/2		PrecSep_0, 9320		0.02675 g	07/13/2018 11:51	07/30/2018 06:00	0 g	0 g	1 mL
160-29426-B-1	GW-ASC-5-070918	PrecSep_0, 9320	T	0.02675 g	07/13/2018 11:51	07/30/2018 06:00	0 g	0 g	1 mL
160-29426-B-2	GW-ASC-4-070918	PrecSep_0, 9320	T	0.02675 g	07/13/2018 11:51	07/30/2018 06:00	0 g	0 g	1 mL
160-29426-B-3	GW-ASC-2A-070918	PrecSep_0, 9320	T	0.02675 g	07/13/2018 11:51	07/30/2018 06:00	0 g	0 g	1 mL
160-29426-C-4	GW-ASC-4-070918-D	PrecSep_0, 9320	T	0.02675 g	07/13/2018 11:51	07/30/2018 06:00	0 g	0 g	1 mL
MB 160-375099/13		PrecSep_0, 9320		0.02675 g	07/13/2018 11:51	07/30/2018 06:00	0 g	0 g	1 mL

Lab Sample ID	Client Sample ID	Method Chain	Basis	Ra-228 00026	Y Carrier 00032				
LCS 160-375099/1		PrecSep_0, 9320		0.1 mL	0.2 mL				
LCSD 160-375099/2		PrecSep_0, 9320		0.1 mL	0.2 mL				
160-29426-B-1	GW-ASC-5-070918	PrecSep_0, 9320	T		0.2 mL				
160-29426-B-2	GW-ASC-4-070918	PrecSep_0, 9320	T		0.2 mL				

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GAS FLOW PROPORTIONAL COUNTER BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29426-1

SDG No.:

Batch Number: 375099 Batch Start Date: 07/12/18 10:40 Batch Analyst: Chapman, Jessica L

Batch Method: PrecSep_0 Batch End Date: 07/30/18 08:50

Lab Sample ID	Client Sample ID	Method Chain	Basis	Ra-228 00026	Y Carrier 00032				
160-29426-B-3	GW-ASC-2A-070918	PrecSep_0, 9320	T		0.2 mL				
160-29426-C-4	GW-ASC-4-070918-D	PrecSep_0, 9320	T		0.2 mL				
MB 160-375099/13		PrecSep_0, 9320			0.2 mL				

Batch Notes	
Balance ID	1122021820, 1125330898
Batch Comment	In CPR, Out JTR
Pipette ID	RAD112, SEP009, SEP005
Analyst ID - Reagent Drop Witness	CLP per JLC, CMM per CPR
Analyst ID - Reagent Drop	JLC, CPR
SOP Number	ST-RC-0041, ST-RC-0002

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Alpha/Beta Count Results

Sample Activity Report

Protean 0-3 - A

Addr: 0

Sample ID LCS 160-375099/1-A

Repeat 1

Carrier No. 0

Batch ID 375099

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/30/2018 9:25:46 AM

Count Ended 7/30/2018 12:45:59 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 200.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.077	53	0.265	0.188
sd	0.000			0.009	7.280	0.036	0.037
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.645	986	4.930	4.285
sd	0.000			0.025	31.401	0.157	0.159

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Protean 0-3 - B

Addr: 1

Sample ID LCSD 160-375099/2-A

Repeat 1

Carrier No. 0

Batch ID 375099

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/30/2018 9:25:52 AM

Count Ended 7/30/2018 12:46:04 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 200.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.076	44	0.220	0.144
sd	0.000			0.009	6.633	0.033	0.034
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.491	923	4.615	4.124
sd	0.000			0.022	30.381	0.152	0.154

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Protean 4-7 - B

Addr: 5

Sample ID 160-29426-B-1-C

Repeat 1

Carrier No. 0

Batch ID 375099

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/30/2018 9:26:37 AM

Count Ended 7/30/2018 12:46:49 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 200.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.070	28	0.140	0.070
sd	0.000			0.008	5.292	0.026	0.028
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.437	115	0.575	0.138
sd	0.000			0.021	10.724	0.054	0.058

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Protean 4-7 - C

Addr: 6

Sample ID 160-29426-B-2-B

Repeat 1

Carrier No. 0

Batch ID 375099

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/30/2018 9:26:41 AM

Count Ended 7/30/2018 12:46:55 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 200.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.111	31	0.155	0.044
sd	0.000			0.011	5.568	0.028	0.030
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.436	109	0.545	0.109
sd	0.000			0.021	10.440	0.052	0.056

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Protean 4-7 - D

Addr: 7

Sample ID 160-29426-B-3-C

Repeat 1

Carrier No. 0

Batch ID 375099

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/30/2018 9:26:48 AM

Count Ended 7/30/2018 12:47:01 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 200.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.120	28	0.140	0.020
sd	0.000			0.011	5.292	0.026	0.029
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.481	128	0.640	0.159
sd	0.000			0.022	11.314	0.057	0.061

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Protean 8-11 - A

Addr: 8

Sample ID 160-29426-C-4-B

Repeat 1

Carrier No. 0

Batch ID 375099

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/30/2018 9:26:54 AM

Count Ended 7/30/2018 12:47:07 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 200.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.065	19	0.095	0.030
sd	0.000			0.008	4.359	0.022	0.023
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.392	130	0.650	0.258
sd	0.000			0.020	11.402	0.057	0.060

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Protean 12-15 - B

Addr: 13

Sample ID MB 160-375099/13-A

Repeat 1

Carrier No. 0

Batch ID 375099

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/30/2018 9:27:19 AM

Count Ended 7/30/2018 12:47:33 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 200.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	35	0.175	0.044
sd	0.000			0.011	5.916	0.030	0.032
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.439	107	0.535	0.096
sd	0.000			0.021	10.344	0.052	0.056

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Daily Checks

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: Blue

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
Detector 0											
1:08 AM	**Efficiency**	12168.29	12736.38	382.09	-568.08	**FAIL**					
	Background										
	Crosstalk	4546.000	4320.400	60.092	225.600	**DOEF**					
1:22 AM	**Efficiency**						50284.00	50552.05	1516.56	-268.05	Pass
	Background										
	Crosstalk						7.107	347.875	39.589	-340.768	NA
1:48 AM	**Efficiency**	12209.31	12736.38	382.09	-527.07	**FAIL**					
	Background										
	Crosstalk	4542.500	4320.400	60.092	222.100	**DOEF**					
5:16 AM	**Efficiency**										
	Background	0.075	0.126	0.018	-0.051	Pass	0.420	0.480	0.093	-0.060	Pass
	Crosstalk										
Detector 1											
1:08 AM	**Efficiency**	12788.52	13581.05	407.43	-792.53	**FAIL**					
	Background										
	Crosstalk	4659.000	4345.550	38.640	313.450	**DOEF**					
1:22 AM	**Efficiency**						48154.99	47641.23	1429.24	513.77	Pass
	Background										
	Crosstalk						4.568	375.000	61.275	-370.432	NA
1:48 AM	**Efficiency**	12891.61	13581.05	407.43	-689.44	**FAIL**					
	Background										
	Crosstalk	4746.000	4345.550	38.640	400.450	**DOEF**					
5:16 AM	**Efficiency**										
	Background	0.095	0.137	0.022	-0.042	Pass	0.425	0.442	0.068	-0.017	Pass
	Crosstalk										
Detector 2											

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: Blue

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
1:08 AM	**Efficiency**	13455.05	14524.43	435.73	-1069.38	**FAIL**					
	Background										
	Crosstalk	5169.000	4732.575	47.122	436.425	**DOEF**					
1:22 AM	**Efficiency**						50798.01	49734.44	1492.03	1063.57	Pass
	Background										
	Crosstalk						6.091	391.600	62.401	-385.509	NA
1:48 AM	**Efficiency**	13375.49	14524.43	435.73	-1148.94	**FAIL**					
	Background										
	Crosstalk	5126.500	4732.575	47.122	393.925	**DOEF**					
5:16 AM	**Efficiency**										
	Background	0.065	0.071	0.018	-0.006	Pass	0.345	0.420	0.081	-0.075	Pass
	Crosstalk										
Detector 3											
1:08 AM	**Efficiency**	12868.09	13572.53	407.18	-704.44	**FAIL**					
	Background										
	Crosstalk	4657.500	4272.975	38.662	384.525	**DOEF**					
1:22 AM	**Efficiency**						59567.33	60167.98	1805.04	-600.65	Pass
	Background										
	Crosstalk						5.583	416.450	40.691	-410.867	NA
1:48 AM	**Efficiency**	12982.18	13572.53	407.18	-590.35	**FAIL**					
	Background										
	Crosstalk	4668.000	4272.975	38.662	395.025	**DOEF**					
5:16 AM	**Efficiency**										
	Background	0.080	0.058	0.024	0.022	Pass	0.445	0.396	0.094	0.049	Pass
	Crosstalk										
Detector 4											
1:08 AM	**Efficiency**	15878.80	16472.18	494.17	-593.38	**FAIL**					
	Background										
	Crosstalk	6482.000	6055.100	216.759	426.900	Pass					

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THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: Blue

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
1:22 AM	**Efficiency**						55777.66	55277.35	1658.32	500.31	Pass
	Background										
	Crosstalk						2.538	1.225	0.910	1.313	NA
1:48 AM	**Efficiency**	15973.87	16472.18	494.17	-498.30	**FAIL**					
	Background										
	Crosstalk	6347.000	6055.100	216.759	291.900	Pass					
5:16 AM	**Efficiency**										
	Background	0.110	0.087	0.031	0.023	Pass	0.325	0.398	0.082	-0.073	Pass
	Crosstalk										
Detector 5											
1:08 AM	**Efficiency**	16488.32	16597.30	497.92	-108.98	Pass					
	Background										
	Crosstalk	6004.500	5933.150	70.806	71.350	Pass					
1:22 AM	**Efficiency**						55113.77	55004.03	1650.12	109.74	Pass
	Background										
	Crosstalk						3.045	1.675	1.217	1.370	NA
5:17 AM	**Efficiency**										
	Background	0.075	0.082	0.020	-0.007	Pass	0.370	0.418	0.083	-0.048	Pass
	Crosstalk										
Detector 6											
1:08 AM	**Efficiency**	15190.26	15385.25	461.56	-194.99	Pass					
	Background										
	Crosstalk	5704.500	5557.975	84.930	146.525	Pass					
1:22 AM	**Efficiency**						52617.88	51042.40	1531.27	1575.48	**FAIL**
	Background										
	Crosstalk						5.076	3.425	1.688	1.651	NA
1:48 AM	**Efficiency**						52481.24	51042.40	1531.27	1438.84	Pass
	Background										
	Crosstalk						5.583	3.425	1.688	2.158	NA

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: Blue

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
5:17 AM	**Efficiency**										
	Background	0.075	0.051	0.020	0.025	Pass	0.285	0.364	0.060	-0.079	Pass
	Crosstalk										
Detector 7											
1:08 AM	**Efficiency**	14549.78	14744.85	442.35	-195.07	Pass					
	Background										
	Crosstalk	5959.000	6171.550	158.707	-212.550	Pass					
1:22 AM	**Efficiency**						44950.69	43523.08	1305.69	1427.62	**FAIL**
	Background										
	Crosstalk						3.045	0.500	0.459	2.545	NA
1:48 AM	**Efficiency**						44750.56	43523.08	1305.69	1227.48	Pass
	Background										
	Crosstalk						3.553	0.500	0.459	3.053	NA
5:17 AM	**Efficiency**										
	Background	0.060	0.076	0.032	-0.016	Pass	0.475	0.511	0.123	-0.036	Pass
	Crosstalk										
Detector 8											
1:12 AM	**Efficiency**	11868.72	12369.30	371.08	-500.58	**FAIL**					
	Background										
	Crosstalk	4746.500	4637.625	82.606	108.875	Pass					
1:25 AM	**Efficiency**						49918.74	49959.33	1498.78	-40.58	Pass
	Background										
	Crosstalk						12.181	5.025	1.963	7.156	NA
1:51 AM	**Efficiency**	11839.19	12369.30	371.08	-530.11	**FAIL**					
	Background										
	Crosstalk	4783.000	4637.625	82.606	145.375	Pass					
5:17 AM	**Efficiency**										
	Background	0.140	0.074	0.026	0.067	Pass	0.565	0.465	0.134	0.100	Pass
	Crosstalk										

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Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: Blue

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
Detector 9											
1:12 AM	**Efficiency**	12721.47	13216.48	396.49	-495.01	FAIL					
	Background										
	Crosstalk	5180.500	4879.900	47.988	300.600	DOEF					
1:25 AM	**Efficiency**						48469.70	47696.08	1430.88	773.62	Pass
	Background										
	Crosstalk						5.583	3.950	2.870	1.633	NA
1:51 AM	**Efficiency**	12770.51	13216.48	396.49	-445.97	FAIL					
	Background										
	Crosstalk	5160.500	4879.900	47.988	280.600	DOEF					
5:17 AM	**Efficiency**										
	Background	0.195	0.075	0.022	0.120	FAIL	0.545	0.408	0.074	0.137	Pass
	Crosstalk										
Detector 10											
1:12 AM	**Efficiency**	13403.00	13968.53	419.06	-565.52	FAIL					
	Background										
	Crosstalk	5335.000	5032.150	58.657	302.850	DOEF					
1:25 AM	**Efficiency**						50025.74	50136.65	1504.10	-110.91	Pass
	Background										
	Crosstalk						3.553	3.775	2.447	-0.222	NA
1:51 AM	**Efficiency**	13379.99	13968.53	419.06	-588.54	FAIL					
	Background										
	Crosstalk	5331.500	5032.150	58.657	299.350	DOEF					
5:17 AM	**Efficiency**										
	Background	0.115	0.072	0.026	0.043	Pass	0.420	0.345	0.078	0.075	Pass
	Crosstalk										
Detector 11											

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: Blue

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
1:12 AM	**Efficiency**	12793.95	13091.33	392.74	-297.37	Pass					
	Background										
	Crosstalk	4996.500	4821.400	79.982	175.100	**WARNING**					
1:25 AM	**Efficiency**						59961.11	59951.55	1798.55	9.56	Pass
	Background										
	Crosstalk						9.136	6.900	3.386	2.236	NA
5:17 AM	**Efficiency**										
	Background	0.110	0.070	0.025	0.040	Pass	0.515	0.449	0.088	0.066	Pass
	Crosstalk										
Detector 12											
1:13 AM	**Efficiency**	14903.58	14824.28	444.73	79.31	Pass					
	Background										
	Crosstalk	7507.000	7794.625	354.802	-287.625	Pass					
1:26 AM	**Efficiency**						55720.09	56070.40	1682.11	-350.31	Pass
	Background										
	Crosstalk						2.501	1.150	1.053	1.351	NA
5:17 AM	**Efficiency**										
	Background	0.065	0.060	0.038	0.005	Pass	0.350	0.392	0.050	-0.042	Pass
	Crosstalk										
Detector 13											
1:13 AM	**Efficiency**	16754.38	16939.10	508.17	-184.72	Pass					
	Background										
	Crosstalk	5506.000	5646.200	124.346	-140.200	Pass					
1:26 AM	**Efficiency**						54547.03	55607.20	1668.22	-1060.17	Pass
	Background										
	Crosstalk						51.030	88.475	36.851	-37.445	NA
5:17 AM	**Efficiency**										
	Background	0.105	0.070	0.029	0.036	Pass	0.375	0.374	0.085	0.001	Pass
	Crosstalk										

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: Blue

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
Detector 14											
1:13 AM	**Efficiency**	13176.66	13320.80	399.62	-144.14	Pass					
	Background										
	Crosstalk	7010.500	7295.625	357.533	-285.125	Pass					
1:26 AM	**Efficiency**						49578.97	50580.03	1517.40	-1001.05	Pass
	Background										
	Crosstalk						2.501	0.475	0.525	2.026	NA
5:17 AM	**Efficiency**										
	Background	0.035	0.071	0.028	-0.036	Pass	0.315	0.368	0.090	-0.053	Pass
	Crosstalk										
Detector 15											
1:13 AM	**Efficiency**	13794.28	13884.40	416.53	-90.12	Pass					
	Background										
	Crosstalk	6986.000	7292.875	391.340	-306.875	Pass					
1:26 AM	**Efficiency**						45223.31	44601.55	1338.05	621.76	Pass
	Background										
	Crosstalk						2.501	0.625	0.666	1.876	NA
5:17 AM	**Efficiency**										
	Background	0.060	0.068	0.030	-0.008	Pass	0.440	0.467	0.094	-0.027	Pass
	Crosstalk										
Detector 16											
1:15 AM	**Efficiency**	12095.98	12474.03	374.22	-378.05	**FAIL**					
	Background										
	Crosstalk	4597.000	4621.975	46.894	-24.975	Pass					
1:29 AM	**Efficiency**						50081.70	49665.88	1489.98	415.83	Pass
	Background										
	Crosstalk						5.076	1.550	1.347	3.526	NA

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: Blue

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
1:53 AM	**Efficiency**	12101.98	12474.03	374.22	-372.04	Pass					
	Background										
	Crosstalk	4669.500	4621.975	46.894	47.525	Pass					
5:18 AM	**Efficiency**										
	Background	0.180	0.039	0.022	0.141	**FAIL**	6.950	0.520	0.119	6.430	**FAIL**
	Crosstalk										
Detector 17											
1:15 AM	**Efficiency**	13032.21	13345.48	400.36	-313.27	Pass					
	Background										
	Crosstalk	4909.000	4862.375	40.239	46.625	Pass					
1:29 AM	**Efficiency**						48649.33	48166.13	1444.98	483.20	Pass
	Background										
	Crosstalk						11.166	2.200	1.490	8.966	NA
5:18 AM	**Efficiency**										
	Background	0.055	0.069	0.032	-0.014	Pass	0.360	0.378	0.196	-0.018	Pass
	Crosstalk										
Detector 18											
1:15 AM	**Efficiency**	13711.24	14223.58	426.71	-512.33	**FAIL**					
	Background										
	Crosstalk	4854.000	4941.250	56.316	-87.250	Pass					
1:29 AM	**Efficiency**						50049.64	49957.23	1498.72	92.42	Pass
	Background										
	Crosstalk						12.641	2.950	1.953	9.691	NA
1:53 AM	**Efficiency**	13667.71	14223.58	426.71	-555.87	**FAIL**					
	Background										
	Crosstalk	4998.500	4941.250	56.316	57.250	Pass					
5:18 AM	**Efficiency**										
	Background	0.920	0.053	0.029	0.868	**FAIL**	1.310	0.621	0.089	0.690	**FAIL**
	Crosstalk										

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: Blue

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
Detector 19											
1:15 AM	**Efficiency**	12867.97	13007.35	390.22	-139.38	Pass					
	Background										
	Crosstalk	4924.500	4806.200	94.171	118.300	Pass					
1:29 AM	**Efficiency**						60155.61	59167.80	1775.03	987.81	Pass
	Background										
	Crosstalk						3.045	1.325	0.799	1.720	NA
5:18 AM	**Efficiency**										
	Background	0.120	0.140	0.020	-0.020	Pass	0.455	0.460	0.087	-0.005	Pass
	Crosstalk										
Detector 20											
1:15 AM	**Efficiency**	14959.61	14579.30	437.38	380.31	Pass					
	Background										
	Crosstalk	7398.000	8318.925	448.012	-920.925	**WARNING**					
1:29 AM	**Efficiency**						56979.63	57321.08	1719.63	-341.44	Pass
	Background										
	Crosstalk						4.036	0.800	0.880	3.236	NA
5:18 AM	**Efficiency**										
	Background	0.080	0.044	0.020	0.036	Pass	0.400	0.455	0.101	-0.055	Pass
	Crosstalk										
Detector 21											
1:15 AM	**Efficiency**	15832.82	15327.10	459.81	505.72	**FAIL**					
	Background										
	Crosstalk	6758.000	7388.475	328.343	-630.475	Pass					
1:29 AM	**Efficiency**						55411.55	55281.80	1658.45	129.75	Pass
	Background										
	Crosstalk						2.018	1.500	0.811	0.518	NA

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THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: Blue

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
1:49 AM	**Efficiency**	15934.35	15327.10	459.81	607.25	FAIL					
	Background										
	Crosstalk	6688.000	7388.475	328.343	-700.475	WARNING					
5:18 AM	**Efficiency**										
	Background	0.080	0.050	0.021	0.030	Pass	0.325	0.282	0.052	0.043	Pass
	Crosstalk										
Detector 22											
1:15 AM	**Efficiency**	14132.91	13790.58	413.72	342.34	Pass					
	Background										
	Crosstalk	6561.500	7290.650	330.123	-729.150	WARNING					
1:29 AM	**Efficiency**						52238.42	52477.75	1574.33	-239.33	Pass
	Background										
	Crosstalk						3.531	0.600	0.503	2.931	NA
5:18 AM	**Efficiency**										
	Background	0.120	0.058	0.022	0.062	Pass	0.485	0.412	0.048	0.073	Pass
	Crosstalk										
Detector 23											
1:15 AM	**Efficiency**	14433.99	13986.48	419.59	447.51	FAIL					
	Background										
	Crosstalk	6720.500	7564.275	376.472	-843.775	WARNING					
1:29 AM	**Efficiency**						45707.59	46160.75	1384.82	-453.16	Pass
	Background										
	Crosstalk						1.513	0.875	0.809	0.638	NA
1:49 AM	**Efficiency**	14311.46	13986.48	419.59	324.98	Pass					
	Background										
	Crosstalk	6766.000	7564.275	376.472	-798.275	WARNING					
5:18 AM	**Efficiency**										
	Background	0.050	0.051	0.021	-0.001	Pass	0.430	0.509	0.060	-0.079	Pass
	Crosstalk										

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: Blue

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag

The Alpha and Beta +/- limit are based upon initial 20-point population.

The Alpha and Beta +/- limit for Efficiency is stated at 3%. Flags are "FAIL" > 3%.

The Alpha and Beta +/- limit for Background is stated at 1 StDev. Flags are "FAIL" > 3 StDev.

The Alpha +/- limit for Crosstalk is stated at 1 StDev. Flags are "Warning > 2 StDev and "DOEF" > 3 StDev. Beta is negligible, for trend only ("NA").

Times shown reflect the end of the count duration.

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Gas Proportional Counter Daily Quality Control Checks

Monday, July 30, 2018

Instrument: Protean

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
Detector 0											
12:07 AM	**Efficiency**	12380.69	12598.25	377.95	-217.56	Pass					
	Background										
	Crosstalk	4118.000	4210.200	44.960	-92.200	**WARNING**					
12:11 AM	**Efficiency**						49671.17	48583.18	1457.50	1087.99	Pass
	Background										
	Crosstalk						18.774	23.225	5.043	-4.451	NA
4:14 AM	**Efficiency**										
	Background	0.460	0.096	0.037	0.364	**FAIL**	1.485	0.716	0.094	0.769	**FAIL**
	Crosstalk										
8:51 AM	**Efficiency**										
	Background	0.110	0.096	0.037	0.014	Pass	0.735	0.716	0.094	0.019	Pass
	Crosstalk										
Detector 1											
12:07 AM	**Efficiency**	13173.31	13515.73	405.47	-342.41	Pass					
	Background										
	Crosstalk	4639.500	4578.400	63.081	61.100	Pass					
12:11 AM	**Efficiency**						48184.91	47659.85	1429.80	525.06	Pass
	Background										
	Crosstalk						12.685	10.950	2.549	1.735	NA
4:14 AM	**Efficiency**										
	Background	0.165	0.111	0.029	0.054	Pass	0.690	0.498	0.078	0.193	Pass
	Crosstalk										
Detector 2											
12:07 AM	**Efficiency**	13500.57	14068.05	422.04	-567.48	**FAIL**					
	Background										
	Crosstalk	4844.000	4802.250	75.574	41.750	Pass					

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Monday, July 30, 2018

Instrument: Protean

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
12:11 AM	**Efficiency**						49965.95	49887.83	1496.63	78.12	Pass
	Background										
	Crosstalk						8.119	5.375	1.806	2.744	NA
12:56 AM	**Efficiency**	13583.63	14068.05	422.04	-484.42	**FAIL**					
	Background										
	Crosstalk	4859.500	4802.250	75.574	57.250	Pass					
4:16 AM	**Efficiency**										
	Background	0.135	0.088	0.031	0.047	Pass	0.820	0.541	0.087	0.279	**FAIL**
	Crosstalk										
8:51 AM	**Efficiency**										
	Background	0.115	0.088	0.031	0.027	Pass	0.585	0.541	0.087	0.044	Pass
	Crosstalk										
Detector 3											
12:07 AM	**Efficiency**	13068.23	13271.53	398.15	-203.30	Pass					
	Background										
	Crosstalk	4505.500	4349.025	65.645	156.475	**WARNING**					
12:12 AM	**Efficiency**						58906.26	59018.83	1770.56	-112.56	Pass
	Background										
	Crosstalk						8.626	10.375	2.724	-1.749	NA
4:14 AM	**Efficiency**										
	Background	0.250	0.085	0.023	0.165	**FAIL**	0.945	0.682	0.093	0.263	Pass
	Crosstalk										
8:51 AM	**Efficiency**										
	Background	0.160	0.085	0.023	0.075	**FAIL**	0.675	0.682	0.093	-0.007	Pass
	Crosstalk										
Detector 4											
12:07 AM	**Efficiency**	16242.71	16556.85	496.71	-314.14	Pass					
	Background										
	Crosstalk	6321.000	6135.800	62.856	185.200	**WARNING**					

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Monday, July 30, 2018

Instrument: Protean

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
12:12 AM	**Efficiency**						56093.48	56572.13	1697.16	-478.64	Pass
	Background										
	Crosstalk						2.030	0.850	0.651	1.180	NA
4:14 AM	**Efficiency**										
	Background	0.275	0.073	0.013	0.203	**FAIL**	0.770	0.435	0.045	0.335	**FAIL**
	Crosstalk										
8:51 AM	**Efficiency**										
	Background	0.130	0.073	0.013	0.058	**FAIL**	0.465	0.435	0.045	0.030	Pass
	Crosstalk										
Detector 5											
12:07 AM	**Efficiency**	15670.76	15673.68	470.21	-2.91	Pass					
	Background										
	Crosstalk	6584.500	6104.975	888.403	479.525	Pass					
12:12 AM	**Efficiency**						53703.15	53786.35	1613.59	-83.20	Pass
	Background										
	Crosstalk						1.015	0.325	0.373	0.690	NA
4:14 AM	**Efficiency**										
	Background	0.165	0.074	0.018	0.092	**FAIL**	0.685	0.418	0.056	0.267	**FAIL**
	Crosstalk										
8:51 AM	**Efficiency**										
	Background	0.095	0.074	0.018	0.022	Pass	0.425	0.418	0.056	0.007	Pass
	Crosstalk										
Detector 6											
12:07 AM	**Efficiency**	14556.89	14736.55	442.10	-179.66	Pass					
	Background										
	Crosstalk	5838.000	5498.275	745.701	339.725	Pass					
12:12 AM	**Efficiency**						51407.91	51221.45	1536.64	186.46	Pass
	Background										
	Crosstalk						2.539	0.700	0.410	1.839	NA

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Instrument: Protean

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
4:14 AM	**Efficiency**										
	Background	0.170	0.114	0.035	0.056	Pass	0.710	0.418	0.055	0.292	**FAIL**
	Crosstalk										
8:51 AM	**Efficiency**										
	Background	0.155	0.114	0.035	0.041	Pass	0.500	0.418	0.055	0.082	Pass
	Crosstalk										
Detector 7											
12:07 AM	**Efficiency**	15112.83	15385.65	461.57	-272.82	Pass					
	Background										
	Crosstalk	5848.000	5760.050	798.954	87.950	Pass					
12:12 AM	**Efficiency**						44577.34	44749.03	1342.47	-171.69	Pass
	Background										
	Crosstalk						4.059	1.425	0.922	2.634	NA
4:14 AM	**Efficiency**										
	Background	0.935	0.072	0.027	0.863	**FAIL**	3.285	0.523	0.066	2.762	**FAIL**
	Crosstalk										
8:51 AM	**Efficiency**										
	Background	0.140	0.072	0.027	0.068	Pass	0.555	0.523	0.066	0.032	Pass
	Crosstalk										
Detector 8											
12:07 AM	**Efficiency**						45945.01	46135.45	1384.06	-190.44	Pass
	Background										
	Crosstalk						3.045	0.725	0.638	2.320	NA
12:11 AM	**Efficiency**	11620.59	11620.55	348.62	0.04	Pass					
	Background										
	Crosstalk	4191.500	3784.000	489.685	407.500	Pass					
4:15 AM	**Efficiency**										
	Background	0.170	0.097	0.034	0.074	Pass	0.505	0.445	0.078	0.060	Pass
	Crosstalk										

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Instrument: Protean

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
Detector 9											
12:07 AM	**Efficiency**						47739.81	47841.35	1435.24	-101.54	Pass
	Background										
	Crosstalk						9.641	10.350	2.705	-0.709	NA
12:11 AM	**Efficiency**	13295.40	13544.15	406.32	-248.75	Pass					
	Background										
	Crosstalk	4827.000	4627.500	61.771	199.500	**DOEF**					
4:15 AM	**Efficiency**										
	Background	0.245	0.115	0.033	0.130	**FAIL**	0.685	0.440	0.052	0.245	**FAIL**
	Crosstalk										
8:51 AM	**Efficiency**										
	Background	0.110	0.115	0.033	-0.005	Pass	0.340	0.440	0.052	-0.100	Pass
	Crosstalk										
Detector 10											
12:07 AM	**Efficiency**						49233.50	49376.35	1481.29	-142.85	Pass
	Background										
	Crosstalk						13.193	28.625	5.591	-15.432	NA
12:11 AM	**Efficiency**	13568.12	13960.33	418.81	-392.21	Pass					
	Background										
	Crosstalk	4938.500	4854.775	66.791	83.725	Pass					
4:15 AM	**Efficiency**										
	Background	0.140	0.105	0.038	0.035	Pass	0.600	0.420	0.089	0.180	Pass
	Crosstalk										
Detector 11											
12:07 AM	**Efficiency**						59469.62	59256.13	1777.68	213.50	Pass
	Background										
	Crosstalk						18.774	33.400	4.406	-14.626	NA

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Monday, July 30, 2018

Instrument: ***Protean***

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
12:11 AM	**Efficiency**	13029.69	13382.03	401.46	-352.33	Pass					
	Background										
	Crosstalk	4638.500	4646.925	43.882	-8.425	Pass					
4:15 AM	**Efficiency**										
	Background	0.195	0.096	0.029	0.099	**FAIL**	0.665	0.470	0.063	0.196	**FAIL**
	Crosstalk										
8:52 AM	**Efficiency**										
	Background	0.100	0.096	0.029	0.004	Pass	0.330	0.470	0.063	-0.140	Pass
	Crosstalk										
Detector 12											
12:07 AM	**Efficiency**						0.00	57255.23	1717.66	-57255.23	**FAIL**
	Background										
	Crosstalk						0.000	22.750	5.663	-22.750	NA
12:11 AM	**Efficiency**	0.00	16555.28	496.66	-16555.28	**FAIL**					
	Background										
	Crosstalk	5.000	5593.325	888.555	-5588.325	**DOEF**					
4:15 AM	**Efficiency**										
	Background	0.000	0.073	0.021	-0.073	**FAIL**	0.000	0.483	0.059	-0.483	**FAIL**
	Crosstalk										
Detector 13											
12:07 AM	**Efficiency**						54971.02	55313.48	1659.40	-342.45	Pass
	Background										
	Crosstalk						6.089	8.025	2.603	-1.936	NA
12:11 AM	**Efficiency**	16584.47	16489.13	494.67	95.35	Pass					
	Background										
	Crosstalk	6246.500	5831.525	819.117	414.975	Pass					
4:15 AM	**Efficiency**										
	Background	0.190	0.141	0.019	0.049	Pass	0.640	0.480	0.068	0.160	Pass
	Crosstalk										

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Monday, July 30, 2018

Instrument: Protean

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
Detector 14											
12:07 AM	**Efficiency**						51168.65	51515.98	1545.48	-347.33	Pass
	Background										
	Crosstalk						4.567	0.950	0.742	3.617	NA
12:11 AM	**Efficiency**	14869.63	15209.15	456.27	-339.52	Pass					
	Background										
	Crosstalk	5809.000	5770.450	63.706	38.550	Pass					
4:15 AM	**Efficiency**										
	Background	0.260	0.106	0.036	0.154	**FAIL**	0.885	0.434	0.070	0.451	**FAIL**
	Crosstalk										
8:52 AM	**Efficiency**										
	Background	0.125	0.106	0.036	0.019	Pass	0.465	0.434	0.070	0.031	Pass
	Crosstalk										
Detector 15											
12:07 AM	**Efficiency**						44712.39	45036.85	1351.11	-324.46	Pass
	Background										
	Crosstalk						2.030	2.575	1.417	-0.545	NA
12:11 AM	**Efficiency**	14922.17	14890.68	446.72	31.50	Pass					
	Background										
	Crosstalk	5600.500	5361.500	749.037	239.000	Pass					
4:15 AM	**Efficiency**										
	Background	0.270	0.133	0.018	0.138	**FAIL**	0.650	0.553	0.100	0.097	Pass
	Crosstalk										

The Alpha and Beta +/- limit are based upon initial 20-point population.

The Alpha and Beta +/- limit for Efficiency is stated at 3%. Flags are "FAIL" > 3%.

The Alpha and Beta +/- limit for Background is stated at 1 StDev. Flags are "FAIL" > 3 StDev.

The Alpha +/- limit for Crosstalk is stated at 1 StDev. Flags are "Warning > 2 StDev and "DOEF" > 3 StDev. Beta is negligible, for trend only ("NA").

Times shown reflect the end of the count duration.

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Friday, August 03, 2018

Instrument: Purple

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
Detector 0											
12:57 AM	**Efficiency**						50188.59	50226.98	1506.81	-38.39	Pass
	Background										
	Crosstalk						109.725	260.250	91.636	-150.525	NA
1:17 AM	**Efficiency**	12468.88	12818.03	384.54	-349.14	Pass					
	Background										
	Crosstalk	4263.000	4137.600	27.333	125.400	**DOEF**					
5:17 AM	**Efficiency**										
	Background	0.180	0.119	0.014	0.061	**FAIL**	0.490	0.457	0.079	0.033	Pass
	Crosstalk										
9:09 AM	**Efficiency**										
	Background	0.165	0.119	0.014	0.046	**FAIL**	0.415	0.457	0.079	-0.042	Pass
	Crosstalk										
Detector 1											
12:57 AM	**Efficiency**						48743.26	48796.70	1463.90	-53.44	Pass
	Background										
	Crosstalk						163.323	319.350	91.764	-156.027	NA
1:17 AM	**Efficiency**	13598.23	13847.28	415.42	-249.04	Pass					
	Background										
	Crosstalk	4483.000	4251.525	66.025	231.475	**DOEF**					
5:17 AM	**Efficiency**										
	Background	0.180	0.092	0.035	0.089	Pass	0.430	0.435	0.080	-0.004	Pass
	Crosstalk										
Detector 2											
12:58 AM	**Efficiency**						50846.28	50875.48	1526.26	-29.19	Pass
	Background										
	Crosstalk						26.902	48.425	14.546	-21.523	NA

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Instrument: Purple

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
1:17 AM	**Efficiency**	13892.96	14421.23	432.64	-528.27	**FAIL**					
	Background										
	Crosstalk	4818.000	4765.100	53.594	52.900	Pass					
1:56 AM	**Efficiency**	13752.35	14421.23	432.64	-668.87	**FAIL**					
	Background										
	Crosstalk	4770.000	4765.100	53.594	4.900	Pass					
5:17 AM	**Efficiency**										
	Background	0.145	0.119	0.024	0.026	Pass	0.545	0.475	0.060	0.070	Pass
	Crosstalk										
Detector 3											
12:58 AM	**Efficiency**						60316.12	60107.23	1803.22	208.89	Pass
	Background										
	Crosstalk						1.523	5.750	1.923	-4.227	NA
1:17 AM	**Efficiency**	13074.34	13516.38	405.49	-442.04	**FAIL**					
	Background										
	Crosstalk	4932.500	4697.000	60.596	235.500	**DOEF**					
1:51 AM	**Efficiency**	13234.46	13516.38	405.49	-281.91	Pass					
	Background										
	Crosstalk	4834.500	4697.000	60.596	137.500	**WARNING**					
5:17 AM	**Efficiency**										
	Background	0.130	0.063	0.017	0.067	**FAIL**	0.615	0.388	0.053	0.227	**FAIL**
	Crosstalk										
9:09 AM	**Efficiency**										
	Background	0.090	0.063	0.017	0.027	Pass	0.395	0.388	0.053	0.007	Pass
	Crosstalk										
Detector 4											
12:58 AM	**Efficiency**						57368.10	56940.95	1708.23	427.15	Pass
	Background										
	Crosstalk						2.023	1.075	0.816	0.948	NA

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Instrument: Purple

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
1:18 AM	**Efficiency**	16823.16	16907.73	507.23	-84.56	Pass					
	Background										
	Crosstalk	6138.000	5249.050	86.836	888.950	**DOEF**					
5:17 AM	**Efficiency**										
	Background	0.145	0.110	0.033	0.035	Pass	0.380	0.455	0.083	-0.075	Pass
	Crosstalk										
Detector 5											
12:58 AM	**Efficiency**						55000.60	54659.90	1639.80	340.70	Pass
	Background										
	Crosstalk						2.538	0.750	0.769	1.788	NA
1:18 AM	**Efficiency**	16650.03	16603.10	498.09	46.93	Pass					
	Background										
	Crosstalk	6172.500	5630.275	57.623	542.225	**DOEF**					
5:17 AM	**Efficiency**										
	Background	0.040	0.100	0.026	-0.060	Pass	0.350	0.432	0.060	-0.082	Pass
	Crosstalk										
Detector 6											
12:58 AM	**Efficiency**						52076.34	52013.25	1560.40	63.09	Pass
	Background										
	Crosstalk						3.046	1.125	0.793	1.921	NA
1:18 AM	**Efficiency**	15169.42	15352.98	460.59	-183.56	Pass					
	Background										
	Crosstalk	5757.000	5483.125	60.864	273.875	**DOEF**					
5:17 AM	**Efficiency**										
	Background	0.125	0.079	0.015	0.046	**FAIL**	0.515	0.523	0.073	-0.008	Pass
	Crosstalk										
9:09 AM	**Efficiency**										
	Background	0.050	0.079	0.015	-0.029	Pass	0.370	0.523	0.073	-0.153	Pass
	Crosstalk										

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Instrument: Purple

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
Detector 7											
12:58 AM	**Efficiency**						45491.71	45069.13	1352.07	422.59	Pass
	Background										
	Crosstalk						3.553	0.575	0.591	2.978	NA
1:18 AM	**Efficiency**	15060.83	15280.13	458.40	-219.29	Pass					
	Background										
	Crosstalk	5781.500	5238.075	59.071	543.425	**DOEF**					
5:17 AM	**Efficiency**										
	Background	0.095	0.105	0.027	-0.009	Pass	0.510	0.475	0.061	0.035	Pass
	Crosstalk										
Detector 8											
1:01 AM	**Efficiency**						50263.21	50025.35	1500.76	237.86	Pass
	Background										
	Crosstalk						35.023	27.925	7.162	7.098	NA
1:21 AM	**Efficiency**	12511.41	12654.18	379.63	-142.76	Pass					
	Background										
	Crosstalk	4156.000	3940.575	65.191	215.425	**DOEF**					
5:17 AM	**Efficiency**										
	Background	0.080	0.074	0.016	0.006	Pass	0.515	0.408	0.057	0.108	Pass
	Crosstalk										
Detector 9											
1:01 AM	**Efficiency**						53868.97	48665.90	1459.98	5203.07	**FAIL**
	Background										
	Crosstalk						17.765	14.375	3.324	3.390	NA
1:21 AM	**Efficiency**	13405.58	13601.78	408.05	-196.19	Pass					
	Background										
	Crosstalk	4635.000	4499.925	53.320	135.075	**WARNING**					

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: Purple

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
1:51 AM	**Efficiency**						48741.55	48665.90	1459.98	75.65	Pass
	Background										
	Crosstalk						20.811	14.375	3.324	6.436	NA
5:17 AM	**Efficiency**										
	Background	0.125	0.067	0.018	0.058	**FAIL**	0.440	0.417	0.071	0.024	Pass
	Crosstalk										
9:09 AM	**Efficiency**										
	Background	0.110	0.067	0.018	0.043	Pass	0.395	0.417	0.071	-0.022	Pass
	Crosstalk										
Detector 10											
1:01 AM	**Efficiency**						50989.24	50649.48	1519.48	339.77	Pass
	Background										
	Crosstalk						23.349	13.700	5.220	9.649	NA
1:21 AM	**Efficiency**	13938.49	14212.15	426.36	-273.66	Pass					
	Background										
	Crosstalk	4938.000	4846.950	72.642	91.050	Pass					
5:18 AM	**Efficiency**										
	Background	0.115	0.082	0.020	0.033	Pass	0.355	0.361	0.058	-0.006	Pass
	Crosstalk										
Detector 11											
1:01 AM	**Efficiency**						59766.12	59849.50	1795.49	-83.38	Pass
	Background										
	Crosstalk						20.811	24.050	6.063	-3.239	NA
1:21 AM	**Efficiency**	13259.47	13390.48	401.71	-131.00	Pass					
	Background										
	Crosstalk	4714.500	4510.725	57.644	203.775	**DOEF**					
5:18 AM	**Efficiency**										
	Background	0.060	0.082	0.022	-0.022	Pass	0.440	0.430	0.057	0.011	Pass
	Crosstalk										

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: ***Purple***

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
Detector 12											
1:01 AM	**Efficiency**						57184.12	57028.43	1710.85	155.69	Pass
	Background										
	Crosstalk						22.841	8.875	2.345	13.966	NA
1:21 AM	**Efficiency**	17061.84	17069.95	512.10	-8.11	Pass					
	Background										
	Crosstalk	5711.000	5754.475	74.086	-43.475	Pass					
5:18 AM	**Efficiency**										
	Background	0.130	0.079	0.017	0.051	**FAIL**	0.495	0.419	0.043	0.076	Pass
	Crosstalk										
9:10 AM	**Efficiency**										
	Background	0.105	0.079	0.017	0.026	Pass	0.330	0.419	0.043	-0.089	Pass
	Crosstalk										
Detector 13											
1:01 AM	**Efficiency**						55760.51	55607.25	1668.22	153.26	Pass
	Background										
	Crosstalk						12.690	17.250	2.414	-4.560	NA
1:21 AM	**Efficiency**	17083.85	17214.35	516.43	-130.50	Pass					
	Background										
	Crosstalk	5722.500	5504.975	107.414	217.525	**WARNING**					
5:18 AM	**Efficiency**										
	Background	0.135	0.073	0.017	0.062	**FAIL**	0.335	0.351	0.051	-0.016	Pass
	Crosstalk										
9:10 AM	**Efficiency**										
	Background	0.110	0.073	0.017	0.037	Pass	0.315	0.351	0.051	-0.036	Pass
	Crosstalk										
Detector 14											

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: Purple

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
1:01 AM	**Efficiency**						52320.89	52310.05	1569.30	10.84	Pass
	Background										
	Crosstalk						16.243	9.625	2.182	6.618	NA
1:21 AM	**Efficiency**	15304.01	15614.75	468.44	-310.74	Pass					
	Background										
	Crosstalk	5280.000	5358.675	50.187	-78.675	Pass					
5:18 AM	**Efficiency**										
	Background	0.085	0.071	0.019	0.015	Pass	0.325	0.324	0.043	0.001	Pass
	Crosstalk										
Detector 15											
1:01 AM	**Efficiency**						45103.78	45182.03	1355.46	-78.25	Pass
	Background										
	Crosstalk						16.750	9.200	2.441	7.550	NA
1:21 AM	**Efficiency**	15217.24	15117.25	453.52	99.99	Pass					
	Background										
	Crosstalk	5355.500	4871.075	600.751	484.425	Pass					
5:18 AM	**Efficiency**										
	Background	0.180	0.075	0.017	0.105	**FAIL**	0.480	0.403	0.069	0.078	Pass
	Crosstalk										
9:10 AM	**Efficiency**										
	Background	0.175	0.075	0.017	0.100	**FAIL**	0.345	0.403	0.069	-0.058	Pass
	Crosstalk										
Detector 16											
1:04 AM	**Efficiency**						49561.98	49489.98	1484.70	72.00	Pass
	Background										
	Crosstalk						26.902	22.125	4.707	4.777	NA
1:25 AM	**Efficiency**	12306.25	12631.78	378.95	-325.53	Pass					
	Background										
	Crosstalk	4059.500	3761.825	61.842	297.675	**DOEF**					

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: Purple

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
5:18 AM	**Efficiency**										
	Background	0.100	0.067	0.017	0.033	Pass	0.340	0.400	0.068	-0.060	Pass
	Crosstalk										
Detector 17											
1:04 AM	**Efficiency**						46469.88	46812.78	1404.38	-342.89	Pass
	Background										
	Crosstalk						1780.099	1717.750	90.777	62.349	NA
1:25 AM	**Efficiency**	13858.41	13907.10	417.21	-48.69	Pass					
	Background										
	Crosstalk	4090.500	4136.325	63.925	-45.825	Pass					
5:18 AM	**Efficiency**										
	Background	0.170	0.123	0.031	0.047	Pass	0.320	0.313	0.052	0.007	Pass
	Crosstalk										
Detector 18											
1:04 AM	**Efficiency**						50169.63	50124.63	1503.74	45.00	Pass
	Background										
	Crosstalk						14.212	9.575	2.966	4.637	NA
1:25 AM	**Efficiency**	13717.81	14192.53	425.78	-474.72	**FAIL**					
	Background										
	Crosstalk	4982.500	4822.800	47.757	159.700	**DOEF**					
1:58 AM	**Efficiency**	13690.79	14192.53	425.78	-501.74	**FAIL**					
	Background										
	Crosstalk	4959.000	4822.800	47.757	136.200	**WARNING**					
5:19 AM	**Efficiency**										
	Background	0.080	0.065	0.017	0.015	Pass	0.340	0.357	0.043	-0.017	Pass
	Crosstalk										
Detector 19											

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: Purple

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
1:04 AM	**Efficiency**						59824.43	60073.05	1802.19	-248.62	Pass
	Background										
	Crosstalk						72.077	55.325	8.301	16.752	NA
1:25 AM	**Efficiency**	13366.04	13562.28	406.87	-196.23	Pass					
	Background										
	Crosstalk	4547.500	4355.900	55.822	191.600	**DOEF**					
5:18 AM	**Efficiency**										
	Background	0.135	0.099	0.020	0.036	Pass	0.540	0.486	0.055	0.054	Pass
	Crosstalk										
Detector 20											
1:04 AM	**Efficiency**						57112.87	57328.65	1719.86	-215.78	Pass
	Background										
	Crosstalk						66.494	40.550	7.024	25.944	NA
1:29 AM	**Efficiency**	17192.42	17215.45	516.46	-23.03	Pass					
	Background										
	Crosstalk	5687.000	5605.225	42.547	81.775	Pass					
5:18 AM	**Efficiency**										
	Background	0.045	0.084	0.018	-0.039	Pass	0.615	0.549	0.058	0.066	Pass
	Crosstalk										
Detector 21											
1:04 AM	**Efficiency**						54774.24	54662.13	1639.86	112.12	Pass
	Background										
	Crosstalk						43.652	32.275	5.908	11.377	NA
1:25 AM	**Efficiency**	16568.95	16751.35	502.54	-182.40	Pass					
	Background										
	Crosstalk	5730.000	5681.525	48.731	48.475	Pass					
5:18 AM	**Efficiency**										
	Background	0.110	0.069	0.017	0.042	Pass	0.360	0.328	0.051	0.033	Pass
	Crosstalk										

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, August 03, 2018

Instrument: Purple

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
Detector 22											
1:04 AM	**Efficiency**						52426.33	52239.03	1567.17	187.30	Pass
	Background										
	Crosstalk						22.334	11.975	3.768	10.359	NA
1:29 AM	**Efficiency**	15387.56	15704.48	471.13	-316.91	Pass					
	Background										
	Crosstalk	5200.500	5093.125	47.821	107.375	**WARNING**					
5:18 AM	**Efficiency**										
	Background	0.105	0.068	0.016	0.037	Pass	0.400	0.341	0.056	0.059	Pass
	Crosstalk										
Detector 23											
1:04 AM	**Efficiency**						45814.45	45717.00	1371.51	97.45	Pass
	Background										
	Crosstalk						4.061	0.375	0.358	3.686	NA
1:25 AM	**Efficiency**	15313.01	15502.55	465.08	-189.54	Pass					
	Background										
	Crosstalk	5864.000	5773.975	41.468	90.025	**WARNING**					
5:18 AM	**Efficiency**										
	Background	0.075	0.090	0.014	-0.015	Pass	0.260	0.486	0.070	-0.226	**FAIL**
	Crosstalk										
9:10 AM	**Efficiency**										
	Background	0.120	0.090	0.014	0.031	Pass	0.425	0.486	0.070	-0.061	Pass
	Crosstalk										

The Alpha and Beta +/- limit are based upon initial 20-point population.

The Alpha and Beta +/- limit for Efficiency is stated at 3%. Flags are "FAIL" > 3%.

The Alpha and Beta +/- limit for Background is stated at 1 StDev. Flags are "FAIL" > 3 StDev.

The Alpha +/- limit for Crosstalk is stated at 1 StDev. Flags are "Warning > 2 StDev and "DOEF" > 3 StDev. Beta is negligible, for trend only ("NA").

Times shown reflect the end of the count duration.

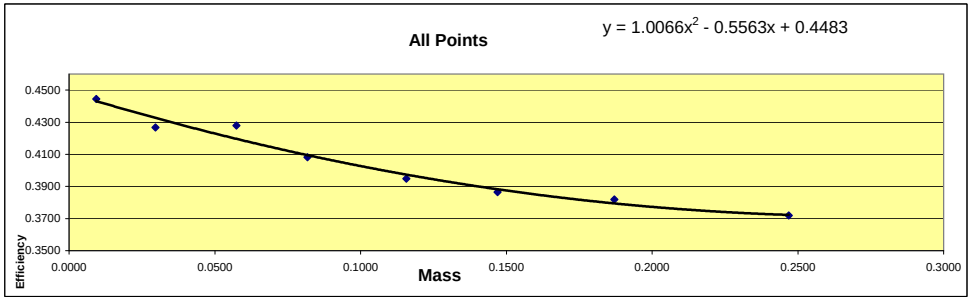
Alpha Beta Calibrations

Curve is for Gross Beta
Strontium 90
and
Total Strontium

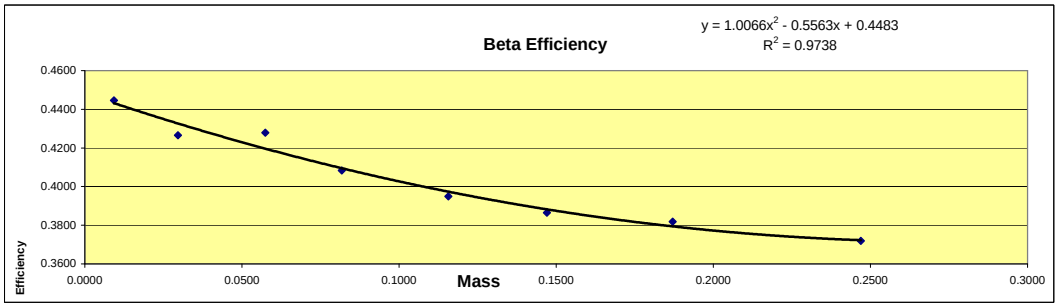
Protean 0

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41414.371 CPM	Sr-90 Eff	Standard Aliquot
0	B1	3/27/2013 12:24:34 AM	0.0093	1.01	18594	18409.901	0.4445	1mL
0	B2	3/27/2013 9:20:47 AM	0.0296	1.01	17845	17668.317	0.4266	1mL
0	B3	3/27/2013 8:55:13 AM	0.0574	1.01	17895	17717.822	0.4278	1mL
0	B4	3/27/2013 8:50:39 AM	0.0818	1.01	17078	16908.911	0.4083	1mL
0	B5	3/27/2013 2:15:46 AM	0.1157	1.01	16518	16354.455	0.3949	1mL
0	B6	3/27/2013 1:06:53 AM	0.1470	1.01	16166	16005.941	0.3865	1mL
0	B7	3/27/2013 12:52:20 AM	0.1871	1.01	15970	15811.881	0.3818	1mL
0	B8	3/27/2013 12:33:51 AM	0.2469	1.01	15554	15400.000	0.3719	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4445	0.4432	0.30%
0.0296	0.4266	0.4327	-1.41%
0.0574	0.4278	0.4197	1.94%
0.0818	0.4083	0.4095	-0.30%
0.1157	0.3949	0.3974	-0.63%
0.1470	0.3865	0.3883	-0.46%
0.1871	0.3818	0.3795	0.62%
0.2469	0.3719	0.3723	-0.12%



Mass	Efficiency
0.0093	0.4445
0.0296	0.4266
0.0574	0.4278
0.0818	0.4083
0.1157	0.3949
0.1470	0.3865
0.1871	0.3818
0.2469	0.3719



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

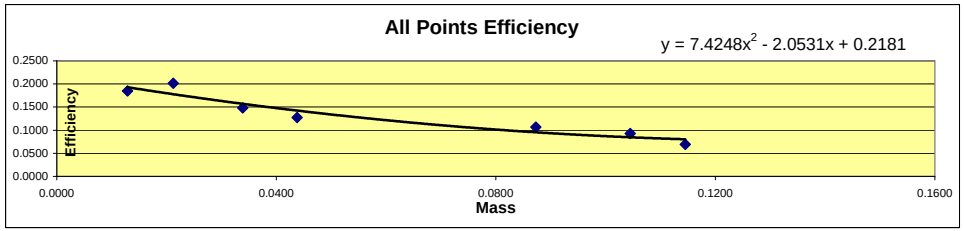
Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	3/27/2013
Elapsed Time:	1287.000 days
Half Life:	10409.625 days
Exponential Term:	0.91787171
Corrected Activity:	20707.1857 dpm/mL
Decay Activity (Sr/Y-90)	41414.3714 dpm

Curve is for Gross Alpha

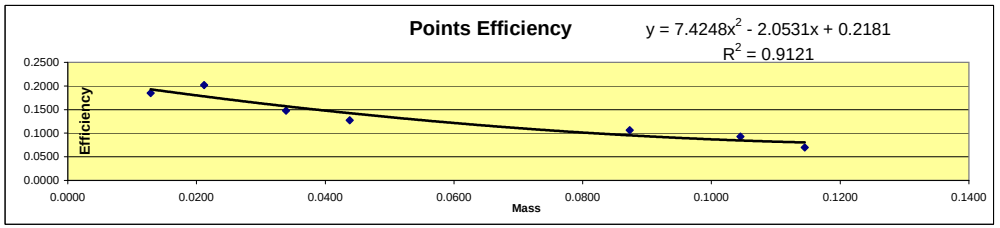
Protean 0

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
0	ICABT-51465;A1	11/13/2015 1:18:49 PM	50	21949	438.980	2374.5	0.1849	1mL	0.0129
0	ICABT-51465;A2	11/15/2015 6:17:57 PM	20.89	10003	478.842	2374.5	0.2017	1mL	0.0212
0	ICABT-51465;A3	11/15/2015 2:39:37 PM	28.46	10002	351.441	2374.5	0.1480	1mL	0.0339
0	ICABT-51465;A4	11/15/2015 1:38:18 PM	33.02	10000	302.847	2374.5	0.1275	1mL	0.0438
0	ICABT-51465;A6	11/15/2015 11:16:21 PM	19.82	10007	504.894	4749.0	0.1063	2mL	0.0873
0	ICABT-51465;A7	11/15/2015 10:33:57 PM	22.71	10004	440.511	4749.0	0.0928	2mL	0.1045
0	ICABT-51465;A8	11/15/2015 9:23:24 PM	30.28	10000	330.251	4749.0	0.0695	2mL	0.1145

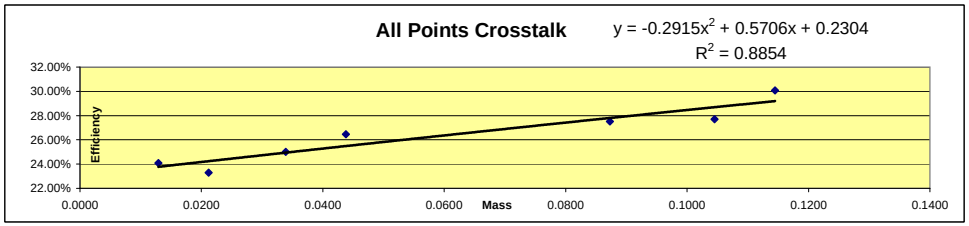
Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0129	0.1849	0.1929	-4.14%
0.0212	0.2017	0.1779	13.35%
0.0339	0.1480	0.1570	-5.75%
0.0438	0.1275	0.1424	-10.45%
0.0873	0.1063	0.0955	11.38%
0.1045	0.0928	0.0846	9.60%
0.1145	0.0695	0.0804	-13.46%



Mass	Efficiency
0.0129	0.1849
0.0212	0.2017
0.0339	0.1480
0.0438	0.1275
0.0873	0.1063
0.1045	0.0928
0.1145	0.0695



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
0	ICABT-51465;A1	0.0129	50	21949	6967	438.98	139.34	24.09%	Min
0	ICABT-51465;A2	0.0212	20.89	10003	3037	478.84	145.3805649	23.29%	23.29%
0	ICABT-51465;A3	0.0339	28.46	10002	3336	351.44	117.2171469	25.01%	
0	ICABT-51465;A4	0.0438	33.02	10000	3599	302.85	108.9945488	26.47%	Max
0	ICABT-51465;A6	0.0873	19.82	10007	3797	504.89	191.5741675	27.51%	30.07%
0	ICABT-51465;A7	0.1045	22.71	10004	3832	440.51	168.7362395	27.70%	
0	ICABT-51465;A8	0.1145	30.28	10000	4301	330.25	142.0409511	30.07%	Mean
									26.31%



Standard ID
Thorium-230
Th-230_00016 #51465
Cert # 92523 Ref. date 11/29/2012
Activity 2374.5 dpm/mL

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08/09/2018

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-6322;B1*** **Repeat** ***1***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:23 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	7	6.931	6.895
sd	0.000			0.006	2.646	2.620	2.620
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	18,594	18,409.901	18,409.342
sd	0.000			0.024	136.360	135.010	135.010

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-6322;B8*** **Repeat** ***2***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:32 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	6	5.941	5.905
sd	0.000			0.006	2.449	2.425	2.425
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	15,554	15,400.000	15,399.441
sd	0.000			0.024	124.716	123.481	123.481

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-6322;B7*** **Repeat** ***3***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:51 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	14	13.861	13.825
sd	0.000			0.006	3.742	3.705	3.705
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	15,970	15,811.881	15,811.322
sd	0.000			0.024	126.372	125.121	125.121

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-6322;B6*** **Repeat** ***4***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 01:05 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	11	10.891	10.855
sd	0.000			0.006	3.317	3.284	3.284
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	16,166	16,005.941	16,005.382
sd	0.000			0.024	127.146	125.887	125.887

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-6322;B5*** **Repeat** ***6***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 02:14 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	9	8.911	8.875
sd	0.000			0.006	3.000	2.970	2.970
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	16,518	16,354.455	16,353.896
sd	0.000			0.024	128.522	127.250	127.250

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-6322;B4*** **Repeat** ***7***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 08:49 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	6	5.941	5.905
sd	0.000			0.006	2.449	2.425	2.425
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	17,078	16,908.911	16,908.352
sd	0.000			0.024	130.683	129.389	129.389

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-6322;B3*** **Repeat** ***8***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 08:54 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	10	9.901	9.865
sd	0.000			0.006	3.162	3.131	3.131
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	17,895	17,717.822	17,717.263
sd	0.000			0.024	133.772	132.448	132.448

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-6322;B2*** **Repeat** ***9***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:19 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	14	13.861	13.825
sd	0.000			0.006	3.742	3.705	3.705
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	17,845	17,668.317	17,667.758
sd	0.000			0.024	133.585	132.263	132.263

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-51465;A1*** **Repeat** ***39***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/13/201! 12:28 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	21,949	438.980	438.909
sd	0.000			0.008	148.152	2.963	2.963
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	6,967	139.340	138.719
sd	0.000			0.025	83.469	1.669	1.670

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-51465;A4*** **Repeat** ***40***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 13:05 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 33.02 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,000	302.847	302.776
sd	0.000			0.008	100.000	3.028	3.028
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	3,599	108.995	108.374
sd	0.000			0.025	59.992	1.817	1.817

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-51465;A3*** **Repeat** ***41***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 14:11 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 28.46 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,002	351.441	351.370
sd	0.000			0.008	100.010	3.514	3.514
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	3,336	117.217	116.596
sd	0.000			0.025	57.758	2.029	2.030

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-51465;A2*** **Repeat** ***42***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 17:57 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 20.89 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,003	478.842	478.771
sd	0.000			0.008	100.015	4.788	4.788
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	3,037	145.381	144.760
sd	0.000			0.025	55.109	2.638	2.638

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-51465;A8*** **Repeat** ***40***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 20:53 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.28 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,000	330.251	330.180
sd	0.000			0.008	100.000	3.303	3.303
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	4,301	142.041	141.420
sd	0.000			0.025	65.582	2.166	2.166

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-51465;A7*** **Repeat** ***41***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 22:11 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 22.71 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,004	440.511	440.440
sd	0.000			0.008	100.020	4.404	4.404
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	3,832	168.736	168.115
sd	0.000			0.025	61.903	2.726	2.726

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-51465;A6*** **Repeat** ***42***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 22:56 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 19.82 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,007	504.894	504.823
sd	0.000			0.008	100.035	5.047	5.047
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	3,797	191.574	190.953
sd	0.000			0.025	61.620	3.109	3.109

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

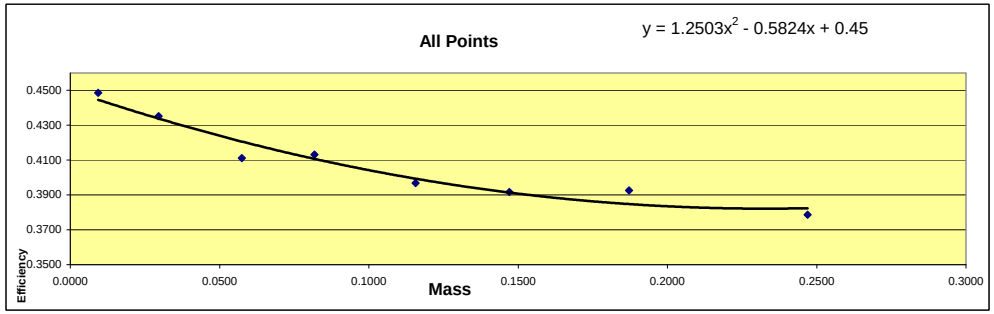
*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Curve is for Gross Beta
Strontium 90
and
Total Strontium

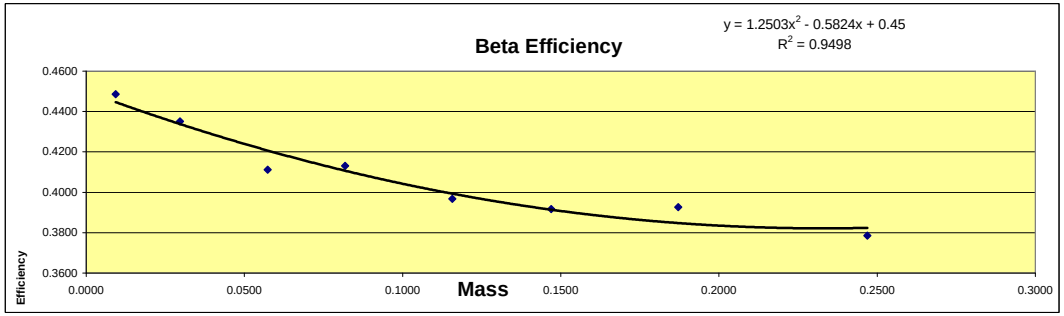
Protean 1

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41414.371 CPM	Sr-90 Eff	Standard Aliquot
1	B1	3/27/2013 12:33:56 AM	0.0093	1.01	18766	18580.198	0.4486	1mL
1	B2	3/27/2013 12:24:46 AM	0.0296	1.01	18203	18022.772	0.4352	1mL
1	B3	3/27/2013 9:20:52 AM	0.0574	1.01	17197	17026.733	0.4111	1mL
1	B4	3/27/2013 8:55:22 AM	0.0818	1.01	17282	17110.891	0.4132	1mL
1	B5	3/27/2013 8:50:46 AM	0.1157	1.01	16596	16431.683	0.3968	1mL
1	B6	3/27/2013 2:15:52 AM	0.1470	1.01	16384	16221.782	0.3917	1mL
1	B7	3/27/2013 1:10:03 AM	0.1871	1.01	16421	16258.416	0.3926	1mL
1	B8	3/27/2013 12:52:33 AM	0.2469	1.01	15836	15679.208	0.3786	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4486	0.4447	0.89%
0.0296	0.4352	0.4339	0.31%
0.0574	0.4111	0.4207	-2.27%
0.0818	0.4132	0.4107	0.59%
0.1157	0.3968	0.3994	-0.65%
0.1470	0.3917	0.3914	0.07%
0.1871	0.3926	0.3848	2.02%
0.2469	0.3786	0.3824	-1.00%



Mass	Efficiency
0.0093	0.4486
0.0296	0.4352
0.0574	0.4111
0.0818	0.4132
0.1157	0.3968
0.1470	0.3917
0.1871	0.3926
0.2469	0.3786



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

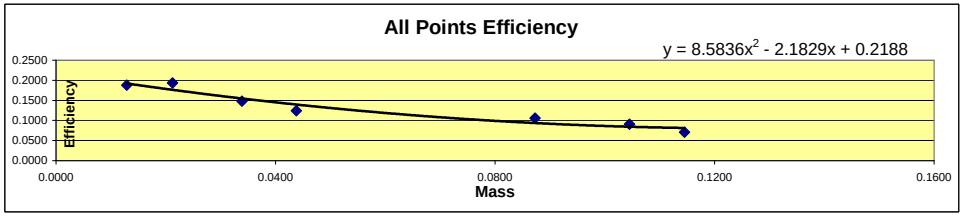
Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	3/27/2013
Elapsed Time:	1287.000 days
Half Life:	10409.625 days
Exponential Term:	0.917871706
Corrected Activity:	20707.18568 dpm/mL
Decay Activity (Sr/Y-90)	41414.37137 dpm

Curve is for Gross Alpha

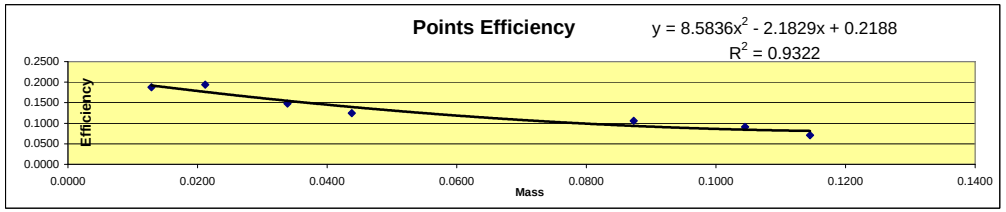
Protean 1

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
1	ICABT-51465I;A1	11/15/2015 1:27:50 PM	22.43	10004	446.010	2374.5	0.1878	1mL	0.0129
1	ICABT-51465I;A2	11/13/2015 1:18:58 PM	50	23017	460.340	2374.5	0.1939	1mL	0.0212
1	ICABT-51465;A3	11/15/2015 6:25:34 PM	28.44	10002	351.688	2374.5	0.1481	1mL	0.0339
1	ICABT-51465;A4	11/15/2015 2:45:06 PM	33.88	10002	295.218	2374.5	0.1243	1mL	0.0438
1	ICABT-51465I;A6	11/14/2015 9:57:48 PM	50	25132	502.640	4749.0	0.1058	2mL	0.0873
1	ICABT-51465I;A7	11/15/2015 11:19:41 PM	23.12	10004	432.699	4749.0	0.0911	2mL	0.1045
1	ICABT-51465I;A8	11/15/2015 10:41:00 PM	29.7	10003	336.801	4749.0	0.0709	2mL	0.1145

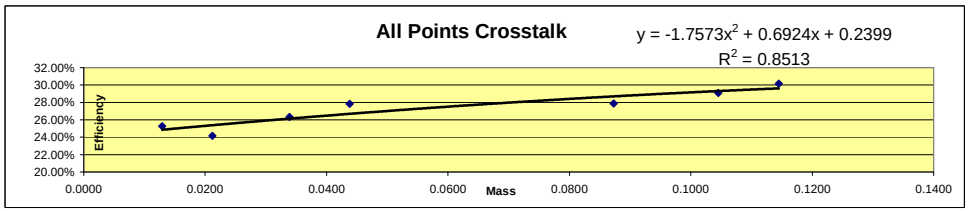
Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0129	0.1878	0.1921	-2.21%
0.0212	0.1939	0.1764	9.91%
0.0339	0.1481	0.1547	-4.24%
0.0438	0.1243	0.1397	-10.98%
0.0873	0.1058	0.0937	13.02%
0.1045	0.0911	0.0844	7.93%
0.1145	0.0709	0.0814	-12.86%



Mass	Efficiency
0.0129	0.1878
0.0212	0.1939
0.0339	0.1481
0.0438	0.1243
0.0873	0.1058
0.1045	0.0911
0.1145	0.0709



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
1	ICABT-51465I;A1	0.0129	22.43	10004	3383	446.01	150.8247882	25.27%	Min
1	ICABT-51465I;A2	0.0212	50	23017	7336	460.34	146.72	24.17%	24.17%
1	ICABT-51465;A3	0.0339	28.44	10002	3575	351.69	125.7032349	26.33%	
1	ICABT-51465;A4	0.0438	33.88	10002	3856	295.22	113.8134593	27.83%	Max
1	ICABT-51465I;A6	0.0873	50	25132	9717	502.64	194.34	27.88%	30.14%
1	ICABT-51465I;A7	0.1045	23.12	10004	4101	432.70	177.3788927	29.07%	
1	ICABT-51465I;A8	0.1145	29.7	10003	4316	336.80	145.3198653	30.14%	Mean
									27.24%



Standard ID
Thorium-230
Th-230_00016 #51465
Cert # 92523 Ref. date 11/29/2012
Activity 2374.5 dpm/mL

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Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-6322;B2*** **Repeat** ***1***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:23 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	38	37.624	37.583
sd	0.000			0.006	6.164	6.103	6.103
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	18,203	18,022.772	18,022.305
sd	0.000			0.022	134.918	133.583	133.583

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-6322;B1*** **Repeat** *2*

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:32 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	50	49.505	49.464
sd	0.000			0.006	7.071	7.001	7.001
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	18,766	18,580.198	18,579.731
sd	0.000			0.022	136.989	135.633	135.633

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** ***1***

Sample ID ***ICABT-6322;B8*** **Repeat** ***3***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:51 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	27	26.733	26.692
sd	0.000			0.006	5.196	5.145	5.145
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	15,836	15,679.208	15,678.741
sd	0.000			0.022	125.841	124.595	124.595

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** ***1***

Sample ID ***ICABT-6322;B7*** **Repeat** ***5***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 01:09 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	26	25.743	25.702
sd	0.000			0.006	5.099	5.049	5.049
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	16,421	16,258.416	16,257.949
sd	0.000			0.022	128.144	126.876	126.876

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** ***1***

Sample ID ***ICABT-6322;B6*** **Repeat** ***6***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 02:14 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	31	30.693	30.652
sd	0.000			0.006	5.568	5.513	5.513
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	16,384	16,221.782	16,221.315
sd	0.000			0.022	128.000	126.733	126.733

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** ***1***

Sample ID ***ICABT-6322;B5*** **Repeat** ***7***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 08:49 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	18	17.822	17.781
sd	0.000			0.006	4.243	4.201	4.201
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	16,596	16,431.683	16,431.216
sd	0.000			0.022	128.825	127.550	127.550

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** ***1***

Sample ID ***ICABT-6322;B4*** **Repeat** ***8***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 08:54 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	36	35.644	35.603
sd	0.000			0.006	6.000	5.941	5.941
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	17,282	17,110.891	17,110.424
sd	0.000			0.022	131.461	130.159	130.159

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** ***1***

Sample ID ***ICABT-6322;B3*** **Repeat** ***9***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:19 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	27	26.733	26.692
sd	0.000			0.006	5.196	5.145	5.145
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	17,197	17,026.733	17,026.266
sd	0.000			0.022	131.137	129.839	129.839

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-51465;A2*** **Repeat** ***39***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/13/201! 12:28 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	23,017	460.340	460.260
sd	0.000			0.009	151.714	3.034	3.034
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	7,336	146.720	146.226
sd	0.000			0.022	85.650	1.713	1.713

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** ***1***

Sample ID ***ICABT-51465;A6*** **Repeat** ***39***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/14/201! 21:07 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	25,132	502.640	502.560
sd	0.000			0.009	158.531	3.171	3.171
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	9,717	194.340	193.846
sd	0.000			0.022	98.575	1.971	1.972

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-51465;A1*** **Repeat** ***40***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 13:05 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 22.43 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	10,004	446.010	445.930
sd	0.000			0.009	100.020	4.459	4.459
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	3,383	150.825	150.331
sd	0.000			0.022	58.164	2.593	2.593

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-51465;A4*** **Repeat** ***41***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 14:11 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 33.88 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	10,002	295.218	295.138
sd	0.000			0.009	100.010	2.952	2.952
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	3,856	113.813	113.319
sd	0.000			0.022	62.097	1.833	1.833

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-51465;A3*** **Repeat** ***42***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 17:57 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 28.44 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	10,002	351.688	351.608
sd	0.000			0.009	100.010	3.517	3.517
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	3,575	125.703	125.209
sd	0.000			0.022	59.791	2.102	2.102

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** ***1***

Sample ID ***ICABT-51465;A8*** **Repeat** ***41***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 22:11 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 29.70 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	10,003	336.801	336.721
sd	0.000			0.009	100.015	3.368	3.368
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	4,316	145.320	144.826
sd	0.000			0.022	65.696	2.212	2.212

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-51465;A7*** **Repeat** ***42***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 22:56 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 23.12 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	10,004	432.699	432.619
sd	0.000			0.009	100.020	4.326	4.326
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	4,101	177.379	176.885
sd	0.000			0.022	64.039	2.770	2.770

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

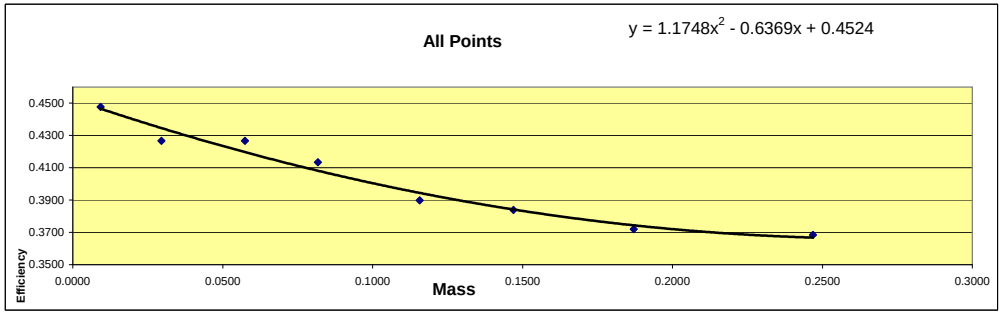
*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Curve is for Gross Beta
Strontium 90
and
Total Strontium

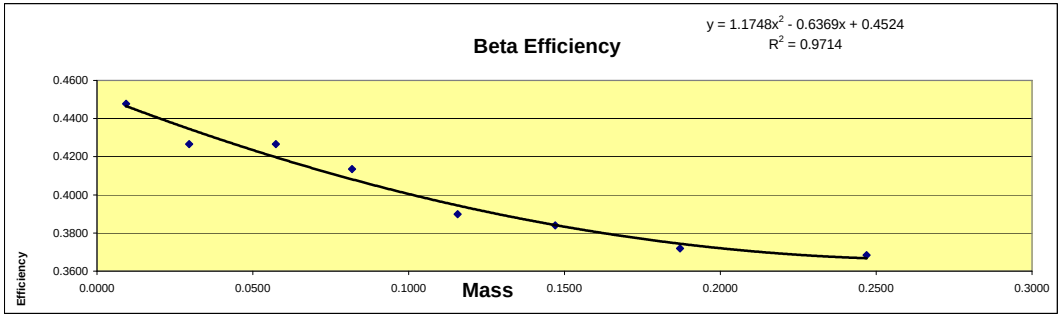
Protean 5

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41414.371 CPM 18545.545	Sr-90 Eff	Standard Aliquot
5	B1	3/27/2013 8:51:21 AM	0.0093	1.01	18731		0.4478	1mL
5	B2	3/27/2013 2:16:23 AM	0.0296	1.01	17847	17670.297	0.4267	1mL
5	B3	3/27/2013 1:10:45 AM	0.0574	1.01	17845	17668.317	0.4266	1mL
5	B4	3/27/2013 12:52:36 AM	0.0818	1.01	17296	17124.752	0.4135	1mL
5	B5	3/27/2013 12:34:19 AM	0.1157	1.01	16309	16147.525	0.3899	1mL
5	B6	3/27/2013 12:25:10 AM	0.1470	1.01	16061	15901.980	0.3840	1mL
5	B7	3/27/2013 9:21:18 AM	0.1871	1.01	15558	15403.960	0.3719	1mL
5	B8	3/27/2013 8:56:23 AM	0.2469	1.01	15409	15256.436	0.3684	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4478	0.4466	0.27%
0.0296	0.4267	0.4346	-1.82%
0.0574	0.4266	0.4197	1.65%
0.0818	0.4135	0.4082	1.31%
0.1157	0.3899	0.3944	-1.15%
0.1470	0.3840	0.3842	-0.05%
0.1871	0.3719	0.3744	-0.64%
0.2469	0.3684	0.3668	0.44%



Mass	Efficiency
0.0093	0.4478
0.0296	0.4267
0.0574	0.4266
0.0818	0.4135
0.1157	0.3899
0.1470	0.3840
0.1871	0.3719
0.2469	0.3684



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

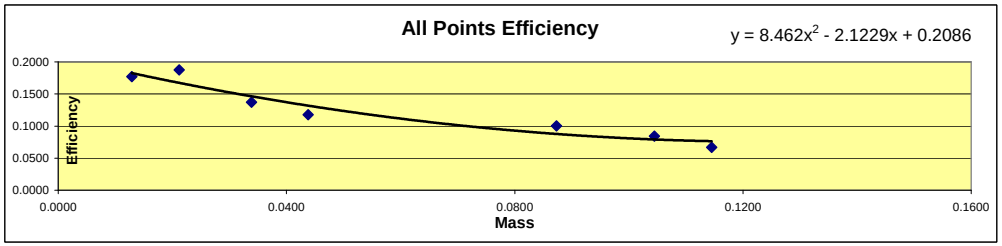
Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	3/27/2013
Elapsed Time:	1287.000 days
Half Life:	10409.625 days
Exponential Term:	0.917871706
Corrected Activity:	20707.18568 dpm/mL
Decay Activity (Sr/Y-90)	41414.37137 dpm

Curve is for Gross Alpha

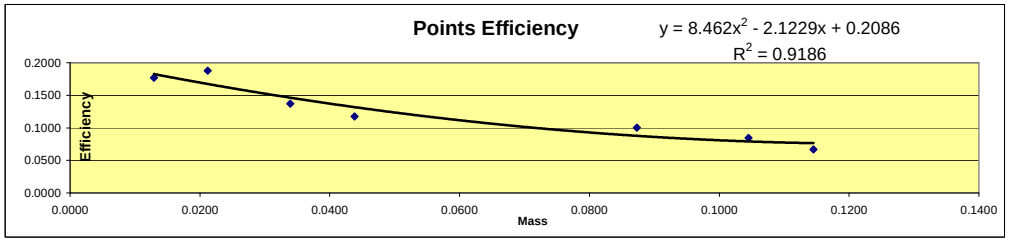
Protean 5

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
5	ICABT-51465;A1	11/24/2015 3:02:55	50	21017	420.340	2374.5	0.1770	1mL	0.0129
5	ICABT-51465;A2	11/24/2015 12:57:49	50	22292	445.840	2374.5	0.1878	1mL	0.0212
5	ICABT-51465;A3	11/24/2015 4:51:28	30.68	10002	326.010	2374.5	0.1373	1mL	0.0339
5	ICABT-51465;A4	11/24/2015 3:50:45	35.83	10000	279.096	2374.5	0.1175	1mL	0.0438
5	ICABT-51465;A6	11/24/2015 6:08:44	20.96	10002	477.195	4749.0	0.1005	2mL	0.0873
5	ICABT-51465;A7	11/24/2015 9:06:33	24.94	10002	401.043	4749.0	0.0844	2mL	0.1045
5	ICABT-51465;A8	11/24/2015 8:06:23	31.51	10002	317.423	4749.0	0.0668	2mL	0.1145

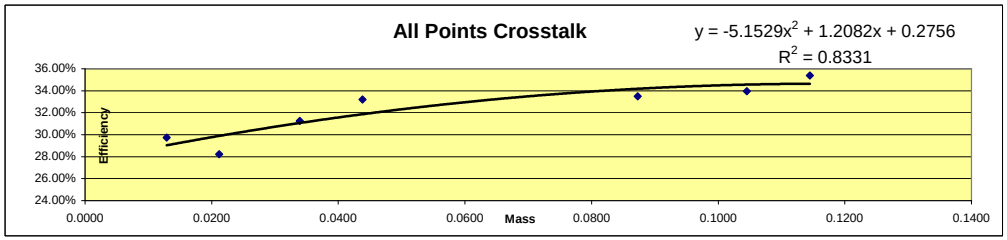
Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0129	0.1770	0.1826	-3.07%
0.0212	0.1878	0.1674	12.17%
0.0339	0.1373	0.1464	-6.19%
0.0438	0.1175	0.1319	-10.85%
0.0873	0.1005	0.0878	14.49%
0.1045	0.0844	0.0792	6.67%
0.1145	0.0668	0.0765	-12.59%



Mass	Efficiency
0.0129	0.1770
0.0212	0.1878
0.0339	0.1373
0.0438	0.1175
0.0873	0.1005
0.1045	0.0844
0.1145	0.0668



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
5	ICABT-51465;A1	0.0129	50	21017	8891	420.34	177.82	29.73%	Min
5	ICABT-51465;A2	0.0212	50	22292	8770	445.84	175.40	28.23%	28.23%
5	ICABT-51465;A3	0.0339	30.68	10002	4545	326.01	148.14	31.24%	
5	ICABT-51465;A4	0.0438	35.83	10000	4973	279.10	138.79	33.21%	Max
5	ICABT-51465;A6	0.0873	20.96	10002	5035	477.19	240.22	33.48%	35.38%
5	ICABT-51465;A7	0.1045	24.94	10002	5146	401.04	206.34	33.97%	
5	ICABT-51465;A8	0.1145	31.51	10002	5475	317.42	173.75	35.38%	Mean
									32.18%



Standard ID
Thorium-230
Th-230_00016 #51465
Cert # 92523 Ref. date 11/29/2012
Activity 2374.5 dpm/mL

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** ***5***

Sample ID ***ICABT-6322;B6*** **Repeat** ***1***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:24 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.033	0	0.000	-0.033
sd	0.000			0.006	0.000	0.000	0.256
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	16,061	15,901.980	15,901.591
sd	0.000			0.020	126.732	125.477	125.477

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** *5*

Sample ID ***ICABT-6322;B5*** **Repeat** *2*

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:33 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.033	0	0.000	-0.033
sd	0.000			0.006	0.000	0.000	0.256
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	16,309	16,147.525	16,147.136
sd	0.000			0.020	127.707	126.442	126.442

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** ***5***

Sample ID ***ICABT-6322;B4*** **Repeat** ***3***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:51 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.033	0	0.000	-0.033
sd	0.000			0.006	0.000	0.000	0.256
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	17,296	17,124.752	17,124.363
sd	0.000			0.020	131.514	130.212	130.212

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** ***5***

Sample ID ***ICABT-6322;B3*** **Repeat** ***5***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 01:09 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.033	2	1.980	1.947
sd	0.000			0.006	1.414	1.400	1.400
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	17,845	17,668.317	17,667.928
sd	0.000			0.020	133.585	132.263	132.263

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** ***5***

Sample ID ***ICABT-6322;B2*** **Repeat** ***6***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 02:15 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.033	0	0.000	-0.033
sd	0.000			0.006	0.000	0.000	0.256
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	17,847	17,670.297	17,669.908
sd	0.000			0.020	133.593	132.270	132.270

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** ***5***

Sample ID ***ICABT-6322;B1*** **Repeat** ***7***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 08:50 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.033	0	0.000	-0.033
sd	0.000			0.006	0.000	0.000	0.256
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	18,731	18,545.545	18,545.156
sd	0.000			0.020	136.861	135.506	135.506

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** *5*

Sample ID ***ICABT-6322;B8*** **Repeat** ***8***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 08:55 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.033	0	0.000	-0.033
sd	0.000			0.006	0.000	0.000	0.256
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	15,409	15,256.436	15,256.047
sd	0.000			0.020	124.133	122.904	122.904

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** ***5***

Sample ID ***ICABT-6322;B7*** **Repeat** ***9***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:20 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.033	1	0.990	0.957
sd	0.000			0.006	1.000	0.990	0.990
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	15,558	15,403.960	15,403.571
sd	0.000			0.020	124.732	123.497	123.497

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** *5*

Sample ID ***ICABT-51465;A2*** **Repeat** ***43***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 12:06 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.066	22,292	445.840	445.774
sd	0.000			0.008	149.305	2.986	2.986
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	8,770	175.400	174.978
sd	0.000			0.021	93.648	1.873	1.873

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** ***5***

Sample ID ***ICABT-51465;A1*** **Repeat** ***44***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 14:12 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.066	21,017	420.340	420.274
sd	0.000			0.008	144.972	2.899	2.899
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	8,891	177.820	177.398
sd	0.000			0.021	94.292	1.886	1.886

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** ***5***

Sample ID ***ICABT-51465;A4*** **Repeat** ***45***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 15:14 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 35.83 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.066	10,000	279.096	279.030
sd	0.000			0.008	100.000	2.791	2.791
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	4,973	138.794	138.372
sd	0.000			0.021	70.520	1.968	1.968

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** *5*

Sample ID ***ICABT-51465;A3*** **Repeat** ***46***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 16:20 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.68 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.066	10,002	326.010	325.944
sd	0.000			0.008	100.010	3.260	3.260
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	4,545	148.142	147.720
sd	0.000			0.021	67.417	2.197	2.198

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** ***5***

Sample ID ***ICABT-51465;A6*** **Repeat** ***43***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 17:47 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 20.96 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.066	10,002	477.195	477.129
sd	0.000			0.008	100.010	4.771	4.771
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	5,035	240.219	239.797
sd	0.000			0.021	70.958	3.385	3.385

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** *5*

Sample ID ***ICABT-51465;A8*** **Repeat** ***45***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 19:34 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 31.51 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.066	10,002	317.423	317.357
sd	0.000			0.008	100.010	3.174	3.174
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	5,475	173.754	173.332
sd	0.000			0.021	73.993	2.348	2.348

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** ***5***

Sample ID ***ICABT-51465;A7*** **Repeat** ***46***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 20:41 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 24.94 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.066	10,002	401.043	400.977
sd	0.000			0.008	100.010	4.010	4.010
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	5,146	206.335	205.913
sd	0.000			0.021	71.736	2.876	2.876

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

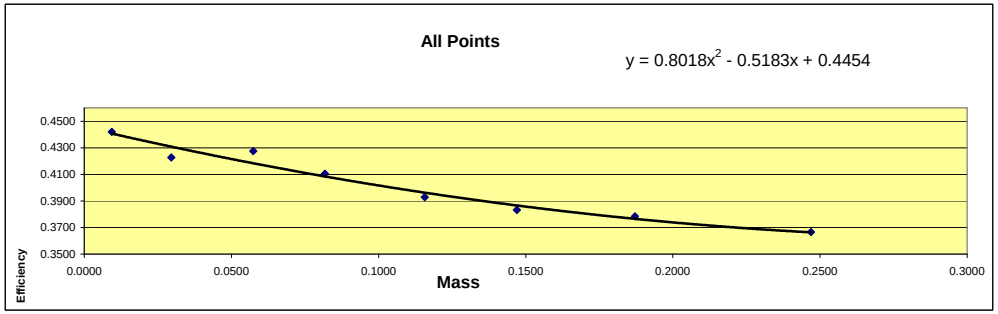
Curve is for Gross Beta
Strontium 90
and
Total Strontium

Protean 6

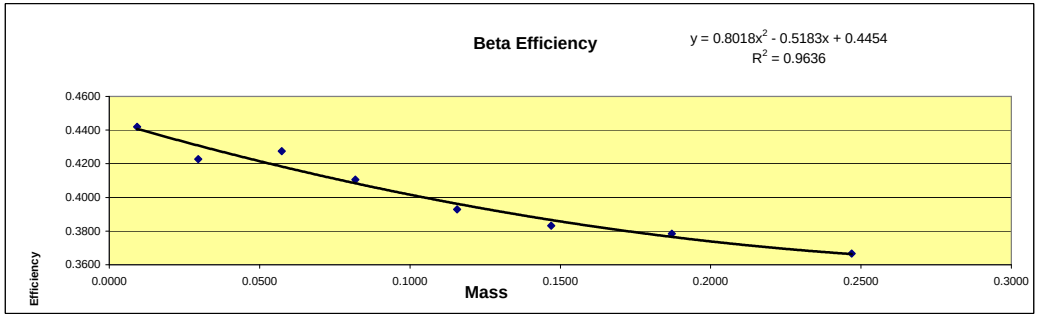
DPM
41414.371
41411.614

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	CPM	Sr-90 Eff	Standard Aliquot
6	B1	3/27/2013 8:57:05 AM	0.0093	1.01	18489	18305.941	0.4420	1mL
6	B2	3/27/2013 8:51:24 AM	0.0296	1.01	17685	17509.901	0.4228	1mL
6	B3	3/27/2013 2:16:23 AM	0.0574	1.01	17885	17707.921	0.4276	1mL
6	B4	3/27/2013 1:10:46 AM	0.0818	1.01	17171	17000.990	0.4105	1mL
6	B5	3/27/2013 12:52:37 AM	0.1157	1.01	16434	16271.287	0.3929	1mL
6	B6	3/27/2013 12:34:20 AM	0.1470	1.01	16028	15869.307	0.3832	1mL
6	B7	3/27/2013 12:25:16 AM	0.1871	1.01	15827	15670.297	0.3784	1mL
6	B8	3/28/2013 9:66:06 AM	0.2469	1.01	15335	15182.970	0.3666	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4420	0.4406	0.31%
0.0296	0.4228	0.4308	-1.85%
0.0574	0.4276	0.4183	2.22%
0.0818	0.4105	0.4084	0.52%
0.1157	0.3929	0.3962	-0.83%
0.1470	0.3832	0.3865	-0.87%
0.1871	0.3784	0.3765	0.50%
0.2469	0.3666	0.3663	0.09%



Mass	Efficiency
0.0093	0.4420
0.0296	0.4228
0.0574	0.4276
0.0818	0.4105
0.1157	0.3929
0.1470	0.3832
0.1871	0.3784
0.2469	0.3666



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

Initial Activity:	22560	dpm/mL
Reference Date:	9/17/2009	
Count Date:	3/27/2013	
Elapsed Time:	1287.000	days
Half Life:	10409.625	days
Exponential Term:	0.917871706	
Corrected Activity:	20707.18568	dpm/mL
Decay Activity (Sr/Y-9	41414.37137	dpm

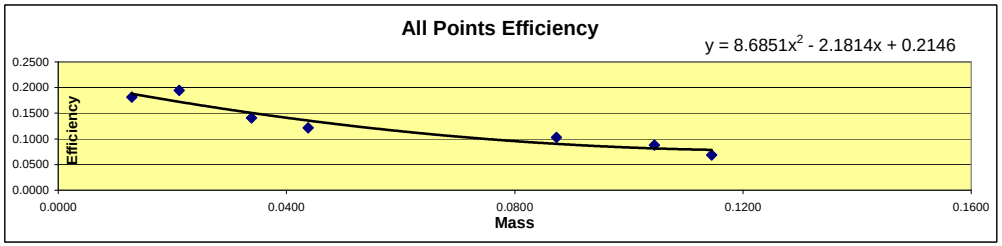
Initial Activity:	22560	dpm/mL
Reference Date:	9/17/2009	
Count Date:	3/28/2013	
Elapsed Time:	1288.000	days
Half Life:	10409.625	days
Exponential Term:	0.917810589	
Corrected Activity:	20705.8069	dpm/mL
Decay Activity (Sr/Y-90)	41411.6138	dpm

Curve is for Gross Alpha

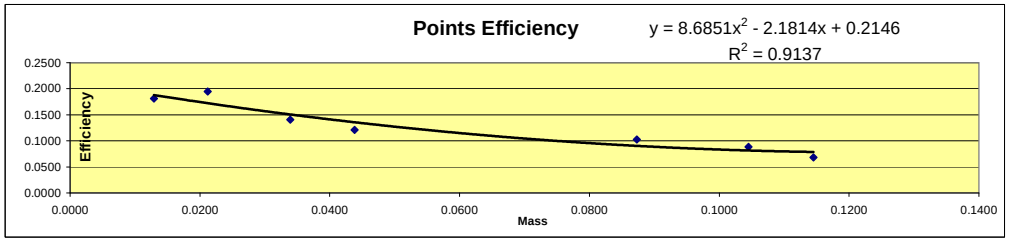
Protean 6

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
6	ICABT-51465;A1	11/24/2015 3:38:12	23.22	10002	430.749	2374.5	0.1814	1mL	0.0129
6	ICABT-51465;A2	11/24/2015 3:03:05	50	23091	461.820	2374.5	0.1945	1mL	0.0212
6	ICABT-51465;A3	11/24/2015 12:57:52	50	16716	334.320	2374.5	0.1408	1mL	0.0339
6	ICABT-51465;A4	11/24/2015 4:55:35	34.73	10003	288.022	2374.5	0.1213	1mL	0.0438
6	ICABT-51465;A6	11/24/2015 6:46:55	20.52	10001	487.378	4749.0	0.1026	2mL	0.0873
6	ICABT-51465;A7	11/24/2015 6:11:42	23.88	10002	418.844	4749.0	0.0882	2mL	0.1045
6	ICABT-51465;A8	11/24/2015 9:12:30	30.84	10000	324.254	4749.0	0.0683	2mL	0.1145

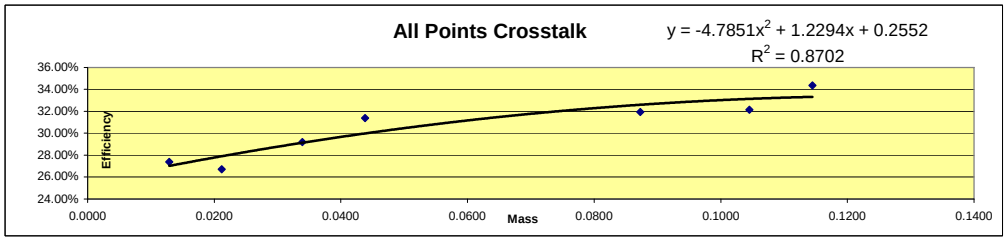
Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0129	0.1814	0.1879	-3.46%
0.0212	0.1945	0.1723	12.91%
0.0339	0.1408	0.1506	-6.53%
0.0438	0.1213	0.1357	-10.62%
0.0873	0.1026	0.0904	13.58%
0.1045	0.0882	0.0815	8.23%
0.1145	0.0683	0.0787	-13.24%



Mass	Efficiency
0.0129	0.1814
0.0212	0.1945
0.0339	0.1408
0.0438	0.1213
0.0873	0.1026
0.1045	0.0882
0.1145	0.0683



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
6	ICABT-51465;A1	0.0129	23.22	10002	3770	430.75	162.36	27.37%	Min
6	ICABT-51465;A2	0.0212	50	23091	8416	461.82	168.32	26.71%	26.71%
6	ICABT-51465;A3	0.0339	50	16716	6891	334.32	137.82	29.19%	
6	ICABT-51465;A4	0.0438	34.73	10003	4576	288.02	131.76	31.39%	Max
6	ICABT-51465;A6	0.0873	20.52	10001	4695	487.38	228.80	31.95%	34.35%
6	ICABT-51465;A7	0.1045	23.88	10002	4739	418.84	198.45	32.15%	
6	ICABT-51465;A8	0.1145	30.84	10000	5233	324.25	169.68	34.35%	Mean
									30.44%



Standard ID
Thorium-230
Th-230_00016 #51465
Cert # 92523 Ref. date 11/29/2012
Activity 2374.5 dpm/mL

08/09/2018

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** ***6***

Sample ID ***ICABT-6322;B7*** **Repeat** ***1***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:24 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	3	2.970	2.924
sd	0.000			0.007	1.732	1.715	1.715
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.447	15,827	15,670.297	15,669.850
sd	0.000			0.021	125.805	124.560	124.560

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** *6*

Sample ID ***ICABT-6322;B6*** **Repeat** *2*

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:33 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	1	0.990	0.944
sd	0.000			0.007	1.000	0.990	0.990
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.447	16,028	15,869.307	15,868.860
sd	0.000			0.021	126.602	125.348	125.348

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** ***6***

Sample ID ***ICABT-6322;B5*** **Repeat** ***3***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:51 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	0	0.000	-0.046
sd	0.000			0.007	0.000	0.000	0.302
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.447	16,434	16,271.287	16,270.840
sd	0.000			0.021	128.195	126.926	126.926

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** ***6***

Sample ID ***ICABT-6322;B4*** **Repeat** ***5***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 01:09 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	1	0.990	0.944
sd	0.000			0.007	1.000	0.990	0.990
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.447	17,171	17,000.990	17,000.543
sd	0.000			0.021	131.038	129.741	129.741

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** *6*

Sample ID ***ICABT-6322;B3*** **Repeat** *6*

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 02:15 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	1	0.990	0.944
sd	0.000			0.007	1.000	0.990	0.990
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.447	17,885	17,707.921	17,707.474
sd	0.000			0.021	133.735	132.411	132.411

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** ***6***

Sample ID ***ICABT-6322;B2*** **Repeat** ***7***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 08:50 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	0	0.000	-0.046
sd	0.000			0.007	0.000	0.000	0.302
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.447	17,685	17,509.901	17,509.454
sd	0.000			0.021	132.985	131.668	131.668

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** *6*

Sample ID ***ICABT-6322;B1*** **Repeat** *8*

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 08:56 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	2	1.980	1.934
sd	0.000			0.007	1.414	1.400	1.400
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.447	18,489	18,305.941	18,305.494
sd	0.000			0.021	135.974	134.628	134.628

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** ***6***

Sample ID ***ICABT-6322;B8*** **Repeat** ***9***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:20 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	0	0.000	-0.046
sd	0.000			0.007	0.000	0.000	0.302
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.447	18,322	18,140.594	18,140.147
sd	0.000			0.021	135.359	134.019	134.019

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** *6*

Sample ID ***ICABT-51465;A3*** **Repeat** ***43***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 12:07 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	16,716	334.320	334.189
sd	0.000			0.011	129.290	2.586	2.586
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	6,891	137.820	137.255
sd	0.000			0.024	83.012	1.660	1.660

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** ***6***

Sample ID ***ICABT-51465;A2*** **Repeat** ***44***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 14:12 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	23,091	461.820	461.689
sd	0.000			0.011	151.957	3.039	3.039
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	8,416	168.320	167.755
sd	0.000			0.024	91.739	1.835	1.835

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** *6*

Sample ID ***ICABT-51465;A1*** **Repeat** ***45***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 15:14 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 23.22 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	10,002	430.749	430.618
sd	0.000			0.011	100.010	4.307	4.307
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	3,770	162.360	161.795
sd	0.000			0.024	61.400	2.644	2.644

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** *6*

Sample ID ***ICABT-51465;A4*** **Repeat** ***46***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 16:20 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 34.73 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	10,003	288.022	287.891
sd	0.000			0.011	100.015	2.880	2.880
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	4,576	131.759	131.194
sd	0.000			0.024	67.646	1.948	1.948

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** ***6***

Sample ID ***ICABT-51465;A7*** **Repeat** ***43***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 17:47 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 23.88 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	10,002	418.844	418.713
sd	0.000			0.011	100.010	4.188	4.188
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	4,739	198.451	197.886
sd	0.000			0.024	68.840	2.883	2.883

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** ***6***

Sample ID ***ICABT-51465;A6*** **Repeat** ***44***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 18:26 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 20.52 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	10,001	487.378	487.247
sd	0.000			0.011	100.005	4.874	4.874
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	4,695	228.801	228.236
sd	0.000			0.024	68.520	3.339	3.339

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** *6*

Sample ID ***ICABT-51465;A8*** **Repeat** ***46***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 20:41 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.84 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	10,000	324.254	324.123
sd	0.000			0.011	100.000	3.243	3.243
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	5,233	169.682	169.117
sd	0.000			0.024	72.339	2.346	2.346

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

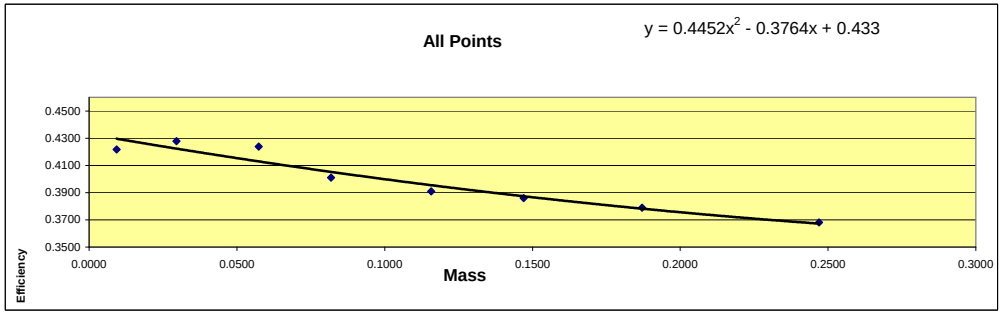
*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Curve is for Gross Beta
Strontium 90
and
Total Strontium

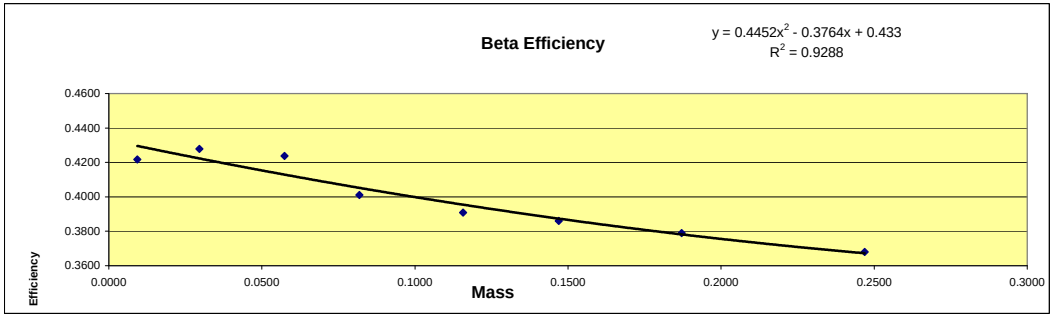
Protean 7

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41414.371 CPM	Sr-90 Eff	Standard Aliquot
7	B1	3/27/2013 9:21:38 AM	0.0093	1.01	17636	17461.386	0.4216	1mL
7	B2	3/27/2013 8:57:18 AM	0.0296	1.01	17896	17718.812	0.4278	1mL
7	B3	3/27/2013 8:51:31 AM	0.0574	1.01	17725	17549.505	0.4238	1mL
7	B4	3/27/2013 2:16:29 AM	0.0818	1.01	16777	16610.891	0.4011	1mL
7	B5	3/27/2013 1:10:47 AM	0.1157	1.01	16352	16190.099	0.3909	1mL
7	B6	3/27/2013 12:52:43 AM	0.1470	1.01	16144	15984.158	0.3860	1mL
7	B7	3/27/2013 12:34:21 AM	0.1871	1.01	15853	15696.040	0.3790	1mL
7	B8	3/27/2013 12:25:22 AM	0.2469	1.01	15396	15243.564	0.3681	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4216	0.4295	-1.84%
0.0296	0.4278	0.4222	1.32%
0.0574	0.4238	0.4129	2.64%
0.0818	0.4011	0.4052	-1.01%
0.1157	0.3909	0.3954	-1.13%
0.1470	0.3860	0.3873	-0.34%
0.1871	0.3790	0.3782	0.22%
0.2469	0.3681	0.3672	0.24%



Mass	Efficiency
0.0093	0.4216
0.0296	0.4278
0.0574	0.4238
0.0818	0.4011
0.1157	0.3909
0.1470	0.3860
0.1871	0.3790
0.2469	0.3681



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

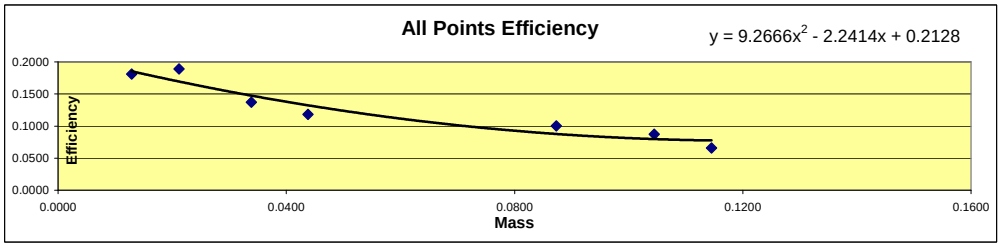
Initial Activity:	22560	dpm/mL
Reference Date:	9/17/2009	
Count Date:	3/27/2013	
Elapsed Time:	1287.000	days
Half Life:	10409.625	days
Exponential Term:	0.917871706	
Corrected Activity:	20707.18568	dpm/mL
Decay Activity (Sr/Y-90)	41414.37137	dpm

Curve is for Gross Alpha

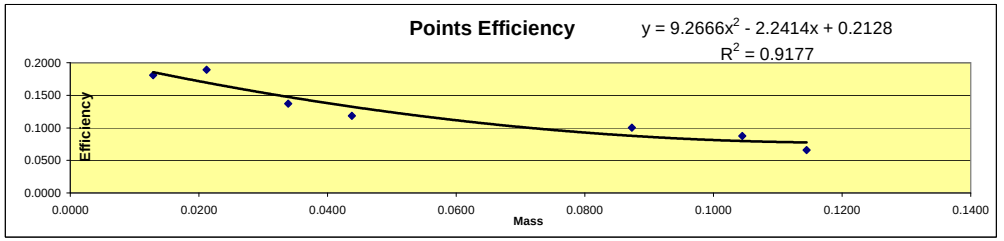
Protean 7

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
7	ICABT-51465;A1	11/24/2015 4:44:10	23.26	10001	429.966	2374.5	0.1811	1mL	0.0129
7	ICABT-51465;A2	11/24/2015 3:37:19	22.29	10006	448.901	2374.5	0.1891	1mL	0.0212
7	ICABT-51465;A3	11/24/2015 3:03:15	50	16296	325.920	2374.5	0.1373	1mL	0.0339
7	ICABT-51465;A4	11/24/2015	50	14036	280.720	2374.5	0.1182	1mL	0.0438
7	ICABT-51465;A6	11/24/2015 7:55:46	20.98	10007	476.978	4749.0	0.1004	2mL	0.0873
7	ICABT-51465;A7	11/24/2015 6:50:32	24.07	10002	415.538	4749.0	0.0875	2mL	0.1045
7	ICABT-51465;A8	11/24/2015 6:19:46	31.88	10003	313.770	4749.0	0.0661	2mL	0.1145

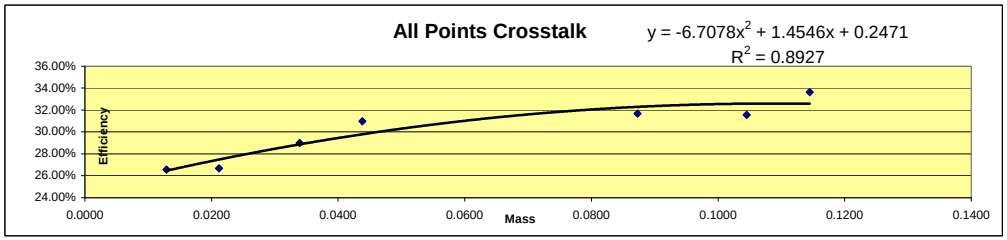
Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0129	0.1811	0.1854	-2.35%
0.0212	0.1891	0.1694	11.57%
0.0339	0.1373	0.1475	-6.92%
0.0438	0.1182	0.1324	-10.71%
0.0873	0.1004	0.0877	14.46%
0.1045	0.0875	0.0798	9.69%
0.1145	0.0661	0.0776	-14.91%



Mass	Efficiency
0.0129	0.1811
0.0212	0.1891
0.0339	0.1373
0.0438	0.1182
0.0873	0.1004
0.1045	0.0875
0.1145	0.0661



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
7	A1	0.0129	50.00	10001	3616	200.02	72.32	26.56%	Min 26.56%
7	A2	0.0212	50.00	10006	3641	200.12	72.82	26.68%	
7	A3	0.0339	50.00	16296	6655	325.92	133.10	29.00%	
7	A4	0.0438	50.00	14036	6302	280.72	126.04	30.99%	Max 33.62%
7	A6	0.0873	50.00	10007	4639	200.14	92.78	31.67%	
7	A7	0.1045	50.00	10002	4613	200.04	92.26	31.56%	
7	A8	0.1145	50.00	10003	5067	200.06	101.34	33.62%	Mean 30.01%



Standard ID
Thorium-230
Th-230_00016 #51465
Cert # 92523 Ref. date 11/29/2012
Activity 2374.5 dpm/mL

08/09/2018

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** *7*

Sample ID ***ICABT-6322;B8*** **Repeat** ***1***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:24 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.035	1	0.990	0.955
sd	0.000			0.006	1.000	0.990	0.990
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.489	15,396	15,243.564	15,243.075
sd	0.000			0.022	124.081	122.852	122.852

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** *7*

Sample ID ***ICABT-6322;B7*** **Repeat** ***2***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:33 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.035	0	0.000	-0.035
sd	0.000			0.006	0.000	0.000	0.263
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.489	15,853	15,696.040	15,695.551
sd	0.000			0.022	125.909	124.662	124.662

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** ***7***

Sample ID ***ICABT-6322;B6*** **Repeat** ***3***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:51 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.035	0	0.000	-0.035
sd	0.000			0.006	0.000	0.000	0.263
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.489	16,144	15,984.158	15,983.669
sd	0.000			0.022	127.059	125.801	125.801

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** *7*

Sample ID ***ICABT-6322;B5*** **Repeat** *5*

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 01:09 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.035	3	2.970	2.935
sd	0.000			0.006	1.732	1.715	1.715
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.489	16,352	16,190.099	16,189.610
sd	0.000			0.022	127.875	126.609	126.609

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** *7*

Sample ID ***ICABT-6322;B4*** **Repeat** ***6***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 02:15 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.035	3	2.970	2.935
sd	0.000			0.006	1.732	1.715	1.715
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.489	16,777	16,610.891	16,610.402
sd	0.000			0.022	129.526	128.244	128.244

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** *7*

Sample ID ***ICABT-6322;B3*** **Repeat** *7*

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 08:50 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.035	1	0.990	0.955
sd	0.000			0.006	1.000	0.990	0.990
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.489	17,725	17,549.505	17,549.016
sd	0.000			0.022	133.135	131.817	131.817

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** *7*

Sample ID ***ICABT-6322;B2*** **Repeat** ***8***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 08:56 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.035	3	2.970	2.935
sd	0.000			0.006	1.732	1.715	1.715
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.489	17,896	17,718.812	17,718.323
sd	0.000			0.022	133.776	132.451	132.451

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** *7*

Sample ID ***ICABT-6322;B1*** **Repeat** *9*

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:20 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.035	2	1.980	1.945
sd	0.000			0.006	1.414	1.400	1.400
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.489	17,636	17,461.386	17,460.897
sd	0.000			0.022	132.801	131.486	131.486

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** *7*

Sample ID ***ICABT-51465;A4*** **Repeat** ***43***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 12:07 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	14,036	280.720	280.649
sd	0.000			0.008	118.474	2.369	2.369
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.529	6,302	126.040	125.511
sd	0.000			0.023	79.385	1.588	1.588

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** *7*

Sample ID ***ICABT-51465;A3*** **Repeat** ***44***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 14:13 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	16,296	325.920	325.849
sd	0.000			0.008	127.656	2.553	2.553
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.529	6,655	133.100	132.571
sd	0.000			0.023	81.578	1.632	1.632

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** *7*

Sample ID ***ICABT-51465;A2*** **Repeat** ***45***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 15:14 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 22.29 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,006	448.901	448.830
sd	0.000			0.008	100.030	4.488	4.488
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.529	3,641	163.347	162.818
sd	0.000			0.023	60.341	2.707	2.707

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address: *7***

Sample ID ***ICABT-51465;A1*** **Repeat** ***46***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 16:20 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 23.26 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,001	429.966	429.895
sd	0.000			0.008	100.005	4.299	4.299
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.529	3,616	155.460	154.931
sd	0.000			0.023	60.133	2.585	2.585

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** *7*

Sample ID ***ICABT-51465;A8*** **Repeat** ***43***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 17:47 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 31.88 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,003	313.770	313.699
sd	0.000			0.008	100.015	3.137	3.137
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.529	5,067	158.940	158.411
sd	0.000			0.023	71.183	2.233	2.233

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** ***7***

Sample ID ***ICABT-51465;A7*** **Repeat** ***44***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 18:26 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 24.07 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,002	415.538	415.467
sd	0.000			0.008	100.010	4.155	4.155
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.529	4,613	191.649	191.120
sd	0.000			0.023	67.919	2.822	2.822

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** ***7***

Sample ID ***ICABT-51465;A6*** **Repeat** ***45***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/24/201! 19:34 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 20.98 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,007	476.978	476.907
sd	0.000			0.008	100.035	4.768	4.768
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.529	4,639	221.115	220.586
sd	0.000			0.023	68.110	3.246	3.247

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

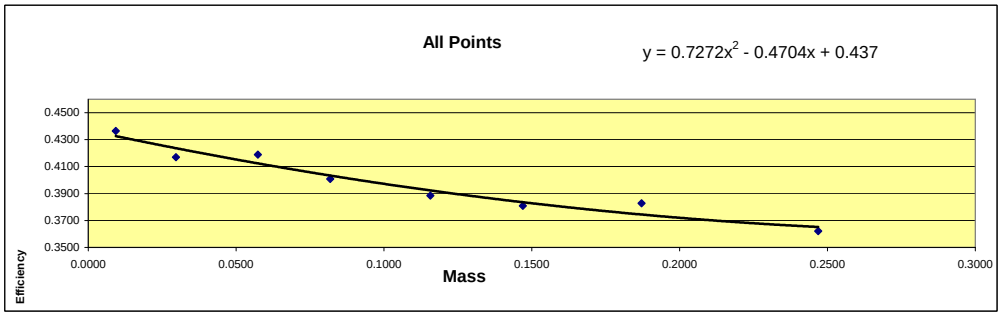
*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Curve is for Gross Beta
Strontium 90
and
Total Strontium

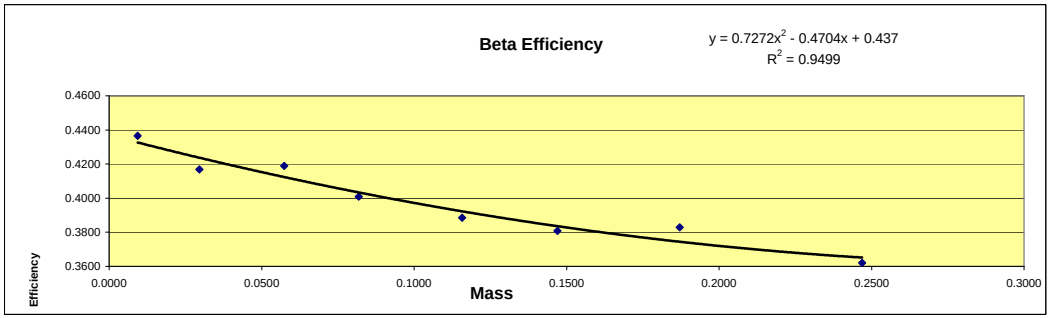
Protean 8

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41414.371 CPM	Sr-90 Eff	Standard Aliquot
8	B1	3/27/2013 9:27:24 AM	0.0093	1.01	18258	18077.228	0.4365	1mL
8	B2	3/27/2013 10:28:05 AM	0.0296	1.01	17439	17266.337	0.4169	1mL
8	B3	3/27/2013 10:20:33 AM	0.0574	1.01	17519	17345.545	0.4188	1mL
8	B4	3/27/2013 10:13:30 AM	0.0818	1.01	16771	16604.950	0.4009	1mL
8	B5	3/27/2013 10:05:28 AM	0.1157	1.01	16254	16093.069	0.3886	1mL
8	B6	3/27/2013 9:56:32 AM	0.1470	1.01	15930	15772.277	0.3808	1mL
8	B7	3/27/2013 9:48:57 AM	0.1871	1.01	16014	15855.446	0.3828	1mL
8	B8	3/27/2013 9:35:28 AM	0.2469	1.01	15148	14998.020	0.3621	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4365	0.4327	0.88%
0.0296	0.4169	0.4237	-1.60%
0.0574	0.4188	0.4124	1.56%
0.0818	0.4009	0.4034	-0.61%
0.1157	0.3886	0.3923	-0.95%
0.1470	0.3808	0.3836	-0.71%
0.1871	0.3828	0.3744	2.24%
0.2469	0.3621	0.3652	-0.83%



Mass	Efficiency
0.0093	0.4365
0.0296	0.4169
0.0574	0.4188
0.0818	0.4009
0.1157	0.3886
0.1470	0.3808
0.1871	0.3828
0.2469	0.3621



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

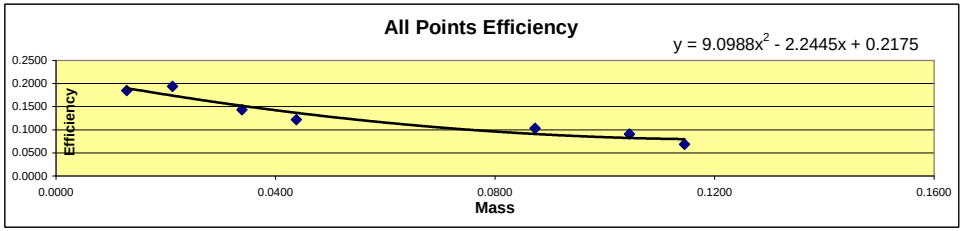
Initial Activity:	22560	dpm/mL
Reference Date:	9/17/2009	
Count Date:	3/27/2013	
Elapsed Time:	1287.000	days
Half Life:	10409.625	days
Exponential Term:	0.917871706	
Corrected Activity:	20707.18568	dpm/mL
Decay Activity (Sr/Y-90)	41414.37137	dpm

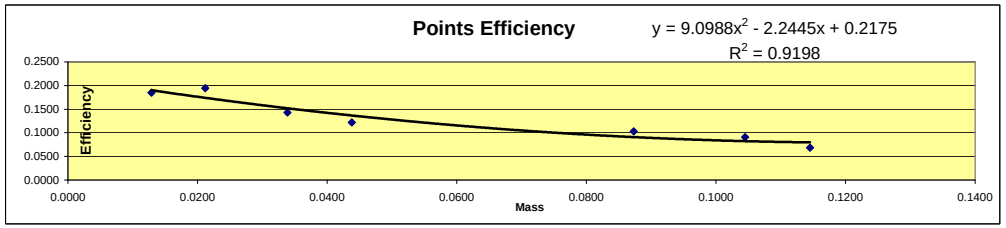
Curve is for Gross Alpha

Protean 8

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
8	ICABT-51465;A1	11/25/2015 7:08:42 PM	50	21946	438.920	2374.5	0.1848	1mL	0.0129
8	ICABT-51465;A2	11/27/2015 1:36:08 PM	50	23058	461.160	2374.5	0.1942	1mL	0.0212
8	ICABT-51465;A3	11/27/2015 12:39:10 PM	50	16985	339.700	2374.5	0.1431	1mL	0.0339
8	ICABT-51465;A4	11/29/2015 4:23:41 PM	50	14451	289.020	2374.5	0.1217	1mL	0.0438
8	ICABT-51465;A6	11/27/2015 8:37:48 AM	50	24444	488.880	4749.0	0.1029	2mL	0.0873
8	ICABT-51465;A7	11/26/2015 12:35:54 AM	50	21487	429.740	4749.0	0.0905	2mL	0.1045
8	ICABT-51465;A8	11/25/2015 11:38:12 PM	50	16219	324.380	4749.0	0.0683	2mL	0.1145

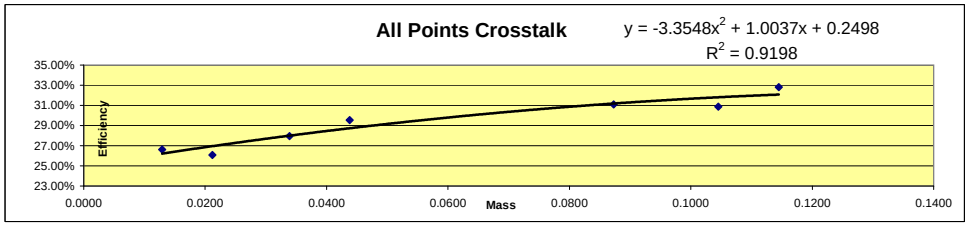
Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0129	0.1848	0.1901	-2.74%
0.0212	0.1942	0.1740	11.61%
0.0339	0.1431	0.1519	-5.80%
0.0438	0.1217	0.1366	-10.92%
0.0873	0.1029	0.0909	13.25%
0.1045	0.0905	0.0823	9.94%
0.1145	0.0683	0.0798	-14.40%





Mass	Efficiency
0.0129	0.1848
0.0212	0.1942
0.0339	0.1431
0.0438	0.1217
0.0873	0.1029
0.1045	0.0905
0.1145	0.0683

Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
8	ICABT-51465;A1	0.0129	50	21946	7959	438.92	159.18	26.61%	Min
8	ICABT-51465;A2	0.0212	50	23058	8132	461.16	162.64	26.07%	26.07%
8	ICABT-51465;A3	0.0339	50	16985	6590	339.70	131.80	27.95%	
8	ICABT-51465;A4	0.0438	50	14451	6062	289.02	121.24	29.55%	Max
8	ICABT-51465;A6	0.0873	50	24444	11033	488.88	220.66	31.10%	32.81%
8	ICABT-51465;A7	0.1045	50	21487	9600	429.74	192.00	30.88%	
8	ICABT-51465;A8	0.1145	50	16219	7919	324.38	158.38	32.81%	Mean
									29.28%



Standard ID
Thorium-230
Th-230_00016 #51465
Cert # 92523 Ref. date 11/29/2012
Activity 2374.5 dpm/mL

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08/09/2018

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICABT-6322;B1*** **Repeat** ***10***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:26 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.043	3	2.970	2.927
sd	0.000			0.007	1.732	1.715	1.715
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.455	18,258	18,077.228	18,076.773
sd	0.000			0.021	135.122	133.784	133.784

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICABT-6322;B8*** **Repeat** ***11***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:34 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.043	2	1.980	1.937
sd	0.000			0.007	1.414	1.400	1.400
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.455	15,148	14,998.020	14,997.565
sd	0.000			0.021	123.077	121.859	121.859

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICABT-6322;B7*** **Repeat** ***12***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:47 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.043	3	2.970	2.927
sd	0.000			0.007	1.732	1.715	1.715
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.455	16,014	15,855.446	15,854.991
sd	0.000			0.021	126.546	125.293	125.294

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICABT-6322;B6*** **Repeat** ***13***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:55 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.043	3	2.970	2.927
sd	0.000			0.007	1.732	1.715	1.715
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.455	15,930	15,772.277	15,771.822
sd	0.000			0.021	126.214	124.964	124.964

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICABT-6322;B5*** **Repeat** ***14***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 10:04 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.043	2	1.980	1.937
sd	0.000			0.007	1.414	1.400	1.400
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.455	16,254	16,093.069	16,092.614
sd	0.000			0.021	127.491	126.229	126.229

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICABT-6322;B4*** **Repeat** ***15***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 10:12 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.043	3	2.970	2.927
sd	0.000			0.007	1.732	1.715	1.715
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.455	16,771	16,604.950	16,604.495
sd	0.000			0.021	129.503	128.221	128.221

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICABT-6322;B3*** **Repeat** ***16***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 10:19 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.043	5	4.950	4.907
sd	0.000			0.007	2.236	2.214	2.214
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.455	17,519	17,345.545	17,345.090
sd	0.000			0.021	132.359	131.049	131.049

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICABT-6322;B2*** **Repeat** ***17***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 10:27 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.043	5	4.950	4.907
sd	0.000			0.007	2.236	2.214	2.214
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.455	17,439	17,266.337	17,265.882
sd	0.000			0.021	132.057	130.749	130.749

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICABT-51465;A1*** **Repeat** ***47***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/25/201! 18:18 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.208	21,946	438.920	438.712
sd	0.000			0.014	148.142	2.963	2.963
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	7,959	159.180	158.615
sd	0.000			0.024	89.213	1.784	1.784

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICABT-51465;A8*** **Repeat** ***48***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/25/201! 22:48 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.208	16,219	324.380	324.172
sd	0.000			0.014	127.354	2.547	2.547
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	7,919	158.380	157.815
sd	0.000			0.024	88.989	1.780	1.780

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICABT-51465;A7*** **Repeat** ***49***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/25/201! 23:45 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.208	21,487	429.740	429.532
sd	0.000			0.014	146.584	2.932	2.932
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	9,600	192.000	191.435
sd	0.000			0.024	97.980	1.960	1.960

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICABT-51465;A6*** **Repeat** ***50***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/27/201! 07:47 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.208	24,444	488.880	488.672
sd	0.000			0.014	156.346	3.127	3.127
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	11,033	220.660	220.095
sd	0.000			0.024	105.038	2.101	2.101

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICABT-51465;A3*** **Repeat** ***52***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/27/201! 11:47 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.208	16,985	339.700	339.492
sd	0.000			0.014	130.327	2.607	2.607
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	6,590	131.800	131.235
sd	0.000			0.024	81.179	1.624	1.624

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICABT-51465;A2*** **Repeat** ***53***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/27/201! 12:45 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.208	23,058	461.160	460.952
sd	0.000			0.014	151.849	3.037	3.037
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	8,132	162.640	162.075
sd	0.000			0.024	90.178	1.804	1.804

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICABT-51465;A4*** **Repeat** ***54***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/29/201! 15:33 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.208	14,451	289.020	288.812
sd	0.000			0.014	120.212	2.404	2.404
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	6,062	121.240	120.675
sd	0.000			0.024	77.859	1.557	1.557

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

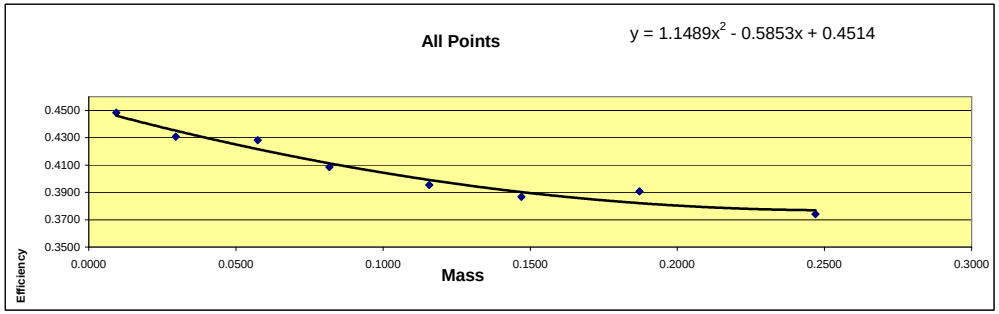
*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Curve is for Gross Beta
Strontium 90
and
Total Strontium

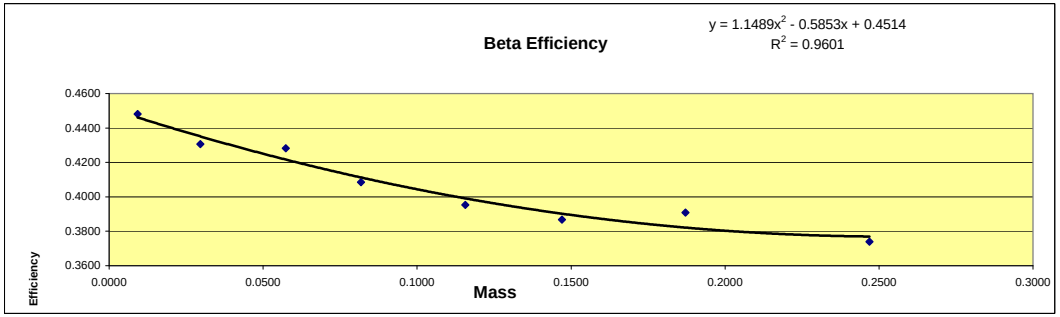
Protean 13

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41414.371 CPM 18561.386	Sr-90 Eff	Standard Aliquot
13	B1	3/27/2013 10:14:19 AM	0.0093	1.01	18747		0.4482	1mL
13	B2	3/27/2013 10:06:06 AM	0.0296	1.01	18015	17836.634	0.4307	1mL
13	B3	3/27/2013 9:57:08 AM	0.0574	1.01	17908	17730.693	0.4281	1mL
13	B4	3/27/2013 9:49:28 AM	0.0818	1.01	17087	16917.822	0.4085	1mL
13	B5	3/27/2013 9:36:05 AM	0.1157	1.01	16537	16373.267	0.3954	1mL
13	B6	3/27/2013 9:27:49 AM	0.1470	1.01	16181	16020.792	0.3868	1mL
13	B7	3/27/2013 10:28:32 AM	0.1871	1.01	16347	16185.149	0.3908	1mL
13	B8	3/27/2013 10:21:43 AM	0.2469	1.01	15645	15490.099	0.3740	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4482	0.4461	0.48%
0.0296	0.4307	0.4351	-1.01%
0.0574	0.4281	0.4216	1.55%
0.0818	0.4085	0.4112	-0.66%
0.1157	0.3954	0.3991	-0.93%
0.1470	0.3868	0.3902	-0.86%
0.1871	0.3908	0.3821	2.28%
0.2469	0.3740	0.3769	-0.77%



Mass	Efficiency
0.0093	0.4482
0.0296	0.4307
0.0574	0.4281
0.0818	0.4085
0.1157	0.3954
0.1470	0.3868
0.1871	0.3908
0.2469	0.3740



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

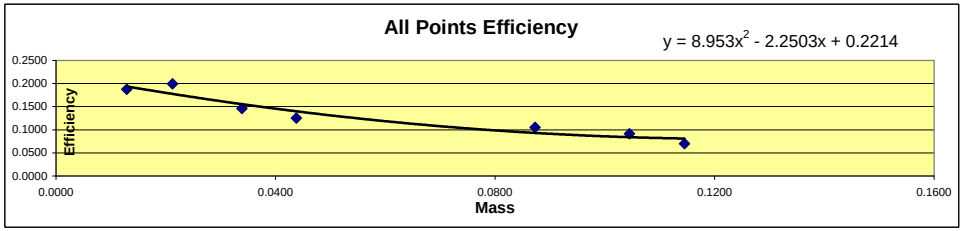
Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	3/27/2013
Elapsed Time:	1287.000 days
Half Life:	10409.625 days
Exponential Term:	0.917871706
Corrected Activity:	20707.18568 dpm/mL
Decay Activity (Sr/Y-90)	41414.37137 dpm

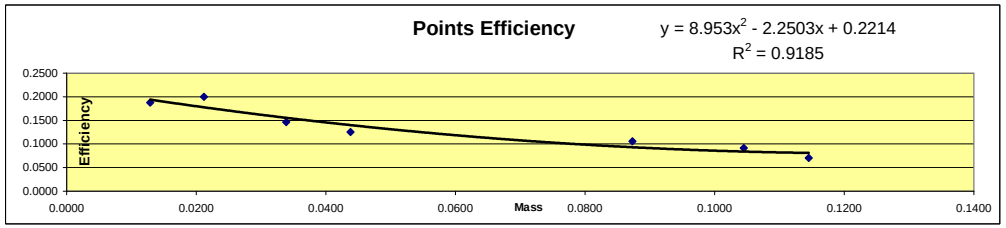
Curve is for Gross Alpha

Protean 13

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
13	ICABT-51465;A1	11/29/2015 4:23:27 PM	50	22264	445.280	2374.5	0.1875	1mL	0.0129
13	ICABT-51465;A2	11/27/2015 9:40:57 AM	50	23693	473.860	2374.5	0.1996	1mL	0.0212
13	ICABT-51465;A3	11/27/2015 8:38:31 AM	50	17349	346.980	2374.5	0.1461	1mL	0.0339
13	ICABT-51465;A4	11/26/2015 12:35:38 AM	50	14844	296.880	2374.5	0.1250	1mL	0.0438
13	ICABT-51465;A6	11/25/2015 7:09:06 PM	50	25031	500.620	4749.0	0.1054	2mL	0.0873
13	ICABT-51465;A7	11/27/2015 1:36:42 PM	50	21665	433.300	4749.0	0.0912	2mL	0.1045
13	ICABT-51465;A8	11/27/2015 12:40:03 PM	50	16687	333.740	4749.0	0.0703	2mL	0.1145

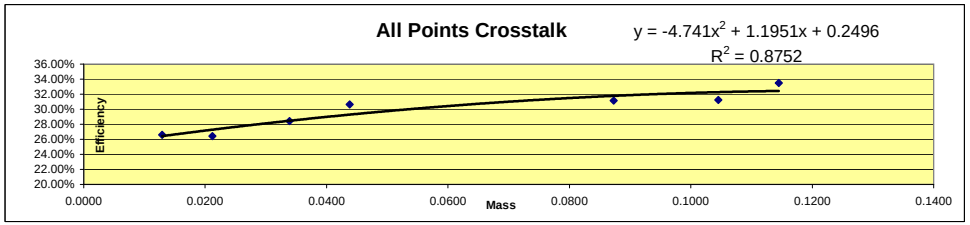
Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0129	0.1875	0.1939	-3.27%
0.0212	0.1996	0.1777	12.29%
0.0339	0.1461	0.1554	-5.97%
0.0438	0.1250	0.1400	-10.70%
0.0873	0.1054	0.0932	13.13%
0.1045	0.0912	0.0840	8.60%
0.1145	0.0703	0.0811	-13.36%





Mass	Efficiency
0.0129	0.1875
0.0212	0.1996
0.0339	0.1461
0.0438	0.1250
0.0873	0.1054
0.1045	0.0912
0.1145	0.0703

Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
13	ICABT-51465;A1	0.0129	50	22264	8058	445.28	161.16	26.57%	Min
13	ICABT-51465;A2	0.0212	50	23693	8503	473.86	170.06	26.41%	26.41%
13	ICABT-51465;A3	0.0339	50	17349	6894	346.98	137.88	28.44%	
13	ICABT-51465;A4	0.0438	50	14844	6559	296.88	131.18	30.65%	Max
13	ICABT-51465;A6	0.0873	50	25031	11318	500.62	226.36	31.14%	33.49%
13	ICABT-51465;A7	0.1045	50	21665	9845	433.30	196.90	31.24%	
13	ICABT-51465;A8	0.1145	50	16687	8403	333.74	168.06	33.49%	Mean
									29.71%



Standard ID
Thorium-230
Th-230_00016 #51465
Cert # 92523 Ref. date 11/29/2012
Activity 2374.5 dpm/mL

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08/09/2018

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-6322;B6*** **Repeat** ***10***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:26 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	5	4.950	4.903
sd	0.000			0.007	2.236	2.214	2.214
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	16,181	16,020.792	16,020.363
sd	0.000			0.021	127.205	125.945	125.945

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-6322;B5*** **Repeat** ***11***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:35 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	4	3.960	3.913
sd	0.000			0.007	2.000	1.980	1.980
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	16,537	16,373.267	16,372.838
sd	0.000			0.021	128.596	127.323	127.323

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-6322;B4*** **Repeat** ***12***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:48 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	1	0.990	0.943
sd	0.000			0.007	1.000	0.990	0.990
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	17,087	16,917.822	16,917.393
sd	0.000			0.021	130.717	129.423	129.423

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-6322;B3*** **Repeat** ***13***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:55 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	3	2.970	2.923
sd	0.000			0.007	1.732	1.715	1.715
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	17,908	17,730.693	17,730.264
sd	0.000			0.021	133.821	132.496	132.496

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-6322;B2*** **Repeat** ***14***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 10:05 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	4	3.960	3.913
sd	0.000			0.007	2.000	1.980	1.980
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	18,015	17,836.634	17,836.205
sd	0.000			0.021	134.220	132.891	132.891

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-6322;B1*** **Repeat** ***15***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 10:13 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	9	8.911	8.864
sd	0.000			0.007	3.000	2.970	2.970
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	18,747	18,561.386	18,560.957
sd	0.000			0.021	136.920	135.564	135.564

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-6322;B8*** **Repeat** ***16***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 10:20 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	3	2.970	2.923
sd	0.000			0.007	1.732	1.715	1.715
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	15,645	15,490.099	15,489.670
sd	0.000			0.021	125.080	123.842	123.842

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-6322;B7*** **Repeat** ***17***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 10:27 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	4	3.960	3.913
sd	0.000			0.007	2.000	1.980	1.980
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	16,347	16,185.149	16,184.720
sd	0.000			0.021	127.855	126.589	126.589

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-51465;A6*** **Repeat** ***47***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/25/201! 18:18 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	25,031	500.620	500.471
sd	0.000			0.012	158.212	3.164	3.164
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	11,318	226.360	225.868
sd	0.000			0.022	106.386	2.128	2.128

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-51465;A4*** **Repeat** ***49***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/25/201! 23:45 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	14,844	296.880	296.731
sd	0.000			0.012	121.836	2.437	2.437
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	6,559	131.180	130.688
sd	0.000			0.022	80.988	1.620	1.620

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-51465;A3*** **Repeat** ***50***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/27/201! 07:48 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	17,349	346.980	346.831
sd	0.000			0.012	131.716	2.634	2.634
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	6,894	137.880	137.388
sd	0.000			0.022	83.030	1.661	1.661

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-51465;A2*** **Repeat** ***51***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/27/201! 08:50 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	23,693	473.860	473.711
sd	0.000			0.012	153.925	3.079	3.079
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	8,503	170.060	169.568
sd	0.000			0.022	92.212	1.844	1.844

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-51465;A8*** **Repeat** ***52***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/27/201! 11:48 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	16,687	333.740	333.591
sd	0.000			0.012	129.178	2.584	2.584
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	8,403	168.060	167.568
sd	0.000			0.022	91.668	1.833	1.833

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-51465;A7*** **Repeat** ***53***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/27/201! 12:46 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	21,665	433.300	433.151
sd	0.000			0.012	147.190	2.944	2.944
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	9,845	196.900	196.408
sd	0.000			0.022	99.222	1.984	1.985

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-51465;A1*** **Repeat** ***54***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/29/201! 15:32 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	22,264	445.280	445.131
sd	0.000			0.012	149.211	2.984	2.984
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	8,058	161.160	160.668
sd	0.000			0.022	89.766	1.795	1.795

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

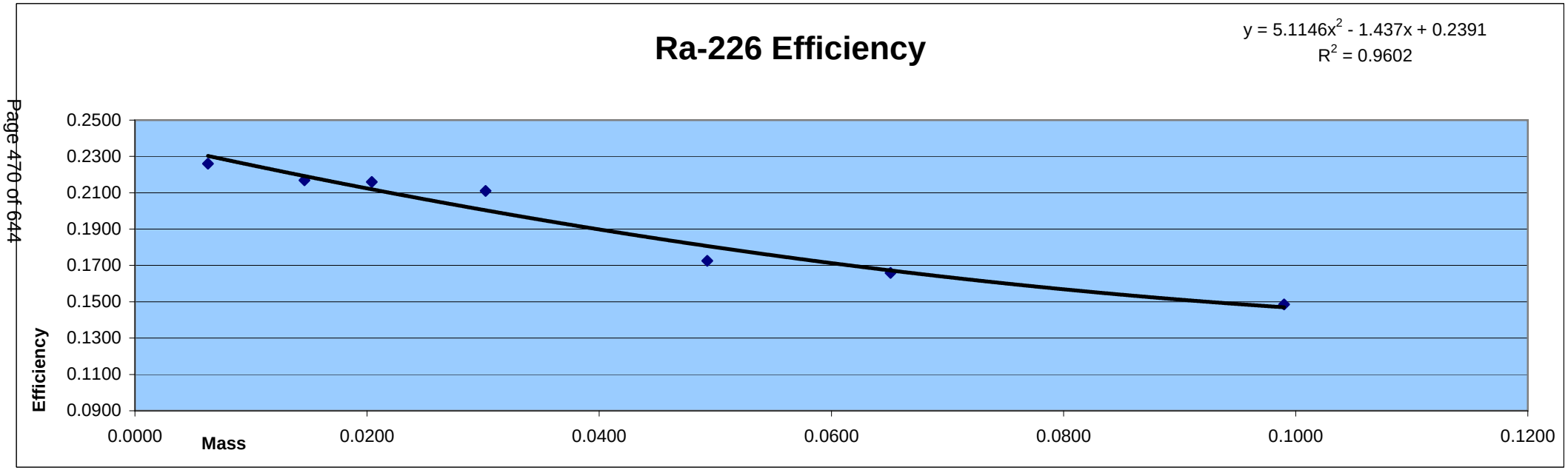
*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Ra-226 Calibrations

Ra-226 Calibration 2017

Blue 5

Std #	Mass	Sample Time	Count Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
R2	0.0063	3/17/2017 16:45	15.00	45751	3050.0667	2/13/2017 13:30	3.9911	0.4487	1703.0869	7534.6	0.2260
R3	0.0146	3/17/2017 15:58	15.00	67800	4520.0000	2/13/2017 13:30	3.9911	0.6933	1633.6195	7534.6	0.2168
R4	0.0204	3/17/2017 15:13	15.00	70759	4717.2667	2/13/2017 13:30	3.9910	0.7265	1626.9303	7534.6	0.2159
R5	0.0302	3/17/2017 13:50	15.00	81900	5460.0000	2/13/2017 13:30	3.9909	0.8604	1590.0713	7534.6	0.2110
R6	0.0493	3/17/2017 13:01	15.00	72858	4857.2000	2/13/2017 13:30	3.9909	0.9364	1299.7772	7534.6	0.1725
R7	0.0651	3/17/2017 12:12	15.00	69362	4624.1333	2/13/2017 13:30	3.9908	0.9274	1249.4624	7534.6	0.1658
R8	0.0990	3/19/2017 13:51	15.00	63023	4201.5333	2/13/2017 13:30	3.9937	0.9402	1118.9898	7534.6	0.1485



Reagent ID:Ra-226_00022
Container #:986404
Final Conc.: 7534.60740 dpm/mL
Added: 1mL

Reagent ID:Ba Carrier_00026
Container #: 1015438
Cert.#: 16I027

SOP: ST-RD-0403 current rev

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - B

Addr: 5

Sample ID ICRa6-986404;Ra7 **Repeat** 1

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/17/2017 12:12:58 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/17/2017 12:28:18 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	69,362	4,624.133	4,624.133
sd	0.000			0.000	263.367	17.558	17.558
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	95,928	6,395.200	6,395.200
sd	0.000			0.000	309.722	20.648	20.648

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - B

Addr: 5

Sample ID ICRa6-986404;Ra6 **Repeat** 2

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/17/2017 1:01:34 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/17/2017 1:16:55 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	72,858	4,857.200	4,857.200
sd	0.000			0.000	269.922	17.995	17.995
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	99,040	6,602.667	6,602.667
sd	0.000			0.000	314.706	20.980	20.980

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - B

Addr: 5

Sample ID ICRa6-986404;Ra5 **Repeat** 3

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/17/2017 1:50:13 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/17/2017 2:05:31 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	81,900	5,460.000	5,460.000
sd	0.000			0.000	286.182	19.079	19.079
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	95,643	6,376.200	6,376.200
sd	0.000			0.000	309.262	20.617	20.617

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - B

Addr: 5

Sample ID ICRa6-986404;Ra4 **Repeat** 4

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/17/2017 3:13:05 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/17/2017 3:28:26 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	70,759	4,717.267	4,717.267
sd	0.000			0.000	266.006	17.734	17.734
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	82,800	5,520.000	5,520.000
sd	0.000			0.000	287.750	19.183	19.183

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - B

Addr: 5

Sample ID ICRa6-986404;Ra3

Repeat 5

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/17/2017 3:58:08 PM

Count Ended 3/17/2017 4:13:25 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	67,800	4,520.000	4,520.000
sd	0.000			0.000	260.384	17.359	17.359
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	77,743	5,182.867	5,182.867
sd	0.000			0.000	278.824	18.588	18.588

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - B

Addr: 5

Sample ID ICRa6-986404;Ra2

Repeat 6

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/17/2017 4:45:15 PM

Count Ended 3/17/2017 5:00:27 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	45,751	3,050.067	3,050.067
sd	0.000			0.000	213.895	14.260	14.260
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	50,366	3,357.733	3,357.733
sd	0.000			0.000	224.424	14.962	14.962

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - B

Addr: 5

Sample ID ICRa6-986404;Ra8 **Repeat** 8

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/19/2017 1:51:22 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/19/2017 2:06:43 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	63,023	4,201.533	4,201.533
sd	0.000			0.000	251.044	16.736	16.736
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	98,521	6,568.067	6,568.067
sd	0.000			0.000	313.881	20.925	20.925

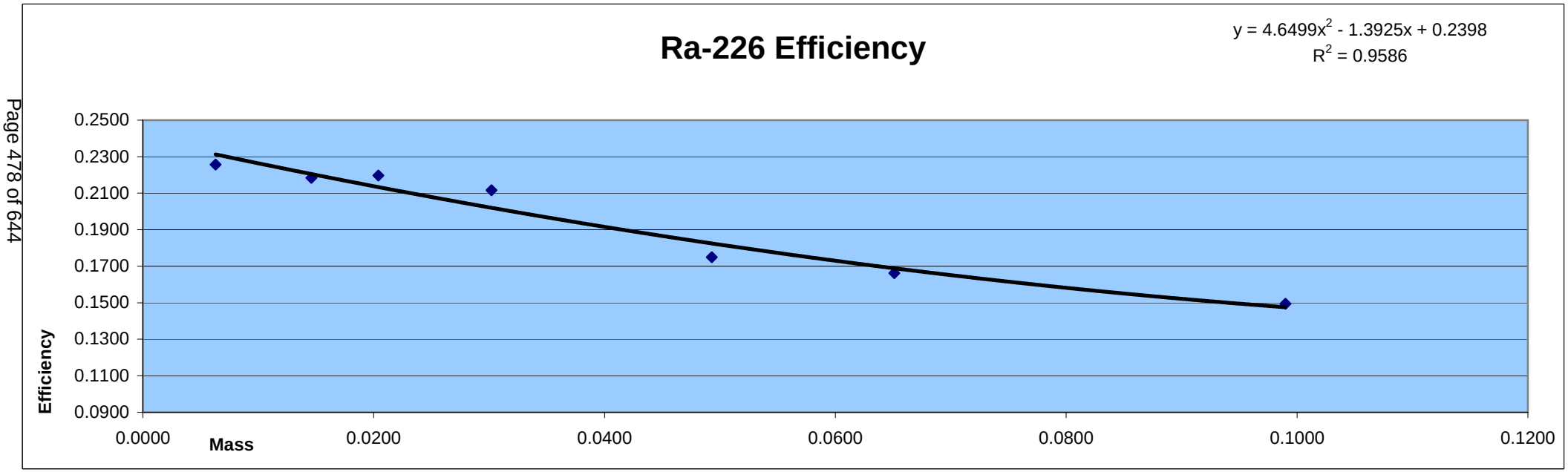
	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Ra-226 Calibration 2017

Blue 6

Std #	Mass	Sample Time	Count Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
R2	0.0063	3/19/2017 13:34	15	45708	3047.2000	2/13/2017 13:30	3.9937	0.4487	1700.4025	7534.6	0.2257
R3	0.0146	3/17/2017 16:45	15	68280	4552.0000	2/13/2017 13:30	3.9911	0.6933	1645.1632	7534.6	0.2183
R4	0.0204	3/17/2017 15:58	15	71983	4798.8667	2/13/2017 13:30	3.9911	0.7265	1655.0522	7534.6	0.2197
R5	0.0302	3/17/2017 15:13	15	82146	5476.4000	2/13/2017 13:30	3.9910	0.8604	1594.8098	7534.6	0.2117
R6	0.0493	3/17/2017 13:50	15	73915	4927.6667	2/13/2017 13:30	3.9909	0.9364	1318.6155	7534.6	0.1750
R7	0.0651	3/17/2017 13:01	15	69511	4634.0667	2/13/2017 13:30	3.9909	0.9274	1252.1288	7534.6	0.1662
R8	0.0990	3/17/2017 12:13	15	63383	4225.5333	2/13/2017 13:30	3.9908	0.9402	1126.1899	7534.6	0.1495



Reagent ID:Ra-226_00022
Container #:986404
Final Conc.: 7534.60740 dpm/mL
Added: 1mL

Reagent ID:Ba Carrier_00026
Container #: 1015438
Cert.#: 16I027

SOP: ST-RD-0403 current rev

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - C

Addr: 6

Sample ID ICRa6-986404;Ra8 **Repeat** 1

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/17/2017 12:13:02 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/17/2017 12:28:22 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	63,383	4,225.533	4,225.533
sd	0.000			0.000	251.760	16.784	16.784
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	97,286	6,485.733	6,485.733
sd	0.000			0.000	311.907	20.794	20.794

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - C

Addr: 6

Sample ID ICRa6-986404;Ra7 **Repeat** 2

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/17/2017 1:01:37 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/17/2017 1:16:55 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	69,511	4,634.067	4,634.067
sd	0.000			0.000	263.649	17.577	17.577
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	95,010	6,334.000	6,334.000
sd	0.000			0.000	308.237	20.549	20.549

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - C

Addr: 6

Sample ID ICRa6-986404;Ra6 **Repeat** 3

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/17/2017 1:50:17 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/17/2017 2:05:39 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	73,915	4,927.667	4,927.667
sd	0.000			0.000	271.873	18.125	18.125
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	97,885	6,525.667	6,525.667
sd	0.000			0.000	312.866	20.858	20.858

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - C

Addr: 6

Sample ID ICRa6-986404;Ra5 **Repeat** 4

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/17/2017 3:13:09 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/17/2017 3:28:30 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	82,146	5,476.400	5,476.400
sd	0.000			0.000	286.611	19.107	19.107
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	95,129	6,341.933	6,341.933
sd	0.000			0.000	308.430	20.562	20.562

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - C

Addr: 6

Sample ID ICRa6-986404;Ra4 **Repeat** 5

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/17/2017 3:58:12 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/17/2017 4:13:30 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	71,983	4,798.867	4,798.867
sd	0.000			0.000	268.296	17.886	17.886
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	82,445	5,496.333	5,496.333
sd	0.000			0.000	287.132	19.142	19.142

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - C

Addr: 6

Sample ID ICRa6-986404;Ra3 **Repeat** 6

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/17/2017 4:45:18 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/17/2017 5:00:35 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	68,280	4,552.000	4,552.000
sd	0.000			0.000	261.304	17.420	17.420
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	76,831	5,122.067	5,122.067
sd	0.000			0.000	277.184	18.479	18.479

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - C

Addr: 6

Sample ID ICRa6-986404;Ra2 **Repeat** 7

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 3/19/2017 1:34:05 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/19/2017 1:49:16 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** .00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.000	45,708	3,047.200	3,047.200
sd	0.000			0.000	213.794	14.253	14.253
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.000	49,363	3,290.867	3,290.867
sd	0.000			0.000	222.178	14.812	14.812

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - B

Addr: 13

Sample ID ICRa6-986404;Ra3

Repeat 13

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/10/2017 8:14:32 PM

Count Ended 5/10/2017 8:29:51 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.037	69,251	4,616.733	4,616.696
sd	0.000			0.006	263.156	17.544	17.544
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.256	75,870	5,058.000	5,057.744
sd	0.000			0.016	275.445	18.363	18.363

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - B

Addr: 13

Sample ID ICRa6-986404;Ra2 **Repeat** 14

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/10/2017 8:35:35 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/10/2017 8:50:50 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.037	46,369	3,091.267	3,091.230
sd	0.000			0.006	215.335	14.356	14.356
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.256	48,964	3,264.267	3,264.011
sd	0.000			0.016	221.278	14.752	14.752

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - B

Addr: 13

Sample ID ICRa6-986404;Ra5

Repeat 15

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/10/2017 9:31:38 PM

Count Ended 5/10/2017 9:46:58 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.037	83,650	5,576.667	5,576.630
sd	0.000			0.006	289.223	19.282	19.282
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.256	92,485	6,165.667	6,165.411
sd	0.000			0.016	304.113	20.274	20.274

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - B

Addr: 13

Sample ID ICRa6-986404;Ra4 **Repeat** 16

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 5/10/2017 9:49:05 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/10/2017 10:04:27 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.037	72,641	4,842.733	4,842.696
sd	0.000			0.006	269.520	17.968	17.968
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.256	81,120	5,408.000	5,407.744
sd	0.000			0.016	284.816	18.988	18.988

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - B

Addr: 13

Sample ID ICRa6-986404;Ra7

Repeat 13

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 5/10/2017 10:14:41 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/10/2017 10:30:00 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.037	69,347	4,623.133	4,623.096
sd	0.000			0.006	263.338	17.556	17.556
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.256	91,786	6,119.067	6,118.811
sd	0.000			0.016	302.962	20.197	20.197

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - B

Addr: 13

Sample ID ICRa6-986404;Ra6 **Repeat** 14

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 5/10/2017 10:53:07 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/10/2017 11:08:26 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.037	73,042	4,869.467	4,869.430
sd	0.000			0.006	270.263	18.018	18.018
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.256	95,163	6,344.200	6,343.944
sd	0.000			0.016	308.485	20.566	20.566

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - B

Addr: 13

Sample ID ICRa6-986404;Ra8

Repeat 16

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/11/2017 12:43:37 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/11/2017 12:58:58 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.037	64,640	4,309.333	4,309.296
sd	0.000			0.006	254.244	16.950	16.950
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.256	95,580	6,372.000	6,371.744
sd	0.000			0.016	309.160	20.611	20.611

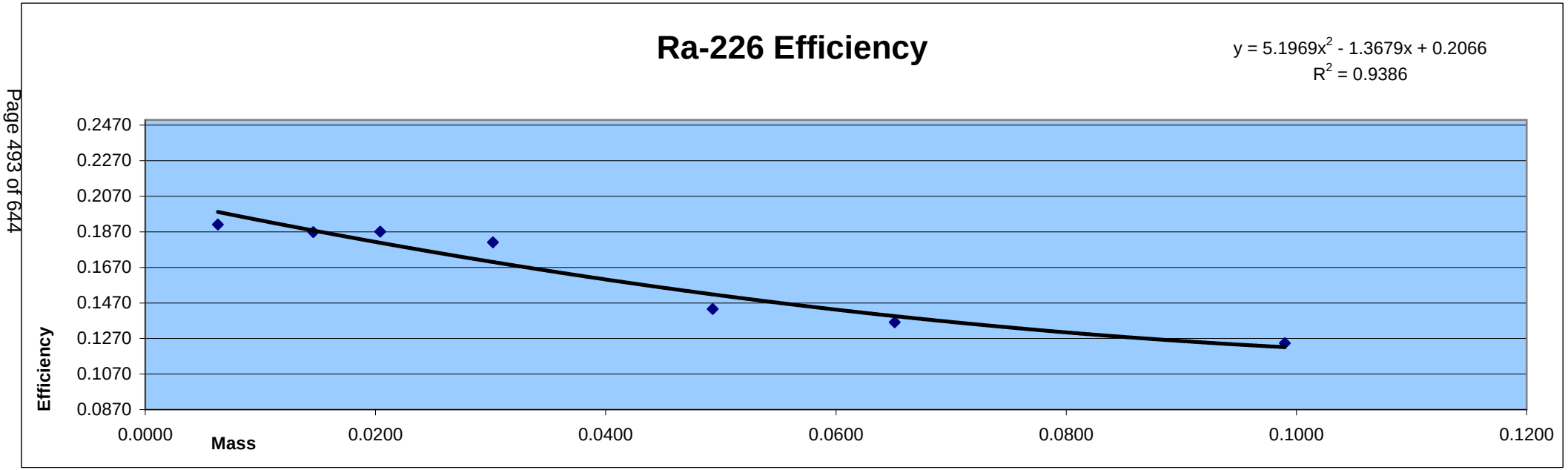
	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Ra-226 Calibration 2017

Blue 14

Std #	Mass	Sample Time	Count Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
R2	0.0063	5/10/2017 21:31	15	38775	2585.000	2/13/2017 13:30	4.0000	0.4487	1440.2079	7534.6	0.1911
R3	0.0146	5/10/2017 20:35	15	58561	3904.067	2/13/2017 13:30	4.0000	0.6933	1407.8654	7534.6	0.1869
R4	0.0204	5/10/2017 20:14	15	61472	4098.133	2/13/2017 13:30	4.0000	0.7265	1410.2319	7534.6	0.1872
R5	0.0302	5/10/2017 21:49	15	70445	4696.333	2/13/2017 13:30	4.0000	0.8604	1364.5787	7534.6	0.1811
R6	0.0493	5/11/2017 0:01	15	60788	4052.533	2/13/2017 13:30	4.0000	0.9364	1081.9798	7534.6	0.1436
R7	0.0651	5/10/2017 22:53	15	57042	3802.800	2/13/2017 13:30	4.0000	0.9274	1025.1794	7534.6	0.1361
R8	0.0990	5/10/2017 22:14	15	52887	3525.800	2/13/2017 13:30	4.0000	0.9402	937.5433	7534.6	0.1244



Reagent ID:Ra-226_00022
Container #:986404
Final Conc.: 7534.60740 dpm/mL
Added: 1mL

Reagent ID:Ba Carrier_00026
Container #: 1015438
Cert.#: 16I027

SOP: ST-RD-0403 current rev

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - C

Addr: 14

Sample ID ICRa6-986404;Ra4 **Repeat** 13

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 5/10/2017 8:14:37 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/10/2017 8:29:58 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.023	61,472	4,098.133	4,098.110
sd	0.000			0.005	247.935	16.529	16.529
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.258	89,501	5,966.733	5,966.475
sd	0.000			0.016	299.167	19.944	19.944

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - C

Addr: 14

Sample ID ICRa6-986404;Ra3

Repeat 14

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/10/2017 8:35:39 PM

Count Ended 5/10/2017 8:50:58 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.023	58,561	3,904.067	3,904.044
sd	0.000			0.005	241.994	16.133	16.133
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.258	84,700	5,646.667	5,646.409
sd	0.000			0.016	291.033	19.402	19.402

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - C

Addr: 14

Sample ID ICRa6-986404;Ra2

Repeat 15

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/10/2017 9:31:28 PM

Count Ended 5/10/2017 9:46:45 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.023	38,775	2,585.000	2,584.977
sd	0.000			0.005	196.914	13.128	13.128
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.258	55,515	3,701.000	3,700.742
sd	0.000			0.016	235.616	15.708	15.708

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - C

Addr: 14

Sample ID ICRa6-986404;Ra5

Repeat 16

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/10/2017 9:49:08 PM

Count Ended 5/10/2017 10:04:27 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.023	70,445	4,696.333	4,696.310
sd	0.000			0.005	265.415	17.694	17.694
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.258	103,058	6,870.533	6,870.275
sd	0.000			0.016	321.026	21.402	21.402

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - C

Addr: 14

Sample ID ICRa6-986404;Ra8 **Repeat** 13

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 5/10/2017 10:14:45 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/10/2017 10:30:07 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.023	52,887	3,525.800	3,525.777
sd	0.000			0.005	229.972	15.331	15.331
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.258	104,480	6,965.333	6,965.075
sd	0.000			0.016	323.234	21.549	21.549

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - C

Addr: 14

Sample ID ICRa6-986404;Ra7

Repeat 14

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/10/2017 10:53:12 PM

Count Ended 5/10/2017 11:08:33 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.023	57,042	3,802.800	3,802.777
sd	0.000			0.005	238.835	15.922	15.922
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.258	102,254	6,816.933	6,816.675
sd	0.000			0.016	319.772	21.318	21.318

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - C

Addr: 14

Sample ID ICRa6-986404;Ra6 **Repeat** 15

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 5/11/2017 12:01:39 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/11/2017 12:16:58 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.023	60,788	4,052.533	4,052.510
sd	0.000			0.005	246.552	16.437	16.437
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.258	105,941	7,062.733	7,062.475
sd	0.000			0.016	325.486	21.699	21.699

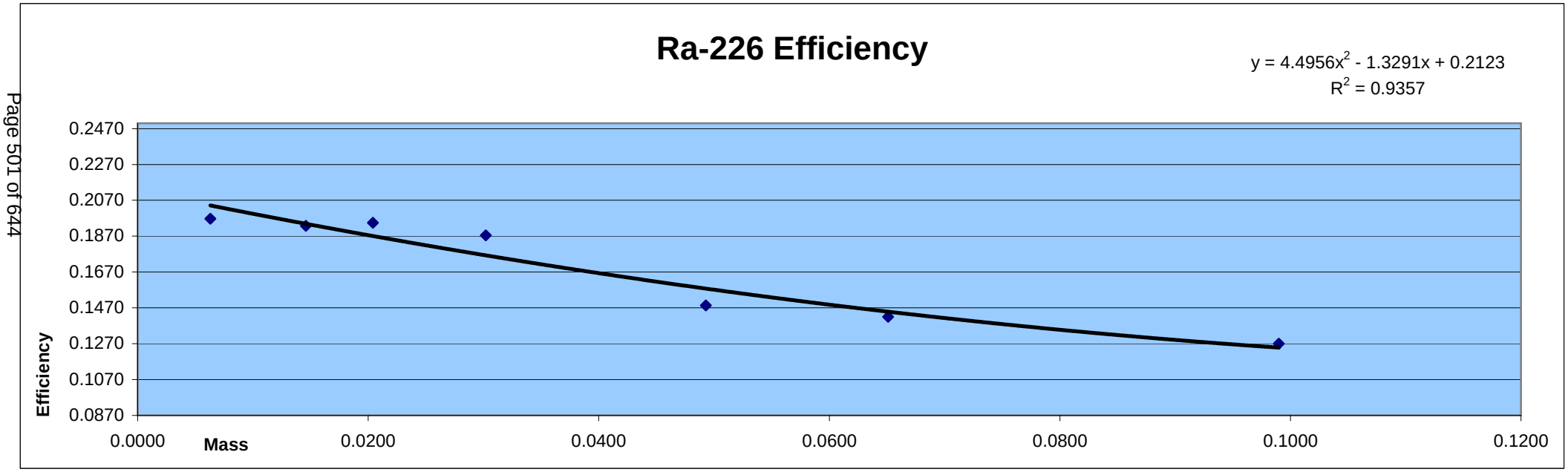
	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Ra-226 Calibration 2017

Blue 15

Std #	Mass	Sample Time	Count Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
R2	0.0063	5/10/2017 21:48	15	39909	2660.600	2/13/2017 13:30	4.0000	0.4487	1482.3277	7534.6	0.1967
R3	0.0146	5/10/2017 21:31	15	60396	4026.400	2/13/2017 13:30	4.0000	0.6933	1451.9807	7534.6	0.1927
R4	0.0204	5/10/2017 20:35	15	63874	4258.267	2/13/2017 13:30	4.0000	0.7265	1465.3363	7534.6	0.1945
R5	0.0302	5/10/2017 20:14	15	72916	4861.067	2/13/2017 13:30	4.0000	0.8604	1412.4440	7534.6	0.1875
R6	0.0493	5/11/2017 0:43	15	62815	4187.667	2/13/2017 13:30	4.0000	0.9364	1118.0589	7534.6	0.1484
R7	0.0651	5/11/2017 0:01	15	59527	3968.467	2/13/2017 13:30	4.0000	0.9274	1069.8407	7534.6	0.1420
R8	0.0990	5/10/2017 22:53	15	54014	3600.933	2/13/2017 13:30	4.0000	0.9402	957.5220	7534.6	0.1271



Reagent ID:Ra-226_00022
Container #:986404
Final Conc.: 7534.60740 dpm/mL
Added: 1mL

Reagent ID:Ba Carrier_00026
Container #: 1015438
Cert.#: 16I027

SOP: ST-RD-0403 current rev

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - D

Addr: 15

Sample ID ICRa6-986404;Ra5 **Repeat** 13

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/10/2017 8:14:41 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/10/2017 8:30:06 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.018	72,916	4,861.067	4,861.049
sd	0.000			0.004	270.030	18.002	18.002
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.272	102,524	6,834.933	6,834.661
sd	0.000			0.016	320.194	21.346	21.346

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - D

Addr: 15

Sample ID ICRa6-986404;Ra4 **Repeat** 14

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 5/10/2017 8:35:42 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/10/2017 8:50:59 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.018	63,874	4,258.267	4,258.249
sd	0.000			0.004	252.733	16.849	16.849
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.272	88,509	5,900.600	5,900.328
sd	0.000			0.016	297.505	19.834	19.834

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - D

Addr: 15

Sample ID ICRa6-986404;Ra3

Repeat 15

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/10/2017 9:31:32 PM

Count Ended 5/10/2017 9:46:52 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.018	60,396	4,026.400	4,026.382
sd	0.000			0.004	245.756	16.384	16.384
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.272	84,038	5,602.533	5,602.261
sd	0.000			0.016	289.893	19.326	19.326

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - D

Addr: 15

Sample ID ICRa6-986404;Ra2 **Repeat** 16

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 5/10/2017 9:48:56 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/10/2017 10:04:14 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.018	39,909	2,660.600	2,660.582
sd	0.000			0.004	199.772	13.318	13.318
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.272	54,873	3,658.200	3,657.928
sd	0.000			0.016	234.250	15.617	15.617

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - D

Addr: 15

Sample ID ICRa6-986404;Ra8 **Repeat** 14

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 5/10/2017 10:53:18 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/10/2017 11:08:40 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.018	54,014	3,600.933	3,600.915
sd	0.000			0.004	232.409	15.494	15.494
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.272	104,286	6,952.400	6,952.128
sd	0.000			0.016	322.933	21.529	21.529

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - D

Addr: 15

Sample ID ICRa6-986404;Ra7 **Repeat** 15

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/11/2017 12:01:47 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/11/2017 12:17:05 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.018	59,527	3,968.467	3,968.449
sd	0.000			0.004	243.982	16.265	16.265
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.272	101,390	6,759.333	6,759.061
sd	0.000			0.016	318.418	21.228	21.228

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - D

Addr: 15

Sample ID ICRa6-986404;Ra6 **Repeat** 16

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/11/2017 12:43:24 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/11/2017 12:58:42 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.018	62,815	4,187.667	4,187.649
sd	0.000			0.004	250.629	16.709	16.709
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.272	104,853	6,990.200	6,989.928
sd	0.000			0.016	323.810	21.587	21.587

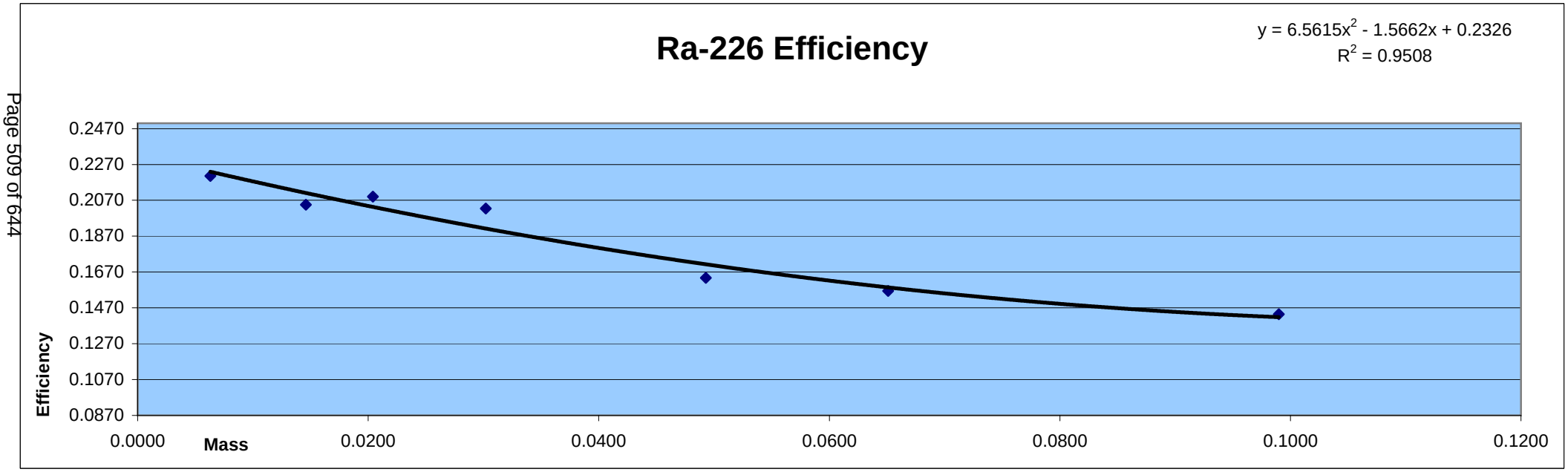
	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Ra-226 Calibration 2017

Blue 17

Std #	Mass	Sample Time	Count Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
R2	0.0063	5/12/2017 11:39	15	44743	2982.867	2/13/2017 13:30	4.0000	0.4487	1661.8754	7534.6	0.2206
R3	0.0146	5/12/2017 10:58	15	64095	4273.000	2/13/2017 13:30	4.0000	0.6933	1540.9083	7534.6	0.2045
R4	0.0204	5/12/2017 12:23	15	68663	4577.533	2/13/2017 13:30	4.0000	0.7265	1575.2009	7534.6	0.2091
R5	0.0302	5/12/2017 11:58	15	78754	5250.267	2/13/2017 13:30	4.0000	0.8604	1525.5309	7534.6	0.2025
R6	0.0493	5/12/2017 13:48	15	69303	4620.200	2/13/2017 13:30	4.0000	0.9364	1233.5403	7534.6	0.1637
R7	0.0651	5/12/2017 12:57	15	65573	4371.533	2/13/2017 13:30	4.0000	0.9274	1178.5016	7534.6	0.1564
R8	0.0990	5/12/2017 14:28	15	60960	4064.000	2/13/2017 13:30	4.0000	0.9402	1080.6557	7534.6	0.1434



Reagent ID:Ra-226_00022
Container #:986404
Final Conc.: 7534.60740 dpm/mL
Added: 1mL

Reagent ID:Ba Carrier_00026
Container #: 1015438
Cert.#: 16I027

SOP: ST-RD-0403 current rev

Alpha/Beta Count Results

Sample Activity Report

Blue 16 - 19 - B

Addr: 17

Sample ID ICRa6-986404;Ra3

Repeat 17

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/12/2017 10:58:00 AM

Count Ended 5/12/2017 11:13:18 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.034	64,095	4,273.000	4,272.966
sd	0.000			0.006	253.170	16.878	16.878
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.209	76,671	5,111.400	5,111.191
sd	0.000			0.014	276.895	18.460	18.460

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16 - 19 - B

Addr: 17

Sample ID ICRa6-986404;Ra2 **Repeat** 18

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/12/2017 11:39:09 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/12/2017 11:54:25 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.034	44,743	2,982.867	2,982.833
sd	0.000			0.006	211.525	14.102	14.102
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.209	51,329	3,421.933	3,421.724
sd	0.000			0.014	226.559	15.104	15.104

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16 - 19 - B

Addr: 17

Sample ID ICRa6-986404;Ra5 **Repeat** 19

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***ml*** **sd** 0 ***ml***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 5/12/2017 11:58:49 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/12/2017 12:14:08 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.034	78,754	5,250.267	5,250.233
sd	0.000			0.006	280.631	18.709	18.709
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.209	95,874	6,391.600	6,391.391
sd	0.000			0.014	309.635	20.642	20.642

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16 - 19 - B

Addr: 17

Sample ID ICRa6-986404;Ra4

Repeat 20

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/12/2017 12:23:49 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/12/2017 12:39:08 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.034	68,663	4,577.533	4,577.499
sd	0.000			0.006	262.036	17.469	17.469
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.209	82,737	5,515.800	5,515.591
sd	0.000			0.014	287.640	19.176	19.176

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16 - 19 - B

Addr: 17

Sample ID ICRa6-986404;Ra7

Repeat 17

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/12/2017 12:57:33 PM

Count Ended 5/12/2017 1:12:50 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.034	65,573	4,371.533	4,371.499
sd	0.000			0.006	256.072	17.071	17.071
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.209	95,019	6,334.600	6,334.391
sd	0.000			0.014	308.252	20.550	20.550

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16 - 19 - B

Addr: 17

Sample ID ICRa6-986404;Ra6 **Repeat** 18

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/12/2017 1:48:38 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/12/2017 2:04:02 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.034	69,303	4,620.200	4,620.166
sd	0.000			0.006	263.255	17.550	17.550
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.209	97,397	6,493.133	6,492.924
sd	0.000			0.014	312.085	20.806	20.806

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16 - 19 - B

Addr: 17

Sample ID ICRa6-986404;Ra8

Repeat 20

Carrier No. 0

Batch ID Ra226_IC

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***ml***	**sd**	0 ***ml***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/12/2017 2:28:51 PM

Count Ended 5/12/2017 2:44:14 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.034	60,960	4,064.000	4,063.966
sd	0.000			0.006	246.901	16.460	16.460
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.209	97,277	6,485.133	6,484.924
sd	0.000			0.014	311.893	20.793	20.793

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

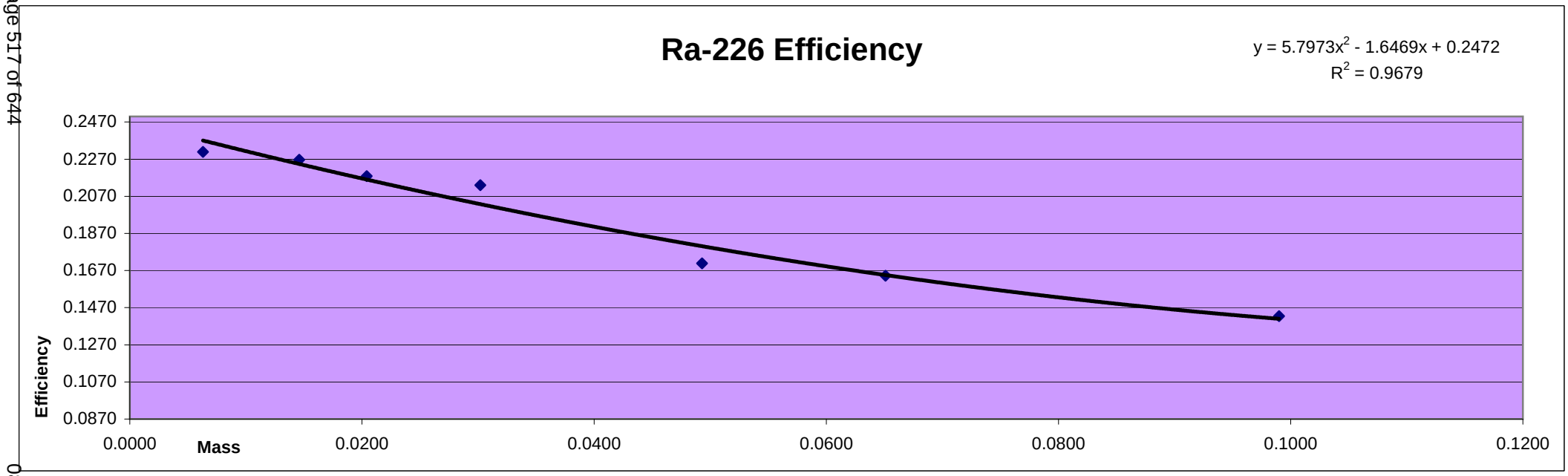
MDC Method Currie

Error = .00 **x sd**

Ra-226 Calibration 2017

Purple 22

Std #	Mass	Count Time	Sample Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
R2	0.0063	15.00	2/16/2017 21:37	27662	1844.1333	2/13/2017 13:30	2.3621	0.4487	1739.8866	7534.6	0.2309
R3	0.0146	15.00	2/16/2017 21:20	41900	2793.3333	2/13/2017 13:30	2.3586	0.6933	1708.3377	7534.6	0.2267
R4	0.0204	15.00	2/16/2017 13:00	40274	2684.9333	2/13/2017 13:30	2.2519	0.7265	1641.1208	7534.6	0.2178
R5	0.0302	15.00	2/16/2017 12:12	46424	3094.9333	2/13/2017 13:30	2.2412	0.8604	1604.9948	7534.6	0.2130
R6	0.0493	15.00	2/16/2017 11:52	40448	2696.5333	2/13/2017 13:30	2.2369	0.9364	1287.3772	7534.6	0.1709
R7	0.0651	15.00	2/16/2017 11:30	38418	2561.2000	2/13/2017 13:30	2.2320	0.9274	1237.3890	7534.6	0.1642
R8	0.0990	15.00	2/16/2017 10:40	33599	2239.9333	2/13/2017 13:30	2.2208	0.9402	1072.7865	7534.6	0.1424



Alpha/Beta Count Results

Sample Activity Report

Purple 20-23 - C

Addr: 22

Sample ID ICRa6-986404;8-A

Repeat 1

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 2/16/2017 10:40:37 AM

Count Ended 2/16/2017 10:55:48 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.126	33,599	2,239.933	2,239.807
sd	0.000			0.011	183.300	12.220	12.220
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.298	39,535	2,635.667	2,635.369
sd	0.000			0.017	198.834	13.256	13.256

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Purple 20-23 - C

Addr: 22

Sample ID ICRa6-986404;7-A

Repeat 2

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 2/16/2017 11:30:38 AM

Count Ended 2/16/2017 11:45:47 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.126	38,418	2,561.200	2,561.074
sd	0.000			0.011	196.005	13.067	13.067
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.298	39,510	2,634.000	2,633.702
sd	0.000			0.017	198.771	13.251	13.251

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Purple 20-23 - C

Addr: 22

Sample ID ICRa6-986404;6-A

Repeat 3

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 2/16/2017 11:52:50 AM

Count Ended 2/16/2017 12:08:01 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.126	40,448	2,696.533	2,696.407
sd	0.000			0.011	201.117	13.408	13.408
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.298	40,767	2,717.800	2,717.502
sd	0.000			0.017	201.908	13.461	13.461

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Purple 20-23 - C

Addr: 22

Sample ID ICRa6-986404;5-A

Repeat 4

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 2/16/2017 12:12:01 PM

Count Ended 2/16/2017 12:27:13 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.126	46,424	3,094.933	3,094.807
sd	0.000			0.011	215.462	14.364	14.364
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.298	39,084	2,605.600	2,605.302
sd	0.000			0.017	197.697	13.180	13.180

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Purple 20-23 - C

Addr: 22

Sample ID ICRa6-986404;4-A

Repeat 5

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 2/16/2017 1:00:46 PM

Count Ended 2/16/2017 1:15:59 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.126	40,274	2,684.933	2,684.807
sd	0.000			0.011	200.684	13.379	13.379
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.298	33,824	2,254.933	2,254.635
sd	0.000			0.017	183.913	12.261	12.261

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Purple 20-23 - C

Addr: 22

Sample ID ICRa6-986404;-3-A

Repeat 6

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 2/16/2017 9:20:52 PM

Count Ended 2/16/2017 9:36:03 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.126	41,900	2,793.333	2,793.207
sd	0.000			0.011	204.695	13.646	13.646
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.298	34,815	2,321.000	2,320.702
sd	0.000			0.017	186.588	12.439	12.439

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Purple 20-23 - C

Addr: 22

Sample ID ICRa6-986404;2-A

Repeat 7

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 2/16/2017 9:37:48 PM

Count Ended 2/16/2017 9:52:59 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.126	27,662	1,844.133	1,844.007
sd	0.000			0.011	166.319	11.088	11.088
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.298	22,771	1,518.067	1,517.769
sd	0.000			0.017	150.901	10.060	10.060

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha Beta Calibration Verifications

ICV is for Gross Alpha

Protean Alpha ICV - 2015				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
0	101.29%	85.46%	85.48%	90.74%

Standard ID

Thorium-230

Th-230_00019 #181198

Cert # 92776 Ref. date 08/08/2013

Activity 5.0185 pCi/mL

Prep Batch: M153001

	Low Mass	Medium Mass	High Mass
	0.142g	0.0512g	0.0747g
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
0	5.083	4.289	4.29

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Protean Beta ICV - 2013				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
0	98.05%	97.20%	98.50%	97.92%

Beta Activity 2000.929 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Count Date:	3/28/2013		(or date at which you wish to determine activity)
Elapsed Time:	119.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.992107441		
Corrected Activity:	2221.030929	dpm	
Decay Activity (Sr/Y-90)	4442.061857	dpm	2000.929 pCi

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICVABT-51512;Beta 1*** **Repeat** ***5***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 10:21 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	6	1.200	1.164
sd	0.000			0.006	2.449	0.490	0.490
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	9,201	1,840.200	1,839.641
sd	0.000			0.024	95.922	19.184	19.184

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICVABT-51512;Beta 3*** **Repeat** ***10***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 13:22 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	5	1.000	0.964
sd	0.000			0.006	2.236	0.447	0.447
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	8,327	1,665.400	1,664.841
sd	0.000			0.024	91.252	18.250	18.250

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICVABT-51512;Beta 2*** **Repeat** ***11***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 13:39 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	7	1.400	1.364
sd	0.000			0.006	2.646	0.529	0.529
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	8,614	1,722.800	1,722.241
sd	0.000			0.024	92.812	18.562	18.562

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICVABT-181198;A1*** **Repeat** ***1***

Batch ID ***m153001***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/20/201! 13:53 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	12,896	429.867	429.796
sd	0.000			0.008	113.561	3.785	3.785
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	4,088	136.267	135.646
sd	0.000			0.025	63.937	2.131	2.131

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICVABT-181198;A3*** **Repeat** ***3***

Batch ID ***m153001***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/20/201! 18:43 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	6,068	202.267	202.196
sd	0.000			0.008	77.897	2.597	2.597
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	2,274	75.800	75.179
sd	0.000			0.025	47.686	1.590	1.590

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICVABT-181198;A2*** **Repeat** ***4***

Batch ID ***m153001***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/20/201! 19:40 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	7,568	252.267	252.196
sd	0.000			0.008	86.994	2.900	2.900
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	2,634	87.800	87.179
sd	0.000			0.025	51.323	1.711	1.711

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

ICV is for Gross Alpha

Protean Alpha ICV - 2015				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
1	100.63%	88.77%	87.70%	92.36%

Standard ID

Thorium-230

Th-230_00019 #181198

Cert # 92776 Ref. date 08/08/2013

Activity 5.0185 pCi/mL

Prep Batch: M153001

	Low Mass	Medium Mass	High Mass
	0.142g	0.0512g	0.0747g
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
1	5.05	4.455	4.401

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Protean Beta ICV - 2013				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
1	100.10%	97.30%	99.70%	99.04%

Beta Activity 2000.929 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	3/28/2013		(or date at which you wish to determine activity)
Elapsed Time:	119.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.992107441		
Corrected Activity:	2221.030929	dpm	
Decay Activity (Sr/Y-90)	4442.061857	dpm	2000.929 pCi

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** ***1***

Sample ID ***ICVABT-51512;Beta 2*** **Repeat** ***5***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 10:21 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	13	2.600	2.559
sd	0.000			0.006	3.606	0.721	0.721
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	8,660	1,732.000	1,731.533
sd	0.000			0.022	93.059	18.612	18.612

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** ***1***

Sample ID ***ICVABT-51512;Beta 3*** **Repeat** ***11***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 13:39 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	15	3.000	2.959
sd	0.000			0.006	3.873	0.775	0.775
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	8,539	1,707.800	1,707.333
sd	0.000			0.022	92.407	18.481	18.481

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** ***1***

Sample ID ***ICVABT-51512;Beta 1*** **Repeat** ***20***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 4/2/2013 21:11 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	23	4.600	4.559
sd	0.000			0.006	4.796	0.959	0.959
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	9,415	1,883.000	1,882.533
sd	0.000			0.022	97.031	19.406	19.406

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICVABT-181198;A2*** **Repeat** *1*

Batch ID ***m153001***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/20/201! 13:53 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	7,689	256.300	256.220
sd	0.000			0.009	87.687	2.923	2.923
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	2,743	91.433	90.939
sd	0.000			0.022	52.374	1.746	1.746

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICVABT-181198;A1*** **Repeat** *2*

Batch ID ***m153001***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/20/201! 14:28 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	12,752	425.067	424.987
sd	0.000			0.009	112.925	3.764	3.764
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	4,155	138.500	138.006
sd	0.000			0.022	64.459	2.149	2.149

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICVABT-181198;A3*** **Repeat** *4*

Batch ID ***m153001***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/20/201! 19:40 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	6,077	202.567	202.487
sd	0.000			0.009	77.955	2.599	2.599
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	2,442	81.400	80.906
sd	0.000			0.022	49.417	1.647	1.647

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

ICV is for Gross Alpha

Protean Alpha ICV - 2015				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
5	102.56%	102.38%	101.88%	102.27%

Standard ID

Thorium-230
Th-230_00019 #181198
Cert # 92776 Ref. date 08/08/2013

Activity 5.0185 pCi/mL

Prep Batch: M153007

	Low Mass	Medium Mass	High Mass
	0.161g	0.0552g	0.0777g
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
5	5.147	5.138	5.113

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Protean Beta ICV - 2013				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
5	98.40%	97.40%	100.60%	98.80%

Beta Activity 2000.929 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	3/28/2013		(or date at which you wish to determine activity)
Elapsed Time:	119.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.992107441		
Corrected Activity:	2221.030929	dpm	
Decay Activity (Sr/Y-90)	4442.061857	dpm	2000.929 pCi

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** *5*

Sample ID ***ICVABT-51512;Beta 3*** **Repeat** *7*

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 12:32 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.033	1	0.200	0.167
sd	0.000			0.006	1.000	0.200	0.200
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	8,393	1,678.600	1,678.211
sd	0.000			0.020	91.613	18.323	18.323

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** ***5***

Sample ID ***ICVABT-51512;Beta 2*** **Repeat** ***8***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 12:46 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.033	1	0.200	0.167
sd	0.000			0.006	1.000	0.200	0.200
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	8,568	1,713.600	1,713.211
sd	0.000			0.020	92.563	18.513	18.513

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** ***5***

Sample ID ***ICVABT-51512;Beta 1*** **Repeat** ***9***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 13:04 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.033	0	0.000	-0.033
sd	0.000			0.006	0.000	0.000	0.115
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	9,244	1,848.800	1,848.411
sd	0.000			0.020	96.146	19.229	19.229

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** ***5***

Sample ID ***ICVABT-181198; A3*** **Repeat** ***104***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 12:56 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.066	8,023	267.433	267.367
sd	0.000			0.008	89.571	2.986	2.986
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	3,465	115.500	115.078
sd	0.000			0.021	58.864	1.962	1.962

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** ***5***

Sample ID ***ICVABT-181198; A2*** **Repeat** ***105***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 13:59 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.066	12,111	403.700	403.634
sd	0.000			0.008	110.050	3.668	3.668
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	4,725	157.500	157.078
sd	0.000			0.021	68.739	2.291	2.291

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - B **Address:** ***5***

Sample ID ***ICVABT-181198; A1*** **Repeat** ***25***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 15:12 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.066	6,454	215.133	215.067
sd	0.000			0.008	80.337	2.678	2.678
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	3,056	101.867	101.445
sd	0.000			0.021	55.281	1.843	1.843

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

ICV is for Gross Alpha

Protean Alpha ICV - 2015				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
6	102.32%	103.00%	102.44%	102.59%

Standard ID

Thorium-230

Th-230_00019 #181198

Cert # 92776 Ref. date 08/08/2013

Activity 5.0185 pCi/mL

Prep Batch: M153007

	Low Mass	Medium Mass	High Mass
	0.161g	0.0552g	0.0777g
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
6	5.135	5.169	5.141

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Protean Beta ICV - 2013				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
6	99.25%	96.86%	99.25%	98.45%

Beta Activity 2000.929 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	3/28/2013		(or date at which you wish to determine activity)
Elapsed Time:	119.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.992107441		
Corrected Activity:	2221.030929	dpm	
Decay Activity (Sr/Y-90)	4442.061857	dpm	2000.929 pCi

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** *6*

Sample ID ***ICVABT-51512;Beta 3*** **Repeat** *8*

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 12:46 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	1	0.200	0.154
sd	0.000			0.007	1.000	0.200	0.200
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.447	8,329	1,665.800	1,665.353
sd	0.000			0.021	91.263	18.253	18.253

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** ***6***

Sample ID ***ICVABT-51512;Beta 2*** **Repeat** ***9***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 13:04 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	1	0.200	0.154
sd	0.000			0.007	1.000	0.200	0.200
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.447	8,555	1,711.000	1,710.553
sd	0.000			0.021	92.493	18.499	18.499

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** ***6***

Sample ID ***ICVABT-51512;Beta 1*** **Repeat** ***10***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 13:21 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.046	1	0.200	0.154
sd	0.000			0.007	1.000	0.200	0.200
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.447	9,281	1,856.200	1,855.753
sd	0.000			0.021	96.338	19.268	19.268

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** ***6***

Sample ID ***ICVABT-181198; A1*** **Repeat** ***22***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 12:57 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	6,683	222.767	222.636
sd	0.000			0.011	81.750	2.725	2.725
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	2,847	94.900	94.335
sd	0.000			0.024	53.357	1.779	1.779

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** ***6***

Sample ID ***ICVABT-181198; A3*** **Repeat** ***105***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 13:59 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	8,311	277.033	276.902
sd	0.000			0.011	91.165	3.039	3.039
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	3,362	112.067	111.502
sd	0.000			0.024	57.983	1.933	1.933

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - C **Address:** ***6***

Sample ID ***ICVABT-181198; A2*** **Repeat** ***106***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 14:39 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	12,434	414.467	414.336
sd	0.000			0.011	111.508	3.717	3.717
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	4,426	147.533	146.968
sd	0.000			0.024	66.528	2.218	2.218

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

ICV is for Gross Alpha

Protean Alpha ICV - 2015				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
7	102.90%	103.70%	104.71%	103.77%

Standard ID

Thorium-230

Th-230_00019 #181198

Cert # 92776 Ref. date 08/08/2013

Activity 5.0185 pCi/mL

Prep Batch: M153007

	Low Mass	Medium Mass	High Mass
	0.161g	0.0552g	0.0777g
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
7	5.164	5.204	5.255

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Protean Beta ICV - 2013				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
7	98.40%	98.15%	99.00%	98.52%

Beta Activity 2000.929 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	3/28/2013		(or date at which you wish to determine activity)
Elapsed Time:	119.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.992107441		
Corrected Activity:	2221.030929	dpm	
Decay Activity (Sr/Y-90)	4442.061857	dpm	2000.929 pCi

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** *7*

Sample ID ***ICVABT-51512;Beta 3*** **Repeat** *9*

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 13:04 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.035	1	0.200	0.165
sd	0.000			0.006	1.000	0.200	0.200
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.489	8,345	1,669.000	1,668.511
sd	0.000			0.022	91.351	18.270	18.270

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** *7*

Sample ID ***ICVABT-51512;Beta 2*** **Repeat** ***10***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 13:21 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.035	0	0.000	-0.035
sd	0.000			0.006	0.000	0.000	0.118
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.489	8,650	1,730.000	1,729.511
sd	0.000			0.022	93.005	18.601	18.601

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** ***7***

Sample ID ***ICVABT-51512;Beta 1*** **Repeat** ***11***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 13:39 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.035	2	0.400	0.365
sd	0.000			0.006	1.414	0.283	0.283
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.489	9,068	1,813.600	1,813.111
sd	0.000			0.022	95.226	19.045	19.045

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** *7*

Sample ID ***ICVABT-181198; A1*** **Repeat** ***23***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 13:59 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	6,623	220.767	220.696
sd	0.000			0.008	81.382	2.713	2.713
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.529	2,749	91.633	91.104
sd	0.000			0.023	52.431	1.748	1.748

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** ***7***

Sample ID ***ICVABT-181198; A3*** **Repeat** ***106***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 14:39 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	8,134	271.133	271.062
sd	0.000			0.008	90.189	3.006	3.006
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.529	3,157	105.233	104.704
sd	0.000			0.023	56.187	1.873	1.873

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 4-7 - D **Address:** ***7***

Sample ID ***ICVABT-181198; A2*** **Repeat** ***107***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 15:12 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	12,323	410.767	410.696
sd	0.000			0.008	111.009	3.700	3.700
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.529	4,255	141.833	141.304
sd	0.000			0.023	65.230	2.174	2.174

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

ICV is for Gross Alpha

Protean Alpha ICV - 2015				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
8	103.02%	104.95%	106.65%	104.87%

Standard ID

Thorium-230

Th-230_00019 #181198

Cert # 92776 Ref. date 08/08/2013

Activity 5.0185 pCi/mL

Prep Batch: M153007

	Low Mass	Medium Mass	High Mass
	0.161g	0.0552g	0.0777g
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
8	5.17	5.267	5.352

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Protean Beta ICV - 2013

Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
8	98.75%	95.51%	100.00%	98.09%

Beta Activity 2000.929 pCi

Beta Activity 2000.796 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	3/28/2013		(or date at which you wish to determine activity)
Elapsed Time:	119.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.992107441		
Corrected Activity:	2221.030929	dpm	
Decay Activity (Sr/Y-90)	4442.061857	dpm	2000.929 pCi

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	3/29/2013		(or date at which you wish to determine activity)
Elapsed Time:	120.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.992041382		
Corrected Activity:	2220.883041	dpm	
Decay Activity (Sr/Y-90)	4441.766083	dpm	2000.796 pCi

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICVABT-51512;Beta 1*** **Repeat** ***12***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 21:29 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.043	2	0.400	0.357
sd	0.000			0.007	1.414	0.283	0.283
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.455	9,102	1,820.400	1,819.945
sd	0.000			0.021	95.404	19.081	19.081

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICVABT-51512;Beta 3*** **Repeat** ***18***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 23:59 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.043	3	0.600	0.557
sd	0.000			0.007	1.732	0.346	0.346
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.455	8,344	1,668.800	1,668.345
sd	0.000			0.021	91.345	18.269	18.269

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICVABT-51512;Beta 2*** **Repeat** ***19***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/29/2013 00:05 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.043	1	0.200	0.157
sd	0.000			0.007	1.000	0.200	0.200
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.455	8,351	1,670.200	1,669.745
sd	0.000			0.021	91.384	18.277	18.277

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICVABT-181198; A3*** **Repeat** ***15***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/2/2015 22:14 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.208	8,518	283.933	283.725
sd	0.000			0.014	92.293	3.076	3.076
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	3,262	108.733	108.168
sd	0.000			0.024	57.114	1.904	1.904

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICVABT-181198; A1*** **Repeat** ***17***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 09:10 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.208	6,995	233.167	232.959
sd	0.000			0.014	83.636	2.788	2.788
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	2,753	91.767	91.202
sd	0.000			0.024	52.469	1.749	1.749

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 8-11 - A **Address:** ***8***

Sample ID ***ICVABT-181198; A2*** **Repeat** ***101***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 11:06 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.208	12,657	421.900	421.692
sd	0.000			0.014	112.503	3.750	3.750
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.565	4,145	138.167	137.602
sd	0.000			0.024	64.382	2.146	2.146

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

ICV is for Gross Alpha

Protean Alpha ICV - 2015				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
13	101.68%	103.98%	103.02%	102.89%

Standard ID

Thorium-230

Th-230_00019 #181198

Cert # 92776 Ref. date 08/08/2013

Activity 5.0185 pCi/mL

Prep Batch: M153007

	Low Mass	Medium Mass	High Mass
	0.161g	0.0552g	0.0777g
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
13	5.103	5.218	5.17

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Protean Beta ICV - 2013				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
13	99.70%	99.45%	97.35%	98.84%

Beta Activity 2000.929 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	3/28/2013		(or date at which you wish to determine activity)
Elapsed Time:	119.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.992107441		
Corrected Activity:	2221.030929	dpm	
Decay Activity (Sr/Y-90)	4442.061857	dpm	2000.929 pCi

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICVABT-51512;Beta 3*** **Repeat** ***15***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 23:41 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	3	0.600	0.553
sd	0.000			0.007	1.732	0.346	0.346
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	8,285	1,657.000	1,656.571
sd	0.000			0.021	91.022	18.204	18.204

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICVABT-51512;Beta 2*** **Repeat** ***16***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 23:47 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	5	1.000	0.953
sd	0.000			0.007	2.236	0.447	0.447
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	8,847	1,769.400	1,768.971
sd	0.000			0.021	94.058	18.812	18.812

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICVABT-51512;Beta 1*** **Repeat** ***17***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 23:53 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	2	0.400	0.353
sd	0.000			0.007	1.414	0.283	0.283
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	9,399	1,879.800	1,879.371
sd	0.000			0.021	96.948	19.390	19.390

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICVABT-181198; A3*** **Repeat** ***99***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 08:30 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	8,655	288.500	288.351
sd	0.000			0.012	93.032	3.101	3.101
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	3,265	108.833	108.341
sd	0.000			0.022	57.140	1.905	1.905

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICVABT-181198; A2*** **Repeat** ***100***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 10:24 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	12,748	424.933	424.784
sd	0.000			0.012	112.907	3.764	3.764
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	4,325	144.167	143.675
sd	0.000			0.022	65.765	2.192	2.192

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICVABT-181198; A1*** **Repeat** ***21***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 12:21 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	6,933	231.100	230.951
sd	0.000			0.012	83.265	2.775	2.776
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	2,877	95.900	95.408
sd	0.000			0.022	53.638	1.788	1.788

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Ra-226 Calibration Verifications

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Total Alpha-Emitting Radium

Batch: 291970 **Operator:**

SampID / Analyte	WRKNO	Ts	Aliquot Tb	Cs	Ba Mass Cb	Ba Yield CPMs	Trunc Yield CPMb	Ingrowth	Activity	Ba Precip Time / UncCount	InstrID / UncTotal	Eff / MDA	Cal Type / DLC	Cnt Date Time / MQO	Sigma
160-21018-A-1-A	160-21018-A-1-A		1.0000mL		0.0132	62.68%	False		3.9998	2/13/17 13:30	Blue5	0.2210	2	4/8/17 11:30	1.00
Total Alpha Emitting		10.00	1000.00	41096	26	4109.60	0.03	3.341E+003pCi/mL		1.648E+001	1.513E+002	3.810E-001	6.854E-002	151.2584	
160-21018-A-2-A	160-21018-A-2-A		1.0000mL		0.0271	77.21%	False		3.9998	2/13/17 13:30	Blue5	0.2039	2	4/8/17 11:07	1.00
Total Alpha Emitting		10.00	1000.00	51299	26	5129.90	0.03	3.670E+003pCi/mL		1.620E+001	1.659E+002	3.352E-001	6.031E-002	165.9436	
160-21018-A-3-A	160-21018-A-3-A		1.0000mL		0.0498	94.59%	False		3.9998	2/13/17 13:30	Blue5	0.1802	2	4/8/17 11:46	1.00
Total Alpha Emitting		10.00	1000.00	49880	26	4988.00	0.03	3.296E+003pCi/mL		1.476E+001	1.490E+002	3.096E-001	5.570E-002	149.0413	

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

SampID	SampDupID	Analyte	Activity	DupActivity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	WRKNO	Analyte	Activity	MSActivity	StdAdded	Recovery	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal

ICVRa6-1063071; A1 = 160-21018-A-1-A

ICVRa6-106307/; A2 = 160-21018-A-2-A

ICVRa6-1063071; A3 = 160-21018-A-3-A

gw 7/14/17

Ra226 ICV

Blue - Ra226 ICV 2017				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
5	88.20%	96.88%	87.01%	90.69%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity 3788.19152 pCi/mL

Prep Batch: 291970

Detector	1	Activity	Units
5	Low Mass (0.0132g)	3.341E+03	pCi/mL

2	Activity	Units
Medium Mass (0.0271g)	3.670E+03	pCi/mL

3	Activity	Units
High Mass (0.0498g)	3.296E+03	pCi/mL

3.30E+03

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - B

Addr: 5

Sample ID ICVRa6-1063071;Ra2 **Repeat** 1

Carrier No. 0

Batch ID Ra226_ICV

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/30/2017 1:07:31 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/30/2017 1:12:39 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.018	25,490	5,098.000	5,098.000
sd	0.000			0.000	159.656	31.931	31.931
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.214	30,947	6,189.400	6,189.400
sd	0.000			0.000	175.918	35.184	35.184

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - B

Addr: 5

Sample ID ICVRa6-1063071;Ra1 **Repeat** 2

Carrier No. 0

Batch ID Ra226_ICV

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/30/2017 1:29:31 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/30/2017 1:34:39 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.018	20,144	4,028.800	4,028.800
sd	0.000			0.000	141.930	28.386	28.386
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.214	24,452	4,890.400	4,890.400
sd	0.000			0.000	156.371	31.274	31.274

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - B

Addr: 5

Sample ID ICVRa6-1063071;Ra3 **Repeat** 4

Carrier No. 0

Batch ID Ra226_ICV

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/30/2017 2:04:08 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/30/2017 2:09:18 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.018	24,602	4,920.400	4,920.400
sd	0.000			0.000	156.850	31.370	31.370
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.214	34,784	6,956.800	6,956.800
sd	0.000			0.000	186.505	37.301	37.301

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Total Alpha-Emitting Radium

Batch: 291970 **Operator:**

SampID / Analyte	WRKNO	Ts	Aliquot Tb	Cs	Ba Mass Cb	Ba Yield CPMs	Trunc Yield CPMb	Ingrowth	Activity	Ba Precip Time / UncCount	InstrID / UncTotal	Eff / MDA	Cal Type / DLC	Cnt Date Time / MQO	Sigma
160-21018-A-1-A	160-21018-A-1-A		1.0000mL		0.0132	62.68%	False		3.9991	2/13/17 13:30	Blue6	0.2222	2	3/30/17 13:38	1.00
Total Alpha Emitting		5.00	1000.00	19881	21	3976.20	0.02		3.216E+003pCi/mL	2.281E+001	1.465E+002	6.581E-001	8.644E-002	146.4970	
160-21018-A-2-A	160-21018-A-2-A		1.0000mL		0.0271	77.21%	False		3.9991	2/13/17 13:30	Blue6	0.2055	2	3/30/17 13:29	1.00
Total Alpha Emitting		5.00	1000.00	25881	21	5176.20	0.02		3.676E+003pCi/mL	2.285E+001	1.670E+002	5.778E-001	7.589E-002	166.9696	
160-21018-A-3-A	160-21018-A-3-A		1.0000mL		0.0498	94.59%	False		3.9991	2/13/17 13:30	Blue6	0.1820	2	3/30/17 13:07	1.00
Total Alpha Emitting		5.00	1000.00	25723	21	5144.60	0.02		3.367E+003pCi/mL	2.099E+001	1.530E+002	5.326E-001	6.994E-002	152.9549	

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

SampID	SampDupID	Analyte	Activity	DupActivity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	WRKNO	Analyte	Activity	MSActivity	StdAdded	Recovery	ZFactor

Blanks Information

UncTotal

ICVRa6-106307I ; A1 = 160-21018-A-1-A

ICVRa6-106307I ; A2 = 160-21018-A-2-A

ICVRa6-106307I ; A3 = 160-21018-A-3-A

gw 7/14/17

Ra226 ICV

Blue - Ra226 ICV 2017				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
6	84.90%	97.04%	88.88%	90.27%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity 3788.19152 pCi/mL

Prep Batch: 291970

Detector	1	Activity	Units
6	Low Mass (0.0132g)	3.216E+03	pCi/mL

2	Activity	Units
Medium Mass (0.0271g)	3.676E+03	pCi/mL

3	Activity	Units
High Mass (0.0498g)	3.367E+03	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - C

Addr: 6

Sample ID ICVRa6-1063071;Ra3 **Repeat** 1

Carrier No. 0

Batch ID Ra226_ICV

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/30/2017 1:07:23 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/30/2017 1:12:32 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.021	25,723	5,144.600	5,144.600
sd	0.000			0.000	160.384	32.077	32.077
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.322	34,790	6,958.000	6,958.000
sd	0.000			0.000	186.521	37.304	37.304

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - C

Addr: 6

Sample ID ICVRa6-1063071;Ra2 **Repeat** 2

Carrier No. 0

Batch ID Ra226_ICV

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/30/2017 1:29:38 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/30/2017 1:34:46 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.021	25,881	5,176.200	5,176.200
sd	0.000			0.000	160.876	32.175	32.175
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.322	30,827	6,165.400	6,165.400
sd	0.000			0.000	175.576	35.115	35.115

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 4-7 - C

Addr: 6

Sample ID ICVRa6-1063071;Ra1 **Repeat** 3

Carrier No. 0

Batch ID Ra226_ICV

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 3/30/2017 1:38:13 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 3/30/2017 1:43:21 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	0.000	1.000	0.021	19,881	3,976.200	3,976.200
sd	0.000			0.000	141.000	28.200	28.200
A to B	0.000	0.000				0.000	
sd	0.000					0.000	
Beta	0.000	0.000	1.000	0.322	23,260	4,652.000	4,652.000
sd	0.000			0.000	152.512	30.502	30.502

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Total Alpha-Emitting Radium

Batch: 291970 **Operator:**

SampID / Analyte	WRKNO	Ts	Aliquot Tb	Cs	Ba Mass Cb	Ba Yield CPMs	Trunc Yield CPMb	Ingrowth	Activity	Ba Precip Time	InstrID	Eff	Cal Type	Cnt Date Time	Sigma
									UncCount	UncTotal	MDA	DLC	MQO		
ICVRA6-1063071;A1	160-21018-A-1-A		1.0000mL		0.0132	62.68%	False	4.0000	2/13/17 13:30	Blue13	0.2249	2	5/18/17 23:28		1.00
Total Alpha Emitting		5.00	1000.00	21054	37	4210.80	0.04	3.364E+003pCi/mL	2.319E+001	1.532E+002	7.061E-001	1.133E-001	153.1585		
ICVRA6-1063071;A2	160-21018-A-2-A		1.0000mL		0.0271	77.21%	False	4.0000	2/13/17 13:30	Blue13	0.2064	2	5/18/17 23:18		1.00
Total Alpha Emitting		5.00	1000.00	26036	37	5207.20	0.04	3.681E+003pCi/mL	2.281E+001	1.672E+002	6.247E-001	1.003E-001	167.1992		
ICVRA6-1063071;A3	160-21018-A-3-A		1.0000mL		0.0498	94.59%	False	4.0000	2/13/17 13:30	Blue13	0.1814	2	5/18/17 23:54		1.00
Total Alpha Emitting		5.00	1000.00	25775	37	5155.00	0.04	3.384E+003pCi/mL	2.108E+001	1.537E+002	5.801E-001	9.312E-002	153.7284		

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

SampID	SampDupID	Analyte	Activity	DupActivity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	WRKNO	Analyte	Activity	MSActivity	StdAdded	Recovery	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal

Ra226 ICV

Blue - Ra226 ICV 2017				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
13	88.80%	97.17%	89.33%	91.77%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity 3788.19152 pCi/mL

Prep Batch: 291970

Detector	1	Activity	Units
13	Low Mass (0.0132g)	3.364E+03	pCi/mL

2	Activity	Units
Medium Mass (0.0271g)	3.681E+03	pCi/mL

3	Activity	Units
High Mass (0.0498g)	3.384E+03	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - B

Addr: 13

Sample ID ICVRA6-1063071;RA2 **Repeat** 9

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 5/18/2017 11:18:43 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/18/2017 11:23:51 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.037	26,036	5,207.200	5,207.163
sd	0.000			0.006	161.357	32.271	32.271
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.256	29,803	5,960.600	5,960.344
sd	0.000			0.016	172.635	34.527	34.527

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - B

Addr: 13

Sample ID ICVRA6-1063071;RA1 **Repeat** 10

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 5/18/2017 11:28:27 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/18/2017 11:33:39 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.037	21,054	4,210.800	4,210.763
sd	0.000			0.006	145.100	29.020	29.020
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.256	23,745	4,749.000	4,748.744
sd	0.000			0.016	154.094	30.819	30.819

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - B

Addr: 13

Sample ID ICVRA6-1063071;RA3 **Repeat** 12

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/18/2017 11:54:09 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/18/2017 11:59:19 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.037	25,775	5,155.000	5,154.963
sd	0.000			0.006	160.546	32.109	32.109
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.256	33,712	6,742.400	6,742.144
sd	0.000			0.016	183.608	36.722	36.722

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Total Alpha-Emitting Radium

Batch: 291970 **Operator:**

SampID / Analyte	WRKNO	Ts	Aliquot Tb	Cs	Ba Mass Cb	CPMs	Ba Yield CPMb	Trunc Yield	Ingrowth Activity	Ba Precip Time UncCount	InstrID UncTotal	Eff MDA	Cal Type DLC	Cnt Date Time MQO	Sigma
ICVRA6-1063071;A1	160-21018-A-1-A		1.0000mL		0.0132		62.68%	False	4.0000	2/13/17 13:30	Blue14	0.1894	2	5/18/17 23:38	1.00
Total Alpha Emitting		5.00	1000.00	17174	23	3434.80	0.02		3.258E+003pCi/mL	2.486E+001	1.487E+002	7.813E-001	1.061E-001	148.7065	
ICVRA6-1063071;A2	160-21018-A-2-A		1.0000mL		0.0271		77.21%	False	4.0000	2/13/17 13:30	Blue14	0.1733	2	5/18/17 23:28	1.00
Total Alpha Emitting		5.00	1000.00	21974	23	4394.80	0.02		3.699E+003pCi/mL	2.495E+001	1.683E+002	6.932E-001	9.413E-002	168.2943	
ICVRA6-1063071;A3	160-21018-A-3-A		1.0000mL		0.0498		94.59%	False	4.0000	2/13/17 13:30	Blue14	0.1514	2	5/18/17 23:18	1.00
Total Alpha Emitting		5.00	1000.00	21104	23	4220.80	0.02		3.320E+003pCi/mL	2.286E+001	1.512E+002	6.480E-001	8.799E-002	151.1599	

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

SampID	SampDupID	Analyte	Activity	DupActivity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	WRKNO	Analyte	Activity	MSActivity	StdAdded	Recovery	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal

Ra226 ICV

Blue - Ra226 ICV 2017				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
14	86.00%	97.65%	87.64%	90.43%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity 3788.19152 pCi/mL

Prep Batch: 291970

Detector	1	Activity	Units
14	Low Mass (0.0132g)	3.258E+03	pCi/mL

2	Activity	Units
Medium Mass (0.0271g)	3.699E+03	pCi/mL

3	Activity	Units
High Mass (0.0498g)	3.320E+03	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - C

Addr: 14

Sample ID ICVRA6-1063071;RA3 **Repeat** 9

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/18/2017 11:18:48 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/18/2017 11:23:58 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.023	21,104	4,220.800	4,220.777
sd	0.000			0.005	145.272	29.054	29.054
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.258	37,361	7,472.200	7,471.942
sd	0.000			0.016	193.290	38.658	38.658

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - C

Addr: 14

Sample ID ICVRA6-1063071;RA2

Repeat 10

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 5/18/2017 11:28:32 PM

Count Ended 5/18/2017 11:33:40 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.023	21,974	4,394.800	4,394.777
sd	0.000			0.005	148.236	29.647	29.647
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.258	32,983	6,596.600	6,596.342
sd	0.000			0.016	181.612	36.322	36.322

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - C

Addr: 14

Sample ID ICVRA6-1063071;RA1 **Repeat** 11

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/18/2017 11:38:40 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/18/2017 11:43:49 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.023	17,174	3,434.800	3,434.777
sd	0.000			0.005	131.050	26.210	26.210
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.258	26,188	5,237.600	5,237.342
sd	0.000			0.016	161.827	32.365	32.365

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Total Alpha-Emitting Radium

Batch: 291970 **Operator:**

SampID / Analyte	WRKNO	Ts	Aliquot Tb	Cs	Ba Mass Cb	CPMs	Ba Yield CPMb	Trunc Yield	Ingrowth Activity	Ba Precip Time UncCount	InstrID UncTotal	Eff MDA	Cal Type DLC	Cnt Date Time MQO	Sigma
ICVRA6-1063071;A1	160-21018-A-1-A		1.0000mL		0.0132		62.68%	False	4.0000	2/13/17 13:30	Blue15	0.1955	2	5/23/17 12:12	1.00
Total Alpha Emitting		5.00	1000.00	18550	18	3710.00	0.02		3.410E+003pCi/mL	2.503E+001	1.555E+002	7.333E-001	9.093E-002	155.4583	
ICVRA6-1063071;A2	160-21018-A-2-A		1.0000mL		0.0271		77.21%	False	4.0000	2/13/17 13:30	Blue15	0.1796	2	5/23/17 12:19	1.00
Total Alpha Emitting		5.00	1000.00	23185	18	4637.00	0.02		3.767E+003pCi/mL	2.474E+001	1.713E+002	6.482E-001	8.038E-002	171.3053	
ICVRA6-1063071;A3	160-21018-A-3-A		1.0000mL		0.0498		94.59%	False	4.0000	2/13/17 13:30	Blue15	0.1573	2	5/23/17 12:32	1.00
Total Alpha Emitting		5.00	1000.00	22508	18	4501.60	0.02		3.409E+003pCi/mL	2.272E+001	1.551E+002	6.042E-001	7.492E-002	155.0653	

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

SampID	SampDupID	Analyte	Activity	DupActivity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	WRKNO	Analyte	Activity	MSActivity	StdAdded	Recovery	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal

Ra226 ICV

Blue - Ra226 ICV 2017				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
15	90.02%	99.44%	89.99%	93.15%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity 3788.19152 pCi/mL

Prep Batch: 291970

Detector	1	Activity	Units
15	Low Mass (0.0132g)	3.410E+03	pCi/mL

2	Activity	Units
Medium Mass (0.0271g)	3.767E+03	pCi/mL

3	Activity	Units
High Mass (0.0498g)	3.409E+03	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - D

Addr: 15

Sample ID ICVRA6-1063071;RA3

Repeat 10

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/18/2017 11:28:39 PM

Count Ended 5/18/2017 11:33:47 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.018	21,489	4,297.800	4,297.782
sd	0.000			0.004	146.591	29.318	29.318
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.272	37,424	7,484.800	7,484.528
sd	0.000			0.016	193.453	38.691	38.691

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - D

Addr: 15

Sample ID ICVRA6-1063071;RA2

Repeat 11

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/18/2017 11:38:45 PM

Count Ended 5/18/2017 11:43:56 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.018	22,284	4,456.800	4,456.782
sd	0.000			0.004	149.278	29.856	29.856
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.272	32,829	6,565.800	6,565.528
sd	0.000			0.016	181.188	36.238	36.238

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 12 - 15 - D

Addr: 15

Sample ID ICVRA6-1063071;RA1 **Repeat** 12

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 5/18/2017 11:53:59 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/18/2017 11:59:12 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.018	17,965	3,593.000	3,592.982
sd	0.000			0.004	134.034	26.807	26.807
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.272	26,024	5,204.800	5,204.528
sd	0.000			0.016	161.320	32.264	32.264

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Total Alpha-Emitting Radium

Batch: 291970 **Operator:**

SampID / Analyte	WRKNO	Ts	Aliquot Tb	Cs	Ba Mass Cb	CPMs	Ba Yield CPMb	Trunc Yield	Ingrowth Activity	Ba Precip Time UncCount	InstrID UncTotal	Eff MDA	Cal Type DLC	Cnt Date Time MQO	Sigma
ICVRA6-1063071;A1	160-21018-A-1-A		1.0000mL		0.0132		62.68%	False	4.0000	2/13/17 13:30	Blue17	0.2131	2	5/18/17 19:31	
Total Alpha Emitting		5.00	1000.00	20088	34	4017.60	0.03		3.388E+003pCi/mL	2.391E+001	1.543E+002	7.354E-001	1.147E-001	154.3419	1.00
ICVRA6-1063071;A2	160-21018-A-2-A		1.0000mL		0.0271		77.21%	False	4.0000	2/13/17 13:30	Blue17	0.1950	2	5/18/17 16:22	
Total Alpha Emitting		5.00	1000.00	24224	34	4844.80	0.03		3.625E+003pCi/mL	2.329E+001	1.648E+002	6.524E-001	1.017E-001	164.7776	1.00
ICVRA6-1063071;A3	160-21018-A-3-A		1.0000mL		0.0498		94.59%	False	4.0000	2/13/17 13:30	Blue17	0.1709	2	5/18/17 22:56	
Total Alpha Emitting		5.00	1000.00	23542	34	4708.40	0.03		3.281E+003pCi/mL	2.139E+001	1.492E+002	6.077E-001	9.477E-002	149.1935	1.00

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

SampID	SampDupID	Analyte	Activity	DupActivity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	WRKNO	Analyte	Activity	MSActivity	StdAdded	Recovery	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal

Ra226 ICV

Blue - Ra226 ICV 2017				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
17	89.44%	95.69%	86.61%	90.58%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity 3788.19152 pCi/mL

Prep Batch: 291970

Detector	1	Activity	Units
17	Low Mass (0.0132g)	3.388E+03	pCi/mL

2	Activity	Units
Medium Mass (0.0271g)	3.625E+03	pCi/mL

3	Activity	Units
High Mass (0.0498g)	3.281E+03	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Blue 16 - 19 - B

Addr: 17

Sample ID ICVRA6-1063071;RA2

Repeat 1

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/18/2017 4:22:54 PM

Count Ended 5/18/2017 4:28:09 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.034	24,224	4,844.800	4,844.766
sd	0.000			0.006	155.641	31.128	31.128
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.209	31,034	6,206.800	6,206.591
sd	0.000			0.014	176.165	35.233	35.233

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16 - 19 - B

Addr: 17

Sample ID ICVRA6-1063071;RA1 **Repeat** 2

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta **Detector Volts** 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 5/18/2017 7:31:12 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 5/18/2017 7:36:23 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.034	20,088	4,017.600	4,017.566
sd	0.000			0.006	141.732	28.346	28.346
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.209	24,633	4,926.600	4,926.391
sd	0.000			0.014	156.949	31.390	31.390

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Currie **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Blue 16 - 19 - B

Addr: 17

Sample ID ICVRA6-1063071;RA3

Repeat 8

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 5/18/2017 10:56:51 PM

Count Ended 5/18/2017 11:02:02 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.034	23,542	4,708.400	4,708.366
sd	0.000			0.006	153.434	30.687	30.687
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.209	35,098	7,019.600	7,019.391
sd	0.000			0.014	187.345	37.469	37.469

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Total Alpha-Emitting Radium

Batch: 291970 **Operator:**

SampID / Analyte	WRKNO	Ts	Aliquot Tb	Cs	Ba Mass Cb	Ba Yield CPMs	Trunc Yield CPMb	Ingrowth	Activity	Ba Precip Time	InstrID	UncCount	UncTotal	Eff MDA	Cal Type DLC	Cnt Date Time	MQO	Sigma
ICVRa6-1063071;1-A	160-21018-A-1-A		1.0000mL		0.0133	63.15%	False		2.3897	2/13/17 13:30	Purple22			0.2263	2	2/16/17 23:50		1.00
Total Alpha Emitting		5.00	1000.00	12910	126	2582.00	0.13		**3.405E+003**pCi/mL			2.997E+001	1.561E+002	1.482E+000	3.453E-001		156.1429	
ICVRa6-1063071;2-A	160-21018-A-2-A		1.0000mL		0.0276	78.63%	False		3.1691	2/13/17 13:30	Purple22			0.2062	2	2/20/17 15:26		1.00
Total Alpha Emitting		5.00	1000.00	20642	126	4128.40	0.13		**3.620E+003**pCi/mL			2.520E+001	1.648E+002	9.852E-001	2.296E-001		164.8365	
ICVRa6-1063071;3-A	160-21018-A-3-A		1.0000mL		0.0487	92.50%	False		2.3878	2/13/17 13:30	Purple22			0.1807	2	2/16/17 23:40		1.00
Total Alpha Emitting		5.00	1000.00	15137	126	3027.40	0.13		**3.416E+003**pCi/mL			2.777E+001	1.562E+002	1.268E+000	2.954E-001		156.2182	

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

SampID	SampDupID	Analyte	Activity	DupActivity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	WRKNO	Analyte	Activity	MSActivity	StdAdded	Recovery	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal

Ra-226 ICV

Purple Ra-226 ICV 2017				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
22	89.88%	95.56%	90.17%	91.87%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity 3788.19152 pCi/mL

Prep Batch: 291970

Detector	1	Activity	Units
22	Low Mass (0.0133g)	3.405E+03	pCi/mL

2	Activity	Units
Medium Mass (0.0276g)	3.620E+03	pCi/mL

3	Activity	Units
High Mass (0.0487g)	3.416E+03	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Purple 20-23 - C

Addr: 22

Sample ID ICVRa6-1063071;3-A

Repeat 13

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 2/16/2017 11:40:30 PM

Count Ended 2/16/2017 11:45:38 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.126	15,137	3,027.400	3,027.274
sd	0.000			0.011	123.033	24.607	24.607
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.298	16,049	3,209.800	3,209.502
sd	0.000			0.017	126.685	25.337	25.337

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Purple 20-23 - C

Addr: 22

Sample ID ICVRa6-1063071;1-A

Repeat 14

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 2/16/2017 11:50:02 PM

Count Ended 2/16/2017 11:55:07 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.126	12,910	2,582.000	2,581.874
sd	0.000			0.011	113.622	22.724	22.724
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.298	11,314	2,262.800	2,262.502
sd	0.000			0.017	106.367	21.273	21.273

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Purple 20-23 - C

Addr: 22

Sample ID ICVRa6-1063071;2-A

Repeat 26

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 2/20/2017 3:26:21 PM

Count Ended 2/20/2017 3:31:28 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.126	20,642	4,128.400	4,128.274
sd	0.000			0.011	143.673	28.735	28.735
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.298	21,582	4,316.400	4,316.102
sd	0.000			0.017	146.908	29.382	29.382

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Monthly Backgrounds

Alpha/Beta Count Results

Source Count Report

Blue 4-7 - B

Addr: 5

Sample ID ICB
ICB;Monthly Background

Repeat 409

Carrier No. 0

Batch ID Monthly Background - ICB

Detector Volts 1515

Residual Wt 0 ***mg***

Half Life 0.00 ***Years***

Count Began 7/27/2018 3:23:33 PM

Calibration Date 3/21/2017 12:09:15 PM

Decay Factor 1.000

Count Ended 7/28/2018 8:04:33 AM

Backgrounds From

Sample Count Time 1,000.00 ***mins***

Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	71	0.071	0.000	0.071
sd	8.426	0.008	0.000	0.008
Beta	324	0.324	0.000	0.324
sd	18.000	0.018	0.000	0.018

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Blue 4-7 - C

Addr: 6

Sample ID ICB
ICB;Monthly Background

Repeat 410

Carrier No. 0

Batch ID Monthly Background - ICB

Detector Volts 1515

Residual Wt 0 ***mg***

Half Life 0.00 ***Years***

Count Began 7/27/2018 3:23:38 PM

Calibration Date 3/21/2017 12:09:15 PM

Decay Factor 1.000

Count Ended 7/28/2018 8:04:41 AM

Backgrounds From

Sample Count Time 1,000.00 ***mins***

Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	64	0.064	0.000	0.064
sd	8.000	0.008	0.000	0.008
Beta	348	0.348	0.000	0.348
sd	18.655	0.019	0.000	0.019

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Blue 12-15 - B

Addr: 13

Sample ID ICB
ICB;Monthly Background

Repeat 417

Carrier No. 0

Batch ID Monthly Background - ICB

Detector Volts 1515

Residual Wt 0 ***mg***

Half Life 0.00 ***Years***

Count Began 7/27/2018 3:24:56 PM

Calibration Date 3/21/2017 12:09:15 PM

Decay Factor 1.000

Count Ended 7/28/2018 8:06:02 AM

Backgrounds From

Sample Count Time 1,000.00 ***mins***

Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	42	0.042	0.000	0.042
sd	6.481	0.006	0.000	0.006
Beta	300	0.300	0.000	0.300
sd	17.321	0.017	0.000	0.017

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Blue 12-15 - C

Addr: 14

Sample ID ICB
ICB;Monthly Background

Repeat 418

Carrier No. 0

Batch ID Monthly Background - ICB

Detector Volts 1515

Residual Wt 0 ***mg***

Half Life 0.00 ***Years***

Count Began 7/27/2018 3:25:02 PM

Calibration Date 3/21/2017 12:09:15 PM

Decay Factor 1.000

Count Ended 7/28/2018 8:06:02 AM

Backgrounds From

Sample Count Time 1,000.00 ***mins***

Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	35	0.035	0.000	0.035
sd	5.916	0.006	0.000	0.006
Beta	246	0.246	0.000	0.246
sd	15.684	0.016	0.000	0.016

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Blue 12-15 - D

Addr: 15

Sample ID ICB
ICB;Monthly Background

Repeat 419

Carrier No. 0

Batch ID Monthly Background - ICB

Detector Volts 1515

Residual Wt 0 ***mg***

Half Life 0.00 ***Years***

Count Began 7/27/2018 3:25:07 PM

Calibration Date 3/21/2017 12:09:15 PM

Decay Factor 1.000

Count Ended 7/28/2018 8:06:10 AM

Backgrounds From

Sample Count Time 1,000.00 ***mins***

Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	37	0.037	0.000	0.037
sd	6.083	0.006	0.000	0.006
Beta	359	0.359	0.000	0.359
sd	18.947	0.019	0.000	0.019

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Blue 16-19 - B

Addr: 17

Sample ID ICB
ICB;Monthly Background

Repeat 421

Carrier No. 0

Batch ID Monthly Background - ICB

Detector Volts 1515

Residual Wt 0 ***mg***

Half Life 0.00 ***Years***

Count Began 7/27/2018 3:25:34 PM

Calibration Date 3/21/2017 12:09:15 PM

Decay Factor 1.000

Count Ended 7/28/2018 8:06:32 AM

Backgrounds From

Sample Count Time 1,000.00 ***mins***

Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	72	0.072	0.000	0.072
sd	8.485	0.008	0.000	0.008
Beta	318	0.318	0.000	0.318
sd	17.833	0.018	0.000	0.018

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Protean 0-3 - A

Addr: 0

Sample ID ICB
ICB; Monthly Backgrounds

Batch ID ICB;Monthly Backgrounds

Repeat 518
Carrier No. 0
Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/27/2018 2:36:07 PM
Count Ended 7/28/2018 7:16:59 AM
Sample Count Time 1,000.00 ***mins***

Calibration Date 2/15/2016 5:20:09 PM
Backgrounds From
Background Count Time 0.00

Half Life 0.00 ***Years***
Decay Factor 1.000

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	77	0.077	0.000	0.077
sd	8.775	0.009	0.000	0.009
Beta	645	0.645	0.000	0.645
sd	25.397	0.025	0.000	0.025

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Protean 0-3 - B

Addr: 1

Sample ID ICB
ICB; Monthly Backgrounds

Repeat 517
Carrier No. 0

Batch ID ICB;Monthly Backgrounds

Detector Volts 1515

Residual Wt 0 ***mg***
Half Life 0.00 ***Years***
Count Began 7/27/2018 2:35:02 PM
Calibration Date 2/15/2016 5:20:09 PM
Decay Factor 1.000
Count Ended 7/28/2018 7:15:53 AM
Backgrounds From

Sample Count Time 1,000.00 ***mins***
Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	76	0.076	0.000	0.076
sd	8.718	0.009	0.000	0.009
Beta	491	0.491	0.000	0.491
sd	22.159	0.022	0.000	0.022

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Protean 4-7 - B

Addr: 5

Sample ID ICB
ICB; Monthly Backgrounds

Batch ID ICB;Monthly Backgrounds

Repeat 522
Carrier No. 0
Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/27/2018 2:40:30 PM
Count Ended 7/28/2018 7:20:25 AM
Sample Count Time 1,000.00 ***mins***

Calibration Date 2/15/2016 5:20:09 PM
Backgrounds From
Background Count Time 0.00

Half Life 0.00 ***Years***
Decay Factor 1.000

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	70	0.070	0.000	0.070
sd	8.367	0.008	0.000	0.008
Beta	437	0.437	0.000	0.437
sd	20.905	0.021	0.000	0.021

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Protean 4-7 - C

Addr: 6

Sample ID ICB
ICB; Monthly Backgrounds

Batch ID ICB;Monthly Backgrounds

Repeat 523
Carrier No. 0
Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/27/2018 2:41:36 PM
Count Ended 7/28/2018 7:21:31 AM
Sample Count Time 1,000.00 ***mins***

Calibration Date 2/15/2016 5:20:09 PM
Backgrounds From
Background Count Time 0.00

Half Life 0.00 ***Years***
Decay Factor 1.000

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	111	0.111	0.000	0.111
sd	10.536	0.011	0.000	0.011
Beta	436	0.436	0.000	0.436
sd	20.881	0.021	0.000	0.021

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Protean 4-7 - D

Addr: 7

Sample ID ICB
ICB; Monthly Backgrounds

Batch ID ICB;Monthly Backgrounds

Repeat 524
Carrier No. 0
Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/27/2018 2:42:40 PM
Count Ended 7/28/2018 7:22:35 AM
Sample Count Time 1,000.00 ***mins***

Calibration Date 2/15/2016 5:20:09 PM
Backgrounds From
Background Count Time 0.00

Half Life 0.00 ***Years***
Decay Factor 1.000

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	120	0.120	0.000	0.120
sd	10.954	0.011	0.000	0.011
Beta	481	0.481	0.000	0.481
sd	21.932	0.022	0.000	0.022

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Protean 8-11 - A

Addr: 8

Sample ID ICB
ICB; Monthly Backgrounds

Batch ID ICB;Monthly Backgrounds

Repeat 525
Carrier No. 0
Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/27/2018 2:43:47 PM
Count Ended 7/28/2018 7:23:43 AM
Sample Count Time 1,000.00 ***mins***

Calibration Date 2/15/2016 5:20:09 PM
Backgrounds From
Background Count Time 0.00

Half Life 0.00 ***Years***
Decay Factor 1.000

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	65	0.065	0.000	0.065
sd	8.062	0.008	0.000	0.008
Beta	392	0.392	0.000	0.392
sd	19.799	0.020	0.000	0.020

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Protean 12-15 - B

Addr: 13

Sample ID ICB
ICB; Monthly Backgrounds

Batch ID ICB;Monthly Backgrounds

Repeat 530
Carrier No. 0
Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/27/2018 2:48:13 PM
Count Ended 7/28/2018 7:28:10 AM
Sample Count Time 1,000.00 ***mins***

Calibration Date 2/15/2016 5:20:09 PM
Backgrounds From
Background Count Time 0.00

Half Life 0.00 ***Years***
Decay Factor 1.000

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	131	0.131	0.000	0.131
sd	11.446	0.011	0.000	0.011
Beta	439	0.439	0.000	0.439
sd	20.952	0.021	0.000	0.021

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Purple 20-23 - C

Addr: 22

Sample ID ICB
None

Repeat 1977
Carrier No. 0

Batch ID ICB;Monthly Background

Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 7/27/2018 3:10:21 PM
Count Ended 7/28/2018 7:51:39 AM

Calibration Date 7/27/2018 3:07:26 PM
Backgrounds From

Half Life 0.00 ***Years***
Decay Factor 1.000

Sample Count Time 1,000.00 ***mins***
Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	89	0.089	0.000	0.089
sd	9.434	0.009	0.000	0.009
Beta	301	0.301	0.000	0.301
sd	17.349	0.017	0.000	0.017

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Run Logs

Gas Flow Proportional Counter Run Log

Detector: Blue5 — Serial Number: Unknown

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/17/17 12:12	15	ICRA6 160-302713/1		302713			PS
03/17/17 13:01	15	ICRA6 160-302713/2		302713			PS
03/17/17 13:50	15	ICRA6 160-302713/3		302713			PS
03/17/17 15:13	15	ICRA6 160-302713/4		302713			PS
03/17/17 15:58	15	ICRA6 160-302713/5		302713			PS
03/17/17 16:45	15	ICRA6 160-302713/6		302713			PS
03/19/17 13:51	15	ICRA6 160-302713/7		302713			PS
03/30/17 13:07	5	ICVRA6 160-302713/8		302713			PS
03/30/17 13:29	5	ICVRA6 160-302713/9		302713			PS
03/30/17 14:04	5	ICVRA6 160-302713/10		302713			PS
07/27/18 15:23	1000	ICB 160-378548/6		378548			PS
08/03/18 00:59	2	CCVA 160-380133/6		380133			ALS
08/03/18 01:17	2	CCVB 160-380133/30		380133			ALS
08/03/18 01:56	200	CCB 160-380133/68		380133			ALS
08/03/18 07:10	100	LCS 160-375093/1-A		380133	375093	9315	ALS

Detector: Blue6 — Serial Number: Unknown

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/17/17 12:13	15	ICRA6 160-302714/1		302714			PS
03/17/17 13:01	15	ICRA6 160-302714/2		302714			PS
03/17/17 13:50	15	ICRA6 160-302714/3		302714			PS
03/17/17 15:13	15	ICRA6 160-302714/4		302714			PS
03/17/17 15:58	15	ICRA6 160-302714/5		302714			PS
03/17/17 16:45	15	ICRA6 160-302714/6		302714			PS
03/19/17 13:34	15	ICRA6 160-302714/7		302714			PS
03/30/17 13:07	5	ICVRA6 160-302714/8		302714			PS
03/30/17 13:29	5	ICVRA6 160-302714/9		302714			PS
03/30/17 13:38	5	ICVRA6 160-302714/10		302714			PS
07/27/18 15:23	1000	ICB 160-378548/7		378548			PS
08/03/18 00:59	2	CCVA 160-380133/7		380133			ALS
08/03/18 01:17	2	CCVB 160-380133/31		380133			
08/03/18 01:45	2	CCVB 160-380133/49		380133			ALS
08/03/18 01:56	200	CCB 160-380133/69		380133			ALS
08/03/18 07:10	100	LCSD 160-375093/2-A		380133	375093	9315	ALS

Detector: Blue13 — Serial Number: Unknown

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/10/17 20:14	15	ICRA6 160-310137/1		310137			PS
05/10/17 20:35	15	ICRA6 160-310137/2		310137			PS
05/10/17 21:31	15	ICRA6 160-310137/3		310137			PS
05/10/17 21:49	15	ICRA6 160-310137/4		310137			PS
05/10/17 22:14	15	ICRA6 160-310137/5		310137			PS
05/10/17 22:53	15	ICRA6 160-310137/6		310137			PS
05/11/17 00:43	15	ICRA6 160-310137/7		310137			PS
05/18/17 23:18	5	ICVRA6 160-310137/8		310137			PS
05/18/17 23:28	5	ICVRA6 160-310137/9		310137			PS
05/18/17 23:54	5	ICVRA6 160-310137/10		310137			PS
07/27/18 15:24	1000	ICB 160-378548/14		378548			PS
08/03/18 01:00	2	CCVA 160-380133/14		380133			ALS
08/03/18 01:18	2	CCVB 160-380133/38		380133			ALS
08/03/18 01:57	200	CCB 160-380133/76		380133			ALS

Gas Flow Proportional Counter Run Log

Detector: Blue13 (Continued) — Serial Number: Unknown

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/03/18 07:11	100	160-29426-1	GW-ASC-5-070918	380133	375093	9315	ALS

Detector: Blue14 — Serial Number: Unknown

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/10/17 20:14	15	ICRA6 160-310138/1		310138			PS
05/10/17 20:35	15	ICRA6 160-310138/2		310138			PS
05/10/17 21:31	15	ICRA6 160-310138/3		310138			PS
05/10/17 21:49	15	ICRA6 160-310138/4		310138			PS
05/10/17 22:14	15	ICRA6 160-310138/5		310138			PS
05/10/17 22:53	15	ICRA6 160-310138/6		310138			PS
05/11/17 00:01	15	ICRA6 160-310138/7		310138			PS
05/18/17 23:18	5	ICVRA6 160-310138/8		310138			PS
05/18/17 23:28	5	ICVRA6 160-310138/9		310138			PS
05/18/17 23:38	5	ICVRA6 160-310138/10		310138			PS
07/27/18 15:25	1000	ICB 160-378548/15		378548			PS
08/03/18 01:00	2	CCVA 160-380133/15		380133			ALS
08/03/18 01:18	2	CCVB 160-380133/39		380133			ALS
08/03/18 01:57	200	CCB 160-380133/77		380133			ALS
08/03/18 07:11	100	160-29426-2	GW-ASC-4-070918	380133	375093	9315	ALS

Detector: Blue15 — Serial Number: Unknown

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/10/17 20:14	15	ICRA6 160-310139/1		310139			PS
05/10/17 20:35	15	ICRA6 160-310139/2		310139			PS
05/10/17 21:31	15	ICRA6 160-310139/3		310139			PS
05/10/17 21:48	15	ICRA6 160-310139/4		310139			PS
05/10/17 22:53	15	ICRA6 160-310139/5		310139			PS
05/11/17 00:01	15	ICRA6 160-310139/6		310139			PS
05/11/17 00:43	15	ICRA6 160-310139/7		310139			PS
05/18/17 23:28	5	ICVRA6 160-310139/8		310139			PS
05/18/17 23:38	5	ICVRA6 160-310139/9		310139			PS
05/18/17 23:53	5	ICVRA6 160-310139/10		310139			PS
07/27/18 15:25	1000	ICB 160-378548/16		378548			PS
08/03/18 01:00	2	CCVA 160-380133/16		380133			ALS
08/03/18 01:18	2	CCVB 160-380133/40		380133			ALS
08/03/18 01:57	200	CCB 160-380133/78		380133			ALS
08/03/18 07:12	100	160-29426-3	GW-ASC-2A-070918	380133	375093	9315	ALS

Detector: Blue17 — Serial Number: Unknown

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/12/17 10:58	15	ICRA6 160-310141/1		310141			PS
05/12/17 11:39	15	ICRA6 160-310141/2		310141			PS
05/12/17 11:58	15	ICRA6 160-310141/3		310141			PS
05/12/17 12:23	15	ICRA6 160-310141/4		310141			PS
05/12/17 12:57	15	ICRA6 160-310141/5		310141			PS
05/12/17 13:48	15	ICRA6 160-310141/6		310141			PS
05/12/17 14:28	15	ICRA6 160-310141/7		310141			PS
05/18/17 16:22	5	ICVRA6 160-310141/8		310141			PS
05/18/17 19:31	5	ICVRA6 160-310141/9		310141			PS
05/18/17 22:56	5	ICVRA6 160-310141/10		310141			PS

Gas Flow Proportional Counter Run Log

Detector: Blue17 (Continued) — Serial Number: Unknown

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/27/18 15:25	1000	ICB 160-378548/18		378548			PS
08/03/18 01:01	2	CCVA 160-380133/18		380133			ALS
08/03/18 01:18	2	CCVB 160-380133/42		380133			ALS
08/03/18 01:58	200	CCB 160-380133/80		380133			ALS
08/03/18 07:12	100	160-29426-4	GW-ASC-4-070918-D	380133	375093	9315	ALS

Detector: Protean0

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/13 00:23	1.01	ICABT 160-224068/1		224068			JLW
03/27/13 00:32	1.01	ICABT 160-224068/2		224068			JLW
03/27/13 00:51	1.01	ICABT 160-224068/3		224068			JLW
03/27/13 01:05	1.01	ICABT 160-224068/4		224068			JLW
03/27/13 01:08	1.01	ZZZZZ		224068			
03/27/13 02:14	1.01	ICABT 160-224068/6		224068			JLW
03/27/13 08:49	1.01	ICABT 160-224068/7		224068			JLW
03/27/13 08:54	1.01	ICABT 160-224068/8		224068			JLW
03/27/13 09:19	1.01	ICABT 160-224068/9		224068			JLW
03/28/13 10:21	5	ICVABT 160-224068/10		224068			JLW
03/28/13 13:22	5	ICVABT 160-224068/11		224068			JLW
03/28/13 13:39	5	ICVABT 160-224068/12		224068			JLW
11/13/15 12:28	50	ICABT 160-224068/22		224068			JLW
11/14/15 21:07	50	ZZZZZ		224068			
11/15/15 13:05	33	ICABT 160-224068/13		224068			JLW
11/15/15 14:11	28	ICABT 160-224068/14		224068			JLW
11/15/15 17:57	21	ICABT 160-224068/15		224068			JLW
11/15/15 20:53	30	ICABT 160-224068/16		224068			JLW
11/15/15 22:11	23	ICABT 160-224068/17		224068			JLW
11/15/15 22:56	20	ICABT 160-224068/18		224068			JLW
11/20/15 13:53	30	ICVABT 160-224068/19		224068			JLW
11/20/15 18:43	30	ICVABT 160-224068/20		224068			JLW
11/20/15 19:40	30	ICVABT 160-224068/21		224068			JLW
07/27/18 14:36	1000	ICB 160-378545/2		378545			PS
07/30/18 00:05	2	CCVA 160-378627/9		378627			RTM
07/30/18 00:09	2	CCVB 160-378627/25		378627			RTM
07/30/18 00:54	200	CCB 160-378627/34		378627			
07/30/18 05:31	200	CCB 160-378627/50		378627			RTM
07/30/18 09:25	200	LCS 160-375099/1-A		378627	375099	9320	RTM
07/30/18 15:56	100	ZZZZZ		378627			

Detector: Protean1

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/13 00:23	1.01	ICABT 160-224047/10		224047			JLW
03/27/13 00:32	1.01	ICABT 160-224047/11		224047			JLW
03/27/13 00:51	1.01	ICABT 160-224047/12		224047			JLW
03/27/13 01:05	1.01	ZZZZZ		224047			
03/27/13 01:09	1.01	ICABT 160-224047/14		224047			JLW
03/27/13 02:14	1.01	ICABT 160-224047/15		224047			JLW
03/27/13 08:49	1.01	ICABT 160-224047/16		224047			JLW
03/27/13 08:54	1.01	ICABT 160-224047/17		224047			JLW
03/27/13 09:19	1.01	ICABT 160-224047/18		224047			JLW
03/28/13 10:21	5	ICVABT 160-224047/19		224047			JLW

Gas Flow Proportional Counter Run Log

Detector: Protean1 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/28/13 13:39	5	ICVABT 160-224047/20		224047			JLW
04/02/13 21:11	5	ICVABT 160-224047/21		224047			JLW
11/13/15 12:28	50	ICABT 160-224047/22		224047			JLW
11/14/15 21:07	50	ICABT 160-224047/23		224047			JLW
11/15/15 13:05	22	ICABT 160-224047/1		224047			JLW
11/15/15 14:11	34	ICABT 160-224047/2		224047			JLW
11/15/15 17:57	28	ICABT 160-224047/3		224047			JLW
11/15/15 20:52	24	ZZZZZ		224047			
11/15/15 22:11	30	ICABT 160-224047/5		224047			JLW
11/15/15 22:56	23	ICABT 160-224047/6		224047			JLW
11/20/15 13:53	30	ICVABT 160-224047/7		224047			JLW
11/20/15 14:28	30	ICVABT 160-224047/8		224047			JLW
11/20/15 19:40	30	ZZZZZ		224047			
11/20/15 19:40	30	ICVABT 160-224047/24		224047			JLW
07/27/18 14:35	1000	ICB 160-378545/1		378545			PS
07/30/18 00:05	2	CCVA 160-378627/11		378627			RTM
07/30/18 00:09	2	CCVB 160-378627/26		378627			RTM
07/30/18 00:54	200	CCB 160-378627/35		378627			RTM
07/30/18 05:35	100	ZZZZZ		378627			
07/30/18 09:25	200	LCSD 160-375099/2-A		378627	375099	9320	RTM
07/30/18 15:56	100	ZZZZZ		378627			

Detector: Protean5

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/13 00:24	1.01	ICABT 160-224295/12		224295			JLW
03/27/13 00:33	1.01	ICABT 160-224295/13		224295			JLW
03/27/13 00:51	1.01	ICABT 160-224295/14		224295			JLW
03/27/13 01:06	1.01	ZZZZZ		224295			
03/27/13 01:09	1.01	ICABT 160-224295/16		224295			JLW
03/27/13 02:15	1.01	ICABT 160-224295/17		224295			JLW
03/27/13 08:50	1.01	ICABT 160-224295/18		224295			JLW
03/27/13 08:55	1.01	ICABT 160-224295/19		224295			JLW
03/27/13 09:20	1.01	ICABT 160-224295/20		224295			JLW
03/28/13 12:32	5	ICVABT 160-224295/21		224295			JLW
03/28/13 12:46	5	ICVABT 160-224295/22		224295			JLW
03/28/13 13:04	5	ICVABT 160-224295/23		224295			JLW
11/24/15 12:06	50	ICABT 160-224295/1		224295			JLW
11/24/15 14:12	50	ICABT 160-224295/2		224295			JLW
11/24/15 15:14	36	ICABT 160-224295/3		224295			JLW
11/24/15 16:20	31	ICABT 160-224295/4		224295			JLW
11/24/15 17:47	21	ICABT 160-224295/5		224295			JLW
11/24/15 18:26	26	ZZZZZ		224295			
11/24/15 19:34	32	ICABT 160-224295/7		224295			JLW
11/24/15 20:41	25	ICABT 160-224295/8		224295			JLW
11/24/15 21:33	30	ZZZZZ		224295			
11/24/15 22:56	24	ZZZZZ		224295			
11/25/15 09:44	30	ZZZZZ		224295			
11/25/15 18:18	30	ZZZZZ		224295			
11/25/15 22:45	30	ZZZZZ		224295			
11/27/15 08:56	30	ZZZZZ		224295			
12/03/15 12:56	30	ICVABT 160-224295/27		224295			JLW
12/03/15 13:59	30	ICVABT 160-224295/28		224295			JLW

Gas Flow Proportional Counter Run Log

Detector: Protean5 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
12/03/15 15:12	30	ICVABT 160-224295/29		224295			JLW
07/27/18 14:40	1000	ICB 160-378545/6		378545			PS
07/30/18 00:05	2	CCVA 160-378627/16		378627			RTM
07/30/18 00:09	2	CCVB 160-378627/30		378627			RTM
07/30/18 00:54	200	CCB 160-378627/38		378627			
07/30/18 05:31	200	CCB 160-378627/54		378627			RTM
07/30/18 09:26	200	160-29426-1	GW-ASC-5-070918	378627	375099	9320	RTM
07/30/18 15:56	100	ZZZZZ		378627			

Detector: Protean6

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/13 00:24	1.01	ICABT 160-224296/12		224296			JLW
03/27/13 00:33	1.01	ICABT 160-224296/13		224296			JLW
03/27/13 00:51	1.01	ICABT 160-224296/14		224296			JLW
03/27/13 01:06	1.01	ZZZZZ		224296			
03/27/13 01:09	1.01	ICABT 160-224296/16		224296			JLW
03/27/13 02:15	1.01	ICABT 160-224296/17		224296			JLW
03/27/13 08:50	1.01	ICABT 160-224296/18		224296			JLW
03/27/13 08:56	1.01	ICABT 160-224296/19		224296			JLW
03/27/13 09:20	1.01	ICABT 160-224296/20		224296			JLW
03/28/13 12:46	5	ICVABT 160-224296/21		224296			JLW
03/28/13 13:04	5	ICVABT 160-224296/22		224296			JLW
03/28/13 13:21	5	ICVABT 160-224296/23		224296			JLW
11/24/15 12:07	50	ICABT 160-224296/1		224296			JLW
11/24/15 14:12	50	ICABT 160-224296/2		224296			JLW
11/24/15 15:14	23	ICABT 160-224296/3		224296			JLW
11/24/15 16:20	35	ICABT 160-224296/4		224296			JLW
11/24/15 17:47	24	ICABT 160-224296/5		224296			JLW
11/24/15 18:26	21	ICABT 160-224296/6		224296			JLW
11/24/15 19:34	25	ZZZZZ		224296			
11/24/15 20:41	31	ICABT 160-224296/8		224296			JLW
11/24/15 21:33	30	ZZZZZ		224296			
11/24/15 22:56	30	ZZZZZ		224296			
11/24/15 23:31	23	ZZZZZ		224296			
11/25/15 18:18	30	ZZZZZ		224296			
11/25/15 22:45	30	ZZZZZ		224296			
11/25/15 23:31	30	ZZZZZ		224296			
12/03/15 12:57	30	ICVABT 160-224296/27		224296			JLW
12/03/15 13:59	30	ICVABT 160-224296/28		224296			JLW
12/03/15 14:39	30	ICVABT 160-224296/29		224296			JLW
07/27/18 14:41	1000	ICB 160-378545/7		378545			PS
07/30/18 00:05	2	CCVA 160-378627/7		378627			RTM
07/30/18 00:09	2	CCVB 160-378627/31		378627			RTM
07/30/18 00:54	200	CCB 160-378627/39		378627			
07/30/18 05:31	200	CCB 160-378627/55		378627			RTM
07/30/18 09:26	200	160-29426-2	GW-ASC-4-070918	378627	375099	9320	RTM
07/30/18 15:56	100	ZZZZZ		378627			

Detector: Protean7

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/13 00:24	1.01	ICABT 160-224297/12		224297			JLW

Gas Flow Proportional Counter Run Log

Detector: Protean7 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/13 00:33	1.01	ICABT 160-224297/13		224297			JLW
03/27/13 00:51	1.01	ICABT 160-224297/14		224297			JLW
03/27/13 01:06	1.01	ZZZZZ		224297			
03/27/13 01:09	1.01	ICABT 160-224297/16		224297			JLW
03/27/13 02:15	1.01	ICABT 160-224297/17		224297			JLW
03/27/13 08:50	1.01	ICABT 160-224297/18		224297			JLW
03/27/13 08:56	1.01	ICABT 160-224297/19		224297			JLW
03/27/13 09:20	1.01	ICABT 160-224297/20		224297			JLW
03/28/13 13:04	5	ICVABT 160-224297/21		224297			JLW
03/28/13 13:21	5	ICVABT 160-224297/22		224297			JLW
03/28/13 13:39	5	ICVABT 160-224297/23		224297			JLW
11/24/15 12:07	50	ICABT 160-224297/1		224297			JLW
11/24/15 14:13	50	ICABT 160-224297/2		224297			JLW
11/24/15 15:14	22	ICABT 160-224297/3		224297			JLW
11/24/15 16:20	23	ICABT 160-224297/4		224297			JLW
11/24/15 17:47	32	ICABT 160-224297/5		224297			JLW
11/24/15 18:26	24	ICABT 160-224297/6		224297			JLW
11/24/15 19:34	21	ICABT 160-224297/7		224297			JLW
11/24/15 20:41	25	ZZZZZ		224297			
11/24/15 22:56	30	ZZZZZ		224297			
11/24/15 23:31	30	ZZZZZ		224297			
11/25/15 09:44	30	ZZZZZ		224297			
11/25/15 22:45	30	ZZZZZ		224297			
11/25/15 23:31	50	ZZZZZ		224297			
11/27/15 08:56	30	ZZZZZ		224297			
12/03/15 13:59	30	ICVABT 160-224297/27		224297			JLW
12/03/15 14:39	30	ICVABT 160-224297/28		224297			JLW
12/03/15 15:12	30	ICVABT 160-224297/29		224297			JLW
07/27/18 14:42	1000	ICB 160-378545/8		378545			PS
07/30/18 00:05	2	CCVA 160-378627/3		378627			RTM
07/30/18 00:10	2	CCVB 160-378627/32		378627			RTM
07/30/18 00:54	200	CCB 160-378627/40		378627			
07/30/18 05:31	200	CCB 160-378627/56		378627			RTM
07/30/18 09:26	200	160-29426-3	GW-ASC-2A-070918	378627	375099	9320	RTM
07/30/18 15:56	100	ZZZZZ		378627			

Detector: Protean8

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/13 09:26	1.01	ICABT 160-224906/12		224906			ALD
03/27/13 09:34	1.01	ICABT 160-224906/13		224906			ALD
03/27/13 09:47	1.01	ICABT 160-224906/14		224906			ALD
03/27/13 09:55	1.01	ICABT 160-224906/15		224906			ALD
03/27/13 10:04	1.01	ICABT 160-224906/16		224906			ALD
03/27/13 10:12	1.01	ICABT 160-224906/17		224906			ALD
03/27/13 10:19	1.01	ICABT 160-224906/18		224906			ALD
03/27/13 10:27	1.01	ICABT 160-224906/19		224906			ALD
03/28/13 21:29	5	ICVABT 160-224906/20		224906			ALD
03/28/13 23:59	5	ICVABT 160-224906/21		224906			ALD
03/29/13 00:05	5	ICVABT 160-224906/22		224906			ALD
11/25/15 18:18	50	ICABT 160-224906/1		224906			ALD
11/25/15 22:48	50	ICABT 160-224906/2		224906			ALD
11/25/15 23:45	50	ICABT 160-224906/3		224906			ALD

Gas Flow Proportional Counter Run Log

Detector: Protean8 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
11/27/15 07:47	50	ICABT 160-224906/4		224906			ALD
11/27/15 08:50	50	ZZZZZ		224906			
11/27/15 11:47	50	ICABT 160-224906/6		224906			ALD
11/27/15 12:45	50	ICABT 160-224906/7		224906			ALD
11/29/15 15:33	50	ICABT 160-224906/8		224906			ALD
11/29/15 20:57	30	ZZZZZ		224906			
11/29/15 22:54	30	ZZZZZ		224906			
11/29/15 23:29	30	ZZZZZ		224906			
12/02/15 22:14	30	ICVABT 160-224906/23		224906			ALD
12/03/15 09:10	30	ICVABT 160-224906/24		224906			ALD
12/03/15 11:06	30	ICVABT 160-224906/25		224906			ALD
07/27/18 14:43	1000	ICB 160-378545/9		378545			PS
07/30/18 00:05	2	CCVB 160-378627/5		378627			RTM
07/30/18 00:08	2	CCVA 160-378627/17		378627			RTM
07/30/18 00:54	200	CCB 160-378627/41		378627			RTM
07/30/18 05:36	100	ZZZZZ		378627			
07/30/18 09:26	200	160-29426-4	GW-ASC-4-070918-D	378627	375099	9320	RTM
07/30/18 15:57	100	ZZZZZ		378627			

Detector: Protean13

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/13 09:26	1.01	ICABT 160-224911/9		224911			JLW
03/27/13 09:35	1.01	ICABT 160-224911/10		224911			JLW
03/27/13 09:48	1.01	ICABT 160-224911/11		224911			JLW
03/27/13 09:55	1.01	ICABT 160-224911/12		224911			JLW
03/27/13 10:05	1.01	ICABT 160-224911/13		224911			JLW
03/27/13 10:13	1.01	ICABT 160-224911/14		224911			JLW
03/27/13 10:20	1.01	ICABT 160-224911/15		224911			JLW
03/27/13 10:27	1.01	ICABT 160-224911/16		224911			JLW
03/28/13 23:41	5	ICVABT 160-224911/17		224911			JLW
03/28/13 23:47	5	ICVABT 160-224911/18		224911			JLW
03/28/13 23:53	5	ICVABT 160-224911/19		224911			JLW
11/25/15 18:18	50	ICABT 160-224911/1		224911			JLW
11/25/15 22:48	50	ZZZZZ		224911			
11/25/15 23:45	50	ICABT 160-224911/3		224911			JLW
11/27/15 07:48	50	ICABT 160-224911/4		224911			JLW
11/27/15 08:50	50	ICABT 160-224911/5		224911			JLW
11/27/15 11:48	50	ICABT 160-224911/6		224911			JLW
11/27/15 12:46	50	ICABT 160-224911/7		224911			JLW
11/29/15 15:32	50	ICABT 160-224911/8		224911			JLW
12/03/15 08:30	30	ICVABT 160-224911/20		224911			JLW
12/03/15 10:24	30	ICVABT 160-224911/21		224911			JLW
12/03/15 12:21	30	ICVABT 160-224911/22		224911			JLW
07/27/18 14:48	1000	ICB 160-378545/14		378545			PS
07/30/18 00:05	2	CCVB 160-378627/14		378627			RTM
07/30/18 00:09	2	CCVA 160-378627/22		378627			RTM
07/30/18 00:55	200	CCB 160-378627/46		378627			RTM
07/30/18 09:27	200	MB 160-375099/13-A		378627	375099	9320	RTM
07/30/18 15:57	100	ZZZZZ		378627			

Gas Flow Proportional Counter Run Log

Detector: Purple22

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
02/16/17 10:40	15	ICRA6 160-293731/1		293731			JLW
02/16/17 11:30	15	ICRA6 160-293731/2		293731			JLW
02/16/17 11:52	15	ICRA6 160-293731/3		293731			JLW
02/16/17 12:12	15	ICRA6 160-293731/4		293731			JLW
02/16/17 13:00	15	ICRA6 160-293731/5		293731			JLW
02/16/17 21:20	15	ICRA6 160-293731/6		293731			JLW
02/16/17 21:37	15	ICRA6 160-293731/7		293731			JLW
02/16/17 23:40	5	ICVRA6 160-293731/8		293731			JLW
02/16/17 23:50	5	ICVRA6 160-293731/9		293731			JLW
02/17/17 00:09	5	ZZZZZ		293731			
02/20/17 15:26	5	ICVRA6 160-293731/11		293731			JLW
07/27/18 15:10	1000	ICB 160-378549/19		378549			PS
08/03/18 00:57	2	CCVB 160-380132/23		380132			ALS
08/03/18 01:08	2	CCVA 160-380132/27		380132			ALS
08/03/18 01:57	200	CCB 160-380132/74		380132			ALS
08/03/18 07:13	100	MB 160-375093/13-A		380132	375093	9315	ALS
08/03/18 10:25	200	ZZZZZ		380132			

Shipping and Receiving Documents

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Phone: 314.298.8566 Fax: 314.298.8757

Chain of Custody Record 215035

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TestAmerica Laboratories, Inc.
TAL-8210 (0713)

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☒ Other:

Client Contact	Project Manager: Kris Schnoes	Site Contact: Same	Date: 7/9/18	COC No:
Company Name: Tetra Tech	Tel/Fax: 773/759-8058	Lab Contact:	Carrier: FedEx	____ of ____ COCs
Address: 1 S. Wacker Drive	Analysis Turnaround Time			Sampler:
City/State/Zip: Chicago, IL 60606	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
Phone: 312/201-7700	TAT if different from Below ____			Walk-in Client:
Fax:	☒ 2 weeks			Lab Sampling:
Project Name: Carnotite Reduction Co.	☐ 1 week			
Site: Chicago, IL	☐ 2 days			Job / SDG No.:
PO #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	9315-Ra226 9320-Ra228	6020 - Uranium	Thorium - 230	Sample Specific Notes:
GW-ASC-5-070918	7/9/18	915	G	GW	3			X	X	X	
GW-ASC-4-070918	7/9/18	1035	G	GW	3			X	X	X	
GW-ASC-4-070918-D	7/9/18	1035	G	GW	3			X	X	X	
GW-ASC-2A-070918	7/9/18	1245	G	GW	3			X	X	X	

160-29426 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☐ Disposal by Lab ☐ Archive for ____ Months

Special Instructions/QC Requirements & Comments: 2 Coolers

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd: ____ Corr'd: ____ | Therm ID No.: ____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Kristine L. Schnoes	Tetra Tech	7/9/18 1600	C McS	TA STL	071018 0915
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Login Sample Receipt Checklist

Client: Tetra Tech, Inc.

Job Number: 160-29426-1

Login Number: 29426
List Number: 1
Creator: McKinney, Gerrod E

List Source: TestAmerica St. Louis

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	19.0
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

Job Number: 160-29476-1

Job Description: Former Carnotite Site - Non-Rad Analysis

For:
Tetra Tech, Inc.
1 South Wacker Dr.
Suite 3700
Chicago, IL 60606

Attention: Ms. Kristine Schnoes

Approved for release.
Chenise Y Lambert-Sykes
Project Manager I
8/17/2018 5:45 PM

Chenise Y Lambert-Sykes, Project Manager I
13715 Rider Trail North, Earth City, MO, 63045
(314)298-8566
chenise.lambert-sykes@testamericainc.com
08/17/2018

The test results in this report meet NELAP requirements for parameters for which accreditation is required or available. Any exceptions to the NELAP requirements are noted. Results pertain only to samples listed in this report. Pursuant to NELAP, this report shall not be reproduced, except in full, without the written approval of the laboratory. This report is confidential and is intended for the sole use of TestAmerica and its client. All questions regarding this report should be directed to the TestAmerica Project Manager.

Louisiana Lab Certification ID (Non-Potable, Solid/Haz. Material): 106151
Florida Lab Certification ID (Drinking Water): E87689.

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Qualifiers

HPLC/IC

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Metals

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

General Chemistry

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time
U	Indicates the analyte was analyzed for but not detected.
*	LCS or LCSD is outside acceptance limits.
F1	MS and/or MSD Recovery is outside acceptance limits.

Rad

Qualifier	Qualifier Description
X	Tracer is outside acceptance limits.
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

CASE NARRATIVE

Client: Tetra Tech, Inc.

Project: Former Carnotite Site - Non-Rad Analysis

Report Number: 160-29476-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 07/12/2018; the samples arrived in good condition, properly preserved and on ice. The temperatures of the 3 coolers at receipt time were 2.6º C, 20.0º C and 20.0º C.

TOTAL METALS (ICP)

Sample CRC-MW-1 (160-29476-1) was analyzed for total metals (ICP) in accordance with EPA SW-846 Method 6010C. The samples were prepared on 07/31/2018 and analyzed on 08/02/2018 and 08/06/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

HEXAVALENT CHROMIUM

Sample CRC-MW-1 (160-29476-1) was analyzed for hexavalent chromium in accordance with EPA SW-846 Method 7196A. The samples were analyzed on 07/13/2018.

Analytical Batch: 160-375313

The following sample in Hexavalent Chromium batch 160-375313 was received with less than one shift remaining of holding time, and was processed into the laboratory after the 24 hour holding time had expired: CRC-MW-1 (160-29476-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TOTAL MERCURY

Sample CRC-MW-1 (160-29476-1) was analyzed for total mercury in accordance with EPA SW-846 Methods 7470A. The samples were

prepared on 07/16/2018 and analyzed on 07/17/2018.

Prep Batch: 160-375873
The following samples were re-extracted/re-digested for mercury because the calibration tied to these samples was consumed before analysis could be performed in the previous prep batch: CRC-MW-1 (160-29476-1). Due to this issue the MS/MSD was spiked after preservation.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

1664A
Sample CRC-MW-1 (160-29476-1) was analyzed for 1664A in accordance with ASTM Method D3987-85/EPA Method 1664A. The samples were prepared and analyzed on 08/02/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TOTAL SUSPENDED SOLIDS
Sample CRC-MW-1 (160-29476-1) was analyzed for total suspended solids in accordance with SM 2540D. The samples were analyzed on 07/18/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ANIONS, ION CHROMATOGRAPHY
Sample CRC-MW-1 (160-29476-1) was analyzed for Anions, Ion Chromatography in accordance with EPA Method 300.0. The samples were analyzed on 08/04/2018.

Analytical Batch:160-380227
The following sample in Anion batch 160-380227 were diluted to bring the concentrations of target analytes within the calibration range: CRC-MW-1 (160-29476-1). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TOTAL CYANIDE
Sample CRC-MW-1 (160-29476-1) was analyzed for total cyanide in accordance with EPA SW-846 Method 9012B. The samples were prepared and analyzed on 07/24/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

PHENOLICS, TOTAL RECOVERABLE
Sample CRC-MW-1 (160-29476-1) was analyzed for phenolics, total recoverable in accordance with EPA SW-846 Method 9066. The samples were prepared and analyzed on 08/03/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

BIOCHEMICAL OXYGEN DEMAND
Sample CRC-MW-1 (160-29476-1) was analyzed for Biochemical Oxygen Demand in accordance with SM 5210B. The samples were analyzed on 07/14/2018.

Analytical Batch: 490-529442
The following sample was received with less than 2 days remaining on the holding time or less than one shift (8 hours) remaining on a test with a holding time of 48 hours or less. As such, the laboratory had insufficient time remaining to perform the analysis within holding time: CRC-MW-1 (160-29476-1).

The correction factor for the Seeded Control Blank (SCB) for batch 490-529442 was outside the method range of 0.6 to 1.0 mg/L. Thus, there is added uncertainty for the associated sample results.

The glucose-glutamic acid standard recovered outside the recovery limits specified in the method in batch 490-529442. LCS 490-529442/2

All the dilutions failed to deplete the method-required 2 mgO2/L for the following samples: CRC-MW-1 (160-29476-1). Only a "less than" result could be calculated from the least dilute preparation.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM 226 (21 DAY INGROWTH)
Sample CRC-MW-1 (160-29476-1) was analyzed for Radium 226 (21 day ingrowth) in accordance with SW- 846 Method 9315. The samples were prepared on 07/13/2018 and analyzed on 08/08/2018.

Prep Batch: 160-375564
Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: CRC-MW-1 (160-29476-1). A

laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-228 (GFPC)
Sample CRC-MW-1 (160-29476-1) was analyzed for Radium-228 (GFPC) in accordance with SW-846 Method 9320. The samples were prepared on 07/13/2018 and analyzed on 07/27/2018.

Prep Batch: 160-375578
Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: CRC-MW-1 (160-29476-1). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)
Sample CRC-MW-1 (160-29476-1) was analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with DOE. The samples were prepared on 08/08/2018 and analyzed on 08/10/2018.

Prep Batch: 160-381166
Insufficient sample volume was available to perform a sample duplicate (DUP) for following samples: CRC-MW-1 (160-29476-1). A Laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)
Sample CRC-MW-1 (160-29476-1) was analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were prepared on 07/24/2018 and analyzed on 08/06/2018.

Prep Batch: 160-377736
The uranium-232 tracer recovery for the following samples are low outside of the lower QC limit of 30% (160-29476-G-1-C, 17.4% and 160-29476-G-1-D DU, 17.1%). The DOE/DOD Quality Systems Manual for Environmental Laboratories (QSM Rev. 5.0) allows for reporting results as quantitative when tracer recoveries are below 30% if a) the relative uncertainty associated with the tracer recovery is less than 10% (2 sigma), b) spectral resolution requirements are met and there are no indications of spectral interferences, and c) detection limit requirements are met. All three of these criteria are met for these samples: a) a minimum of 400 counts (which leads to 10% count uncertainty at 2 sigma) in the tracer peak, b) resolution of < 100 keV is met for all peaks, and c) the activity in the sample is well above the MDC and the MDC is below the RL. The data have been qualified and reported. CRC-MW-1 (160-29476-1) and (160-29476-G-1-D DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Client Sample Results

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29476-1

Client Sample ID: CRC-MW-1

Date Collected: 07/11/18 13:55
Date Received: 07/12/18 09:30

Lab Sample ID: 160-29476-1

Matrix: Water

Method: 300.0 - Anions, Ion Chromatography - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	**4700**		2000	520	ug/L			08/04/18 06:06	20

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**330**		200	50	ug/L		07/31/18 19:39	08/02/18 17:32	1
Antimony	3.0	U	10	3.0	ug/L		07/31/18 19:39	08/02/18 17:32	1
Arsenic	4.0	U	10	4.0	ug/L		07/31/18 19:39	08/06/18 12:41	1
Barium	**15**	**J**	50	15	ug/L		07/31/18 19:39	08/02/18 17:32	1
Beryllium	1.5	U	5.0	1.5	ug/L		07/31/18 19:39	08/02/18 17:32	1
Cadmium	1.5	U	5.0	1.5	ug/L		07/31/18 19:39	08/02/18 17:32	1
Calcium	**71000**		1000	300	ug/L		07/31/18 19:39	08/02/18 17:32	1
Chromium	3.0	U	10	3.0	ug/L		07/31/18 19:39	08/02/18 17:32	1
Cobalt	15	U	50	15	ug/L		07/31/18 19:39	08/02/18 17:32	1
Copper	7.0	U	25	7.0	ug/L		07/31/18 19:39	08/02/18 17:32	1
Iron	**540**		100	30	ug/L		07/31/18 19:39	08/02/18 17:32	1
Lead	3.0	U	10	3.0	ug/L		07/31/18 19:39	08/02/18 17:32	1
Magnesium	**23000**		1000	300	ug/L		07/31/18 19:39	08/02/18 17:32	1
Manganese	**100**		15	4.0	ug/L		07/31/18 19:39	08/02/18 17:32	1
Nickel	10	U	40	10	ug/L		07/31/18 19:39	08/02/18 17:32	1
Potassium	**4000**	**J**	5000	1500	ug/L		07/31/18 19:39	08/02/18 17:32	1
Selenium	8.0	U	15	8.0	ug/L		07/31/18 19:39	08/06/18 12:41	1
Silver	3.0	U	10	3.0	ug/L		07/31/18 19:39	08/02/18 17:32	1
Sodium	**28000**		1000	300	ug/L		07/31/18 19:39	08/02/18 17:32	1
Thallium	5.0	U	20	5.0	ug/L		07/31/18 19:39	08/02/18 17:32	1
Vanadium	**56**		50	25	ug/L		07/31/18 19:39	08/02/18 17:32	1
Zinc	**8.1**	**J**	20	6.0	ug/L		07/31/18 19:39	08/02/18 17:32	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.060	U	0.20	0.060	ug/L		07/16/18 11:20	07/17/18 14:12	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	1.3	U	3.8	1.3	mg/L		08/02/18 13:17	08/02/18 13:17	1
Cr (VI)	2.6	U H	10	2.6	ug/L			07/13/18 07:59	1
Cyanide, Total	0.0070	U	0.010	0.0070	mg/L		07/24/18 12:33	07/24/18 16:50	1
Phenols, Total	0.020	U F1	0.050	0.020	mg/L		08/03/18 10:04	08/03/18 18:39	1
Total Suspended Solids	**12**		2.0	1.4	mg/L			07/18/18 17:00	1
Biochemical Oxygen Demand	2.0	U H *	2.0	2.0	mg/L			07/14/18 15:33	1

Method: 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.356**		0.105	0.109	1.00	0.0859	pCi/L	07/13/18 13:31	08/08/18 05:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*96.5*		*40 - 110*	*07/13/18 13:31*	*08/08/18 05:29*	*1*

Client Sample ID: CRC-MW-1 **Lab Sample ID: 160-29476-1**
Date Collected: 07/11/18 13:55 **Matrix: Water**
Date Received: 07/12/18 09:30

Method: 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.533**		0.273	0.277	1.00	0.404	pCi/L	07/13/18 14:09	07/27/18 09:20	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*96.5*		*40 - 110*	*07/13/18 14:09*	*07/27/18 09:20*	*1*
Y Carrier	*83.0*		*40 - 110*	*07/13/18 14:09*	*07/27/18 09:20*	*1*

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	0.197	U	0.247	0.248	1.00	0.328	pCi/L	08/08/18 14:32	08/10/18 18:48	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*74.9*		*30 - 110*	*08/08/18 14:32*	*08/10/18 18:48*	*1*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	**183**		4.60	16.1	1.00	0.353	pCi/L	07/24/18 18:01	08/06/18 22:38	1
Uranium-235	**9.10**		1.15	1.38	1.00	0.342	pCi/L	07/24/18 18:01	08/06/18 22:38	1
Uranium-238	**185**		4.62	16.2	1.00	0.274	pCi/L	07/24/18 18:01	08/06/18 22:38	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*17.4*	*X*	*30 - 110*	*07/24/18 18:01*	*08/06/18 22:38*	*1*

Default Detection Limits

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29476-1

Method: 300.0 - Anions, Ion Chromatography

Analyte	RL	MDL	Units	Method
Fluoride	100	26	ug/L	300.0

Method: 6010C - Metals (ICP)

Prep: 3010A

Analyte	RL	MDL	Units	Method
Aluminum	200	50	ug/L	6010C
Antimony	10	3.0	ug/L	6010C
Arsenic	10	4.0	ug/L	6010C
Barium	50	15	ug/L	6010C
Beryllium	5.0	1.5	ug/L	6010C
Cadmium	5.0	1.5	ug/L	6010C
Calcium	1000	300	ug/L	6010C
Chromium	10	3.0	ug/L	6010C
Cobalt	50	15	ug/L	6010C
Copper	25	7.0	ug/L	6010C
Iron	100	30	ug/L	6010C
Lead	10	3.0	ug/L	6010C
Magnesium	1000	300	ug/L	6010C
Manganese	15	4.0	ug/L	6010C
Nickel	40	10	ug/L	6010C
Potassium	5000	1500	ug/L	6010C
Selenium	15	8.0	ug/L	6010C
Silver	10	3.0	ug/L	6010C
Sodium	1000	300	ug/L	6010C
Thallium	20	5.0	ug/L	6010C
Vanadium	50	25	ug/L	6010C
Zinc	20	6.0	ug/L	6010C

Method: 7470A - Mercury (CVAA)

Prep: 7470A

Analyte	RL	MDL	Units	Method
Mercury	0.20	0.060	ug/L	7470A

General Chemistry

Analyte	RL	MDL	Units	Method
Cr (VI)	10	2.6	ug/L	7196A
Total Suspended Solids	1.0	0.70	mg/L	SM 2540D
Biochemical Oxygen Demand	2.0	2.0	mg/L	SM5210B

General Chemistry

Prep: 1664B

Analyte	RL	MDL	Units	Method
HEM (Oil & Grease)	4.0	1.4	mg/L	1664B

General Chemistry

Prep: 9012B

Analyte	RL	MDL	Units	Method
Cyanide, Total	0.010	0.0070	mg/L	9012B

Default Detection Limits

Client: Tetra Tech, Inc. TestAmerica Job ID: 160-29476-1
Project/Site: Former Carnotite Site - Non-Rad Analysis

General Chemistry

Prep: Distill/Phenol

Analyte	RL	MDL	Units	Method
Phenols, Total	0.050	0.020	mg/L	9066

Tracer/Carrier Summary

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29476-1

Method: 9315 - Radium-226 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Ba Carrier (40-110)
160-29476-1	CRC-MW-1	96.5
LCS 160-375564/1-A	Lab Control Sample	92.0
LCSD 160-375564/2-A	Lab Control Sample Dup	99.7
MB 160-375564/15-A	Method Blank	101

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Method: 9320 - Radium-228 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Ba Carrier (40-110)	Y Carrier (40-110)
160-29476-1	CRC-MW-1	96.5	83.0
LCS 160-375578/1-A	Lab Control Sample	92.0	84.9
LCSD 160-375578/2-A	Lab Control Sample Dup	99.7	81.1
MB 160-375578/15-A	Method Blank	101	83.4

Tracer/Carrier Legend

Ba Carrier = Ba Carrier
Y Carrier = Y Carrier

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	horium-22 (30-110)
160-29476-1	CRC-MW-1	74.9
LCS 160-381166/2-A	Lab Control Sample	98.9
LCSD 160-381166/3-A	Lab Control Sample Dup	95.4
MB 160-381166/1-A	Method Blank	87.9

Tracer/Carrier Legend

Thorium-229 = Thorium-229

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	ranium-23 (30-110)
160-29476-1	CRC-MW-1	17.4 X
160-29476-1 DU	CRC-MW-1	17.1 X
LCS 160-377736/2-A	Lab Control Sample	69.2
MB 160-377736/1-A	Method Blank	81.0

Tracer/Carrier Legend

Uranium-232 = Uranium-232

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 160-380227/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 380227

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	26	U	100	26	ug/L			08/03/18 18:49	1

Lab Sample ID: LCS 160-380227/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 380227

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Fluoride			1000	1000		ug/L		100	90 - 110		

Method: 300.0 - Anions, Ion Chromatography - DL

Lab Sample ID: 160-29476-1 MS — **Client Sample ID: CRC-MW-1**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 380227

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Fluoride - DL	4700		40000	46200		ug/L		104	90 - 110		

Lab Sample ID: 160-29476-1 DU — **Client Sample ID: CRC-MW-1**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 380227

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Fluoride - DL	4700			4800		ug/L				2	20

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 160-379537/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 380117 — **Prep Batch: 379537**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	50	U	200	50	ug/L		07/31/18 19:39	08/02/18 17:23	1
Antimony	3.0	U	10	3.0	ug/L		07/31/18 19:39	08/02/18 17:23	1
Barium	15	U	50	15	ug/L		07/31/18 19:39	08/02/18 17:23	1
Beryllium	1.5	U	5.0	1.5	ug/L		07/31/18 19:39	08/02/18 17:23	1
Cadmium	1.5	U	5.0	1.5	ug/L		07/31/18 19:39	08/02/18 17:23	1
Calcium	300	U	1000	300	ug/L		07/31/18 19:39	08/02/18 17:23	1
Chromium	3.0	U	10	3.0	ug/L		07/31/18 19:39	08/02/18 17:23	1
Cobalt	15	U	50	15	ug/L		07/31/18 19:39	08/02/18 17:23	1
Copper	7.0	U	25	7.0	ug/L		07/31/18 19:39	08/02/18 17:23	1
Iron	30	U	100	30	ug/L		07/31/18 19:39	08/02/18 17:23	1
Lead	3.0	U	10	3.0	ug/L		07/31/18 19:39	08/02/18 17:23	1
Magnesium	300	U	1000	300	ug/L		07/31/18 19:39	08/02/18 17:23	1
Manganese	4.0	U	15	4.0	ug/L		07/31/18 19:39	08/02/18 17:23	1
Nickel	10	U	40	10	ug/L		07/31/18 19:39	08/02/18 17:23	1
Potassium	1500	U	5000	1500	ug/L		07/31/18 19:39	08/02/18 17:23	1
Silver	3.0	U	10	3.0	ug/L		07/31/18 19:39	08/02/18 17:23	1

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: MB 160-379537/1-A
Matrix: Water
Analysis Batch: 380117

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 379537

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sodium	300	U	1000	300	ug/L		07/31/18 19:39	08/02/18 17:23	1
Thallium	5.0	U	20	5.0	ug/L		07/31/18 19:39	08/02/18 17:23	1
Vanadium	25	U	50	25	ug/L		07/31/18 19:39	08/02/18 17:23	1
Zinc	6.0	U	20	6.0	ug/L		07/31/18 19:39	08/02/18 17:23	1

Lab Sample ID: MB 160-379537/1-A
Matrix: Water
Analysis Batch: 380741

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 379537

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	4.0	U	10	4.0	ug/L		07/31/18 19:39	08/06/18 12:32	1
Selenium	8.0	U	15	8.0	ug/L		07/31/18 19:39	08/06/18 12:32	1

Lab Sample ID: LCS 160-379537/2-A
Matrix: Water
Analysis Batch: 380117

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 379537

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	10000	9610		ug/L		96	80 - 120
Antimony	500	451		ug/L		90	80 - 120
Barium	1000	946		ug/L		95	80 - 120
Beryllium	100	97.4		ug/L		97	80 - 120
Cadmium	1000	963		ug/L		96	80 - 120
Calcium	10000	10300		ug/L		103	80 - 120
Chromium	1000	967		ug/L		97	80 - 120
Cobalt	1000	1010		ug/L		101	80 - 120
Copper	1000	969		ug/L		97	80 - 120
Iron	10000	9990		ug/L		100	80 - 120
Lead	1000	977		ug/L		98	80 - 120
Magnesium	10000	9670		ug/L		97	80 - 120
Manganese	1000	987		ug/L		99	80 - 120
Nickel	1000	1020		ug/L		102	80 - 120
Potassium	10000	9980		ug/L		100	80 - 120
Silver	200	206		ug/L		103	80 - 120
Sodium	10000	9950		ug/L		99	80 - 120
Thallium	200	203		ug/L		102	80 - 120
Vanadium	1000	946		ug/L		95	80 - 120
Zinc	1000	963		ug/L		96	80 - 120

Lab Sample ID: LCS 160-379537/2-A
Matrix: Water
Analysis Batch: 380741

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 379537

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	1000	995		ug/L		100	80 - 120
Selenium	500	504		ug/L		101	80 - 120

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: 160-29476-1 MS **Client Sample ID: CRC-MW-1**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 380117 **Prep Batch: 379537**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	330		10000	9910		ug/L		96	75 - 125
Antimony	3.0	U	500	462		ug/L		92	75 - 125
Barium	15	J	1000	959		ug/L		94	75 - 125
Beryllium	1.5	U	100	97.5		ug/L		98	75 - 125
Cadmium	1.5	U	1000	975		ug/L		97	75 - 125
Calcium	71000		10000	81100	4	ug/L		97	75 - 125
Chromium	3.0	U	1000	953		ug/L		95	75 - 125
Cobalt	15	U	1000	993		ug/L		99	75 - 125
Copper	7.0	U	1000	958		ug/L		96	75 - 125
Iron	540		10000	10400		ug/L		99	75 - 125
Lead	3.0	U	1000	951		ug/L		95	75 - 125
Magnesium	23000		10000	32200		ug/L		95	75 - 125
Manganese	100		1000	1070		ug/L		97	75 - 125
Nickel	10	U	1000	1000		ug/L		100	75 - 125
Potassium	4000	J	10000	14100		ug/L		102	75 - 125
Silver	3.0	U	200	210		ug/L		105	75 - 125
Sodium	28000		10000	38200		ug/L		101	75 - 125
Thallium	5.0	U	200	194		ug/L		97	75 - 125
Vanadium	56		1000	999		ug/L		94	75 - 125
Zinc	8.1	J	1000	985		ug/L		98	75 - 125

Lab Sample ID: 160-29476-1 MS **Client Sample ID: CRC-MW-1**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 380741 **Prep Batch: 379537**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	4.0	U	1000	976		ug/L		98	75 - 125
Selenium	8.0	U	500	493		ug/L		99	75 - 125

Lab Sample ID: 160-29476-1 MSD **Client Sample ID: CRC-MW-1**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 380117 **Prep Batch: 379537**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	330		10000	9970		ug/L		96	75 - 125	1	20
Antimony	3.0	U	500	447		ug/L		89	75 - 125	3	20
Barium	15	J	1000	955		ug/L		94	75 - 125	0	20
Beryllium	1.5	U	100	97.1		ug/L		97	75 - 125	0	20
Cadmium	1.5	U	1000	956		ug/L		96	75 - 125	2	20
Calcium	71000		10000	80600	4	ug/L		92	75 - 125	1	20
Chromium	3.0	U	1000	939		ug/L		94	75 - 125	1	20
Cobalt	15	U	1000	979		ug/L		98	75 - 125	1	20
Copper	7.0	U	1000	936		ug/L		94	75 - 125	2	20
Iron	540		10000	10500		ug/L		99	75 - 125	1	20
Lead	3.0	U	1000	935		ug/L		93	75 - 125	2	20
Magnesium	23000		10000	32600		ug/L		99	75 - 125	1	20
Manganese	100		1000	1070		ug/L		97	75 - 125	0	20
Nickel	10	U	1000	992		ug/L		99	75 - 125	1	20

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: 160-29476-1 MSD **Client Sample ID: CRC-MW-1**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 380117 **Prep Batch: 379537**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Potassium	4000	J	10000	14200		ug/L		103	75 - 125	1	20
Silver	3.0	U	200	209		ug/L		105	75 - 125	0	20
Sodium	28000		10000	38500		ug/L		104	75 - 125	1	20
Thallium	5.0	U	200	189		ug/L		95	75 - 125	3	20
Vanadium	56		1000	987		ug/L		93	75 - 125	1	20
Zinc	8.1	J	1000	969		ug/L		96	75 - 125	2	20

Lab Sample ID: 160-29476-1 MSD **Client Sample ID: CRC-MW-1**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 380741 **Prep Batch: 379537**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	4.0	U	1000	1000		ug/L		100	75 - 125	3	20
Selenium	8.0	U	500	504		ug/L		101	75 - 125	2	20

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 160-375873/1-A **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 376379 **Prep Batch: 375873**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.060	U	0.20	0.060	ug/L		07/16/18 11:20	07/17/18 13:55	1

Lab Sample ID: LCS 160-375873/2-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 376379 **Prep Batch: 375873**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	5.00	5.36		ug/L		107	80 - 120

Lab Sample ID: 160-29274-A-3-C MS **Client Sample ID: Matrix Spike**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 376379 **Prep Batch: 375873**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.060	U	5.00	5.48		ug/L		110	80 - 120

Lab Sample ID: 160-29274-A-3-D MSD **Client Sample ID: Matrix Spike Duplicate**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 376379 **Prep Batch: 375873**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.060	U	5.00	5.39		ug/L		108	80 - 120	2	20

Method: 1664B - HEM and SGT-HEM

Lab Sample ID: MB 490-533397/1-A **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 533454 **Prep Batch: 533397**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
HEM (Oil & Grease)	1.4	U	4.0	1.4	mg/L		08/02/18 13:17	08/02/18 13:17	1

Lab Sample ID: LCS 490-533397/2-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 533454 **Prep Batch: 533397**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
HEM (Oil & Grease)	41.7	39.58		mg/L		95	78 - 114

Lab Sample ID: LCSD 490-533397/3-A **Client Sample ID: Lab Control Sample Dup**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 533454 **Prep Batch: 533397**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
HEM (Oil & Grease)	41.7	39.48		mg/L		95	78 - 114	0	18

Lab Sample ID: 180-80122-B-1-A MS **Client Sample ID: Matrix Spike**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 533454 **Prep Batch: 533397**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
HEM (Oil & Grease)	1.3	U	40.5	37.55		mg/L		93	78 - 114

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 160-375313/8 **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 375313

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cr (VI)	2.6	U	10	2.6	ug/L			07/13/18 07:59	1

Lab Sample ID: LCS 160-375313/9 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 375313

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cr (VI)	50.1	50.0		ug/L		100	85 - 115

Lab Sample ID: 160-29476-1 MS **Client Sample ID: CRC-MW-1**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 375313

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cr (VI)	2.6	U H	50.1	51.2		ug/L		102	85 - 115

Method: 7196A - Chromium, Hexavalent (Continued)

Lab Sample ID: 160-29476-1 DU — **Client Sample ID: CRC-MW-1**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 375313

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Cr (VI)	2.6	U H	2.6	U	ug/L		NC	20

Method: 9012B - Cyanide, Total andor Amenable

Lab Sample ID: MB 490-531103/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 531193 — **Prep Batch: 531103**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0070	U	0.010	0.0070	mg/L		07/24/18 12:33	07/24/18 16:47	1

Lab Sample ID: LCS 490-531103/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 531193 — **Prep Batch: 531103**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	0.100	0.0864		mg/L		86	85 - 115

Lab Sample ID: 160-29476-1 MS — **Client Sample ID: CRC-MW-1**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 531193 — **Prep Batch: 531103**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	0.0070	U	0.100	0.105		mg/L		105	70 - 130

Lab Sample ID: 160-29476-1 MSD — **Client Sample ID: CRC-MW-1**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 531193 — **Prep Batch: 531103**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cyanide, Total	0.0070	U	0.100	0.0927		mg/L		93	70 - 130	12	46

Lab Sample ID: 160-29476-1 DU — **Client Sample ID: CRC-MW-1**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 531193 — **Prep Batch: 531103**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Cyanide, Total	0.0070	U	0.0070	U	mg/L		NC	20

Method: SM 2540D - Solids, Total Suspended (TSS)

Lab Sample ID: MB 490-529799/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 529799

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	0.70	U	1.0	0.70	mg/L			07/18/18 17:00	1

Method: SM 2540D - Solids, Total Suspended (TSS) (Continued)

Lab Sample ID: LCS 490-529799/2
Matrix: Water
Analysis Batch: 529799

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Suspended Solids			100	99.6		mg/L		100	90 - 110		

Lab Sample ID: 490-155579-A-1 DU
Matrix: Water
Analysis Batch: 529799

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Suspended Solids	260			316		mg/L				18	20

Lab Sample ID: 490-155733-A-1 DU
Matrix: Water
Analysis Batch: 529799

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Suspended Solids	79			82.0		mg/L				4	20

Method: SM5210B - BOD, 5 Day

Lab Sample ID: USB 490-529442/1
Matrix: Water
Analysis Batch: 529442

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	USB Result	USB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Biochemical Oxygen Demand	2.0	U	2.0	2.0	mg/L			07/14/18 18:22	1

Lab Sample ID: LCS 490-529442/2
Matrix: Water
Analysis Batch: 529442

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Biochemical Oxygen Demand			3.96	4.99	*	mg/L		126	85 - 115		

Lab Sample ID: 490-155652-F-1 DU
Matrix: Water
Analysis Batch: 529442

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Biochemical Oxygen Demand	5.0	b *		5.13	*	mg/L				2	20

Method: 9315 - Radium-226 (GFPC)

Lab Sample ID: MB 160-375564/15-A
Matrix: Water
Analysis Batch: 380986

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 375564

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.1295		0.0706	0.0716	1.00	0.0869	pCi/L	07/13/18 13:31	08/08/18 05:29	1

Method: 9315 - Radium-226 (GFPC) (Continued)

Lab Sample ID: MB 160-375564/15-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 380986 — **Prep Batch: 375564**

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	101		40 - 110	07/13/18 13:31	08/08/18 05:29	1

Lab Sample ID: LCS 160-375564/1-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 380986 — **Prep Batch: 375564**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-226			11.4	10.46		1.09	1.00	0.0719	pCi/L	92	68 - 137		

Carrier	LCS %Yield	LCS Qualifier	Limits
Ba Carrier	92.0		40 - 110

Lab Sample ID: LCSD 160-375564/2-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 380986 — **Prep Batch: 375564**

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-226			11.4	10.60		1.10	1.00	0.101	pCi/L	93	68 - 137	0.07	1

Carrier	LCSD %Yield	LCSD Qualifier	Limits
Ba Carrier	99.7		40 - 110

Method: 9320 - Radium-228 (GFPC)

Lab Sample ID: MB 160-375578/15-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 378362 — **Prep Batch: 375578**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.3845	U	0.274	0.276	1.00	0.430	pCi/L	07/13/18 14:09	07/27/18 09:20	1

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	101		40 - 110	07/13/18 14:09	07/27/18 09:20	1
Y Carrier	83.4		40 - 110	07/13/18 14:09	07/27/18 09:20	1

Lab Sample ID: LCS 160-375578/1-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 378362 — **Prep Batch: 375578**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-228			11.2	11.46		1.31	1.00	0.513	pCi/L	102	56 - 140		

Method: 9320 - Radium-228 (GFPC) (Continued)

Lab Sample ID: LCS 160-375578/1-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 378362 **Prep Batch: 375578**

Carrier	LCS %Yield	LCS Qualifier	Limits
Ba Carrier	92.0		40 - 110
Y Carrier	84.9		40 - 110

Lab Sample ID: LCSD 160-375578/2-A **Client Sample ID: Lab Control Sample Dup**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 378362 **Prep Batch: 375578**

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-228			11.2	10.96		1.25	1.00	0.404	pCi/L	98	56 - 140	0.19	1

Carrier	LCSD %Yield	LCSD Qualifier	Limits
Ba Carrier	99.7		40 - 110
Y Carrier	81.1		40 - 110

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-381166/1-A **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 381888 **Prep Batch: 381166**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	-0.03130	U	0.178	0.178	1.00	0.295	pCi/L	08/08/18 14:32	08/10/18 18:48	1

Tracer	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Thorium-229	87.9		30 - 110	08/08/18 14:32	08/10/18 18:48	1

Lab Sample ID: LCS 160-381166/2-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 381889 **Prep Batch: 381166**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Thorium-230			8.03	9.236		1.21	1.00	0.283	pCi/L	115	81 - 125		

Tracer	LCS %Yield	LCS Qualifier	Limits
Thorium-229	98.9		30 - 110

Lab Sample ID: LCSD 160-381166/3-A **Client Sample ID: Lab Control Sample Dup**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 381909 **Prep Batch: 381166**

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Thorium-230			8.03	7.713		1.08	1.00	0.285	pCi/L	96	81 - 125	0.67	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) (Continued)

Lab Sample ID: LCSD 160-381166/3-A **Client Sample ID: Lab Control Sample Dup**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 381909 **Prep Batch: 381166**

Tracer	LCSD %Yield	LCSD Qualifier	Limits
Thorium-229	95.4		30 - 110

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-377736/1-A **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 380260 **Prep Batch: 377736**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	0.02174	U	0.0739	0.0739	1.00	0.169	pCi/L	07/24/18 18:01	08/03/18 14:29	1
Uranium-235	-0.01739	U	0.0201	0.0201	1.00	0.176	pCi/L	07/24/18 18:01	08/03/18 14:29	1
Uranium-238	-0.01395	U	0.0161	0.0162	1.00	0.141	pCi/L	07/24/18 18:01	08/03/18 14:29	1

Tracer	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Uranium-232	81.0		30 - 110	07/24/18 18:01	08/03/18 14:29	1

Lab Sample ID: LCS 160-377736/2-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 380261 **Prep Batch: 377736**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Uranium-234			12.7	12.62		1.59	1.00	0.203	pCi/L	99	84 - 120		
Uranium-238			13.0	13.18		1.63	1.00	0.125	pCi/L	101	83 - 121		

Tracer	LCS %Yield	LCS Qualifier	Limits
Uranium-232	69.2		30 - 110

Lab Sample ID: 160-29476-1 DU **Client Sample ID: CRC-MW-1**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 380835 **Prep Batch: 377736**

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Uranium-234	183			195.3		17.1	1.00	0.380	pCi/L			0.36	1
Uranium-235	9.10			10.52		1.50	1.00	0.234	pCi/L			0.49	1
Uranium-238	185			195.2		17.0	1.00	0.188	pCi/L			0.29	1

Tracer	DU %Yield	DU Qualifier	Limits
Uranium-232	17.1	X	30 - 110

HPLC/IC

Analysis Batch: 380227

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1 - DL	CRC-MW-1	Total/NA	Water	300.0	
MB 160-380227/3	Method Blank	Total/NA	Water	300.0	
LCS 160-380227/4	Lab Control Sample	Total/NA	Water	300.0	
160-29476-1 MS - DL	CRC-MW-1	Total/NA	Water	300.0	
160-29476-1 DU - DL	CRC-MW-1	Total/NA	Water	300.0	

Metals

Prep Batch: 375873

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	7470A	
MB 160-375873/1-A	Method Blank	Total/NA	Water	7470A	
LCS 160-375873/2-A	Lab Control Sample	Total/NA	Water	7470A	
160-29274-A-3-C MS	Matrix Spike	Total/NA	Water	7470A	
160-29274-A-3-D MSD	Matrix Spike Duplicate	Total/NA	Water	7470A	

Analysis Batch: 376379

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	7470A	375873
MB 160-375873/1-A	Method Blank	Total/NA	Water	7470A	375873
LCS 160-375873/2-A	Lab Control Sample	Total/NA	Water	7470A	375873
160-29274-A-3-C MS	Matrix Spike	Total/NA	Water	7470A	375873
160-29274-A-3-D MSD	Matrix Spike Duplicate	Total/NA	Water	7470A	375873

Prep Batch: 379537

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	3010A	
MB 160-379537/1-A	Method Blank	Total/NA	Water	3010A	
LCS 160-379537/2-A	Lab Control Sample	Total/NA	Water	3010A	
160-29476-1 MS	CRC-MW-1	Total/NA	Water	3010A	
160-29476-1 MSD	CRC-MW-1	Total/NA	Water	3010A	

Analysis Batch: 380117

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	6010C	379537
MB 160-379537/1-A	Method Blank	Total/NA	Water	6010C	379537
LCS 160-379537/2-A	Lab Control Sample	Total/NA	Water	6010C	379537
160-29476-1 MS	CRC-MW-1	Total/NA	Water	6010C	379537
160-29476-1 MSD	CRC-MW-1	Total/NA	Water	6010C	379537

Analysis Batch: 380741

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	6010C	379537
MB 160-379537/1-A	Method Blank	Total/NA	Water	6010C	379537
LCS 160-379537/2-A	Lab Control Sample	Total/NA	Water	6010C	379537
160-29476-1 MS	CRC-MW-1	Total/NA	Water	6010C	379537
160-29476-1 MSD	CRC-MW-1	Total/NA	Water	6010C	379537

General Chemistry

Analysis Batch: 375313

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	7196A	
MB 160-375313/8	Method Blank	Total/NA	Water	7196A	
LCS 160-375313/9	Lab Control Sample	Total/NA	Water	7196A	
160-29476-1 MS	CRC-MW-1	Total/NA	Water	7196A	
160-29476-1 DU	CRC-MW-1	Total/NA	Water	7196A	

Analysis Batch: 529442

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	SM5210B	
USB 490-529442/1	Method Blank	Total/NA	Water	SM5210B	
LCS 490-529442/2	Lab Control Sample	Total/NA	Water	SM5210B	
490-155652-F-1 DU	Duplicate	Total/NA	Water	SM5210B	

Analysis Batch: 529799

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	SM 2540D	
MB 490-529799/1	Method Blank	Total/NA	Water	SM 2540D	
LCS 490-529799/2	Lab Control Sample	Total/NA	Water	SM 2540D	
490-155579-A-1 DU	Duplicate	Total/NA	Water	SM 2540D	
490-155733-A-1 DU	Duplicate	Total/NA	Water	SM 2540D	

Prep Batch: 531103

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	9012B	
MB 490-531103/1-A	Method Blank	Total/NA	Water	9012B	
LCS 490-531103/2-A	Lab Control Sample	Total/NA	Water	9012B	
160-29476-1 MS	CRC-MW-1	Total/NA	Water	9012B	
160-29476-1 MSD	CRC-MW-1	Total/NA	Water	9012B	
160-29476-1 DU	CRC-MW-1	Total/NA	Water	9012B	

Analysis Batch: 531193

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	9012B	531103
MB 490-531103/1-A	Method Blank	Total/NA	Water	9012B	531103
LCS 490-531103/2-A	Lab Control Sample	Total/NA	Water	9012B	531103
160-29476-1 MS	CRC-MW-1	Total/NA	Water	9012B	531103
160-29476-1 MSD	CRC-MW-1	Total/NA	Water	9012B	531103
160-29476-1 DU	CRC-MW-1	Total/NA	Water	9012B	531103

Prep Batch: 533397

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	1664B	
MB 490-533397/1-A	Method Blank	Total/NA	Water	1664B	
LCS 490-533397/2-A	Lab Control Sample	Total/NA	Water	1664B	
LCSD 490-533397/3-A	Lab Control Sample Dup	Total/NA	Water	1664B	
180-80122-B-1-A MS	Matrix Spike	Total/NA	Water	1664B	

Analysis Batch: 533454

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	1664B	533397
MB 490-533397/1-A	Method Blank	Total/NA	Water	1664B	533397

General Chemistry (Continued)

Analysis Batch: 533454 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 490-533397/2-A	Lab Control Sample	Total/NA	Water	1664B	533397
LCSD 490-533397/3-A	Lab Control Sample Dup	Total/NA	Water	1664B	533397
180-80122-B-1-A MS	Matrix Spike	Total/NA	Water	1664B	533397

Prep Batch: 533652

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	Distill/Phenol	

Analysis Batch: 533852

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	9066	533652

Rad

Prep Batch: 375564

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	PrecSep-21	
MB 160-375564/15-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-375564/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
LCSD 160-375564/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep-21	

Prep Batch: 375578

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	PrecSep_0	
MB 160-375578/15-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-375578/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-375578/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Prep Batch: 377736

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	ExtChrom	
MB 160-377736/1-A	Method Blank	Total/NA	Water	ExtChrom	
LCS 160-377736/2-A	Lab Control Sample	Total/NA	Water	ExtChrom	
160-29476-1 DU	CRC-MW-1	Total/NA	Water	ExtChrom	

Prep Batch: 381166

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29476-1	CRC-MW-1	Total/NA	Water	ExtChrom	
MB 160-381166/1-A	Method Blank	Total/NA	Water	ExtChrom	
LCS 160-381166/2-A	Lab Control Sample	Total/NA	Water	ExtChrom	
LCSD 160-381166/3-A	Lab Control Sample Dup	Total/NA	Water	ExtChrom	

Lab Chronicle

Client: Tetra Tech, Inc. TestAmerica Job ID: 160-29476-1
Project/Site: Former Carnotite Site - Non-Rad Analysis

Client Sample ID: CRC-MW-1 Lab Sample ID: 160-29476-1

Date Collected: 07/11/18 13:55 **Matrix: Water**
Date Received: 07/12/18 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0	DL	20	380227	08/04/18 06:06	JCB	TAL SL
Total/NA	Prep	3010A			379537	07/31/18 19:39	LAM	TAL SL
Total/NA	Analysis	6010C		1	380741	08/06/18 12:41	SFF	TAL SL
Total/NA	Prep	3010A			379537	07/31/18 19:39	LAM	TAL SL
Total/NA	Analysis	6010C		1	380117	08/02/18 17:32	SFF	TAL SL
Total/NA	Prep	7470A			375873	07/16/18 11:20	DAS	TAL SL
Total/NA	Analysis	7470A		1	376379	07/17/18 14:12	DAS	TAL SL
Total/NA	Prep	1664B			533397	08/02/18 13:17	BAD	TAL NSH
Total/NA	Analysis	1664B		1	533454	08/02/18 13:17	BAD	TAL NSH
Total/NA	Analysis	7196A		1	375313	07/13/18 07:59	NPV	TAL SL
Total/NA	Prep	9012B			531103	07/24/18 12:33	LDT	TAL NSH
Total/NA	Analysis	9012B		1	531193	07/24/18 16:50	SDL	TAL NSH
Total/NA	Prep	Distill/Phenol			533652	08/03/18 10:04	CAD	TAL NSH
Total/NA	Analysis	9066		1	533852	08/03/18 18:39	SDL	TAL NSH
Total/NA	Analysis	SM 2540D		1	529799	07/18/18 17:00	BMC	TAL NSH
Total/NA	Analysis	SM5210B		1	529442	(Start) 07/14/18 15:33 (End) 07/19/18 11:00	MSP	TAL NSH
Total/NA	Prep	PrecSep-21			375564	07/13/18 13:31	JLC	TAL SL
Total/NA	Analysis	9315		1	380986	08/08/18 05:29	RTM	TAL SL
Total/NA	Prep	PrecSep_0			375578	07/13/18 14:09	JLC	TAL SL
Total/NA	Analysis	9320		1	378362	07/27/18 09:20	RTM	TAL SL
Total/NA	Prep	ExtChrom			377736	07/24/18 18:01	KNF	TAL SL
Total/NA	Analysis	A-01-R		1	380834	08/06/18 22:38	ALS	TAL SL
Total/NA	Prep	ExtChrom			381166	08/08/18 14:32	KNF	TAL SL
Total/NA	Analysis	A-01-R		1	381919	08/10/18 18:48	RTM	TAL SL

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: Tetra Tech, Inc. TestAmerica Job ID: 160-29476-1
Project/Site: Former Carnotite Site - Non-Rad Analysis

Laboratory: TestAmerica St. Louis

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Louisiana	NELAP	6	04080	06-30-19

The following analytes are included in this report, but accreditation/certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
A-01-R	ExtChrom	Water	Uranium-235

Laboratory: TestAmerica Nashville

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
A2LA	ISO/IEC 17025		0453.07	12-31-19
Alaska (UST)	State Program	10	UST-087	06-30-18 *
Arizona	State Program	9	AZ0473	05-05-19
Arkansas DEQ	State Program	6	88-0737	04-25-19
California	State Program	9	2938	10-31-18
Connecticut	State Program	1	PH-0220	12-31-19
Florida	NELAP	4	E87358	06-30-19
Georgia	State Program	4	NA: NELAP & A2LA	12-31-19
Illinois	NELAP	5	200010	12-09-18
Iowa	State Program	7	131	04-01-20
Kansas	NELAP	7	E-10229	10-31-18
Kentucky (UST)	State Program	4	19	06-30-19
Kentucky (WW)	State Program	4	90038	12-31-18
Louisiana	NELAP	6	30613	06-30-19
Maine	State Program	1	TN00032	11-03-19
Maryland	State Program	3	316	03-31-19
Massachusetts	State Program	1	M-TN032	06-30-19
Minnesota	NELAP	5	047-999-345	12-31-18
Mississippi	State Program	4	N/A	06-30-19
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-19
New Hampshire	NELAP	1	2963	10-09-18
New Jersey	NELAP	2	TN965	06-30-19
New York	NELAP	2	11342	03-31-19
North Carolina (WW/SW)	State Program	4	387	12-31-18
North Dakota	State Program	8	R-146	06-30-19
Ohio VAP	State Program	5	CL0033	07-06-19
Oklahoma	State Program	6	9412	08-31-18
Oregon	NELAP	10	TN200001	04-26-19
Pennsylvania	NELAP	3	68-00585	07-31-19
Rhode Island	State Program	1	LAO00268	12-30-18
South Carolina	State Program	4	84009 (001)	02-28-19
Tennessee	State Program	4	2008	02-23-20
Texas	NELAP	6	T104704077	08-31-19
USDA	Federal		P330-13-00306	12-01-19
Utah	NELAP	8	TN00032	07-31-18 *
Virginia	NELAP	3	460152	06-14-19
Washington	State Program	10	C789	07-19-19
West Virginia DEP	State Program	3	219	02-28-19
Wisconsin	State Program	5	998020430	08-31-18
Wyoming (UST)	A2LA	8	453.07	12-31-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: Tetra Tech, Inc. TestAmerica Job ID: 160-29476-1
Project/Site: Former Carnotite Site - Non-Rad Analysis

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	TAL SL
6010C	Metals (ICP)	SW846	TAL SL
7470A	Mercury (CVAA)	SW846	TAL SL
1664B	HEM and SGT-HEM	1664B	TAL NSH
7196A	Chromium, Hexavalent	SW846	TAL SL
9012B	Cyanide, Total andor Amenable	SW846	TAL NSH
9066	Phenolics, Total Recoverable	SW846	TAL NSH
SM 2540D	Solids, Total Suspended (TSS)	SM	TAL NSH
SM5210B	BOD, 5 Day	SM	TAL NSH
9315	Radium-226 (GFPC)	SW846	TAL SL
9320	Radium-228 (GFPC)	SW846	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
1664B	HEM and SGT-HEM (SPE)	1664B	TAL NSH
3010A	Preparation, Total Metals	SW846	TAL SL
7470A	Preparation, Mercury	SW846	TAL SL
9012B	Cyanide, Total and/or Amenable, Distillation	SW846	TAL NSH
Distill/Phenol	Distillation, Phenolics	None	TAL NSH
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL
PrecSep_0	Preparation, Precipitate Separation	None	TAL SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	TAL SL

Protocol References:

1664B = EPA-821-98-002
DOE = U.S. Department of Energy
MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.
None = None
SM = "Standard Methods For The Examination Of Water And Wastewater"
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177
TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29476-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-29476-1	CRC-MW-1	Water	07/11/18 13:55	07/12/18 09:30

HPLC/IC MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Instrument ID: CIC2500 Analysis Batch Number: 379990

Lab Sample ID: STD2 160-379990/2 IC Client Sample ID:

Date Analyzed: 08/02/18 17:07 Lab File ID: 080218- 2.d GC Column: IonPacAS14 ID: 4(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Fluoride	3.05	Baseline Smoothing	boydj	08/03/18 11:47

Lab Sample ID: STD3 160-379990/3 IC Client Sample ID:

Date Analyzed: 08/02/18 17:24 Lab File ID: 080218- 3.d GC Column: IonPacAS14 ID: 4(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Fluoride	3.04	Baseline Smoothing	boydj	08/03/18 11:48

Lab Sample ID: STD4 160-379990/4 IC Client Sample ID:

Date Analyzed: 08/02/18 17:41 Lab File ID: 080218- 4.d GC Column: IonPacAS14 ID: 4(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Fluoride	3.07	Baseline Smoothing	boydj	08/03/18 11:47

Lab Sample ID: STD5 160-379990/5 IC Client Sample ID:

Date Analyzed: 08/02/18 17:58 Lab File ID: 080218- 5.d GC Column: IonPacAS14 ID: 4(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Fluoride	3.05	Baseline Smoothing	boydj	08/03/18 11:48

Lab Sample ID: ICV 160-379990/7 Client Sample ID:

Date Analyzed: 08/02/18 18:32 Lab File ID: 080218- 7.d GC Column: IonPacAS14 ID: 4(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Fluoride	3.04	Baseline Smoothing	boydj	08/03/18 11:48

HPLC/IC MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Instrument ID: CIC2500 Analysis Batch Number: 379990

Lab Sample ID: ICB 160-379990/8 Client Sample ID:

Date Analyzed: 08/02/18 18:49 Lab File ID: 080218- 8.d GC Column: IonPacAS14 ID: 4(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Fluoride		Invalid Compound ID	boydj	08/03/18 11:49

HPLC/IC MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Instrument ID: CIC2500 Analysis Batch Number: 380227

Lab Sample ID: CCB 160-380227/2 Client Sample ID:

Date Analyzed: 08/03/18 18:32 Lab File ID: 080318- 2.d GC Column: IonPacAS14 ID: 4(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Fluoride		Invalid Compound ID	boydj	08/06/18 10:32

Lab Sample ID: LCS 160-380227/4 Client Sample ID:

Date Analyzed: 08/03/18 19:06 Lab File ID: 080318- 4.d GC Column: IonPacAS14 ID: 4(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Fluoride	3.05	Baseline Smoothing	boydj	08/06/18 10:33

Lab Sample ID: CCV 160-380227/13 Client Sample ID:

Date Analyzed: 08/03/18 21:39 Lab File ID: 080318- 13.d GC Column: IonPacAS14 ID: 4(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Fluoride	3.04	Baseline Smoothing	boydj	08/06/18 10:34

Lab Sample ID: CCB 160-380227/14 Client Sample ID:

Date Analyzed: 08/03/18 21:56 Lab File ID: 080318- 14.d GC Column: IonPacAS14 ID: 4(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Fluoride		Invalid Compound ID	boydj	08/06/18 10:34

Lab Sample ID: CCV 160-380227/36 Client Sample ID:

Date Analyzed: 08/04/18 04:08 Lab File ID: 080318- 36.d GC Column: IonPacAS14 ID: 4(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Fluoride	3.03	Baseline Smoothing	boydj	08/06/18 10:38

HPLC/IC MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Instrument ID: CIC2500 Analysis Batch Number: 380227

Lab Sample ID: CCB 160-380227/37 Client Sample ID:

Date Analyzed: 08/04/18 04:25 Lab File ID: 080318- 37.d GC Column: IonPacAS14 ID: 4(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Fluoride		Invalid Compound ID	boydj	08/06/18 10:38

Lab Sample ID: 160-29476-1 DL Client Sample ID: CRC-MW-1 DL

Date Analyzed: 08/04/18 06:06 Lab File ID: 080318- 43.d GC Column: IonPacAS14 ID: 4(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Fluoride	3.03	Baseline Smoothing	boydj	08/06/18 10:39

Lab Sample ID: 160-29476-1 DU DL Client Sample ID: CRC-MW-1 DU DL

Date Analyzed: 08/04/18 06:40 Lab File ID: 080318- 45.d GC Column: IonPacAS14 ID: 4(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Fluoride	3.03	Baseline Smoothing	boydj	08/06/18 10:40

Lab Sample ID: CCV 160-380227/48 Client Sample ID:

Date Analyzed: 08/04/18 07:31 Lab File ID: 080318- 48.d GC Column: IonPacAS14 ID: 4(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Fluoride	3.03	Baseline Smoothing	boydj	08/06/18 10:40

Lab Sample ID: CCB 160-380227/49 Client Sample ID:

Date Analyzed: 08/04/18 07:48 Lab File ID: 080318- 49.d GC Column: IonPacAS14 ID: 4(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Fluoride		Invalid Compound ID	boydj	08/06/18 10:40

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
82232-334_00001	06/03/60	Eckert & Ziegler, Lot 82232-334			(Purchased Reagent)		Am-241	7.281 Bq
							Pu-239	7.137 Bq
							Thorium-230	7.63 Bq
82233-334_00001	06/03/60	Eckert & Zigler, Lot 82233-334			(Purchased Reagent)		Am-241	5.114 Bq
							Pu-239	6.064 Bq
							Thorium-230	4.95 Bq
82236-334_00001	06/02/60	Eckert & Ziegler, Lot 82236-334			(Purchased Reagent)		Am-241	6.891 Bq
							Pu-239	6.664 Bq
							Thorium-230	7.107 Bq
82237-334_00003	06/01/60	Eckert & Ziegler, Lot 82237-334			(Purchased Reagent)		Am-241	5.608 Bq
							Pu-239	6.424 Bq
							Thorium-230	5.856 Bq
82241-334_00001	06/08/60	Eckert & Ziegler, Lot 82241-334			(Purchased Reagent)		Am-241	6.638 Bq
							Pu-239	6.797 Bq
							Thorium-230	6.629 Bq
82243-334_00001	06/09/60	Eckert & Ziegler, Lot 82243-334			(Purchased Reagent)		Am-241	6.39 Bq
							Pu-239	5.979 Bq
							Thorium-230	5.856 Bq
82244-334_00001	06/09/60	Eckert & Zigler, Lot 82244-334			(Purchased Reagent)		Am-241	6.897 Bq
							Pu-239	6.717 Bq
							Thorium-230	7.352 Bq
Ba Carrier_00038	07/09/19	CPI, Lot 1104033			(Purchased Reagent)		Ba Carrier	20000 ug/mL
Cr6 5ppm Cal_00224	07/17/18	07/10/18	DI Water, Lot 071018	100 mL	Cr6 100ppmCal_00062	5 mL	Cr (VI)	5.00839 mg/L
.Cr6 100ppmCal_00062	10/30/18	04/30/18	DI Water, Lot 043018	100 mL	Cr6 1000ppmCa_00013	10 mL	Cr (VI)	100.168 mg/L
..Cr6 1000ppmCa_00013	04/30/19	04/30/18	DI Water, Lot 043018	500 mL	K Dichromate_00004	1.4168 g	Cr (VI)	1001.68 mg/L
...K Dichromate_00004	05/03/22	Sigma-Aldrich, Lot MKBV0900V			(Purchased Reagent)		Cr (VI)	0.3535 g/g
Cr6 5ppm QC_00219	07/17/18	07/10/18	DI Water, Lot 071018	100 mL	Cr6 100ppmQC_00057	5 mL	Cr (VI)	5.00627 mg/L
.Cr6 100ppmQC_00057	10/30/18	04/30/18	DI Water, Lot 043018	100 mL	Cr6 1000ppmQC_00015	10 mL	Cr (VI)	100.125 mg/L
..Cr6 1000ppmQC_00015	04/30/19	04/30/18	DI Water, Lot 043018	500 mL	K-Dichromate_00002	1.4162 g	Cr (VI)	1001.25 mg/L
...K-Dichromate_00002	05/31/20	Fisher, Lot 153492			(Purchased Reagent)		Cr (VI)	0.3535 g/g
Hg Curve Int._01021	07/17/18	07/16/18	2% Nitric Acid, Lot 1491915	100 mL	HG CAL_00012	0.1 mL	Mercury	0.1 ug/mL
.HG CAL_00012	06/01/19	Spex, Lot 23-116HGY			(Purchased Reagent)		Mercury	100 ug/mL
Hg QC Int._00998	07/17/18	07/16/18	2% Nitric Acid, Lot 1491915	100 mL	HG QC_00009	0.1 mL	Mercury	0.1 ug/mL
.HG QC_00009	06/21/19	Inorganic Ventures, Lot N2-HG667900			(Purchased Reagent)		Mercury	100 ug/mL
IC 2nd Source_00012	03/31/19	High-Purity Standards, Lot 1806639			(Purchased Reagent)		Fluoride	2500 ug/L
IC Cal High_00059	06/28/19	Inorganic Ventures, Lot M2-MEB661096			(Purchased Reagent)		Bromide	5000 ug/L
							Chloride	5000 ug/L
							Fluoride	2500 ug/L
							Sulfate	20000 ug/L
IC Cal Low_00009	01/23/19	Inorganic Ventures, Lot N2-MEB664662			(Purchased Reagent)		Bromide	5000 ug/L
							Chloride	4000 ug/L

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Fluoride	2000 ug/L
							Sulfate	10000 ug/L
IC MS Soln_00010	01/31/19	Inorganic Ventures, Lot N2-MEB664708			(Purchased Reagent)		Fluoride	100 ug/mL
ICP CAL1/LLC_00162	01/26/19	07/26/18	5% HCl/5%HN03, Lot 1511757	1000 mL	ICP LLC A_00007	5 mL	Antimony	0.01 ug/mL
					ICP LLC B_00005	5 mL	Aluminum	0.2 ug/mL
							Ba Carrier	0.05 ug/mL
							Beryllium	0.005 ug/mL
							Cadmium	0.005 ug/mL
							Calcium	1 ug/mL
							Chromium	0.01 ug/mL
							Cobalt	0.05 ug/mL
							Copper	0.025 ug/mL
							Iron	0.1 ug/mL
							Lead	0.01 ug/mL
							Magnesium	1 ug/mL
							Manganese	0.015 ug/mL
							Nickel	0.04 ug/mL
							Potassium	5 ug/mL
							Silver	0.01 ug/mL
							Sodium	1 ug/mL
							Thallium	0.02 ug/mL
							Vanadium	0.05 ug/mL
							Zinc	0.02 ug/mL
.ICP LLC A_00007	03/23/19	INORGANIC VENTURES, Lot M2-MEB661165			(Purchased Reagent)		Antimony	2 mg/L
.ICP LLC B_00005	03/23/19	INORGANIC VENTURES, Lot M2-MEB661170			(Purchased Reagent)		Aluminum	40 mg/L
							Ba Carrier	10 mg/L
							Beryllium	1 mg/L
							Cadmium	1 mg/L
							Calcium	200 mg/L
							Chromium	2 mg/L
							Cobalt	10 mg/L
							Copper	5 mg/L
							Iron	20 mg/L
							Lead	2 mg/L
							Magnesium	200 mg/L
							Manganese	3 mg/L
							Nickel	8 mg/L
							Potassium	1000 mg/L
							Silver	2 mg/L
							Sodium	200 mg/L
							Thallium	4 mg/L
							Vanadium	10 mg/L
							Zinc	4 mg/L
ICP CAL1/LLC_00163	02/02/19	08/02/18	5% HCl/5%HN03, Lot 1511757	1000 mL	ICP LLC B_00005	5 mL	Arsenic	0.01 ug/mL
							Selenium	0.015 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
.ICP LLC B_00005	03/23/19	INORGANIC VENTURES, Lot M2-MEB661170			(Purchased Reagent)		Arsenic	2 mg/L
							Selenium	3 mg/L
ICP CAL2/CCV_00154	01/23/19	07/23/18	5% HCl/5@HN03, Lot 1511757	1000 mL	ICP CAL A_00006	5 mL	Ba Carrier	5 ug/mL
							Beryllium	5 ug/mL
							Cadmium	5 ug/mL
							Chromium	5 ug/mL
							Cobalt	5 ug/mL
							Copper	5 ug/mL
							Iron	50 ug/mL
							Lead	5 ug/mL
							Manganese	5 ug/mL
							Nickel	5 ug/mL
							Silver	1 ug/mL
							Sodium	50 ug/mL
							Thallium	1 ug/mL
							Vanadium	5 ug/mL
							Zinc	5 ug/mL
					ICP CAL B_00004	5 mL	Aluminum	50 ug/mL
							Calcium	50 ug/mL
							Magnesium	50 ug/mL
							Potassium	50 ug/mL
					ICP CAL C_00004	5 mL	Antimony	1 ug/mL
.ICP CAL A_00006	06/11/19	INORGANIC VENTURES, Lot M2-MEB661171			(Purchased Reagent)		Ba Carrier	1000 mg/L
							Beryllium	1000 mg/L
							Cadmium	1000 mg/L
							Chromium	1000 mg/L
							Cobalt	1000 mg/L
							Copper	1000 mg/L
							Iron	10000 mg/L
							Lead	1000 mg/L
							Manganese	1000 mg/L
							Nickel	1000 mg/L
							Silver	200 mg/L
							Sodium	10000 mg/L
							Thallium	200 mg/L
							Vanadium	1000 mg/L
							Zinc	1000 mg/L
.ICP CAL B_00004	06/11/19	INORGANIC VENTURES, Lot M2-MEB661174			(Purchased Reagent)		Aluminum	10000 mg/L
							Calcium	10000 mg/L
							Magnesium	10000 mg/L
							Potassium	10000 mg/L
.ICP CAL C_00004	06/11/19	INORGANIC VENTURES, Lot M2-MEB661175			(Purchased Reagent)		Antimony	200 mg/L
ICP CAL2/CCV_00155	01/26/19	07/26/18	5% HCl/5@HN03, Lot 1511757	1000 mL	ICP CAL A_00006	5 mL	Arsenic	5 ug/mL
							Selenium	1 ug/mL
.ICP CAL A_00006	06/11/19	INORGANIC VENTURES, Lot M2-MEB661171			(Purchased Reagent)		Arsenic	1000 mg/L

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Selenium	200 mg/L
ICP ICSA_00021	12/04/18	06/04/18	5% HCl/5%HN03, Lot 1455607	1000 mL	ICP ICSA A_00003	5 mL	Aluminum	100 ug/mL
							Iron	100 ug/mL
					ICP ICSA B_00003	5 mL	Calcium	100 ug/mL
							Potassium	100 ug/mL
							Sodium	100 ug/mL
					ICP ICSA C_00003	5 mL	Magnesium	100 ug/mL
.ICP ICSA A_00003	03/26/19	INORGANIC VENTURES, Lot N2-MEB666538			(Purchased Reagent)		Aluminum	20000 mg/L
							Iron	20000 mg/L
.ICP ICSA B_00003	03/26/19	INORGANIC VENTURES, Lot N2-MEB666539			(Purchased Reagent)		Calcium	20000 mg/L
							Potassium	20000 mg/L
							Sodium	20000 mg/L
.ICP ICSA C_00003	03/26/19	INORGANIC VENTURES, Lot N2-MEB666542			(Purchased Reagent)		Magnesium	20000 mg/L
ICP ICSAB_00018	12/04/18	06/04/18	5% HCl/5%HN03, Lot 1455607	1000 mL	ICP ICSA A_00003	5 mL	Aluminum	100 ug/mL
							Iron	100 ug/mL
					ICP ICSA B_00003	5 mL	Calcium	100 ug/mL
							Potassium	100 ug/mL
							Sodium	100 ug/mL
					ICP ICSA C_00003	5 mL	Magnesium	100 ug/mL
					ICP ICSAB A_00003	5 mL	Arsenic	2.5 ug/mL
							Ba Carrier	2.5 ug/mL
							Beryllium	2.5 ug/mL
							Cadmium	2.5 ug/mL
							Chromium	2.5 ug/mL
							Cobalt	2.5 ug/mL
							Copper	2.5 ug/mL
							Lead	2.5 ug/mL
							Manganese	2.5 ug/mL
							Nickel	2.5 ug/mL
							Selenium	0.5 ug/mL
							Silver	0.5 ug/mL
							Thallium	0.5 ug/mL
							Vanadium	2.5 ug/mL
							Zinc	2.5 ug/mL
					ICP ICSAB B_00003	5 mL	Antimony	0.5 ug/mL
.ICP ICSA A_00003	03/26/19	INORGANIC VENTURES, Lot N2-MEB666538			(Purchased Reagent)		Aluminum	20000 mg/L
							Iron	20000 mg/L
.ICP ICSA B_00003	03/26/19	INORGANIC VENTURES, Lot N2-MEB666539			(Purchased Reagent)		Calcium	20000 mg/L
							Potassium	20000 mg/L
							Sodium	20000 mg/L
.ICP ICSA C_00003	03/26/19	INORGANIC VENTURES, Lot N2-MEB666542			(Purchased Reagent)		Magnesium	20000 mg/L
.ICP ICSAB A_00003	03/26/19	INORGANIC VENTURES, Lot N2-MEB666540			(Purchased Reagent)		Arsenic	500 mg/L
							Ba Carrier	500 mg/L
							Beryllium	500 mg/L
							Cadmium	500 mg/L

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Chromium	500 mg/L
							Cobalt	500 mg/L
							Copper	500 mg/L
							Lead	500 mg/L
							Manganese	500 mg/L
							Nickel	500 mg/L
							Selenium	100 mg/L
							Silver	100 mg/L
							Thallium	100 mg/L
							Vanadium	500 mg/L
							Zinc	500 mg/L
.ICP ICSAB B_00003	03/26/19	INORGANIC VENTURES, Lot N2-MEB666541			(Purchased Reagent)		Antimony	100 mg/L
ICP ICV_00518	08/03/18	08/02/18	5% HCl/5@HN03, Lot 1524339	100 mL	ICP ICV 1_00005	0.5 mL	Aluminum	50 ug/mL
							Calcium	50 ug/mL
							Iron	50 ug/mL
							Magnesium	50 ug/mL
					ICP ICV 2_00006	0.5 mL	Antimony	1 ug/mL
							Beryllium	5 ug/mL
					ICP ICV 3_00005	0.5 mL	Ba Carrier	5 ug/mL
							Cadmium	5 ug/mL
							Chromium	5 ug/mL
							Cobalt	5 ug/mL
							Copper	5 ug/mL
							Lead	5 ug/mL
							Manganese	5 ug/mL
							Nickel	5 ug/mL
							Silver	1 ug/mL
							Thallium	1 ug/mL
							Vanadium	5 ug/mL
							Zinc	5 ug/mL
					ICP ICV 4_00004	0.5 mL	Potassium	50 ug/mL
							Sodium	50 ug/mL
.ICP ICV 1_00005	06/25/19	SPEX, Lot 2-200SG			(Purchased Reagent)		Aluminum	10000 ug/mL
							Calcium	10000 ug/mL
							Iron	10000 ug/mL
							Magnesium	10000 ug/mL
.ICP ICV 2_00006	06/25/19	SPEX, Lot 2-198SG			(Purchased Reagent)		Antimony	200 ug/mL
							Beryllium	1000 ug/mL
.ICP ICV 3_00005	06/25/19	SPEX, Lot 2-199SG			(Purchased Reagent)		Ba Carrier	1000 ug/mL
							Cadmium	1000 ug/mL
							Chromium	1000 ug/mL
							Cobalt	1000 ug/mL
							Copper	1000 ug/mL
							Lead	1000 ug/mL
							Manganese	1000 ug/mL
							Nickel	1000 ug/mL
							Silver	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Thallium	200 ug/mL
							Vanadium	1000 ug/mL
							Zinc	1000 ug/mL
.ICP ICV 4_00004	06/25/19		SPEX, Lot 2-208SG		(Purchased Reagent)		Potassium	10000 ug/mL
							Sodium	10000 ug/mL
ICP ICV_00520	08/07/18	08/06/18	5% HCl/5@HN03, Lot 1524339	100 mL	ICP ICV 2_00006	0.5 mL	Arsenic	5 ug/mL
							Selenium	1 ug/mL
.ICP ICV 2_00006	06/25/19		SPEX, Lot 2-198SG		(Purchased Reagent)		Arsenic	1000 ug/mL
							Selenium	200 ug/mL
MPREP1_00017	06/22/19		Inorganic Ventures, Lot M2-MEB663768		(Purchased Reagent)		Aluminum	2000 mg/L
							Arsenic	200 mg/L
							B	40.01 mg/L
							Ba Carrier	200 mg/L
							Beryllium	20 mg/L
							Bi	200 mg/L
							Cadmium	200.1 mg/L
							Calcium	2000 mg/L
							Chromium	200 mg/L
							Cobalt	200 mg/L
							Copper	200 mg/L
							Iron	2000 mg/L
							Lead	200 mg/L
							Li	20 mg/L
							Magnesium	2000 mg/L
							Manganese	200 mg/L
							Nickel	200 mg/L
							P	200 mg/L
							Potassium	2000 mg/L
							Selenium	100 mg/L
							Silver	40.01 mg/L
							Sm	200 mg/L
							Sodium	2000 mg/L
							Sr	200.1 mg/L
							Sulfur	2000 mg/L
							Th	200 mg/L
							Thallium	40.01 mg/L
							U	200 mg/L
							Vanadium	200 mg/L
							Zinc	200 mg/L
MPREP2_00015	06/22/19		Inorganic Ventures, Lot M2-MEB663767		(Purchased Reagent)		Antimony	100 mg/L
							Mo	100 mg/L
							Si	1000 mg/L
							Sn	200 mg/L
							Ti	200 mg/L
							W	200 mg/L
							Zr	200 mg/L

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
Ra-226_00022	08/03/18	08/24/16	1M HNO3, Lot n/a	100 mL			Ra	7534.61 dpm/mL
					Ra-226_00021	5.0595 g	Radium-226	7534.61 dpm/mL
							Rn-222	7534.61 dpm/mL
							Total Alpha Emitting Radium Isotopes	7534.61 dpm/mL
.Ra-226_00021	09/01/53	NIST, Lot 4967A			(Purchased Reagent)		Radium-226	2482 Bq/g
							Rn-222	2482 Bq/g
							Total Alpha Emitting Radium Isotopes	2482 Bq/g
Ra-226_00025	10/19/18	12/08/16	0.1M HCl, Lot N/A	100 mL	Ra-226_00024	4.9774 g	Ra	8409.79 dpm/mL
							Radium-226	8409.79 dpm/mL
							Rn-222	8409.79 dpm/mL
							Total Alpha Emitting Radium Isotopes	8409.79 dpm/mL
.Ra-226_00024	12/05/66	Eckert & Ziegler, Lot 104858			(Purchased Reagent)		Ra	2815.99 Bq/g
							Radium-226	2815.99 Bq/g
							Rn-222	2815.99 Bq/g
							Total Alpha Emitting Radium Isotopes	2815.99 Bq/g
Ra-226_00027	10/19/18	08/02/17	0.1M HCl, Lot N/A	500 mL	Ra-226_00025	1.5 mL	Ra	25.2294 dpm/mL
							Radium-226	25.2294 dpm/mL
							Total Alpha Emitting Radium Isotopes	25.2294 dpm/mL
.Ra-226_00025	10/19/18	12/08/16	0.1M HCl, Lot N/A	100 mL	Ra-226_00024	4.9774 g	Ra	8409.79 dpm/mL
							Radium-226	8409.79 dpm/mL
							Total Alpha Emitting Radium Isotopes	8409.79 dpm/mL
..Ra-226_00024	12/05/66	Eckert & Ziegler, Lot 104858			(Purchased Reagent)		Ra	2815.99 Bq/g
							Radium-226	2815.99 Bq/g
							Total Alpha Emitting Radium Isotopes	2815.99 Bq/g
Ra22804A120_00001	07/12/19	Analytics, Lot 68824-310			(Purchased Reagent)		Radium-228	448.466 dpm/mL
Sr-90_00004	09/17/59	06/21/11	0.1M HCL, Lot 0	100 mL	Sr-90_00001	5.0139 g	Gross Beta	45120.6 dpm/mL
							Sr	22560.3 dpm/mL
							Sr-90	22560.3 dpm/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
.Sr-90_00001	09/17/59	Eckert & Ziegler, Lot 80573-334			(Purchased Reagent)		Gross Beta	14998.5 Bq/g
							Sr	7499.25 Bq/g
							Sr-90	7499.25 Bq/g
Sr-90_00018	03/12/19	11/28/12	0.1M HCL, Lot 0	100 mL	Sr-90_00017	4.9997 g	Gross Beta	44774.2 dpm/mL
							Sr-90	22387.1 dpm/mL
.Sr-90_00017	11/29/62	Analytics, Lot 92352			(Purchased Reagent)		Gross Beta	14925.6 Bq/g
							Sr-90	7462.82 Bq/g
Th-229_00023	12/20/18	12/15/17	0.1M HNO3, Lot n/a	500 mL	Th-229_00017	15 mL	At-217	67.2296 dpm/mL
							Thorium-229	67.2296 dpm/mL
.Th-229_00017	12/20/18	08/20/14	0.1M HNO3, Lot n/a	100 mL	Th-229_00016	5.0464 g	At-217	2240.99 dpm/mL
							Thorium-229	2240.99 dpm/mL
..Th-229_00016	08/06/64	Analytics, Lot 97790			(Purchased Reagent)		At-217	740.127 Bq/g
							Thorium-229	740.127 Bq/g
Th-230_00016	11/29/62	11/28/12	0.5M HNO3, Lot 0	100 mL	Th-230_00015	5.0489 g	Gross Alpha	2374.49 dpm/mL
							Thorium-230	2374.49 dpm/mL
.Th-230_00015	11/29/62	Analytics, Lot 92523			(Purchased Reagent)		Gross Alpha	783.829 Bq/g
							Thorium-230	783.829 Bq/g
Th-230_00019	08/28/18	08/13/13	1M HNO3, Lot n/a	100 mL	Th-230_00018	5.0731 mL	Gross Alpha	2228.23 dpm/mL
							Thorium-230	2228.23 dpm/mL
.Th-230_00018	08/08/63	Eckert & Ziegler Analytics, Lot 92776			(Purchased Reagent)		Gross Alpha	43922.5 dpm/g
							Thorium-230	43922.5 dpm/g
Th-230_00036	08/28/18	08/30/16	1M HNO3, Lot 0	200 mL	Th-230_00019	4 mL	Gross Alpha	44.5646 dpm/mL
							Thorium-230	44.5646 dpm/mL
.Th-230_00019	08/28/18	08/13/13	1M HNO3, Lot n/a	100 mL	Th-230_00018	5.0731 mL	Gross Alpha	2228.23 dpm/mL
							Thorium-230	2228.23 dpm/mL
..Th-230_00018	08/08/63	Eckert & Ziegler Analytics, Lot 92776			(Purchased Reagent)		Gross Alpha	43922.5 dpm/g
							Thorium-230	43922.5 dpm/g
U-232_00040	12/20/18	12/18/17	DI Water, Lot n/a	500 mL	U-232_00009	4 mL	Uranium-232	82.2457 dpm/mL
.U-232_00009	12/20/18	08/29/11	1M HNO3, Lot 0	100 mL	U-232_00003	5.1609 g	Uranium-232	10280.7 dpm/mL
..U-232_00003	08/25/61	Eckert & Ziegler, Lot 85539-334			(Purchased Reagent)		Uranium-232	3320.07 Bq/g

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
UNAT_00014	11/28/18	12/21/17	1M HNO3, Lot n/a	200 mL	UNAT Parent_00001	20 mL	Uranium-234	70.6912 dpm/mL
							Uranium-235	3.37064 dpm/mL
							Uranium-238	72.265 dpm/mL
.UNAT Parent_00001	11/28/18	05/03/13	1M HNO3, Lot n/a	200 mL	UNAT Ampoule_00001	19.2509 g	Uranium-234	706.912 dpm/mL
							Uranium-235	33.7064 dpm/mL
							Uranium-238	722.65 dpm/mL
..UNAT Ampoule_00001	03/30/58	New Brunswick Lab, Lot CRM 145			(Purchased Reagent)		Uranium-234	7344.2 dpm/g
							Uranium-235	350.18 dpm/g
							Uranium-238	7507.7 dpm/g
Y Carrier_00032	04/16/19	CPI, Lot 10064660-5			(Purchased Reagent)		Y Carrier	50000 mg/L

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
O&G_Disks_00015	06/06/23		Horizon, Lot 510721		(Purchased Reagent)		Stock Chemical	0 Filter
O&G_HCL_00004	04/02/19		J.T. Baker, Lot 0000189699		(Purchased Reagent)		Stock Chemical	100 %
O&G_Hexane_00015	11/03/18		J.T.Baker, Lot 0000189044		(Purchased Reagent)		Hexane	0 mg/mL
O&G_Methanol_00006	04/18/19		J.T. Baker, Lot 00001123898		(Purchased Reagent)		Methanol	0 %
OP_HEM_spike_00019	11/25/18	05/25/18	ACETONE, Lot 0000168702	1000 mL	O&G_Stearic_A_00001	5 g	HEM (Oil & Grease)	10000 ug/mL
							SGT-HEM	5000 ug/mL
							Stearic Acid	0 ug/mL
					OP_Acetone_cy_00028	1000 mL	Acetone	0 ug/mL
					OP_Hexadecane_00002	5 g	HEM (Oil & Grease)	10000 ug/mL
							Hexadecane	0 ug/mL
							SGT-HEM	5000 ug/mL
.O&G_Stearic_A_00001	10/26/22		Sigma, Lot BCBS5461V		(Purchased Reagent)		HEM (Oil & Grease)	1000000 ug/mL
							SGT-HEM	500000 ug/mL
							Stearic Acid	0 ug/mL
.OP_Acetone_cy_00028	03/20/19		J.T. Baker, Lot 0000192047		(Purchased Reagent)		Acetone	0 ug/mL
.OP_Hexadecane_00002	01/31/19		EMD, Lot 51126121		(Purchased Reagent)		HEM (Oil & Grease)	1000000 ug/mL
							Hexadecane	0 ug/mL
							SGT-HEM	500000 ug/mL
pH strips_00011	05/30/19		Merck, Lot HC740840		(Purchased Reagent)		Physical Description	0 Filter Strip
W_BODGlucose_00095	03/22/20		LabChem, Lot H068-19		(Purchased Reagent)		Biochemical Oxygen Demand	198 mg/L
W_CN CCV_00084	03/08/20	05/09/18	NaOH, Lot na	100 mL	W_Cyanide Std_00048	1 mL	Cyanide, Total	10 mg/L
.W_Cyanide Std_00048	03/08/20		Inorganic Venture, Lot N2-CN665509		(Purchased Reagent)		Cyanide, Total	1000 mg/L
W_CN CCV_00087	03/07/20	07/11/18	NaOH, Lot na	100 mL	W_Cyanide Std_00051	1 mL	Cyanide, Amenable	10 mg/L
							Cyanide, Non-amenable	10 mg/L
							Cyanide, Total	10 mg/L
							Cyanide, Weak Acid Dissociable	10 mg/L
.W_Cyanide Std_00051	03/07/20		Inorganic Venture, Lot N2-CN665509		(Purchased Reagent)		Cyanide, Amenable	1000 mg/L
							Cyanide, Non-amenable	1000 mg/L
							Cyanide, Total	1000 mg/L
							Cyanide, Weak Acid Dissociable	1000 mg/L
W_CNworkLCS_00052	02/10/19	02/22/17	NaOH, Lot na	50 mL	Complex CN_00006	0.5 mL	Cyanide, Amenable	10 mg/L
							Cyanide, Non-amenable	0 mg/L
							Cyanide, Total	10 mg/L
							Cyanide, Weak Acid Dissociable	10 mg/L
.Complex CN_00006	02/10/19		Absolute Standards, Lot 021017		(Purchased Reagent)		Cyanide, Amenable	1000 ug/mL
							Cyanide, Non-amenable	0 ug/mL
							Cyanide, Total	1000 ug/mL
							Cyanide, Weak Acid Dissociable	1000 ug/mL
W_H2SO4 (50%)_00102	02/23/20		LabChem, Lot H046-08		(Purchased Reagent)		Stock Chemical	18 N
W_Mag. Chlori_00074	01/24/19	07/24/18	DI Water, Lot na	1000 mL/L	WC_magneiumCl_00064	510 g	Stock Chemical	510 g
.WC_magneiumCl_00064	07/24/23		Fisher, Lot 175303		(Purchased Reagent)		Stock Chemical	1 g/g
W_Sulfamic_00085	11/23/18	05/23/18	DI Water, Lot na	1000 mL	W_SulfamicAci_00034	200 g	Stock Chemical	200000 mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
.W_SulfamicAci_00034	09/23/24	Ricca Chemical, Lot 2710F94			(Purchased Reagent)		Stock Chemical	1 g/g
W_TSS_LCS_00520	07/28/18	06/28/18	DI Water, Lot na	1 L	W_Celite_00006	0.1 g	Total Suspended Solids	100 mg/L
.W_Celite_00006	01/31/22	Fisher, Lot 170908			(Purchased Reagent)		Total Suspended Solids	1 g/g

Reagent

82232-334_00001

Eckert & Ziegler
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CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82232-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 3-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	7.630E+00	4420-4800	7.540E+04	0.7	1.1	2.6
Pu-239	7.137E+00	4950-5240	2.410E+04	0.7	1.1	2.6
Am-241	7.281E+00	5280-5600	4.326E+02	0.7	1.1	2.6
Total Activity	2.210E+01	3000-8000		0.4	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82233-334_00001

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CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82233-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 3-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	4.950E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	6.064E+00	4950-5240	2.410E+04	0.7	1.1	2.6
Am-241	5.114E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	1.616E+01	3000-8000		0.1	1.1	2.2

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82236-334_00001

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CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82236-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 2-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	7.107E+00	4420-4800	7.540E+04	0.7	1.1	2.6
Pu-239	6.664E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	6.891E+00	5280-5600	4.326E+02	0.7	1.1	2.6
Total Activity	2.071E+01	3000-8000		0.4	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.46 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82237-334_00003

Eckert & Ziegler
Analytics

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CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82237-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 1-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	5.856E+00	4420-4800	7.540E+04	1.0	1.1	3.0
Pu-239	6.424E+00	4950-5240	2.410E+04	0.9	1.1	2.8
Am-241	5.608E+00	5280-5600	4.326E+02	1.0	1.1	3.0
Total Activity	1.793E+01	3000-8000		0.6	1.1	2.5

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82241-334_00001

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CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82241-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 8-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	6.629E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	6.797E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	6.638E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	2.011E+01	3000-8000		0.4	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82243-334_00001

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CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82243-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 9-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	5.856E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	5.979E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	6.390E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	1.827E+01	3000-8000		0.3	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1966

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82244-334_00001

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CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82244-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 9-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	7.352E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	6.717E+00	4950-5240	2.410E+04	0.9	1.1	2.8
Am-241	6.897E+00	5280-5600	4.326E+02	0.9	1.1	2.8
Total Activity	2.101E+01	3000-8000		0.6	1.1	2.5

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

Ba Carrier_00038

REPORT OF ANALYSIS

Single-Element Aqueous RM

Custom Barium Standard

Product #: 4400-132859

Matrix: 2% HNO_3

Lot #: 10079154-1

Element	Certified Concentration
Ba	20,000 µg/mL

Intended Use: This solution is intended for use as a reference material (RM) or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), flame or furnace atomic absorption spectroscopy (AA or GFAA), and other techniques for elemental analysis.

Certification & Traceability: This RM was manufactured, processed, and/or certified under a quality management system that is registered/accredited to **ISO 9001**, **ISO Guide 34**, and **ISO/IEC 17025**. This RM was prepared to a nominal concentration of 20,000 µg/mL by gravimetric methods using single-element concentrate dissolved in high purity nitric acid (HNO_3) and diluted with filtered (0.22 µm), 18 M-ohm deionized water. The balances used in the preparation of this RM are calibrated regularly with traceability to NIST, using a calibration provider that is accredited to ISO/IEC 17025 by a mutually recognized accreditation body. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentration was determined based upon gravimetric procedures. Secondary verification of the certified concentration was performed using ICP-OES and is traceable to **NIST SRM 3104a**. The uncertainty associated with the certified concentration is ±0.5% relative, which is the sum of the estimated errors due to the purity of the raw materials, the gravimetric preparation of the solution, and transpiration through the container. This represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Instructions for Use: We recommend that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy, the analyst should: (1) use only pre-cleaned containers and transferware, (2) not pipette directly from the RM's original container, (3) never pour used product back into the original container, (4) make dilutions using calibrated balances or certified class A volumetric flasks and pipettes, (5) use a minimum sub-sample size of 500 µL, and (6) dilute with the same matrix as the original RM or other chemically suitable matrix. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or immerse the bottle or its contents, and avoid exposure to direct sunlight or moisture.

Period of Validity: CPI International ensures the accuracy of this solution for **18 months** from the certification date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Chuck Goudreau

Chuck Goudreau, Certifying Officer

May 1, 2018
Certification Date

CPI International waives all responsibility for any damages resulting from the usage and/or implementation of the products/data described herein.

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Reagent

HG CAL_00012

ACCREDITED
Reference Materials Producer
Cert #2495.01

SPEXertificate®

Certificate of Reference Material

ilac-MRA ACCREDITED
Chemical Testing
Cert #2495.02

Catalog Number: PLHG2-1Y **Lot No.** 23-116HGY

Description: 100 µg/mL Mercury

Matrix: 5% HNO_3

1484756
ID HG CAL_00012
Exp:06/01/19 Prpd:DAS Opn 06/21/18
Hg CAL 100PPM

This **ASSURANCE®** Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 100 µg/mL ±0.5 µg/mL

Certified Value is Traceable to: 3133*

* - indicates NIST SRM † - indicates SPEX CertiPrep CRM (when NIST SRM is not available)

The CRM is prepared gravimetrically using high purity Mercury Metal, Lot# 03141E. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis.

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 100 µg/mL

Method: This value was derived from dilution calculations of a Titrimetry analysis result of a Mercury concentrate. The concentrate was analyzed by EDTA titration using Ammonium Thiocyanate with Ferric Nitrate as indicator.

Instrumental Analysis by ICP Spectrometer: 100 µg/mL

Uncertified Properties

Density: 1.024 g/mL @ 20.0°C

Trace Metallic Impurities in the Actual Solution via ICP-MS Analysis:

Element	µg/mL	Element	µg/mL	Element	µg/mL	Element	µg/mL	Element	µg/mL	Element	µg/mL
Ag	<0.001	Cr	<0.001	Ho	<0.001	Nb	<0.001	Ru	<0.001	Th	<0.001
Al	<0.001	Cs	<0.001	In	<0.001	Nd	<0.001	Sb	<0.001	Ti	<0.001
As	<0.001	Cu	<0.001	Ir	<0.001	Ni	<0.001	Sc	<0.001	Tl	<0.001
Au	<0.01	Dy	<0.001	K	0.02	P	<0.1	Se	<0.02	Tm	<0.001
B	<0.002	Er	<0.001	La	<0.001	Pb	<0.001	Si	<0.2	U	<0.001
Ba	<0.001	Eu	<0.001	Li	<0.001	Pd	<0.01	Sm	<0.001	V	<0.001
Be	<0.001	Fe	0.002	Lu	<0.001	Pr	<0.001	Sn	<0.001	W	<0.001
Bi	<0.001	Ga	<0.001	Mg	<0.01	Pt	<0.001	Sr	<0.001	Y	<0.001
Ca	0.01	Gd	<0.001	Mn	<0.001	Rb	<0.001	Ta	<0.001	Yb	<0.001
Cd	<0.001	Ge	<0.001	Mo	<0.001	Re	<0.001	Tb	<0.001	Zn	0.003
Ce	<0.001	Hf	<0.001	Na	0.01	Rh	<0.001	Te	<0.001	Zr	<0.001
Co	<0.001										

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32867 and others. This CRM is guaranteed stable and accurate to +/- 0.5% of the certified value. This includes uncertainty components due to preparation, homogeneity by the most precise method, and short-term and long-term stability. This guarantee is valid for a period of one year from the date of certification only when the material is unopened and stored under ambient laboratory conditions.

Date of Certification: JUN - - 2018 Certifying Officer: Kathleen Cullen

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Report of Certification

This Certified Reference Material (CRM) has been prepared and certified under an ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 quality system consistent with the following guides:

- ISO 9001: Quality management systems – Requirements – certified by UL-DQS
- ISO 17025: General requirements for the competence of testing and calibration laboratories – accredited by A2LA
- ISO Guide 34: General requirements for the competence of reference material producers – accredited by A2LA
- ISO Guide 31: Reference Materials – Contents of certificates and labels
- ISO Guide 35: Reference Materials – General & Statistical Principals for Certification
- Guide To The Expression Of Uncertainty In Measurement 1997
- EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
- ASTM Guide D6362-98
- NIST Technical Note 1297
- ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
- ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

Instructions for Use:

Primary usage of this CRM is in neat form or diluted serially with matrix of a purity at or greater than the purity of the original matrix solution. If dilution is required the diluent must be compatible with all certified analytes and contain stabilizers appropriate for the period of intended use. The CRM can also be used as a spike or with a spike, again with appropriate compatibility considerations. All solutions should be thoroughly mixed, by shaking, prior to use and never pipetted directly from the bottle. All surfaces that come in contact with the solution must be thoroughly cleaned and leached prior to use. Dilutions should be performed only with Class A volumetric glassware.

Method of Preparation:

Clean laboratory procedures and techniques have been used throughout the preparation. All materials, equipment, analytical instrumentation and personnel have been qualified prior to use. The highest purity acids applicable, 18 megohm, double deionized water, acid-leached triple-rinsed bottles (where appropriate), and Class A/calibrated volumetrics have been used in all preparations.

Homogeneity:

The homogeneity of the CRM has been confirmed by procedures consistent with ISO 17025:2005, ISO Guide 34:2009, and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed to prove homogeneity in accordance with our internal procedure 4600-HOMOGEN-1A. Since the product is highly homogeneous, any sample size taken for analysis would be within the uncertainty budget. This is consistent with the intended use of the CRM.

Statistical Estimator and Confidence Limits:

The certified value 'X' listed on the reverse of this document is at the 95% level of confidence and can be expressed as:

- $X = x \pm U$ where X = certified value, U = expanded uncertainty, x = property value
- $U = ku_c$ where $k = 2$ is the coverage factor at the 95% confidence level
- u_c is obtained by combining the individual element standard uncertainty components u_i, and $u_c = \sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from the Traveler Report (SPEX CertiPrep's traceability documentation) identified by the lot number of this CRM. During the stated period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

Legal Notice:

SPEX CertiPrep reference materials are not for any cosmetic, drug or household application and are to be used only by qualified individuals who are trained in appropriate procedures. No claims against SPEX CertiPrep, LLC of any kind whatsoever, whether based on breach of warranty, alleged negligence, or otherwise, with respect to this Reference Material shall be greater than the purchase price. In no event shall SPEX CertiPrep, LLC be liable for any loss of profits or any incidental, special, or consequential damages.

SPEX CertiPrep®
Your Science is Our Passion®

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Reagent

HG QC_00009

INORGANIC VENTURES

CERTIFICATE of ANALYSIS

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 863.01 ACCREDITED Reference Material Producer Certificate 863.02

2.0 PRODUCT DESCRIPTION

1484757
ID: HG QC_00009
Exp:06/21/19 Prpd:DAS Opn:06/21/18
HG QC 100PPM

Product Code:	Single Analyte Mass Spec Solution
Catalog Number:	MSHGN-100PPM
Lot Number:	N2-HG667900
Matrix:	10% (v/v) HNO3
Value / Analyte(s):	100 µg/mL ea: Mercury
Starting Material:	Hg Metal
Starting Material Lot#:	1780
Starting Material Purity:	99.9965%

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 100.11 ± 0.53 µg/mL

Density: 1.050 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Hg	ICP Assay	3133	061204
Hg	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2 (u_{char\ a})^2 + (w_b)^2 (u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

M	Ag	<	0.000604	M	Eu	<	0.000201	O	Na		0.000742	M	Se	<	0.005040	O	Zn	<	0.000591
O	Al		0.000387	O	Fe		0.000015	O	Nb		0.000727	O	Si		0.000755	M	Zr		0.000014
M	As	<	0.001008	M	Ga	<	0.000201	M	Nd	<	0.000201	M	Sm	<	0.000201				
O	Au	<	0.003207	M	Gd	<	0.000201	O	Ni	<	0.001318	M	Sn	<	0.000403				
O	B		0.000688	M	Ge	<	0.001209	M	Os	<	0.000201	O	Sr	<	0.000558				
O	Ba	<	0.000853	M	Hf	<	0.000201	O	P	<	0.021340	M	Ta	<	0.000201				
M	Be	<	0.000604	s	Hg	<		M	Pb	<	0.000201	M	Tb	<	0.000201				
M	Bi	<	0.001613	M	Ho	<	0.000201	M	Pd	<	0.001209	M	Te	<	0.001613				
O	Ca		0.000111	M	In	<	0.000201	M	Pr	<	0.000201	M	Th	<	0.000201				
M	Cd	<	0.001209	M	Ir	<	0.000201	M	Pt	<	0.000201	M	Ti	<	0.001008				
M	Ce	<	0.000403	O	K		0.000088	M	Rb	<	0.000201	O	Tl	<	0.019206				
M	Co	<	0.000201	M	La	<	0.000201	M	Re	<	0.000604	M	Tm	<	0.000201				
O	Cr	<	0.001666	O	Li	<	0.000242	M	Rh	<	0.000201	M	U	<	0.002822				
M	Cs	<	0.000403	M	Lu	<	0.000201	M	Ru	<	0.000201	M	V	<	0.000604				
M	Cu	<	0.000604	O	Mg		0.000024	O	S	<	0.012481	M	W	<	0.000403				
M	Dy	<	0.000201	O	Mn	<	0.001280	M	Sb	<	0.002016	M	Y	<	0.000201				
M	Er	<	0.000201	O	Mo	<	0.001525	M	Sc	<	0.000403	M	Yb	<	0.000201				

M - Checked by ICP-MS O - Checked by ICP-OES i - Spectral Interference
n - Not Checked For s - Solution Standard Element

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit www.inorganicventures.com/TCT

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 200.59 +2 4 Hg(OH)(aq) 1+
Chemical Compatibility - Stable in HNO3. Avoid basic media forming insoluble carbonate. The sulfide, basic carbonate, oxalate, phosphate, arsenite, arsenate and iodide are insoluble in water.
Stability - 2-100 ppb levels not stable in 1% HNO3 / LDPE container, stable in 10% HNO3 packaged in borosilicate glass. 1-100 ppm levels stable in 7% HNO3 packaged in borosilicate glass. 1000-10,000 ppm solutions are chemically stable for years in 5-10% HNO3 / LDPE container.
Hg Containing Samples (Preparation and Solution) - Metal (soluble in HNO3); Oxide (Soluble in HNO3); Ores and Organic based (The literature has more references to the preparation of Hg containing samples than any other element. Please consult the literature for your specific sample type, since such preparations are prone to error. Or e-mail our technical staff and we will contact you to discuss your particular sample preparation questions in further detail.).
Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	**Estimated D.L.**	**Order**	**Interferences** (underlined indicates severe)
ICP-MS 202 amu	9 ppt	n/a	186W16O
ICP-OES 184.950 nm	0.03 / 0.005 µg/mL	1	
ICP-OES 194.227 nm	0.03 / 0.005 µg/mL	1	V
ICP-OES 253.652 nm	0.1 / 0.03 µg/mL	1	Ta, Co, Th ,Rh , Fe, U

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.3 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone 800.669.6799; 540.585.3030, Fax: 540.585.3012, inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

May 25, 2018

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- May 25, 2022

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: 6/21/18

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Michael J Booth

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Paul R Gaines

Reagent

IC 2nd Source_00012

HIGH-PURITY STANDARDS
www.highpuritystandards.com

1454841
ID: IC 2nd Source_00012
Exp:03/31/19 Prpd:JCB Opn:05/22/18
IC 2nd Source

P.O. Box 41727
Charleston, SC 29423
Phone (843) 767-7900
Fax (843) 767-7906

Certificate of Analysis

Certified Reference Material

ISO Guide 34:2009 (RMP) Accreditation
Certificate Number AR-1436

ISO/IEC 17025:2005 Accreditation
Certificate Number AT-1529

Product Description:

Part Number: **SM-606-138**
Lot Number: **1806639**
Matrix: H_2O
Purity: 98.5+%

Certified Values:

Component	Certified Value (mg/L)	NIST SRM ID	NIST SRM Lot #
Bromide	5.00 ± 0.05	3184	151130
Chloride	5.00 ± 0.05	3182	060925
Fluoride	2.50 ± 0.03	3183	140203
NO_3 as N	1.00 ± 0.01	3185	050517
Phosphate	20.0 ± 0.2	*	
Sulfate	20.0 ± 0.2	3181	080603

Certified values are based on gravimetric and volumetric preparation, and verified against NIST SRM 3100 series when available via ion chromatography (IC) and/or inductively coupled plasma optical emission spectrometry (ICP-OES) using an internal laboratory-developed method. The uncertainty in the certified value is calculated for a 95% confidence interval and coverage factor k is about 2.

* Refer to Traceability Information, Section d

Packaging and Storage Conditions:

The standard is packaged in a pre-cleaned polyethylene bottle. To maintain the integrity of this product, the solution should be kept tightly capped and stored under normal laboratory conditions.

Expiration Information:

The expiry date is guaranteed to be valid for twelve months from the shipping date provided and is guaranteed through the month of expiration. For this reason, standards from the same lot may have different expiration dates.

Shipped Date: **March 2018**

Certificate Issue Date: March 8, 2018

Moven Mututuvari
Moven Mututuvari PhD., Laboratory Manager

Preparation Information:

The Certified Reference Material (CRM) is generally prepared from single element standard solutions that are ISO Guide 34 certified reference materials and manufactured under appropriate laboratory conditions using the methods developed at NIST for SRM Spectrometric Standard Solutions. The matrix is as noted above in 18 megaohm deionized water.

Stability of this product is based upon rigorous short term and long term testing of the solution for the certified value. This testing includes, but is not limited to, the effect of temperature and packaging on the product. If during the period of validity, a recall is instituted due to substantial changes in the stability of this product, the purchaser will be notified.

Homogeneity:

This product is determined to be homogeneous following in-house procedures developed in accordance with the requirements of ISO Guide 34 and ISO Guide 35.

Intended Use:

This product is intended for use as a calibration standard, quality control standard, and/or for the validation of analytical methods.

Traceability Information:

The traceability of this standard is maintained through an unbroken chain of comparisons to appropriate standards with suitable procedure and measurement uncertainties. The maintenance of the base and derived units of International System of Units (SI) with traceability of measurement results (contemporary metrology) to SI ensures their comparability over time as follows.

a. **Standard Weight and Analytical Balance**
The standard weights (NBS weights Inventory No 20231A) are calibrated every two years by South Carolina Metrology Laboratory that is a participant in "NIST Weights and Measures Measurement Assurance Program" with a certificate of measurement traceability to NIST primary standards.
The balances are calibrated yearly by the ISO 17025 accredited metrology service, and are verified weekly by an in-house method using standard weights.

b. **Volumetric Device**
The calibration of volumetric vessels is checked annually using the ASTM method E542.

c. **Thermometer**
The standard thermometers are calibrated every year by the ISO 17025 accredited metrology service. The thermometers used in-house are verified against the standard thermometers yearly.

d. **Calibration Standards**
The Calibration Standard is traceable to SRM 3100 Series Spectrometric Standard Solutions. If a SRM is not available, a second source standard or independent lot is used.

Refer to Safety Datasheet (SDS) for hazardous information.

NOTICE: HPS products are intended for laboratory use only. All products should be handled and used by trained professional personnel. The responsibility for the safe handling and use of these products rests solely with the buyer and/or user. The data and information as stated was furnished by the manufacturer of the product. The information provided in this certificate pertains only to the lot number specified. None of the information provided in this certificate may be used, reproduced or transmitted in any form or by any means without written approval from High Purity Standards.

Reagent

IC Cal High_00059

INORGANIC VENTURES
300 Technology Drive
Christiansburg, VA 24073 - USA
inorganicventures.com

CERTIFICATE OF ANALYSIS

tel: 800.669.6729 - 540.585.3030
fax: 540.585.3012
info@inorganicventures.com

1492393
ID: IC Cal High_00059
Exp:06/28/19 Prpd:JCB Opn:06/28/18
IC Cal High

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01
ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Ion Chromatography Solution
Catalog Number:	STL-CAL-HIGH
Lot Number:	M2-MEB661096
Matrix:	H2O
Value / Analyte(s):	20 000 µg/L ea: o-Phosphate, Sulfate, 5 000 µg/L ea: Bromide, Chloride, 2 500 µg/L ea: Fluoride, 1 000 µg/L ea: Nitrate as N, 400 µg/L ea: Nitrite as N

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Bromide, Br	5 000 ± 26 µg/L	Chloride, Cl	5 000 ± 22 µg/L
Fluoride, F-	2 500 ± 11 µg/L	Nitrate as N, NNO3-	1 000 ± 5 µg/L
Nitrite as N, NNO2-	400.0 ± 3.4 µg/L	o-Phosphate, PO4	20 000.0 ± 90.0 µg/L
Sulfate, SO4	20 000.0 ± 90.0 µg/L		

Density: 0.998 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Br	IC Assay	3184	020701
Br	Volhard	999c	999c
Cl	IC Assay	3182	060925
Cl	Volhard	999c	999c
F-	IC Assay	3183	050721
F-	Calculated		See Sec. 4.2
NNO3-	IC Assay	3185	050517
NNO3-	Calculated		See Sec. 4.2
NNO2-	Calculated	8040	8040
NNO2-	IC Assay		traceable to 40h
PO4	IC Assay	3186	090723
SO4	IC Assay	3181	080603
SO4	Calculated		See Sec. 4.2

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\,(u_{char\ a})^2 + (w_b)^2\,(u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 CHROMATOGRAM

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

August 24, 2017

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- August 24, 2020

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

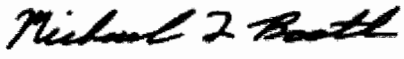
- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control



Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Reagent

IC Cal Low_00009

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CERTIFICATE OF ANALYSIS

1364880

ID: IC Cal Low_00009
Exp:01/23/19 Prpd:JCB Opn:01/23/18
IC Cal Low

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 853.01 ACCREDITED Reference Material Producer Certificate 853.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Ion Chromatography Solution
Catalog Number:	STL-CAL-LOW
Lot Number:	N2-MEB664662
Matrix:	H2O
Value / Analyte(s):	10 000 µg/L ea: o-Phosphate, Sulfate, 5 000 µg/L ea: Bromide, 4 000 µg/L ea: Chloride, 2 000 µg/L ea: Fluoride, 400 µg/L ea: Nitrate as N, Nitrite as N

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Bromide, Br	5 001 ± 30 µg/L	Chloride, Cl	4 002 ± 17 µg/L
Fluoride, F-	2 000 ± 10 µg/L	Nitrate as N, NNO3-	400.0 ± 2.0 µg/L
Nitrite as N, NNO2-	399.9 ± 3.1 µg/L	o-Phosphate, PO4	10 000.0 ± 40.0 µg/L
Sulfate, SO4	9 990.0 ± 50.0 µg/L		

Density: 0.999 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Br	IC Assay	3184	020701
Br	Volhard	999b	999b
Cl	IC Assay	3182	060925
Cl	Volhard	999c	999c
F-	IC Assay	3183	050721
NNO3-	Calculated		See Sec. 4.2
NNO2-	Calculated	traceable to 8040	SRM 8040
NNO2-	IC Assay		traceable to 40h new
PO4	IC Assay	3186	090723
SO4	IC Assay	3181	080603
SO4	Calculated		See Sec. 4.2

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2 (u_{char\ a})^2 + (w_b)^2 (u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 CHROMATOGRAM

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

January 16, 2018

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- January 16, 2021

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

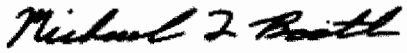
- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control



Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Reagent

IC MS Soln_00010

INORGANIC VENTURES
300 Technology Drive
Christiansburg, VA 24073 - USA
inorganicventures.com

CERTIFICATE OF ANALYSIS

tel: 888.662.6729 - 540.260.0030
fax: 540.260.0032
email: orders@inorganicventures.com

1370921

ID: IC MS Soln_00010

Exp:01/31/19 Prpd:JCB Opn:01/31/18

IC MS Solution

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 863.01 ACCREDITED Reference Material Producer Certificate 863.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Ion Chromatography Solution
Catalog Number:	STLMO-MS-1
Lot Number:	N2-MEB664708
Matrix:	H2O
Value / Analyte(s):	200 µg/mL ea: o-Phosphate, Sulfate, 100 µg/mL ea: Bromide, Chloride, Fluoride, 20 µg/mL ea: Nitrate as N, 5 µg/mL ea: Nitrite as N

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Bromide, Br	**100.0 ± 0.5 µg/mL**	**Chloride, Cl**	**100.0 ± 0.5 µg/mL**
Fluoride, F-	**100.0 ± 0.4 µg/mL**	**Nitrate as N, NNO3-**	**19.99 ± 0.09 µg/mL**
Nitrite as N, NNO2-	**5.000 ± 0.026 µg/mL**	**o-Phosphate, PO4**	**200.0 ± 0.9 µg/mL**
Sulfate, SO4	**200.0 ± 1.0 µg/mL**		

Density: 0.999 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Br	IC Assay	3184	020701
Br	Volhard	999c	999c
Cl	IC Assay	3182	060925
Cl	Fajans	999c	999c
F-	IC Assay	3183	050721
NNO3-	IC Assay	3185	050517
NNO3-	Calculated		See Sec. 4.2
NNO2-	IC Assay		traceable to 40h
PO4	IC Assay	3186	090723
SO4	IC Assay	3181	080603
SO4	Calculated		See Sec. 4.2

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods Characterization of CRM by one method

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2 (u_{char\ a})^2 + (w_b)^2 (u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 CHROMATOGRAM

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

January 19, 2018

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- January 19, 2021

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

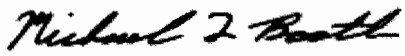
- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control



Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Reagent

ICP CAL A_00006

1474108
ID: ICP CAL A_00006
Exp 06/11/19 Prpd:LKP Opn 06/11/18
ICP CAL A

INORGANIC VENTURES

CERTIFICATE OF ANALYSIS

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01 ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	ICP CAL-A
Lot Number:	M2-MEB661171
Matrix:	15% (v/v) HNO3
Value / Analyte(s):	10 000 mg/L ea:

Iron,	Sodium,	Sulfur,
1 000 mg/L ea:		
Nickel,	Lead,	Strontium,
Thorium,	Uranium,	Vanadium,
Zinc,	Lithium,	Manganese,
Arsenic,	Barium,	Beryllium,
Bismuth,	Cadmium,	Cobalt,
Chromium,	Copper,	
200 mg/L ea:		
Boron,	Thallium,	Selenium,
Silver		

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Arsenic, As	1 000 ± 9 mg/L	Barium, Ba	1 000 ± 4 mg/L
Beryllium, Be	1 000 ± 6 mg/L	Bismuth, Bi	1 000 ± 6 mg/L
Boron, B	200.0 ± 1.2 mg/L	Cadmium, Cd	1 000 ± 4 mg/L
Chromium, Cr	1 000 ± 6 mg/L	Cobalt, Co	1 000 ± 4 mg/L
Copper, Cu	1 000 ± 4 mg/L	Iron, Fe	10 000.0 ± 40.0 mg/L
Lead, Pb	1 000 ± 5 mg/L	Lithium, Li	996 ± 4 mg/L
Manganese, Mn	1 000 ± 4 mg/L	Nickel, Ni	1 000 ± 4 mg/L
Selenium, Se	200.0 ± 1.3 mg/L	Silver, Ag	200.0 ± 0.8 mg/L
Sodium, Na	10 000.0 ± 40.0 mg/L	Strontium, Sr	1 000 ± 4 mg/L
Sulfur, S	10 000.0 ± 50.0 mg/L	Thallium, Tl	200.0 ± 1.3 mg/L
Thorium, Th	1 000 ± 5 mg/L	Uranium, U	1 000 ± 7 mg/L
Vanadium, V	1 000 ± 4 mg/L	Zinc, Zn	1 000 ± 4 mg/L

Density: 1.174 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ag	ICP Assay	3151	992212
Ag	Volhard	999c	999c
As	ICP Assay	3103a	100818
B	ICP Assay	3107	110830
Ba	ICP Assay	3104a	070222
Ba	Gravimetric		See Sec. 4.2
Be	ICP Assay	3105a	090514
Bi	ICP Assay	3106	991212
Bi	Calculated		See Sec. 4.2
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Co	ICP Assay	3113	000630 Co
Co	EDTA	928	928
Cr	ICP Assay	3112a	030730Cr3
Cu	ICP Assay	3114	121207
Cu	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928
Li	ICP Assay	3129a	100714
Li	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	ICP Assay	3152a	120715
Na	Gravimetric		See Sec. 4.2
Ni	ICP Assay	3136	120619
Ni	EDTA	928	928
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
S	Potentiometric	84L	84L
Se	ICP Assay	3149	100901
Sr	EDTA	928	928
Sr	ICP Assay	3153a	990906
Th	EDTA	928	928
Tl	ICP Assay	3158	993012
U	ICP Assay	3164	891509
U	Calculated		See Sec. 4.2
V	EDTA	928	928
V	ICP Assay	3165	992706
Zn	ICP Assay	3168a	120629
Zn	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\,(u_{char\ a})^2 + (w_b)^2\,(u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Certified Abundance:

IV's Certified Abundance

Isotope	Atom %
Uranium 238U	99.6 ± 0.1
Uranium 235U	0.42 ± 0.05

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Uranium Note: If uranium is present in this standard, it is natural abundance unless specified in Section 3

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA: Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012, inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

August 29, 2017

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **August 29, 2020**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Reagent

ICP CAL B_00004

1474107
ID: ICP CAL B_00004
Exp:06/11/19 Prpd:LKP Opn:06/11/18
ICP CAL B

INORGANIC VENTURES

CERTIFICATE OF ANALYSIS

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 863.01 ACCREDITED Reference Material Producer Certificate 863.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	ICP CAL-B
Lot Number:	M2-MEB661174
Matrix:	5% (v/v) HNO3
Value / Analyte(s):	10 000 mg/L ea: Aluminum, Calcium, Potassium, Magnesium, Phosphorus

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Aluminum, Al	10 000.0 ± 30.0 mg/L	Calcium, Ca	10 000.0 ± 40.0 mg/L
Magnesium, Mg	10 000.0 ± 40.0 mg/L	Phosphorus, P	10 000.0 ± 40.0 mg/L
Potassium, K	10 000.0 ± 40.0 mg/L		

Density: 1.185 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Al	ICP Assay	3101a	140903
Al	EDTA	928	928
Ca	ICP Assay	3109a	130213
Ca	EDTA	928	928
K	ICP Assay	3141a	140813
K	Gravimetric		See Sec. 4.2
Mg	ICP Assay	3131a	050302
Mg	EDTA	928	928
P	ICP Assay	3139a	060717
P	Acidimetric		traceable to 84L

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\,(u_{char\ a})^2 + (w_b)^2\,(u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

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u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

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$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

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$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

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4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA, Telephone: 800 669 6799, 540 585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

August 29, 2017

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **August 29, 2020**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

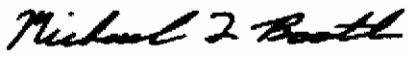
- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control



Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Reagent

ICP CAL C_00004

1474106

ID ICP CAL C_00004

Exp:06/11/19 Prpd:LKP Opn:06/11/18

ICP CAL C

INORGANIC VENTURES

CERTIFICATE OF ANALYSIS

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ACCREDITED Testing Laboratory Certificate 883.01 ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	ICP CAL-C
Lot Number:	M2-MEB661175
Matrix:	5% (v/v) HNO3 2.5% (v/v) HF
Value / Analyte(s):	1 000 mg/L ea: Silicon, Tin, Titanium, 200 mg/L ea: Molybdenum, Antimony

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Antimony, Sb	200.0 ± 1.4 mg/L	Molybdenum, Mo	200.0 ± 0.9 mg/L
Silicon, Si	1 000 ± 7 mg/L	Tin, Sn	1 000 ± 4 mg/L
Titanium, Ti	1 000 ± 6 mg/L		

Density: 1.039 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Mo	ICP Assay	3134	130418
Mo	Calculated		See Sec. 4.2
Sb	ICP Assay	3102A	061229
Si	ICP Assay	3150	130912
Sn	ICP Assay	3161a	070330
Sn	Calculated		See Sec. 4.2
Ti	ICP Assay	3162a	130925

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods Characterization of CRM by one method

Characterization of CRM/RM by Two Methods

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$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\,(u_{char\ a})^2 + (w_b)^2\,(u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

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u_{ts} = transport stability standard uncertainty

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Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

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u_{bb} = bottle to bottle homogeneity standard uncertainty

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u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

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4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

HF Note: This standard should not be prepared or stored in glass.

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

August 29, 2017

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **August 29, 2020**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

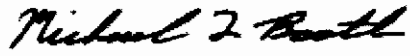
- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control



Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Reagent

ICP ICSA A_00003

INORGANIC VENTURES

CERTIFICATE OF ANALYSIS

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01 ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	ICP ICSA-A
Lot Number:	N2-MEB666538
Matrix:	5% (v/v) HNO3
Value / Analyte(s):	20 000 mg/L ea: Aluminum, Iron

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Aluminum, Al	20 000.0 ± 70.0 mg/L	Iron, Fe	20 000.0 ± 80.0 mg/L

Density: 1.219 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Al	ICP Assay	3101a	140903
Al	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\,(u_{char\ a})^2 + (w_b)^2\,(u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

March 20, 2018

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **March 20, 2021**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Reagent

ICP ICSA B_00003

INORGANIC VENTURES

CERTIFICATE OF ANALYSIS

1.0 ACCREDITATION / REGISTRATION

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ACCREDITED Testing Laboratory Certificate 883.01 ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	ICP ICSA-B
Lot Number:	N2-MEB666539
Matrix:	5% (v/v) HNO3
Value / Analyte(s):	20 000 mg/L ea: Calcium, Potassium, Sodium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Calcium, Ca	20 000.0 ± 80.0 mg/L	Potassium, K	20 000.0 ± 70.0 mg/L
Sodium, Na	20 000.0 ± 70.0 mg/L		

Density: 1.164 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ca	ICP Assay	3109a	130213
Ca	EDTA	928	928
K	ICP Assay	3141a	140813
K	Gravimetric		See Sec. 4.2
Na	ICP Assay	3152a	120715
Na	Gravimetric		See Sec. 4.2

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\ (u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\ (u_{char\ a})^2 + (w_b)^2\ (u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\ (u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

March 20, 2018

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **March 20, 2021**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Reagent

ICP ICSA C_00003

INORGANIC VENTURES

CERTIFICATE OF ANALYSIS

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01
ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	ICP ICSA-C
Lot Number:	N2-MEB666542
Matrix:	5% (v/v) HNO3
Value / Analyte(s):	20 000 mg/L ea: Magnesium, Phosphorus

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Magnesium, Mg	20 000.0 ± 80.0 mg/L	Phosphorus, P	20 000.0 ± 100.0 mg/L

Density: 1.146 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Mg	ICP Assay	3131a	050302
Mg	EDTA	928	928
P	ICP Assay	3139a	060717
P	Acidimetric	84L	84L

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\,(u_{char\ a})^2 + (w_b)^2\,(u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

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u_{bb} = bottle to bottle homogeneity standard uncertainty

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u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

March 20, 2018

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **March 20, 2021**

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- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Michael J Booth

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Paul R Gaines

Reagent

ICP ICSAB A_00003

1410355
ID: ICP ICSAB A_00003
Exp:03/26/19 Prpd:LKP Opn:03/26/18
ICP ICSAB A

INORGANIC VENTURES

CERTIFICATE OF ANALYSIS

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ACCREDITED Testing Laboratory Certificate 863.01
ACCREDITED Reference Material Producer Certificate 863.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	ICP ICSAB-A
Lot Number:	N2-MEB666540
Matrix:	7% (v/v) HNO3
Value / Analyte(s):	500 mg/L ea:

Barium,	Beryllium,	Bismuth,
Cadmium,	Cobalt,	Chromium,
Copper,	Lithium,	Manganese,
Nickel,	Lead,	Arsenic,
Strontium,	Thorium,	Uranium,
Vanadium,	Zinc,	
100 mg/L ea:		
Silver,	Thallium,	Boron,
Selenium		

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Arsenic, As	500.0 ± 4.3 mg/L	Barium, Ba	500.0 ± 2.1 mg/L
Beryllium, Be	500.1 ± 2.8 mg/L	Bismuth, Bi	500.1 ± 3.1 mg/L
Boron, B	100.0 ± 0.6 mg/L	Cadmium, Cd	500.1 ± 2.1 mg/L
Chromium, Cr	500.0 ± 2.9 mg/L	Cobalt, Co	500.0 ± 2.4 mg/L
Copper, Cu	500.3 ± 2.1 mg/L	Lead, Pb	500.1 ± 2.2 mg/L
Lithium, Li	500.0 ± 2.1 mg/L	Manganese, Mn	500.1 ± 2.0 mg/L
Nickel, Ni	500.3 ± 2.2 mg/L	Selenium, Se	100.1 ± 0.6 mg/L
Silver, Ag	100.0 ± 0.4 mg/L	Strontium, Sr	500.0 ± 2.0 mg/L
Thallium, Tl	100.0 ± 0.5 mg/L	Thorium, Th	500.0 ± 2.5 mg/L
Uranium, U	500.1 ± 2.8 mg/L	Vanadium, V	500.0 ± 2.1 mg/L
Zinc, Zn	500.2 ± 2.1 mg/L		

Density: 1.070 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ag	ICP Assay	3151	992212
Ag	Volhard	999c	999c
As	ICP Assay	3103a	100818
B	ICP Assay	3107	110830
Ba	ICP Assay	3104a	070222
Ba	Gravimetric		See Sec. 4.2
Be	ICP Assay	3105a	090514
Bi	ICP Assay	3106	991212
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Co	ICP Assay	3113	000630 Co
Co	EDTA	928	928
Cr	ICP Assay	3112a	030730Cr3
Cu	ICP Assay	3114	121207
Cu	EDTA	928	928
Li	ICP Assay	3129a	100714
Li	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Ni	ICP Assay	3136	120619
Ni	EDTA	928	928
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
Se	ICP Assay	3149	100901
Se	Calculated		See Sec. 4.2
Sr	EDTA	928	928
Sr	ICP Assay	3153a	990906
Th	EDTA	928	928
Tl	ICP Assay	3158	993012
Tl	Calculated		See Sec. 4.2
U	ICP Assay	3164	080521
U	Calculated		See Sec. 4.2
V	EDTA	928	928
V	ICP Assay	3165	992706
Zn	ICP Assay	3168a	120629
Zn	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods Characterization of CRM by one method

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2 (u_{char\ a})^2 + (w_b)^2 (u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Certified Abundance:

IV's Certified Abundance

Isotope	Atom %
Uranium 238U	99.7 ± 0.1
Uranium 235U	0.28 ± 0.05

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Uranium Note: If uranium is present in this standard, it is natural abundance unless specified in Section 3

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

March 20, 2018

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **March 20, 2021**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Reagent

ICP ICSAB B_00003

INORGANIC VENTURES

CERTIFICATE of ANALYSIS

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01
ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	ICP ICSAB-B
Lot Number:	N2-MEB666541
Matrix:	5% (v/v) HNO3 tr. HF
Value / Analyte(s):	500 mg/L ea: Silicon, Tin, Titanium, 100 mg/L ea: Molybdenum, Antimony

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Antimony, Sb	100.0 ± 0.6 mg/L	Molybdenum, Mo	100.0 ± 0.5 mg/L
Silicon, Si	499.9 ± 3.2 mg/L	Tin, Sn	500.2 ± 1.9 mg/L
Titanium, Ti	500.0 ± 3.0 mg/L		

Density: 1.030 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Mo	ICP Assay	3134	130418
Sb	ICP Assay	3102a	140911
Si	ICP Assay	3150	130912
Sn	ICP Assay	3161a	070330
Sn	Calculated		See Sec. 4.2
Ti	ICP Assay	3162a	130925

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2 (u_{char\ a})^2 + (w_b)^2 (u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

HF Note: This standard should not be prepared or stored in glass.

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

March 20, 2018

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- March 20, 2021

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Reagent

ICP ICV 1_00005

Reference Materials Producer
Cert #2495.01

SPEXertificate®

Certificate of Reference Material

Chemical Testing
Cert #2495.02

Catalog Number: ZITMO-55-250 **Lot No.** 2-200SG
Description: Custom Claritas Standard
Matrix: 5% HNO_3

1487731
ID: ICP ICV 1_00005
Exp:06/25/19 Prpd:SFF Opn:06/25/18
ICP ICV 1

This **CLARITAS PPT®** Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

The CRM is prepared from high purity single element concentrates of individual elements using Class A laboratory ware to give precise concentrations.

Instrumental Analysis by ICP Spectrometer:

Analyte	Labeled	Uncertainty	SRM	Analyte	Labeled	Uncertainty	SRM
Al	10000 µg/mL	±200 µg/mL	3101a*	Fe	10000 µg/mL	±200 µg/mL	3126a*
Ca	10000 µg/mL	±200 µg/mL	3109a*	Mg	10000 µg/mL	±200 µg/mL	3131a*

* - indicates NIST SRM † - indicates SPEX CertiPrep CRM (when NIST SRM is not available)

SPEX CertiPrep Reference Multi: Lot# ALL8

Trace Metallic Impurities in the Actual Solution via ICP-MS Analysis:

Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L
Ag	<2	Cs	<0.4	In	<1	Ni	75	Sc	<2	Ti	130
As	5	Cu	40	Ir	<1	P	<1000	Se	<100	Tl	<4
Au	<4	Dy	<0.2	K	130	Pb	3	Si	200	Tm	0.05
B	<100	Er	<0.01	La	8	Pd	<3	Sm	<0.1	U	0.3
Ba	10	Eu	<0.08	Li	<80	Pr	1	Sn	<2	V	<0.6
Be	<5	Ga	3	Lu	<0.2	Pt	2	Sr	150	W	<4
Bi	0.8	Gd	1	Mn	500	Rb	<0.9	Ta	<4	Y	0.6
Cd	<3	Ge	<100	Mo	<8	Re	<0.3	Tb	0.2	Yb	<0.1
Ce	20	Hf	1	Na	80	Rh	<10	Te	<2	Zn	50
Co	22	Hg	10	Nb	<3	Ru	<3	Th	<4	Zr	<20
Cr	40	Ho	<0.04	Nd	2	Sb	30				

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable and accurate to ±2% of the labeled value. This includes uncertainty components due to preparation, measurement, homogeneity, and short-term and long-term stability. This guarantee is valid for a period of one year from the date of certification only when the material is kept tightly capped and stored under ambient laboratory conditions.

Date of Certification: JUN - - 2018

Certifying Officer: Katherine Cullinan, QC Manager

© 2018 SPEX CertiPrep, LLC

Reagent

ICP ICV 2_00006

Reference Materials Producer
Cert #2495.01

SPEXertificate®

Certificate of Reference Material

Chemical Testing
Cert #2495.02

Catalog Number: ZITMO-53A-250 **Lot No.** 2-198SG

Description: Custom Claritas Standard

Matrix: 10% HNO_3 / Tr. Tart. Acid / Tr. HF

1487732

ID: ICP ICV 2_00006
Exp:06/25/19 Prpd:SFF Opn:06/25/18
ICP ICV 2

This **CLARITAS PPT®** Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

The CRM is prepared from high purity single element concentrates of individual elements using Class A laboratory ware to give precise concentrations.

Instrumental Analysis by ICP Spectrometer:

Analyte	Labeled	Uncertainty	SRM	Analyte	Labeled	Uncertainty	SRM
As	1000 µg/mL	±20 µg/mL	3103a*	B	200 µg/mL	±4 µg/mL	3107*
Be	1000 µg/mL	±20 µg/mL	3105a*	Mo	200 µg/mL	±4 µg/mL	3134*
Si	1000 µg/mL	±20 µg/mL	3150*	Sb	200 µg/mL	±4 µg/mL	3102a*
Sn	1000 µg/mL	±20 µg/mL	3161a*	Se	200 µg/mL	±4 µg/mL	3149*
Ti	1000 µg/mL	±20 µg/mL	3162a*				

* - indicates NIST SRM † - indicates SPEX CertiPrep CRM (when NIST SRM is not available)

SPEX CertiPrep Reference Multi: Lot# ALL8

Trace Metallic Impurities in the Actual Solution via ICP-MS Analysis:

Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L
Ag	30	Cs	2	Hg	<6	Na	100	Re	3	Tl	2
Al	70	Cu	10	Ho	<0.1	Nb	3	Rh	<8	Tm	<0.07
Au	<2	Dy	<0.4	In	<200	Nd	<0.3	Ru	<2	U	<0.5
Ba	50	Er	<0.01	Ir	<0.4	Ni	70	Sc	<20	V	<6
Bi	<0.3	Eu	<0.03	K	90	P	<1000	Sm	<0.3	W	20
Ca	40	Fe	5	La	5	Pb	3	Sr	<7	Y	0.3
Cd	40	Ga	0.6	Li	60	Pd	<4	Ta	20	Yb	<0.1
Ce	1	Gd	<0.5	Lu	0.1	Pr	0.3	Tb	0.2	Zn	40
Co	8	Ge	<5	Mg	200	Pt	<0.3	Te	<9	Zr	20
Cr	<10	Hf	0.5	Mn	<3	Rb	<0.6	Th	<0.6		

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable and accurate to ±2% of the labeled value. This includes uncertainty components due to preparation, measurement, homogeneity, and short-term and long-term stability. This guarantee is valid for a period of one year from the date of certification only when the material is kept tightly capped and stored under ambient laboratory conditions.

Date of Certification: JUN - 2018

Certifying Officer: Katherine Cullinan

Katherine Cullinan, QC Manager

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Reagent

ICP ICV 3_00005

Reference Materials Producer
Cert #2495.01

SPEXertificate®

Certificate of Reference Material

Chemical Testing
Cert #2495.02

Catalog Number: ZITMO-54-250 **Lot No.** 2-199SG
Description: Custom Claritas Standard
Matrix: 10% HNO_3

1487733
ID: ICP ICV 3_00005
Exp:06/25/19 Prpd:SFF Opn:06/25/18
ICP ICV 3

This **CLARITAS PPT®** Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

The CRM is prepared from high purity single element concentrates of individual elements using Class A laboratory ware to give precise concentrations.

Instrumental Analysis by ICP Spectrometer:

Analyte	Labeled	Uncertainty	SRM	Analyte	Labeled	Uncertainty	SRM
Ba	1000 µg/mL	±20 µg/mL	3104a*	Pb	1000 µg/mL	±20 µg/mL	3128*
Bi	1000 µg/mL	±20 µg/mL	3106*	Sr	1000 µg/mL	±20 µg/mL	3153a*
Cd	1000 µg/mL	±20 µg/mL	3108*	Th	1000 µg/mL	±20 µg/mL	3159*
Co	1000 µg/mL	±20 µg/mL	3113*	U	1000 µg/mL	±20 µg/mL	3164*
Cr	1000 µg/mL	±20 µg/mL	3112a*	V	1000 µg/mL	±20 µg/mL	3165*
Cu	1000 µg/mL	±20 µg/mL	3114*	Zn	1000 µg/mL	±20 µg/mL	3168a*
Li	1000 µg/mL	±20 µg/mL	3129a*	Ag	200 µg/mL	±4 µg/mL	3151*
Mn	1000 µg/mL	±20 µg/mL	3132*	Tl	200 µg/mL	±4 µg/mL	3158*
Ni	1000 µg/mL	±20 µg/mL	3136*				

* - indicates NIST SRM † - indicates SPEX CertiPrep CRM (when NIST SRM is not available)

SPEX CertiPrep Reference Multi: Lot# ALL8

Trace Metallic Impurities in the Actual Solution via ICP-MS Analysis:

Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L
Al	40	Er	<0.01	In	1	Nd	<3	Ru	<30	Tb	0.08
As	<100	Eu	<1	Ir	<2	P	<1000	Sb	<2	Te	<30
Au	<3	Fe	100	K	130	Pd	<400	Sc	<3	Ti	<40
B	<100	Ga	20	La	10	Pr	0.7	Se	<100	Tm	<0.06
Be	<6	Gd	3	Lu	0.1	Pt	<0.3	Si	<400	W	<3
Ca	300	Ge	<4	Mg	140	Rb	2	Sm	30	Y	20
Ce	20	Hf	<0.3	Mo	<20	Re	<0.07	Sn	<1	Yb	<0.2
Cs	1	Hg	<4	Na	500	Rh	200	Ta	<0.9	Zr	4
Dy	<0.4	Ho	0.09	Nb	4						

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable and accurate to ±2% of the labeled value. This includes uncertainty components due to preparation, measurement, homogeneity, and short-term and long-term stability. This guarantee is valid for a period of one year from the date of certification only when the material is kept tightly capped and stored under ambient laboratory conditions.

Date of Certification: JUN - - 2018

Certifying Officer: Katherine Cullinan, QC Manager

© 2018 SPEX CertiPrep, LLC

Reagent

ICP ICV 4_00004

Reference Materials Producer
Cert #2495.01

SPEXertificate®

Certificate of Reference Material

Chemical Testing
Cert #2495.02

Catalog Number: ZITMO-56-250 **Lot No.** 2-208SG
Description: Custom Claritas Standard
Matrix: 10% HNO_3

1487734
ID: ICP ICV 4_00004
Exp:06/25/19 Prpd:SFF Opn:06/25/18
ICP ICV 4

This **CLARITAS PPT®** Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

The CRM is prepared from high purity single element concentrates of individual elements using Class A laboratory ware to give precise concentrations.

Instrumental Analysis by ICP Spectrometer:

Analyte	Labeled	Uncertainty	SRM	Analyte	Labeled	Uncertainty	SRM
K	10000 µg/mL	±200 µg/mL	3141a*	P	10000 µg/mL	±200 µg/mL	3139a*
Na	10000 µg/mL	±200 µg/mL	3152a*	S	10000 µg/mL	±200 µg/mL	3154*

* - indicates NIST SRM † - indicates SPEX CertiPrep CRM (when NIST SRM is not available)

SPEX CertiPrep Reference Multi: Lot# ALL8

Trace Metallic Impurities in the Actual Solution via ICP-MS Analysis:

Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L
Ag	3	Co	0.6	Hf	0.6	Nb	<0.9	Sb	<0.7	Ti	<20
Al	40	Cr	10	Hg	<4	Nd	3	Sc	<2	Tl	<9
As	<7	Cs	0.3	Ho	<0.04	Ni	8	Se	3	Tm	<0.03
Au	<1	Cu	<8	In	2	Pb	<1	Si	1000	U	<0.3
B	100	Dy	0.7	Ir	<1	Pd	<3	Sm	<0.1	V	<3
Ba	3	Er	<0.1	La	0.05	Pr	0.3	Sn	<7	W	<3
Be	<3	Eu	<0.08	Li	<100	Pt	<0.5	Sr	<0.4	Y	<0.1
Bi	<0.4	Fe	5	Lu	<0.03	Rb	400	Ta	<3	Yb	<0.1
Ca	200	Ga	<0.5	Mg	30	Re	<0.3	Tb	<0.1	Zn	20
Cd	<0.5	Gd	<0.3	Mn	2	Rh	<20	Te	<8	Zr	<20
Ce	<0.1	Ge	<10	Mo	<6	Ru	<0.9	Th	<2		

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable and accurate to ±2% of the labeled value. This includes uncertainty components due to preparation, measurement, homogeneity, and short-term and long-term stability. This guarantee is valid for a period of one year from the date of certification only when the material is kept tightly capped and stored under ambient laboratory conditions.

Date of Certification: JUN - - 2018 Certifying Officer: Katherine Cullinan, QC Manager

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Reagent

ICP LLC A_00007

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01 ACCREDITED Reference Material Producer Certificate 883.02

1409519

ID ICP LLC A_00007

Exp 03/23/19 Prpd SFF Opn 03/23/18

ICP LLC A

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	ICP LLC-A
Lot Number:	M2-MEB661165
Matrix:	5% (v/v) HNO3 tr. HF
Value / Analyte(s):	80 mg/L ea: Silicon, 20 mg/L ea: Tin, 8 mg/L ea: Molybdenum, 4 mg/L ea: Titanium, 2 mg/L ea: Antimony

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Antimony, Sb	**2.000 ± 0.014 mg/L**	**Molybdenum, Mo**	**8.00 ± 0.05 mg/L**
Silicon, Si	**80.0 ± 0.5 mg/L**	**Tin, Sn**	**20.00 ± 0.10 mg/L**
Titanium, Ti	**4.000 ± 0.024 mg/L**		

Density: 1.024 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Mo	ICP Assay	3134	130418
Mo	Calculated		See Sec. 4.2
Sb	ICP Assay	3102a	140911
Sb	Calculated		See Sec. 4.2
Si	ICP Assay	3150	130912
Si	Calculated		See Sec. 4.2
Sn	ICP Assay	3161a	070330
Ti	ICP Assay	3162a	130925
Ti	Calculated		See Sec. 4.2

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\ (u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2 (u_{char\ a})^2 + (w_b)^2 (u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\ (u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

HF Note: This standard should not be prepared or stored in glass.

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

August 29, 2017

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- August 29, 2020

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Michael J Booth

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Paul R Gaines

Reagent

ICP LLC B_00005

INORGANIC VENTURES

CERTIFICATE OF ANALYSIS

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01
ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	ICP LLC-B
Lot Number:	M2-MEB661170
Matrix:	5% (v/v) HNO3
Value / Analyte(s):	1 000 mg/L ea: Potassium, Sulfur, 200 mg/L ea: Sodium, Magnesium, Calcium, 100 mg/L ea: Uranium, 50 mg/L ea: Phosphorus, 40 mg/L ea: Thorium, Bismuth, Aluminum, 20 mg/L ea: Boron, Iron, 10 mg/L ea: Cobalt, Lithium, Barium, Vanadium, 8 mg/L ea: Nickel, 5 mg/L ea: Copper, 4 mg/L ea: Thallium, Zinc, 3 mg/L ea: Selenium, Manganese, 2 mg/L ea: Chromium, Arsenic, Silver, Lead, 1 mg/L ea: Strontium, Cadmium, Beryllium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Aluminum, Al	40.00 ± 0.14 mg/L	Arsenic, As	2.000 ± 0.018 mg/L
Barium, Ba	10.00 ± 0.06 mg/L	Beryllium, Be	1.000 ± 0.006 mg/L
Bismuth, Bi	40.00 ± 0.23 mg/L	Boron, B	20.00 ± 0.14 mg/L
Cadmium, Cd	1.000 ± 0.007 mg/L	Calcium, Ca	200.0 ± 0.9 mg/L
Chromium, Cr	2.000 ± 0.015 mg/L	Cobalt, Co	10.00 ± 0.05 mg/L
Copper, Cu	5.000 ± 0.030 mg/L	Iron, Fe	20.00 ± 0.10 mg/L
Lead, Pb	2.000 ± 0.009 mg/L	Lithium, Li	10.00 ± 0.04 mg/L
Magnesium, Mg	200.0 ± 0.8 mg/L	Manganese, Mn	3.000 ± 0.016 mg/L
Nickel, Ni	8.00 ± 0.05 mg/L	Phosphorus, P	50.00 ± 0.23 mg/L
Potassium, K	1 000 ± 4 mg/L	Selenium, Se	3.000 ± 0.016 mg/L
Silver, Ag	2.000 ± 0.014 mg/L	Sodium, Na	200.0 ± 0.7 mg/L
Strontium, Sr	1.000 ± 0.006 mg/L	Sulfur, S	1 000 ± 5 mg/L
Thallium, Tl	4.000 ± 0.024 mg/L	Thorium, Th	40.00 ± 0.20 mg/L
Uranium, U	100.0 ± 0.5 mg/L	Vanadium, V	10.00 ± 0.06 mg/L
Zinc, Zn	4.000 ± 0.024 mg/L		

Density: 1.033 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ag	ICP Assay	3151	992212
Ag	Volhard	999c	999c
Al	ICP Assay	3101a	140903
Al	EDTA	928	928
As	ICP Assay	3103a	100818
B	ICP Assay	3107	110830
B	Calculated		See Sec. 4.2
Ba	ICP Assay	3104a	140909
Ba	Gravimetric		See Sec. 4.2
Be	ICP Assay	3105a	090514
Bi	ICP Assay	3106	991212
Ca	ICP Assay	3109a	130213
Ca	EDTA	928	928
Cd	ICP Assay	3108	060531
Cd	EDTA	928	928
Co	ICP Assay	3113	000630 Co
Co	EDTA	928	928
Cr	ICP Assay	3112a	030730Cr3
Cu	ICP Assay	3114	121207
Cu	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928
K	ICP Assay	3141a	140813
K	Gravimetric		See Sec. 4.2
Li	ICP Assay	3129a	100714
Li	Gravimetric		See Sec. 4.2
Mg	ICP Assay	3131a	140110
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	ICP Assay	3152a	120715
Na	Gravimetric		See Sec. 4.2
Ni	ICP Assay	3136	120619
Ni	EDTA	928	928
P	ICP Assay	3139a	060717
P	Acidimetric	84L	84L
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
S	ICP Assay	3154	892205
S	Acidimetric		traceable to 84L
Se	ICP Assay	3149	100901
Se	Calculated		See Sec. 4.2
Sr	EDTA	928	928
Sr	ICP Assay	3153a	990906
Th	EDTA	928	928
Th	Calculated		See Sec. 4.2
Tl	ICP Assay	3158	993012
Tl	Calculated		See Sec. 4.2
U	ICP Assay	3164	080521

U	Calculated		See Sec. 4.2
V	EDTA	928	928
V	ICP Assay	3165	992706
Zn	ICP Assay	3168a	120629
Zn	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2 (u_{char\ a})^2 + (w_b)^2 (u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Certified Abundance:

IV's Certified Abundance

Isotope	Atom %
Uranium 238U	99.6 ± 0.1
Uranium 235U	0.37 ± 0.05

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Low Silver Note: This solution contains "LOW" levels of Silver. Please store this entire bottle inside a sealed glass jar.

Uranium Note: If uranium is present in this standard, it is natural abundance unless specified in Section 3

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

August 29, 2017

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **August 29, 2020**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

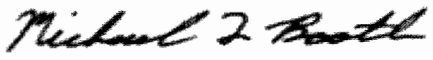
- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control



Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Reagent

K Dichromate_00004

3050 Spruce Street, Saint Louis, MO 63103, USA
Website: www.sigmaaldrich.com
Email USA: techserv@sial.com
Outside USA: eurtechserv@sial.com

Certificate of Analysis

Product Name:
Potassium dichromate - ACS reagent, ≥99.0%

Product Number:	**207802**
Batch Number:	**MKBV0900V**
Brand:	SIAL
CAS Number:	7778-50-9
MDL Number:	MFCD00011367
Formula:	Cr2K2O7
Formula Weight:	294.18 g/mol
Quality Release Date:	07 APR 2015

$K_2Cr_2O_7$

900931
ID: K Dichromate_00004
Exp:05/03/22 Prpd:NPV Opn:05/03/15
Potassium Dichromate Cal

Test	Specification	Result
Appearance (Color) Orange	Conforms to Requirements	Orange
Appearance (Form)	Crystals	Crystals
X-Ray Diffraction	Conforms to Structure	Conforms
Titration by Na2S2O3	≥ 99.0 %	99.0 %
Loss on Drying	≤ 0.05 %	< 0.03 %
Calcium (Ca)	≤ 0.003 %	< 0.001 %
Chloride Content	≤ 0.001 %	< 0.001 %
Iron (Fe)	≤ 0.001 %	< 0.001 %
Insoluble Matter C = 10%, H2O	≤ 0.005 %	< 0.001 %
Sodium (Na)	≤ 0.02 %	< 0.01 %
Sulfate (SO4)	≤ 0.005 %	< 0.005 %
Meets ACS Requirements Tenth Edition	Current ACS Specification	Conforms

Ali Ataei, Manager
Quality Control
Milwaukee, WI US

Sigma-Aldrich warrants, that at the time of the quality release or subsequent retest date this product conformed to the information contained in this publication. The current Specification sheet may be available at Sigma-Aldrich.com. For further inquiries, please contact Technical Service. Purchaser must determine the suitability of the product for its particular use. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Reagent

K-Dichromate_00002

Fisher Scientific

1 Reagent Lane
Fair Lawn, NJ 07410
201.796.7100 tel
201.796.1329 fax

Certificate of Analysis

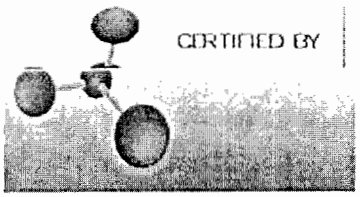
Fisher Scientific's Quality System has been found to conform to Quality Management System Standard ISO9001:2008 standard by SAI Global Certificate Number CERT - 0064970

This is to certify that units of the lot number below were tested and found to comply with the specifications of the grade listed. Certain data have been supplied by third parties. Fisher Scientific expressly disclaims all warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose. Certain products (USP/FCC/NF/EP/BP/JP grades) are sold for use in food, drug, or medical device manufacturing. Fisher does not claim regulatory coverage under 21 CFR nor maintain DMF's with the FDA. The following are the actual analytical results obtained:

Catalog Number	P188	Quality Test / Release Date 5/14/2015	
Lot Number	153492		
Description	POTASSIUM DICHROMATE, A.C.S.		
Country of Origin	United States	* Suggested Retest Date	May-2020
Chemical Origin	Inorganic-non animal		
BSE/TSE Comment	No animal products are used as starting raw material ingredients, or used in processing, including lubricants, processing aids, or any other material that might migrate to the finished product.		

Result name	Units	Specifications	Test Value
APPEARANCE		REPORT	FINE ORANGE CRYSTALS
ASSAY	%	>= 99	99.9
CALCIUM	%	<= 0.003	0.0010
CHLORIDE	%	<= 0.001	<0.0010
IDENTIFICATION	PASS/FAIL	= PASS TEST	PASS TEST
INSOLUBLE MATTER	%	<= 0.005	0.001
IRON (Fe)	%	<= 0.001	<0.0010
LOSS ON DRYING @ 105 C	%	<= 0.05	0.02
SODIUM (Na)	%	<= 0.02	<0.020
SULFATE (SO4)	%	<= 0.005	0.004

1166282
ID: K-Dichromate_00002
Exp:05/31/20 Prpd:NPV Opn:05/02/17
Potassium Dichromate



Lab Manager Fair Lawn

Note: The data listed is valid for all package sizes of this lot of this product, expressed as a extension of this catalog number listed above. If there are any questions with this certificate, please call Chemical Services at (800) 227-6701.
*Based on suggested storage condition.

Reagent

MPREP1_00017

INORGANIC VENTURES

CERTIFICATE OF ANALYSIS

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01 ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	TESTAMERICA-13
Lot Number:	M2-MEB663768
Matrix:	7% (v/v) HNO3
Value / Analyte(s):	2 000 mg/L ea:

1486976
ID: MPREP1_00017
Exp:06/22/19 Prpd:LAM Opn:06/23/16
Metals Prep 1 Spike

Aluminum,	Calcium,	Iron,
Potassium,	Sodium,	Magnesium,
Sulfur,		
200 mg/L ea:		
Manganese,	Samarium,	Strontium,
Thorium,	Uranium,	Vanadium,
Zinc,	Nickel,	Phosphorus,
Lead,	Bismuth,	Cadmium,
Cobalt,	Chromium,	Copper,
Arsenic,	Barium,	
100 mg/L ea:		
Selenium,		
40 mg/L ea:		
Thallium,	Boron,	Silver,
20 mg/L ea:		
Lithium,	Beryllium	

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Aluminum, Al	2 000 ± 7 mg/L	Arsenic, As	200.0 ± 1.7 mg/L
Barium, Ba	200.0 ± 0.8 mg/L	Beryllium, Be	20.00 ± 0.09 mg/L
Bismuth, Bi	200.0 ± 1.1 mg/L	Boron, B	40.01 ± 0.24 mg/L
Cadmium, Cd	200.1 ± 0.8 mg/L	Calcium, Ca	2 000 ± 8 mg/L
Chromium, Cr	200.0 ± 1.2 mg/L	Cobalt, Co	200.0 ± 0.9 mg/L
Copper, Cu	200.0 ± 0.8 mg/L	Iron, Fe	2 000 ± 8 mg/L
Lead, Pb	200.0 ± 0.9 mg/L	Lithium, Li	20.00 ± 0.07 mg/L
Magnesium, Mg	2 000 ± 8 mg/L	Manganese, Mn	200.0 ± 0.8 mg/L
Nickel, Ni	200.0 ± 0.8 mg/L	Phosphorus, P	200.0 ± 0.9 mg/L
Potassium, K	2 000 ± 8 mg/L	Samarium, Sm	200.0 ± 1.2 mg/L
Selenium, Se	100.0 ± 0.6 mg/L	Silver, Ag	40.01 ± 0.18 mg/L
Sodium, Na	2 000 ± 7 mg/L	Strontium, Sr	200.1 ± 0.8 mg/L
Sulfur, S	2 000 ± 10 mg/L	Thallium, Tl	40.01 ± 0.22 mg/L
Thorium, Th	200.0 ± 1.0 mg/L	Uranium, U	200.0 ± 1.1 mg/L
Vanadium, V	200.0 ± 0.9 mg/L	Zinc, Zn	200.0 ± 0.8 mg/L

Density: 1.091 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ag	ICP Assay	3151	992212
Ag	Volhard	999c	999c
Al	ICP Assay	3101a	140903
Al	EDTA	928	928
As	ICP Assay	3103a	100818
B	ICP Assay	3107	110830
Ba	ICP Assay	3104a	070222
Ba	Gravimetric		See Sec. 4.2
Be	ICP Assay	3105a	090514
Be	Calculated		See Sec. 4.2
Bi	ICP Assay	3106	991212
Bi	Calculated		See Sec. 4.2
Ca	ICP Assay	3109a	130213
Ca	EDTA	928	928
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Co	ICP Assay	3113	000630 Co
Co	EDTA	928	928
Cr	ICP Assay	3112a	030730Cr3
Cu	ICP Assay	3114	121207
Cu	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928
K	ICP Assay	3141a	140813
K	Gravimetric		See Sec. 4.2
Li	ICP Assay	3129a	100714
Li	Gravimetric		See Sec. 4.2
Mg	ICP Assay	3131a	050302
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	ICP Assay	3152a	120715
Na	Gravimetric		See Sec. 4.2
Ni	ICP Assay	3136	120619
Ni	EDTA	928	928
P	ICP Assay	3139a	060717
P	Acidimetric		traceable to 84L
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
S	ICP Assay	3154	892205
S	Acidimetric		traceable to 84L
Se	ICP Assay	3149	100901
Sm	ICP Assay	3147a	892911
Sm	EDTA	928	928
Sr	EDTA	928	928
Sr	ICP Assay	3153a	990906
Th	EDTA	928	928
Tl	ICP Assay	3158	993012
Tl	Calculated		See Sec. 4.2

U	ICP Assay	3164	080521
U	Calculated		See Sec. 4.2
V	EDTA	928	928
V	ICP Assay	3165	992706
Zn	ICP Assay	3168a	120629
Zn	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods Characterization of CRM by one method

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{½}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2 (u_{char\ a})^2 + (w_b)^2 (u_{char\ b})^2]^{½}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{½}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Certified Abundance:

IV's Certified Abundance

Isotope	Atom %
Uranium 238U	99.7 ± 0.1
Uranium 235U	0.28 ± 0.05

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Uranium Note: If uranium is present in this standard, it is natural abundance unless specified in Section 3

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ag	ICP Assay	3151	992212
Ag	Volhard	999c	999c
Al	ICP Assay	3101a	140903
Al	EDTA	928	928
As	ICP Assay	3103a	100818
B	ICP Assay	3107	110830
Ba	ICP Assay	3104a	070222
Ba	Gravimetric		See Sec. 4.2
Be	ICP Assay	3105a	090514
Be	Calculated		See Sec. 4.2
Bi	ICP Assay	3106	991212
Bi	Calculated		See Sec. 4.2
Ca	ICP Assay	3109a	130213
Ca	EDTA	928	928
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Co	ICP Assay	3113	000630 Co
Co	EDTA	928	928
Cr	ICP Assay	3112a	030730Cr3
Cu	ICP Assay	3114	121207
Cu	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928
K	ICP Assay	3141a	140813
K	Gravimetric		See Sec. 4.2
Li	ICP Assay	3129a	100714
Li	Gravimetric		See Sec. 4.2
Mg	ICP Assay	3131a	050302
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	ICP Assay	3152a	120715
Na	Gravimetric		See Sec. 4.2
Ni	ICP Assay	3136	120619
Ni	EDTA	928	928
P	ICP Assay	3139a	060717
P	Acidimetric		traceable to 84L
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
S	ICP Assay	3154	892205
S	Acidimetric		traceable to 84L
Se	ICP Assay	3149	100901
Sm	ICP Assay	3147a	892911
Sm	EDTA	928	928
Sr	EDTA	928	928
Sr	ICP Assay	3153a	990906
Th	EDTA	928	928
Tl	ICP Assay	3158	993012
Tl	Calculated		See Sec. 4.2

Reagent

MPREP2_00015

INORGANIC VENTURES

CERTIFICATE OF ANALYSIS

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01 ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	PREP-2
Lot Number:	M2-MEB663767
Matrix:	7% (v/v) HNO3 1.6% (v/v) HF
Value / Analyte(s):	1 000 mg/L ea: Silicon, 200 mg/L ea: Tin, Titanium, Tungsten, Zirconium, 100 mg/L ea: Molybdenum, Antimony

1486979
ID: MPREP2_00015
Exp:06/22/19 Prpd:LAM Opn:06/23/18
Metals Prep 2 Spike

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Antimony, Sb	**100.0 ± 0.6 mg/L**	**Molybdenum, Mo**	**100.0 ± 0.5 mg/L**
Silicon, Si	**1 000 ± 6 mg/L**	**Tin, Sn**	**200.0 ± 0.8 mg/L**
Titanium, Ti	**200.0 ± 1.2 mg/L**	**Tungsten, W**	**200.0 ± 1.5 mg/L**
Zirconium, Zr	**200.0 ± 1.4 mg/L**		

Density: 1.043 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Mo	ICP Assay	3134	130418
Sb	ICP Assay	3102a	140911
Si	ICP Assay	3150	130912
Sn	ICP Assay	3161a	070330
Sn	Calculated		See Sec. 4.2
Ti	ICP Assay	3162a	130925
W	ICP Assay	3163	140606
Zr	ICP Assay	3169	130920

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\,(u_{char\ a})^2 + (w_b)^2\,(u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

HF Note: This standard should not be prepared or stored in glass.

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

December 08, 2017

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **December 08, 2020**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Reagent

Ra-226_00021

National Institute of Standards & Technology

Certificate

Standard Reference Material® 4967A

Radium-226 Radioactivity Standard

This Standard Reference Material (SRM) consists of a solution of a standardized and certified quantity of radioactive radium-226 in a suitably stable and homogeneous matrix. It is intended primarily for the calibration of instruments that are used to measure radioactivity and for the monitoring of radiochemical procedures. A unit of SRM 4967A consists of approximately 5 mL of a hydrochloric acid and barium chloride solution, whose composition is specified in Table 1 and 2, contained in a flame-sealed borosilicate-glass ampoule [1].

The certified **radium-226** massic activity value, at a **Reference Time of 1200 EST, 01 September 2003**, is:

$$(2482 \pm 30)\ \mathrm{Bq \cdot g^{-1}}$$

A NIST certified value, as used within the context of this certificate, is a value for which NIST has the highest confidence in its uncertainty assessment. It is a "measurement result" [2] obtained directly or indirectly from a "primary reference measurement procedure" [3]. The certified value is traceable to the derived SI unit, becquerel (Bq).

Additional physical, chemical, and radiological properties for this SRM, as well as details on the standardization method, are given in Table 1 and 2. Uncertainties for the certified quantities are expanded ($k = 2$). The uncertainties are calculated according to the ISO and NIST Guides [4,5]. Table 3 contains a specification of the components that comprise the uncertainty analyses.

Expiration of Certification: The certification of **SRM 4967A** is valid indefinitely, within the measurement uncertainty specified, provided that the SRM is handled and stored properly and that no evaporation or change in composition has occurred. The solution matrix, in an unopened ampoule, is homogeneous and stable within its half-life-dependent useful lifetime provided the SRM is handled in accordance with instructions given in this certificate (see "Instructions for Handling and Storage"). Periodic recertification of this SRM is not required. The certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

Radiological and chemical hazard: Consult the Safety Data Sheet (SDS), enclosed with the SRM shipment, for radiological and chemical hazard information.

This SRM was prepared in the NIST Physical Measurement Laboratory, Radiation Physics Division, under the direction of M.P. Unterweger, Group Leader of the Radioactivity Group. The overall production, technical direction, and physical measurement leading to certification were provided by R. Collé and P. Volkovitsky of the NIST Radiation Physics Division, Radioactivity Group. Statistical consultation was provided by S.D. Leigh of the NIST Statistical Engineering Division.

Support aspects involved in the issuance of this SRM were coordinated through the NIST Office of Reference Materials.

Lisa R. Karam, Chief
Radiation Physics Division

Gaithersburg, Maryland 20899
Certificate Issue Date: 03 September 2013
See Certificate Revision History on Last Page

Robert L. Watters, Jr., Director
Office of Reference Materials

Table 3. Uncertainty Evaluation for the Massic Activity of SRM 4967A

	Uncertainty component	Assessment Type[a]	Relative standard uncertainty contribution on massic activity of ^{226}Ra (%)
1	Calibration of the "1947 (1967 recalibrated) series" of radium-226 solution standards in terms of mass of radium-226[b]	B	0.34
2	Ratio of the mass of radium-226 in SRM 4967A to the mass of radium-226 in the "1947 (1967 recalibrated) series" of radium-226 solution standards. Weighted mean of the ratios obtained using seven different comparisons.	B	0.15
3	Corrections for the decay of radium-226. Standard uncertainty of the radium-226 half-life.	A	0.007
4	Gravimetric measurements	B	0.10
5	Conversion of radium-226 mass to activity. Standard uncertainty of the radium-226 half-life.[c]	A	0.44
6	Photon emitting impurities. Limit of detection.	B	0.01
Relative combined standard uncertainty			**0.6**
Relative expanded uncertainty ($k = 2$)			**1.2**

[a] Letter A denotes evaluation by statistical methods; B denotes evaluation by other methods.

[b] For further details on NBS/NIST radium series calibrations refer to reference [8]. The 1967 recalibrations of the "1947 series" and of the "1957 series" were made using pressurized "4π"γ ionization chamber (PIC) "A". The master solution for SRM 4967A was directly compared with the "1947 (1967 recalibrated) series" of radium-226 solution standards using PIC "A", and was compared with the solutions of the "1992 series" of radium solution standards (SRM 4967) using PIC "A", pulse-ionization-chamber radon analyses (see references [9] and [10]), and germanium photon spectrometry. The radium-226 in SRM 4967A was chemically purified approximately 55 years from the reference time. The lead-210 and its daughter radionuclides are still not in equilibrium as of the 2013 certificate issue date.

[c] The U.S National Standards for radium-226 are certified in terms of mass of radium-226, as were all radium-226 SRMs prior to the "1992 series". Beginning with "1992 series", radium-226 solution SRMs are now certified in terms of the massic activity of radium-226. The relative standard uncertainty of the activity of radium-226 per unit mass of radium-226 is determined by the relative standard uncertainty of λ (i.e., of the half-life). The relative standard uncertainties of the atomic weight of radium-226 and of Avogadro's number are negligible.

Table 1. Certified Massic Activity of SRM 4967A

Radionuclide	**Radium-226**
Reference time	**1200 EST, 01 September 2003**
Massic activity of the solution	**2482 Bq•g^{-1}**
Relative expanded uncertainty ($k = 2$)	**1.20 %**

Table 2. Uncertified Information of SRM 4967A

Source description	Liquid in a flame-sealed 5 mL borosilicate-glass ampoule [1]
Solution composition	1.0 mol•L^{-1} HCl with 80μg of $BaCl_2$ per gram of solution
Solution density	(1.017 ± 0.002) g•mL^{-1} at 21 °C[(a)]
Solution mass	(5.086 ± 0.003) g[(a)]
Photon-Emitting Impurities	None detected[(b)]
Half-lives used	^{226}Ra: (1600 ± 7) a [6][(c)] ^{222}Ra: (3.8235 ± 0.0003) d [7][(c)]
Calibration methods (and instruments)	Gravimetric dilution of SRM 4963, confirmed by comparison with solution standards, and derivatives thereof, from the NBS/NIST "1947 (1967 recalibrated) series" of radium-226 solution standards. The mass of radium-226 in these solution standards had previously been determined by comparison with the U.S. National Standards for radium-226. Conversion from mass of radium-226 to activity of radium-226 was done using the half-life of radium-226 shown above.[(d)]

[(a)] The stated uncertainty is two times the standard uncertainty. See reference 5.

[(b)] The estimated lower limits of detection for photon-emitting impurities, as of September 2003, expressed as massic photon mission rate, are:

6×10^{0} s^{-1}•g^{-1} for energies between 22 keV and 182 keV,
3×10^{0} s^{-1}•g^{-1} for energies between 190 keV and 347 keV,
8×10^{-1} s^{-1}•g^{-1} for energies between 356 keV and 1455 keV, and
3×10^{-1} s^{-1}•g^{-1} for energies between 1465 keV and 2750 keV,

provided that the photons are separated in energy by 4 keV or more from photons emitted in the decay of ^{226}Ra and progeny.

[(c)] The stated uncertainty is the standard uncertainty. See reference 5.

[(d)] For further details on NBS/NIST radium series calibrations refer to reference [8]. The 1967 recalibrations of the "1947 series" and of the "1957 series" were made using pressurized "4π"γ ionization chamber (PIC) "A". The master solution for SRM 4967A was directly compared with the "1947 (1967 recalibrated) series" of radium-226 solution standards using PIC "A", and was compared with the solutions of the "1992 series" of radium solution standards (SRM 4967) using PIC "A", pulse-ionization-chamber radon analyses (see references [9] and [10]), and germanium photon spectrometry. The radium-226 in SRM 4967A was chemically purified approximately 55 years from the reference time. The lead-210 and its daughter radionuclides are still not in equilibrium as of the 2013 certificate issue date.

INSTRUCTIONS FOR HANDLING AND STORAGE

Handling: If the ampoule is transported, it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) because of both the radioactivity and the strong acid. Only persons qualified to handle both radioactive material and alkaline and/or acidic solutions should open the ampoule. To minimize personnel exposure, appropriate shielding and/or distance should be used. Refer to the SDS for further information.

Storage: SRM 4967A should be stored and used at a temperature between 5 °C and 65 °C. The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material.

REFERENCES

[1] NIST Physical Measurement Laboratory; *Storage and Handling of Radioactive Standard Reference Materials, Ampoule Specifications and Opening Procedure*, available at http://www.nist.gov/pml/div682/grp04/srm.cfm (accessed Sep 2013). Note: This SRM is contained in a generic borosilicate-glass ampoule and not in the standard NIST ampoule.

[2] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 19 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Sep 2013).

[3] JCGM 200:2012; *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)* (2008 version with Minor Corrections), 3rd edition; Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France; p. 18 (2012); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf (accessed Sep 2013).

[4] JCGM 100:2008; *Guide to the Expression of Uncertainty in Measurement;* (GUM 1995 with Minor Corrections), Joint Committee for Guides in Metrology: BIPM, Sevres Cedex, France (2008); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_100_2008_E.pdf (accessed Sep 2013).

[5] Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297, U.S. Government Printing Office: Washington, DC (1994); available at http://www.nist.gov/pml/pubs/index.cfm (accessed Sep 2013).

[6] Chisté, V; Bé, M.M.; *January 2007,* ^{226}Ra; LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Ra-226_tables.pdf (accessed Sep 2013).

[7] Chisté, V; Bé, M.M.; *July 2010,* ^{222}Rn; LNE-LNHB/CEA Table of Radionuclides, available at http://www.nucleide.org/DDEP_WG/Nuclides/Rn-222_tables.pdf (accessed Sep 2013).

[8] Mann, W.B.; Stockman, L.L.; Youden, W.J.; Schwebel, A.; Mullen, P.A.; Garfinkel, S.B.; Preparation of New Solution Standards of Radium, *Journal of Research of the National Bureau of Standards* 62 (1959) 21-26.

[9] Collé, R.; Hutchinson, J.M.R.; Unterweger, M.P.; The NIST Primary Radon-222 Measurement System, *Journal of Research of the National Institute of Standards and Technology* 95 (1990) 155-165.

[10] Hutchinson J.M.R; Cessna, J.; Collé R.; Hodge P.; An International Radon-In-Air Measurement Intercomparison Using a New Transfer Standard, *Applied Radiation Isotopes* 43 (1992) 175-189.

Certificate Revision History: September 2013 (Text and expiration date revised); December 2004 (Original certification date).

Users of this SRM should ensure that the Certificate in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.

Reagent

Ra-226_00024

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404 352 8677
Fax 404 352 2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 104858
Source Description: 5 mL Liquid in Flame Sealed Vial
Product Code: 8226
Customer: TestAmerica St. Louis
P.O. Number: 2665998, Item 1

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics (EZA) using a germanium gamma-ray spectrometer system. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. EZA maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 05-December-2016 12:00 PM EST

Isotope	Half-Life, d	Activity, Bq	Uncertainty u_A, %	Uncertainty u_B, %	Uncertainty U, %*	Calibration Method**
Ra-226	5.844E+05	1.408E+04	1.0	2.1	4.7	HPGe

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results." ****Calibration Methods:** 4π LS - 4π Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber.

(Certificate continued on reverse side)

SRS Number: 104858

Comments:
5.00002 g 0.1 M HCl solution with approximately 30 µg/g Ba carrier.

Impurities:
γ-impurities (other than decay products) < 0.1%

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QC Approved by: _____ Date: 05-DEC-16
J. Lahr, Spectroscopist

Reagent

Ra-226_00025

SRS Number: 104858

Comments:
5.00002 g 0.1 M HCl solution with approximately 30 µg/g Ba carrier.

Impurities:
γ-impurities (other than decay products) < 0.1%

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QC Approved by: _____ Date: 05-DEC-16
J. Lahr, Spectroscopist

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 104858
Source Description: 5 mL Liquid in Flame Sealed Vial
Product Code: 8226
Customer: TestAmerica St. Louis
P.O. Number: 2665998, Item 1

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics (EZA) using a germanium gamma-ray spectrometer system. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. EZA maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 05-December-2016 12:00 PM EST

Isotope	Half-Life, d	Activity, Bq	Uncertainty u_A, %	Uncertainty u_B, %	Uncertainty U, %*	Calibration Method**
Ra-226	5.844E+05	1.408E+04	1.0	2.1	4.7	HPGe

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results." ****Calibration Methods:** 4π LS - 4π Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber.

(Certificate continued on reverse side)

Reagent

Ra-226_00027

Standard ID Number:	Ra-226_00027		Radionuclide:
True Value =	11360	pCi/L or g	Ra-226
Date Analyzed:	10/19/2017		

	Replicates	
#1	11590	pCi/L or g
#2	10870	pCi/L or g
#3	10690	pCi/L or g
#4	11320	pCi/L or g
#5	10440	pCi/L or g
#6	11270	pCi/L or g

Mean = 11030

1 sigma = 434.649284 1.96 sigma = 851.9126

True Value minus 5% = 10792 (True Value - 5%)
True Value plus 5% = 11928 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

1st Reviewed By/Date: RM 10.20.17

2nd Reviewed By/Date: ALD 10/20/17

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Total Alpha-Emitting Radium

Batch: 332805 **Operator:**

SampID / Analyte	WRKNO	Ts	Aliquot Tb	Cs	Ba Mass Cb	Ba Yield CPMs	Trunc Yield CPMb	Ingrowth	Ba Precip Time	InstrID	Eff	Cal Type	Cnt Date Time	Sigma
								Activity	UncCount	UncTotal	MDA	DLC	MQO	
LCS 160-332805/2-A	LCS		1.0000mL		0.0324	95.58%	False	1.0420	10/19/17 17:40	Orange9	0.1948	2	10/19/17 18:41	1.00
Total Alpha Emitting		100.00	1000.00	501	19	5.01	0.02	1.159E+004pCi/L	5.198E+002	7.363E+002	1.801E+002	5.522E+001	736.3182	
LCS 160-332805/3-A	LCS		1.0000mL		0.0308	90.86%	False	1.0421	10/19/17 17:40	Orange14	0.1968	2	10/19/17 18:42	1.00
Total Alpha Emitting		100.00	1000.00	456	64	4.56	0.06	1.087E+004pCi/L	5.166E+002	7.114E+002	2.835E+002	1.055E+002	711.3722	
LCS 160-332805/4-A	LCS		1.0000mL		0.0317	93.51%	False	1.0421	10/19/17 17:40	Orange15	0.1906	2	10/19/17 18:42	1.00
Total Alpha Emitting		100.00	1000.00	447	61	4.47	0.06	1.069E+004pCi/L	5.130E+002	7.033E+002	2.794E+002	1.033E+002	703.3033	
LCS 160-332805/5-A	LCS		1.0000mL		0.0318	93.81%	False	1.0421	10/19/17 17:40	Orange17	0.1926	2	10/19/17 18:42	1.00
Total Alpha Emitting		100.00	1000.00	479	60	4.79	0.06	1.132E+004pCi/L	5.241E+002	7.308E+002	2.741E+002	1.011E+002	730.8393	
LCS 160-332805/6-A	LCS		1.0000mL		0.0304	89.68%	False	1.0421	10/19/17 17:40	Orange19	0.1983	2	10/19/17 18:42	1.00
Total Alpha Emitting		100.00	1000.00	440	103	4.40	0.10	1.044E+004pCi/L	5.105E+002	6.939E+002	3.421E+002	1.346E+002	693.8952	
LCS 160-332805/7-A	LCS		1.0000mL		0.0324	95.58%	False	1.0422	10/19/17 17:40	Orange22	0.1944	2	10/19/17 18:42	1.00
Total Alpha Emitting		100.00	1000.00	491	68	4.91	0.07	1.127E+004pCi/L	5.159E+002	7.234E+002	2.792E+002	1.047E+002	723.3587	

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity		StdAdded	Recovery		LCL	UCL	ZFactor
LCS 160-332805/2-A	LCS 160-332805/2-A	Total Alpha	1.159E+004	pCi/L	1.136E+004	102.01	%			0.2216
LCS 160-332805/3-A	LCS 160-332805/3-A	Total Alpha	1.087E+004	pCi/L	1.136E+004	95.67	%			-0.4779
LCS 160-332805/4-A	LCS 160-332805/4-A	Total Alpha	1.069E+004	pCi/L	1.136E+004	94.11	%			-0.6522
LCS 160-332805/5-A	LCS 160-332805/5-A	Total Alpha	1.132E+004	pCi/L	1.136E+004	99.64	%			-0.0395
LCS 160-332805/6-A	LCS 160-332805/6-A	Total Alpha	1.044E+004	pCi/L	1.136E+004	91.94	%			-0.8930
LCS 160-332805/7-A	LCS 160-332805/7-A	Total Alpha	1.127E+004	pCi/L	1.136E+004	99.17	%			-0.0912

Sample Duplicate Information

SampID	SampDupID	Analyte	Activity	DupActivity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	WRKNO	Analyte	Activity	MSActivity	StdAdded	Recovery	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal

Rf. 12/5/16

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Reagent ID: Ra-226_00027

Description:	Ra-226 Spike	Expiration Date:	02/16/2018
No. of Bottles:	2	Laboratory:	TestAmerica St. Louis
Storage Location:	RAD Separations Reagents - Rm 131	Prepared By:	Bernsen, Sarah C
Reagent Volume:	500.000 mL	Solvent:	0.1M HCl
Creation Date:	08/02/2017	Solvent Lot:	N/A
Open Date:			
Container(s):	1240776, 1240777		
Comment:			

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
Ra	Ra-226_00025	02/16/2018	8409.78500	dpm/mL	25.22936	dpm/mL
Ra-226	Ra-226_00025	02/16/2018	8409.78500	dpm/mL	25.22936	dpm/mL
Total Alpha Emitting Radium Isotopes	Ra-226_00025	02/16/2018	8409.78500	dpm/mL	25.22936	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Ra-226_00025	Ra-226 Parent		02/16/18				1.50000	mL

PrecSep_0 Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-332805 Analyst: Mueller, Rachel T Batch Open: 10/19/2017 2:20:00PM

Batch End: 10/19/2017 6:30:00PM

Preparation, Precipitate Separation

	Input Sample Lab ID (Analytical Method)	SDG (Job #)	Matrix	Initial Amount	Final Amount	Due Date	Analytical TAT	Dlv Rank	Comments	Output Sample Lab ID
1	160-25099-A-1 (903.0_TAR)	N/A (160-25099-1)	Water	1 mL		10/30/17	8_Days	2	dummy- do not count	
2	LCS~160-332805/2 N/A	N/A		1 mL		N/A	N/A	N/A	bottle a orange 9	
3	LCS~160-332805/3 N/A	N/A		1 mL		N/A	N/A	N/A	bottle a 14	
4	LCS~160-332805/4 N/A	N/A		1 mL		N/A	N/A	N/A	bottle a 15	
5	LCS~160-332805/5 N/A	N/A		1 mL		N/A	N/A	N/A	bottle b 17	
6	LCS~160-332805/6 N/A	N/A		1 mL		N/A	N/A	N/A	bottle b 19	
7	LCS~160-332805/7 N/A	N/A		1 mL		N/A	N/A	N/A	bottle b 22	
8	N/A	N/A				N/A	N/A	N/A		
9	N/A	N/A				N/A	N/A	N/A		
10	N/A	N/A				N/A	N/A	N/A		

Ra-226 - 00027 verification

PrecSep_0 Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-332805 Analyst: Mueller, Rachel T Batch Open: 10/19/2017 2:20:00PM

Batch End: 10/19/2017 6:30:00PM

Batch Notes

Manually Enter Results? (0=NO, 1=YES)	No
EiChrom Used (Y/N)?	no
Radium Batch (Y/N)?	yes
Balance ID	n/a
Analyst ID - Reagent Drop	RTM
Analyst ID - Reagent Drop Witness	SCB per RTM
Pipette ID	CR-001
SOP Number	ST-RC-0040
Carrier ID for Barium	Ba
Strontium Carrier ID	
Yttrium Carrier ID	
Batch Comment	Ra-226_00027 Verification- bottle a and bottle b

Comments

PrecSep_0 Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-332805 Analyst: Mueller, Rachel T

Batch Open: 10/19/2017 2:20:00PM

Batch End: 10/19/2017 6:30:00PM

Reagent Additions Worksheet

Lab ID	Reagent Code	Amount Added	Final Amount	By	Witness
160-25099-A-1	Ba Carrier_00030	1 mL			
LCS 160-332805/2	Ba Carrier_00030	1 mL			
LCS 160-332805/2	Ra-226_00027	1 mL			
LCS 160-332805/3	Ba Carrier_00030	1 mL			
LCS 160-332805/3	Ra-226_00027	1 mL			
LCS 160-332805/4	Ba Carrier_00030	1 mL			
LCS 160-332805/4	Ra-226_00027	1 mL			
LCS 160-332805/5	Ba Carrier_00030	1 mL			
LCS 160-332805/5	Ra-226_00027	1 mL			
LCS 160-332805/6	Ba Carrier_00030	1 mL			
LCS 160-332805/6	Ra-226_00027	1 mL			
LCS 160-332805/7	Ba Carrier_00030	1 mL			
LCS 160-332805/7	Ra-226_00027	1 mL			

Rad Worksheet

Batch Number: 160-332805
Method: PrecSep_0
Analyst: Mueller, Rachel T

Date Open: Oct 19 2017 2:20PM
Batch End: Oct 19 2017 6:30PM

Lab ID	Client ID	Method Chain	Basis	Initial weight/volume of sample	Tare Weight of Barium Planchette	Gross Weight of Barium Planchette	Barium Mass Added	Ingrowth/Decay Date1	Ingrowth/Decay Date2
160-25099-A-1	Ra-226 Verification	PrecSep_0, 903.0_TAR	T	1 mL			0.0339 g	10/19/2017 16:21	10/19/2017 17:40
LCS~160-332805/2				1 mL	8.6284 g	8.6608 g	0.0339 g	10/19/2017 16:21	10/19/2017 17:40
LCS~160-332805/3				1 mL	8.7340 g	8.7648 g	0.0339 g	10/19/2017 16:21	10/19/2017 17:40
LCS~160-332805/4				1 mL	8.6106 g	8.6423 g	0.0339 g	10/19/2017 16:21	10/19/2017 17:40
LCS~160-332805/5				1 mL	8.7237 g	8.7555 g	0.0339 g	10/19/2017 16:21	10/19/2017 17:40
LCS~160-332805/6				1 mL	8.8151 g	8.8455 g	0.0339 g	10/19/2017 16:21	10/19/2017 17:40
LCS~160-332805/7				1 mL	8.7377 g	8.7701 g	0.0339 g	10/19/2017 16:21	10/19/2017 17:40

Reagent

Ra22804A120_00001

St. Louis Radiological Standard Verification

Standard ID Number: RA22804A120_00001
True Value = 37455 pCi/L or g
Date Analyzed: 7/12/2018

Radionuclide: Ra-228

	Replicates	
#1	37800	pCi/L or g
#2	37400	pCi/L or g
#3	37200	pCi/L or g

Mean = 37466.6667

1 sigma = 305.505046 1.96 sigma = 598.7899

True Value minus 5% = 35582.25 (True Value - 5%)
True Value plus 5% = 39327.75 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: AB 7/13/18

2nd Reviewed By/Date: RM 7/13/18

Rfg. 7-19-04

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Ra 22804A120 _ 00001

Reagent ID: Ra22804A120_00001

Type:	ASTD	Expiration Date:	07/12/2019
Description:	Ra-228 spike from Richland	Laboratory:	TestAmerica St. Louis
No. of Bottles:	1	Prepared By:	Bernsen, Sarah C
Storage Location:	RAD Actinide STDs	Vendor:	Analytics
Reagent Volume:	125.000 mL	Vendor Lot #:	68824-310
Creation Date:	07/05/2016	Vendor Cat #:	n/a
Open Date:	07/12/2018		
Container(s):	1506348		
Comment:	use 0.3 mL		

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
Ra-228					448.46600	dpm/mL

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	7/19/2004 0:00		
Decayto Date/Time (t):	7/12/18 0:00		
Initial Activity (A_0):	448.47 dpm		
Initial Aliquot:	1 mL		
Initial Conc:	448.466 dpm/mL		
***Soln. Density:**	1 g/mL		
Nuclide:	Ra-228		
Half-Life (days):	2100.1875	decay days	fraction
****Decay Factor:**	0.1854	5106.00	2.43121
Decay Corr Activity:	8.3150E+01 dpm		
Decay Corr Conc:	8.3150E+01 dpm/mL		

Conversion/Calculations

Final Activity Unit:	pCi
Activity Unit Factor:	0.45045
Final Volume Unit:	L
Volume Unit Factor:	0.001
Final Concentration:	3.7455E+04 pCi/L
Aliquot Volume:	1.0000E+00 L
Final Activity (A):	3.7455E+04 pCi

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ASAP

Gamma Barcode Report

RA228044120 Verification

Sample 375155_Gamma_160-29468-A-1-A

Instrument Operator: **Sample ID** 160-29468-A-1-A 160-29468- **Sample Title:** 160-29468-A-1-A

Sample Type: water **Batch ID:** 375155 **Geometry:** 100 mL d=1 (7)

Sample 375155_Gamma_160-29468-A-1-B

Instrument Operator: **Sample ID** 160-29468-A-1-B 160-29468- **Sample Title:** 160-29468-A-1-B

Sample Type: water **Batch ID:** 375155 **Geometry:** (8)

Sample 375155_Gamma_160-29468-A-1-C

Instrument Operator: **Sample ID** 160-29468-A-1-C 160-29468- **Sample Title:** 160-29468-A-1-C

Sample Type: water **Batch ID:** 375155 **Geometry:** (8)

Fill_Geo_0 Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-375155

Analyst: Mueller, Rachel T

Batch Open: 7/12/2018 3:15:00PM

Batch End: 7/12/2018 4:00:00PM

Fill Geometry, No In-Growth

	Input Sample Lab ID (Analytical Method)	SDG (Job #)	Matrix	Initial Amount	Final Amount	Due Date	Analytical TAT	Dlv Rank	Comments	Output Sample Lab ID
1	160-29468-A-1 (901.1_Cs)	N/A (160-29468-1)	Water	100 mL		8/7/18	18_Days	2	RA22804A120_00001	160-29468-A-1-A
2	160-29468-A-1 (901.1_Cs)	N/A (160-29468-1)	Water	100 mL		8/7/18	18_Days	2	RA22804A120_00001	160-29468-A-1-B
3	160-29468-A-1 (901.1_Cs)	N/A (160-29468-1)	Water	100 mL		8/7/18	18_Days	2	RA22804A120_00001	160-29468-A-1-C

Fill_Geo_0 Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 160-375155

Analyst: Mueller, Rachel T

Batch Open: 7/12/2018 3:15:00PM

Batch End: 7/12/2018 4:00:00PM

Reagent Additions Worksheet

Lab ID	Reagent Code	Amount Added	Final Amount	By	Witness
160-29468-A-1	Ra22804A120_00001	100 mL			
160-29468-A-1	Ra22804A120_00001	100 mL			
160-29468-A-1	Ra22804A120_00001	100 mL			

Other Reagents:

Reagent	Amount/Units	Lot#:

Reagent

Sr-90_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

80573-334
5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis
P.O. No.: 2324797, Item 1

This standard radionuclide source was prepared gravimetrically from a calibrated master solution. The master solution was calibrated by liquid scintillation counting. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry and liquid scintillation counting. The nuclear decay rate and assay date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty*, % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Sr-90	10515.5	3.782E+04	0.1	0.9	1.8	09/17/2009

*Uncertainty: U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: γ-impurities <0.1%. 5.04317 grams 0.1M HCl solution with approximately 30 microg/g each of Sr and Y carriers. NOTE: This source also contains Y-90 in secular equilibrium with Sr-90. The Y-90 activity is equal to the Sr-90 activity. Since Sr-90 and Y-90 both decay 100% by beta emission, the total beta emission rate for the source is twice the certified Sr-90 activity. The half-life for Y-90 is 64.08 hours.

Source Prepared by: _____
W. Mao, Radiochemist

QA Approved: _____ Date: 9-22-09
D. M. Montgomery, QA Manager

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Corporate Office
Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia 30318

Reagent

Sr-90_00017

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

92352

Sr-90 5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2502682, Item 1 Product Code: 8090-5FSA-37kBq

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Sr-90	1.052E+04	3.749E+04	0.1	0.9	1.8	11/29/2012

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: γ-impurities<0.1%.
5.02357 g 0.1M HCl solution with approximately 30 µg/g each Sr and Y carriers.

NOTE: This source also contains Y-90 in secular equilibrium with Sr-90. The Y-90 activity is equal to the Sr-90 activity. Since Sr-90 and Y-90 both decay 100% by beta emission, the total activity for the source is twice the certified Sr-90 activity. The half-life for Y-90 is 64.08 hours.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 26 Nov 12
J.D. McCorvey, Counting Room Manager

RAD12-0042
Sr-90
hursts
None
Prep/Opened: 11/28/2012
Exp(1): 11/29/2062
Exp(2): 11/29/2062
51511
ID Sr-90_00017
Sr-90 Ampoule

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Single Isotope Certificate Rev 3, 23 August 2012

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Sr-90_00018

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Reagent ID: Sr-90_00018

		Expiration Date:	11/29/2062
Description:	Sr-90 Calibration STD	Laboratory:	TestAmerica St. Louis
No. of Bottles:	1	Prepared By:	Hurst, Sarah
Storage Location:	RAD Separations Reagents - 1	Solvent:	0.1M HCL
Reagent Volume:	100.000 mL	Solvent Lot:	0
Creation Date:	11/28/2012		
Container(s):	51512		
Comment:	Rad12-0043		

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
Gross Beta	Sr-90_00017	11/29/2062	14925.64000	Bq/g	44774.23338	dpm/mL
Sr-90	Sr-90_00017	11/29/2062	7462.82000	Bq/g	22387.11669	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Sr-90_00017	Sr-90 Ampoule	ASTD	11/29/62	Analytics	92352		4.99970	g

St. Louis Radiological Standard Reverification Form

Standard ID Number: Sr-90_00018 (51512)
True Value = 1976.75 pCi/sample or g
Date Analyzed: 2/10/2014

Radionuclide: Sr-90 (Low mass)

	Replicates	
#1	1935	pCi/sample or g
#2	1941	pCi/sample or g
#3	1924	pCi/sample or g

Mean = 1933.333

1 sigma = 8.621678 1.96 sigma = 16.89849

True Value minus 5% = 1877.913 (True Value - 5%)
True Value plus 5% = 2075.588 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 2/10/14

SOP Reference: STL-QA-0002, Current Revision

St. Louis Radiological Standard Reverification Form

Standard ID Number: Sr-90_00018 (51512)
True Value = 1948.75 pCi/sample or g
Date Analyzed: 2/10/2014

Radionuclide: Sr-90 (Medium mass)

Replicates		
#1	1911	pCi/sample or g
#2	1945	pCi/sample or g
#3	1893	pCi/sample or g

Mean = 1916.333

1 sigma = 26.40707 1.96 sigma = 51.75786

True Value minus 5% = 1851.313 (True Value - 5%)
True Value plus 5% = 2046.188 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 2/10/14

SOP Reference: STL-QA-0002, Current Revision

St. Louis Radiological Standard Reverification Form

Standard ID Number: Sr-90_00018 (51512)
True Value = 1992 pCi/sample or g
Date Analyzed: 2/10/2014

Radionuclide: Sr-90 (High mass)

Replicates		
#1	1907	pCi/sample or g
#2	1930	pCi/sample or g
#3	1937	pCi/sample or g

Mean = 1924.667

1 sigma = 15.69501 1.96 sigma = 30.76222

True Value minus 5% = 1892.4 (True Value - 5%)
True Value plus 5% = 2091.6 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 2/10/14

SOP Reference: STL-QA-0002, Current Revision

Protean Beta ICV-ACV recoveries from March 2013			
Protean Detector	**Low** pCi/sample	**Medium** pCi/sample	**High** pCi/sample
0	1962	1945	1971
1	2003	1947	1995
2	1960	1965	1998
3	1988	1942	1995
4	1977	1940	1997
5	1969	1949	2013
6	1986	1938	1986
7	1969	1964	1981
Average pCi/sample	1976.75	1948.75	1992

Protean Beta ICV-ACV recoveries from February 2014			
Protean Detector	**Low** pCi/sample	**Medium** pCi/sample	**High** pCi/sample
4	1935	1911	1907
5	1941	1945	1930
6	1924	1893	1937
Average pCi/sample	1933.33	1916.33	1924.67

Standard ID
Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122640 **Operator:** 63903

Sample ID	WRKNO	Aliquot		Mass		Instr ID	CountTime		Ts	Tb	Dilution	Sigma	
	Analyte	Cs	Cb	XT		CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC
ICVABT-51512;B1	NA	1.000E+000sample		0.0513	g	Protean4	2/10/14 22:54		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	49	0.00	0.000E+000	4.900E-002	0.1157		**-1.908E-001**pCi/sample	5.869E-002	5.452E-002	3.382E+000	8.968E-001
	Gross Beta	9072	417	0.00	1.814E+003	4.170E-001	0.4224		**1.935E+003**pCi/sample	1.977E+002	4.063E+001	1.594E+000	7.165E-001
ICVABT-51512;B2	NA	1.000E+000sample		0.1114	g	Protean4	2/10/14 23:19		5.00	1000.00	1.00	2.00	
	Gross Alpha	1	49	0.00	2.000E-001	4.900E-002	0.0830		**8.194E-001**pCi/sample	2.174E+000	2.172E+000	4.713E+000	1.250E+000
	Gross Beta	8432	417	0.00	1.686E+003	4.170E-001	0.3973		**1.911E+003**pCi/sample	1.956E+002	4.164E+001	1.694E+000	7.616E-001
ICVABT-51512;B3	NA	1.000E+000sample		0.1813	g	Protean4	2/10/14 23:04		5.00	1000.00	1.00	2.00	
	Gross Alpha	1	49	0.00	2.000E-001	4.900E-002	0.0540		**1.260E+000**pCi/sample	3.343E+000	3.340E+000	7.248E+000	1.922E+000
	Gross Beta	8054	417	0.00	1.611E+003	4.170E-001	0.3804		**1.907E+003**pCi/sample	1.954E+002	4.251E+001	1.770E+000	7.956E-001

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery	LCL	UCL	ZFactor
					%			

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery	ZFactor
						%	

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

RadCapture, version 4.2.06, released 2/9/2012

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122640 **Operator:** 63903

Sample ID	WRKNO	Aliquot		Mass		Instr ID	CountTime		Ts	Tb	Dilution	Sigma	
	Analyte	Cs	Cb	XT		CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC
ICVABT-51512;B1	NA	1.000E+000	sample	0.0513	g	Protean5	2/10/14 23:04		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	43	0.00	0.000E+000	4.300E-002	0.1145		-1.692E-001 pCi/sample	5.510E-002	5.161E-002	3.337E+000	8.490E-001
	Gross Beta	9111	398	0.00	1.822E+003	3.980E-001	0.4228		1.941E+003 pCi/sample	1.983E+002	4.068E+001	1.569E+000	6.992E-001
ICVABT-51512;B2	NA	1.000E+000	sample	0.1114	g	Protean5	2/10/14 22:54		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	43	0.00	0.000E+000	4.300E-002	0.0823		-2.353E-001 pCi/sample	7.661E-002	7.176E-002	4.639E+000	1.180E+000
	Gross Beta	8552	398	0.00	1.710E+003	3.980E-001	0.3960		1.945E+003 pCi/sample	1.990E+002	4.207E+001	1.675E+000	7.465E-001
ICVABT-51512;B3	NA	1.000E+000	sample	0.1813	g	Protean5	2/10/14 23:19		5.00	1000.00	1.00	2.00	
	Gross Alpha	2	43	0.00	4.000E-001	4.300E-002	0.0532		3.022E+000 pCi/sample	4.802E+000	4.790E+000	7.178E+000	1.826E+000
	Gross Beta	8046	398	0.00	1.609E+003	3.980E-001	0.3755		1.930E+003 pCi/sample	1.977E+002	4.304E+001	1.766E+000	7.873E-001

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery	LCL	UCL	ZFactor
					%			

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery	ZFactor
						%	

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

RadCapture, version 4.2.06, released 2/9/2012

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122640 **Operator:** 63903

Sample ID	WRKNO	Aliquot		Mass		Instr ID	CountTime		Ts	Tb	Dilution	Sigma	
	Analyte	Cs	Cb	XT		CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC
ICVABT-51512;B1	NA	1.000E+000	sample	0.0513	g	Protean6	2/10/14 23:19		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	87	0.00	0.000E+000	8.700E-002	0.1165		**-3.362E-001** pCi/sample	8.166E-002	7.210E-002	3.776E+000	1.186E+000
	Gross Beta	8992	520	0.00	1.798E+003	5.200E-001	0.4209		**1.924E+003** pCi/sample	1.966E+002	4.059E+001	1.718E+000	8.029E-001
ICVABT-51512;B2	NA	1.000E+000	sample	0.1114	g	Protean6	2/10/14 23:04		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	87	0.00	0.000E+000	8.700E-002	0.0842		**-4.657E-001** pCi/sample	1.131E-001	9.985E-002	5.230E+000	1.642E+000
	Gross Beta	8356	520	0.00	1.671E+003	5.200E-001	0.3976		**1.893E+003** pCi/sample	1.937E+002	4.142E+001	1.819E+000	8.499E-001
ICVABT-51512;B3	NA	1.000E+000	sample	0.1813	g	Protean6	2/10/14 22:54		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	87	0.00	0.000E+000	8.700E-002	0.0559		**-7.014E-001** pCi/sample	1.703E-001	1.504E-001	7.877E+000	2.474E+000
	Gross Beta	8127	520	0.00	1.625E+003	5.200E-001	0.3778		**1.937E+003** pCi/sample	1.985E+002	4.300E+001	1.914E+000	8.945E-001

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

RadCapture, version 4.2.06, released 2/9/2012

TestAmerica St. Louis

Standards Preparation Logbook Record

Nov-28-2012

Logbook: \\Qstlmo01\Stdslog\RAD_STD.std

RAD12-0042, Sr-90 Sr-90_00017 #51511 Analyst: hursts

Vendor: Analytics Lot No.: 92352
Solvent: None
Date Prep./Opened: 11-28-2012
Date Expires(1): 11-29-2062 (50 Years)
Date Expires(2): 11-29-2062 (50 Years)
Cert: 92352 Activity: 37490Bq Mass: 5.02357 Ref. Date: 11/29/12

Component	Initial Conc (dpm/g)	Final Conc (dpm/g)
Sr-90	447,769	447,769

RAD12-0043, Sr-90 Calibration STD Sr-90_00018 #51512 Analyst: hursts

Solvent: None Volume (ml): 100.00
Date Prep./Opened: 11-28-2012
Date Expires(1): 11-29-2062 (50 Years)
Date Expires(2): 11-29-2062 (50 Years)

Parent Std No.: RAD12-0042, Sr-90 Aliquot Amount (g): 4.9997
Parent Date Expires(1): 11-29-2062 Parent Date Expires(2): 11-29-2062

Component	Initial Conc (dpm/g)	Final Conc (dpm/mL)
Sr-90	447,769	22,387

Reviewed By: SRO

Page 1 of 1

St. Louis Radiological Standard Reverification Form

Standard ID Number: Rad12-0043
True Value = 2016.7 pCi/L or g
Date Analyzed: 11/30/2012

Radionuclide: Sr90

	Replicates	
#1	1964	pCi/L or g
#2	1958	pCi/L or g
#3	2015	pCi/L or g

Mean = 1979

1 sigma = 31.32092 1.96 sigma = 61.389

True Value minus 5% = 1915.865 (True Value - 5%)
True Value plus 5% = 2117.535 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: 11/30/12

SOP Reference: STL-QA-0002, Current Revision

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122629 **Operator:** 63903

Sample ID	WRKNO	*Aliquot*		*Mass*	*Instr ID*	*CountTime*		*Ts*	*Tb*	*Dilution*	*Sigma*	
	Analyte	Cs	Cb	XT	CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC
verification-1b	NA	*1.000E+000sample*		*0.0536 g*	*Purple16*		*11/30/12 10:42*	*8.00*	*1000.00*	*1.00*	*1.00*	
	Gross Alpha	123	175	0.00	1.538E+001	1.750E-001	0.4314	**1.587E+001**pCi/sample	1.707E+000	1.448E+000	8.638E-001	3.593E-001
	Gross Beta	14954	485	0.00	1.869E+003	4.850E-001	0.4285	**1.964E+003**pCi/sample	9.953E+001	1.607E+001	1.211E+000	6.021E-001
verification-2b	NA	*1.000E+000sample*		*0.0529 g*	*Purple17*		*11/30/12 10:43*	*8.00*	*1000.00*	*1.00*	*1.00*	
	Gross Alpha	53	87	0.00	6.625E+000	8.700E-002	0.1306	**2.254E+001**pCi/sample	3.391E+000	3.138E+000	2.356E+000	8.365E-001
	Gross Beta	15152	362	0.00	1.894E+003	3.620E-001	0.4356	**1.958E+003**pCi/sample	9.919E+001	1.591E+001	1.077E+000	5.117E-001
verification-3b	NA	*1.000E+000sample*		*0.0528 g*	*Purple18*		*11/30/12 10:43*	*8.00*	*1000.00*	*1.00*	*1.00*	
	Gross Alpha	85	62	0.00	1.063E+001	6.200E-002	0.1313	**3.624E+001**pCi/sample	4.462E+000	3.954E+000	2.160E+000	7.027E-001
	Gross Beta	15378	395	0.00	1.922E+003	3.950E-001	0.4296	**2.015E+003**pCi/sample	1.020E+002	1.625E+001	1.125E+000	5.420E-001

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery	LCL	UCL	ZFactor
					%			

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery	ZFactor
						%	

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Prep Report for Gross Alpha/Beta

Batch: M122629 **Prep Analyst:** 250

SampID	WRKNO	Aliquot		purple Gross	Tare	Mass	Dilution
verification-1b	NA	1.000E+000	sample	8.7067 g	8.6531 g	0.0536 g	1.00
verification-2b	NA	1.000E+000	sample	8.6615 g	8.6086 g	0.0529 g	1.00
verification-3b	NA	1.000E+000	sample	8.6935 g	8.6407 g	0.0528 g	1.00

Spike Information

Sample ID	Standard ID	Analyte	Std Conc	Aliquot	Ref Date	StdAdded
	Rad12-0043	SR-90	22.387 dpm/mL	0.1 mL	11-29-12	

MS — Spiked By

LM — Spike Verified By

11-28-12 — Spike Date

Standard Operating Procedures

SOPNumber	Title	Revision
☐		

Reviewed By — 11/30/12 Review Date

MS — Analyst/Relenquished By — 11/28/12 Release Date

Received By — 11/28/12 Receipt Date

MS 11-30-12 ~~112~~ 112343897/MS/11-28-12

Balance ID / Initials / Date

Reagent

Th-229_00016

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

97790
Th-229 5 mL Liquid in Flame Sealed Vial

430569
ID: Th-229_00016
Exp:08/06/64 Prpd:SCB Opn:08/20/14
Th-229 Ampoule

Customer: TestAmerica - St. Louis
P.O. No.: 2573570, Item 1 Product Code: 8229

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Th-229	2.681E+06	3.761E+03	0.5	1.5	3.1	08/06/2014

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: α-impurities: Th-228 2.83E-01 Bq, Th-230 2.33E+01 Bq, Th-232 1.51E0 Bq; γ-impurities (other than decay products)<0.1%.
5.08156 g 0.5M HNO3 solution. Carrier free.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QC Approved: _____ Date: 06 AUG 14
A. Chen, Spectroscopist

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

ANA Form005 Rev. —

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

U.S. DEPARTMENT OF COMMERCE
National Institute of Standards & Technology
Gaithersburg, MD 20899

Certificate of Participation

Eckert & Ziegler Analytics
Atlanta, Georgia

is a participant for the period January 1, 2014, through December 31, 2014, in a radioactivity measurements assurance program conducted by the National Institute of Standards and Technology, in cooperation with NRMAP Incorporated. Continued participation is evidenced by dated Reports of Traceability issued for particular radionuclides, which indicate the deviation of the participant's reported value from that measured by the National Institute of Standards and Technology. The significance of these Reports is addressed below.*

For the Director,

Michael P. Unterweger, Leader
Radioactivity Group
Physical Measurement Laboratory

*As guidance for the proper use of Reports of Traceability, it should be emphasized that the National Institute of Standards and Technology is concerned only with fostering good measurements capability and consistency with the national measurements system. The assurance of the proper application of that capability to the ultimate consumer products is the responsibility of each manufacturer of these products and of the Federal regulatory agencies.

A continuing traceability program in radioactivity demonstrates, to the degree established by the periodic assays of calibrated radioactivity samples, a continuing competence to maintain the methods and standards necessary for accurate measurement. Such a program cannot, however, endorse each and every measurement nor the final product, any more than a spot check can vouch for every unchecked item. Care should be taken, therefore, not to imply such endorsement. The proper use of this Report is governed by section 200.114 of Title 15 of the Code of Federal Regulations. These regulations may be met if Reports are quoted only in their entirety. Excerpts out of context may be misleading.

1380 Seaboard Industrial Boulevard
Atlanta, Georgia 30318 USA
Phone (404) 352-8677 • Fax (404) 352-2837
Email: analytics@ezag.com (Tax EIN: 58-1406082)

Eckert & Ziegler
Analytics

Recommended Procedure for Opening the Flame Sealed Vial

1) If the solution is to be diluted, it is recommended that the diluting solution have a composition comparable to that of the standard.

2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood.

3) Shake the vial to wet the entire inside surface of the vial. Return the vial to the upright position.

4) Check that all of the liquid has drained out of the neck of the vial. If necessary, gently tap the neck to speed the process.

5) The Wheaton vials we use are pre-scored.

6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.

7) Hold the vial upright and wrap with soft tissue, such as Chem Wipes, around the tip of the vial and secure with tape (see picture). Snap off the top of the vial by pressing the pre-scored part of the neck away towards you while pulling the tip of the vial away from you.

8) Transfer the solution from the vial using a pycnometer or pipet with a dispenser handle. NEVER PIPETTE BY MOUTH.

9) Seal any unused solution in a flame sealed glass vial, if possible, to minimize the evaporation loss.

Reagent

Th-229_00023

Standard ID Number: Th-229_00023 (Coppt)
True Value = 67.21 dpm/mL
Date Analyzed: 12/20/2017

Radionuclide: Th-229

Replicates		
#1	69.18	dpm/mL
#2	67.64	dpm/mL
#3	64.07	dpm/mL

Mean = 66.9633333

1 sigma = 2.6213419

1.96 sigma = 5.13783

True Value minus 5% = 63.8495 (True Value - 5%)
True Value plus 5% = 70.5705 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: ALD 12/21/17

2nd Reviewed By/Date: RM 12.21.17

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	8/6/2014 0:00		
Decayto Date/Time (t):	12/20/17 0:00		
Initial Activity (A_0):	67.23 dpm		
Initial Aliquot:	1 mL		
Initial Conc:	67.22958 dpm/mL		
***Soln. Density:**	1 g/mL		
Nuclide:	Th-229		
Half-Life (days):	2897163	decay days	fraction
****Decay Factor:**	0.9997	1232.00	0.00043
Decay Corr Activity:	6.7210E+01 dpm		
Decay Corr Conc:	6.7210E+01 dpm/mL		

Conversion/Calculations

Final Activity Unit:	dpm
Activity Unit Factor:	1.00000
Final Volume Unit:	mL
Volume Unit Factor:	1.000
Final Concentration:	6.7210E+01 dpm/mL
Aliquot Volume:	1.0000E+00 mL
Final Activity (A):	6.7210E+01 dpm

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:43:30AM 12/21/2017

Sample

Sample Name: Ver1 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th 229 tracer
AnalysisResultsID: 206417
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

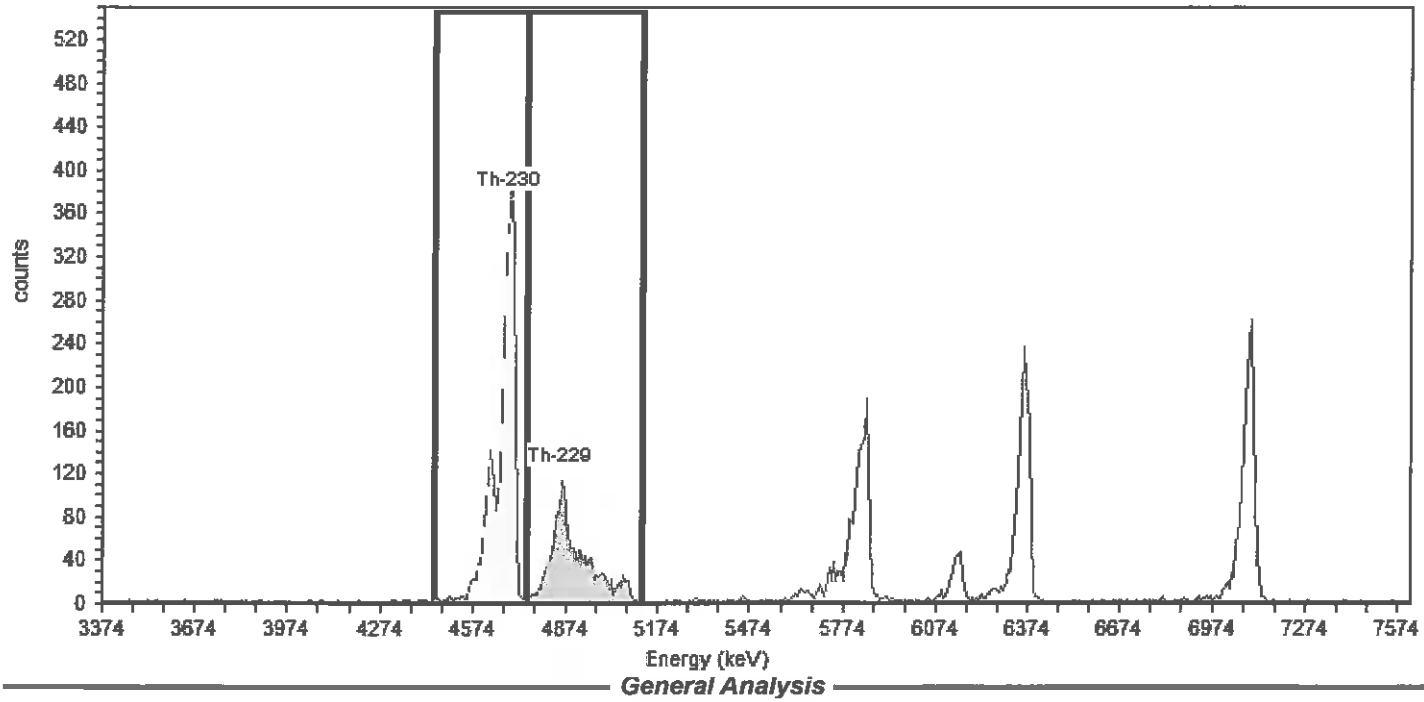
Tracer Name: Th-230_00036
Tracer Activity: 44.56 DPM / mL x (Vol.) 0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 11:41:20AM

Tracer Nuclide: Th-230
Tracer Recovery: 92.23%

Acquisition

Detector: AV210 SN: 50-119AA1
Acquisition Start Date: 12/20/2017 7:15:48PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/17/2017 3:28:10PM
Bkgd Info: Sample: ICB;AV210; Det: AV210; Spectrum #1; 11/17/2017 3:28:10 PM

Energy Calibration: IC-9795;AV210-20171114
Efficiency Calibration:IC-9795;AV210-20171114
Calibration Date: 11/14/2017 12:00:23PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 25.40% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: Absolute Interactive ROI Analysis
Decay Correction:12/20/2017 7:14:50PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-230	4688.0	4,687.5	0.5	4448.3	4746.6	50.8	99.7	3004	6.0000	2998.00	1.233E+002	DPM/mL
Th-229	4848.0	4,845.3	2.7	4746.6	5119.5	69.5	99.8	1554	1.0000	1553.00	6.918E+001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:44:04AM 12/21/2017

Sample

Sample Name: Ver2 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th 229 tracer
AnalysisResultsID: 206418
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

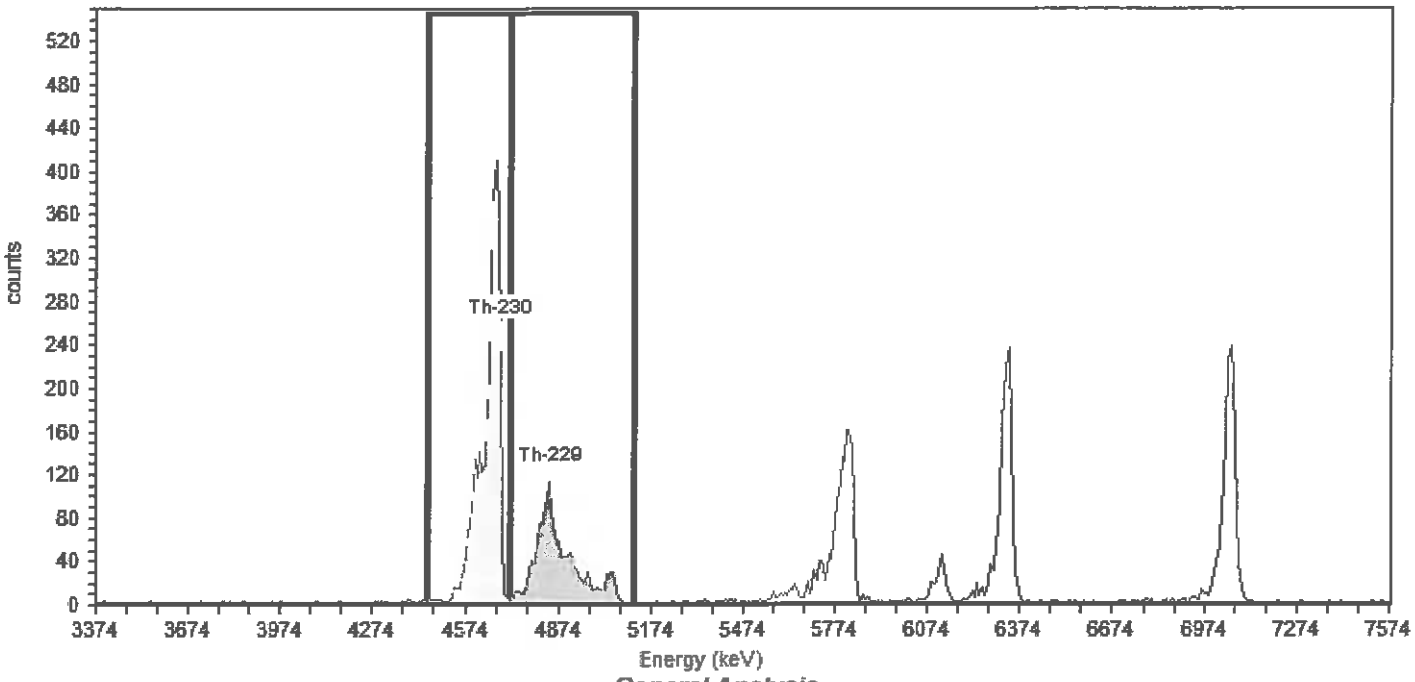
Tracer Name: Th-230_00036
Tracer Activity: 44.56 DPM / mL x (Vol.) 0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 11:41:20AM

Tracer Nuclide: Th-230
Tracer Recovery: 108.60%

Acquisition

Detector: AV211 SN: 50-117Z4
Acquisition Start Date: 12/20/2017 7:15:48PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/17/2017 3:28:10PM
Bkgd Info: Sample: ICB;AV211; Det: AV211; Spectrum #1; 11/17/2017 3:28:10 PM

Energy Calibration: IC-9817;AV211-20171114a
Efficiency Calibration:IC-9817;AV211-20171114a
Calibration Date: 11/14/2017 12:01:51PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.81% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th229_ROI_2010
Decay Correction:12/20/2017 7:14:50PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	22.9	99.7	3182	13.0310	3169.46	1.452E+002	DPM/mL
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	79.0	99.8	1615	10.0310	1605.15	6.764E+001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:45:14AM 12/21/2017

Sample

Sample Name: Ver3 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th 229 tracer
AnalysisResultsID: 206420
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

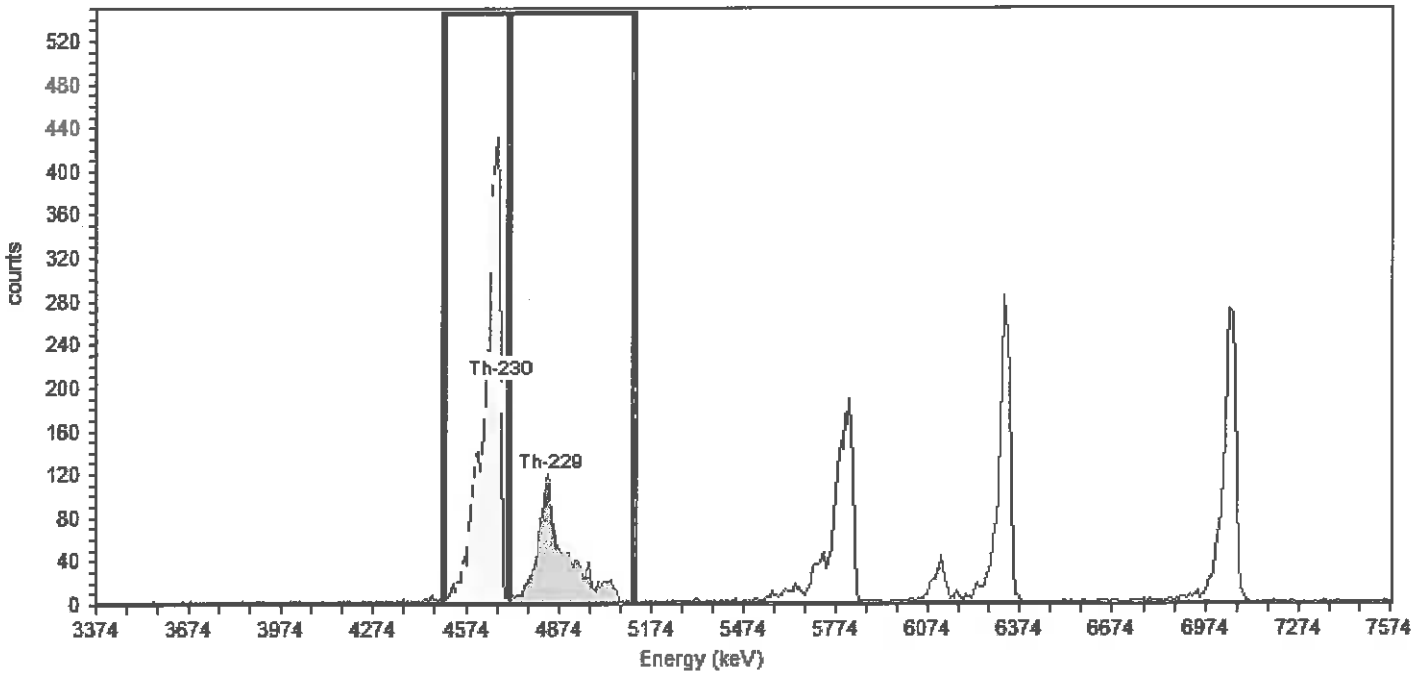
Tracer Name: Th-230_00036
Tracer Activity: 44.56 DPM / mL x (Vol.) 0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 11:41:20AM

Tracer Nuclide: Th-230
Tracer Recovery: 121.11%

Acquisition

Detector: AV212 SN: 49-155m5
Acquisition Start Date: 12/20/2017 7:15:48PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/17/2017 3:28:10PM
Bkgd Info: Sample: ICB;AV212; Det: AV212; Spectrum #1; 11/17/2017 3:28:10 PM

Energy Calibration: IC-9884;AV212-20171114
Efficiency Calibration:IC-9884;AV212-20171114
Calibration Date: 11/14/2017 12:01:41PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.41% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: Absolute Interactive ROI Analysis
Decay Correction:12/20/2017 7:14:50PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-230	4688.0	4,687.5	0.5	4500.5	4709.3	42.7	99.7	3475	2.0000	3473.00	1.619E+002	DPM/mL
Th-229	4848.0	4,845.3	2.7	4709.3	5119.5	67.0	99.8	1667	1.0000	1666.00	6.407E+001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Th-229 Tracer Verification (coppt.)

Standard Verification

Batch No. : _____

Balance ID : _____

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	VER. 1	0.1	210	
2	2	1	211	
3	3	1	212	
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A

Initials / Date

Isotope : Th-230
Std Sol'n No. : Th-230.00036
Vol (mL) : 0.3
Ref Activity (dpm/mL) : 44.5646
Act Ref Date : 08-08-13

Samples Spiked and Traced By:
SUB 12/19/17
Initials / Date

Verification Signature & Date:
RM 12/19/17
Initials / Date

LCS Standard ☐ N/A

Initials / Date

Isotope : Th-229
Std Sol'n ID. : Th-229.00023
Vol (mL) : 0.1
Ref Activity (dpm/mL) : 67.22958
Act Ref Date : 08-06-14

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐ ST-RC-0003 Rev.	☐ ST-RC-0040 Rev.	☐ ST-RC-0110 Rev.
☐ ST-RC-0004 Rev.	☐ ST-RC-0041 Rev.	☐ ST-RC-0120 Rev.
☐ ST-RC-0014 Rev.	☐ ST-RC-0050 Rev.	☐ ST-RC-0232 Rev.
☐ ST-RC-0020 Rev.	☐ ST-RC-0090 Rev.	☐ ST-RC-0238 Rev.
☐ ST-RC-0021 Rev.	☐ ST-RC-0100 Rev.	☐ ST-RC-0240 Rev.
		☐ ST-RC-0241 Rev.
		☐ ST-RC-0242 Rev.
		☐ ST-RC-5016 Rev.
		☐
		☐

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____
Date : _____

Reviewed by: _____
Date: _____

Th-229 Tracer ONLY VER.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Standard Verification (Coppt)

Batch No. : _____

Balance ID : _____

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	VER. 1	0.1	205	RC: 147
2	2	0.1	207	RC: 149
3	3	0.1	209	RC: 152
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A

Initials / Date

Isotope : Th-229

Std Sol'n No. : Th-229.00023

Vol (mL) : 0.1

Ref Activity (dpm/mL) : 67.22958

Act Ref Date : 08-06-14

Samples Spiked and Traced By:

SUB 12/19/17

Initials / Date

Verification Signature & Date:

JDM 12/19/17

Initials / Date

LCS Standard ☐ N/A

Initials / Date

Isotope : I

Std Sol'n ID. :

Vol (mL) :

Ref Activity (dpm/mL) :

Act Ref Date :

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐	ST-RC-0003 Rev.	☐	ST-RC-0040 Rev.	☐	ST-RC-0110 Rev.
☐	ST-RC-0004 Rev.	☐	ST-RC-0041 Rev.	☐	ST-RC-0120 Rev.
☐	ST-RC-0014 Rev.	☐	ST-RC-0050 Rev.	☐	ST-RC-0232 Rev.
☐	ST-RC-0020 Rev.	☐	ST-RC-0090 Rev.	☐	ST-RC-0238 Rev.
☐	ST-RC-0021 Rev.	☐	ST-RC-0100 Rev.	☐	ST-RC-0240 Rev.
				☐	ST-RC-0241 Rev.
				☐	ST-RC-0242 Rev.
				☐	ST-RC-5016 Rev.
				☐	
				☐	

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____

Date : _____

Reviewed by: _____

Date: _____

\\Slsvr01\RAD\MasterForms\RAD-0045 Rev(3)

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:01:20AM 1/15/2018

Sample

Sample Name: Ver. 1
SampleType: Sample

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Sample Collection Date:

Batch

Batch Name: Th-229 Tracer Only
AnalysisID: 719841

Analyst: 60040

Tracer

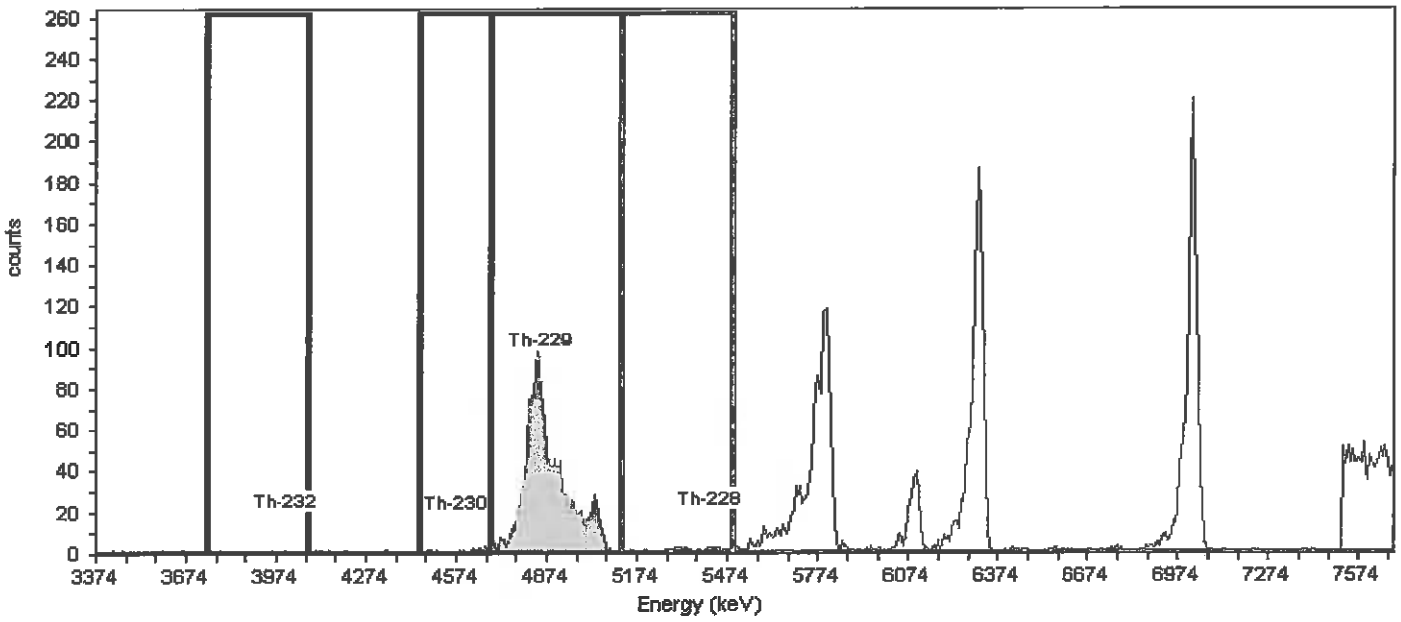
Tracer Name: Undefined
Tracer Activity:
Tracer Ref. Date:

Tracer Nuclide: External Recovery
Tracer Recovery: 100.00%

Acquisition

Detector: AV97
Serial Number: 76-03393
Acquisition Start Date: 1/12/2018 5:11:28PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 12/19/2017 12:16:50PM
Background Info: Sample: ICB;AV97; Det: AV97; Spectrum #1; Dec-19-2017 12:16

Calibration Name: IC-9886;AV97-20170802
Calibration Date: 8/2/2017 11:02:54AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.33% +/- 0.31% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 1/12/2018 5:08:17PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	11.9	100.2	3	1.0000	2.43	0.113	DPM/mL
Th-230	4567.6	4,687.5	-119.9	4448.3	4686.9	29.6	99.7	18	0.0000	18.00	0.842	DPM/mL
Th-229	4848.0	4,845.3	2.7	4686.9	5119.5	82.2	99.8	1538	1.0000	1537.00	71.851	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	140.5	99.8	37	17.9134	19.17	0.897	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:01:54AM 1/15/2018

Sample

Sample Name: Ver 2
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: Th-229 Tracer Only
AnalysisID: 719839

Analyst: 60040

Tracer

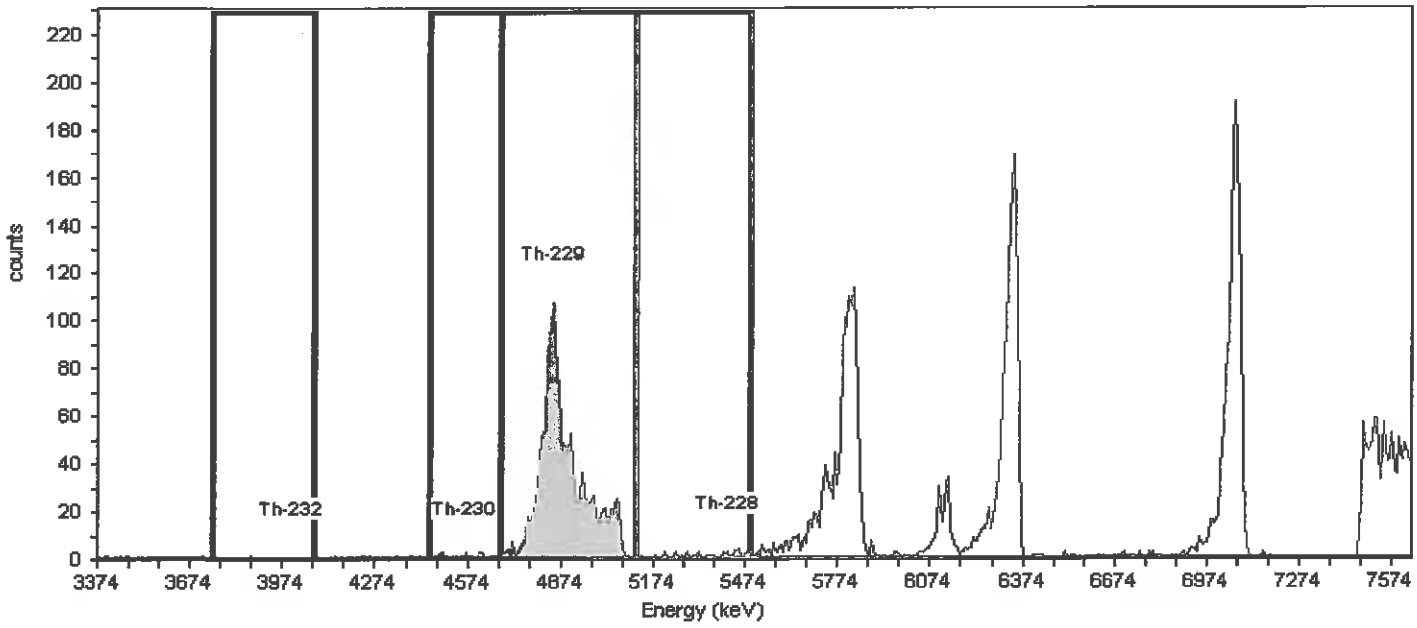
Tracer Name: Undefined
Tracer Activity:
Tracer Ref. Date:

Tracer Nuclide: External Recovery
Tracer Recovery: 100.00%

Acquisition

Detector: AV96
Serial Number: 46-033P1
Acquisition Start Date: 1/12/2018 5:11:26PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 12/19/2017 12:16:48PM
Background Info: Sample: ICB;AV96; Det: AV96; Spectrum #1; Dec-19-2017 12:16

Calibration Name: IC-9885;AV96-20170802
Calibration Date: 8/2/2017 11:02:35AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.24% +/- 0.36% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 1/12/2018 5:08:17PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	44.5	100.2	1	1.0000	0.00	0.000	DPM/mL
Th-230	4563.9	4,687.5	-123.6	4448.3	4679.5	196.1	99.7	23	0.0000	23.00	0.992	DPM/mL
Th-229	4848.0	4,845.3	2.7	4679.5	5119.5	76.5	99.8	1561	2.0000	1559.00	67.142	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	15.1	99.8	39	14.0000	25.00	1.077	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:02:07AM 1/15/2018

Sample

Sample Name: Ver 3
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: Th-229 Tracer Only
AnalysisID: 719837

Analyst: 60040

Tracer

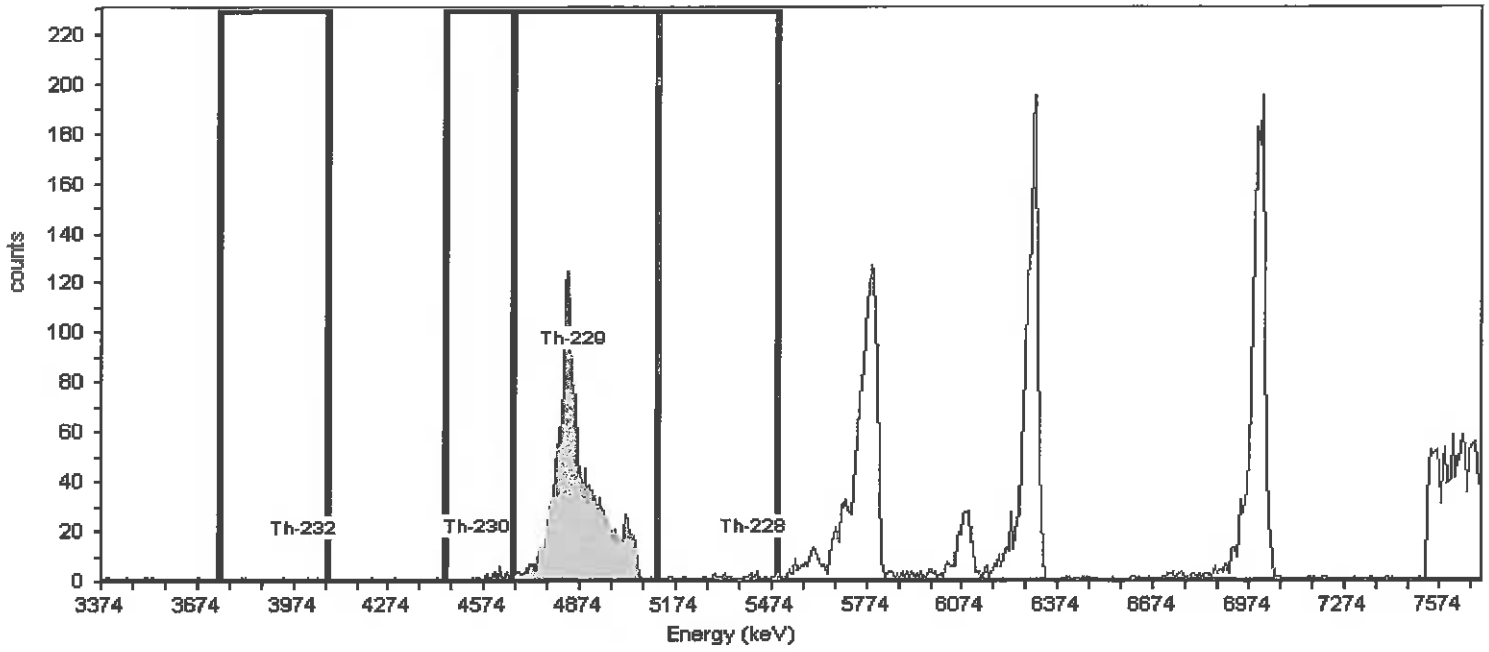
Tracer Name: Undefined
Tracer Activity:
Tracer Ref. Date:

Tracer Nuclide: External Recovery
Tracer Recovery: 100.00%

Acquisition

Detector: AV94
Serial Number: 49-203ff5
Acquisition Start Date: 1/12/2018 5:11:25PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 12/20/2017 2:53:21PM
Background Info: Sample: ICB;AV94; Det: AV94; Spectrum #1; Dec-20-2017 14:53

Calibration Name: IC-9817;AV94-20170802
Calibration Date: 8/2/2017 11:02:05AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 23.29% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 1/12/2018 5:08:17PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	10.8	100.2	6	1.0000	4.57	0.204	DPM/mL
Th-230	4556.4	4,687.5	-131.1	4448.3	4664.6	52.6	99.7	22	0.0000	22.00	0.987	DPM/mL
Th-229	4848.0	4,845.3	2.7	4664.6	5119.5	68.6	99.8	1596	3.0000	1593.00	71.396	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	181.0	99.8	27	14.0000	12.91	0.579	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Reagent ID: Th-229_00023

Description:	Th-229 Tracer	Expiration Date:	12/20/2018
No. of Bottles:	1	Laboratory:	TestAmerica St. Louis
Storage Location:	RAD Actinide STDs	Prepared By:	Bernsen, Sarah C
Reagent Volume:	500.000 mL	Solvent:	0.1M HNO3
Creation Date:	12/15/2017	Solvent Lot:	n/a
Open Date:			
Container(s):	1347365		
Comment:			

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
At-217	Th-229_00017	03/26/2018	2240.98600	dpm/mL	67.22958	dpm/mL
Th-229	Th-229_00017	03/26/2018	2240.98600	dpm/mL	67.22958	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Th-229_00017	Th-229 Parent		03/26/18				15.00000	mL

Reagent

Th-230_00015

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

92523
Th-230 5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2502650, Item 2 Product Code: 8230-5FSA-4kBq

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty*, % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Th-230	2.753E+07	3.979E+03	0.1	0.9	1.8	11/29/2012

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: α-impurities 1.5915 Bq; γ-impurities (other than decay products)<0.1%.
5.07636 g 0.5M HNO3 solution. Carrier free.

Source Prepared by: M. I. Taskaeva, Radiochemist

QA Approved: J.D. McCorvey, Counting Room Manager Date: 27 Nov 12

51464
ID Th-230_00015
Th-230 Ampoule

RAD12-0040
Th-230 Ampoule
hursts
None
Prep/Opened: 11/28/2012
Exp(1): 11/28/2062
Exp(2): 11/28/2062

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Single Isotope Certificate Rev 3, 23 August 2012

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Th-230_00016

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

92523

Th-230 5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2502650, Item 2 Product Code: 8230-5FSA-4kBq

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty*, % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Th-230	2.753E+07	3.979E+03	0.1	0.9	1.8	11/29/2012

*Uncertainty: U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: α-impurities 1.5915 Bq; γ-impurities (other than decay products)<0.1%.
5.07636 g 0.5M HNO3 solution. Carrier free.

Source Prepared by: M. I. Taskaeva, Radiochemist

QA Approved: J.D. McCorvey, Counting Room Manager Date: 27 Nov 12

51464
ID Th-230_00015
Th-230 Ampoule

RAD12-0040
Th-230 Ampoule
hursts
None
Prep/Opened: 11/28/2012
Exp(1): 11/28/2062
Exp(2): 11/28/2062

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

TestAmerica St. Louis

Standards Preparation Logbook Record

Nov-28-2012

Logbook: \\Qstlmo01\Stdslog\RAD_STD.std

RAD12-0040, Th-230 Ampoule Th-230_00015 # 51464 Analyst: hursts

Vendor: Analytics Lot No.: 92523
Solvent: None
Date Prep./Opened: 11-28-2012 Date Consumed: 11-28-2012
Date Expires(1): 11-28-2062 (50 Years)
Date Expires(2): 11-28-2062 (50 Years)
Cert: 92523 Activity: 3979Bq Reference Date: 11/29/12 Mass: 5.07636

Component	Initial Conc (dpm/g)	Final Conc (dpm/g)
Th-230	47,030	47,030

RAD12-0041, Th-230 Calibration Standard Th-230_00016 # 51465 Analyst: hursts

Solvent: 0.5M HNO3 Volume (ml): 100.00
Date Prep./Opened: 11-28-2012
Date Expires(1): 11-29-2062 (50 Years)
Date Expires(2): 11-29-2062 (50 Years)

Parent Std No.: RAD12-0040, Th-230 Ampoule Aliquot Amount (g): 5.0489
Parent Date Expires(1): 11-28-2062 Parent Date Expires(2): 11-28-2062

Component	Initial Conc (dpm/g)	Final Conc (dpm/mL)
Th-230	47,030	2,374.5

Reviewed By: SH

Page 1 of 1

St. Louis Radiological Standard Reverification Form

Standard ID Number: Rad12-0041
True Value = 1069.59 pCi/mL
Date Analyzed: 11/30/2012

Radionuclide: Th-230 Gross Alpha

	Replicates	
#1	1071	pCi/mL
#2	1027	pCi/mL
#3	1085	pCi/mL

Mean = 1061

1 sigma = 30.26549 1.96 sigma = 59.32036

True Value minus 5% = 1016.111 (True Value - 5%)
True Value plus 5% = 1123.07 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: JL 11/30/12

SOP Reference: STL-QA-0002, Current Revision

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122628 **Operator:** 63903

Sample ID	WRKNO	*Aliquot*		*Mass*	*Instr ID*	*CountTime*		*Ts*	*Tb*	*Dilution*	*Sigma*	
	Analyte	Cs	Cb	XT	CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC
verification 1a	NA	*1.000E+000mL*		*0.0546 g*	*Purple16*	*11/30/12 13:03*		*8.00*	*1000.00*	*1.00*	*1.00*	
	Gross Alpha	2528	175	0.00	3.160E+002	1.750E-001	0.1328	**1.071E+006**pCi/L	6.469E+004	2.132E+004	2.807E+003	1.167E+003
	Gross Beta	792	485	0.00	9.900E+001	4.850E-001	0.4280	**1.037E+005**pCi/L	6.370E+003	3.702E+003	1.212E+003	6.028E+002
verification 2a	NA	*1.000E+000mL*		*0.0536 g*	*Purple17*	*11/30/12 13:03*		*8.00*	*1000.00*	*1.00*	*1.00*	
	Gross Alpha	2364	87	0.00	2.955E+002	8.700E-002	0.1295	**1.027E+006**pCi/L	6.225E+004	2.113E+004	2.376E+003	8.436E+002
	Gross Beta	764	362	0.00	9.550E+001	3.620E-001	0.4353	**9.846E+004**pCi/L	6.084E+003	3.576E+003	1.078E+003	5.121E+002
verification 3a	NA	*1.000E+000mL*		*0.0531 g*	*Purple18*	*11/30/12 13:04*		*8.00*	*1000.00*	*1.00*	*1.00*	
	Gross Alpha	2521	62	0.00	3.151E+002	6.200E-002	0.1308	**1.085E+006**pCi/L	6.551E+004	2.161E+004	2.168E+003	7.052E+002
	Gross Beta	788	395	0.00	9.850E+001	3.950E-001	0.4295	**1.029E+005**pCi/L	6.325E+003	3.680E+003	1.125E+003	5.421E+002

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Prep Report for Gross Alpha/Beta

Batch: M122628 **Prep Analyst:** 250

SampID	WRKNO	Aliquot	Gross	Tare	Mass	Dilution
verification 1a	NA	6.500E-001 mL	8.6982 g	8.6436 g	0.0546 g	1.00
		Orange 5	protean 14		16	
verification 2a	NA	6.500E-001 mL	8.6698 g	8.6162 g	0.0536 g	1.00
		7	15		17	
verification 3a	NA	6.500E-001 mL	8.6466 g	8.5935 g	0.0531 g	1.00
		8			18	

Spike Information

Sample ID	Standard ID	Analyte	Std Conc	Aliquot	Ref Date	StdAdded
	Rad12-0041	Th-230	2374.5 dpm/mL	1.00 mL	11-29-12	

MS — Spiked By

LM per MS — Spike Verified By

11-28-12 — Spike Date

Standard Operating Procedures

SOPNumber	Title	Revision
☐		

Reviewed By — 11/30/12 Review Date

MS — Analyst/Relenquished By — 11-28-12 Release Date — Received By — 11/28/12 Receipt Date

1123433897/MS/11-28-12

Balance ID / Initials / Date

Reagent

Th-230_00019

TestAmerica St. Louis

Standards Preparation Logbook Record

Aug-13-2013

Logbook: \\Qstlmo01\Stdslog\RAD_STD.std

RAD13-0028, Th-230 Ampoule — Analyst: marrss

Vendor: Analytics Lot No.: 92776
Solvent: None
Date Prep./Opened: 08-13-2013
Date Expires(1): 08-08-2063 (50 Years)
Date Expires(2): 08-08-2063 (50 Years)
Activity: 3.728 E+03 Bq, Ref date: 08/08/2013, Solution mass: 5.09261g, Source ID: 92776

Component	Initial Conc (dpm/g)	Final Conc (dpm/g)
Th-230	43,922	43,922

Th-230-00019 #181198

RAD13-0029, Th-230 Parent — Analyst: marrss

Solvent: ~~None~~ 1M HNO3 SUB 8/13/13 Volume (ml): 100.00
Date Prep./Opened: 08-13-2013
Date Expires(1): 08-08-2063 (50 Years)
Date Expires(2): 08-08-2063 (50 Years)

Parent Std No.: RAD13-0028, Th-230 Ampoule Aliquot Amount (g): 5.0731
Parent Date Expires(1): 08-08-2063 Parent Date Expires(2): 08-08-2063

Component	Initial Conc (dpm/g)	Final Conc (dpm/mL)
Th-230	43,922	2,228.2

Reviewed By: SUB

Page 1 of 1

Th-230 Parent

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Reagent ID: Th-230_00019

		Expiration Date:	08/08/2063
Description:	Th-230 Parent	Laboratory:	TestAmerica St. Louis
No. of Bottles:	1	Prepared By:	Bernsen, Sarah C
Storage Location:	RAD Actinide STDs	Solvent:	1M HNO3
Reagent Volume:	100.000 mL	Solvent Lot:	n/a
Creation Date:	08/13/2013		
Container(s):	181198		
Comment:			

Reagent Analyte Information

Analyte	Source ID	Source Expiration Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
Th-230	Th-230_00018	08/08/2063	43922.46	dpm/g	2228.23072	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Th-230_00018	Th-230 Ampoule	ASTD	08/08/63	Eckert & Ziegler	92776		5.07310	mL

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

92776

Th-230 5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica
P.O. No.: 2532686, Item 1 Product Code: 8230-5FSA-4kBq

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Th-230	2.753E+07	3.728E+03	0.1	0.9	1.8	08/08/2013

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: α-impurities 0.04%; γ-impurities (other than decay products)<0.1%.
5.09261 g 0.5M HNO3 solution. Carrier free.

Source Prepared by: R. Ormsby
R. Ormsby, Radiochemist

QA Approved:
J.D. McCorvey, Counting Room Manager

Date: 6AUG13

RAD13-0029
Th-230 Parent
marrss
None
Prep/Opened: 8/13/2013
Exp(1): 8/8/2063
Exp(2): 8/8/2063

181198
ID: Th-230_00019
Exp: 08/08/63 Prpd: SH Cal. 08/13/13
Th-230 Parent

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Single Isotope Certificate Rev 3, 23 August 2012

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Th-230_00036

Standard ID Number: Th-230_00034
True Value = 44.563 dpm/mL
Date Analyzed: 8/28/2017

Radionuclide: Th-230

	Replicates	
#1	44.57	dpm/mL
#2	44.43	dpm/mL
#3	43.79	dpm/mL

Mean = 44.2633333

1 sigma = 0.41585254 1.96 sigma = 0.815071

True Value minus 5% = 42.33485 (True Value - 5%)
True Value plus 5% = 46.79115 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: ALD 8/29/17

2nd Reviewed By/Date: RM 8·29·17

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	8/8/2013 0:00		
Decayto Date/Time (t):	8/28/17 0:00		
Initial Activity (A_0):	44.56 dpm		
Initial Aliquot:	1 mL		
Initial Conc:	44.5646 dpm/mL		
***Soln. Density:**	1 g/mL		
Nuclide:	Th-230		
Half-Life (days):	27539850	decay days	fraction
****Decay Factor:**	1.0000	1481.00	0.00005
Decay Corr Activity:	4.4563E+01 dpm		
Decay Corr Conc:	4.4563E+01 dpm/mL		

Conversion/Calculations

Final Activity Unit:	dpm
Activity Unit Factor:	1.00000
Final Volume Unit:	mL
Volume Unit Factor:	1.000
Final Concentration:	4.4563E+01 dpm/mL
Aliquot Volume:	1.0000E+00 mL
Final Activity (A):	4.4563E+01 dpm

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:33:49AM 8/29/2017

Sample

Sample Name: Verification 1 Type: Sample
Spectrum #1 Analysis #1

Sample Collection Date:
Comment:

Sample Volume : 0.30 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th-230_00034
AnalysisResultsID: 199659
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

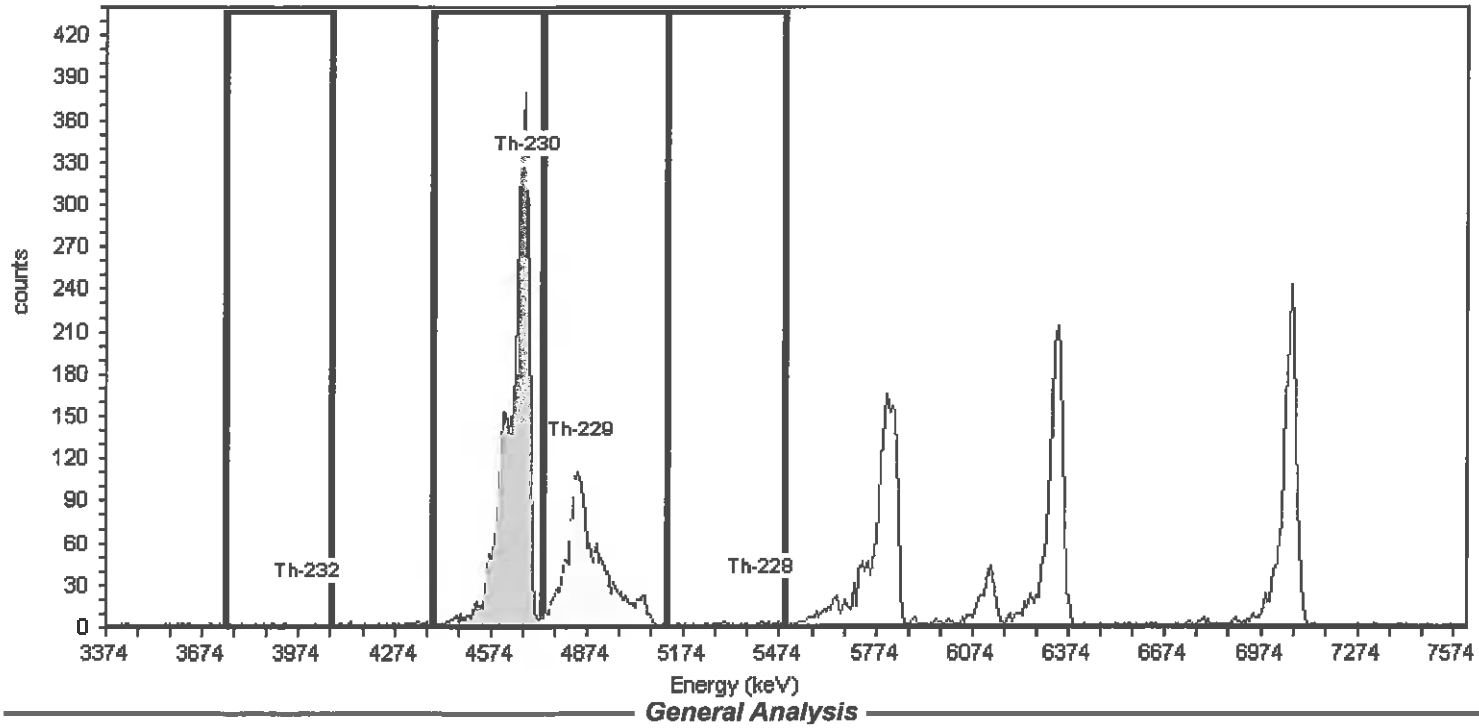
Tracer Name: Th-229_00022
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/6/2014 9:07:15AM

Tracer Nuclide: Th-229
Tracer Recovery: 107.32%

Acquisition

Detector: AV175 SN: 50-117H1
Acquisition Start Date: 8/28/2017 3:27:30PM
Live Time: 960.00 min.
Real Time: 960.23 min.
Background Date: 8/21/2017 10:26:15PM
Bkgd Info: Sample: ICB:AV175; Det: AV175; Spectrum #1; 8/21/2017 10:26:15 PM

Energy Calibration: IC-9885;AV175-20161111
Efficiency Calibration:IC-9885;AV175-20161111
Calibration Date: 11/14/2016 8:18:26AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.93% +/- 0.37% TPU(2 sigma)



General Analysis

Analysis Method: Absolute Interactive ROI Analysis
Decay Correction:8/28/2017 3:25:48PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	317.3	100.2	8	1.0000	6.88	8.917E-002	DPM/mL
Th-230	4688.0	4,687.5	0.5	4388.6	4731.7	62.5	99.7	3429	5.0000	3424.00	4.457E+001	DPM/mL
Th-229	4848.0	4,845.3	2.7	4731.7	5119.5	87.7	99.6	1723	3.0000	1720.00	2.405E+001	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	32.7	99.8	43	14.0866	28.80	3.748E-001	DPM/mL

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:33:17AM 8/29/2017

Sample

Sample Name: Verification 2 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.30 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th-230_00034
AnalysisResultsID: 199658
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

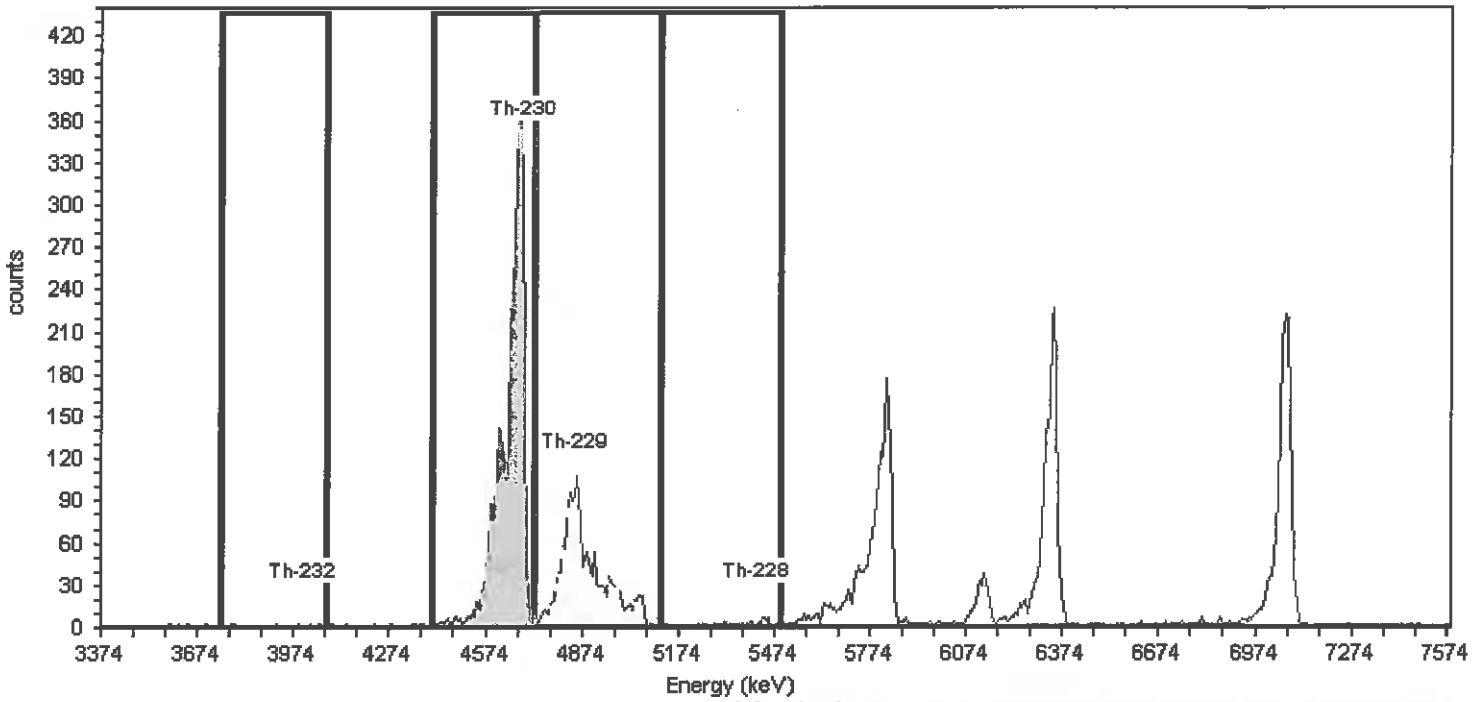
Tracer Name: Th-229_00022
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/6/2014 9:07:15AM

Tracer Nuclide: Th-229
Tracer Recovery: 96.37%

Acquisition

Detector: AV177 SN: 50-117H3
Acquisition Start Date: 8/28/2017 3:27:30PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 8/21/2017 10:26:16PM
Bkgd Info: Sample: ICB:AV177; Det: AV177; Spectrum #1; 8/21/2017 10:26:16 PM

Energy Calibration: IC-7107;AV177-20161206
Efficiency Calibration:IC-7107;AV177-20161206
Calibration Date: 12/16/2016 8:22:47AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 25.69% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute Interactive ROI Analysis
Decay Correction:8/28/2017 3:25:48PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	14.3	100.2	6	0.0000	6.46	9.039E-002	DPM/mL
Th-230	4688.0	4,687.5	0.5	4403.6	4724.2	33.5	99.7	3163	4.0000	3159.00	4.443E+001	DPM/mL
Th-229	4848.0	4,845.3	2.7	4724.2	5119.5	80.6	99.6	1598	6.0000	1592.00	2.160E+001	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	16.8	99.8	49	14.9361	33.72	4.740E-001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:32:40AM 8/29/2017

Sample

Sample Name: Verification 3 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.30 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th-230_00034
AnalysisResultsID: 199657
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

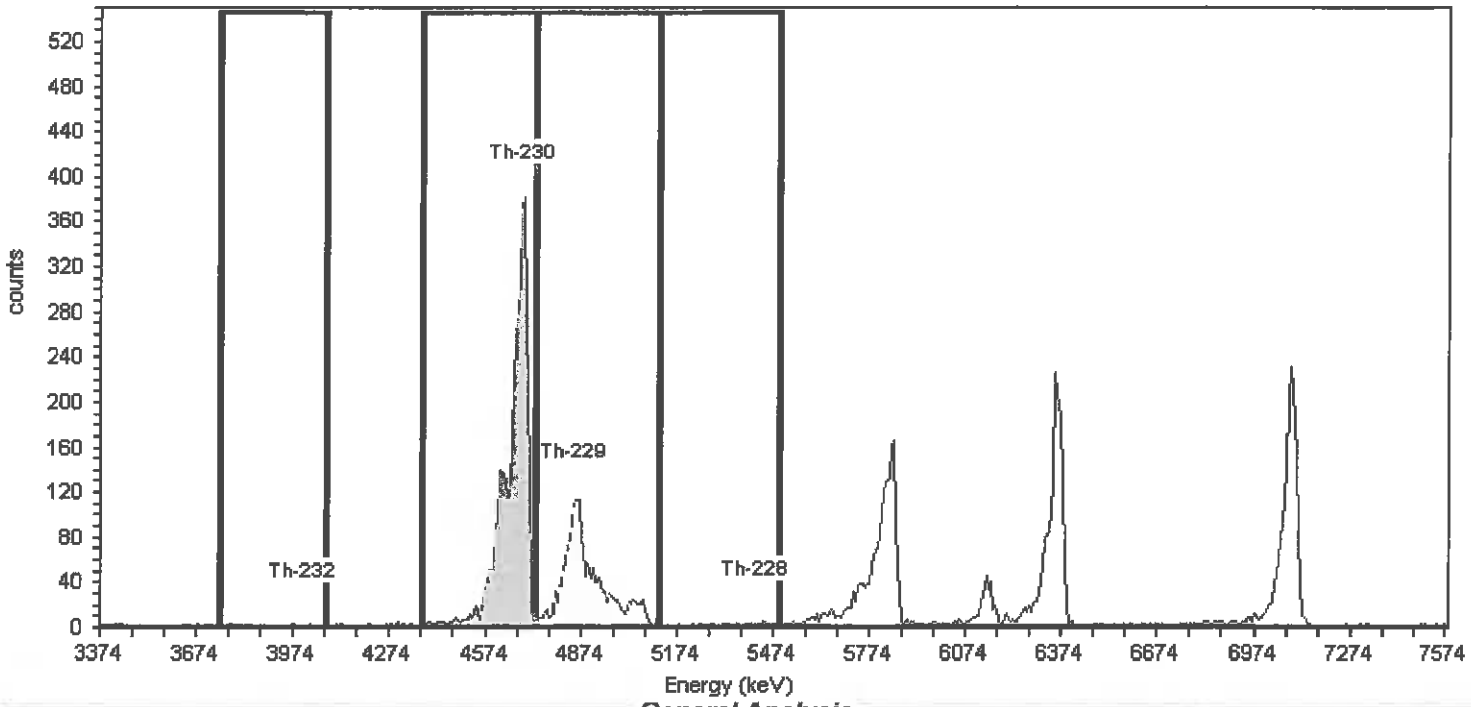
Tracer Name: Th-229_00022
Tracer Activity: 67.23 DPM / mL x (Vol.) 0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/6/2014 9:07:15AM

Tracer Nuclide: Th-229
Tracer Recovery: 99.84%

Acquisition

Detector: AV178 SN: 50-117H4
Acquisition Start Date: 8/28/2017 3:27:30PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 8/21/2017 10:26:16PM
Bkgd Info: Sample: ICB:AV178; Det: AV178; Spectrum #1; 8/21/2017 10:26:16 PM

Energy Calibration: IC-8874;AV178-20161206
Efficiency Calibration:IC-8874;AV178-20161206
Calibration Date: 12/16/2016 8:22:54AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.36% +/- 0.38% TPU(2 sigma)



General Analysis

Analysis Method: Absolute Interactive ROI Analysis
Decay Correction:8/28/2017 3:25:48PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	221.8	100.2	3	1.0000	2.00	2.634E-002	DPM/mL
Th-230	4688.0	4,687.5	0.5	4373.7	4731.7	20.0	99.7	3310	1.0000	3309.00	4.379E+001	DPM/mL
Th-229	4848.0	4,845.3	2.7	4731.7	5119.5	74.7	99.6	1693	1.0000	1692.00	2.237E+001	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	15.9	99.8	33	16.9134	15.91	2.105E-001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Aliquot Only

Th-230 spike Ver (copper)

Batch No. : —

Balance ID : —

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	Ver 1	0.3	175	
2	2	1	177	
3	3		178	
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A.
i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A (Initials / Date)

Isotope : Th-229
Std Sol'n No. : Th-229.0022
Vol (mL) : 0.1
Ref Activity (dpm/mL) : 67.229
Act Ref Date : 08/01/14

Samples Spiked and Traced By: SUB 8/28/17 (Initials / Date)

Verification Signature & Date: NN 8.28.17 (Initials / Date)

LCS Standard ☐ N/A (Initials / Date)

Isotope : Th-230
Std Sol'n ID. : Th-230.00034
Vol (mL) : 0.3
Ref Activity (dpm/mL) : 44.5644
Act Ref Date : 08/08/13

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐ ST-RC-0003 Rev.	☐ ST-RC-0040 Rev.	☐ ST-RC-0110 Rev.
☐ ST-RC-0004 Rev.	☐ ST-RC-0041 Rev.	☐ ST-RC-0120 Rev.
☐ ST-RC-0014 Rev.	☐ ST-RC-0050 Rev.	☐ ST-RC-0232 Rev.
☐ ST-RC-0020 Rev.	☐ ST-RC-0090 Rev.	☐ ST-RC-0238 Rev.
☐ ST-RC-0021 Rev.	☐ ST-RC-0100 Rev.	☐ ST-RC-0240 Rev.
		☐ ST-RC-0241 Rev.
		☐ ST-RC-0242 Rev.
		☐ ST-RC-5016 Rev.
		☐
		☐

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☑	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : SUB
Date : 8/28/13

Reviewed by: _____
Date: _____

\\Slsvr01\RAD\MasterForms\RAD-0045 Rev(3)

Reagent

U-232_00003

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

85539-334

5 mL Liquid in Flame Sealed Vial

Customer: Test America/Earth City, MO
P.O. No.: 2434448, Item 1

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry and liquid scintillation counting. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty*, % Type u_A	u_B	U	Reference Date (12:00 PM EST)
U-232	2.517E+04	1.725E+04	0.5	2.4	4.9	08/25/2011

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: U-232 daughters, γ-impurities (other than decay products) < 0.1 %.

Source Prepared by: M. I. Taskaeva
M. I. Taskaeva, Radiochemist

QA Approved:
J. D. McCorvey, QA Manager Alternate

Date: 8/25/11

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

U-232_00040

Standard ID Number:	U-232_00040 (Clean)		Radionuclide:
True Value =	77.177	dpm/mL	U-232
Date Analyzed:	12/20/2017		

	Replicates	
#1	83.23	dpm/mL
#2	76.85	dpm/mL
#3	78.14	dpm/mL

Mean = 79.4066667

1 sigma = 3.37334157 1.96 sigma = 6.611749

True Value minus 5% = 73.31815 (True Value - 5%)
True Value plus 5% = 81.03585 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: ALD 12/21/17

2nd Reviewed By/Date: [illegible] 12-21-17

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	8/25/2011 0:00		
Decayto Date/Time (t):	12/20/17 0:00		
Initial Activity (A_0):	82.25 dpm		
Initial Aliquot:	1 mL		
Initial Conc:	82.245 dpm/mL		
***Soln. Density:**	1 g/mL		
Nuclide:	U-232		
Half-Life (days):	25165.725	decay days	fraction
****Decay Factor:**	0.9384	2309.00	0.09175
Decay Corr Activity:	7.7177E+01 dpm		
Decay Corr Conc:	7.7177E+01 dpm/mL		

Conversion/Calculations

Final Activity Unit:	dpm
Activity Unit Factor:	1.00000
Final Volume Unit:	mL
Volume Unit Factor:	1.000
Final Concentration:	7.7177E+01 dpm/mL
Aliquot Volume:	1.0000E+00 mL
Final Activity (A):	7.7177E+01 dpm

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:50:32AM 12/21/2017

Sample

Sample Name: Ver1 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: U232 Clean
AnalysisResultsID: 206424
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

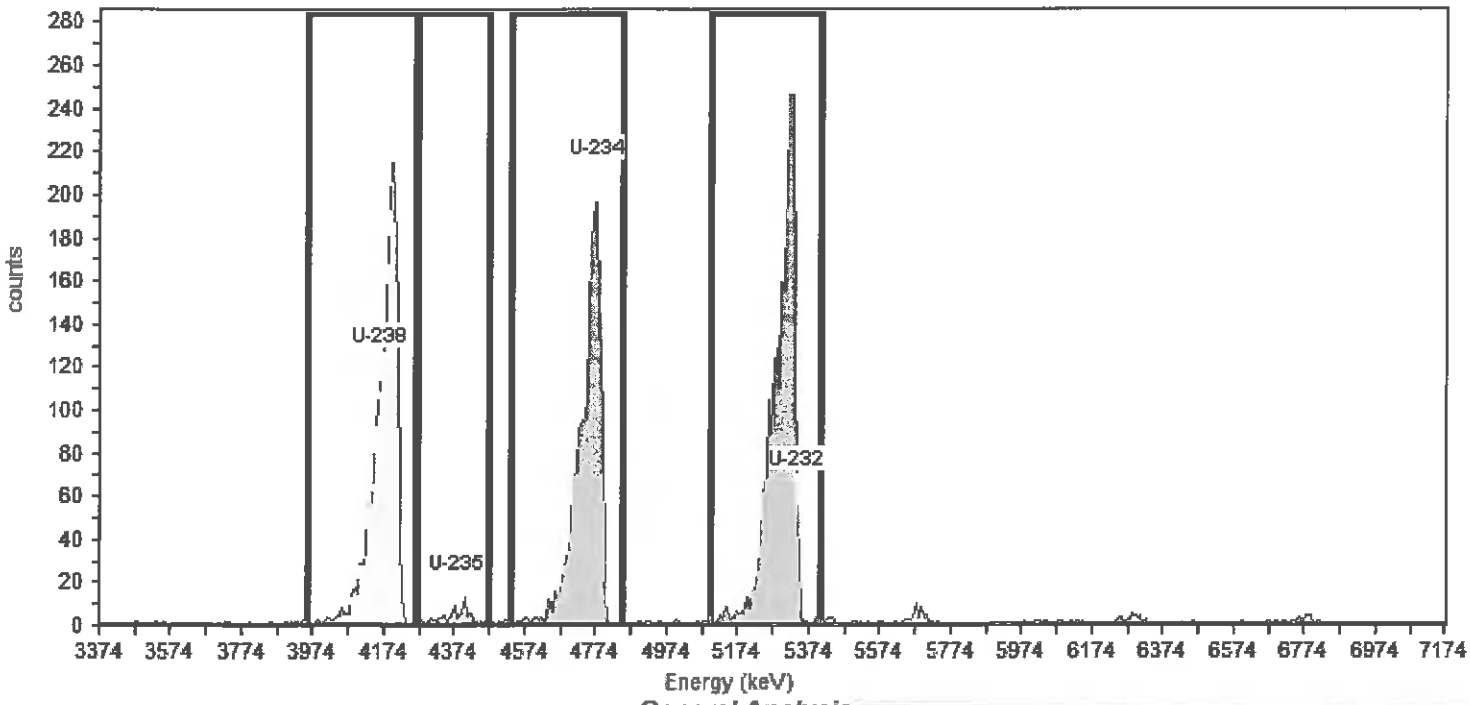
Tracer Name: UNAT_00013
Tracer Activity: 72.26 DPM / mL x (Vol.) 0.10 mL = 7.23 DPM
Tracer Ref. Date: 3/30/2008 11:48:31AM

Tracer Nuclide: U-238
Tracer Recovery: 114.55%

Acquisition

Detector: AV239 SN: 51-005EE1
Acquisition Start Date: 12/20/2017 7:23:04PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Background Date: 11/17/2017 3:28:16PM
Bkgd Info: Sample: ICB;AV239; Det: AV239; Spectrum #1; 11/17/2017 3:28:16 PM

Energy Calibration: IC-9794;AV239-20171114
Efficiency Calibration:IC-9794;AV239-20171114
Calibration Date: 11/15/2017 8:27:30AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.25% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI_U-232
Decay Correction:12/20/2017 7:22:15PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	62.0	100.0	1770	2.0000	1768.00	8.278E+001	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	52.3	80.2	83	4.0000	79.00	4.026E+000	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	62.5	99.8	1701	3.0000	1698.00	6.954E+001	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	72.6	100.1	2043	5.0000	2038.00	8.323E+001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:51:03AM 12/21/2017

Sample

Sample Name: Ver2 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: U232 Clean
AnalysisResultsID: 206425
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

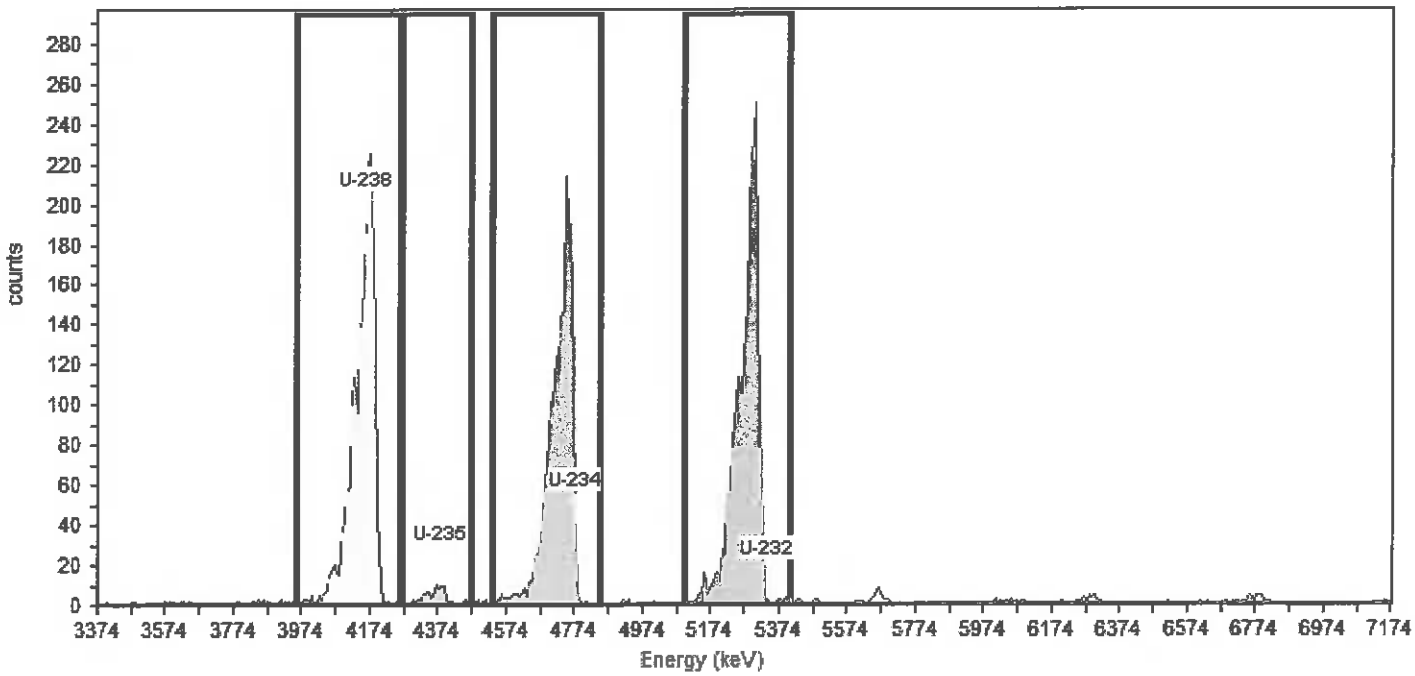
Tracer Name: UNAT_00013
Tracer Activity: 72.26 DPM / mL x (Vol.) 0.10 mL = 7.23 DPM
Tracer Ref. Date: 3/30/2008 11:48:31AM

Tracer Nuclide: U-238
Tracer Recovery: 103.73%

Acquisition

Detector: AV240 SN: 51-005Q1
Acquisition Start Date: 12/20/2017 7:23:05PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Background Date: 11/17/2017 3:28:16PM
Bkgd Info: Sample: ICB;AV240; Det: AV240; Spectrum #1; 11/17/2017 3:28:16 PM

Energy Calibration: IC-9795;AV240-20171114
Efficiency Calibration:IC-9795;AV240-20171114
Calibration Date: 11/15/2017 8:27:37AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.17% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI_U-232
Decay Correction:12/20/2017 7:22:15PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	63.1	100.0	1884	1.0000	1883.00	7.496E+001	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	63.7	80.2	74	1.0000	73.00	3.493E+000	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	71.3	99.8	1817	4.0000	1813.00	6.972E+001	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	67.7	100.1	2005	1.0000	2004.00	7.685E+001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:51:36AM 12/21/2017

Sample

Sample Name: Ver3 Type: Sample
Spectrum #1 Analysis #1

Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: U232 Clean
AnalysisResultsID: 206426
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

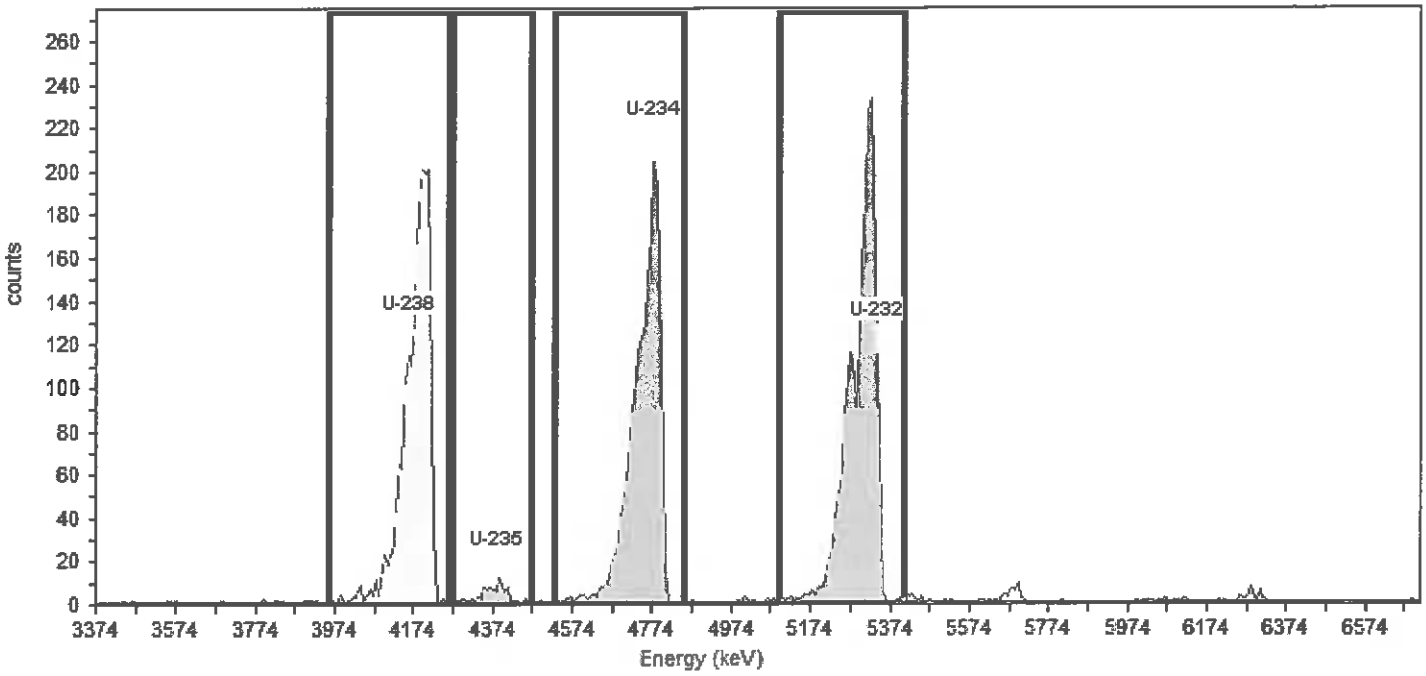
Tracer Name: UNAT_00013
Tracer Activity: 72.26 DPM / mL x (Vol.) 0.10 mL = 7.23 DPM
Tracer Ref. Date: 3/30/2008 11:48:31AM

Tracer Nuclide: U-238
Tracer Recovery: 122.50%

Acquisition

Detector: AV242 SN: 51-005P7
Acquisition Start Date: 12/20/2017 7:23:05PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/17/2017 3:28:17PM
Bkgd Info: Sample: ICB;AV242; Det: AV242; Spectrum #1; 11/17/2017 3:28:17 PM

Energy Calibration: IC-9884;AV242-20171114a
Efficiency Calibration:IC-9884;AV242-20171114a
Calibration Date: 11/15/2017 8:27:49AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.04% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI_U-232
Decay Correction:12/20/2017 7:22:15PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	70.6	100.0	1873	0.0000	1873.00	8.853E+001	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	60.4	80.2	81	1.0000	80.00	3.849E+000	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	72.8	99.8	1864	4.0000	1860.00	7.191E+001	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	64.8	100.1	2039	12.0000	2027.00	7.814E+001	DPM/mL

U-232 Clean Tracer VER.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Standard Verification (copy)

Batch No. : _____

Balance ID : _____

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	VER. 1	0.1	239	
2	2	1	240	
3	3		242	
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A

Initials / Date

Isotope : UNAT

Std Sol'n No. : UNAT-00013

Vol (mL) : 0.1

Ref Activity (dpm/mL) : _____

Act Ref Date : _____

Samples Spiked and Traced By:

SLB 12/19/17
Initials / Date

Verification Signature & Date:

[signature] 12/19/17
Initials / Date

LCS Standard ☐ N/A

Initials / Date

Isotope : U-232 Clean

Std Sol'n ID. : U-232-00040

Vol (mL) : 0.1

Ref Activity (dpm/mL) : 82.245

Act Ref Date : 08-25-11

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐	ST-RC-0003 Rev.	☐	ST-RC-0040 Rev.	☐	ST-RC-0110 Rev.
☐	ST-RC-0004 Rev.	☐	ST-RC-0041 Rev.	☐	ST-RC-0120 Rev.
☐	ST-RC-0014 Rev.	☐	ST-RC-0050 Rev.	☐	ST-RC-0232 Rev.
☐	ST-RC-0020 Rev.	☐	ST-RC-0090 Rev.	☐	ST-RC-0238 Rev.
☐	ST-RC-0021 Rev.	☐	ST-RC-0100 Rev.	☐	ST-RC-0240 Rev.
				☐	ST-RC-0241 Rev.
				☐	ST-RC-0242 Rev.
				☐	ST-RC-5016 Rev.
				☐	
				☐	

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____

Date : _____

Reviewed by: _____

Date: _____

\\Slsvr01\RAD\MasterForms\RAD-0045 Rev(3)

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

U-232 Clean Tracer VER.

Standard Verification ONLY

Batch No. : _____

(COPPA) Balance ID : —

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. I.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution Fac.
1	VER. 1 EC²: 136	0.1	235	EC: 247
2	1 2 EC²: 137	1	237	EC: 248 5h,5T
3	1 3 EC²: 138	1	238	EC: 249
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Tracer ☐ N/A

Initials / Date

Clean

Isotope : U-232

Std Sol'n No. : U-232-000470

Vol (mL) : 0.1

Ref Activity (dpm/mL) : 82.245

Act Ref Date : 08-25-11

Samples Spiked and Traced By:

SNB 12/19/17
Initials / Date

Verification Signature & Date:

DAM 12/19/17
Initials / Date

LCS Standard ☐ N/A

Initials / Date

Isotope : _____

Std Sol'n ID. : _____

Vol (mL) : _____

Ref Activity (dpm/mL) : _____

Act Ref Date : _____

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐ ST-RC-0003 Rev.		☐ ST-RC-0040 Rev.		☐ ST-RC-0110 Rev.	
☐ ST-RC-0004 Rev.		☐ ST-RC-0041 Rev.		☐ ST-RC-0120 Rev.	
☐ ST-RC-0014 Rev.		☐ ST-RC-0050 Rev.		☐ ST-RC-0232 Rev.	
☐ ST-RC-0020 Rev.		☐ ST-RC-0090 Rev.		☐ ST-RC-0238 Rev.	
☐ ST-RC-0021 Rev.		☐ ST-RC-0100 Rev.		☐ ST-RC-0240 Rev.	
				☐ ST-RC-0241 Rev.	
				☐ ST-RC-0242 Rev.	
				☐ ST-RC-5016 Rev.	
				☐	
				☐	

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____

Date : _____

Reviewed by: _____

Date: _____

\\Slsvr01\RAD\MasterForms\RAD-0045 Rev(3)

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:04:10AM 12/28/2017

Sample

Sample Name: Verification 1
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232 Clean Tracer Only
AnalysisID: 718500

Analyst: 60040

Tracer

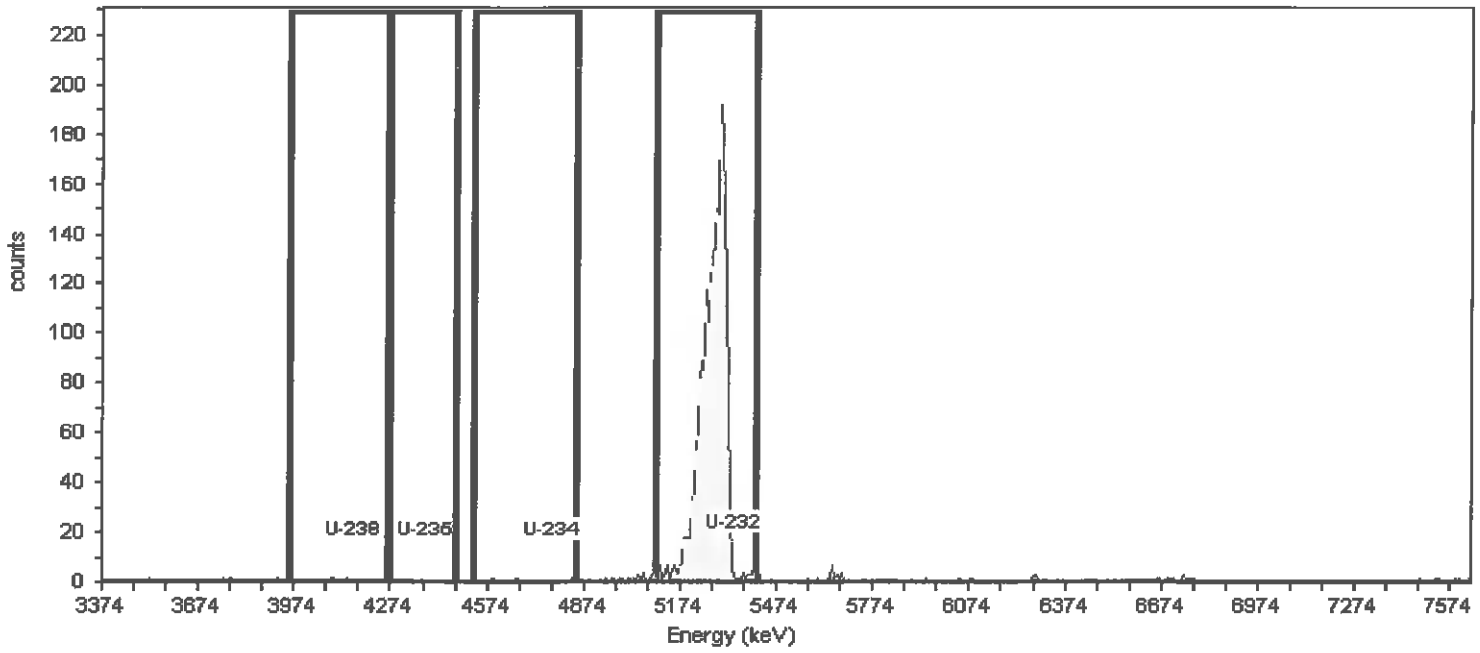
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.10 mL = 8.22 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 104.22%

Acquisition

Detector: AV136
Serial Number: 49-169O2
Acquisition Start Date: 12/27/2017 4:45:29PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 12/19/2017 12:17:35PM
Background Info: Sample: ICB;AV136; Det: AV136; Spectrum #1; Dec-19-2017 12:17

Calibration Name: IC-9885;AV136-20170802
Calibration Date: 8/2/2017 4:16:31PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.16% +/- 0.36% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 12/27/2017 4:44:20PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	88.1	100.0	2	1.0000	1.00	0.041	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	.0	80.2	0	0.0000	0.00	0.000	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	10.7	99.8	3	2.0000	1.00	0.041	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	80.0	100.1	1873	1.0000	1872.00	85.715	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:04:25AM 12/28/2017

Sample

Sample Name: Verification 2
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232 Clean Tracer Only
AnalysisID: 718499

Analyst: 60040

Tracer

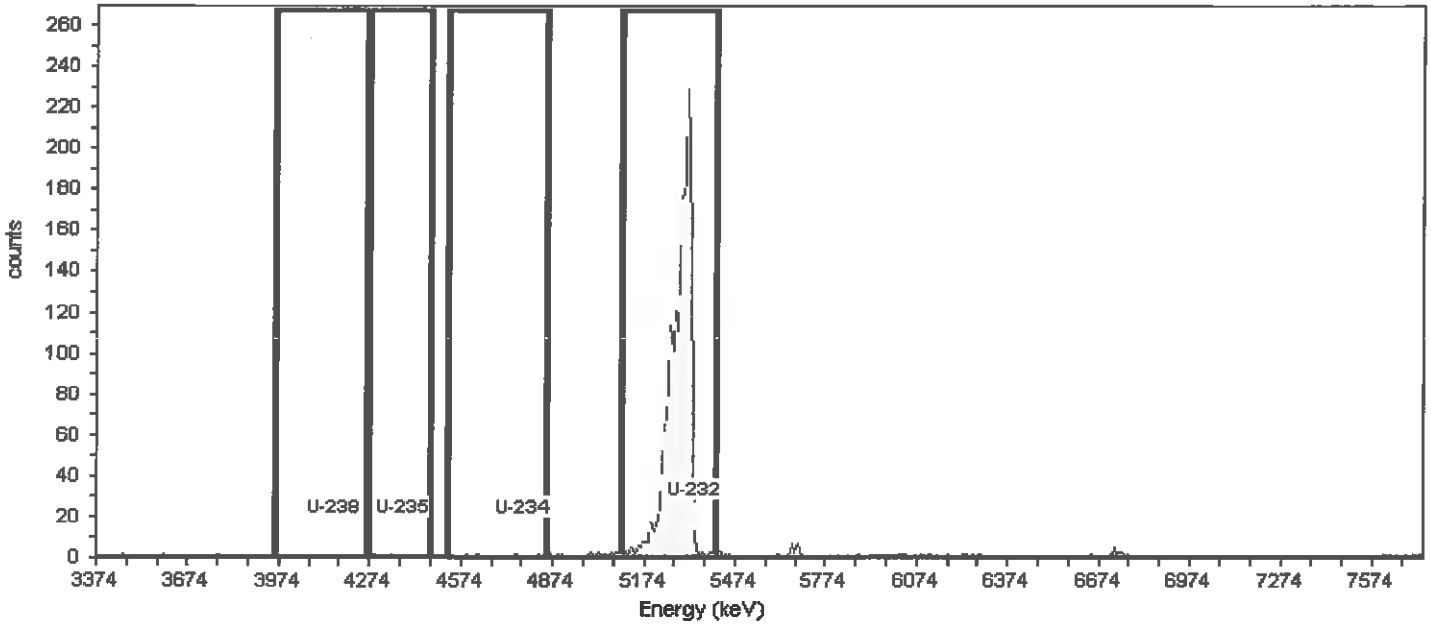
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.10 mL = 8.22 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 121.04%

Acquisition

Detector: AV137
Serial Number: 49-16904
Acquisition Start Date: 12/27/2017 4:45:26PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 12/19/2017 12:17:34PM
Background Info: Sample: ICB;AV137; Det: AV137; Spectrum #1; Dec-19-2017 12:17

Calibration Name: IC-9886;AV137-20170802
Calibration Date: 8/2/2017 4:17:12PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 21.93% +/- 0.31% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 12/27/2017 4:44:20PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	.0	100.0	0	0.0000	0.00	0.000	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	.3	80.2	3	0.0000	3.00	0.147	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	10.2	99.8	4	0.0000	4.00	0.157	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	71.3	100.1	1974	1.0000	1973.00	99.546	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:04:39AM 12/28/2017

Sample

Sample Name: Verification 3
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232 Clean Tracer Only
AnalysisID: 718501

Analyst: 60040

Tracer

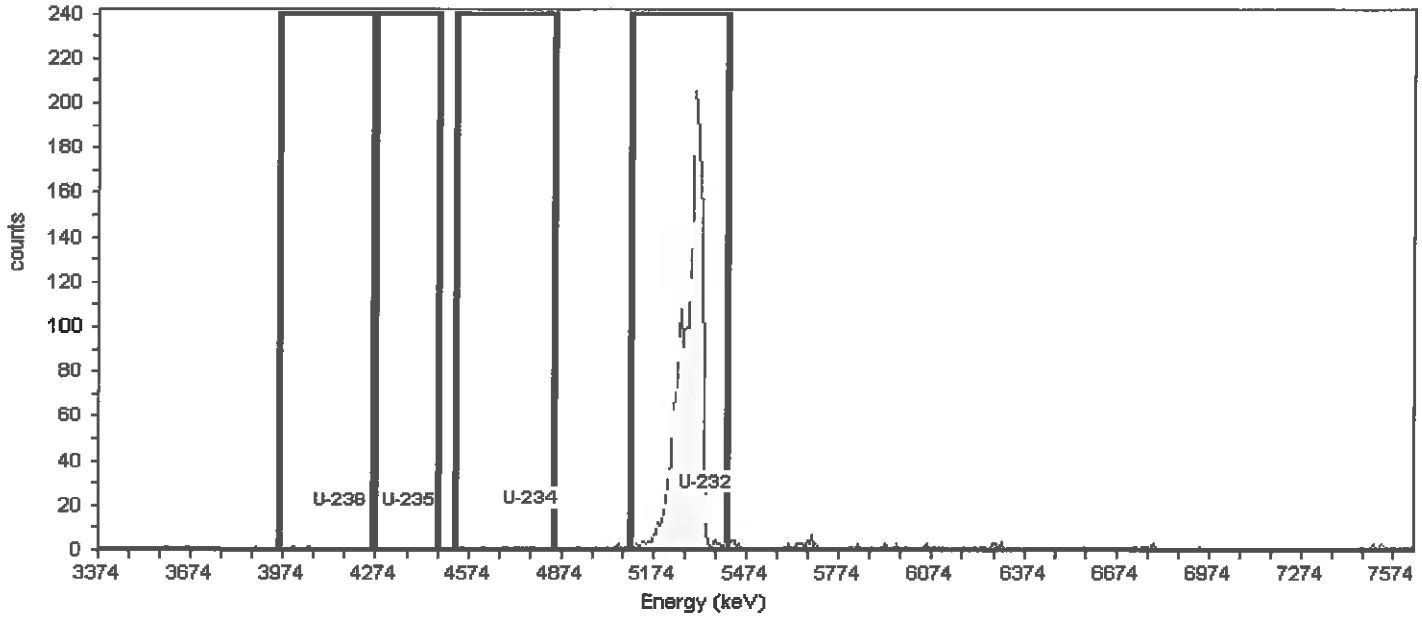
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.10 mL = 8.22 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 104.17%

Acquisition

Detector: AV138
Serial Number: 49-179B7
Acquisition Start Date: 12/27/2017 4:45:25PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 12/19/2017 12:17:36PM
Background Info: Sample: ICB;AV138; Det: AV138; Spectrum #1; Dec-19-2017 12:17

Calibration Name: IC-7107;AV138-20170802
Calibration Date: 8/3/2017 8:14:16AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.42% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 12/27/2017 4:44:20PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	91.2	100.0	2	0.0000	2.00	0.082	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	.0	80.2	0	1.0000	-1.00	-0.051	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	247.6	99.8	10	3.0000	7.00	0.287	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	75.8	100.1	1892	1.0000	1891.00	85.675	DPM/mL

Reagent

UNAT Ampoule_00001

New Brunswick Laboratory
U.S. Department of Energy

Certificate of Analysis

CRM 145

Uranyl (Normal) Nitrate Assay and Isotopic Solution

Uranium Mass Fraction: **0.0101356 g U/g solution ± 0.0000011 g U/g solution**
[10.1356 mg U/g solution ± 0.0011 mg U/g solution]

	$^{234}U/^{238}U$	$^{235}U/^{238}U$
Atom Ratio:	**0.000052841**	**0.0072543**
Atom Ratio Uncertainty:	**0.000000082**	**0.0000040**

	^{234}U	^{235}U	^{238}U
Atom Percent:	**0.0052458**	**0.72017**	**99.27458**
Atom Percent Uncertainty:	**0.0000081**	**0.00039**	**0.00039**
Weight Percent:	**0.0051579**	**0.71114**	**99.28370**
Weight Percent Uncertainty:	**0.0000080**	**0.00038**	**0.00038**

Relative Atomic Weight: **238.028918**
Relative Atomic Weight Uncertainty: **0.000012**

Note: ^{233}U and ^{236}U were not detected. The detection limit of uranium ratios for the technique used is 5×10^{-9}.

This Certified Reference Material (CRM) is a uranium concentration and isotopic solution standard intended for use in calibration of and/or quality control for uranium analysis methods. Each unit of CRM 145 consists of approximately 20-mL of uranyl nitrate solution in 1M nitric acid, contained in a sealed glass ampoule.

NOTE: The vial should be handled under proper radiologically-controlled conditions at all times.

The certified uranium content value is based on the mass of high-purity metal dissolved and diluted to a known solution mass. The stated uranium concentration was calculated as the prepared value and verified experimentally by the NBL-modified Davies and Gray titration. The certified uranium isotopic composition and atomic weight is based upon measurements performed on multiple samples by two different measurement techniques on a Thermal Ionization Mass Spectrometer (TIMS), calibrated using CRM U030-A as primary comparator and CRM 129-A as a quality control sample. The isotopic values are shared with CRM 112-A, uranium (normal) metal standard which was the source of uranium used to produce the solutions.

RAD13-0018
UNAT Spike
marrss
None
Prep/Opened: 5/3/2013
Exp(1): 5/10/2014
Exp(2): 5/10/2014

All uncertainties for the certified values are expressed as expanded uncertainties (U) where $U = k*u_c$, where u_c is the

September 30, 2010
Argonne, Illinois

www.nbl.doe.gov

Jon Neuhoff, Director
New Brunswick Laboratory

(Revision of Certificate dated March 30, 2008)

127971
ID: UNAT_00008
Exp: 05/10/14 Prpd: SB Crt: 05/03/13
UNAT spike

combined standard uncertainty and the coverage factor k = 2. Uncertainties were determined according to the JCGM 100:2008 *Guide to the Expression of Uncertainty in Measurement*. The coverage factor of 2 was chosen to provide an approximate 95% level of confidence. The input quantities associated with the uranium content included uncertainties due to weighing, CRM 112-A purity, and buoyancy factors. The input quantities associated with the uranium isotopic composition included uncertainties from the certified value for CRM U030-A, measurement precision, and background corrections associated with the analytical techniques.

The CRM was produced by dissolving uranium metal in a single batch and container, with extensive mixing of the resultant solution followed by dispensation into individual bottles. Subsequent measurements of a random sampling of the total lot produced did not indicate any inhomogeneity in uranium concentration or isotopic composition. The minimum sample sizes taken from packaged units and measured were 30 mg U by titration and 1 μg U by TIMS. The NBL makes no recommendation as to the minimum sample size to be used to ensure concentration or isotopic homogeneity.

Users are cautioned that once the vial is opened, the uranium concentration and/or isotopic composition of the material may be affected by evaporative losses or environmental contamination. User's should take appropriate precautions to safeguard the material before, during and after use to ensure valid certificate values.

Recommended Procedure for Ampoule Handling and Dispensing of Solution

1. The ampoule contains a strongly acidic solution of uranium. Appropriate precautions should be taken.

2. Before opening the ampoule, ensure that any dried uranium or condensed liquid in the neck or body of the ampoule is re-dissolved into solution. This can be accomplished by inverting the ampoule repeatedly.

3. The glass ampoules are scored at the neck for ease of opening. However, glass burrs and fragments pose a cut hazard to anyone opening the ampoules. Appropriate precautions should be taken.

4. Lightly moisten the scored line on the neck with distilled water to help ensure a clean break at the score.

5. Because of the narrow neck of the ampoule it may be difficult or impossible to pour the solution out. Here is one possible method:

    a. Obtain approximately 12-cm length of plastic capillary tubing (e.g. i.d. 0f 0.1", o.d. of 0.16").
    b. Insert one end of the capillary tubing fully into the ampoule
    c. Fold the remaining length of tubing along the outside of the ampoule, ensuring that the tube is not crimped and will allow the free flow of air through the tube and into the ampoule.
    d. Holding the ampoule and tubing in one hand, and a beaker or dispensing bottle in another, invert the ampoule over the container allowing the solution to drain into it.
    e. The capillary tubing allows air to flow into the ampoule, eliminating the "airlock" created by the narrow neck of the open ampoule.

6. The user should be wary of evaporative losses once the ampoule is opened, and prevent uranium contamination of the sample. It is recommended that the entire solution be accurately weighed and aliquanted as soon as possible after opening the sample. Precautions should be taken (clean glass/plastic ware, air filtration, etc) to prevent uranium contamination of the CRM with subsequent perturbation of the isotopic composition.

Reagent

UNAT_00014

Standard ID Number: UNAT_00013
True Value = 70.689 dpm/mL
Date Analyzed: 11/28/2017

Radionuclide: U-234

	Replicates	
#1	72.749	dpm/mL
#2	75.297	dpm/mL
#3	73.437	dpm/mL

Mean = 73.8276667

1 sigma = 1.31815831 1.96 sigma = 2.58359

True Value minus 5% = 67.15455 (True Value - 5%)
True Value plus 5% = 74.22345 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: Rm 12·21·17

2nd Reviewed By/Date: ALD 12/18/17

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	3/30/2008 0:00		
Decayto Date/Time (t):	11/28/17 0:00		
Initial Activity (A_0):	70.69	dpm	
Initial Aliquot:	1	mL	
Initial Conc:	70.69123	dpm/mL	
***Soln. Density:**	1	g/mL	
Nuclide:	U-234		
Half-Life (days):	89668875	decay days	fraction
****Decay Factor:**	1.0000	3530.00	0.00004
Decay Corr Activity:	7.0689E+01	dpm	
Decay Corr Conc:	7.0689E+01	dpm/mL	

Conversion/Calculations

Final Activity Unit:	dpm	
Activity Unit Factor:	1.00000	
Final Volume Unit:	mL	
Volume Unit Factor:	1.000	
Final Concentration:	7.0689E+01	dpm/mL
Aliquot Volume:	1.0000E+00	mL
Final Activity (A):	7.0689E+01	dpm

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:33:28PM 12/15/2017

Sample

Sample Name: Verification 1
SampleType: Sample

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Sample Collection Date:

Batch

Batch Name: U-232_00039
AnalysisID: 717874

Analyst: 60040

Tracer

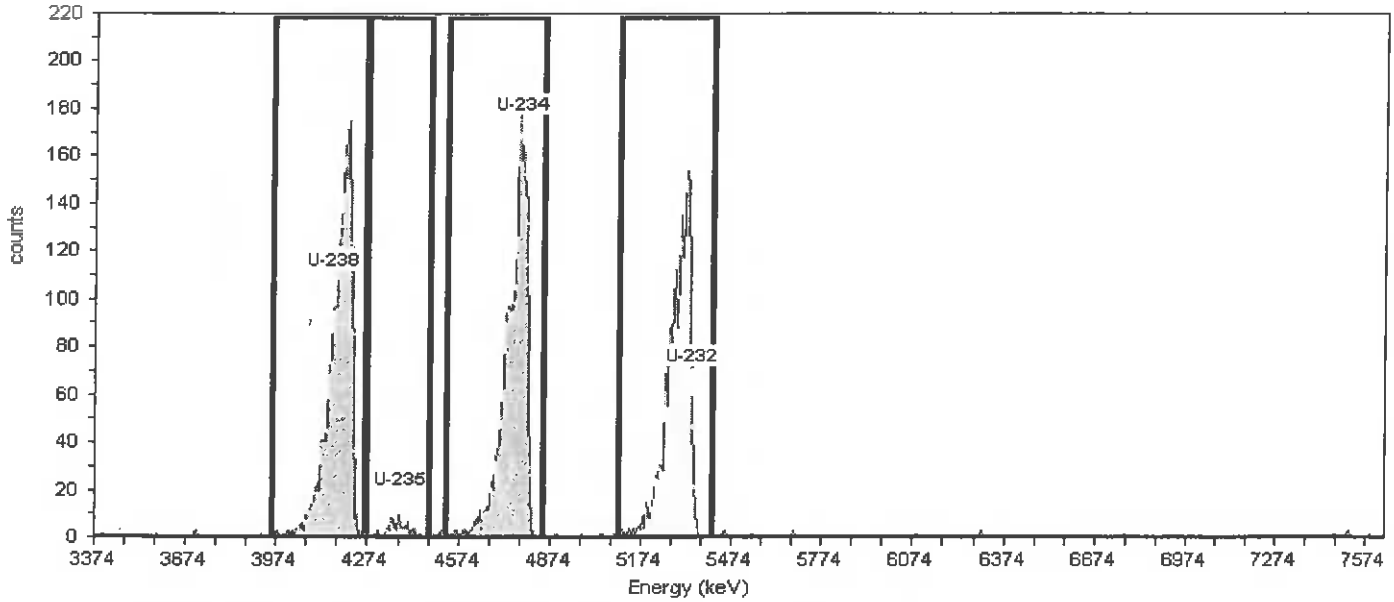
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 90.40%

Acquisition

Detector: AV118
Serial Number: 49-037F4
Acquisition Start Date: 11/28/2017 6:15:19PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:24PM
Background Info: Sample: ICB;AV118; Det: AV118; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9795;AV118-20170802
Calibration Date: 8/2/2017 1:38:49PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 26.06% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	78.5	100.0	1637	0.0000	1637.00	72.382	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	64.9	80.2	56	0.0000	56.00	3.087	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	75.3	99.8	1642	0.0000	1642.00	72.749	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	80.2	100.1	1524	1.0000	1523.00	70.035	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:33:58PM 12/15/2017

Sample

Sample Name: Verification 2
SampleType: Sample

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Sample Collection Date:

Batch

Batch Name: U-232_00039
AnalysisID: 717875

Analyst: 60040

Tracer

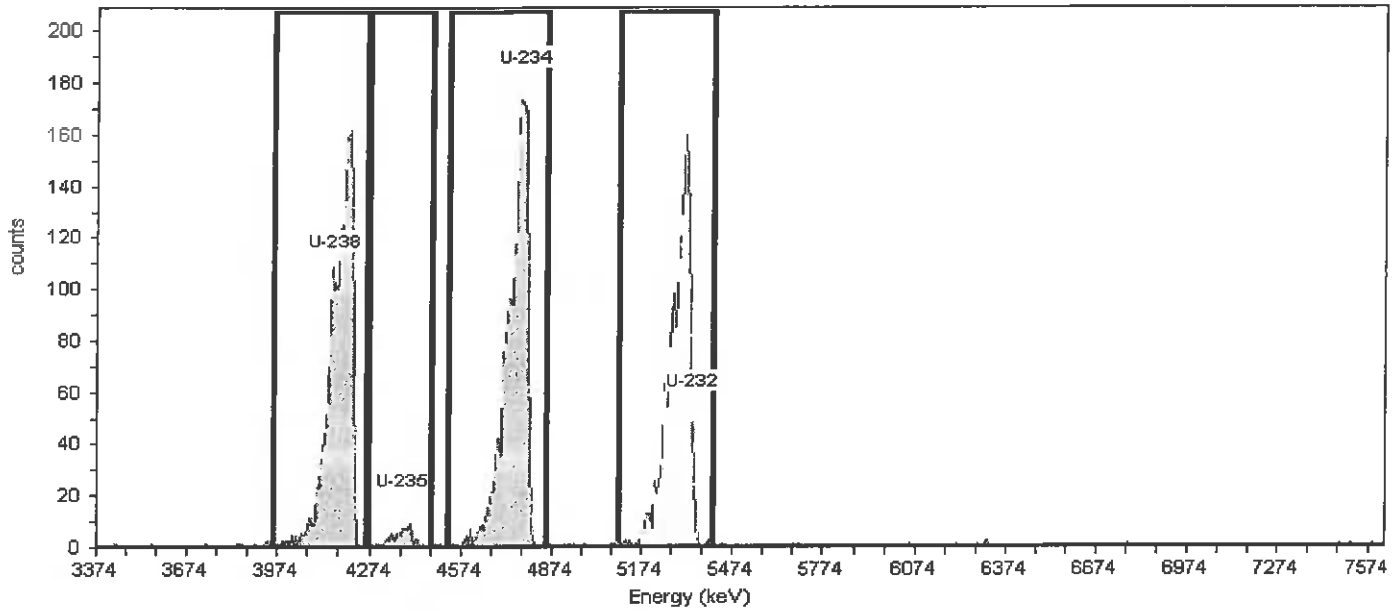
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 99.72%

Acquisition

Detector: AV119
Serial Number: 49-037G6
Acquisition Start Date: 11/28/2017 6:15:20PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:26PM
Background Info: Sample: ICB;AV119; Det: AV119; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9817;AV119-20170802
Calibration Date: 8/2/2017 1:39:16PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 23.42% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	84.0	100.0	1604	0.0000	1604.00	71.534	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	61.4	80.2	69	0.0000	69.00	3.837	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	71.1	99.8	1686	1.0000	1685.00	75.297	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	78.4	100.1	1513	3.0000	1510.00	77.261	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:34:11PM 12/15/2017

Sample

Sample Name: Verification 3
SampleType: Sample

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Sample Collection Date:

Batch

Batch Name: U-232_00039
AnalysisID: 717876

Analyst: 60040

Tracer

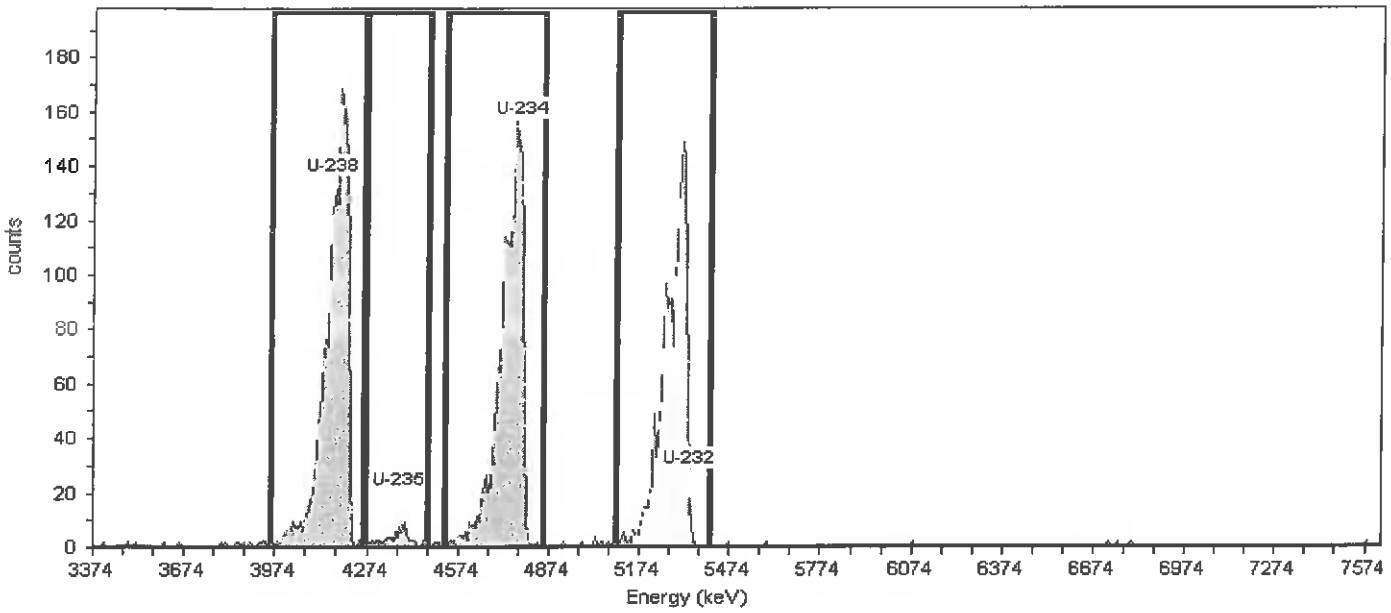
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 104.37%

Acquisition

Detector: AV120
Serial Number: 49-037W3
Acquisition Start Date: 11/28/2017 6:15:21PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:28PM
Background Info: Sample: ICB;AV120; Det: AV120; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9884;AV120-20170802
Calibration Date: 8/2/2017 1:39:29PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.48% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	72.0	100.0	1748	1.0000	1747.00	77.552	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	39.5	80.2	67	0.0000	67.00	3.708	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	80.4	99.8	1651	0.0000	1651.00	73.437	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	89.6	100.1	1519	2.0000	1517.00	80.860	DPM/mL

Ref. 3.30.2008

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

UNAT_00013

Reagent ID: UNAT_00013

Description:	UNAT spike	Expiration Date:	12/22/2017
No. of Bottles:	1	Laboratory:	TestAmerica St. Louis
Storage Location:	RAD Actinide STDs	Prepared By:	Bernsen, Sarah C
Reagent Volume:	200.000 mL	Solvent:	1M HNO3
Creation Date:	11/16/2016	Solvent Lot:	n/a
Open Date:			
Container(s):	1047854		
Comment:	only U-234 and U-238 are controlled as spike analytes, and therefore we have not verified the U-235		

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
U-234	UNAT Parent_00001	12/22/2017	706.91200	dpm/mL	70.69123	dpm/mL
U-235	UNAT Parent_00001	12/22/2017	33.70600	dpm/mL	3.37064	dpm/mL
U-238	UNAT Parent_00001	12/22/2017	722.65000	dpm/mL	72.26499	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
UNAT Parent_00001	UNAT Parent		12/22/17				20.00000	mL

U-232 Tracer Ver.

testAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Aliquot Only

Batch No.

Balance ID :

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	Ver 1	0.1	113	DC = 118
2	2	1	116	1 = 119
3	3	1	117	1 = 120
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A

Initials / Date

Isotope : UNAT
Std Sol'n No. : UNAT-00013
Vol (mL) : 0.1
Ref Activity (dpm/mL) : 72.2650 (U-238)
Act Ref Date : 3-30-08
New Brunswick

Samples Spiked and Traced By:
SMB 11/22/17
Initials / Date

Verification Signature & Date:
amm 11/22/2017
Initials / Date

LCS Standard ☐ N/A

Initials / Date

Isotope : U-232 Uncert
Std Sol'n ID. : U-232-00039
Vol (mL) : 0.1
Ref Activity (dpm/mL) : 77.476
Act Ref Date : 04-07-03

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐ ST-RC-0003 Rev.	☐ ST-RC-0040 Rev.	☐ ST-RC-0110 Rev.
☐ ST-RC-0004 Rev.	☐ ST-RC-0041 Rev.	☐ ST-RC-0120 Rev.
☐ ST-RC-0014 Rev.	☐ ST-RC-0050 Rev.	☐ ST-RC-0232 Rev.
☐ ST-RC-0020 Rev.	☐ ST-RC-0090 Rev.	☐ ST-RC-0238 Rev.
☐ ST-RC-0021 Rev.	☐ ST-RC-0100 Rev.	☐ ST-RC-0240 Rev.
		☐ ST-RC-0241 Rev.
		☐ ST-RC-0242 Rev.
		☐ ST-RC-5016 Rev.
		☐
		☐

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____
Date : _____

Reviewed by: _____
Date: _____

Uranium only via UTEVA

Batch: ST-RC-0238

*All rinses should flow at 1 mL/minute unless 2M HNO_3 may be done at 3 mL/minute)

UTEVA lot: UTSR17E

11.4.4 UTEVA cartridge

11.4.5 5mL 2M HNO_3 COMPLETED

11.4.6 Load sample

11.4.7 25mL 3M HNO_3 COMPLETED

11.4.8 5mL 9M HCl COMPLETED

11.4.9 20mL 5M HCl / 0.05M oxalic COMPLETED

11.4.10-11.4.11 Elute into clean tube with 15mL 1M HCl COMPLETED

Form: RAD-0060, Revised 09/17/13

Standard ID Number: UNAT_00013
True Value = 72.265 dpm/mL
Date Analyzed: 11/28/2017

Radionuclide: U-238

	Replicates	
#1	72.382	dpm/mL
#2	71.534	dpm/mL
#3	77.552	dpm/mL

Mean = 73.8226667

1 sigma = 3.25741022 1.96 sigma = 6.384524

True Value minus 5% = 68.65175 (True Value - 5%)
True Value plus 5% = 75.87825 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: Rm 12·18·17

2nd Reviewed By/Date: ALD 12/18/17

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	3/30/2008 0:00		
Decayto Date/Time (t):	11/28/17 0:00		
Initial Activity (A_0):	72.26 dpm		
Initial Aliquot:	1 mL		
Initial Conc:	72.26499 dpm/mL		
***Soln. Density:**	1 g/mL		
Nuclide:	U-238		
Half-Life (days):	1.63194E+12	decay days	fraction
****Decay Factor:**	1.0000	3530.00	0.00000
Decay Corr Activity:	7.2265E+01 dpm		
Decay Corr Conc:	7.2265E+01 dpm/mL		

Conversion/Calculations

Final Activity Unit:	dpm
Activity Unit Factor:	1.00000
Final Volume Unit:	mL
Volume Unit Factor:	1.000
Final Concentration:	7.2265E+01 dpm/mL
Aliquot Volume:	1.0000E+00 mL
Final Activity (A):	7.2265E+01 dpm

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:33:28PM 12/15/2017

Sample

Sample Name: Verification 1
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232_00039
AnalysisID: 717874

Analyst: 60040

Tracer

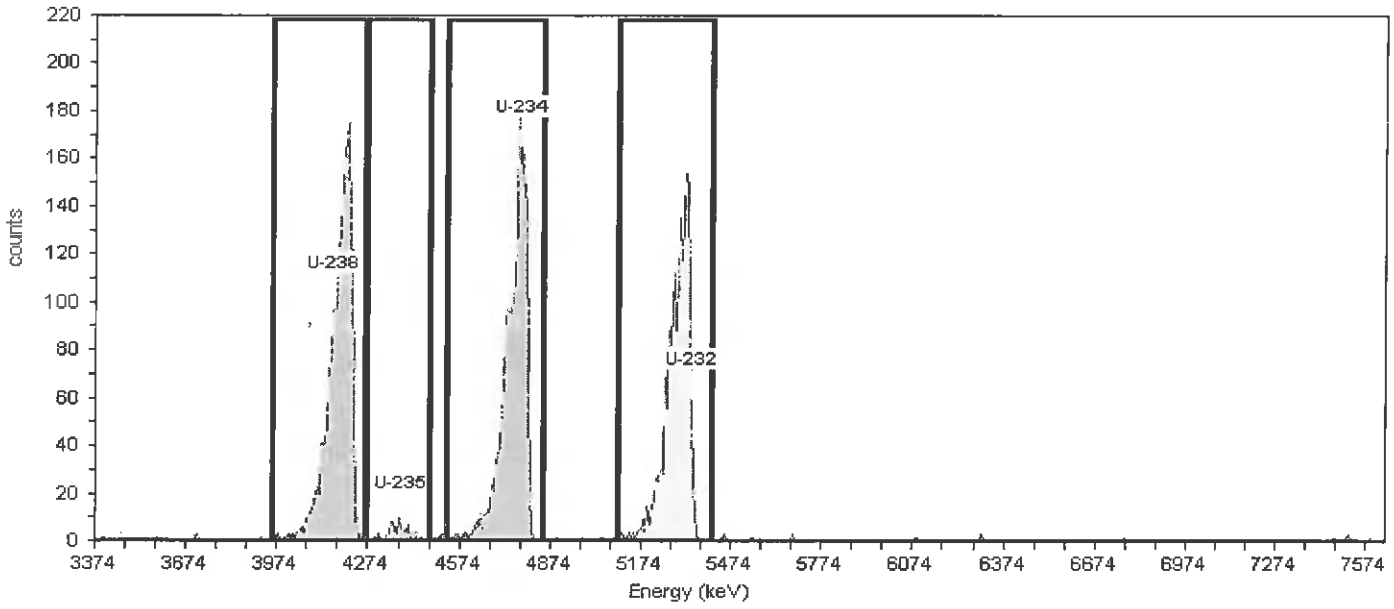
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 90.40%

Acquisition

Detector: AV118
Serial Number: 49-037F4
Acquisition Start Date: 11/28/2017 6:15:19PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:24PM
Background Info: Sample: ICB;AV118; Det: AV118; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9795;AV118-20170802
Calibration Date: 8/2/2017 1:38:49PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.06% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	78.5	100.0	1637	0.0000	1637.00	72.382	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	64.9	80.2	56	0.0000	56.00	3.087	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	75.3	99.8	1642	0.0000	1642.00	72.749	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	80.2	100.1	1524	1.0000	1523.00	70.035	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:33:58PM 12/15/2017

Sample

Sample Name: Verification 2
SampleType: Sample

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Sample Collection Date:

Batch

Batch Name: U-232_00039
AnalysisID: 717875

Analyst: 60040

Tracer

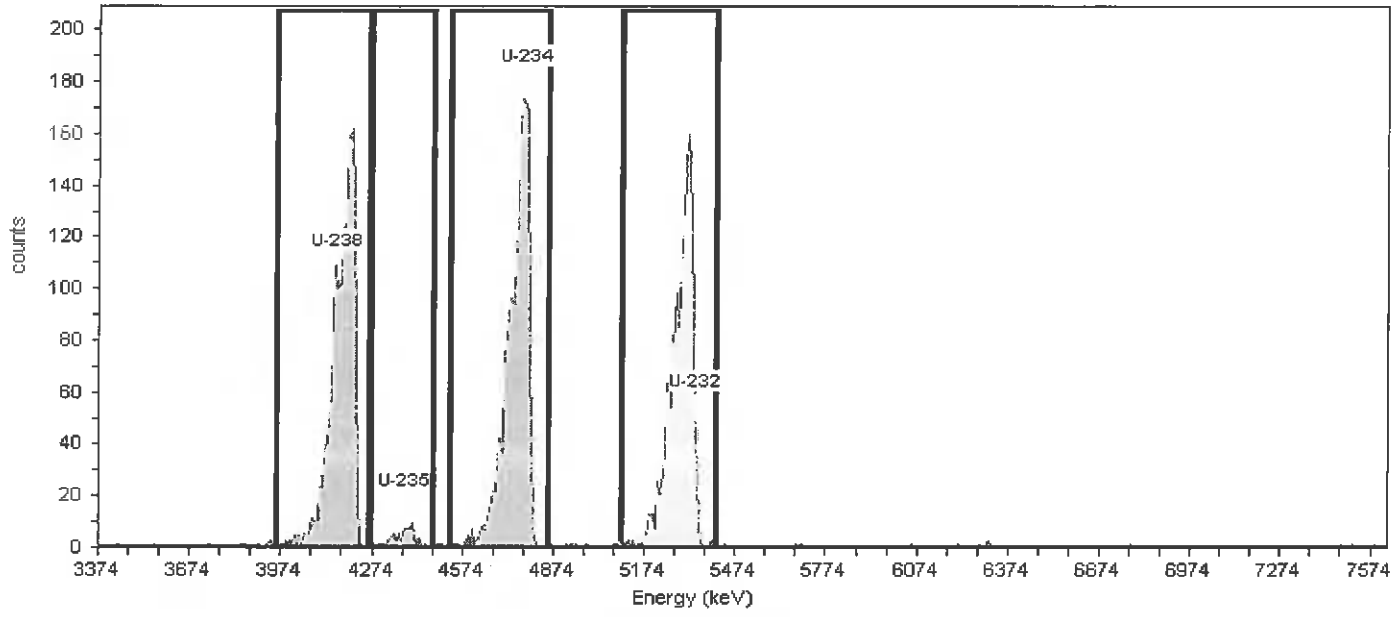
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 99.72%

Acquisition

Detector: AV119
Serial Number: 49-037G6
Acquisition Start Date: 11/28/2017 6:15:20PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:26PM
Background Info: Sample: ICB;AV119; Det: AV119; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9817;AV119-20170802
Calibration Date: 8/2/2017 1:39:16PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 23.42% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	84.0	100.0	1604	0.0000	1604.00	71.534	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	61.4	80.2	69	0.0000	69.00	3.837	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	71.1	99.8	1686	1.0000	1685.00	75.297	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	78.4	100.1	1513	3.0000	1510.00	77.261	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:34:11PM 12/15/2017

Sample

Sample Name: Verification 3
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232_00039
AnalysisID: 717876

Analyst: 60040

Tracer

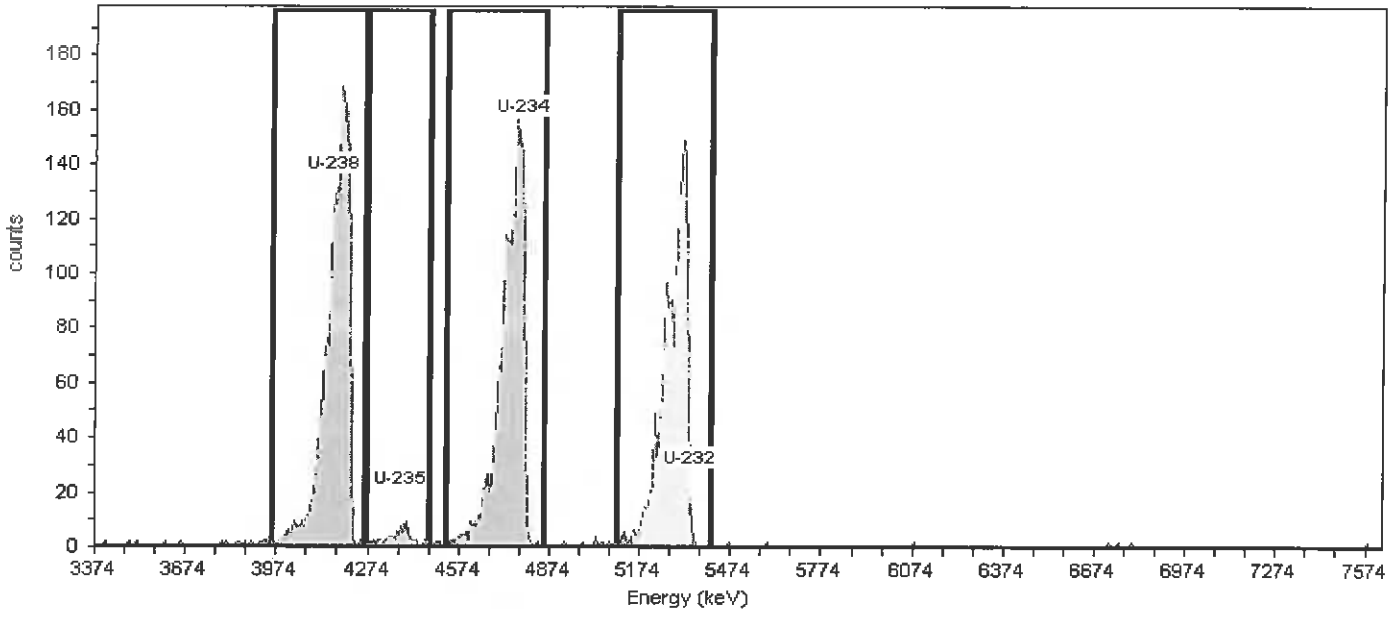
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 104.37%

Acquisition

Detector: AV120
Serial Number: 49-037W3
Acquisition Start Date: 11/28/2017 6:15:21PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:28PM
Background Info: Sample: ICB;AV120; Det: AV120; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9884;AV120-20170802
Calibration Date: 8/2/2017 1:39:29PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.48% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	72.0	100.0	1748	1.0000	1747.00	77.552	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	39.5	80.2	67	0.0000	67.00	3.708	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	80.4	99.8	1651	0.0000	1651.00	73.437	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	89.6	100.1	1519	2.0000	1517.00	80.860	DPM/mL

Ref. 3.30.2008

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Reagent ID: UNAT_00013

Description:	UNAT spike	Expiration Date:	12/22/2017
No. of Bottles:	1	Laboratory:	TestAmerica St. Louis
Storage Location:	RAD Actinide STDs	Prepared By:	Bernsen, Sarah C
Reagent Volume:	200.000 mL	Solvent:	1M HNO3
Creation Date:	11/16/2016	Solvent Lot:	n/a
Open Date:			
Container(s):	1047854		
Comment:	only U-234 and U-238 are controlled as spike analytes, and therefore we have not verified the U-235		

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
U-234	UNAT Parent_00001	12/22/2017	706.91200	dpm/mL	70.69123	dpm/mL
U-235	UNAT Parent_00001	12/22/2017	33.70600	dpm/mL	3.37064	dpm/mL
U-238	UNAT Parent_00001	12/22/2017	722.65000	dpm/mL	72.26499	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
UNAT Parent_00001	UNAT Parent		12/22/17				20.00000	mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

U-232 Tracer Ver.

Aliquot Only

Batch No. :

960 mL

Balance ID :

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	Ver 1	0.1	113	QC = 118
2	2	1	116	= 119
3	3	1	117	= 120
4				
5				
6				
7				
8				
9				
10				
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21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A

Initials / Date

Isotope : UNAT

Std Sol'n No. : UNAT-00013

Vol (mL) : 0.1

Ref Activity (dpm/mL) : 72.2650 (0.235)

Act Ref Date : 3-30-05

New Brunswick

Samples Spiked and Traced By:

SAB 11/22/17

Initials / Date

Verification Signature & Date:

amm 11/22/2017

Initials / Date

LCS Standard ☐ N/A

Initials / Date

Isotope : U-232 uncert

Std Sol'n ID. : U-232-00039

Vol (mL) : 0.1

Ref Activity (dpm/mL) : 77.47 ± 4

Act Ref Date : 04-01-03

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐ ST-RC-0003 Rev.	☐ ST-RC-0040 Rev.	☐ ST-RC-0110 Rev.
☐ ST-RC-0004 Rev.	☐ ST-RC-0041 Rev.	☐ ST-RC-0120 Rev.
☐ ST-RC-0014 Rev.	☐ ST-RC-0050 Rev.	☐ ST-RC-0232 Rev.
☐ ST-RC-0020 Rev.	☐ ST-RC-0090 Rev.	☐ ST-RC-0238 Rev.
☐ ST-RC-0021 Rev.	☐ ST-RC-0100 Rev.	☐ ST-RC-0240 Rev.
		☐ ST-RC-0241 Rev.
		☐ ST-RC-0242 Rev.
		☐ ST-RC-5016 Rev.
		☐
		☐

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____

Date : _____

Reviewed by: _____

Date: _____

\\Slsvr01\RAD\MasterForms\RAD-0045 Rev(3)

Uranium only via UTEVA

ST-RC-0238

Batch:

*All stages should flow at 1 mL/minute (only 2M HNO3 may be done at 3 mL/minute)

UTEVA lot: UTSR17E

11.4.4 UTEVA cartridge

11.4.5 5mL 2M HNO_3 — COMPLETED

11.4.6 Load sample

11.4.7 25mL 3M HNO_3 — COMPLETED

11.4.8 5mL 9M HCl — COMPLETED

11.4.9 20mL 5M HCl / 0.05M oxalic — COMPLETED

11.4.10-11.4.11 Elute into clean tube with 15mL 1M HCl — COMPLETED

Form: RAD-0060, Revised 09/17/13

Reagent

Y Carrier_00032

REPORT OF ANALYSIS

Single-Element Aqueous RM

Yttrium Oxide

Product #: Z-067074-05-1L

Matrix: 10% HNO_3

Lot #: 10064660-5

Analyte	Certified Concentration
Y_2O_3	**50,000 µg/mL**

Intended Use: This solution is intended for use as a reference material (RM) or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), flame or furnace atomic absorption spectroscopy (AA or GFAA), and other techniques for elemental analysis.

Certification & Traceability: This RM was manufactured, processed, and/or certified under a quality management system that is registered/accredited to **ISO 9001**, **ISO Guide 34**, and **ISO/IEC 17025**. This RM was prepared to a nominal concentration of 50,000 µg/mL by gravimetric methods using single-element concentrate dissolved in high purity nitric acid (HNO_3) and diluted with filtered (0.22 µm), 18 M-ohm deionized water. The balances used in the preparation of this RM are calibrated regularly with traceability to NIST, using a calibration provider that is accredited to ISO/IEC 17025 by a mutually recognized accreditation body. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentration was determined based upon gravimetric procedures. Secondary verification of the certified concentration was performed using ICP-OES and is traceable to **NIST SRM 3167a**. The uncertainty associated with the certified concentration is ±0.5% relative, which is the sum of the estimated errors due to the purity of the raw materials, the gravimetric preparation of the solution, and transpiration through the container. This represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Instructions for Use: We recommend that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy, the analyst should: (1) use only pre-cleaned containers and transferware, (2) not pipette directly from the RM's original container, (3) never pour used product back into the original container, (4) make dilutions using calibrated balances or certified class A volumetric flasks and pipettes, (5) use a minimum sub-sample size of 500 µL, and (6) dilute with the same matrix as the original RM or other chemically suitable matrix. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or immerse the bottle or its contents, and avoid exposure to direct sunlight or moisture.

Period of Validity: CPI International ensures the accuracy of this solution for **18 months** from the certification date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Chuck Goudreau

Chuck Goudreau, Certifying Officer

April 6, 2018

Certification Date

CPI International waives all responsibility for any damages resulting from the usage and/or implementation of the products/data described herein.

USA
5580 Skylane Boulevard P: 707.525.5788
Santa Rosa, CA 95403 P: 800.878.7654
F: 707.545.7901

Europe
Nieuwe Hemweg 7P P: +31 20 638 05 97
1013BG Amsterdam F: +31 20 420 28 36
The Netherlands

www.cpiinternational.com

REPORT OF ANALYSIS

Single-Element Aqueous RM

Yttrium Oxide

Product #: Z-067074-05-1L

Matrix: 10% HNO_3

Lot #: 10064660-5

Analyte	Certified Concentration
Y_2O_3	50,000 µg/mL

Intended Use: This solution is intended for use as a reference material (RM) or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), flame or furnace atomic absorption spectroscopy (AA or GFAA), and other techniques for elemental analysis.

Certification & Traceability: This RM was manufactured, processed, and/or certified under a quality management system that is registered/accredited to **ISO 9001**, **ISO Guide 34**, and **ISO/IEC 17025**. This RM was prepared to a nominal concentration of 50,000 µg/mL by gravimetric methods using single-element concentrate dissolved in high purity nitric acid (HNO_3) and diluted with filtered (0.22 µm), 18 M-ohm deionized water. The balances used in the preparation of this RM are calibrated regularly with traceability to NIST, using a calibration provider that is accredited to ISO/IEC 17025 by a mutually recognized accreditation body. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentration was determined based upon gravimetric procedures. Secondary verification of the certified concentration was performed using ICP-OES and is traceable to **NIST SRM 3167a**. The uncertainty associated with the certified concentration is ±0.5% relative, which is the sum of the estimated errors due to the purity of the raw materials, the gravimetric preparation of the solution, and transpiration through the container. This represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Instructions for Use: We recommend that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy, the analyst should: (1) use only pre-cleaned containers and transferware, (2) not pipette directly from the RM's original container, (3) never pour used product back into the original container, (4) make dilutions using calibrated balances or certified class A volumetric flasks and pipettes, (5) use a minimum sub-sample size of 500 µL, and (6) dilute with the same matrix as the original RM or other chemically suitable matrix. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or immerse the bottle or its contents, and avoid exposure to direct sunlight or moisture.

Period of Validity: CPI International ensures the accuracy of this solution for **18 months** from the certification date shown below, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

Chuck Goudreau

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Europe
Nieuwe Hemweg 7P P: +31 20 638 05 97
1013BG Amsterdam F: +31 20 420 28 36
The Netherlands

www.cpiinternational.com

Reagent

Complex CN_00006

Absolute Standards, Inc.
800-368-1131
www.absolutestandards.com

Certified Reference Material CRM

ISO 9001 QS Registered
ISO 17025-34-35-43 Accredited
Scopes: http://AbsoluteStandards.com

CERTIFIED WEIGHT REPORT:

Part Number: 54150
Lot Number: 021017
Description: Complex Cyanide (CN^-)

Expiration Date: 021019
Recommended Storage: Refrigerate (4 °C)
Nominal Concentration (µg/mL): 1000
NIST Test Number: 822-275872-11 5E-05 Balance Uncertainty
Weights shown below were diluted to (mL): 999.86 0.058 Flask Uncertainty

Lot #
Solvent: 021017 ASTM Type 1 Water

Formulated By: Lawrence Barry 021017
Reviewed By: Pedro L. Rentas 021017

Compound	RM#	Lot Number	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty Purity (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	MSDS Information (Solvent Safety Info. On Attached pg.) CAS#	OSHA PEL (TWA)	LD50	NIST SRM
1. Potassium Ferricyanide (III) (CN)	IN166	TS08427AR	1000.0	99.0	0.10	47.5	2.12846	2.12850	1000.0	2.0	13746-66-2	NA	orl-mus 2970mg/kg	3141a
2. Sodium hydroxide, ACS	IN072	MKBG2154V	NA	97.0	0.10	40.0	1.59977	1.59988	640.0	NA	1310-73-2	2 mg/m3	40 mg/kg	NA

3612388
ID: Complex CN_00005
Exp:02/22/18 Prpd:SMC Opn:02/22/17
1000 ppm STD Potassium Fe

3710353
ID: Complex CN_00006
Exp:02/10/19 Prpd:LDT Opn:02/22/17
1000 ppm STD Potassium Fe

* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
* All standard containers are meticulously cleaned prior to use.
* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.
* All Standards should be stored with caps tight and under appropriate laboratory conditions.
* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Reagent

OP_Hexadecane_00002

EMD Chemicals Inc.
480 S. Democrat Road
Gibbstown, NJ 08027
Phone 856-423-6300
Fax 856-423-4389

Name: Hexadecane
Olefin Free, A.S.T.M. Grade Cetane

Formula: $CH_3(CH_2)_{14}CH_3$

Item Number: HX0200-1, HX0200-3, HX0200-901

Formula Wt: 226.45

Lot Number: 51126121

Data Order No: 000431481

CHARACTERISTIC	REQUIREMENT		RESULTS	UNITS
	Min.	Max.		
Assay (GC)	99.0		99.07	%
Color (APHA)		10	< 10	
Form			Clear liquid	
Infrared spectrum			Conforms	

Gene A. Desotelle

Gene A. Desotelle,
Quality Control Manager

Release Date: 3/13/2013

EMD Chemicals Inc.
(Formerly EM Science, A Division of EM Industries, Inc.)

An Affiliate of Merck KGaA, Darmstadt, Germany

Specification

8.20633.0005 n-Hexadecane for synthesis

	Specification	
Assay (GC, area%)	≥ 99.0	% (a/a)
Density (d 20 °C/ 4 °C)	0.773 - 0.774	
Identity (GC)	passes test	

Due to its specific melting range the product may be solid, liquid, a solidified melt or a supercooled melt.

Dr. Oliver Schramel
Responsible laboratory manager quality control

This document has been produced electronically and is valid without a signature.

Merck KGaA, Frankfurter Straße 250, 64293 Darmstadt (Germany): +49 6151 72-0
EMD Millipore Corporation - a subsidiary of Merck KGaA, Darmstadt, Germany
290 Concord Road, Billerica, MA 01821, USA, Phone: (978) 715-4321
SALSA **Version 518351** /000000000000// Date: 17.10.2016

Reagent

W_Celite_00006

4058837
ID W_Celite_00006
Exp 01/31/22 Prpd BMC Opn 01/05/17
S_Celite

Fisher Scientific

1 Reagent Lane
Fair Lawn, NJ 07410
201.796.7100 tel
201.796.1329 fax

Certificate of Analysis

Fisher Scientific's Quality System has been found to conform to Quality Management System Standard ISO9001:2008 standard by SAI Global Certificate Number CERT - 0090918

This is to certify that units of the lot number below were tested and found to comply with the specifications of the grade listed. Certain data have been supplied by third parties. Fisher Scientific expressly disclaims all warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose. Certain products (USP/FCC/NF/EP/BP/JP grades) are sold for use in food, drug, or medical device manufacturing. Fisher does not claim regulatory coverage under 21 CFR nor maintain DMF's with the FDA. The following are the actual analytical results obtained.

Catalog Number	**C212**	**Quality Test / Release Date**	**2/21/2017**
Lot Number	**170908**		
Description	**CELITE 545**		
Country of Origin	**United States**	*** Suggested Retest Date**	**Feb-2022**
Chemical Origin	**Organic - Plant**		
BSE/TSE Comment	This product is a synthetic silicate, processed from the skeletal remains of single-celled plants called diatoms. There is no known potential for BSE or TSE to be present in this material.		

Result name	Units	Specifications	Test Value
APPEARANCE		REPORT	White powder
IDENTIFICATION	PASS/FAIL	= PASS TEST	PASS TEST

Teresa Bailey-Wyche

Quality Assurance Specialist - Certificate of Analysis Fair Lawn

Note: The data listed is valid for all package sizes of this lot of this product, expressed as a extension of this catalog number listed above. If there are any questions with this certificate, please call Chemical Services at (800) 227-6701.
*Based on suggested storage condition.

Reagent

W_CNworkLCS_00052

Absolute Standards, Inc.
800-368-1131
www.absolutestandards.com

Certified Reference Material CRM

ISO 9001 QS Registered
ISO 17025-34-35-43 Accredited
Scopes: http://AbsoluteStandards.com

CERTIFIED WEIGHT REPORT

Part Number: 54150
Lot Number: 021017
Description: Complex Cyanide (CN)

Expiration Date: 021019
Recommended Storage: Refrigerate (4 °C)
Nominal Concentration (µg/mL): 1000
NIST Test Number: 822-275872-11 5E-05 Balance Uncertainty
Weights shown below were diluted to (mL): 999.86 0.058 Flask Uncertainty

Solvent: Lot # 021017 ASTM Type 1 Water

Formulated By	Lawrence Barry	021017
Reviewed By	Pedro L. Rentas	021017

Compound	RM#	Lot Number	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty Purity (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	MSDS Information (Solvent Safety Info. On Attached pg.) CAS#	OSHA PEL (TWA)	LD50	NIST SRM
1. Potassium Ferricyanide (III) (CN)	IN166	TS08427AR	1000.0	99.0	0.10	47.5	2.12846	2.12850	**1000.0**	**2.0**	13746-66-2	NA	orl-mus 2970mg/kg	3141a
2. Sodium hydroxide, ACS	IN072	MKBG2154V	NA	97.0	0.10	40.0	1.59977	1.59988	640.0	**NA**	1310-73-2	2 mg/m3	40 mg/kg	NA

* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
* All standard containers are meticulously cleaned prior to use.
* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.
* All Standards should be stored with caps tight and under appropriate laboratory conditions.
* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Reagent

W_Cyanide Std_00048

INORGANIC VENTURES™
300 Technology Drive
Christiansburg, VA 24073 - USA
inorganicventures.com

CERTIFICATE OF ANALYSIS

tel: 800.669.6799 · 540.585.3030
fax: 540.585.3012
info@inorganicventures.com

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories." Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED
Testing Laboratory
Certificate 883.01

ACCREDITED
Reference Material Producer
Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	**Water QC Reference Material**
Catalog Number:	CN-1000-25
Lot Number:	N2-CN665509
Matrix:	H_2O
Starting Material:	NaCN
Starting Material Lot #:	00426KR

4387829
ID: W_Cyanide Std_00048
Exp: 03/08/20 Prpd: SDL
S_Cyanide Free Standard

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value:	990 ± 20 µg/mL
Density:	0.999 g/mL (measured at 20 ± 4°C)
Assay Information:	
Assay Method #1	990 ± 6 µg/mL Titrimetric Method, NIST SRM 3151, Lot Number 160729

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2 (u_{char\ a})^2 + (w_b)^2 (u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

No correction has been applied for transpiration that will occur after the CRM/RM bottle has been removed from the sealed aluminized bag. See Section 7.0 (Instructions for the Correct Use of this Reference Material) for more information.

4.0 TRACEABILITY TO NIST

-This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution

errors. In rare cases where no NIST SRM/RM are available, the term "in-house std." is specified.

4.1 Thermometer Calibration

-All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

-All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

-An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL) - N/A

6.0 INTENDED USE

-For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

-For optimum conditions, this product should be frozen before opening. If this is not possible, then it should be stored at 4°C. Bring to room temperature and shake well before using to ensure the homogeneity of the solution. EPA method 335.4 recommends that the prepared sample (See Sec. 7.2) be analyzed within 14 days and stored at 4°C.

-While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur. It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

-After opening the sealed TCT bag keep cap tightly sealed when not in use. Do not pipette from the container. Do not return removed aliquots to container.

-For more information, visit **www.inorganicventures.com/TCT**.

7.2 Preparation Instructions

Carefully open the container and transfer solution to a clean, dry glass or plastic container for pipetting. If following EPA method 335.4, preserve any diluted solutions to pH of ≥12 with NaOH.

8.0 HAZARDOUS INFORMATION

-Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

-This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B – Nuclear Regulatory Commission

-Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 – Nuclear Regulatory Commission

-Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

-Chemical Testing – Accredited / A2LA Certificate Number 883.01

10.5 ISO/IEC Guide 34 "General Requirements for the Competence of Reference Material Producers"

-Reference Material Producer – Accredited / A2LA Certificate Number 883.02

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

March 7, 2018

-The certification is valid within the measurement uncertainty specified, provided the CRM/RM is stored and handled in accordance with instructions given in Section 7.1. This certification is nullified if instructions in Section 7.1 are not followed or if the CRM/RM is damaged, contaminated or otherwise modified.

11.2 Period of Validity

-Sealed TCT Bag Open Date: _____

-This CRM/RM should not be used longer than one year from the date of opening the sealed TCT bag or after the date given in Section 11.3, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instruction given in Section 7.1.

11.3 Lot Expiration Date

March 7, 2020

-The date after which this CRM/RM should not be used (See Section 11.2)

-The lot expiration date reflects the period of time the stability of a CRM/RM can be supported by long-term stability studies conducted on properly stored and handled CRM/RMs.

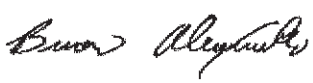
12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Joseph Burns
Product Documentation Supervisor

Certificate Approved By:

Brian Alexander
PhD., Technical Process Director



Certifying Officer:

Paul Gaines
PhD., Senior Technical Director

Method 300.0

Anions (IC) by Method 300.0

FORM III
HPLC/IC LAB CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Matrix: Water Level: Low Lab File ID: 080318- 4.d

Lab ID: LCS 160-380227/4 Client ID:

COMPOUND	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC	QC LIMITS REC	#
Fluoride	1000	1000	100	90-110	

Column to be used to flag recovery and RPD values

FORM III 300.0

FORM III
HPLC/IC MATRIX SPIKE RECOVERY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Matrix: Water Level: Low Lab File ID: 080318- 47.d

Lab ID: 160-29476-1 MS DL Client ID: CRC-MW-1 MS DL

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC	QC LIMITS REC	#
Fluoride	40000	4700	46200	104	90-110	

Column to be used to flag recovery and RPD values

FORM III 300.0

FORM IV
HPLC/IC METHOD BLANK SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Lab File ID: 080318- 3.d Lab Sample ID: MB 160-380227/3

Matrix: Water Date Extracted:

Instrument ID: CIC2500 Date Analyzed: 08/03/2018 18:49

Level:(Low/Med) Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
	CCB 160-380227/2	080318- 2.d	08/03/2018 18:32
	LCS 160-380227/4	080318- 4.d	08/03/2018 19:06
	CCB 160-380227/14	080318-14.d	08/03/2018 21:56
	CCB 160-380227/37	080318-37.d	08/04/2018 04:25
CRC-MW-1 DL	160-29476-1 DL	080318-43.d	08/04/2018 06:06
CRC-MW-1 DU DL	160-29476-1 DU DL	080318-45.d	08/04/2018 06:40
CRC-MW-1 MS DL	160-29476-1 MS DL	080318-47.d	08/04/2018 07:14
	CCB 160-380227/49	080318-49.d	08/04/2018 07:48

FORM I
HPLC/IC ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Client Sample ID: CRC-MW-1 DL Lab Sample ID: 160-29476-1 DL

Matrix: Water Lab File ID: 080318- 43.d

Analysis Method: 300.0 Date Collected: 07/11/2018 13:55

Extraction Method: Date Extracted:

Sample wt/vol: 5(mL) Date Analyzed: 08/04/2018 06:06

Con. Extract Vol.: Dilution Factor: 20

Injection Volume: 50(uL) GC Column: IonPacAS14 ID: 4(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 380227 Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
16984-48-8	Fluoride	4700		2000	520

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 43.d
Lims ID: 160-29476-Q-1
Client ID: CRC-MW-1
Sample Type: Client
Inject. Date: 04-Aug-2018 06:06:00 ALS Bottle#: 0 Worklist Smp#: 43
Injection Vol: 50.0 uL Dil. Factor: 20.0000
Sample Info: 160-0013784-043
Misc. Info.: 15298 160-29476-Q-1
Operator ID: Instrument ID: CIC2500

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 06-Aug-2018 10:41:49 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0308

First Level Reviewer: boydj Date: 06-Aug-2018 10:39:58

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	OnCol Amt ug/l	Flags
1 Fluoride	3.025	3.067	-0.042	5065675	235.1	M
2 Chloride	4.167	4.200	-0.033	25953804	1597.3	
3 Nitrite as N		4.950			ND	
4 Bromide		6.100			ND	
5 Nitrate as N	6.958	7.050	-0.092	375276	9.93	
8 Chlorate		7.533			ND	
6 Orthophosphate		9.233			ND	
7 Sulfate	11.533	11.700	-0.167	18655069	1490.9	
10 Orthophosphate as P		0.000			ND	

QC Flag Legend

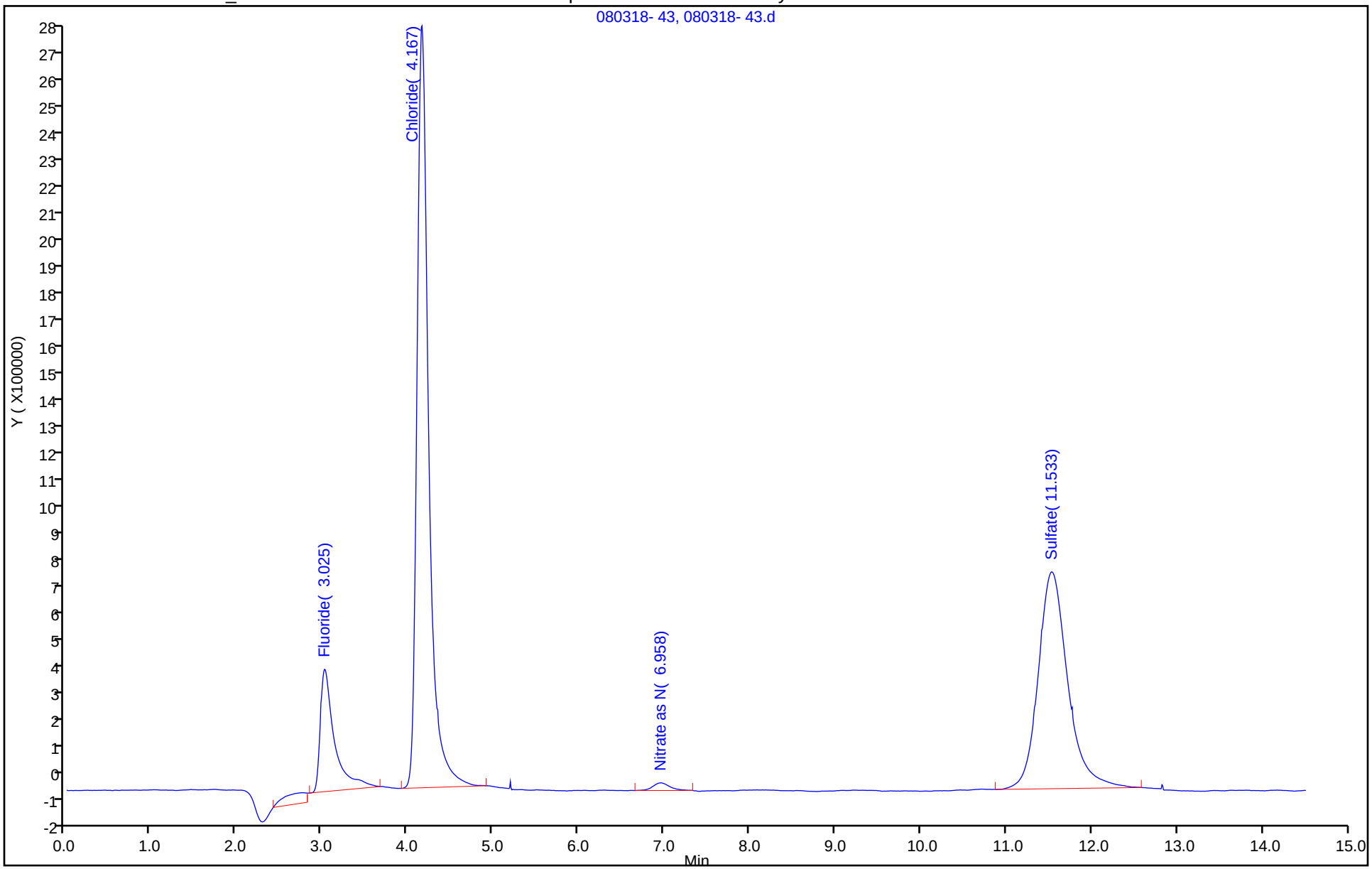
Review Flags
M - Manually Integrated

Report Date: 06-Aug-2018 10:41:51 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 43.d

Injection Date:	04-Aug-2018 06:06:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	160-29476-Q-1	Lab Sample ID:	160-29476-1	Worklist Smp#:	43
Client ID:	CRC-MW-1				
Injection Vol:	50.0 uL	Dil. Factor:	20.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



Manual Integration/User Assign Peak Report

TestAmerica St. Louis

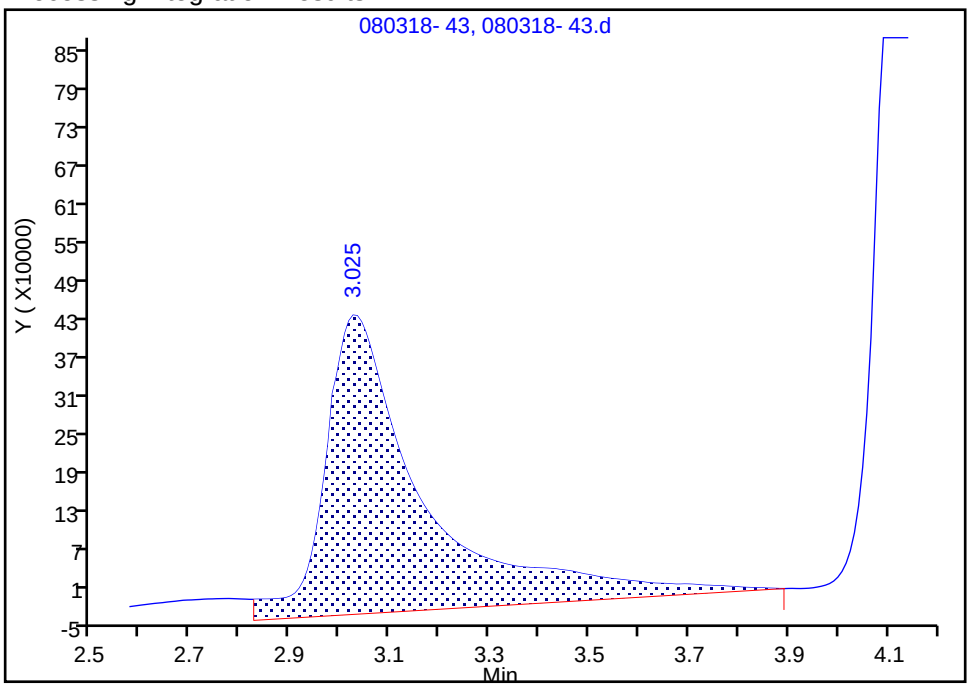
Data File:	\\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 43.d				
Injection Date:	04-Aug-2018 06:06:00	Instrument ID:	CIC2500		
Lims ID:	160-29476-Q-1	Lab Sample ID:	160-29476-1		
Client ID:	CRC-MW-1				
Operator ID:		ALS Bottle#:	0	Worklist Smp#:	43
Injection Vol:	50.0 uL	Dil. Factor:	20.0000		
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		
Column:		Detector	113		

1 Fluoride, CAS: 16984-48-8

Signal: 1

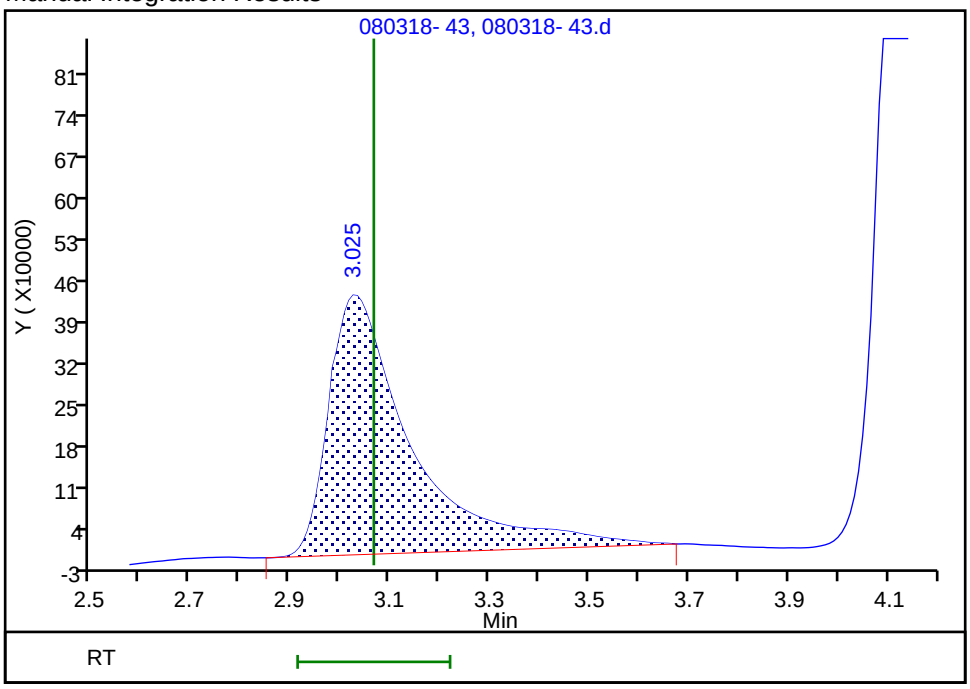
Processing Integration Results

RT: 3.03
Area: 6421742
Amount: 297.9754
Amount Units: ug/l



Manual Integration Results

RT: 3.03
Area: 5065675
Amount: 235.0525
Amount Units: ug/l



Reviewer: boydj, 06-Aug-2018 10:39:51

Audit Action: Manually Integrated Audit Reason: Baseline Smoothing

FORM VI
HPLC/IC BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA
RETENTION TIME SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1 Analy Batch No.: 379990

SDG No.:

Instrument ID: CIC2500 GC Column: IonPacAS14 ID: 4(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 16:50 Calibration End Date: 08/02/2018 18:15 Calibration ID: 14920

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD0 160-379990/1	080218- 1.d
Level 2	STD2 160-379990/2	080218- 2.d
Level 3	STD3 160-379990/3	080218- 3.d
Level 4	STD4 160-379990/4	080218- 4.d
Level 5	STD5 160-379990/5	080218- 5.d
Level 6	STD6 160-379990/6	080218- 6.d

ANALYTE	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5	LVL 6					RT WINDOW	AVG RT
Fluoride		3.050	3.042	3.067	3.050	3.050					2.913 - 3.220	3.052
Chloride	+++++	4.183	4.167	4.200	4.183	4.192					3.990 - 4.410	4.185
Bromide		6.092	6.083	6.100	6.083	6.083					5.795 - 6.405	6.088
Sulfate		11.683	11.683	11.700	11.692	11.675					11.115 - 12.285	11.687

FORM VI
HPLC/IC BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1 Analy Batch No.: 379990

SDG No.:

Instrument ID: CIC2500 GC Column: IonPacAS14 ID: 4(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 16:50 Calibration End Date: 08/02/2018 18:15 Calibration ID: 14920

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD0 160-379990/1	080218- 1.d
Level 2	STD2 160-379990/2	080218- 2.d
Level 3	STD3 160-379990/3	080218- 3.d
Level 4	STD4 160-379990/4	080218- 4.d
Level 5	STD5 160-379990/5	080218- 5.d
Level 6	STD6 160-379990/6	080218- 6.d

ANALYTE	CF				CURVE TYPE	COEFFICIENT			#	MIN CF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 5	LVL 2 LVL 6	LVL 3	LVL 4		B	M1	M2								
Fluoride	21348	19867 21635	21287	20863	LinF		21551.2523							1.0000		0.9950
Chloride	+++++ 15750	14990 16433	14694	15208	LinF		16248.6881							0.9990		0.9950
Bromide	6762.2	6664.0 6816.4	6631.7	6671.5	LinF		6799.82156							1.0000		0.9950
Sulfate	12132	11277 12652	11478	11673	LinF		12512.3321							0.9990		0.9950

Note: The M1 coefficient is the same as Ave CF for an Ave curve type.

FORM VI
HPLC/IC BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1 Analy Batch No.: 379990

SDG No.:

Instrument ID: CIC2500 GC Column: IonPacAS14 ID: 4(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 16:50 Calibration End Date: 08/02/2018 18:15 Calibration ID: 14920

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD0 160-379990/1	080218- 1.d
Level 2	STD2 160-379990/2	080218- 2.d
Level 3	STD3 160-379990/3	080218- 3.d
Level 4	STD4 160-379990/4	080218- 4.d
Level 5	STD5 160-379990/5	080218- 5.d
Level 6	STD6 160-379990/6	080218- 6.d

ANALYTE	CURVE TYPE	RESPONSE					CONCENTRATION (UG/L)				
		LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5	LVL 6	LVL 2	LVL 3	LVL 4	LVL 5
Fluoride	LinF	54087549	1986702	5321770	10431300	26684642	2500	100	250	500	1250
Chloride	LinF	+++++ 82163074	2997912	7346961	15207641	39374495	+++++ 5000	200	500	1000	2500
Bromide	LinF	34081859	1666006	3315864	6671531	16905572	5000	250	500	1000	2500
Sulfate	LinF	253041868	5638546	22956147	46691919	121320415	20000	500	2000	4000	10000

Curve Type Legend:
LinF = Linear forced zero

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 1.d
Lims ID: STD0
Client ID:
Sample Type: IC Calib Level: 1
Inject. Date: 02-Aug-2018 16:50:00 ALS Bottle#: 0 Worklist Smp#: 1
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013779-001
Misc. Info.: 1 STD0
Operator ID: Instrument ID: CIC2500
Sublist: chrom-Anions_CIC2500*sub2

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 03-Aug-2018 12:04:22 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0302

First Level Reviewer: boydj Date: 03-Aug-2018 11:48:00

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride		3.067				ND	U
2 Chloride	4.092	4.200	-0.108	243239		15.0	
3 Nitrite as N		4.950				ND	
4 Bromide		6.100				ND	
5 Nitrate as N		7.050				ND	
6 Orthophosphate		9.233				ND	
7 Sulfate		11.700				ND	

QC Flag Legend

Review Flags
U - Marked Undetected

Reagents:

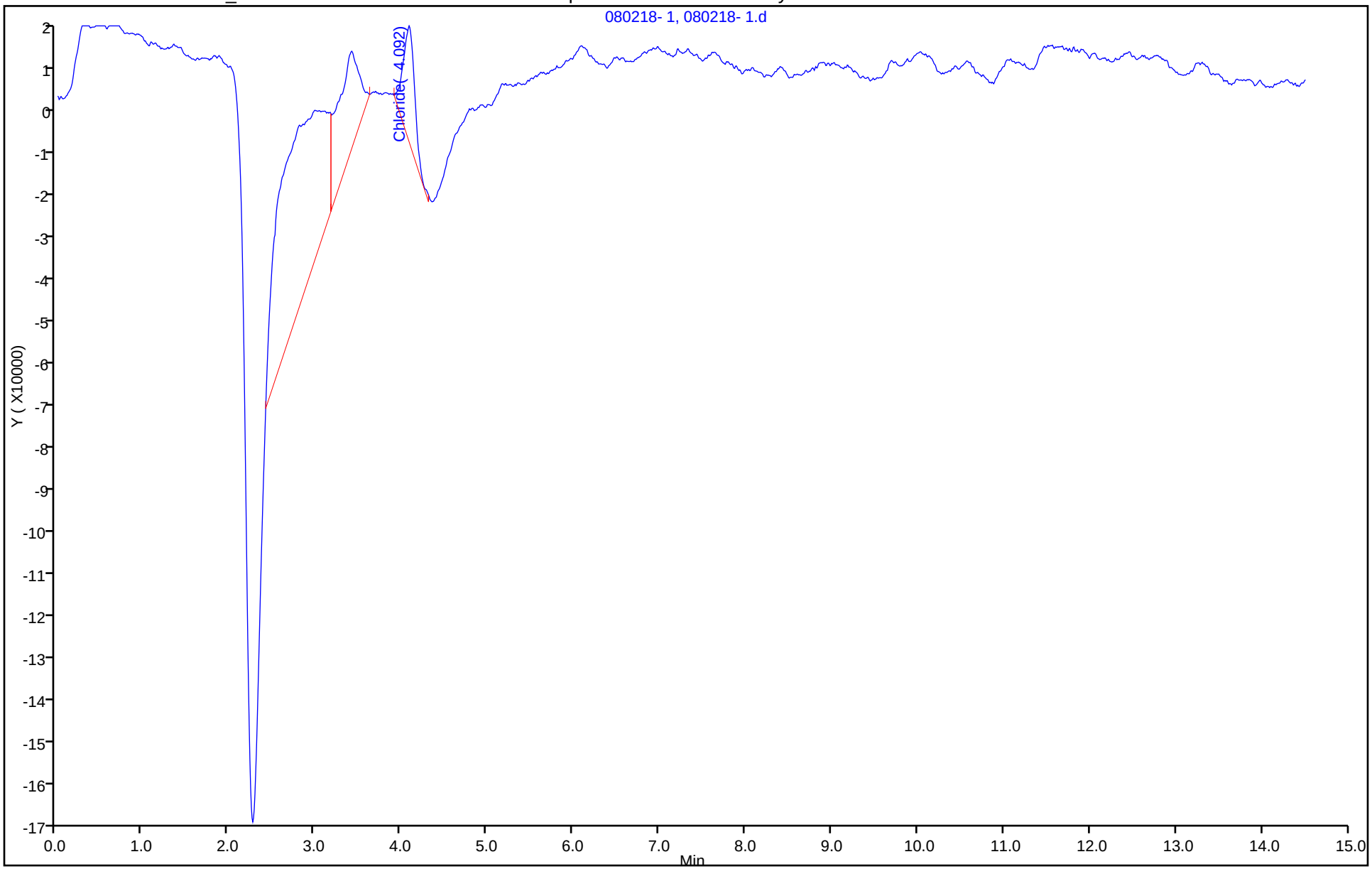
IC Cal Low_00009 Amount Added: 0.00 Units: uL

Report Date: 03-Aug-2018 12:04:23 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 1.d

Injection Date:	02-Aug-2018 16:50:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	STD0			Worklist Smp#:	1
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 2.d
Lims ID: STD2
Client ID:
Sample Type: IC Calib Level: 2
Inject. Date: 02-Aug-2018 17:07:00 ALS Bottle#: 0 Worklist Smp#: 2
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013779-002
Misc. Info.: 2 STD2
Operator ID: Instrument ID: CIC2500
Sublist: chrom-Anions_CIC2500*sub2

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 03-Aug-2018 12:04:24 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0302

First Level Reviewer: boydj Date: 03-Aug-2018 11:47:52

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride	3.050	3.067	-0.017	1986702	100.0	92.2	M
2 Chloride	4.183	4.200	-0.017	2997912	200.0	184.5	
3 Nitrite as N	4.942	4.950	-0.008	681282	20.0	22.2	
4 Bromide	6.092	6.100	-0.008	1666006	250.0	245.0	
5 Nitrate as N	7.050	7.050	0.000	766353	20.0	20.3	
6 Orthophosphate	9.233	9.233	0.000	2082228	500.0	440.8	
7 Sulfate	11.683	11.700	-0.017	5638546	500.0	450.6	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

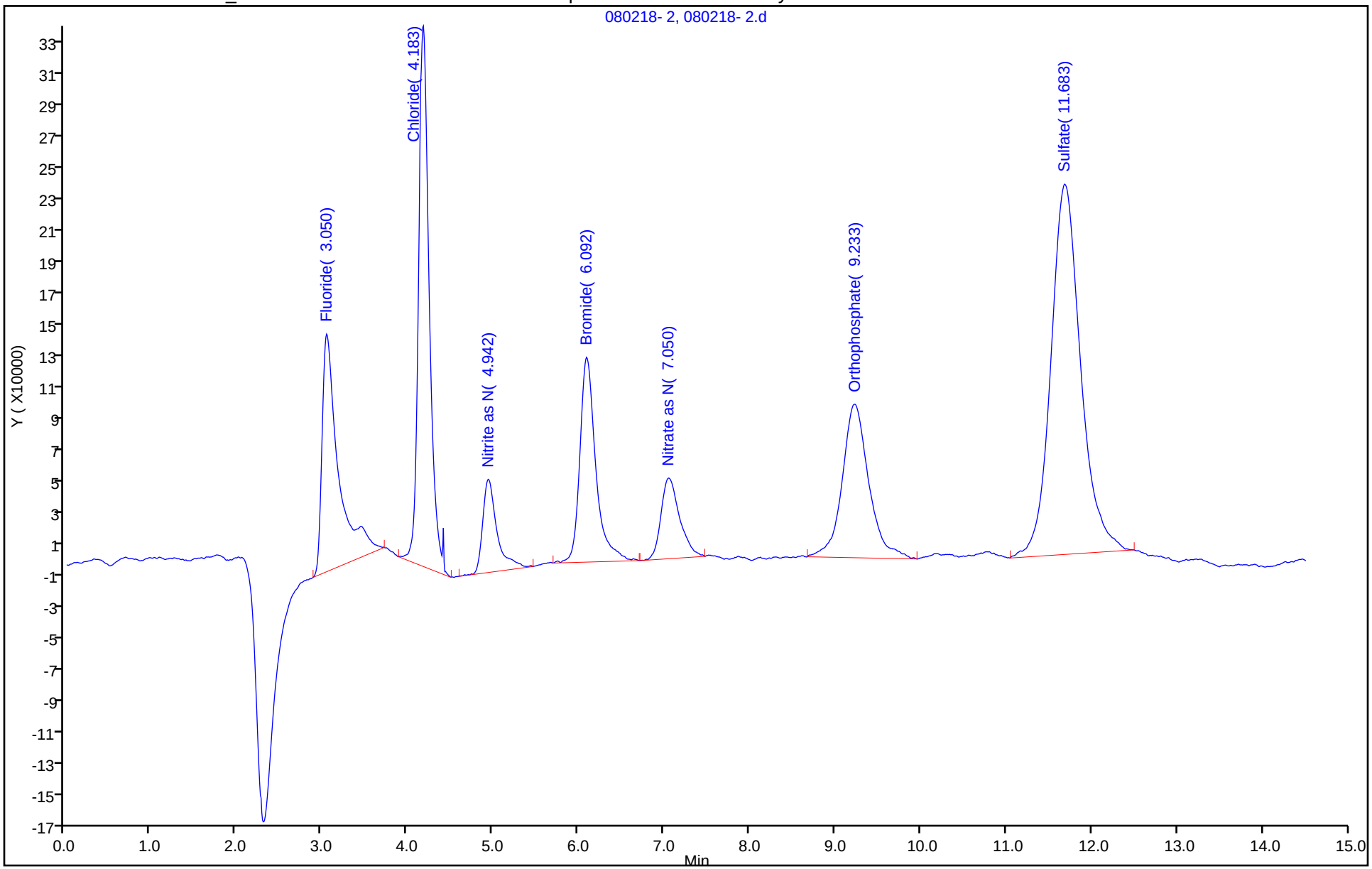
IC Cal Low_00009 Amount Added: 0.25 Units: mL

Report Date: 03-Aug-2018 12:04:25 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 2.d

Injection Date:	02-Aug-2018 17:07:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	STD2			Worklist Smp#:	2
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



Manual Integration/User Assign Peak Report

TestAmerica St. Louis

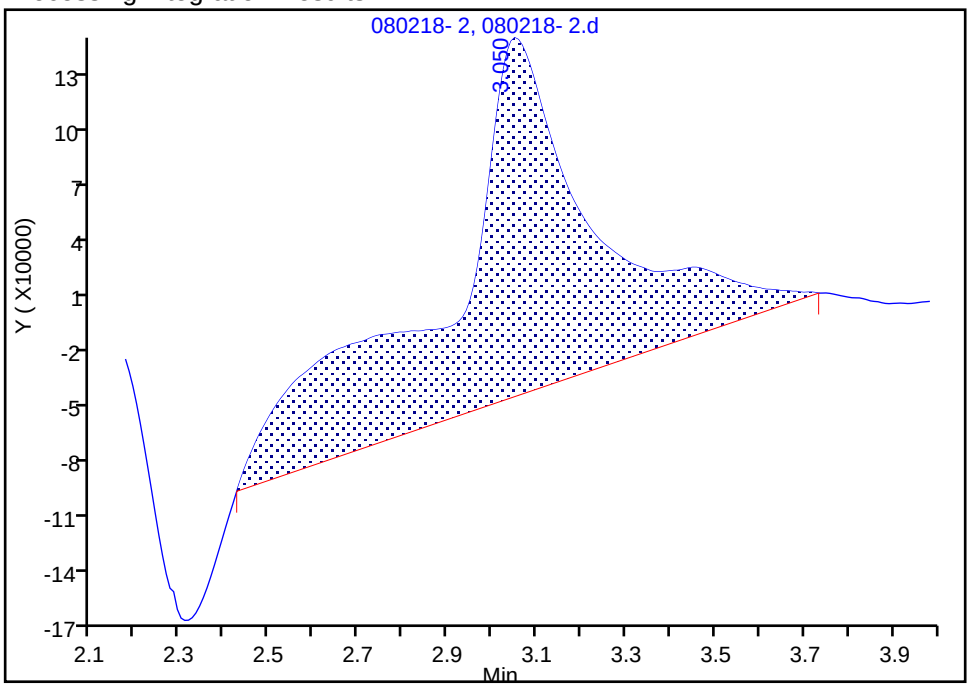
Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 2.d
Injection Date: 02-Aug-2018 17:07:00 Instrument ID: CIC2500
Lims ID: STD2
Client ID:
Operator ID: ALS Bottle#: 0 Worklist Smp#: 2
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Method: Anions_CIC2500 Limit Group: WT - IC - 28Days
Column: Detector 113

1 Fluoride, CAS: 16984-48-8

Signal: 1

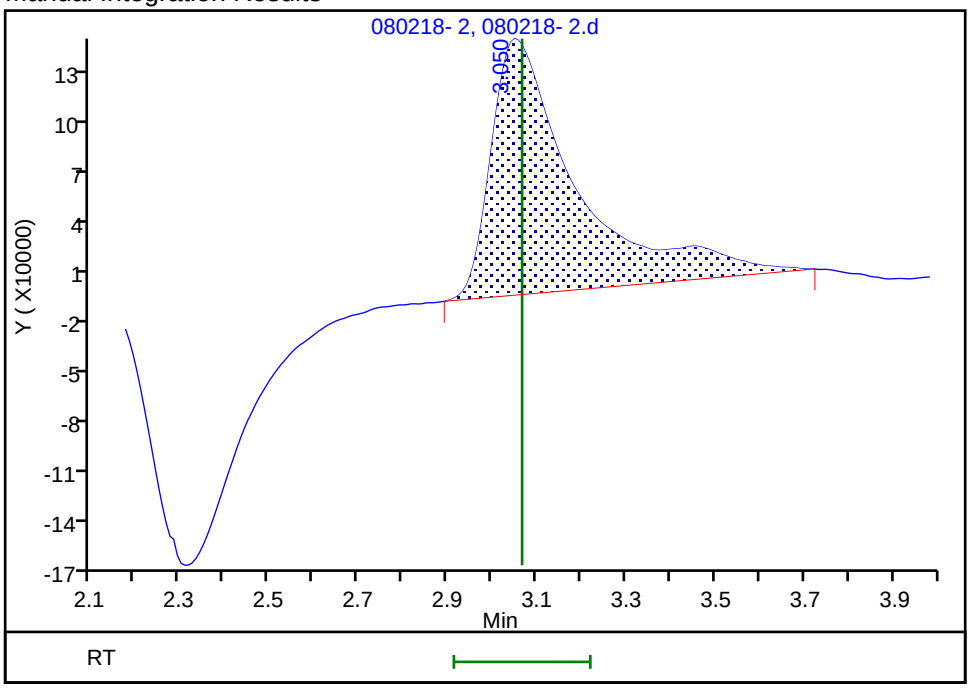
Processing Integration Results

RT: 3.05
Area: 4526133
Amount: 207.9268
Amount Units: ug/l



Manual Integration Results

RT: 3.05
Area: 1986702
Amount: 92.184991
Amount Units: ug/l



Reviewer: boydj, 03-Aug-2018 11:47:43
Audit Action: Manually Integrated Audit Reason: Baseline Smoothing

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 3.d
Lims ID: STD3
Client ID:
Sample Type: IC Calib Level: 3
Inject. Date: 02-Aug-2018 17:24:00 ALS Bottle#: 0 Worklist Smp#: 3
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013779-003
Misc. Info.: 3 STD3
Operator ID: Instrument ID: CIC2500
Sublist: chrom-Anions_CIC2500*sub2

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 03-Aug-2018 12:04:26 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0302

First Level Reviewer: boydj Date: 03-Aug-2018 11:47:35

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride	3.042	3.067	-0.025	5321770	250.0	246.9	M
2 Chloride	4.167	4.200	-0.033	7346961	500.0	452.2	
3 Nitrite as N	4.933	4.950	-0.017	1201777	40.0	39.1	
4 Bromide	6.083	6.100	-0.017	3315864	500.0	487.6	
5 Nitrate as N	7.033	7.050	-0.017	3574160	100.0	94.6	
6 Orthophosphate	9.208	9.233	-0.025	8379807	2000.0	1774.0	
7 Sulfate	11.683	11.700	-0.017	22956147	2000.0	1834.7	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

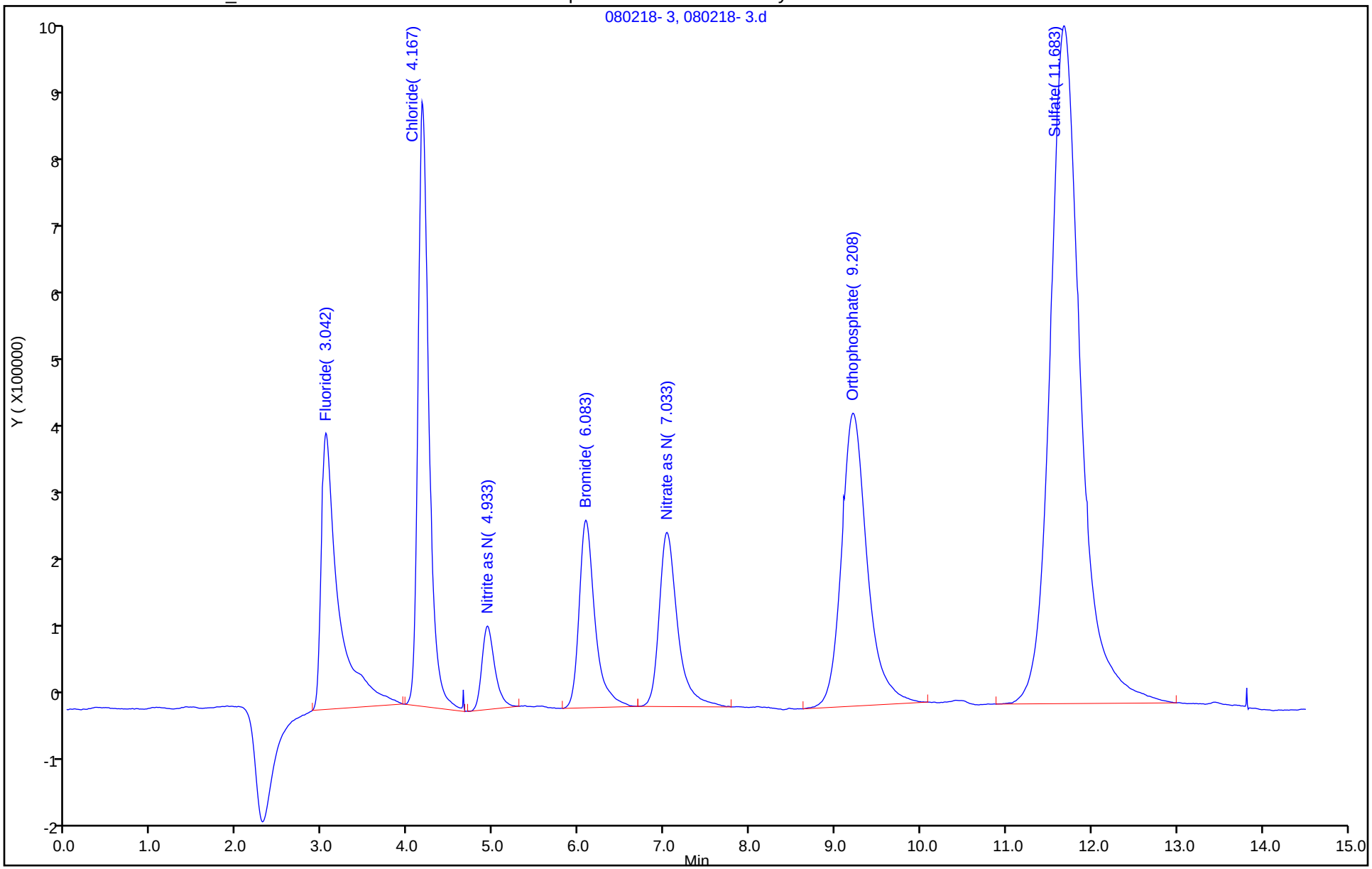
IC Cal High_00059 Amount Added: 0.50 Units: mL

Report Date: 03-Aug-2018 12:04:26 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 3.d

Injection Date:	02-Aug-2018 17:24:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	STD3			Worklist Smp#:	3
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



Manual Integration/User Assign Peak Report

TestAmerica St. Louis

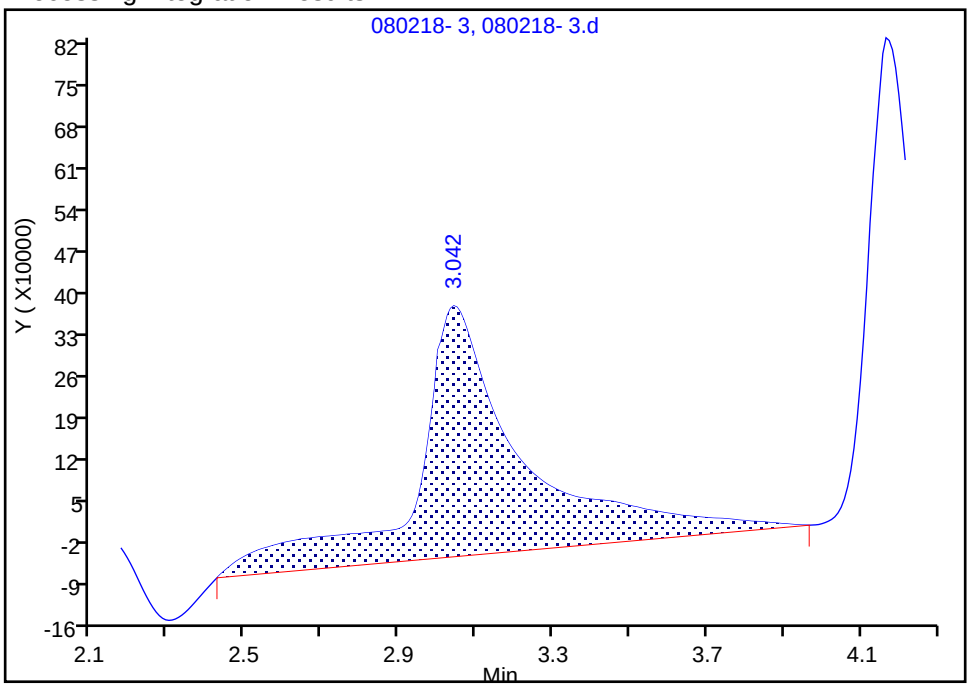
Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 3.d
Injection Date: 02-Aug-2018 17:24:00 Instrument ID: CIC2500
Lims ID: STD3
Client ID:
Operator ID: ALS Bottle#: 0 Worklist Smp#: 3
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Method: Anions_CIC2500 Limit Group: WT - IC - 28Days
Column: Detector 113

1 Fluoride, CAS: 16984-48-8

Signal: 1

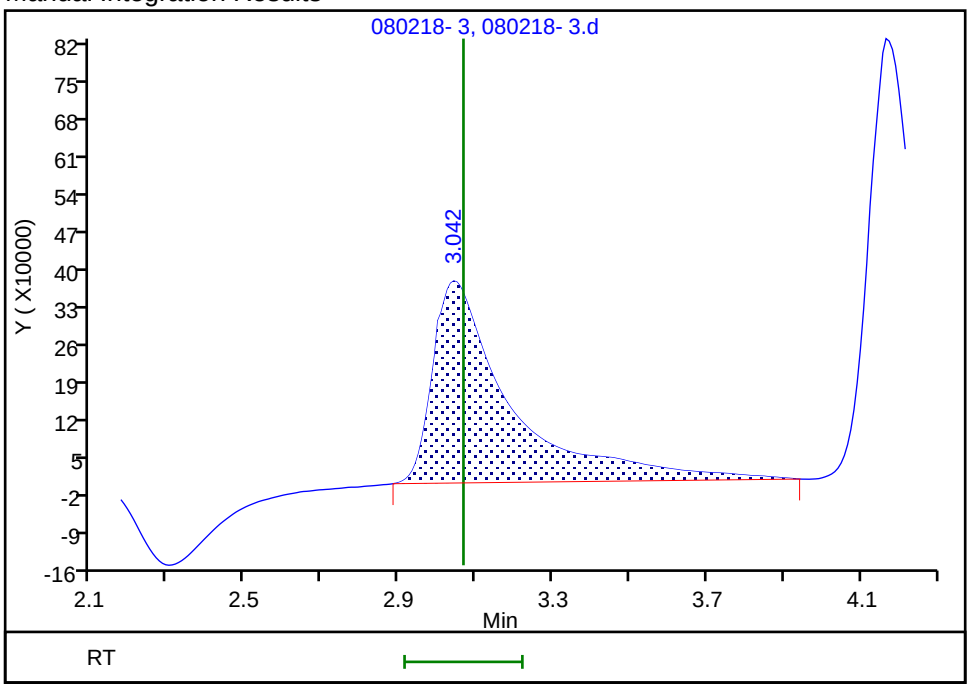
Processing Integration Results

RT: 3.04
Area: 8327848
Amount: 380.8634
Amount Units: ug/l



Manual Integration Results

RT: 3.04
Area: 5321770
Amount: 246.9355
Amount Units: ug/l



Reviewer: boydj, 03-Aug-2018 11:48:14
Audit Action: Manually Integrated Audit Reason: Baseline Smoothing

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 4.d
Lims ID: STD4
Client ID:
Sample Type: IC Calib Level: 4
Inject. Date: 02-Aug-2018 17:41:00 ALS Bottle#: 0 Worklist Smp#: 4
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013779-004
Misc. Info.: 4 STD4
Operator ID: Instrument ID: CIC2500
Sublist: chrom-Anions_CIC2500*sub2

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 03-Aug-2018 12:04:27 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0302

First Level Reviewer: boydj Date: 03-Aug-2018 11:47:23

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride	3.067	3.067	0.000	10431300	500.0	484.0	M
2 Chloride	4.200	4.200	0.000	15207641	1000.0	935.9	
3 Nitrite as N	4.950	4.950	0.000	2421320	80.0	78.8	
4 Bromide	6.100	6.100	0.000	6671531	1000.0	981.1	
5 Nitrate as N	7.050	7.050	0.000	7494480	200.0	198.3	
6 Orthophosphate	9.233	9.233	0.000	17421077	4000.0	3688.0	
7 Sulfate	11.700	11.700	0.000	46691919	4000.0	3731.7	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

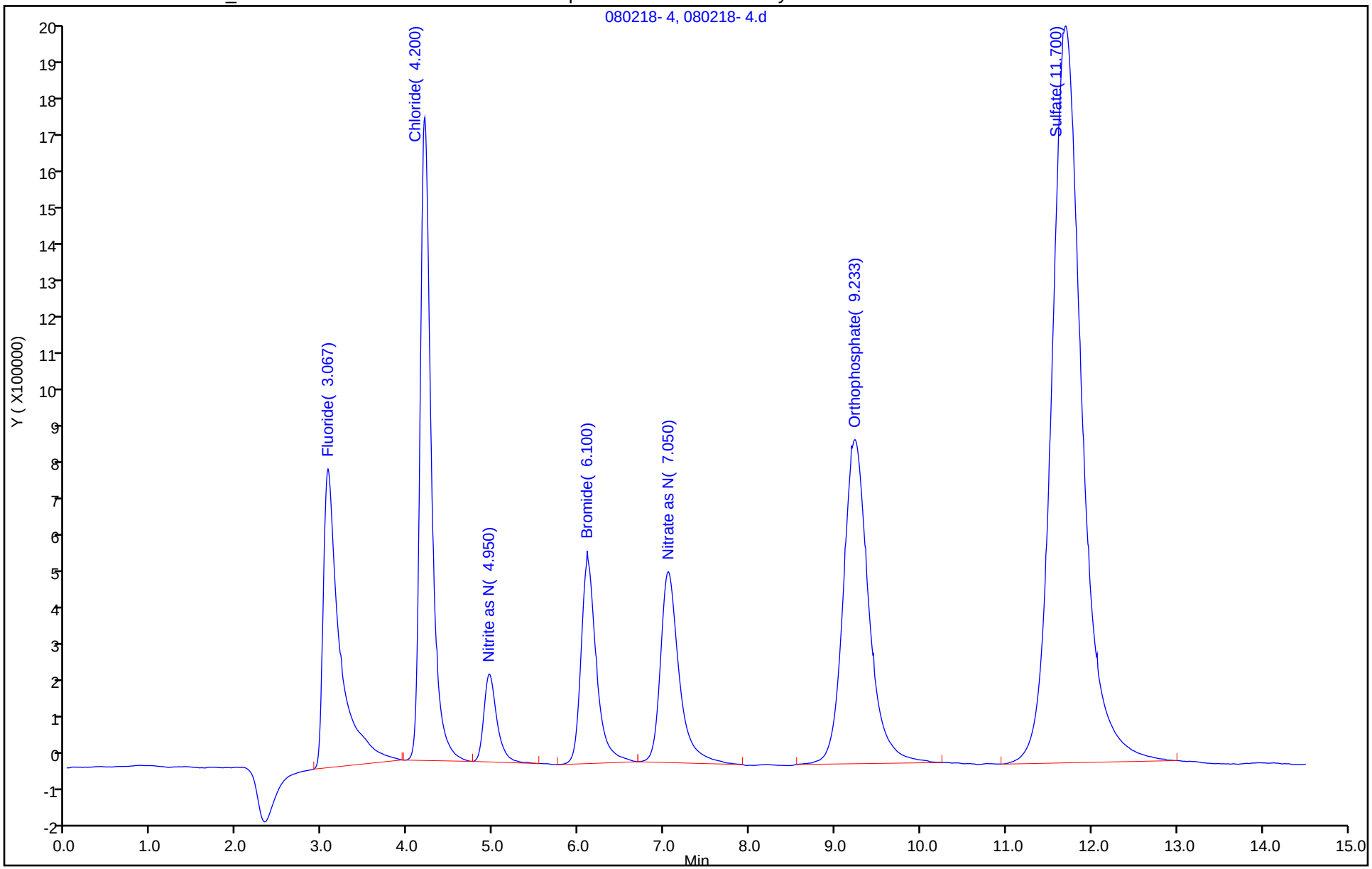
IC Cal High_00059 Amount Added: 1.00 Units: mL

Report Date: 03-Aug-2018 12:04:28 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 4.d

Injection Date:	02-Aug-2018 17:41:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	STD4			Worklist Smp#:	4
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



Manual Integration/User Assign Peak Report

TestAmerica St. Louis

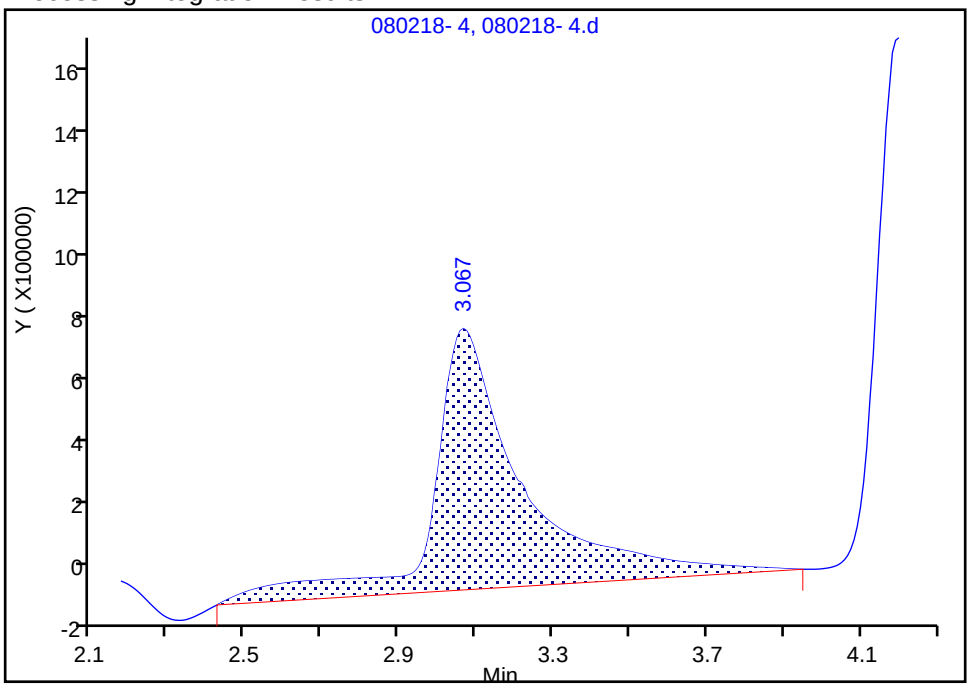
Data File:	\\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 4.d				
Injection Date:	02-Aug-2018 17:41:00	Instrument ID:	CIC2500		
Lims ID:	STD4				
Client ID:					
Operator ID:		ALS Bottle#:	0	Worklist Smp#:	4
Injection Vol:	50.0 uL	Dil. Factor:	1.0000		
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		
Column:		Detector	113		

1 Fluoride, CAS: 16984-48-8

Signal: 1

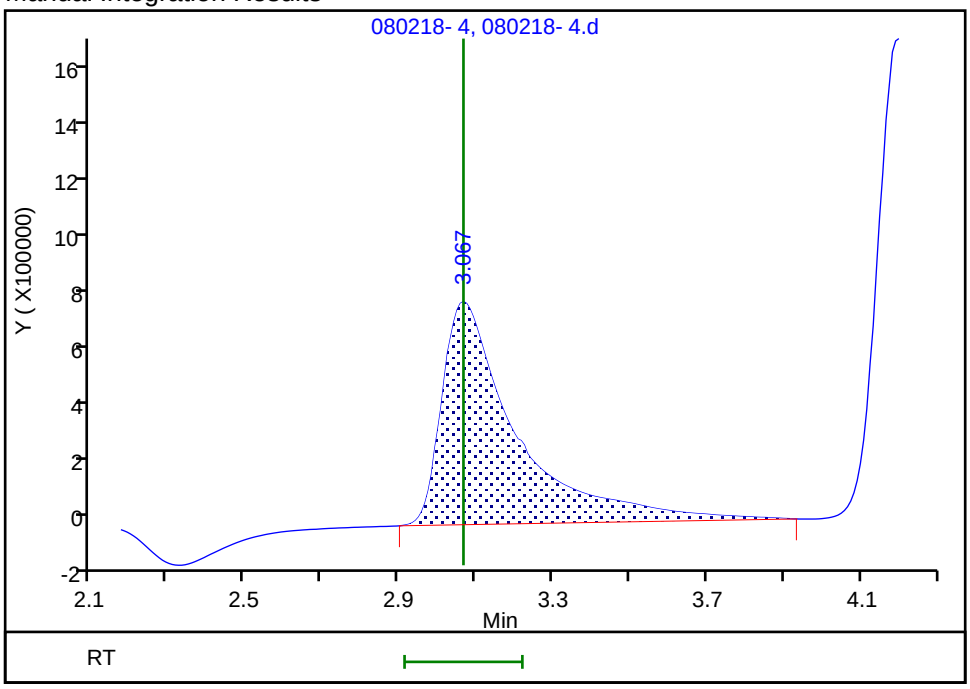
Processing Integration Results

RT: 3.07
Area: 13519888
Amount: 612.9928
Amount Units: ug/l



Manual Integration Results

RT: 3.07
Area: 10431300
Amount: 484.0229
Amount Units: ug/l



Reviewer: boydj, 03-Aug-2018 11:47:20
Audit Action: Manually Integrated Audit Reason: Baseline Smoothing

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 5.d
Lims ID: STD5
Client ID:
Sample Type: IC Calib Level: 5
Inject. Date: 02-Aug-2018 17:58:00 ALS Bottle#: 0 Worklist Smp#: 5
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013779-005
Misc. Info.: 5 STD5
Operator ID: Instrument ID: CIC2500
Sublist: chrom-Anions_CIC2500*sub2

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 03-Aug-2018 12:04:30 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0302

First Level Reviewer: boydj Date: 03-Aug-2018 11:48:37

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride	3.050	3.067	-0.017	26684642	1250.0	1238.2	M
2 Chloride	4.183	4.200	-0.017	39374495	2500.0	2423.2	
3 Nitrite as N	4.933	4.950	-0.017	6156895	200.0	200.3	
4 Bromide	6.083	6.100	-0.017	16905572	2500.0	2486.2	
5 Nitrate as N	7.017	7.050	-0.033	18845943	500.0	498.7	
6 Orthophosphate	9.208	9.233	-0.025	46138467	10000	9767.4	
7 Sulfate	11.692	11.700	-0.008	121320415	10000	9696.1	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

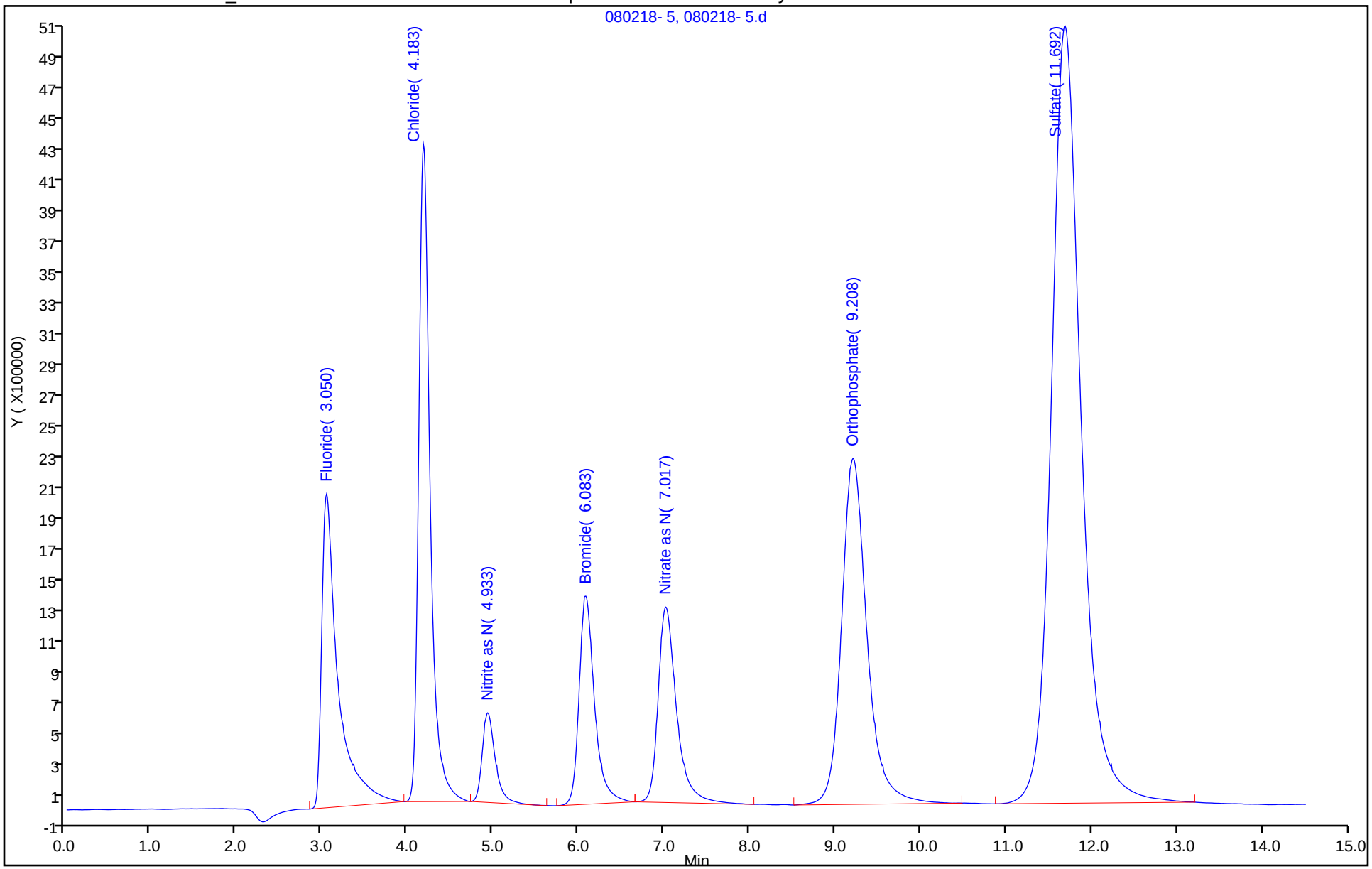
IC Cal High_00059 Amount Added: 2.50 Units: mL

Report Date: 03-Aug-2018 12:04:30 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 5.d

Injection Date:	02-Aug-2018 17:58:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	STD5			Worklist Smp#:	5
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



Manual Integration/User Assign Peak Report

TestAmerica St. Louis

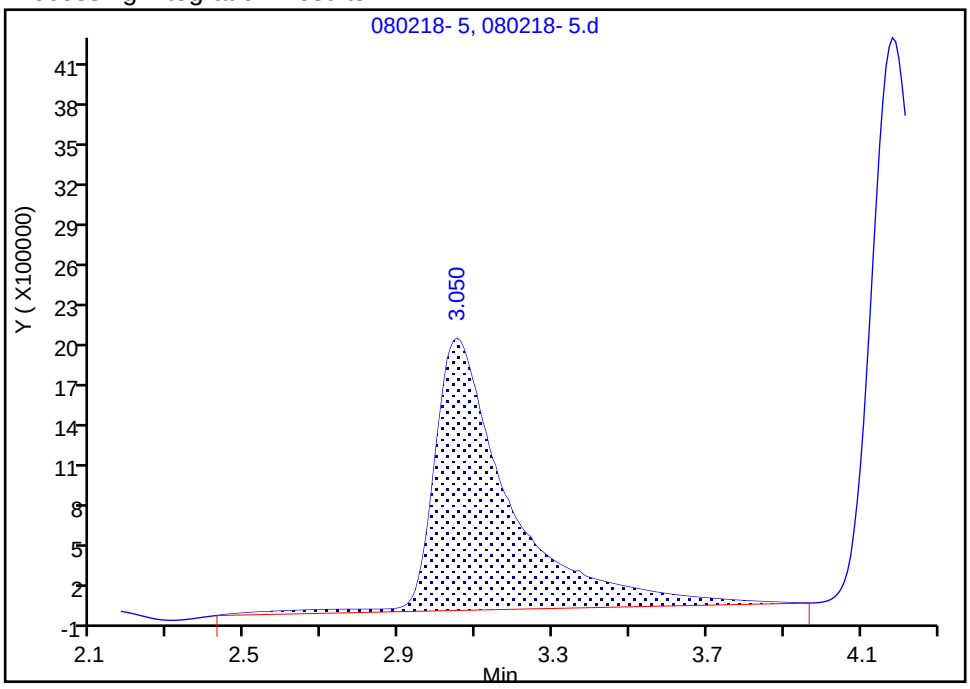
Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 5.d
Injection Date: 02-Aug-2018 17:58:00 Instrument ID: CIC2500
Lims ID: STD5
Client ID:
Operator ID: ALS Bottle#: 0 Worklist Smp#: 5
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Method: Anions_CIC2500 Limit Group: WT - IC - 28Days
Column: Detector 113

1 Fluoride, CAS: 16984-48-8

Signal: 1

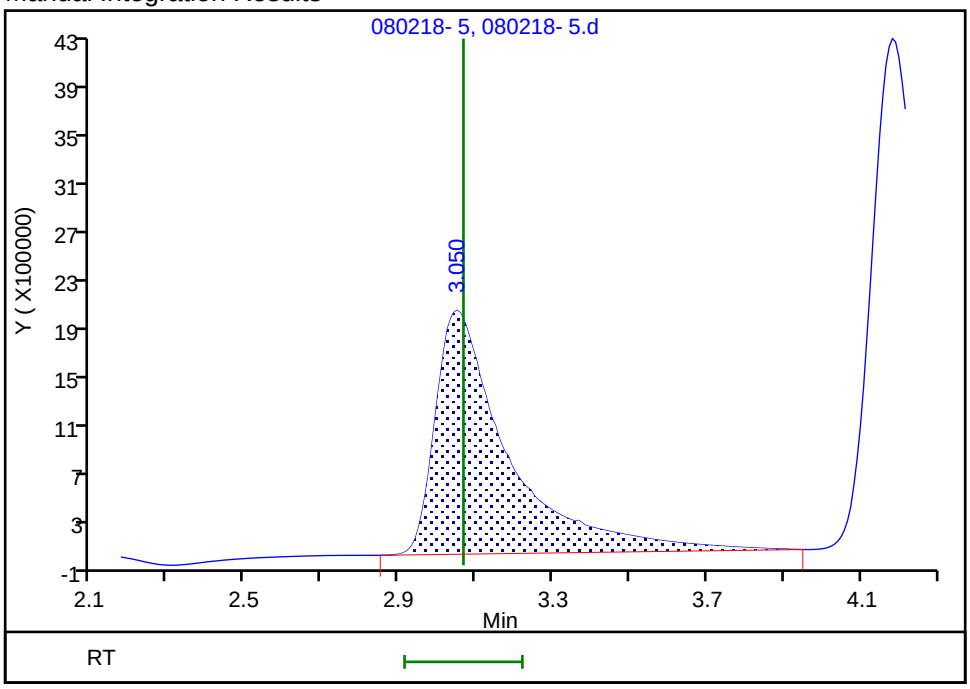
Processing Integration Results

RT: 3.05
Area: 27926745
Amount: 1284.4542
Amount Units: ug/l



Manual Integration Results

RT: 3.05
Area: 26684642
Amount: 1238.1945
Amount Units: ug/l



Reviewer: boydj, 03-Aug-2018 11:48:33
Audit Action: Manually Integrated Audit Reason: Baseline Smoothing

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d
Lims ID: STD6
Client ID:
Sample Type: IC Calib Level: 6
Inject. Date: 02-Aug-2018 18:15:00 ALS Bottle#: 0 Worklist Smp#: 6
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013779-006
Misc. Info.: 6 STD6
Operator ID: Instrument ID: CIC2500
Sublist: chrom-Anions_CIC2500*sub2

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 03-Aug-2018 12:04:31 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0302

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride	3.050	3.067	-0.017	54087549	2500.0	2509.7	
2 Chloride	4.192	4.200	-0.008	82163074	5000.0	5056.6	
3 Nitrite as N	4.942	4.950	-0.008	12297204	400.0	400.1	
4 Bromide	6.083	6.100	-0.017	34081859	5000.0	5012.2	
5 Nitrate as N	7.008	7.050	-0.042	37843843	1000.0	1001.5	
6 Orthophosphate	9.208	9.233	-0.025	95431881	20000	20203	
7 Sulfate	11.675	11.700	-0.025	253041868	20000	20223	

Reagents:

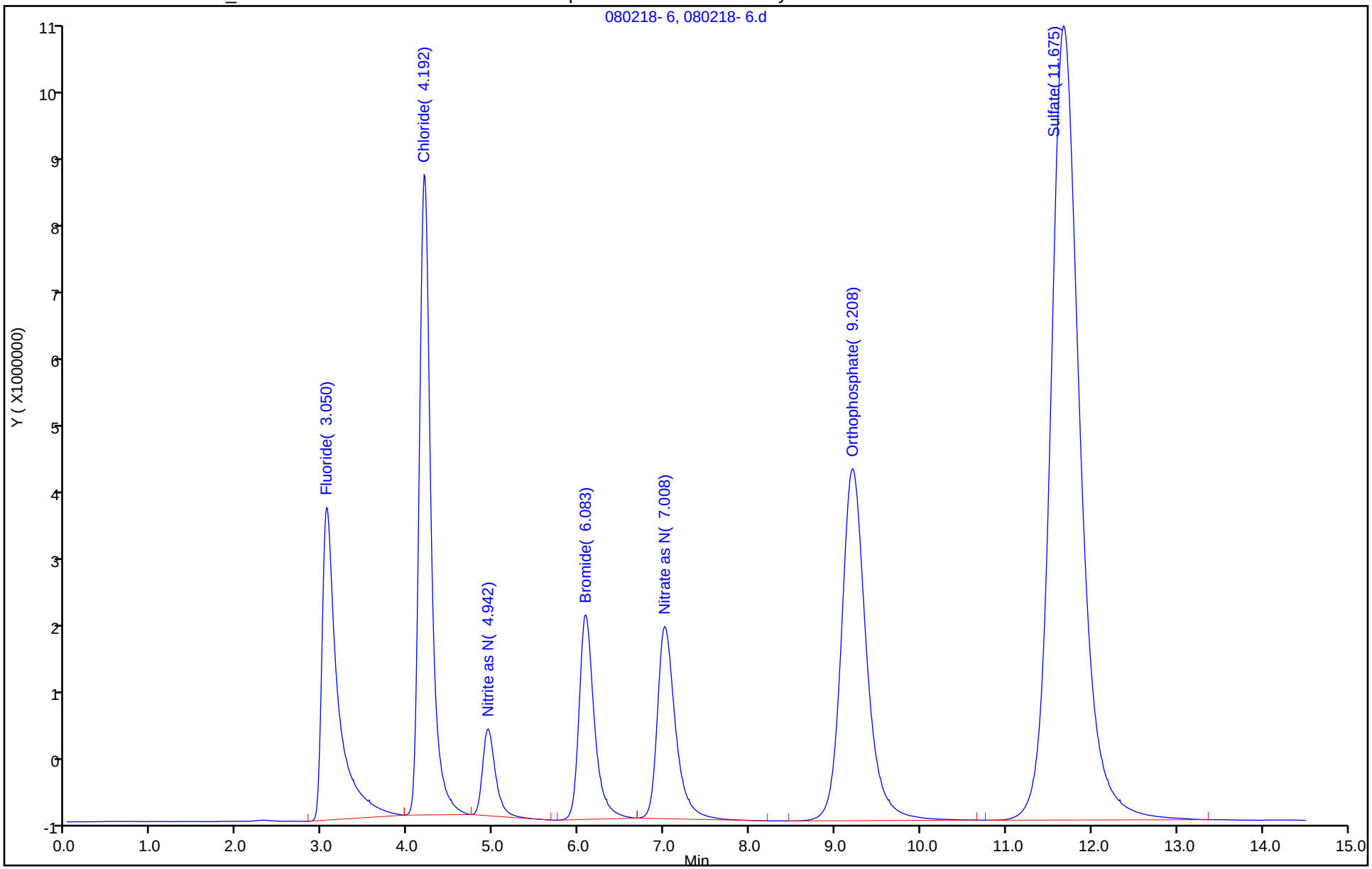
IC Cal High_00059 Amount Added: 5.00 Units: mL

Report Date: 03-Aug-2018 12:04:32 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Injection Date:	02-Aug-2018 18:15:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	STD6			Worklist Smp#:	6
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



FORM VII
HPLC/IC CONTINUING CALIBRATION DATA

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Lab Sample ID: ICV 160-379990/7 Calibration Date: 08/02/2018 18:32

Instrument ID: CIC2500 Calib Start Date: 08/02/2018 16:50

GC Column: IonPacAS14 ID: 4.00(mm) Calib End Date: 08/02/2018 18:15

Lab File ID: 080218- 7.d Conc. Units: mg/L

ANALYTE	CURVE TYPE	AVE CF	CF	MIN CF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Fluoride	LinF		21251		0.986	1.00	-1.4	10.0
Chloride	LinF		15553		1.91	2.00	-4.3	10.0
Nitrite as N	LinF		30720		0.160	0.160	-0.0	
Bromide	LinF		6677		1.96	2.00	-1.8	10.0
Nitrate as N	LinF		36914		0.391	0.400	-2.3	
Orthophosphate	LinF		4525		7.66	8.00	-4.2	
Sulfate	LinF		11969		7.65	8.00	-4.3	10.0

FORM VII
HPLC/IC CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Lab Sample ID: ICV 160-379990/7 Calibration Date: 08/02/2018 18:32

Instrument ID: CIC2500 Calib Start Date: 08/02/2018 16:50

GC Column: IonPacAS14 ID: 4.00(mm) Calib End Date: 08/02/2018 18:15

Lab File ID: 080218- 7.d

Analyte	RT	RT WINDOW	
		FROM	TO
Fluoride	3.04	2.91	3.22
Chloride	4.18	3.99	4.41
Nitrite as N	4.93	4.70	5.20
Bromide	6.08	5.80	6.41
Nitrate as N	7.03	6.70	7.40
Orthophosphate	9.22	8.77	9.70
Sulfate	11.69	11.12	12.29

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 7.d
Lims ID: ICV
Client ID:
Sample Type: ICV
Inject. Date: 02-Aug-2018 18:32:00 ALS Bottle#: 0 Worklist Smp#: 7
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013779-007
Misc. Info.: 7 ICV
Operator ID: Instrument ID: CIC2500
Sublist:

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 03-Aug-2018 12:05:08 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0302

First Level Reviewer: boydj Date: 03-Aug-2018 11:49:00

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride	3.042	3.067	-0.025	21250688	1000.0	986.1	M
2 Chloride	4.183	4.200	-0.017	31106769	2000.0	1914.4	
3 Nitrite as N	4.933	4.950	-0.017	4915126	160.0	159.9	
4 Bromide	6.083	6.100	-0.017	13354330	2000.0	1963.9	
5 Nitrate as N	7.025	7.050	-0.025	14765591	400.0	390.8	
6 Orthophosphate	9.217	9.233	-0.016	36199962	8000.0	7663.5	
7 Sulfate	11.692	11.700	-0.008	95752007	8000.0	7652.6	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

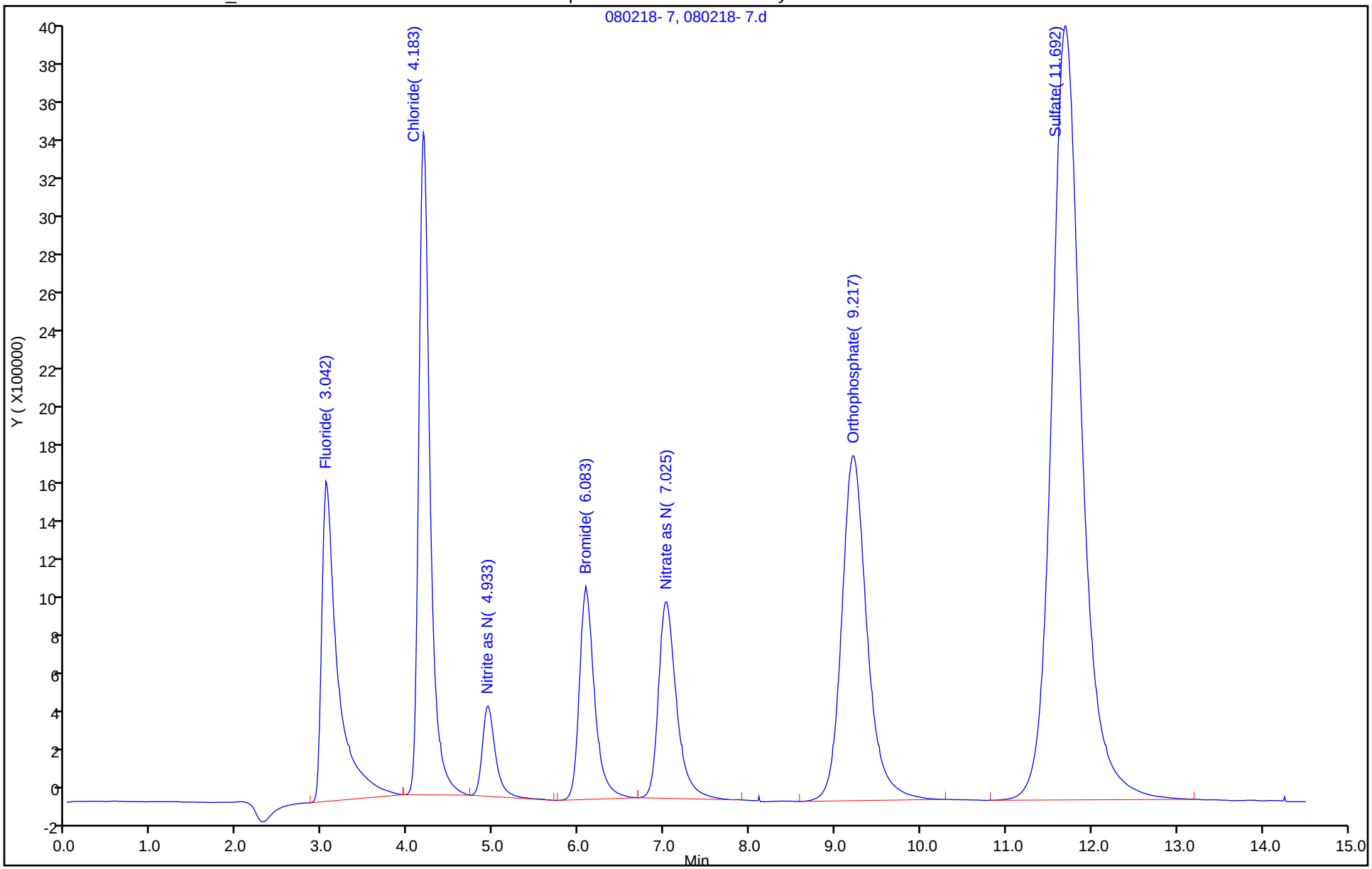
IC 2nd Source_00012 Amount Added: 2.00 Units: mL
IC NO2 2nd_00016 Amount Added: 16.00 Units: uL

Report Date: 03-Aug-2018 12:05:09 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 7.d

Injection Date:	02-Aug-2018 18:32:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	ICV			Worklist Smp#:	7
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



Manual Integration/User Assign Peak Report

TestAmerica St. Louis

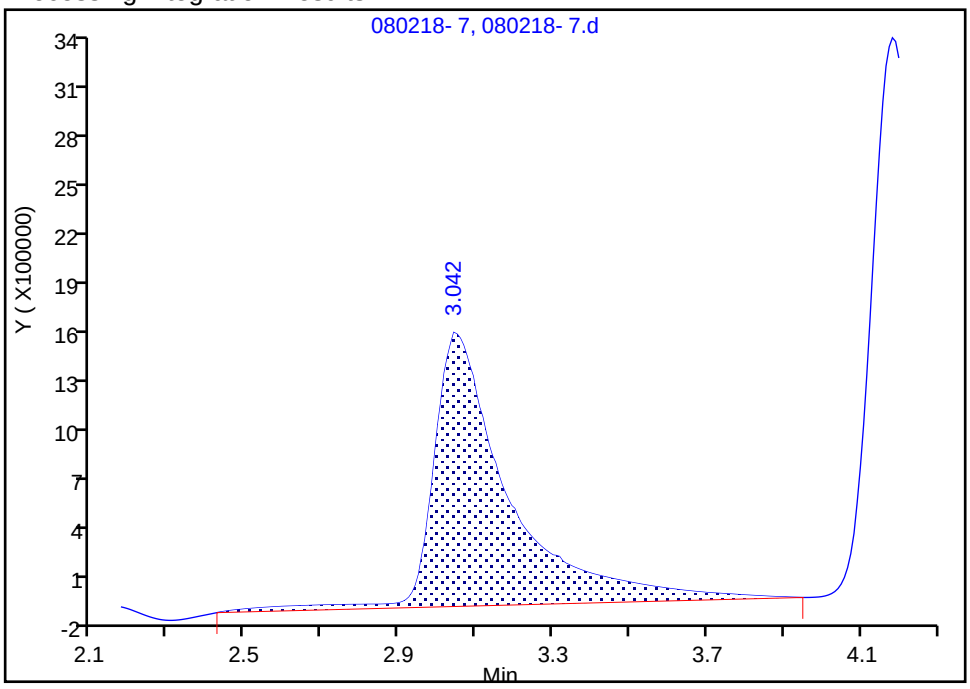
Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 7.d
Injection Date: 02-Aug-2018 18:32:00 Instrument ID: CIC2500
Lims ID: ICV
Client ID:
Operator ID: ALS Bottle#: 0 Worklist Smp#: 7
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Method: Anions_CIC2500 Limit Group: WT - IC - 28Days
Column: Detector 113

1 Fluoride, CAS: 16984-48-8

Signal: 1

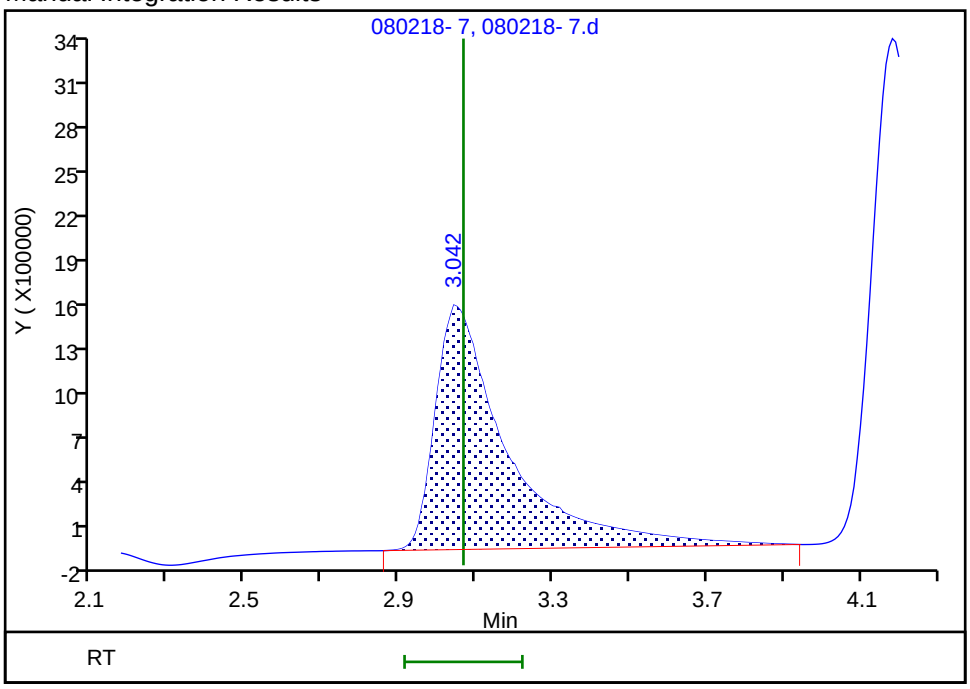
Processing Integration Results

RT: 3.04
Area: 22690865
Amount: 1052.8792
Amount Units: ug/l



Manual Integration Results

RT: 3.04
Area: 21250688
Amount: 986.0535
Amount Units: ug/l



Reviewer: boydj, 03-Aug-2018 11:48:53
Audit Action: Manually Integrated Audit Reason: Baseline Smoothing

FORM VII
HPLC/IC CONTINUING CALIBRATION DATA

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Lab Sample ID: CCV 160-380227/1 Calibration Date: 08/03/2018 18:16

Instrument ID: CIC2500 Calib Start Date: 08/02/2018 16:50

GC Column: IonPacAS14 ID: 4.00(mm) Calib End Date: 08/02/2018 18:15

Lab File ID: 080318- 1.d Conc. Units: mg/L

ANALYTE	CURVE TYPE	AVE CF	CF	MIN CF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Fluoride	LinF		21744		1.01	1.00	0.9	10.0
Chloride	LinF		15436		1.90	2.00	-5.0	10.0
Nitrite as N	LinF		30547		0.159	0.160	-0.6	
Bromide	LinF		6699		1.97	2.00	-1.5	10.0
Nitrate as N	LinF		37264		0.394	0.400	-1.4	
Orthophosphate	LinF		4506		7.63	8.00	-4.6	
Sulfate	LinF		11911		7.62	8.00	-4.8	10.0

FORM VII
HPLC/IC CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Lab Sample ID: CCV 160-380227/1 Calibration Date: 08/03/2018 18:16

Instrument ID: CIC2500 Calib Start Date: 08/02/2018 16:50

GC Column: IonPacAS14 ID: 4.00(mm) Calib End Date: 08/02/2018 18:15

Lab File ID: 080318- 1.d

Analyte	RT	RT WINDOW	
		FROM	TO
Fluoride	3.01	2.91	3.22
Chloride	4.13	3.99	4.41
Nitrite as N	4.87	4.70	5.20
Bromide	5.98	5.80	6.41
Nitrate as N	6.92	6.70	7.40
Orthophosphate	9.08	8.77	9.70
Sulfate	11.53	11.12	12.29

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 1.d
Lims ID: CCV
Client ID:
Sample Type: CCV
Inject. Date: 03-Aug-2018 18:16:00 ALS Bottle#: 0 Worklist Smp#: 1
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013784-001
Misc. Info.: 19 CCV
Operator ID: Instrument ID: CIC2500
Sublist: chrom-Anions_CIC2500*sub2

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 06-Aug-2018 10:41:26 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0308

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride	3.008	3.067	-0.059	21743928	1000.0	1008.9	
2 Chloride	4.125	4.200	-0.075	30871503	2000.0	1899.9	
3 Nitrite as N	4.867	4.950	-0.083	4887584	160.0	159.0	
4 Bromide	5.983	6.100	-0.117	13397856	2000.0	1970.3	
5 Nitrate as N	6.917	7.050	-0.133	14905449	400.0	394.5	
6 Orthophosphate	9.075	9.233	-0.158	36046097	8000.0	7630.9	
7 Sulfate	11.533	11.700	-0.167	95286358	8000.0	7615.4	

Reagents:

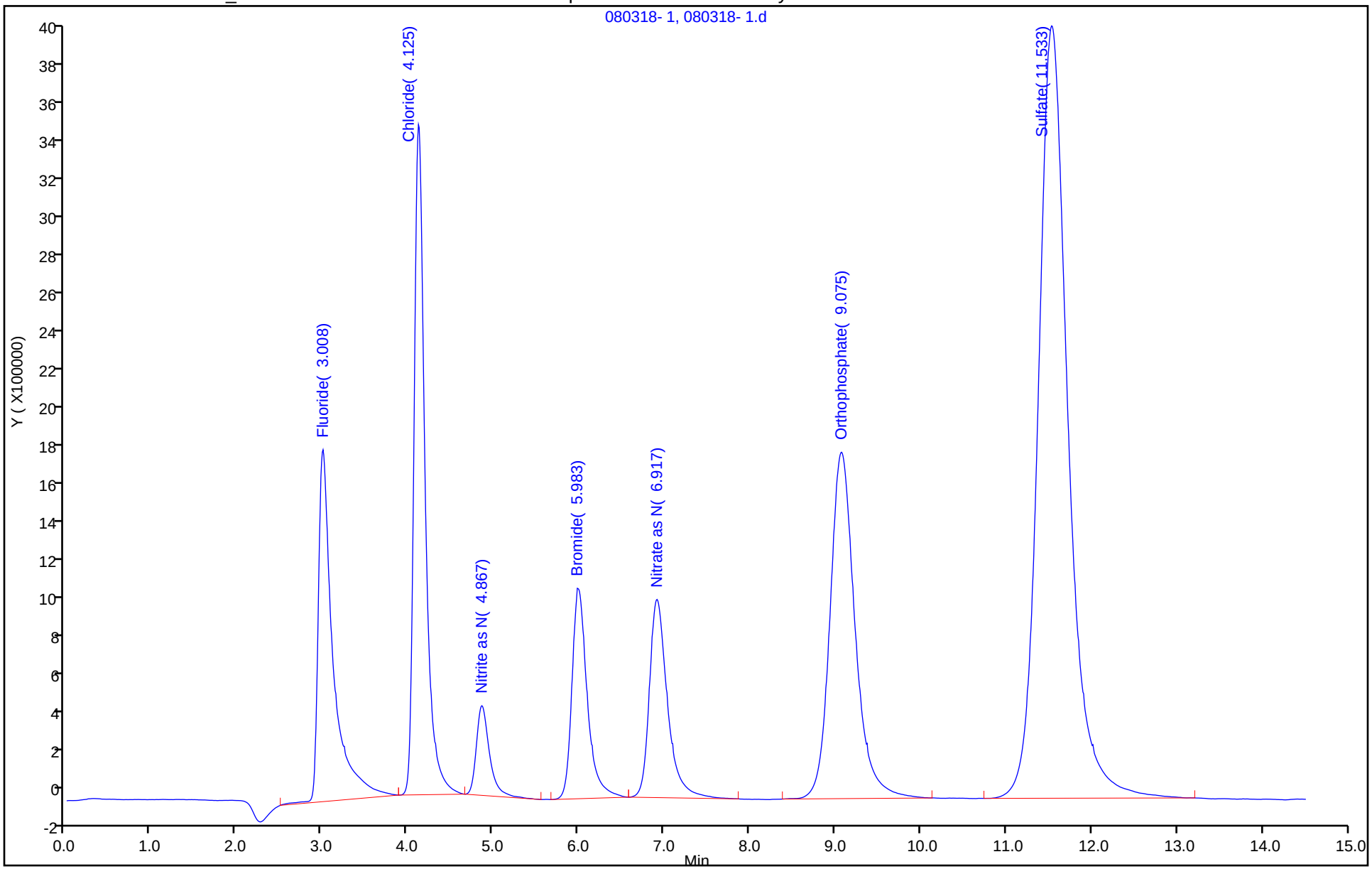
IC Cal High_00059 Amount Added: 2.00 Units: mL

Report Date: 06-Aug-2018 10:41:26 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 1.d

Injection Date:	03-Aug-2018 18:16:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	CCV			Worklist Smp#:	1
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



FORM VII
HPLC/IC CONTINUING CALIBRATION DATA

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Lab Sample ID: CCV 160-380227/13 Calibration Date: 08/03/2018 21:39

Instrument ID: CIC2500 Calib Start Date: 08/02/2018 16:50

GC Column: IonPacAS14 ID: 4.00(mm) Calib End Date: 08/02/2018 18:15

Lab File ID: 080318- 13.d Conc. Units: mg/L

ANALYTE	CURVE TYPE	AVE CF	CF	MIN CF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Fluoride	LinF		22287		1.03	1.00	3.4	10.0
Chloride	LinF		16153		1.99	2.00	-0.6	10.0
Nitrite as N	LinF		30922		0.161	0.160	0.6	
Bromide	LinF		6884		2.02	2.00	1.2	10.0
Nitrate as N	LinF		38456		0.407	0.400	1.8	
Orthophosphate	LinF		4682		7.93	8.00	-0.9	
Sulfate	LinF		12325		7.88	8.00	-1.5	10.0

FORM VII
HPLC/IC CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Lab Sample ID: CCV 160-380227/13 Calibration Date: 08/03/2018 21:39

Instrument ID: CIC2500 Calib Start Date: 08/02/2018 16:50

GC Column: IonPacAS14 ID: 4.00(mm) Calib End Date: 08/02/2018 18:15

Lab File ID: 080318- 13.d

Analyte	RT	RT WINDOW	
		FROM	TO
Fluoride	3.04	2.91	3.22
Chloride	4.17	3.99	4.41
Nitrite as N	4.91	4.70	5.20
Bromide	6.03	5.80	6.41
Nitrate as N	6.95	6.70	7.40
Orthophosphate	9.11	8.77	9.70
Sulfate	11.58	11.12	12.29

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 13.d
Lims ID: CCV
Client ID:
Sample Type: CCV
Inject. Date: 03-Aug-2018 21:39:00 ALS Bottle#: 0 Worklist Smp#: 13
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013784-013
Misc. Info.: 31 CCV
Operator ID: Instrument ID: CIC2500
Sublist: chrom-Anions_CIC2500*sub2

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 06-Aug-2018 10:41:39 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0308

First Level Reviewer: boydj Date: 06-Aug-2018 10:34:27

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride	3.042	3.067	-0.025	22287434	1000.0	1034.2	M
2 Chloride	4.167	4.200	-0.033	32306766	2000.0	1988.3	
3 Nitrite as N	4.908	4.950	-0.042	4947558	160.0	161.0	
4 Bromide	6.033	6.100	-0.067	13768935	2000.0	2024.9	
5 Nitrate as N	6.950	7.050	-0.100	15382317	400.0	407.1	
6 Orthophosphate	9.108	9.233	-0.125	37458728	8000.0	7929.9	
7 Sulfate	11.583	11.700	-0.117	98603615	8000.0	7880.5	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

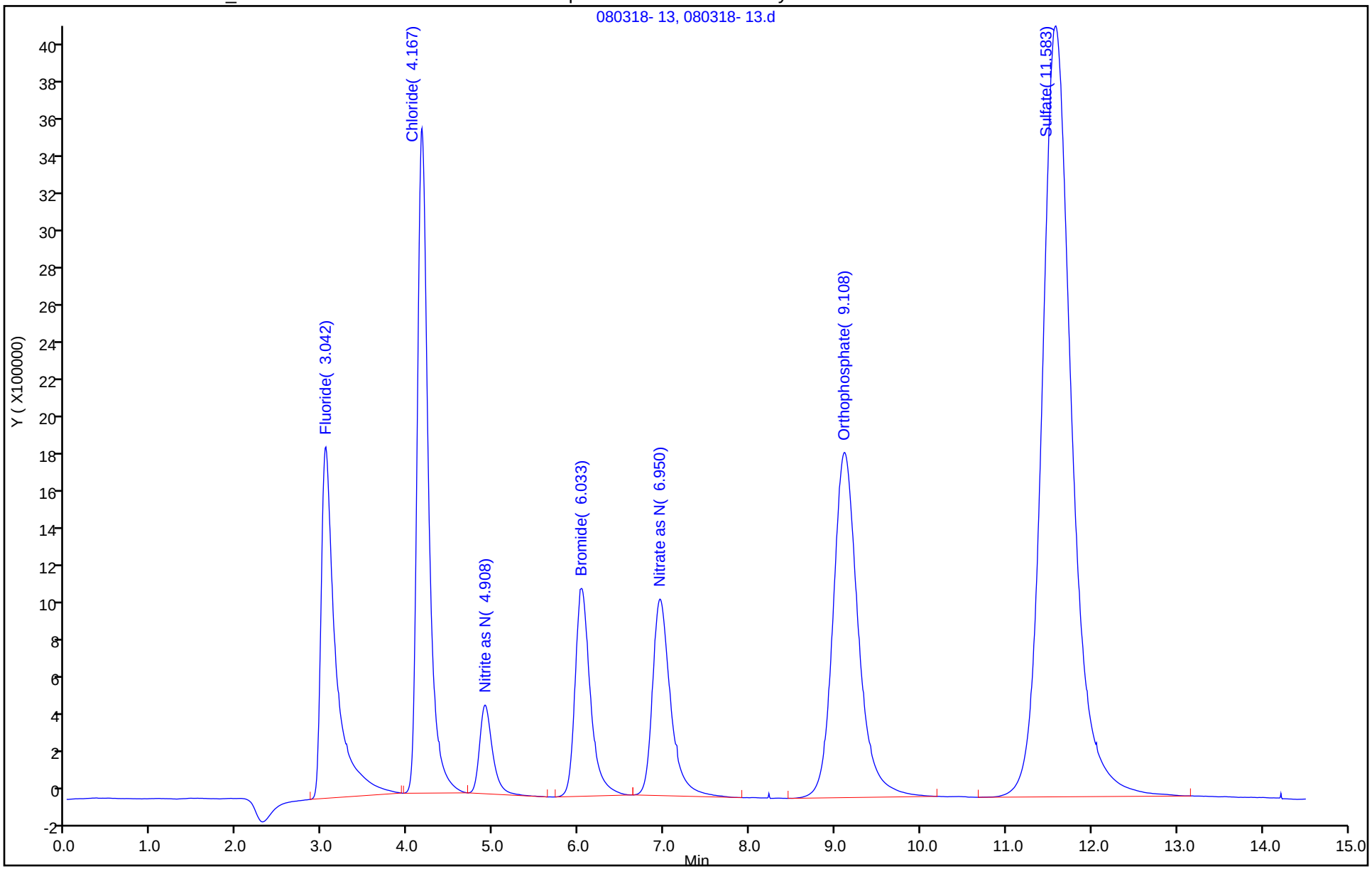
IC Cal High_00059 Amount Added: 2.00 Units: mL

Report Date: 06-Aug-2018 10:41:39 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 13.d

Injection Date:	03-Aug-2018 21:39:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	CCV			Worklist Smp#:	13
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



Manual Integration/User Assign Peak Report

TestAmerica St. Louis

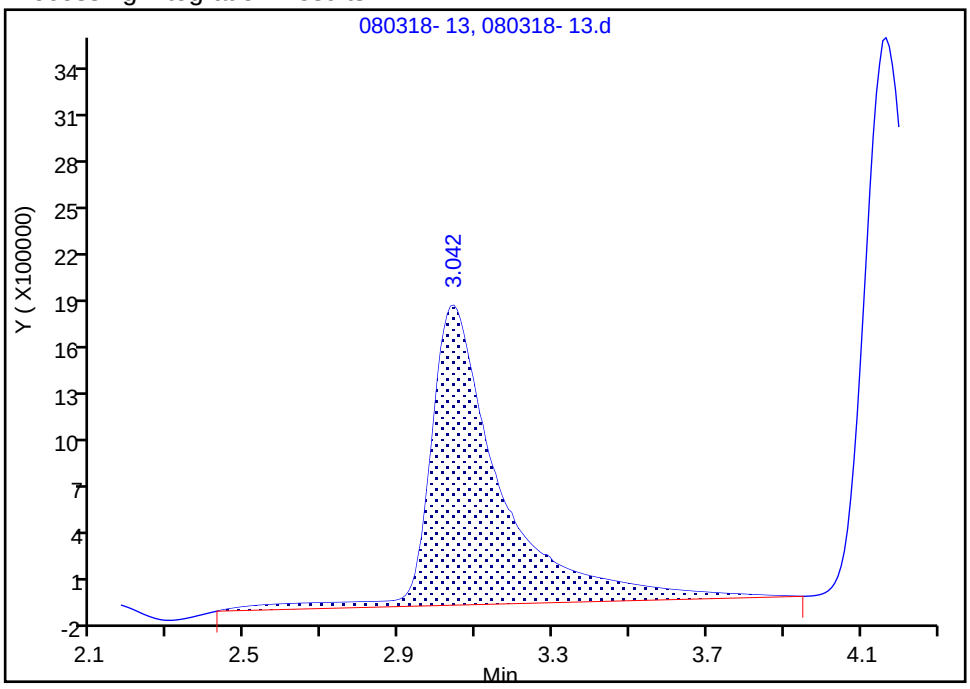
Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 13.d
Injection Date: 03-Aug-2018 21:39:00 Instrument ID: CIC2500
Lims ID: CCV
Client ID:
Operator ID: ALS Bottle#: 0 Worklist Smp#: 13
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Method: Anions_CIC2500 Limit Group: WT - IC - 28Days
Column: Detector 113

1 Fluoride, CAS: 16984-48-8

Signal: 1

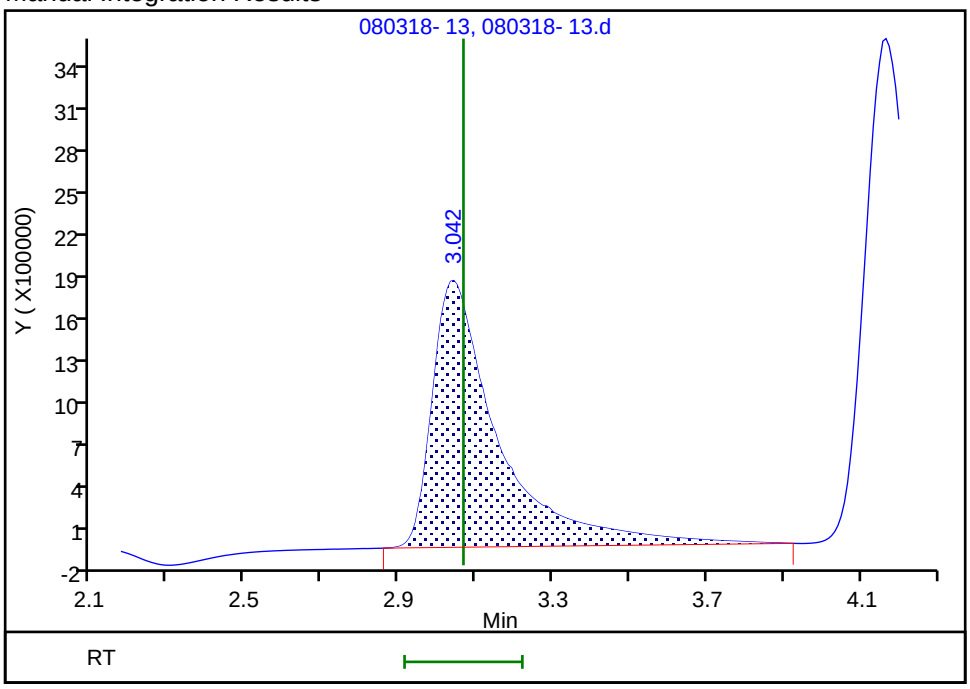
Processing Integration Results

RT: 3.04
Area: 24267538
Amount: 1126.0384
Amount Units: ug/l



Manual Integration Results

RT: 3.04
Area: 22287434
Amount: 1034.1596
Amount Units: ug/l



Reviewer: boydj, 06-Aug-2018 10:34:21
Audit Action: Manually Integrated Audit Reason: Baseline Smoothing

FORM VII
HPLC/IC CONTINUING CALIBRATION DATA

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Lab Sample ID: CCV 160-380227/36 Calibration Date: 08/04/2018 04:08

Instrument ID: CIC2500 Calib Start Date: 08/02/2018 16:50

GC Column: IonPacAS14 ID: 4.00(mm) Calib End Date: 08/02/2018 18:15

Lab File ID: 080318- 36.d Conc. Units: mg/L

ANALYTE	CURVE TYPE	AVE CF	CF	MIN CF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Fluoride	LinF		21515		0.998	1.00	-0.2	10.0
Chloride	LinF		15392		1.89	2.00	-5.3	10.0
Nitrite as N	LinF		29776		0.155	0.160	-3.1	
Bromide	LinF		6630		1.95	2.00	-2.5	10.0
Nitrate as N	LinF		36630		0.388	0.400	-3.1	
Orthophosphate	LinF		4516		7.65	8.00	-4.4	
Sulfate	LinF		11918		7.62	8.00	-4.7	10.0

FORM VII
HPLC/IC CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Lab Sample ID: CCV 160-380227/36 Calibration Date: 08/04/2018 04:08

Instrument ID: CIC2500 Calib Start Date: 08/02/2018 16:50

GC Column: IonPacAS14 ID: 4.00(mm) Calib End Date: 08/02/2018 18:15

Lab File ID: 080318- 36.d

Analyte	RT	RT WINDOW	
		FROM	TO
Fluoride	3.03	2.91	3.22
Chloride	4.15	3.99	4.41
Nitrite as N	4.88	4.70	5.20
Bromide	6.00	5.80	6.41
Nitrate as N	6.93	6.70	7.40
Orthophosphate	9.07	8.77	9.70
Sulfate	11.53	11.12	12.29

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 36.d
Lims ID: CCV
Client ID:
Sample Type: CCV
Inject. Date: 04-Aug-2018 04:08:00 ALS Bottle#: 0 Worklist Smp#: 36
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013784-036
Misc. Info.: 1921 CCV
Operator ID: Instrument ID: CIC2500
Sublist: chrom-Anions_CIC2500*sub2

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 06-Aug-2018 10:41:49 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0308

First Level Reviewer: boydj Date: 06-Aug-2018 10:38:45

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride	3.025	3.067	-0.042	21514642	1000.0	998.3	M
2 Chloride	4.150	4.200	-0.050	30783566	2000.0	1894.5	
3 Nitrite as N	4.883	4.950	-0.067	4764138	160.0	155.0	
4 Bromide	6.000	6.100	-0.100	13259125	2000.0	1949.9	
5 Nitrate as N	6.925	7.050	-0.125	14652097	400.0	387.8	
6 Orthophosphate	9.067	9.233	-0.166	36130897	8000.0	7648.8	
7 Sulfate	11.525	11.700	-0.175	95346307	8000.0	7620.2	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

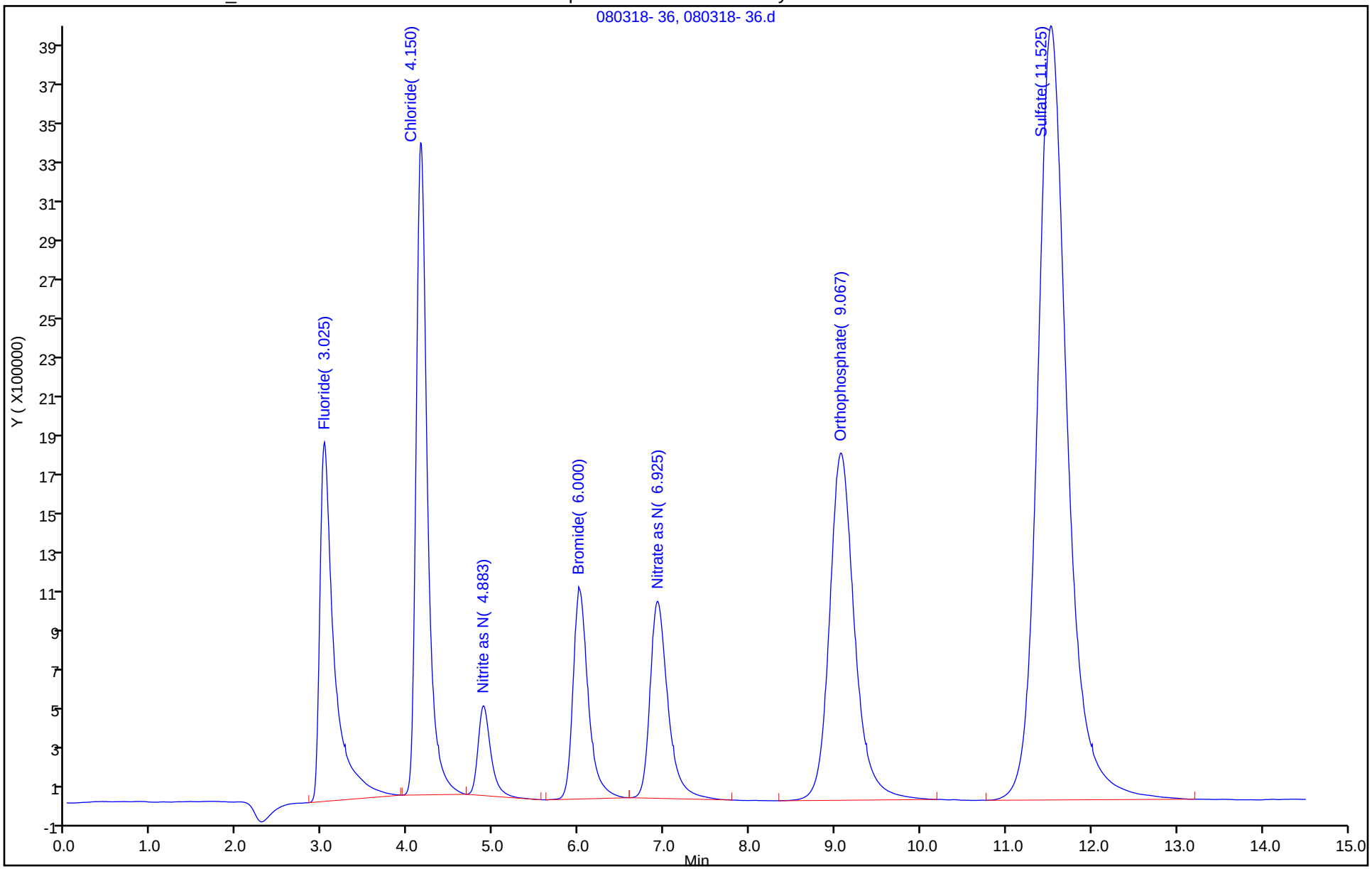
IC Cal High_00059 Amount Added: 2.00 Units: mL

Report Date: 06-Aug-2018 10:41:49 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 36.d

Injection Date:	04-Aug-2018 04:08:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	CCV			Worklist Smp#:	36
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



Manual Integration/User Assign Peak Report

TestAmerica St. Louis

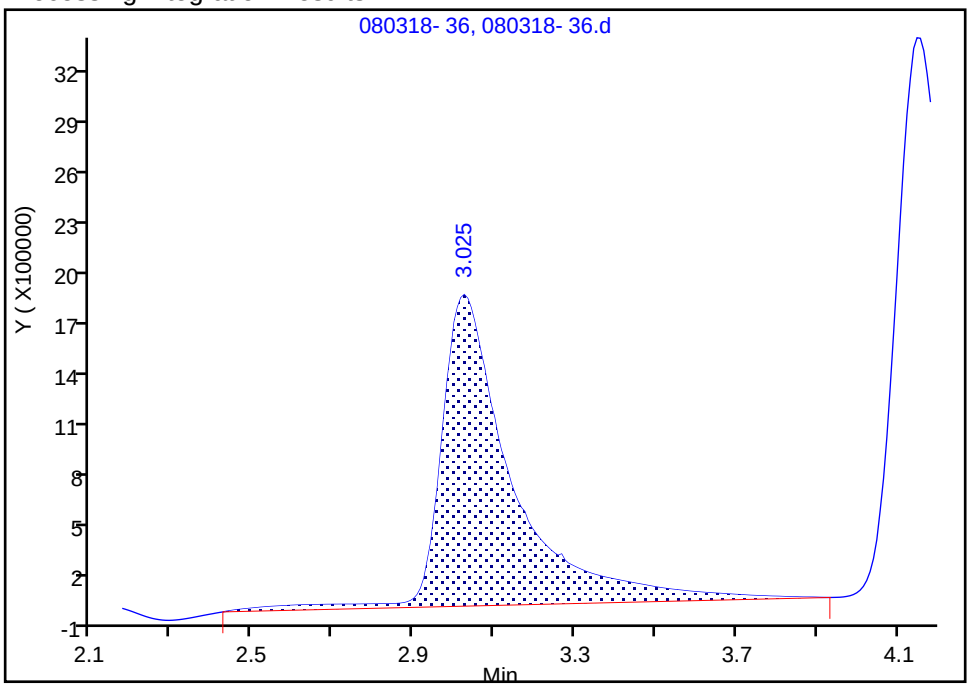
Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 36.d
Injection Date: 04-Aug-2018 04:08:00 Instrument ID: CIC2500
Lims ID: CCV
Client ID:
Operator ID: ALS Bottle#: 0 Worklist Smp#: 36
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Method: Anions_CIC2500 Limit Group: WT - IC - 28Days
Column: Detector 113

1 Fluoride, CAS: 16984-48-8

Signal: 1

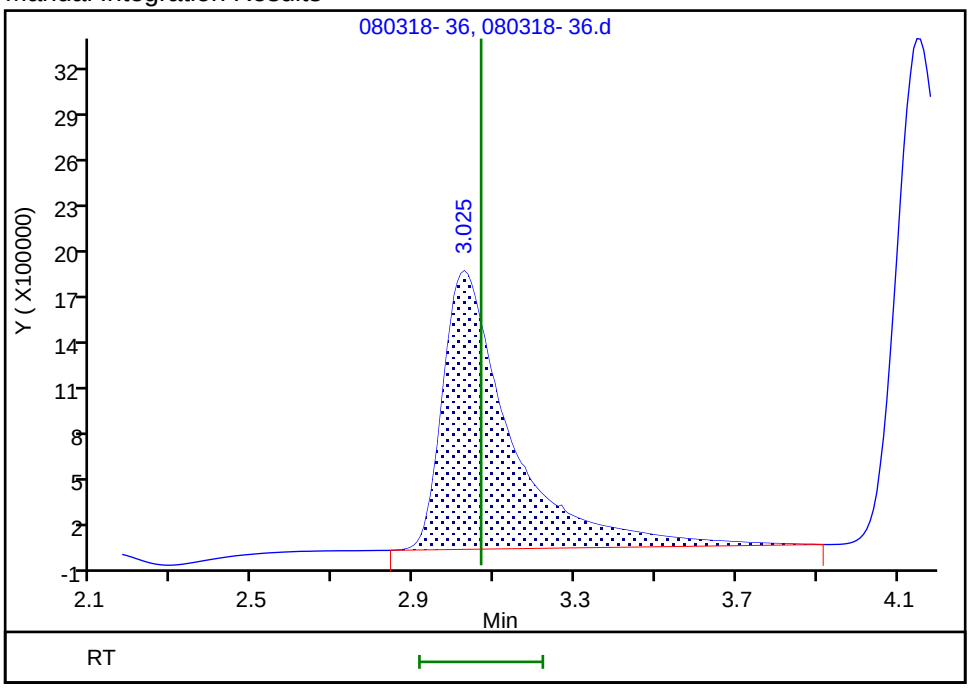
Processing Integration Results

RT: 3.03
Area: 22911474
Amount: 1063.1157
Amount Units: ug/l



Manual Integration Results

RT: 3.03
Area: 21514642
Amount: 998.3012
Amount Units: ug/l



Reviewer: boydj, 06-Aug-2018 10:38:40
Audit Action: Manually Integrated Audit Reason: Baseline Smoothing

FORM VII
HPLC/IC CONTINUING CALIBRATION DATA

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Lab Sample ID: CCV 160-380227/48 Calibration Date: 08/04/2018 07:31

Instrument ID: CIC2500 Calib Start Date: 08/02/2018 16:50

GC Column: IonPacAS14 ID: 4.00(mm) Calib End Date: 08/02/2018 18:15

Lab File ID: 080318- 48.d Conc. Units: mg/L

ANALYTE	CURVE TYPE	AVE CF	CF	MIN CF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Fluoride	LinF		22238		1.03	1.00	3.2	10.0
Chloride	LinF		15875		1.95	2.00	-2.3	10.0
Nitrite as N	LinF		30744		0.160	0.160	0.0	
Bromide	LinF		6774		1.99	2.00	-0.4	10.0
Nitrate as N	LinF		37615		0.398	0.400	-0.5	
Orthophosphate	LinF		4644		7.86	8.00	-1.7	
Sulfate	LinF		12136		7.76	8.00	-3.0	10.0

FORM VII
HPLC/IC CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Lab Sample ID: CCV 160-380227/48 Calibration Date: 08/04/2018 07:31

Instrument ID: CIC2500 Calib Start Date: 08/02/2018 16:50

GC Column: IonPacAS14 ID: 4.00(mm) Calib End Date: 08/02/2018 18:15

Lab File ID: 080318- 48.d

Analyte	RT	RT WINDOW	
		FROM	TO
Fluoride	3.03	2.91	3.22
Chloride	4.17	3.99	4.41
Nitrite as N	4.89	4.70	5.20
Bromide	6.01	5.80	6.41
Nitrate as N	6.93	6.70	7.40
Orthophosphate	9.07	8.77	9.70
Sulfate	11.52	11.12	12.29

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 48.d
Lims ID: CCV
Client ID:
Sample Type: CCV
Inject. Date: 04-Aug-2018 07:31:00 ALS Bottle#: 0 Worklist Smp#: 48
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013784-048
Misc. Info.: 28778 CCV
Operator ID: Instrument ID: CIC2500
Sublist: chrom-Anions_CIC2500*sub2

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 06-Aug-2018 10:43:59 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0308

First Level Reviewer: boydj Date: 06-Aug-2018 10:40:28

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride	3.025	3.067	-0.042	22238426	1000.0	1031.9	M
2 Chloride	4.167	4.200	-0.033	31750144	2000.0	1954.0	
3 Nitrite as N	4.892	4.950	-0.058	4919086	160.0	160.0	
4 Bromide	6.008	6.100	-0.092	13547404	2000.0	1992.3	
5 Nitrate as N	6.925	7.050	-0.125	15045808	400.0	398.2	
6 Orthophosphate	9.067	9.233	-0.166	37149132	8000.0	7864.4	
7 Sulfate	11.517	11.700	-0.183	97087644	8000.0	7759.4	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

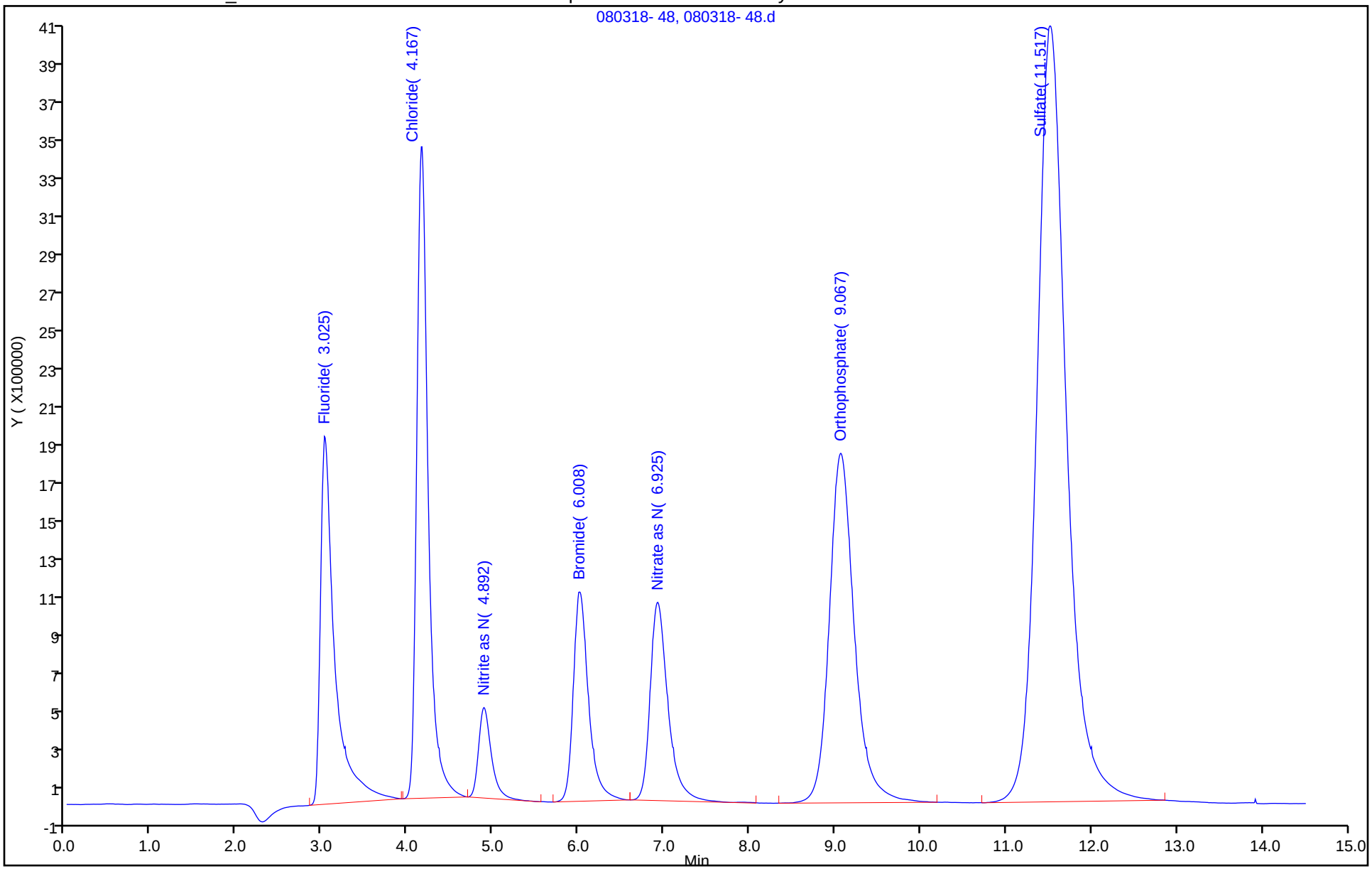
IC Cal High_00059 Amount Added: 2.00 Units: mL

Report Date: 06-Aug-2018 10:43:59 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 48.d

Injection Date:	04-Aug-2018 07:31:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	CCV			Worklist Smp#:	48
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



Manual Integration/User Assign Peak Report

TestAmerica St. Louis

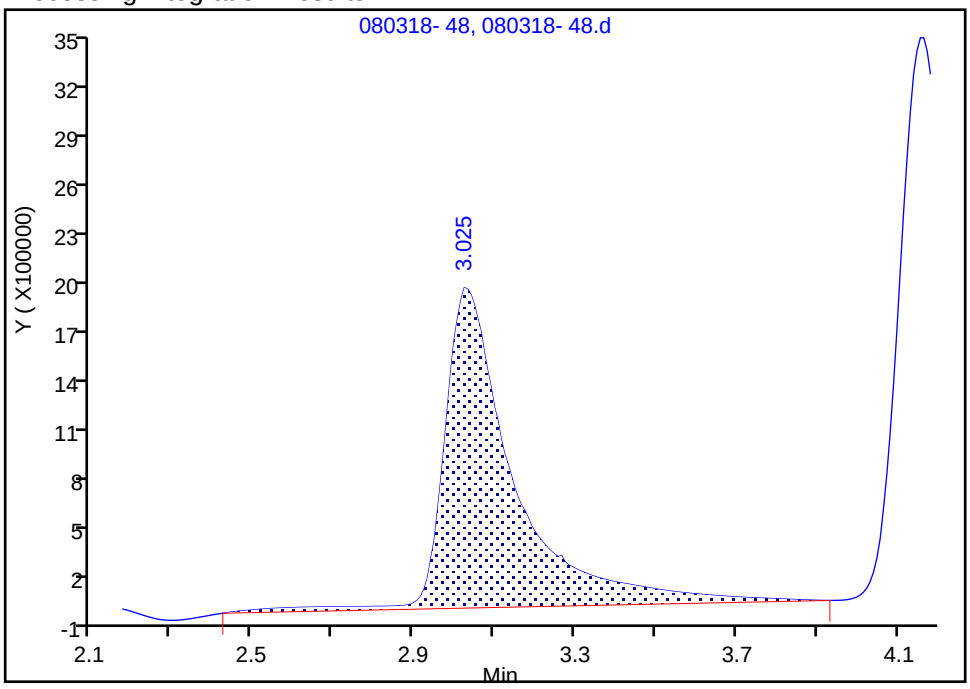
Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 48.d
Injection Date: 04-Aug-2018 07:31:00 Instrument ID: CIC2500
Lims ID: CCV
Client ID:
Operator ID: ALS Bottle#: 0 Worklist Smp#: 48
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Method: Anions_CIC2500 Limit Group: WT - IC - 28Days
Column: Detector 113

1 Fluoride, CAS: 16984-48-8

Signal: 1

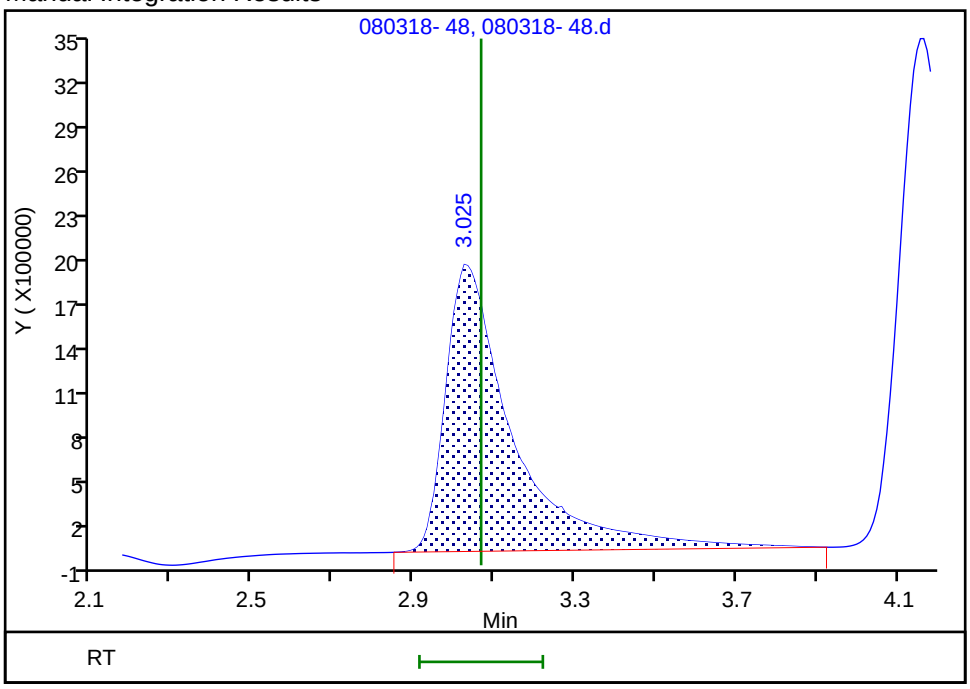
Processing Integration Results

RT: 3.03
Area: 23468362
Amount: 1088.9558
Amount Units: ug/l



Manual Integration Results

RT: 3.03
Area: 22238426
Amount: 1031.8856
Amount Units: ug/l



Reviewer: boydj, 06-Aug-2018 10:40:24
Audit Action: Manually Integrated Audit Reason: Baseline Smoothing

FORM I
HPLC/IC ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Client Sample ID: Lab Sample ID: MB 160-380227/3

Matrix: Water Lab File ID: 080318- 3.d

Analysis Method: 300.0 Date Collected:

Extraction Method: Date Extracted:

Sample wt/vol: 5(mL) Date Analyzed: 08/03/2018 18:49

Con. Extract Vol.: Dilution Factor: 1

Injection Volume: 50(uL) GC Column: IonPacAS14 ID: 4(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 380227 Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
16984-48-8	Fluoride	26	U	100	26

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 3.d
Lims ID: MB
Client ID:
Sample Type: MB
Inject. Date: 03-Aug-2018 18:49:00 ALS Bottle#: 0 Worklist Smp#: 3
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013784-003
Misc. Info.: 21 MB
Operator ID: Instrument ID: CIC2500

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 06-Aug-2018 10:41:26 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0308

First Level Reviewer: boydj Date: 06-Aug-2018 10:33:19

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride		3.067				ND	
2 Chloride	4.125	4.200	-0.075	107535		6.62	M
3 Nitrite as N		4.950				ND	U
4 Bromide		6.100				ND	
5 Nitrate as N		7.050				ND	
8 Chlorate		7.533				ND	
6 Orthophosphate		9.233				ND	
7 Sulfate		11.700				ND	
10 Orthophosphate as P		0.000				ND	

QC Flag Legend

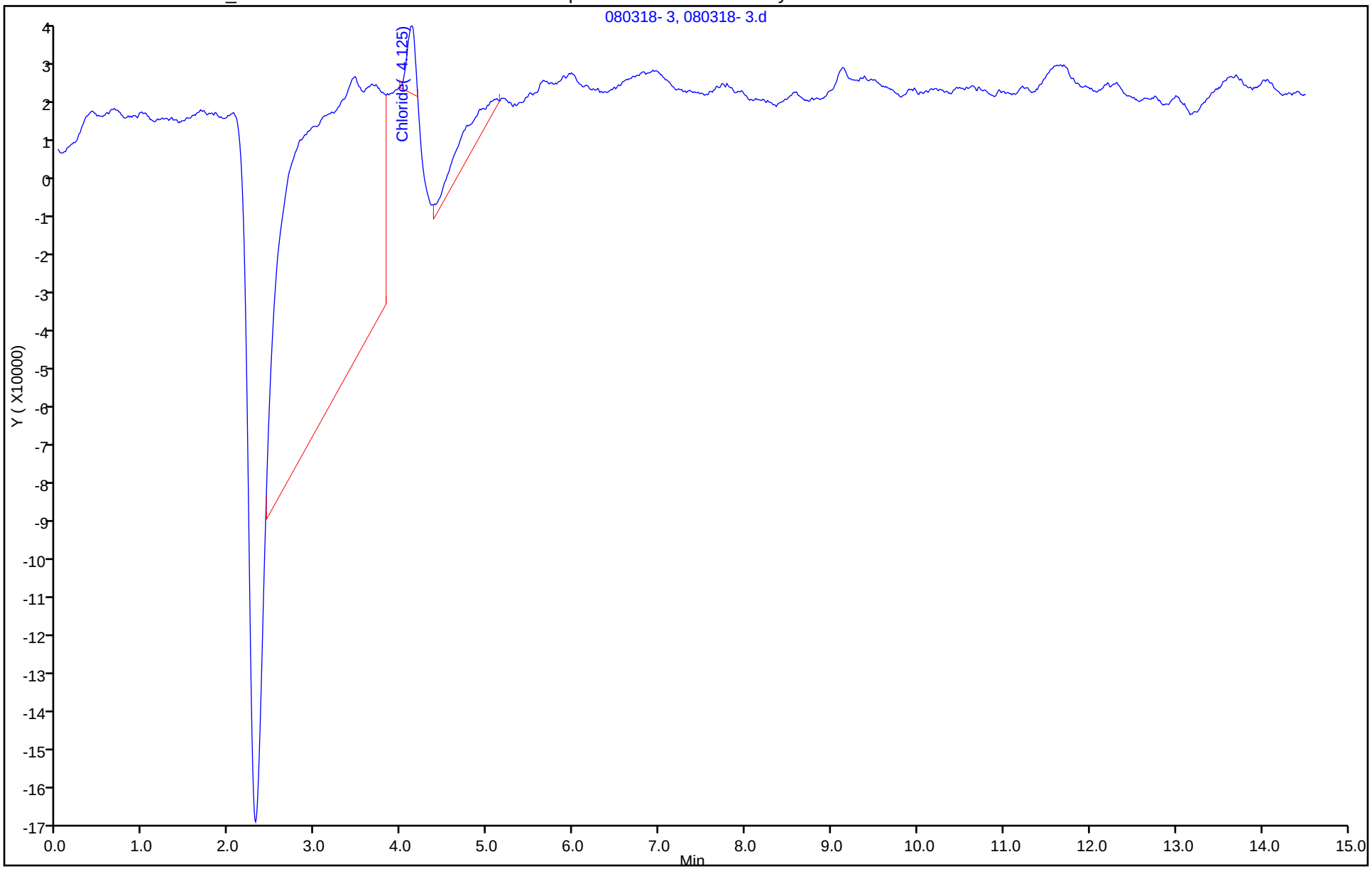
Review Flags
- M - Manually Integrated
- U - Marked Undetected

Report Date: 06-Aug-2018 10:41:28 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 3.d

Injection Date:	03-Aug-2018 18:49:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	MB			Worklist Smp#:	3
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



FORM I
HPLC/IC ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Client Sample ID: Lab Sample ID: CCB 160-380227/2

Matrix: Water Lab File ID: 080318- 2.d

Analysis Method: 300.0 Date Collected:

Extraction Method: Date Extracted:

Sample wt/vol: 5(mL) Date Analyzed: 08/03/2018 18:32

Con. Extract Vol.: Dilution Factor: 1

Injection Volume: 50(uL) GC Column: IonPacAS14 ID: 4(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 380227 Units: mg/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
16984-48-8	Fluoride	0.026	U	0.10	0.026

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 2.d
Lims ID: CCB
Client ID:
Sample Type: CCB
Inject. Date: 03-Aug-2018 18:32:00 ALS Bottle#: 0 Worklist Smp#: 2
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013784-002
Misc. Info.: 20 CCB
Operator ID: Instrument ID: CIC2500

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 06-Aug-2018 10:41:26 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0308

First Level Reviewer: boydj Date: 06-Aug-2018 10:32:53

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride		3.067				ND	U
2 Chloride	4.117	4.200	-0.083	390447		24.0	
3 Nitrite as N		4.950				ND	
4 Bromide		6.100				ND	
5 Nitrate as N		7.050				ND	
8 Chlorate		7.533				ND	
6 Orthophosphate		9.233				ND	
7 Sulfate		11.700				ND	
10 Orthophosphate as P		0.000				ND	

QC Flag Legend

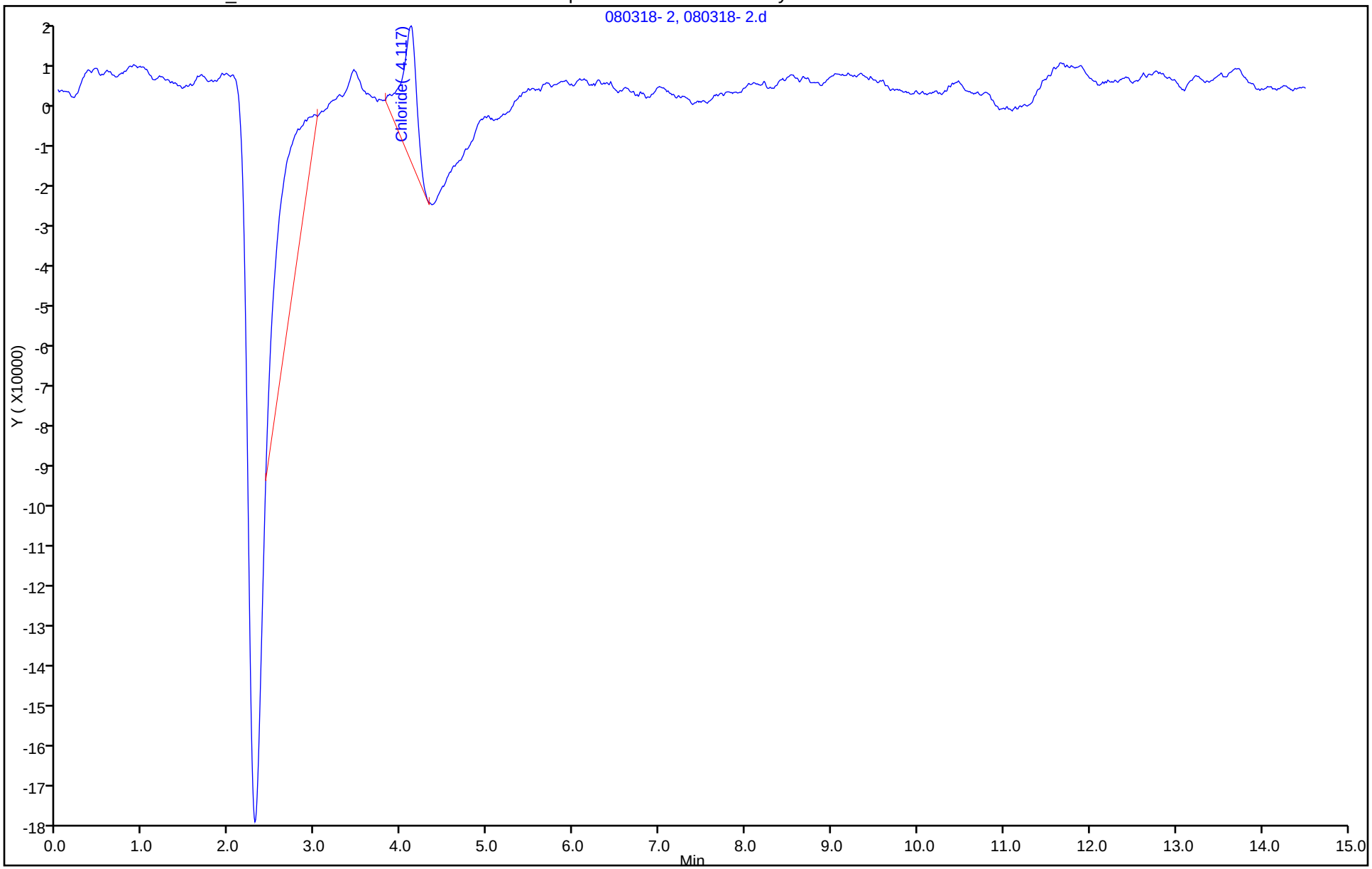
Review Flags
U - Marked Undetected

Report Date: 06-Aug-2018 10:41:27 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 2.d

Injection Date:	03-Aug-2018 18:32:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	CCB			Worklist Smp#:	2
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



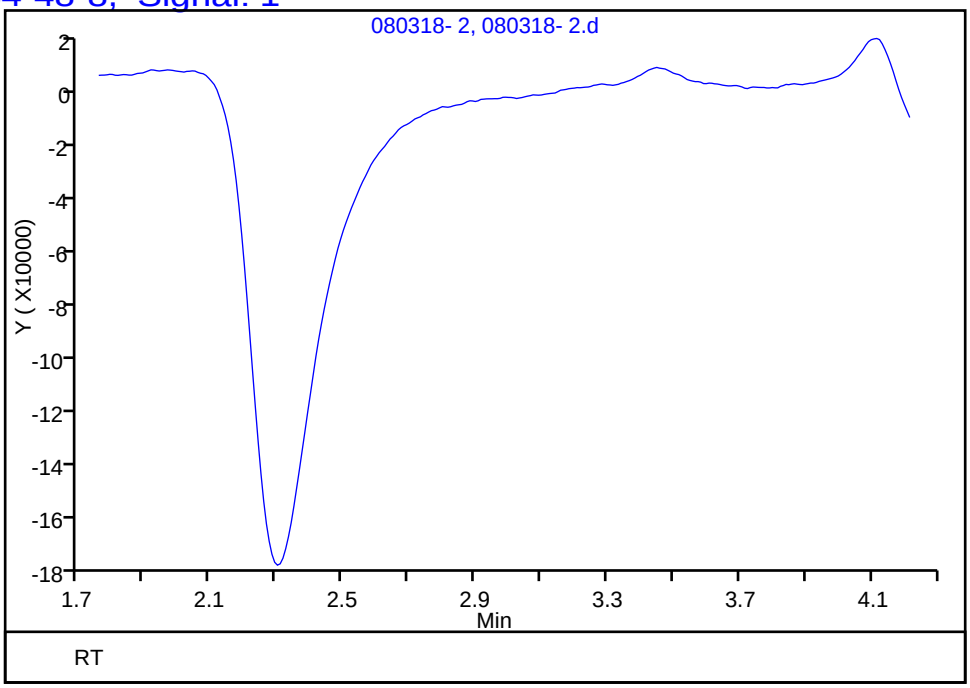
User Disabled Compound Report

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 2.d
Injection Date: 03-Aug-2018 18:32:00 Instrument ID: CIC2500
Lims ID: CCB
Client ID:
Operator ID: ALS Bottle#: 0 Worklist Smp#: 2
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Method: Anions_CIC2500 Limit Group: WT - IC - 28Days
Column: Detector 113

1 Fluoride, CAS: 16984-48-8, Signal: 1

RT: 2.99
Response: 964187
Amount: 44.739256



Reviewer: boydj, 06-Aug-2018 10:32:53
Audit Action: Marked Compound Undetected Audit Reason: Invalid Compound ID

FORM I
HPLC/IC ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Client Sample ID: Lab Sample ID: CCB 160-380227/14

Matrix: Water Lab File ID: 080318- 14.d

Analysis Method: 300.0 Date Collected:

Extraction Method: Date Extracted:

Sample wt/vol: 5(mL) Date Analyzed: 08/03/2018 21:56

Con. Extract Vol.: Dilution Factor: 1

Injection Volume: 50(uL) GC Column: IonPacAS14 ID: 4(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 380227 Units: mg/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
16984-48-8	Fluoride	0.026	U	0.10	0.026

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 14.d
Lims ID: CCB
Client ID:
Sample Type: CCB
Inject. Date: 03-Aug-2018 21:56:00 ALS Bottle#: 0 Worklist Smp#: 14
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013784-014
Misc. Info.: 32 CCB
Operator ID: Instrument ID: CIC2500

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 06-Aug-2018 10:41:39 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0308

First Level Reviewer: boydj Date: 06-Aug-2018 10:34:48

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride		3.067				ND	U
2 Chloride	4.108	4.200	-0.092	78433		4.83	M
3 Nitrite as N		4.950				ND	U
4 Bromide		6.100				ND	
5 Nitrate as N		7.050				ND	
8 Chlorate		7.533				ND	
6 Orthophosphate		9.233				ND	
7 Sulfate		11.700				ND	
10 Orthophosphate as P		0.000				ND	

QC Flag Legend

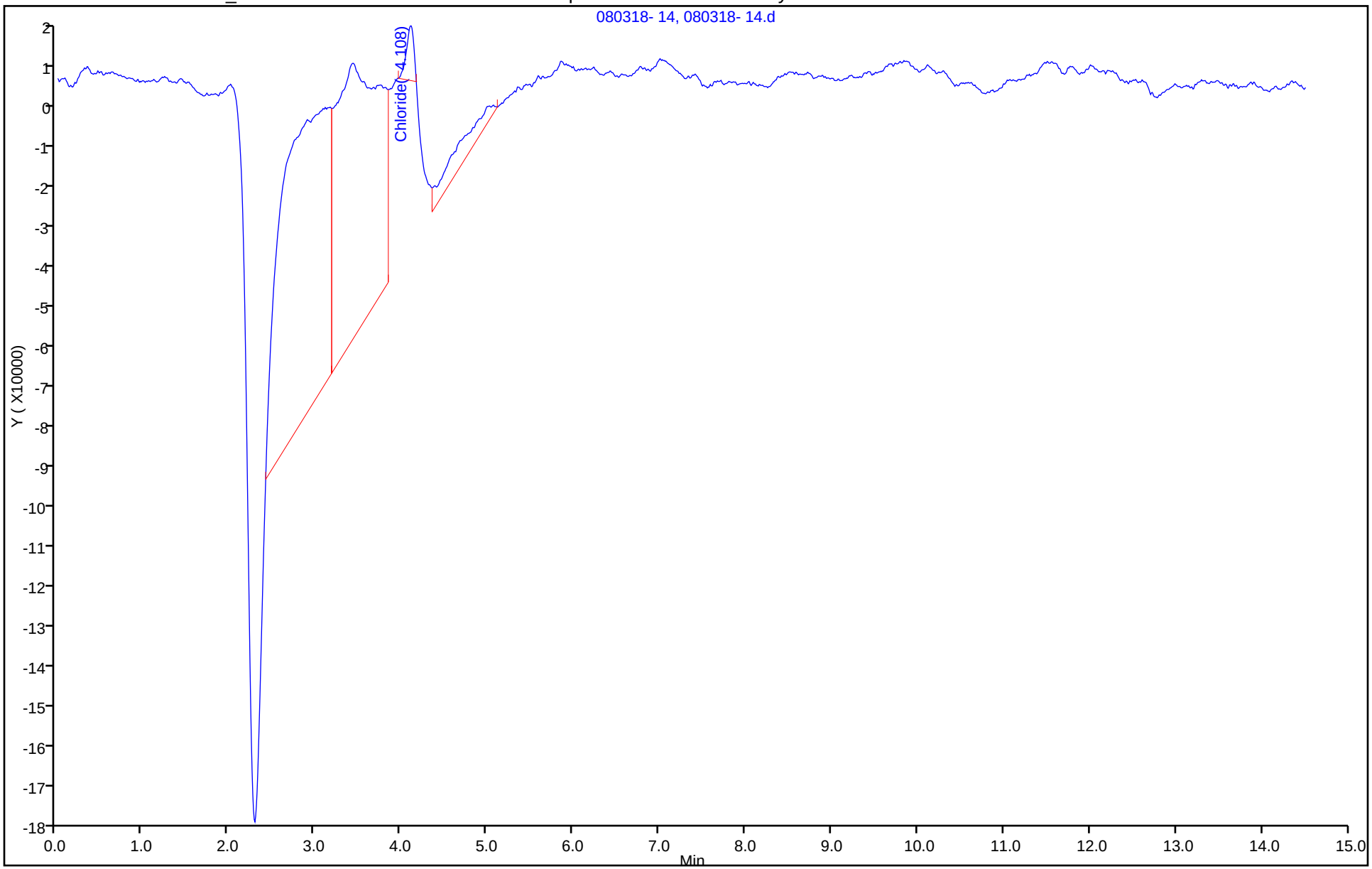
Review Flags
- M - Manually Integrated
- U - Marked Undetected

Report Date: 06-Aug-2018 10:41:40 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 14.d

Injection Date:	03-Aug-2018 21:56:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	CCB			Worklist Smp#:	14
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



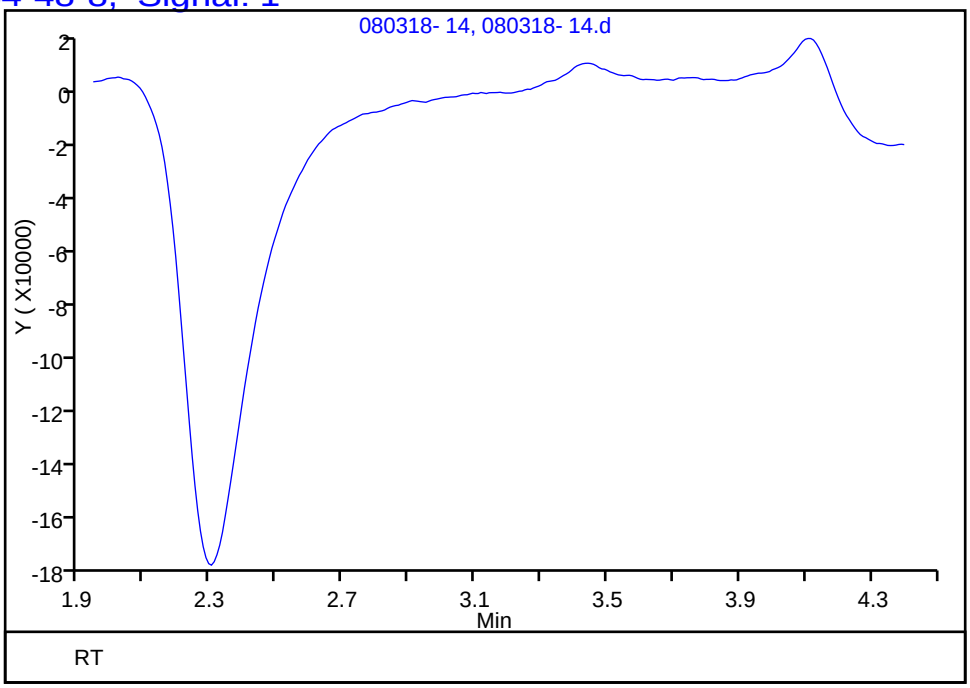
User Disabled Compound Report

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 14.d
Injection Date: 03-Aug-2018 21:56:00 Instrument ID: CIC2500
Lims ID: CCB
Client ID:
Operator ID: ALS Bottle#: 0 Worklist Smp#: 14
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Method: Anions_CIC2500 Limit Group: WT - IC - 28Days
Column: Detector 113

1 Fluoride, CAS: 16984-48-8, Signal: 1

RT: 3.18
Response: 2800341
Amount: 129.9387



Reviewer: boydj, 06-Aug-2018 10:34:48
Audit Action: Marked Compound Undetected Audit Reason: Invalid Compound ID

FORM I
HPLC/IC ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica St. Louis | Job No.: 160-29476-1

SDG No.:

Client Sample ID: | Lab Sample ID: CCB 160-380227/37

Matrix: Water | Lab File ID: 080318- 37.d

Analysis Method: 300.0 | Date Collected:

Extraction Method: | Date Extracted:

Sample wt/vol: 5(mL) | Date Analyzed: 08/04/2018 04:25

Con. Extract Vol.: | Dilution Factor: 1

Injection Volume: 50(uL) | GC Column: IonPacAS14 ID: 4(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 380227 | Units: mg/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
16984-48-8	Fluoride	0.026	U	0.10	0.026

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 37.d
Lims ID: CCB
Client ID:
Sample Type: CCB
Inject. Date: 04-Aug-2018 04:25:00 ALS Bottle#: 0 Worklist Smp#: 37
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013784-037
Misc. Info.: 27090 CCB
Operator ID: Instrument ID: CIC2500

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 06-Aug-2018 10:41:49 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0308

First Level Reviewer: boydj Date: 06-Aug-2018 10:39:01

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride		3.067				ND	U
2 Chloride	4.133	4.200	-0.067	71618		4.41	M
3 Nitrite as N		4.950				ND	
4 Bromide		6.100				ND	
5 Nitrate as N		7.050				ND	
8 Chlorate		7.533				ND	
6 Orthophosphate		9.233				ND	
7 Sulfate		11.700				ND	
10 Orthophosphate as P		0.000				ND	

QC Flag Legend

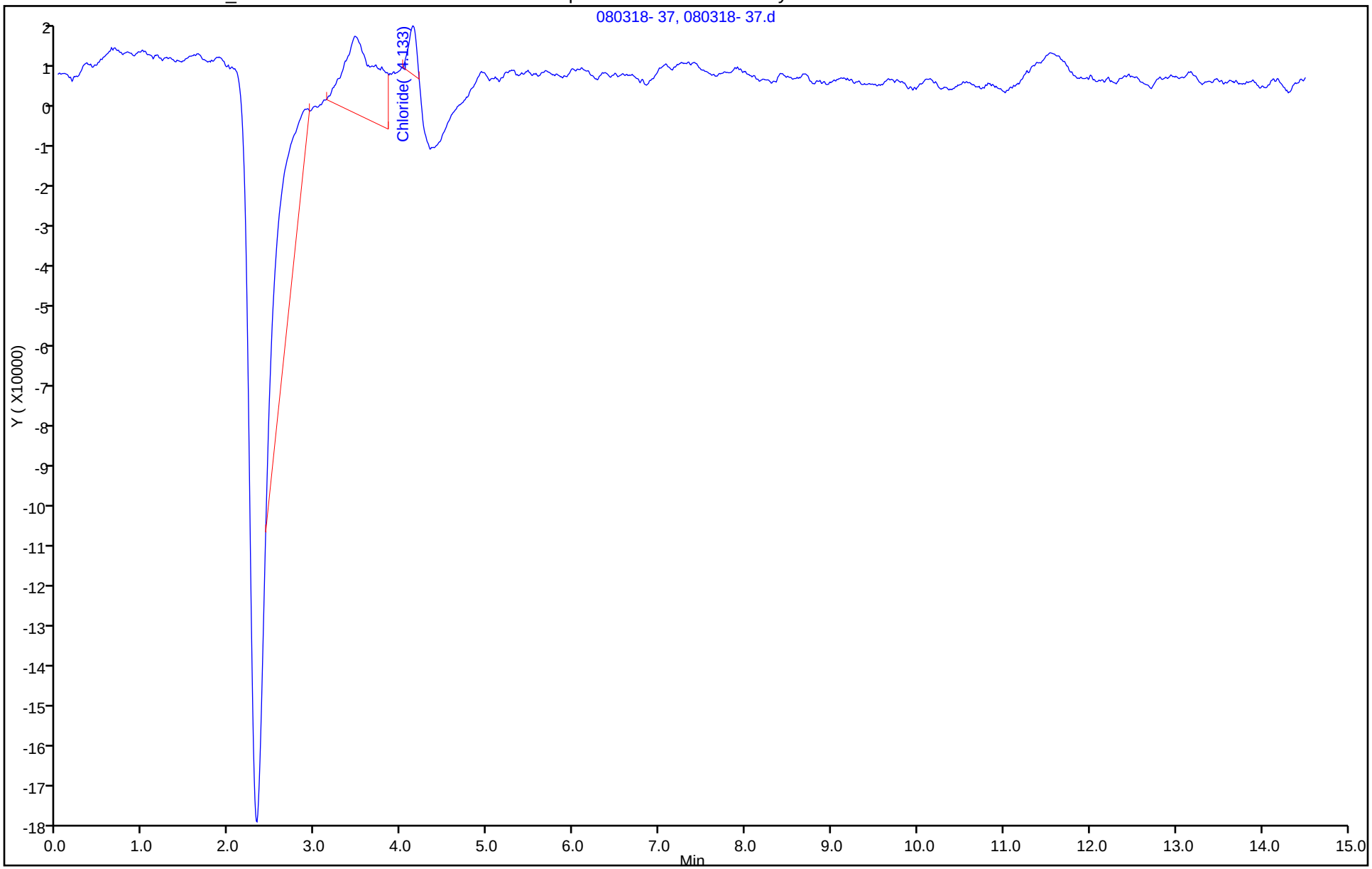
Review Flags
- M - Manually Integrated
- U - Marked Undetected

Report Date: 06-Aug-2018 10:41:49 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 37.d

Injection Date:	04-Aug-2018 04:25:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	CCB			Worklist Smp#:	37
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



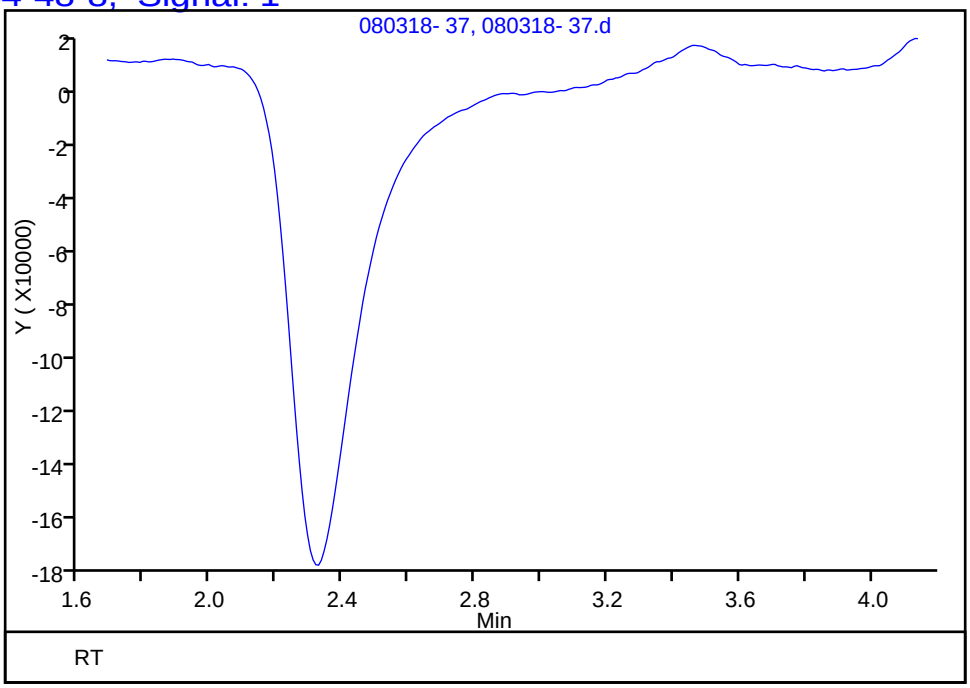
User Disabled Compound Report

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 37.d
Injection Date: 04-Aug-2018 04:25:00 Instrument ID: CIC2500
Lims ID: CCB
Client ID:
Operator ID: ALS Bottle#: 0 Worklist Smp#: 37
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Method: Anions_CIC2500 Limit Group: WT - IC - 28Days
Column: Detector 113

1 Fluoride, CAS: 16984-48-8, Signal: 1

RT: 2.92
Response: 859423
Amount: 39.878100



Reviewer: boydj, 06-Aug-2018 10:39:01
Audit Action: Marked Compound Undetected Audit Reason: Invalid Compound ID

FORM I
HPLC/IC ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Client Sample ID: Lab Sample ID: CCB 160-380227/49

Matrix: Water Lab File ID: 080318- 49.d

Analysis Method: 300.0 Date Collected:

Extraction Method: Date Extracted:

Sample wt/vol: 5(mL) Date Analyzed: 08/04/2018 07:48

Con. Extract Vol.: Dilution Factor: 1

Injection Volume: 50(uL) GC Column: IonPacAS14 ID: 4(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 380227 Units: mg/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
16984-48-8	Fluoride	0.026	U	0.10	0.026

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 49.d
Lims ID: CCB
Client ID:
Sample Type: CCB
Inject. Date: 04-Aug-2018 07:48:00 ALS Bottle#: 0 Worklist Smp#: 49
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013784-049
Misc. Info.: 11682 CCB
Operator ID: Instrument ID: CIC2500

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 06-Aug-2018 10:43:59 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0308

First Level Reviewer: boydj Date: 06-Aug-2018 10:40:51

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride		3.067				ND	U
2 Chloride	4.117	4.200	-0.083	100205		6.17	M
3 Nitrite as N		4.950				ND	U
4 Bromide		6.100				ND	
5 Nitrate as N		7.050				ND	
8 Chlorate		7.533				ND	
6 Orthophosphate		9.233				ND	
7 Sulfate		11.700				ND	
10 Orthophosphate as P		0.000				ND	

QC Flag Legend

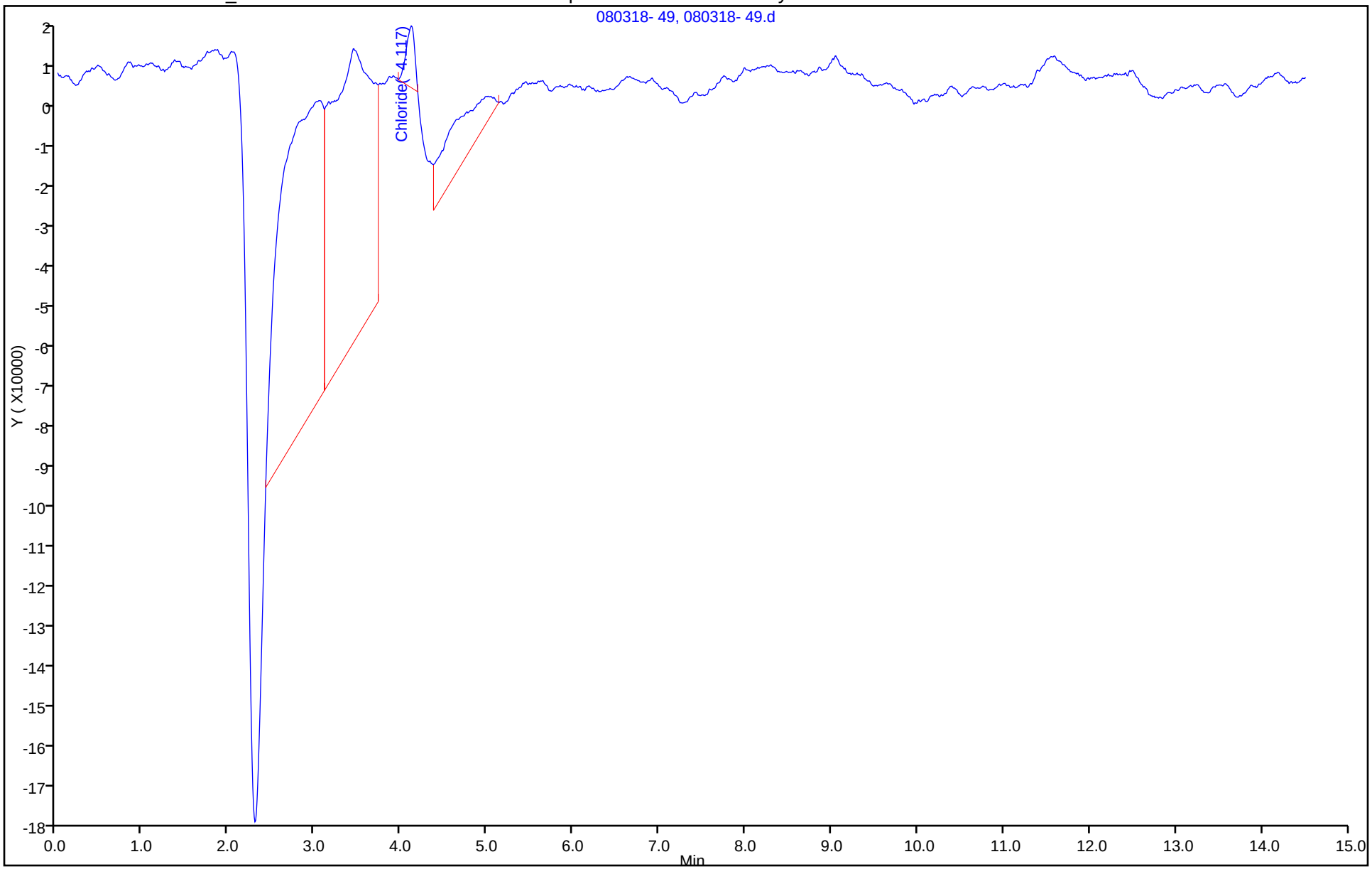
Review Flags
- M - Manually Integrated
- U - Marked Undetected

Report Date: 06-Aug-2018 10:44:00 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 49.d

Injection Date:	04-Aug-2018 07:48:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	CCB			Worklist Smp#:	49
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



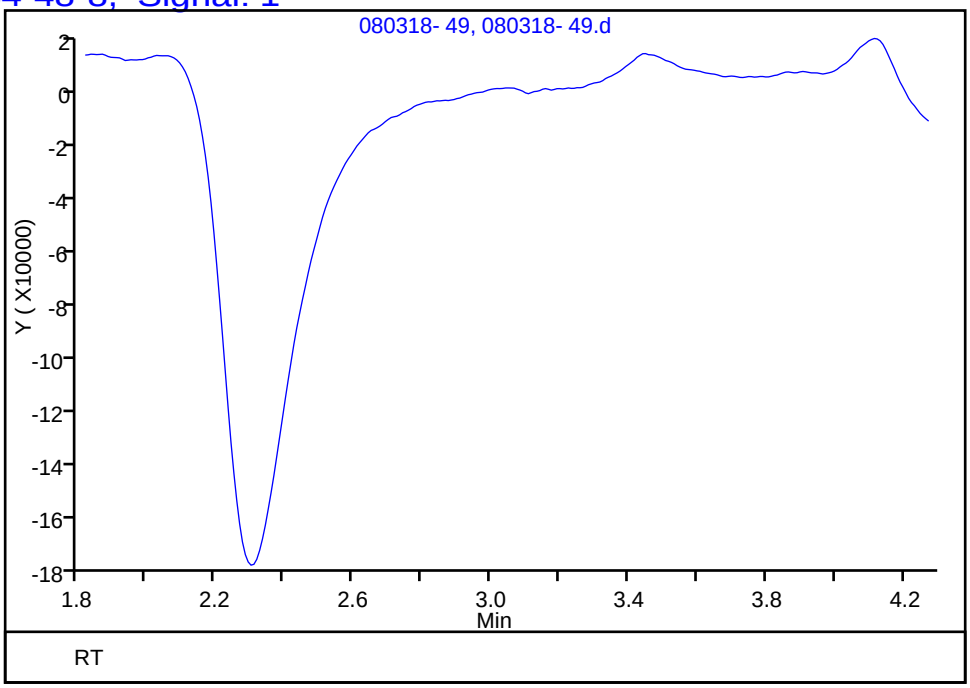
User Disabled Compound Report

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 49.d
Injection Date: 04-Aug-2018 07:48:00 Instrument ID: CIC2500
Lims ID: CCB
Client ID:
Operator ID: ALS Bottle#: 0 Worklist Smp#: 49
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Method: Anions_CIC2500 Limit Group: WT - IC - 28Days
Column: Detector 113

1 Fluoride, CAS: 16984-48-8, Signal: 1

RT: 3.05
Response: 2579645
Amount: 119.6981



Reviewer: boydj, 06-Aug-2018 10:40:51
Audit Action: Marked Compound Undetected Audit Reason: Invalid Compound ID

FORM I
HPLC/IC ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Client Sample ID: Lab Sample ID: ICB 160-379990/8

Matrix: Water Lab File ID: 080218- 8.d

Analysis Method: 300.0 Date Collected:

Extraction Method: Date Extracted:

Sample wt/vol: 5(mL) Date Analyzed: 08/02/2018 18:49

Con. Extract Vol.: Dilution Factor: 1

Injection Volume: 50(uL) GC Column: IonPacAS14 ID: 4(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 379990 Units: mg/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
16984-48-8	Fluoride	0.026	U	0.10	0.026

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 8.d
Lims ID: ICB
Client ID:
Sample Type: ICB
Inject. Date: 02-Aug-2018 18:49:00 ALS Bottle#: 0 Worklist Smp#: 8
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013779-008
Misc. Info.: 8 ICB
Operator ID: Instrument ID: CIC2500

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 03-Aug-2018 12:05:08 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0302

First Level Reviewer: boydj Date: 03-Aug-2018 11:49:09

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride		3.067				ND	U
2 Chloride		4.200				ND	U
3 Nitrite as N		4.950				ND	
4 Bromide		6.100				ND	
5 Nitrate as N		7.050				ND	
8 Chlorate		7.533				ND	
6 Orthophosphate		9.233				ND	
7 Sulfate		11.700				ND	
10 Orthophosphate as P		0.000				ND	

QC Flag Legend

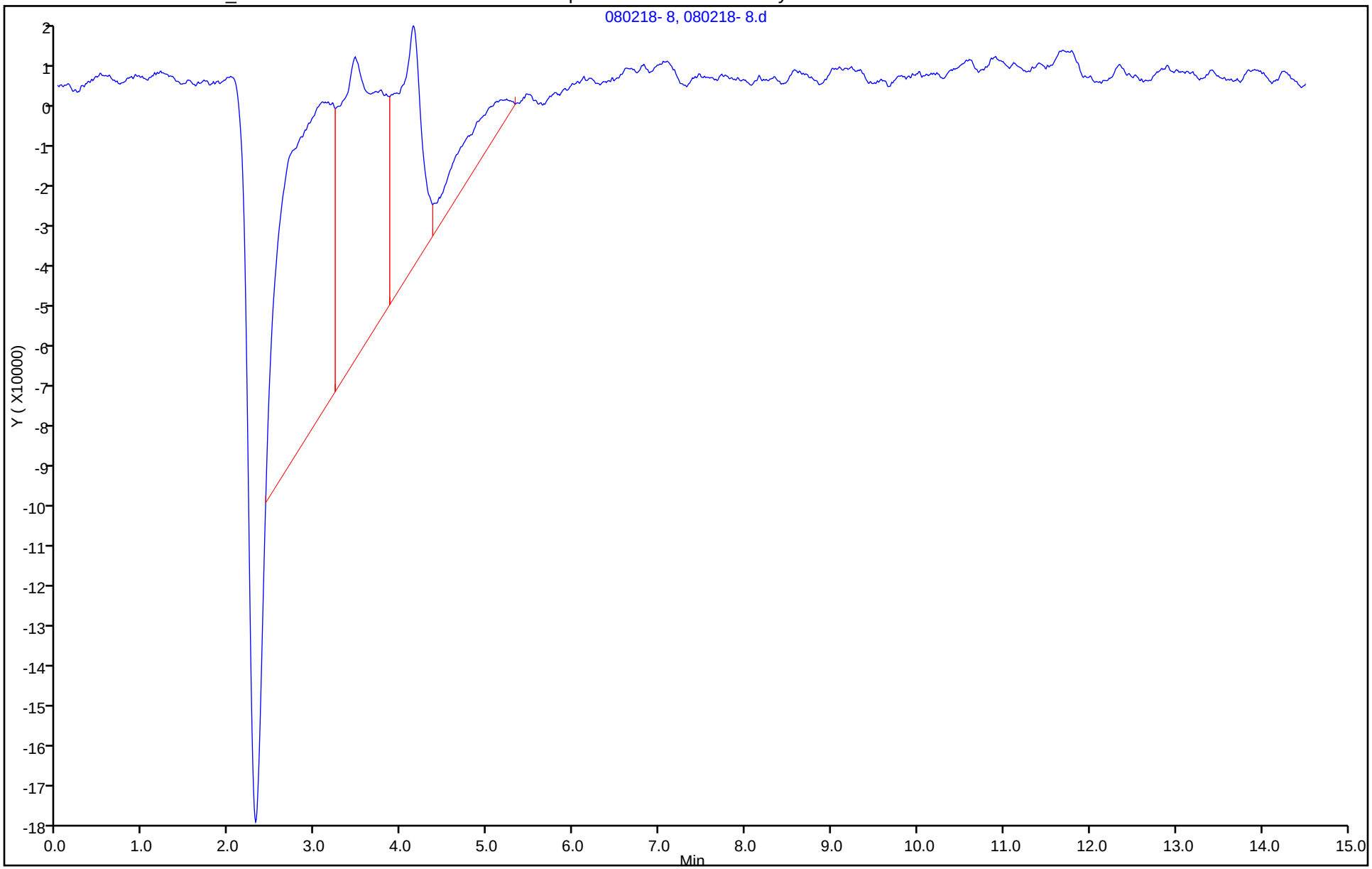
Review Flags
U - Marked Undetected

Report Date: 03-Aug-2018 12:05:10 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 8.d

Injection Date:	02-Aug-2018 18:49:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	ICB			Worklist Smp#:	8
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



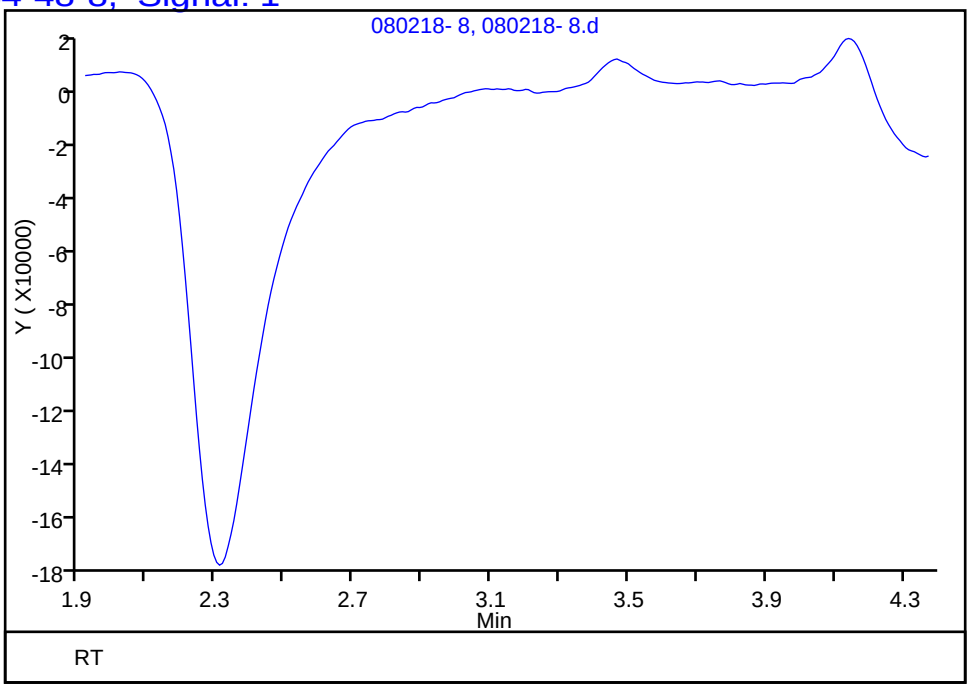
User Disabled Compound Report

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 8.d
Injection Date: 02-Aug-2018 18:49:00 Instrument ID: CIC2500
Lims ID: ICB
Client ID:
Operator ID: ALS Bottle#: 0 Worklist Smp#: 8
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Method: Anions_CIC2500 Limit Group: WT - IC - 28Days
Column: Detector 113

1 Fluoride, CAS: 16984-48-8, Signal: 1

RT: 3.15
Response: 3069468
Amount: 142.4264



Reviewer: boydj, 03-Aug-2018 11:49:09
Audit Action: Marked Compound Undetected Audit Reason: Invalid Compound ID

FORM I
HPLC/IC ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Client Sample ID: Lab Sample ID: LCS 160-380227/4

Matrix: Water Lab File ID: 080318- 4.d

Analysis Method: 300.0 Date Collected:

Extraction Method: Date Extracted:

Sample wt/vol: 5(mL) Date Analyzed: 08/03/2018 19:06

Con. Extract Vol.: Dilution Factor: 1

Injection Volume: 50(uL) GC Column: IonPacAS14 ID: 4(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 380227 Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
16984-48-8	Fluoride	1000		100	26

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 4.d
Lims ID: LCS
Client ID:
Sample Type: LCS
Inject. Date: 03-Aug-2018 19:06:00 ALS Bottle#: 0 Worklist Smp#: 4
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Sample Info: 160-0013784-004
Misc. Info.: 22 LCS
Operator ID: Instrument ID: CIC2500

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 06-Aug-2018 10:41:26 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0308

First Level Reviewer: boydj Date: 06-Aug-2018 10:33:38

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride	3.050	3.067	-0.017	21597944	1000.0	1002.2	M
2 Chloride	4.175	4.200	-0.025	31104244	2000.0	1914.3	
3 Nitrite as N	4.908	4.950	-0.042	4848326	160.0	157.7	
4 Bromide	6.033	6.100	-0.067	13349472	2000.0	1963.2	
5 Nitrate as N	6.958	7.050	-0.092	14917342	400.0	394.8	
6 Orthophosphate	9.125	9.233	-0.108	36609238	8000.0	7750.1	
7 Sulfate	11.608	11.700	-0.092	96113781	8000.0	7681.5	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

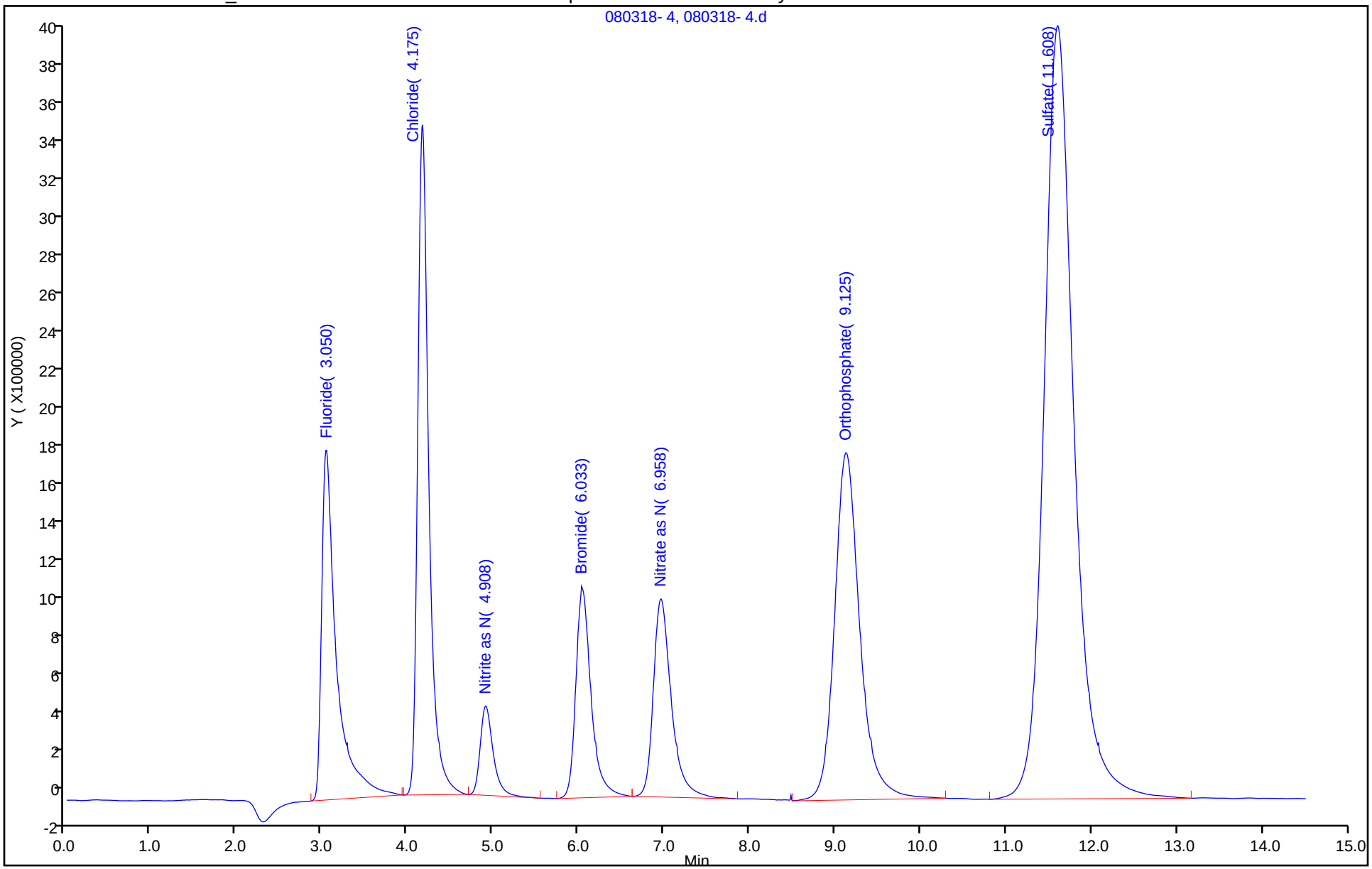
IC Cal High_00059 Amount Added: 2.00 Units: mL

Report Date: 06-Aug-2018 10:41:29 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 4.d

Injection Date:	03-Aug-2018 19:06:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	LCS			Worklist Smp#:	4
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



Manual Integration/User Assign Peak Report

TestAmerica St. Louis

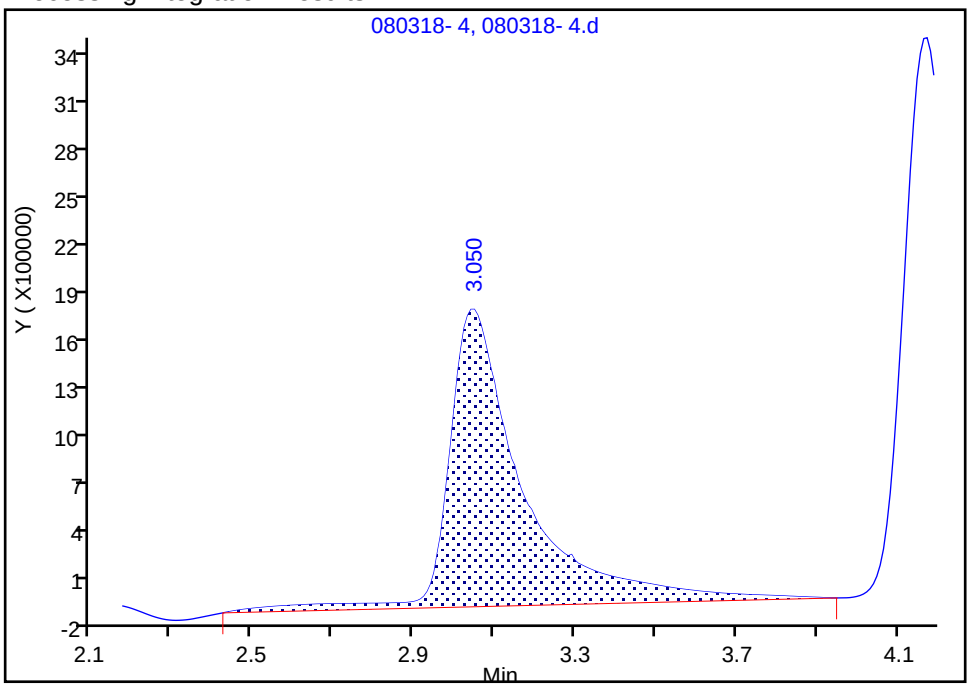
Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 4.d
Injection Date: 03-Aug-2018 19:06:00 Instrument ID: CIC2500
Lims ID: LCS
Client ID:
Operator ID: ALS Bottle#: 0 Worklist Smp#: 4
Injection Vol: 50.0 uL Dil. Factor: 1.0000
Method: Anions_CIC2500 Limit Group: WT - IC - 28Days
Column: Detector 113

1 Fluoride, CAS: 16984-48-8

Signal: 1

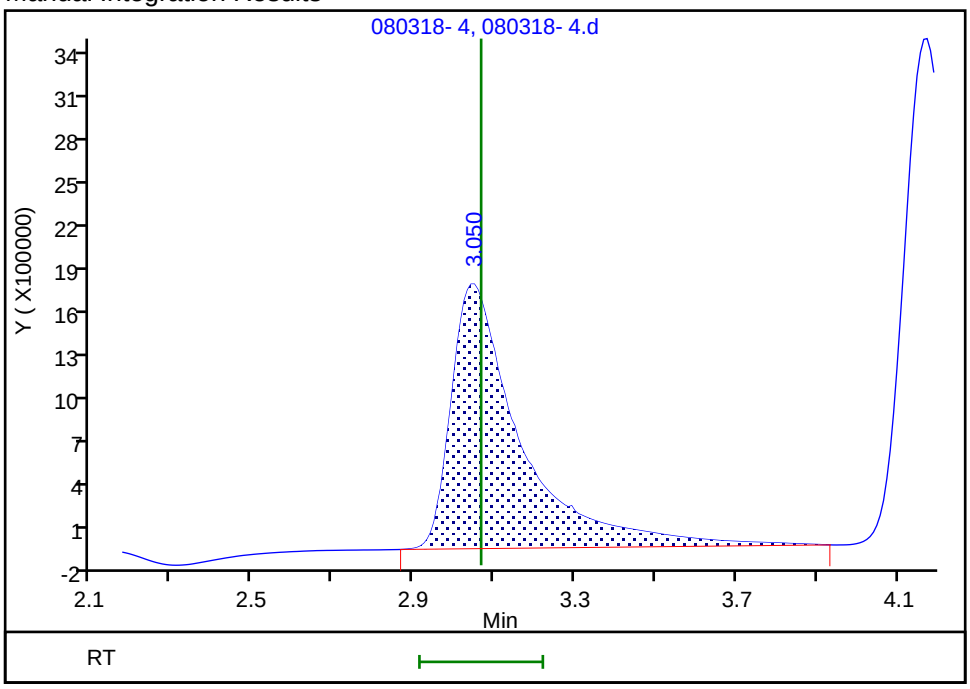
Processing Integration Results

RT: 3.05
Area: 23585048
Amount: 1094.3702
Amount Units: ug/l



Manual Integration Results

RT: 3.05
Area: 21597944
Amount: 1002.1665
Amount Units: ug/l



Reviewer: boydj, 06-Aug-2018 10:33:31
Audit Action: Manually Integrated Audit Reason: Baseline Smoothing

FORM I
HPLC/IC ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Client Sample ID: CRC-MW-1 MS DL Lab Sample ID: 160-29476-1 MS DL

Matrix: Water Lab File ID: 080318- 47.d

Analysis Method: 300.0 Date Collected: 07/11/2018 13:55

Extraction Method: Date Extracted:

Sample wt/vol: 5(mL) Date Analyzed: 08/04/2018 07:14

Con. Extract Vol.: Dilution Factor: 20

Injection Volume: 50(uL) GC Column: IonPacAS14 ID: 4(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 380227 Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
16984-48-8	Fluoride	46200		2000	520

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 47.d
Lims ID: 160-29476-Q-1 MS
Client ID:
Sample Type: MS
Inject. Date: 04-Aug-2018 07:14:00 ALS Bottle#: 0 Worklist Smp#: 47
Injection Vol: 50.0 uL Dil. Factor: 20.0000
Sample Info: 160-0013784-047
Misc. Info.: 15937 160-29476-Q-1 MS
Operator ID: Instrument ID: CIC2500

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 06-Aug-2018 10:41:49 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0308

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride	3.033	3.067	-0.034	49739903	2000.0	2308.0	
2 Chloride	4.175	4.200	-0.025	56893679	2000.0	3501.4	
3 Nitrite as N	4.900	4.950	-0.050	2724961	100.0	88.7	
4 Bromide	6.017	6.100	-0.083	13066454	2000.0	1921.6	
5 Nitrate as N	6.925	7.050	-0.125	15140066	400.0	400.7	
8 Chlorate		7.533				ND	
6 Orthophosphate	9.075	9.233	-0.158	17383226	4000.0	3680.0	
7 Sulfate	11.525	11.700	-0.175	65162355	4000.0	5207.9	
10 Orthophosphate as P		0.000				ND	

Reagents:

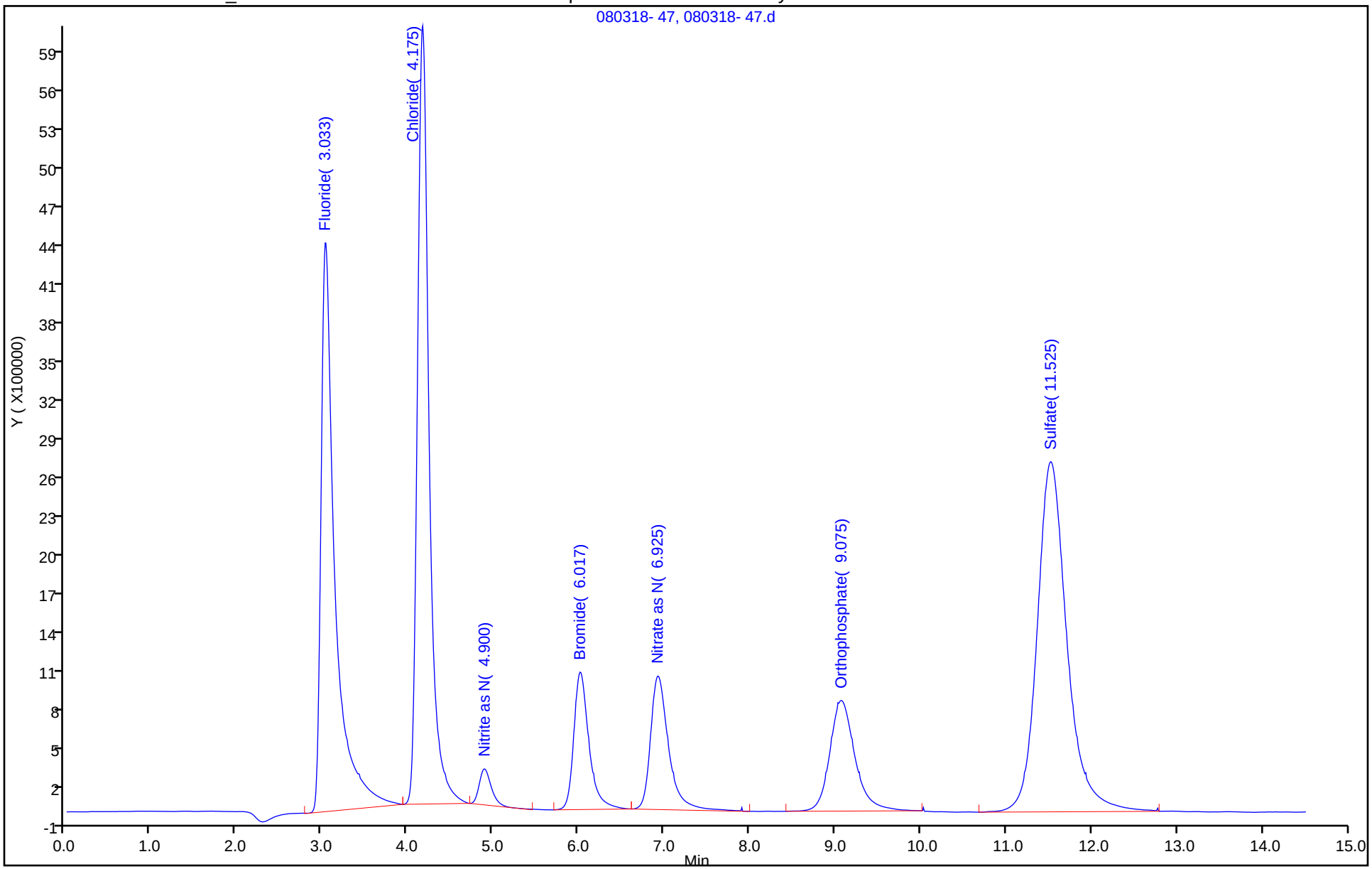
IC MS Soln_00010 Amount Added: 0.10 Units: mL

Report Date: 06-Aug-2018 10:41:52 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 47.d

Injection Date:	04-Aug-2018 07:14:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	160-29476-Q-1 MS			Worklist Smp#:	47
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	20.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



FORM I
HPLC/IC ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica St. Louis | Job No.: 160-29476-1

SDG No.:

Client Sample ID: CRC-MW-1 DU DL | Lab Sample ID: 160-29476-1 DU DL

Matrix: Water | Lab File ID: 080318- 45.d

Analysis Method: 300.0 | Date Collected: 07/11/2018 13:55

Extraction Method: | Date Extracted:

Sample wt/vol: 5(mL) | Date Analyzed: 08/04/2018 06:40

Con. Extract Vol.: | Dilution Factor: 20

Injection Volume: 50(uL) | GC Column: IonPacAS14 ID: 4(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 380227 | Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
16984-48-8	Fluoride	4800		2000	520

TestAmerica St. Louis
Target Compound Quantitation Report

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 45.d
Lims ID: 160-29476-Q-1 DU
Client ID:
Sample Type: DU
Inject. Date: 04-Aug-2018 06:40:00 ALS Bottle#: 0 Worklist Smp#: 45
Injection Vol: 50.0 uL Dil. Factor: 20.0000
Sample Info: 160-0013784-045
Misc. Info.: 9268 160-29476-Q-1 DU
Operator ID: Instrument ID: CIC2500

Method: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\Anions_CIC2500.m
Limit Group: WT - IC - 28Days
Last Update: 06-Aug-2018 10:41:49 Calib Date: 02-Aug-2018 18:15:00
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\StLouis\ChromData\CIC2500\20180802-13779.b\080218- 6.d

Column 1 : Det: 113
Process Host: CTX0308

First Level Reviewer: boydj Date: 06-Aug-2018 10:40:09

Compound	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
1 Fluoride	3.025	3.067	-0.042	5168145		239.8	M
2 Chloride	4.158	4.200	-0.042	25724973		1583.2	
3 Nitrite as N		4.950				ND	
4 Bromide		6.100				ND	
5 Nitrate as N	6.942	7.050	-0.108	472699		12.5	
8 Chlorate		7.533				ND	
6 Orthophosphate		9.233				ND	
7 Sulfate	11.525	11.700	-0.175	18914272		1511.7	
10 Orthophosphate as P		0.000				ND	

QC Flag Legend

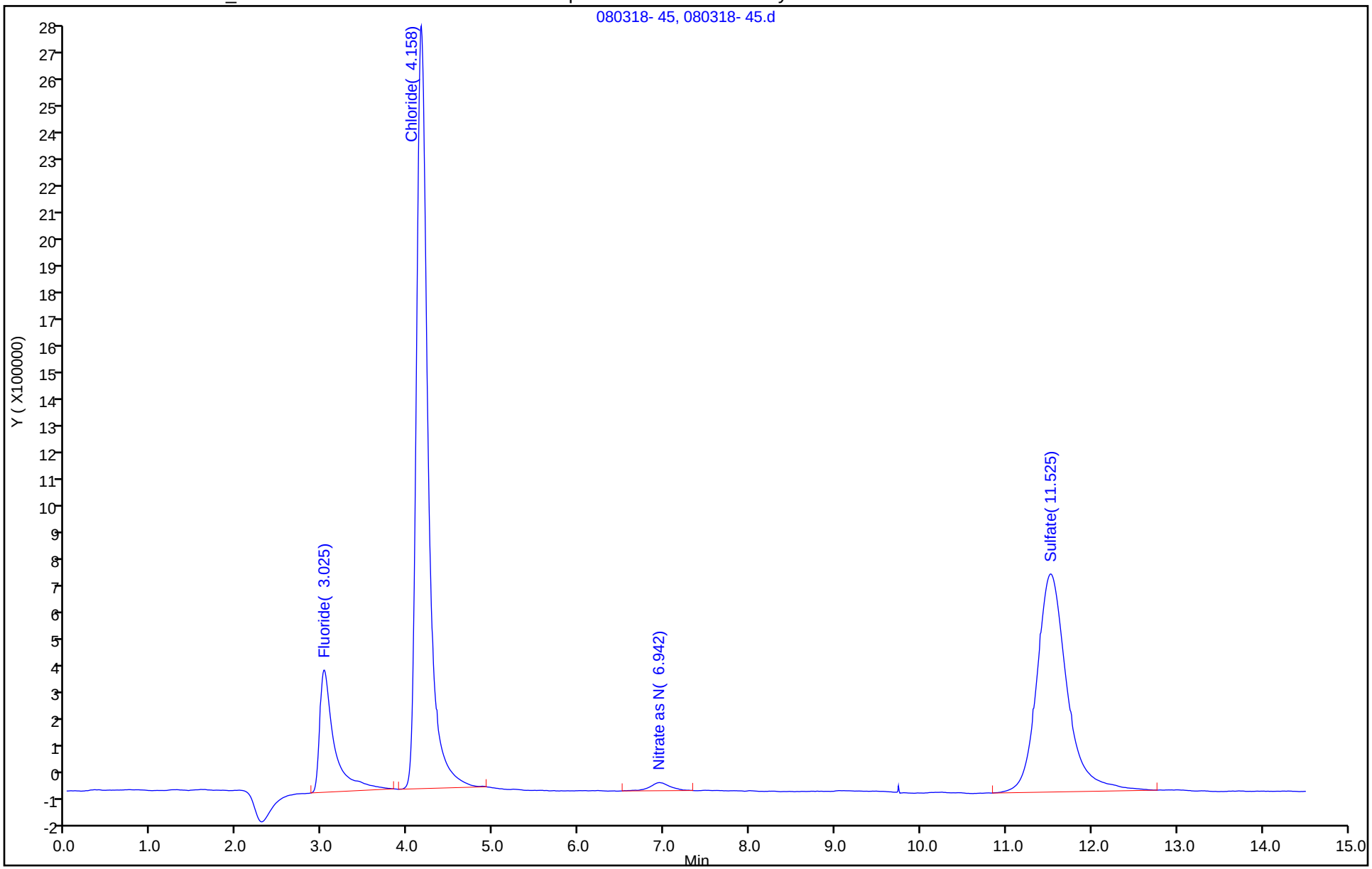
Review Flags
M - Manually Integrated

Report Date: 06-Aug-2018 10:41:52 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica St. Louis

Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 45.d

Injection Date:	04-Aug-2018 06:40:00	Instrument ID:	CIC2500	Operator ID:	
Lims ID:	160-29476-Q-1 DU			Worklist Smp#:	45
Client ID:					
Injection Vol:	50.0 uL	Dil. Factor:	20.0000	ALS Bottle#:	0
Method:	Anions_CIC2500	Limit Group:	WT - IC - 28Days		



Manual Integration/User Assign Peak Report

TestAmerica St. Louis

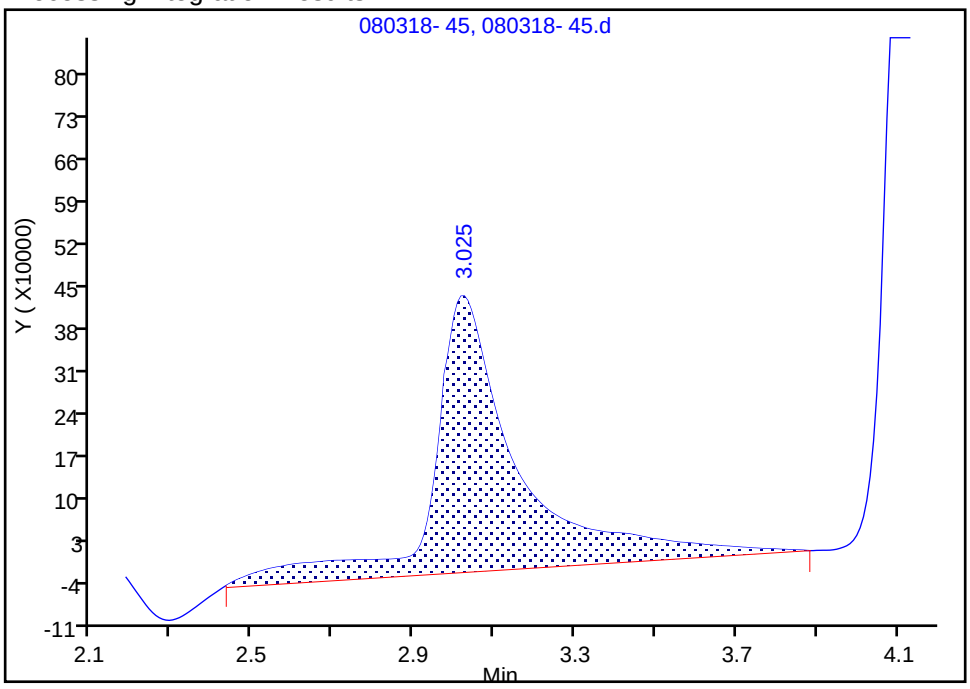
Data File: \\ChromNA\StLouis\ChromData\CIC2500\20180803-13784.b\080318- 45.d
Injection Date: 04-Aug-2018 06:40:00 Instrument ID: CIC2500
Lims ID: 160-29476-Q-1 DU
Client ID:
Operator ID: ALS Bottle#: 0 Worklist Smp#: 45
Injection Vol: 50.0 uL Dil. Factor: 20.0000
Method: Anions_CIC2500 Limit Group: WT - IC - 28Days
Column: Detector 113

1 Fluoride, CAS: 16984-48-8

Signal: 1

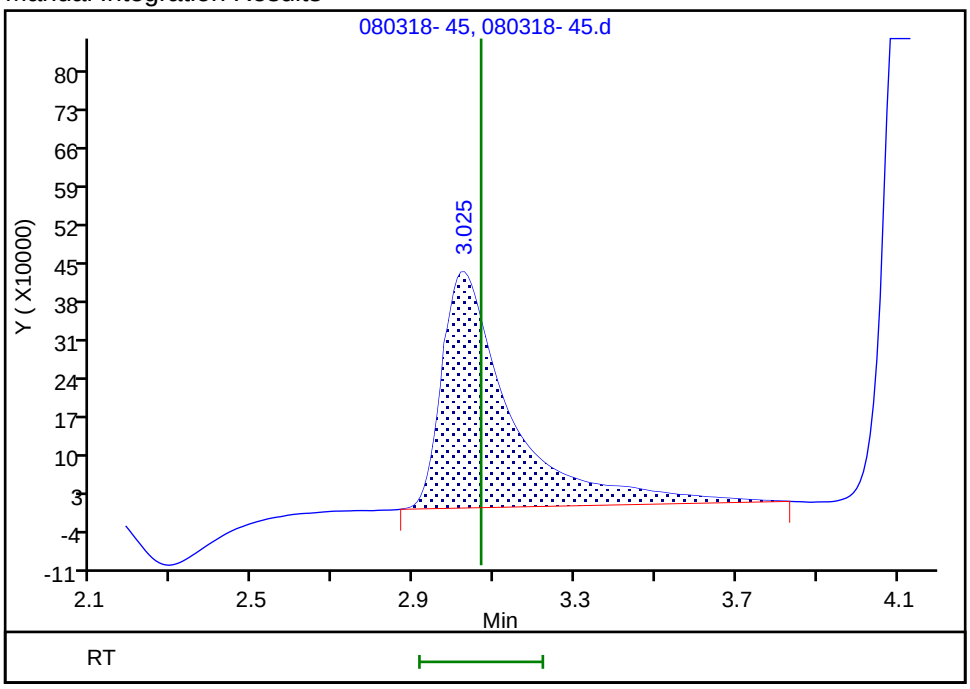
Processing Integration Results

RT: 3.03
Area: 6862816
Amount: 318.4416
Amount Units: ug/l



Manual Integration Results

RT: 3.03
Area: 5168145
Amount: 239.8072
Amount Units: ug/l



Reviewer: boydj, 06-Aug-2018 10:40:05
Audit Action: Manually Integrated Audit Reason: Baseline Smoothing

HPLC/IC ANALYSIS RUN LOG

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Instrument ID: CIC2500 Start Date: 08/02/2018 16:50

Analysis Batch Number: 379990 End Date: 08/03/2018 15:05

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
STD0 160-379990/1 IC		08/02/2018 16:50	1	080218- 1.d	IonPacAS14 4(mm)
STD2 160-379990/2 IC		08/02/2018 17:07	1	080218- 2.d	IonPacAS14 4(mm)
STD3 160-379990/3 IC		08/02/2018 17:24	1	080218- 3.d	IonPacAS14 4(mm)
STD4 160-379990/4 IC		08/02/2018 17:41	1	080218- 4.d	IonPacAS14 4(mm)
STD5 160-379990/5 IC		08/02/2018 17:58	1	080218- 5.d	IonPacAS14 4(mm)
STD6 160-379990/6 IC		08/02/2018 18:15	1	080218- 6.d	IonPacAS14 4(mm)
ICV 160-379990/7		08/02/2018 18:32	1	080218- 7.d	IonPacAS14 4(mm)
ICB 160-379990/8		08/02/2018 18:49	1	080218- 8.d	IonPacAS14 4(mm)
CCV 160-379990/19		08/02/2018 21:55	1		IonPacAS14 4(mm)
CCB 160-379990/20		08/02/2018 22:12	1		IonPacAS14 4(mm)
ZZZZZ		08/02/2018 22:29	1		IonPacAS14 4(mm)
ZZZZZ		08/02/2018 22:46	1		IonPacAS14 4(mm)
ZZZZZ		08/02/2018 23:03	1		IonPacAS14 4(mm)
ZZZZZ		08/02/2018 23:20	1		IonPacAS14 4(mm)
ZZZZZ		08/02/2018 23:36	1		IonPacAS14 4(mm)
ZZZZZ		08/02/2018 23:53	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 00:10	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 00:27	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 00:44	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 01:01	1		IonPacAS14 4(mm)
CCV 160-379990/31		08/03/2018 01:18	1		IonPacAS14 4(mm)
CCB 160-379990/32		08/03/2018 01:35	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 01:52	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 02:09	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 02:26	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 02:43	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 03:00	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 03:16	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 03:33	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 03:50	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 04:07	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 04:24	1		IonPacAS14 4(mm)
CCV 160-379990/43		08/03/2018 04:41	1		IonPacAS14 4(mm)
CCB 160-379990/44		08/03/2018 04:58	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 05:15	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 05:32	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 05:49	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 06:06	1		IonPacAS14 4(mm)
CCV 160-379990/49		08/03/2018 06:23	1		IonPacAS14 4(mm)
CCB 160-379990/50		08/03/2018 06:39	1		IonPacAS14 4(mm)
CCV 160-379990/51		08/03/2018 13:07	1		IonPacAS14 4(mm)
CCB 160-379990/52		08/03/2018 13:24	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 13:41	2		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 13:58	2		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 14:15	2		IonPacAS14 4(mm)

HPLC/IC ANALYSIS RUN LOG

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Instrument ID: CIC2500 Start Date: 08/02/2018 16:50

Analysis Batch Number: 379990 End Date: 08/03/2018 15:05

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
ZZZZZ		08/03/2018 14:32	10		IonPacAS14 4(mm)
CCV 160-379990/57		08/03/2018 14:49	1		IonPacAS14 4(mm)
CCB 160-379990/58		08/03/2018 15:05	1		IonPacAS14 4(mm)

300.0

HPLC/IC ANALYSIS RUN LOG

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Instrument ID: CIC2500 Start Date: 08/03/2018 18:16

Analysis Batch Number: 380227 End Date: 08/04/2018 07:48

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 160-380227/1		08/03/2018 18:16	1	080318- 1.d	IonPacAS14 4(mm)
CCB 160-380227/2		08/03/2018 18:32	1	080318- 2.d	IonPacAS14 4(mm)
MB 160-380227/3		08/03/2018 18:49	1	080318- 3.d	IonPacAS14 4(mm)
LCS 160-380227/4		08/03/2018 19:06	1	080318- 4.d	IonPacAS14 4(mm)
ZZZZZ		08/03/2018 19:23	20		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 19:40	20		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 19:57	20		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 20:14	20		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 20:31	1		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 20:48	20		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 21:05	2		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 21:22	2		IonPacAS14 4(mm)
CCV 160-380227/13		08/03/2018 21:39	1	080318- 13.d	IonPacAS14 4(mm)
CCB 160-380227/14		08/03/2018 21:56	1	080318- 14.d	IonPacAS14 4(mm)
ZZZZZ		08/03/2018 22:29	10		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 23:03	10		IonPacAS14 4(mm)
ZZZZZ		08/03/2018 23:37	10		IonPacAS14 4(mm)
ZZZZZ		08/04/2018 00:11	10		IonPacAS14 4(mm)
ZZZZZ		08/04/2018 00:45	10		IonPacAS14 4(mm)
CCV 160-380227/25		08/04/2018 01:02	1		IonPacAS14 4(mm)
CCB 160-380227/26		08/04/2018 01:19	1		IonPacAS14 4(mm)
ZZZZZ		08/04/2018 01:52	10		IonPacAS14 4(mm)
ZZZZZ		08/04/2018 02:09	1		IonPacAS14 4(mm)
ZZZZZ		08/04/2018 02:43	10		IonPacAS14 4(mm)
ZZZZZ		08/04/2018 03:17	10		IonPacAS14 4(mm)
ZZZZZ		08/04/2018 03:51	10		IonPacAS14 4(mm)
CCV 160-380227/36		08/04/2018 04:08	1	080318- 36.d	IonPacAS14 4(mm)
CCB 160-380227/37		08/04/2018 04:25	1	080318- 37.d	IonPacAS14 4(mm)
ZZZZZ		08/04/2018 04:58	10		IonPacAS14 4(mm)
ZZZZZ		08/04/2018 05:32	10		IonPacAS14 4(mm)
160-29476-1 DL		08/04/2018 06:06	20	080318- 43.d	IonPacAS14 4(mm)
160-29476-1 DU DL		08/04/2018 06:40	20	080318- 45.d	IonPacAS14 4(mm)
160-29476-1 MS DL		08/04/2018 07:14	20	080318- 47.d	IonPacAS14 4(mm)
CCV 160-380227/48		08/04/2018 07:31	1	080318- 48.d	IonPacAS14 4(mm)
CCB 160-380227/49		08/04/2018 07:48	1	080318- 49.d	IonPacAS14 4(mm)

300.0

METALS

COVER PAGE
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG No.:

Project: Former Carnotite Site - Non-Rad Analysis

Client Sample ID	Lab Sample ID
CRC-MW-1	160-29476-1

Comments:

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: CRC-MW-1 Lab Sample ID: 160-29476-1

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG ID.:

Matrix: Water Date Sampled: 07/11/2018 13:55

Reporting Basis: WET Date Received: 07/12/2018 09:30

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7429-90-5	Aluminum	330	200	50	ug/L			1	6010C
7440-36-0	Antimony	3.0	10	3.0	ug/L	U		1	6010C
7440-38-2	Arsenic	4.0	10	4.0	ug/L	U		1	6010C
7440-39-3	Barium	15	50	15	ug/L	J		1	6010C
7440-41-7	Beryllium	1.5	5.0	1.5	ug/L	U		1	6010C
7440-43-9	Cadmium	1.5	5.0	1.5	ug/L	U		1	6010C
7440-70-2	Calcium	71000	1000	300	ug/L			1	6010C
7440-47-3	Chromium	3.0	10	3.0	ug/L	U		1	6010C
7440-48-4	Cobalt	15	50	15	ug/L	U		1	6010C
7440-50-8	Copper	7.0	25	7.0	ug/L	U		1	6010C
7439-89-6	Iron	540	100	30	ug/L			1	6010C
7439-92-1	Lead	3.0	10	3.0	ug/L	U		1	6010C
7439-95-4	Magnesium	23000	1000	300	ug/L			1	6010C
7439-96-5	Manganese	100	15	4.0	ug/L			1	6010C
7440-02-0	Nickel	10	40	10	ug/L	U		1	6010C
7440-09-7	Potassium	4000	5000	1500	ug/L	J		1	6010C
7782-49-2	Selenium	8.0	15	8.0	ug/L	U		1	6010C
7440-22-4	Silver	3.0	10	3.0	ug/L	U		1	6010C
7440-23-5	Sodium	28000	1000	300	ug/L			1	6010C
7440-28-0	Thallium	5.0	20	5.0	ug/L	U		1	6010C
7440-62-2	Vanadium	56	50	25	ug/L			1	6010C
7440-66-6	Zinc	8.1	20	6.0	ug/L	J		1	6010C
7439-97-6	Mercury	0.060	0.20	0.060	ug/L	U		1	7470A

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

ICV Source: ICP ICV_00520 Concentration Units: ug/L

CCV Source: ICP CAL1/LLC_00163

Analyte	ICV 160-380741/5 08/06/2018 11:21				CCVL 160-380741/10 08/06/2018 11:43				CCVL 160-380741/23 08/06/2018 13:18			
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Arsenic	5010		5000	100	12.1		10.0	121	10.6		10.0	106
Selenium	988		1000	99	14.4	J	15.0	96	13.9	J	15.0	93

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

ICV Source: ICP ICV_00520 Concentration Units: ug/L

CCV Source: ICP CAL2/CCV_00155

Analyte	ICV 160-380741/5 08/06/2018 11:21				CCV 160-380741/11 08/06/2018 11:48				CCV 160-380741/24 08/06/2018 13:23			
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Arsenic	5010		5000	100	5040		5000	101	5070		5000	101
Selenium	988		1000	99	1010		1000	101	1020		1000	102

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

ICV Source: ICP ICV_00518 Concentration Units: ug/L

CCV Source: ICP CAL1/LLC_00162

Analyte	ICV 160-380117/5 08/02/2018 15:24				CCVL 160-380117/14 08/02/2018 16:06				CCVL 160-380117/27 08/02/2018 17:37			
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Aluminum	49400		50000	99	205		200	102	207		200	103
Antimony	953		1000	95	10.5		10.0	105	11.1		10.0	111
Barium	4920		5000	98	47.4	J	50.0	95	46.7	J	50.0	93
Beryllium	4930		5000	99	5.00		5.00	100	4.80	J	5.00	96
Cadmium	4900		5000	98	4.30	J	5.00	86	4.70	J	5.00	94
Calcium	49100		50000	98	1020		1000	102	1010		1000	101
Chromium	4860		5000	97	10.2		10.0	102	9.40	J	10.0	94
Cobalt	4910		5000	98	50.5		50.0	101	51.0		50.0	102
Copper	4860		5000	97	25.1		25.0	100	26.3		25.0	105
Iron	51400		50000	103	105		100	105	102		100	102
Lead	4960		5000	99	10.2		10.0	102	10.6		10.0	106
Magnesium	49400		50000	99	1010		1000	101	972	J	1000	97
Manganese	4990		5000	100	15.0		15.0	100	14.8	J	15.0	99
Nickel	4930		5000	99	41.4		40.0	104	40.5		40.0	101
Potassium	49200		50000	98	5060		5000	101	5040		5000	101
Silver	987		1000	99	10.4		10.0	104	9.40	J	10.0	94
Sodium	49100		50000	98	941	J	1000	94	1100		1000	110
Thallium	1030		1000	103	23.3		20.0	117	21.1		20.0	106
Vanadium	4910		5000	98	52.4		50.0	105	48.7	J	50.0	97
Zinc	4870		5000	97	18.7	J	20.0	94	18.7	J	20.0	94

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

ICV Source: ICP ICV_00518 Concentration Units: ug/L

CCV Source: ICP CAL1/LLC_00162

Analyte	CCVL 160-380117/40 08/02/2018 18:36											
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Aluminum	165	J	200	82								
Antimony	10.6		10.0	106								
Barium	46.1	J	50.0	92								
Beryllium	4.80	J	5.00	96								
Cadmium	4.50	J	5.00	90								
Calcium	1020		1000	102								
Chromium	9.50	J	10.0	95								
Cobalt	51.2		50.0	102								
Copper	25.9		25.0	104								
Iron	99.6	J	100	100								
Lead	10.1		10.0	101								
Magnesium	978	J	1000	98								
Manganese	15.2		15.0	101								
Nickel	40.5		40.0	101								
Potassium	4980	J	5000	100								
Silver	9.30	J	10.0	93								
Sodium	961	J	1000	96								
Thallium	19.3	J	20.0	97								
Vanadium	46.5	J	50.0	93								
Zinc	18.7	J	20.0	94								

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

ICV Source: ICP ICV_00518 Concentration Units: ug/L

CCV Source: ICP CAL2/CCV_00154

Analyte	ICV 160-380117/5 08/02/2018 15:24				CCV 160-380117/15 08/02/2018 16:11				CCV 160-380117/28 08/02/2018 17:41			
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Aluminum	49400		50000	99	48200		50000	96	46300		50000	93
Antimony	953		1000	95	959		1000	96	924		1000	92
Barium	4920		5000	98	4820		5000	96	4670		5000	93
Beryllium	4930		5000	99	4870		5000	97	4780		5000	96
Cadmium	4900		5000	98	4870		5000	97	4830		5000	97
Calcium	49100		50000	98	49400		50000	99	49200		50000	98
Chromium	4860		5000	97	4830		5000	97	4700		5000	94
Cobalt	4910		5000	98	4910		5000	98	4920		5000	98
Copper	4860		5000	97	4840		5000	97	4650		5000	93
Iron	51400		50000	103	48900		50000	98	48200		50000	96
Lead	4960		5000	99	4890		5000	98	4730		5000	95
Magnesium	49400		50000	99	48600		50000	97	46400		50000	93
Manganese	4990		5000	100	4870		5000	97	4740		5000	95
Nickel	4930		5000	99	4920		5000	98	4940		5000	99
Potassium	49200		50000	98	48900		50000	98	48700		50000	97
Silver	987		1000	99	985		1000	98	983		1000	98
Sodium	49100		50000	98	48800		50000	98	48000		50000	96
Thallium	1030		1000	103	989		1000	99	951		1000	95
Vanadium	4910		5000	98	4810		5000	96	4620		5000	92
Zinc	4870		5000	97	4890		5000	98	4870		5000	97

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

ICV Source: ICP ICV_00518 Concentration Units: ug/L

CCV Source: ICP CAL2/CCV_00154

Analyte	CCV 160-380117/41 08/02/2018 18:40											
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Aluminum	47000		50000	94								
Antimony	923		1000	92								
Barium	4720		5000	94								
Beryllium	4820		5000	96								
Cadmium	4830		5000	97								
Calcium	49300		50000	99								
Chromium	4720		5000	94								
Cobalt	4920		5000	98								
Copper	4680		5000	94								
Iron	48400		50000	97								
Lead	4750		5000	95								
Magnesium	47200		50000	94								
Manganese	4770		5000	95								
Nickel	4930		5000	99								
Potassium	49600		50000	99								
Silver	991		1000	99								
Sodium	48800		50000	98								
Thallium	956		1000	96								
Vanadium	4670		5000	93								
Zinc	4860		5000	97								

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

ICV Source: Hg QC Int._00998 Concentration Units: ug/L

CCV Source: Hg Curve Int._01021

Analyte	ICV 160-376379/7 07/17/2018 13:50				CCV 160-376379/19 07/17/2018 14:17							
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Mercury	5.21		5.00	104	5.81		5.00	116				

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2B-IN
CRQL CHECK STANDARD
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Method: 6010C Instrument ID: ICP 6500 Duo

Lab Sample ID: CRI 160-380741/7 Concentration Units: ug/L

CRQL Check Standard Source: ICP CAL1/LLC_00163

Analyte	CRQL Check Standard				
	True	Found	Qualifiers	%R(1)	Limits
Arsenic	10.0	10.9		109	70-130
Selenium	15.0	14.9	J	99	70-130

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM IIB-IN

2B-IN
CRQL CHECK STANDARD
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Method: 6010C Instrument ID: ICP6500

Lab Sample ID: CRI 160-380117/7 Concentration Units: ug/L

CRQL Check Standard Source: ICP CAL1/LLC_00162

Analyte	CRQL Check Standard				
	True	Found	Qualifiers	%R(1)	Limits
Aluminum	200	210		105	70-130
Antimony	10.0	11.2		112	70-130
Barium	50.0	47.1	J	94	70-130
Beryllium	5.00	4.90	J	98	70-130
Cadmium	5.00	4.50	J	90	70-130
Calcium	1000	1020		102	70-130
Chromium	10.0	9.80	J	98	70-130
Cobalt	50.0	50.8		102	70-130
Copper	25.0	26.1		104	70-130
Iron	100	105		105	70-130
Lead	10.0	11.6		116	70-130
Magnesium	1000	1010		101	70-130
Manganese	15.0	14.7	J	98	70-130
Nickel	40.0	40.7		102	70-130
Potassium	5000	4970	J	99	70-130
Silver	10.0	10.9		109	70-130
Sodium	1000	924	J	92	70-130
Thallium	20.0	19.2	J	96	70-130
Vanadium	50.0	52.7		105	70-130
Zinc	20.0	18.8	J	94	70-130

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM IIB-IN

3-IN
INSTRUMENT BLANKS
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Concentration Units: ug/L

Analyte	RL	ICB 160-380741/6 08/06/2018 11:25		CCB 160-380741/12 08/06/2018 11:52		CCB 160-380741/25 08/06/2018 13:27			
		Found	C	Found	C	Found	C	Found	C
Arsenic	10	4.0	U	4.0	U	4.0	U		
Selenium	15	8.0	U	8.0	U	8.0	U		

Italicized analytes were not requested for this sequence.

3-IN
INSTRUMENT BLANKS
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Concentration Units: ug/L

Analyte	RL	ICB 160-380117/6 08/02/2018 15:28		CCB 160-380117/16 08/02/2018 16:15		CCB 160-380117/29 08/02/2018 17:46		CCB 160-380117/42 08/02/2018 18:44	
		Found	C	Found	C	Found	C	Found	C
Aluminum	200	50	U	50	U	50	U	50	U
Antimony	10	3.0	U	3.0	U	3.0	U	3.0	U
Barium	50	15	U	15	U	15	U	15	U
Beryllium	5.0	1.5	U	1.5	U	1.5	U	1.5	U
Cadmium	5.0	1.5	U	1.5	U	1.5	U	1.5	U
Calcium	1000	300	U	300	U	300	U	300	U
Chromium	10	3.0	U	3.0	U	3.0	U	3.0	U
Cobalt	50	15	U	15	U	15	U	15	U
Copper	25	7.0	U	7.0	U	7.0	U	7.0	U
Iron	100	30	U	30	U	30	U	30	U
Lead	10	3.0	U	3.0	U	3.0	U	3.0	U
Magnesium	1000	300	U	300	U	300	U	300	U
Manganese	15	4.0	U	4.0	U	4.0	U	4.0	U
Nickel	40	10	U	10	U	10	U	10	U
Potassium	5000	1500	U	1500	U	1500	U	1500	U
Silver	10	3.0	U	3.0	U	3.0	U	3.0	U
Sodium	1000	300	U	300	U	300	U	300	U
Thallium	20	5.0	U	5.0	U	5.0	U	5.0	U
Vanadium	50	15	U	15	U	15	U	15	U
Zinc	20	6.0	U	6.0	U	6.0	U	6.0	U

Italicized analytes were not requested for this sequence.

3-IN
INSTRUMENT BLANKS
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Concentration Units: ug/L

Analyte	RL	ICB 160-376379/8 07/17/2018 13:53		CCB 160-376379/20 07/17/2018 14:18					
		Found	C	Found	C	Found	C	Found	C
Mercury	0.20	0.060	U	0.060	U				

Italicized analytes were not requested for this sequence.

3-IN
METHOD BLANK
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Concentration Units: ug/L Lab Sample ID: MB 160-379537/1-A

Instrument Code: ICP6500 Batch No.: 380117

CAS No.	Analyte	Concentration	C	Q	Method
7429-90-5	Aluminum	50	U		6010C
7440-36-0	Antimony	3.0	U		6010C
7440-39-3	Barium	15	U		6010C
7440-41-7	Beryllium	1.5	U		6010C
7440-43-9	Cadmium	1.5	U		6010C
7440-70-2	Calcium	300	U		6010C
7440-47-3	Chromium	3.0	U		6010C
7440-48-4	Cobalt	15	U		6010C
7440-50-8	Copper	7.0	U		6010C
7439-89-6	Iron	30	U		6010C
7439-92-1	Lead	3.0	U		6010C
7439-95-4	Magnesium	300	U		6010C
7439-96-5	Manganese	4.0	U		6010C
7440-02-0	Nickel	10	U		6010C
7440-09-7	Potassium	1500	U		6010C
7440-22-4	Silver	3.0	U		6010C
7440-23-5	Sodium	300	U		6010C
7440-28-0	Thallium	5.0	U		6010C
7440-62-2	Vanadium	25	U		6010C
7440-66-6	Zinc	6.0	U		6010C

3-IN
METHOD BLANK
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Concentration Units: ug/L Lab Sample ID: MB 160-379537/1-A

Instrument Code: ICP 6500 Duo Batch No.: 380741

CAS No.	Analyte	Concentration	C	Q	Method
7440-38-2	Arsenic	4.0	U		6010C
7782-49-2	Selenium	8.0	U		6010C

3-IN
METHOD BLANK
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Concentration Units: ug/L Lab Sample ID: MB 160-375873/1-A

Instrument Code: HAA2 Batch No.: 376379

CAS No.	Analyte	Concentration	C	Q	Method
7439-97-6	Mercury	0.060	U		7470A

FORM III-IN

4A-IN
INTERFERENCE CHECK STANDARD
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Lab Sample ID: ICSA 160-380741/8 Instrument ID: ICP 6500 Duo

Lab File ID: 080618E2.asc ICS Source: ICP ICSA_00021

Concentration Units: ug/L

Analyte	True Solution A	Found Solution A	Percent Recovery
Arsenic		**6.10**	
Selenium		**0.100**	
Aluminum	*100000*	*100300*	*100*

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM IVA-IN

4A-IN
INTERFERENCE CHECK STANDARD
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Lab Sample ID: ICSAB 160-380741/9 Instrument ID: ICP 6500 Duo

Lab File ID: 080618E2.asc ICS Source: ICP ICSAB_00018

Concentration Units: ug/L

Analyte	True Solution AB	Found Solution AB	Percent Recovery
Arsenic	**2500**	**2507**	**100**
Selenium	**500**	**504**	**101**

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM IVA-IN

4A-IN
INTERFERENCE CHECK STANDARD
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Lab Sample ID: ICSA 160-380117/8 Instrument ID: ICP6500

Lab File ID: 080218C1.asc ICS Source: ICP ICSA_00021

Concentration Units: ug/L

Analyte	True Solution A	Found Solution A	Percent Recovery
Aluminum	**100000**	**98260**	**98**
Antimony		**2.70**	
Barium		**-0.400**	
Beryllium		**0.0000**	
Cadmium		**-0.400**	
Calcium	**100000**	**97210**	**97**
Chromium		**-4.40**	
Cobalt		**7.30**	
Copper		**-13.1**	
Iron	**100000**	**99800**	**100**
Lead		**-6.50**	
Magnesium	**100000**	**98960**	**99**
Manganese		**1.60**	
Nickel		**3.90**	
Potassium	**100000**	**99960**	**100**
Silver		**-0.300**	
Sodium	**100000**	**99040**	**99**
Thallium		**0.900**	
Vanadium		**2.10**	
Zinc		**14.1**	

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM IVA-IN

4A-IN
INTERFERENCE CHECK STANDARD
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Lab Sample ID: ICSAB 160-380117/9 Instrument ID: ICP6500

Lab File ID: 080218C1.asc ICS Source: ICP ICSAB_00018

Concentration Units: ug/L

Analyte	True Solution AB	Found Solution AB	Percent Recovery
Aluminum	**100000**	**97970**	**98**
Antimony	**500**	**497**	**99**
Barium	**2500**	**2462**	**98**
Beryllium	**2500**	**2531**	**101**
Cadmium	**2500**	**2508**	**100**
Calcium	**100000**	**97110**	**97**
Chromium	**2500**	**2450**	**98**
Cobalt	**2500**	**2481**	**99**
Copper	**2500**	**2459**	**98**
Iron	**100000**	**99200**	**99**
Lead	**2500**	**2441**	**98**
Magnesium	**100000**	**99170**	**99**
Manganese	**2500**	**2507**	**100**
Nickel	**2500**	**2474**	**99**
Potassium	**100000**	**99140**	**99**
Silver	**500**	**514**	**103**
Sodium	**100000**	**98490**	**98**
Thallium	**500**	**490**	**98**
Vanadium	**2500**	**2474**	**99**
Zinc	**2500**	**2529**	**101**

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM IVA-IN

5A-IN
MATRIX SPIKE SAMPLE RECOVERY
METALS

Client ID: CRC-MW-1 MS
Lab ID: 160-29476-1 MS
Lab Name: TestAmerica St. Louis
Job No.: 160-29476-1
SDG No.:
Matrix: Water
Concentration Units: ug/L
% Solids:

Analyte	SSR	C	Sample Result (SR)	C	Spike Added (SA)	%R	Control Limit %R	Q	Method
Aluminum	9910		330		10000	96	75-125		6010C
Antimony	462		3.0	U	500	92	75-125		6010C
Arsenic	976		4.0	U	1000	98	75-125		6010C
Barium	959		15	J	1000	94	75-125		6010C
Beryllium	97.5		1.5	U	100	98	75-125		6010C
Cadmium	975		1.5	U	1000	97	75-125		6010C
Calcium	81100		71000		10000	97	75-125	4	6010C
Chromium	953		3.0	U	1000	95	75-125		6010C
Cobalt	993		15	U	1000	99	75-125		6010C
Copper	958		7.0	U	1000	96	75-125		6010C
Iron	10400		540		10000	99	75-125		6010C
Lead	951		3.0	U	1000	95	75-125		6010C
Magnesium	32200		23000		10000	95	75-125		6010C
Manganese	1070		100		1000	97	75-125		6010C
Nickel	1000		10	U	1000	100	75-125		6010C
Potassium	14100		4000	J	10000	102	75-125		6010C
Selenium	493		8.0	U	500	99	75-125		6010C
Silver	210		3.0	U	200	105	75-125		6010C
Sodium	38200		28000		10000	101	75-125		6010C
Thallium	194		5.0	U	200	97	75-125		6010C
Vanadium	999		56		1000	94	75-125		6010C
Zinc	985		8.1	J	1000	98	75-125		6010C

SSR = Spiked Sample Result

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VA - IN

5A-IN
MATRIX SPIKE SAMPLE RECOVERY
METALS

Client ID: _____ Lab ID: 160-29274-A-3-C MS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.: _____

Matrix: Water Concentration Units: ug/L

% Solids: _____

Analyte	SSR	C	Sample Result (SR)	C	Spike Added (SA)	%R	Control Limit %R	Q	Method
Mercury	5.48		0.060	U	5.00	110	80-120		7470A

SSR = Spiked Sample Result

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VA - IN

5A-IN
MATRIX SPIKE DUPLICATE SAMPLE RECOVERY
METALS

Client ID: CRC-MW-1 MSD
Lab ID: 160-29476-1 MSD
Lab Name: TestAmerica St. Louis
Job No.: 160-29476-1
SDG No.:
Matrix: Water
Concentration Units: ug/L
% Solids:

Analyte	(SDR)	C	Spike Added (SA)	%R	Control Limit %R	RPD	RPD Limit	Q	Method
Aluminum	9970		10000	96	75-125	1	20		6010C
Antimony	447		500	89	75-125	3	20		6010C
Arsenic	1000		1000	100	75-125	3	20		6010C
Barium	955		1000	94	75-125	0	20		6010C
Beryllium	97.1		100	97	75-125	0	20		6010C
Cadmium	956		1000	96	75-125	2	20		6010C
Calcium	80600		10000	92	75-125	1	20	4	6010C
Chromium	939		1000	94	75-125	1	20		6010C
Cobalt	979		1000	98	75-125	1	20		6010C
Copper	936		1000	94	75-125	2	20		6010C
Iron	10500		10000	99	75-125	1	20		6010C
Lead	935		1000	93	75-125	2	20		6010C
Magnesium	32600		10000	99	75-125	1	20		6010C
Manganese	1070		1000	97	75-125	0	20		6010C
Nickel	992		1000	99	75-125	1	20		6010C
Potassium	14200		10000	103	75-125	1	20		6010C
Selenium	504		500	101	75-125	2	20		6010C
Silver	209		200	105	75-125	0	20		6010C
Sodium	38500		10000	104	75-125	1	20		6010C
Thallium	189		200	95	75-125	3	20		6010C
Vanadium	987		1000	93	75-125	1	20		6010C
Zinc	969		1000	96	75-125	2	20		6010C

SDR = Sample Duplicate Result

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VD - IN

5A-IN
MATRIX SPIKE DUPLICATE SAMPLE RECOVERY
METALS

Client ID: _____ Lab ID: 160-29274-A-3-D MSD

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.: _____

Matrix: Water Concentration Units: ug/L

% Solids: _____

Analyte	(SDR)	C	Spike Added (SA)	%R	Control Limit %R	RPD	RPD Limit	Q	Method
Mercury	5.39		5.00	108	80-120	2	20		7470A

SDR = Sample Duplicate Result

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VD - IN

7A-IN
LAB CONTROL SAMPLE
METALS

Lab ID: LCS 160-379537/2-A

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

Sample Matrix: Water LCS Source: MPREP1_00017

Analyte	Water(ug/L)							
	True	Found	C	%R	Limits		Q	Method
Aluminum	10000	9610		96	80	120		6010C
Antimony	500	451		90	80	120		6010C
Barium	1000	946		95	80	120		6010C
Beryllium	100	97.4		97	80	120		6010C
Cadmium	1000	963		96	80	120		6010C
Calcium	10000	10300		103	80	120		6010C
Chromium	1000	967		97	80	120		6010C
Cobalt	1000	1010		101	80	120		6010C
Copper	1000	969		97	80	120		6010C
Iron	10000	9990		100	80	120		6010C
Lead	1000	977		98	80	120		6010C
Magnesium	10000	9670		97	80	120		6010C
Manganese	1000	987		99	80	120		6010C
Nickel	1000	1020		102	80	120		6010C
Potassium	10000	9980		100	80	120		6010C
Silver	200	206		103	80	120		6010C
Sodium	10000	9950		99	80	120		6010C
Thallium	200	203		102	80	120		6010C
Vanadium	1000	946		95	80	120		6010C
Zinc	1000	963		96	80	120		6010C

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIIA - IN

7A-IN
LAB CONTROL SAMPLE
METALS

Lab ID: LCS 160-379537/2-A

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

Sample Matrix: Water LCS Source: MPREP1_00017

Analyte	Water(ug/L)							
	True	Found	C	%R	Limits		Q	Method
Arsenic	1000	995		100	80	120		6010C
Selenium	500	504		101	80	120		6010C

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIIA - IN

7A-IN
LAB CONTROL SAMPLE
METALS

Lab ID: LCS 160-375873/2-A

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

Sample Matrix: Water LCS Source: Hg QC Int._00998

Analyte	Water(ug/L)							
	True	Found	C	%R	Limits		Q	Method
Mercury	5.00	5.36		107	80	120		7470A

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIIA - IN

8-IN
ICP-AES AND ICP-MS SERIAL DILUTIONS
METALS

Lab ID: 160-29476-1

SDG No:

Lab Name: TestAmerica St. Louis Job No: 160-29476-1

Matrix: Water Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	Method
Aluminum	330		403	J	NC		6010C
Antimony	3.0	U	15	U	NC		6010C
Arsenic	4.0	U	20	U	NC		6010C
Barium	15	J	75	U	NC		6010C
Beryllium	1.5	U	7.5	U	NC		6010C
Cadmium	1.5	U	7.5	U	NC		6010C
Calcium	71000		74700		4.6		6010C
Chromium	3.0	U	15	U	NC		6010C
Cobalt	15	U	75	U	NC		6010C
Copper	7.0	U	35	U	NC		6010C
Iron	540		551		NC		6010C
Lead	3.0	U	15	U	NC		6010C
Magnesium	23000		23400		3.1		6010C
Manganese	100		104		NC		6010C
Nickel	10	U	50	U	NC		6010C
Potassium	4000	J	7500	U	NC		6010C
Selenium	8.0	U	40	U	NC		6010C
Silver	3.0	U	15	U	NC		6010C
Sodium	28000		28400		1.2		6010C
Thallium	5.0	U	25	U	NC		6010C
Vanadium	56		130	U	NC		6010C
Zinc	8.1	J	30	U	NC		6010C

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIII-IN

8-IN
ICP-AES AND ICP-MS SERIAL DILUTIONS
METALS

Lab ID: 160-29274-A-3-B SD

SDG No:

Lab Name: TestAmerica St. Louis Job No: 160-29476-1

Matrix: Water Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	Method
Mercury	0.060	U	0.30	U	NC		7470A

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIII-IN

9-IN
DETECTION LIMITS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: ICP 6500 Duo

Method: 6010C MDL Date: 09/14/2016 11:58

Prep Method: 3010A

Analyte	Wavelength/ Mass	RL (ug/L)	MDL (ug/L)
Arsenic		10	4
Selenium		15	8

9-IN
CALIBRATION BLANK DETECTION LIMITS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: ICP 6500 Duo

Method: 6010C XMDL Date: 09/14/2016 11:57

Analyte	Wavelength/ Mass	XRL (ug/L)	XMDL (ug/L)
Arsenic		10	4
Selenium		15	8

9-IN
DETECTION LIMITS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: ICP6500

Method: 6010C MDL Date: 09/14/2016 11:58

Prep Method: 3010A

Analyte	Wavelength/ Mass	RL (ug/L)	MDL (ug/L)
Aluminum		200	50
Antimony		10	3
Barium		50	15
Beryllium		5	1.5
Cadmium		5	1.5
Calcium		1000	300
Chromium		10	3
Cobalt		50	15
Copper		25	7
Iron		100	30
Lead		10	3
Magnesium		1000	300
Manganese		15	4
Nickel		40	10
Potassium		5000	1500
Silver		10	3
Sodium		1000	300
Thallium		20	5
Vanadium		50	25
Zinc		20	6

9-IN
CALIBRATION BLANK DETECTION LIMITS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: ICP6500

Method: 6010C XMDL Date: 09/14/2016 11:57

Analyte	Wavelength/ Mass	XRL (ug/L)	XMDL (ug/L)
Aluminum		200	50
Antimony		10	3
Barium		50	15
Beryllium		5	1.5
Cadmium		5	1.5
Calcium		1000	300
Chromium		10	3
Cobalt		50	15
Copper		25	7
Iron		100	30
Lead		10	3
Magnesium		1000	300
Manganese		15	4
Nickel		40	10
Potassium		5000	1500
Silver		10	3
Sodium		1000	300
Thallium		20	5
Vanadium		50	15
Zinc		20	6

9-IN
DETECTION LIMITS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: HAA2

Method: 7470A MDL Date: 06/28/2011 19:17

Prep Method: 7470A

Analyte	Wavelength/ Mass	RL (ug/L)	MDL (ug/L)
Mercury		0.2	0.06

9-IN
CALIBRATION BLANK DETECTION LIMITS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: HAA2

Method: 7470A XMDL Date: 06/28/2011 19:19

Analyte	Wavelength/ Mass	XRL (ug/L)	XMDL (ug/L)
Mercury		0.2	0.06

10-IN
ICP-AES INTERELEMENT CORRECTION FACTORS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG No.:

ICP-AES Instrument ID: ICP 6500 Duo Date: 07/10/2018

Analyte	Wave Length	Ag	Al	As	Au	B	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe
Aluminum															
Antimony													0.005469		
Arsenic															-0.0002931
Barium															
Beryllium															
Bismuth															
Boron															
Cadmium				0.0050593	0										
Calcium															
Chromium								-0.0017766							
Cobalt															
Copper															
Gold															
Iron															
Lead														0.006478	
Lithium															
Magnesium															
Manganese															
Molybdenum															
Nickel															
Palladium															
Phosphorus															
Potassium															
Selenium															
Silicon															
Silver															
Sodium															
Strontium															
Sulfur															
Thallium															

X-IN

10-IN
ICP-AES INTERELEMENT CORRECTION FACTORS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG No.:

ICP-AES Instrument ID: ICP 6500 Duo Date: 07/10/2018

Analyte	Wave Length	Ag	Al	As	Au	B	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe
Thorium															0.0023371
Tin															
Titanium												0.00343			
Uranium															
Vanadium															
Yttrium															
Zinc															

10-IN
ICP-AES INTERELEMENT CORRECTION FACTORS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG No.:

ICP-AES Instrument ID: ICP 6500 Duo Date: 07/10/2018

Analyte	Wave Length	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Se	Si	Sn
Aluminum															
Antimony															
Arsenic															
Barium															
Beryllium															
Bismuth															
Boron															
Cadmium															
Calcium															
Chromium															
Cobalt															
Copper															
Gold															
Iron															
Lead														0.0016372	
Lithium															
Magnesium															
Manganese															
Molybdenum															
Nickel															
Palladium															
Phosphorus															
Potassium															
Selenium															
Silicon															
Silver															
Sodium															
Strontium															
Sulfur															
Thallium															

X-IN

10-IN
ICP-AES INTERELEMENT CORRECTION FACTORS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG No.:

ICP-AES Instrument ID: ICP 6500 Duo Date: 07/10/2018

Analyte	Wave Length	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Se	Si	Sn
Thorium				0.0001125											
Tin															
Titanium															
Uranium															
Vanadium															
Yttrium															
Zinc								0.0056769							

X-IN

10-IN
ICP-AES INTERELEMENT CORRECTION FACTORS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG No.:

ICP-AES Instrument ID: ICP 6500 Duo Date: 07/10/2018

Analyte	Wave Length	Sr	Th	Ti	Tl	U	V	Zn							
Aluminum															
Antimony															
Arsenic															
Barium															
Beryllium															
Bismuth															
Boron															
Cadmium															
Calcium															
Chromium															
Cobalt															
Copper															
Gold															
Iron															
Lead						0.0013161									
Lithium															
Magnesium															
Manganese															
Molybdenum															
Nickel								0.0056769							
Palladium															
Phosphorus															
Potassium															
Selenium						-0.0029707									
Silicon															
Silver						0.0012661									
Sodium															
Strontium															
Sulfur															
Thallium															

X-IN

10-IN
ICP-AES INTERELEMENT CORRECTION FACTORS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG No.:

ICP-AES Instrument ID: ICP 6500 Duo Date: 07/10/2018

Analyte	Wave Length	Sr	Th	Ti	Tl	U	V	Zn							
Thorium						-0.0052638									
Tin															
Titanium															
Uranium															
Vanadium															
Yttrium															
Zinc					-0.0019673										

X-IN

10-IN
ICP-AES INTERELEMENT CORRECTION FACTORS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG No.:

ICP-AES Instrument ID: ICP6500 Date: 04/18/2018

Analyte	Wave Length	Ag	Al	As	B	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	In
Aluminum	396.152														
Antimony	206.833											0.0074765			
Arsenic	189.042													-0.0002894	
Barium	455.403														
Beryllium	313.042														
Bismuth	223.061														
Boron	249.678														
Cadmium	228.802			0.0146407											
Calcium	184.006														
Chromium	205.56						-0.0009892								
Cobalt	228.616														
Copper	217.894														
Iron	259.940														
Lead	220.353														
Lithium	670.784														
Magnesium	279.806														
Manganese	257.610														
Molybdenum	202.030														
Nickel	221.647														
Phosphorus	177.495														
Potassium	766.490														
Selenium	196.090														
Silicon	251.611														
Silver	328.068														
Sodium	589.592														
Strontium	407.771														
Sulfur	182.034														
Thallium	190.856										0.0042244				
Thorium	283.231														
Tin	189.989														

X-IN

10-IN
ICP-AES INTERELEMENT CORRECTION FACTORS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG No.:

ICP-AES Instrument ID: ICP6500 Date: 04/18/2018

Analyte	Wave Length	Ag	Al	As	B	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	In
Titanium	334.941														
Uranium	367.007														
Vanadium	290.882														
Yttrium	371.030														
Zinc	213.856														
Zirconium															

10-IN
ICP-AES INTERELEMENT CORRECTION FACTORS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG No.:

ICP-AES Instrument ID: ICP6500 Date: 04/18/2018

Analyte	Wave Length	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Se	Si	Sn
Aluminum	396.152														
Antimony	206.833					-0.0090711									
Arsenic	189.042														
Barium	455.403														
Beryllium	313.042														
Bismuth	223.061														
Boron	249.678														
Cadmium	228.802														
Calcium	184.006														
Chromium	205.56														
Cobalt	228.616														
Copper	217.894														
Iron	259.940														
Lead	220.353														
Lithium	670.784														
Magnesium	279.806														
Manganese	257.610														
Molybdenum	202.030														
Nickel	221.647														
Phosphorus	177.495														
Potassium	766.490														
Selenium	196.090														
Silicon	251.611														
Silver	328.068														
Sodium	589.592														
Strontium	407.771														
Sulfur	182.034														
Thallium	190.856														
Thorium	283.231														
Tin	189.989														

X-IN

10-IN
ICP-AES INTERELEMENT CORRECTION FACTORS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG No.:

ICP-AES Instrument ID: ICP6500 Date: 04/18/2018

Analyte	Wave Length	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Se	Si	Sn
Titanium	334.941														
Uranium	367.007														
Vanadium	290.882														
Yttrium	371.030														
Zinc	213.856							0.0074156							
Zirconium															

10-IN
ICP-AES INTERELEMENT CORRECTION FACTORS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG No.:

ICP-AES Instrument ID: ICP6500 Date: 04/18/2018

Analyte	Wave Length	Sr	Th	Ti	Tl	U	V	Y	Zn						
Aluminum	396.152														
Antimony	206.833														
Arsenic	189.042														
Barium	455.403														
Beryllium	313.042														
Bismuth	223.061														
Boron	249.678														
Cadmium	228.802														
Calcium	184.006														
Chromium	205.56														
Cobalt	228.616														
Copper	217.894														
Iron	259.940														
Lead	220.353														
Lithium	670.784														
Magnesium	279.806														
Manganese	257.610														
Molybdenum	202.030														
Nickel	221.647														
Phosphorus	177.495														
Potassium	766.490														
Selenium	196.090					-0.0019668									
Silicon	251.611														
Silver	328.068					0.0013483									
Sodium	589.592														
Strontium	407.771														
Sulfur	182.034														
Thallium	190.856														
Thorium	283.231			0.0993051											
Tin	189.989														

X-IN

10-IN
ICP-AES INTERELEMENT CORRECTION FACTORS
METALS

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG No.:

ICP-AES Instrument ID: ICP6500 Date: 04/18/2018

Analyte	Wave Length	Sr	Th	Ti	Tl	U	V	Y	Zn						
Titanium	334.941														
Uranium	367.007														
Vanadium	290.882														
Yttrium	371.030														
Zinc	213.856														
Zirconium															

11-IN
LINEAR RANGES
METALS

Lab Name: TestAmerica St. Louis Job No: 160-29476-1

SDG No.:

Instrument ID: ICP 6500 Duo Date: 02/12/2018 14:09

Analyte	Integ. Time (Sec.)	Concentration (mg/L)	Method
Arsenic		10	6010C
Selenium		2	6010C

11-IN
LINEAR RANGES
METALS

Lab Name: TestAmerica St. Louis Job No: 160-29476-1

SDG No.:

Instrument ID: ICP6500 Date: 02/07/2018 08:55

Analyte	Integ. Time (Sec.)	Concentration (mg/L)	Method
Aluminum		100	6010C
Antimony		2	6010C
Barium		10	6010C
Beryllium		10	6010C
Cadmium		10	6010C
Calcium		100	6010C
Chromium		10	6010C
Cobalt		10	6010C
Copper		10	6010C
Iron		100	6010C
Lead		10	6010C
Magnesium		100	6010C
Manganese		10	6010C
Nickel		10	6010C
Potassium		100	6010C
Silver		2	6010C
Sodium		100	6010C
Thallium		2	6010C
Vanadium		10	6010C
Zinc		10	6010C

11-IN
LINEAR RANGES
METALS

Lab Name: TestAmerica St. Louis Job No: 160-29476-1

SDG No.:

Instrument ID: HAA2 Date: 02/07/2018 11:19

Analyte	Integ. Time (Sec.)	Concentration (ug/L)	Method
Mercury		10	7470A

12-IN
PREPARATION LOG
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Prep Method: 3010A

Lab Sample ID	Preparation Date	Prep Batch	Initial Weight	Initial Volume (mL)	Final Volume (mL)
MB 160-379537/1-A	07/31/2018 19:39	379537		50	50
LCS 160-379537/2-A	07/31/2018 19:39	379537		50	50
160-29476-1	07/31/2018 19:39	379537		50	50
160-29476-1 MS	07/31/2018 19:39	379537		50	50
160-29476-1 MSD	07/31/2018 19:39	379537		50	50

12-IN
PREPARATION LOG
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Prep Method: 7470A

Lab Sample ID	Preparation Date	Prep Batch	Initial Weight	Initial Volume (mL)	Final Volume (mL)
MB 160-375873/1-A	07/16/2018 11:20	375873		30	30
LCS 160-375873/2-A	07/16/2018 11:20	375873		30	30
160-29274-A-3-C MS	07/16/2018 11:20	375873		30	30
160-29274-A-3-D MSD	07/16/2018 11:20	375873		30	30
160-29476-1	07/16/2018 11:20	375873		30	30

13-IN
ANALYSIS RUN LOG
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Instrument ID: ICP 6500 Duo Analysis Method: 6010C

Start Date: 08/06/2018 11:03 End Date: 08/06/2018 17:48

Lab Sample Id	D/F	Type	Time	Analytes																								
				As	Se																							
ICIS 160-380741/1	1		11:03	X	X																							
IC 160-380741/2			11:07	X	X																							
IC 160-380741/3			11:12	X	X																							
IC 160-380741/4			11:16	X	X																							
ICV 160-380741/5	1		11:21	X	X																							
ICB 160-380741/6	1		11:25	X	X																							
CRI 160-380741/7	1		11:30	X	X																							
ICSA 160-380741/8	1		11:34	X	X																							
ICSAB 160-380741/9	1		11:39	X	X																							
CCVL 160-380741/10	1		11:43	X	X																							
CCV 160-380741/11	1		11:48	X	X																							
CCB 160-380741/12	1		11:52	X	X																							
MB 160-379537/1-A	1	T	12:32	X	X																							
LCS 160-379537/2-A	1	T	12:37	X	X																							
160-29476-1	1	T	12:41	X	X																							
160-29476-1 SD	5	T	12:46	X	X																							
160-29476-1 MS	1	T	12:50	X	X																							
160-29476-1 MSD	1	T	12:55	X	X																							
ZZZZZZ			12:59																									
ZZZZZZ			13:04																									
ZZZZZZ			13:08																									
ZZZZZZ			13:13																									
CCVL 160-380741/23	1		13:18	X	X																							
CCV 160-380741/24	1		13:23	X	X																							
CCB 160-380741/25	1		13:27	X	X																							
ZZZZZZ			13:32																									
ZZZZZZ			13:36																									
ZZZZZZ			13:41																									
ZZZZZZ			13:46																									
ZZZZZZ			13:51																									
ZZZZZZ			13:55																									
ZZZZZZ			14:00																									
ZZZZZZ			14:05																									
ZZZZZZ			14:09																									
ZZZZZZ			14:14																									
CCVL 160-380741/36			14:18																									
CCV 160-380741/37			14:23																									
CCB 160-380741/38			14:27																									
ZZZZZZ			14:32																									
ZZZZZZ			14:37																									
ZZZZZZ			14:42																									
ZZZZZZ			14:46																									

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Instrument ID: ICP 6500 Duo Analysis Method: 6010C

Start Date: 08/06/2018 11:03 End Date: 08/06/2018 17:48

Lab Sample Id	D/F	Type	Time	Analytes																								
				As	Se																							
ZZZZZZ			14:51																									
ZZZZZZ			14:56																									
ZZZZZZ			15:00																									
ZZZZZZ			15:05																									
ZZZZZZ			15:09																									
ZZZZZZ			15:14																									
CCVL 160-380741/49			15:19																									
CCV 160-380741/50			15:23																									
CCB 160-380741/51			15:28																									
ZZZZZZ			15:32																									
ZZZZZZ			15:37																									
ZZZZZZ			15:42																									
ZZZZZZ			15:47																									
ZZZZZZ			15:52																									
ZZZZZZ			15:56																									
ZZZZZZ			16:01																									
ZZZZZZ			16:05																									
ZZZZZZ			16:10																									
ZZZZZZ			16:15																									
CCVL 160-380741/62			16:20																									
CCV 160-380741/63			16:24																									
CCB 160-380741/64			16:29																									
ZZZZZZ			16:34																									
LRC 160-380741/66			16:38																									
ZZZZZZ			16:43																									
ZZZZZZ			16:48																									
ZZZZZZ			16:52																									
ZZZZZZ			16:57																									
ZZZZZZ			17:02																									
ZZZZZZ			17:06																									
ZZZZZZ			17:11																									
ZZZZZZ			17:15																									
CCVL 160-380741/75			17:20																									
CCV 160-380741/76			17:25																									
CCB 160-380741/77			17:29																									
ZZZZZZ			17:34																									
CCVL 160-380741/79			17:39																									
CCV 160-380741/80			17:44																									
CCB 160-380741/81			17:48																									

Prep Types:
T = Total/NA

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Instrument ID: ICP6500 Analysis Method: 6010C

Start Date: 08/02/2018 15:06 End Date: 08/02/2018 20:07

Lab Sample Id	D/F	Type	Time	Analytes																									
				Ag	Al	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	K	Mg	Mn	Na	Ni	Pb	Sb	Tl	V	Zn							
ICIS 160-380117/1	1		15:06	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
IC 160-380117/2			15:10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
IC 160-380117/3			15:15	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
IC 160-380117/4			15:19	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
ICV 160-380117/5	1		15:24	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
ICB 160-380117/6	1		15:28	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
CRI 160-380117/7	1		15:32	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
ICSA 160-380117/8	1		15:37	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
ICSAB 160-380117/9	1		15:42	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
ZZZZZZ			15:46																										
ZZZZZZ			15:50																										
ZZZZZZ			15:55																										
ZZZZZZ			16:01																										
CCVL 160-380117/14	1		16:06	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
CCV 160-380117/15	1		16:11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
CCB 160-380117/16	1		16:15	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
ZZZZZZ			16:51																										
ZZZZZZ			16:56																										
ZZZZZZ			17:00																										
ZZZZZZ			17:05																										
ZZZZZZ			17:09																										
ZZZZZZ			17:14																										
ZZZZZZ			17:19																										
MB 160-379537/1-A	1	T	17:23	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
LCS 160-379537/2-A	1	T	17:28	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
160-29476-1	1	T	17:32	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
CCVL 160-380117/27	1		17:37	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
CCV 160-380117/28	1		17:41	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
CCB 160-380117/29	1		17:46	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
160-29476-1 SD	5	T	17:50	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
160-29476-1 MS	1	T	17:55	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
160-29476-1 MSD	1	T	17:59	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
ZZZZZZ			18:04																										
ZZZZZZ			18:08																										
ZZZZZZ			18:13																										
ZZZZZZ			18:17																										
ZZZZZZ			18:22																										
ZZZZZZ			18:26																										
ZZZZZZ			18:31																										
CCVL 160-380117/40	1		18:36	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
CCV 160-380117/41	1		18:40	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
CCB 160-380117/42	1		18:44	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Instrument ID: ICP6500 Analysis Method: 6010C

Start Date: 08/02/2018 15:06 End Date: 08/02/2018 20:07

Lab Sample Id	D/F	Type	Time	Analytes																											
				Ag	Al	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	K	Mg	Mn	Na	Ni	Pb	Sb	Tl	V	Zn								
ZZZZZZ			18:49																												
ZZZZZZ			18:54																												
ZZZZZZ			18:58																												
ZZZZZZ			19:03																												
ZZZZZZ			19:07																												
ZZZZZZ			19:12																												
ZZZZZZ			19:16																												
ZZZZZZ			19:21																												
ZZZZZZ			19:26																												
ZZZZZZ			19:30																												
CCVL 160-380117/53			19:35																												
CCV 160-380117/54			19:40																												
CCB 160-380117/55			19:44																												
ZZZZZZ			19:48																												
ZZZZZZ			19:53																												
CCVL 160-380117/58			19:58																												
CCV 160-380117/59			20:02																												
CCB 160-380117/60			20:07																												

Prep Types:
T = Total/NA

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Instrument ID: HAA2 Analysis Method: 7470A

Start Date: 07/17/2018 13:37 End Date: 07/18/2018 07:09

Lab Sample Id	D/F	Type	Time	Analytes
				Hg
IC 160-376379/1			13:37	X
IC 160-376379/2			13:39	X
IC 160-376379/3			13:41	X
IC 160-376379/4			13:43	X
IC 160-376379/5			13:45	X
IC 160-376379/6			13:47	X
ICV 160-376379/7	1		13:50	X
ICB 160-376379/8	1		13:53	X
MB 160-375873/1-A	1	T	13:55	X
LCS 160-375873/2-A	1	T	13:57	X
ZZZZZZ			13:59	
ZZZZZZ			14:02	
ZZZZZZ			14:04	
160-29274-A-3-B SD	5	T	14:06	X
160-29274-A-3-C MS	1	T	14:07	X
160-29274-A-3-D MSD	1	T	14:09	X
160-29476-1	1	T	14:12	X
ZZZZZZ			14:15	
CCV 160-376379/19	1		14:17	X
CCB 160-376379/20	1		14:18	X
ZZZZZZ			14:21	
ZZZZZZ			14:23	
ZZZZZZ			14:25	
ZZZZZZ			14:27	
ZZZZZZ			14:29	
ZZZZZZ			14:32	
ZZZZZZ			14:34	
ZZZZZZ			14:36	
ZZZZZZ			14:38	
ZZZZZZ			14:40	
CCV 160-376379/31			14:41	
CCB 160-376379/32			14:43	
ZZZZZZ			14:46	
ZZZZZZ			14:48	
ZZZZZZ			14:50	
ZZZZZZ			14:52	
ZZZZZZ			14:54	
ZZZZZZ			14:56	
ZZZZZZ			14:58	
ZZZZZZ			15:00	
ZZZZZZ			15:02	
ZZZZZZ			15:03	

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Instrument ID: HAA2 Analysis Method: 7470A

Start Date: 07/17/2018 13:37 End Date: 07/18/2018 07:09

Lab Sample Id	D/F	Type	Time	Analytes																								
				Hg																								
CCV 160-376379/43			15:05																									
CCB 160-376379/44			15:07																									
CCV 160-376379/45			15:10																									
CCB 160-376379/46			15:12																									
CCV 160-376379/47			06:56																									
CCB 160-376379/48			06:59																									
ZZZZZZ			07:05																									
CCV 160-376379/50			07:07																									
CCB 160-376379/51			07:09																									

Prep Types:
T = Total/NA

FORM XIII-IN

15-IN
ICP INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

ICP Instrument ID: ICP 6500 Duo Start Date: 08/06/2018 End Date: 08/06/2018

Lab Sample ID	Time	Internal Standards %RI For:									
		Element Y 224.306	Q	Element Y 360.073	Q	Element	Q	Element	Q	Element	Q
ICIS 160-380741/1	11:03										
ICV 160-380741/5	11:21	95		96							
ICB 160-380741/6	11:25	99		98							
CRI 160-380741/7	11:30	99		101							
ICSA 160-380741/8	11:34	94		92							
ICSAB 160-380741/9	11:39	95		93							
CCVL 160-380741/10	11:43	99		98							
CCV 160-380741/11	11:48	93		93							
CCB 160-380741/12	11:52	100		101							
MB 160-379537/1-A	12:32	95		98							
LCS 160-379537/2-A	12:37	96		96							
160-29476-1	12:41	96		96							
160-29476-1 SD	12:46	100		99							
160-29476-1 MS	12:50	97		96							
160-29476-1 MSD	12:55	96		95							
CCVL 160-380741/23	13:18	97		98							
CCV 160-380741/24	13:23	91		93							
CCB 160-380741/25	13:27	99		98							

15-IN
ICP INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
METALS

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

ICP Instrument ID: ICP6500 Start Date: 08/02/2018 End Date: 08/02/2018

Lab Sample ID	Time	Internal Standards %RI For:									
		Element Y 224.306	Q	Element Y 360.073	Q	Element	Q	Element	Q	Element	Q
ICIS 160-380117/1	15:06										
ICV 160-380117/5	15:24	95		95							
ICB 160-380117/6	15:28	99		99							
CRI 160-380117/7	15:32	98		100							
ICSA 160-380117/8	15:37	93		93							
ICSAB 160-380117/9	15:42	96		94							
CCVL 160-380117/14	16:06	98		96							
CCV 160-380117/15	16:11	94		94							
CCB 160-380117/16	16:15	98		101							
MB 160-379537/1-A	17:23	101		103							
LCS 160-379537/2-A	17:28	95		96							
160-29476-1	17:32	101		101							
CCVL 160-380117/27	17:37	100		97							
CCV 160-380117/28	17:41	94		98							
CCB 160-380117/29	17:46	101		100							
160-29476-1 SD	17:50	102		102							
160-29476-1 MS	17:55	99		99							
160-29476-1 MSD	17:59	99		96							
CCVL 160-380117/40	18:36	101		101							
CCV 160-380117/41	18:40	93		92							
CCB 160-380117/42	18:44	101		102							

METALS BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Batch Number: 379537 Batch Start Date: 07/31/18 19:39 Batch Analyst: Mazariegos, Leonel A

Batch Method: 3010A Batch End Date: 08/01/18 08:30

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	MPREP1 00017	MPREP2 00015	AnalysisComment	
MB 160-379537/1		3010A, 6010C		50 mL	50 mL				
LCS 160-379537/2		3010A, 6010C		50 mL	50 mL	0.25 mL	0.25 mL		
160-29476-L-1	CRC-MW-1	3010A, 6010C	T	50 mL	50 mL			Samples may be high in Activity	
160-29476-L-1 MS	CRC-MW-1	3010A, 6010C	T	50 mL	50 mL	0.25 mL	0.25 mL	Samples may be high in Activity	
160-29476-L-1 MSD	CRC-MW-1	3010A, 6010C	T	50 mL	50 mL	0.25 mL	0.25 mL	Samples may be high in Activity	

Batch Notes	
Balance ID	27150420
Batch Comment	Digestion started by LAM and completed by DAS
Temperature - Corrected - End	93.8 Degrees C
Temperature - Corrected - Start	93.8 Degrees C
Digestion End Time	08/01/2018 06:50
Digestion Start Time	07/31/2018 20:39
Digestion Unit ID	HOTBLOCK 3
Hydrochloric Acid ID	1510584
Nitric Acid ID	1510472
Pipette/Syringe/Dispenser ID	MET-11
Analyst ID - Spike Analyst	LAM
Sufficient Volume for Batch QC	YES
Thermometer ID	160612183, 160322360
Digestion Tube/Cup ID	306612-8166

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

METALS BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Batch Number: 375873 Batch Start Date: 07/16/18 11:20 Batch Analyst: Shinn, Daniel A

Batch Method: 7470A Batch End Date: 07/16/18 14:15

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	Hg QC Int. 00998			
MB 160-375873/1		7470A, 7470A		30 mL	30 mL				
LCS 160-375873/2		7470A, 7470A		30 mL	30 mL	1.5 mL			
160-29274-A-3 MS		7470A, 7470A	T	30 mL	30 mL	1.5 mL			
160-29274-A-3 MSD		7470A, 7470A	T	30 mL	30 mL	1.5 mL			
160-29476-L-1	CRC-MW-1	7470A, 7470A	T	30 mL	30 mL				

Batch Notes	
Temperature - Corrected - End	94.9 Deg. C
Temperature - Corrected - Start	96.2 Deg. C
Digestion End Time	07/16/2018 @ 14:15
Digestion Start Time	07/16/2018 @ 12:15
Digestion Unit ID	Hot Block HG1
Sulfuric Acid ID	1447931
Nitric Acid ID	1491915
Hydroxylamine ID	1504316
Potassium Persulfate ID	1501574
Potassium Permanganate ID	1504315
Pipette/Syringe/Dispenser ID	MT002 Met-16 Met-10
Analyst ID - Spike Analyst	DAS
Sufficient Volume for Batch QC	yes
Thermometer ID	160322347
Digestion Tube/Cup ID	296900-4191 86

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Sample Name: CALBLK1 Acquired: 8/6/2018 11:03:08 Type: Cal
Method: _2016(v705) Mode: IR Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	**-.0032**	**.0024**	**.0005**	**-.0006**	**.0059**	**.0001**	**-.0007**	**.0026**	**.0009**
Stddev	.0001	.0009	.0001	.0008	.0031	.0007	.0006	.0003	.0002
%RSD	3.688	38.80	17.92	147.8	52.70	982.1	81.62	10.25	17.87
#1	-.0030	.0013	.0004	-.0002	.0057	.0007	-.0007	.0023	.0007
#2	-.0033	.0029	.0005	.0001	.0030	.0002	-.0013	.0027	.0010
#3	-.0032	.0029	.0006	-.0015	.0092	-.0007	-.0001	.0028	.0010

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	**.0019**	**.0001**	**-.0007**	**-.0000**	**.0155**	**.0186**	**-.0009**	**-.0003**	**-.0003**
Stddev	.0002	.0001	.0003	.0002	.0020	.0025	.0005	.0003	.0003
%RSD	9.182	95.13	44.60	1774.	12.92	13.63	51.74	110.3	106.1
#1	.0018	.0002	-.0004	-.0000	.0132	.0188	-.0004	-.0001	-.0006
#2	.0021	.0001	-.0010	-.0002	.0165	.0159	-.0014	-.0001	.0001
#3	.0019	-.0000	-.0007	.0002	.0169	.0210	-.0009	-.0007	-.0005

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	**.0407**	**.0001**	**-.0170**	**.0004**	**-.0005**	**.0007**	**.0002**	**.0018**	**.0011**
Stddev	.0019	.0002	.0002	.0001	.0001	.0002	.0003	.0002	.0002
%RSD	4.754	291.9	1.378	27.96	16.54	32.25	141.7	13.20	16.99
#1	.0394	-.0002	-.0172	.0003	-.0005	.0009	.0003	.0017	.0010
#2	.0397	.0002	-.0168	.0005	-.0005	.0005	.0005	.0021	.0009
#3	.0429	.0002	-.0168	.0003	-.0006	.0006	-.0001	.0016	.0013

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	**-.0170**	**.0006**	**.0004**	**-.0008**	**.0059**	**.0009**	**-.0001**
Stddev	.0008	.0000	.0010	.0002	.0001	.0006	.0001
%RSD	4.414	6.235	281.0	19.73	1.716	64.62	127.2
#1	-.0176	.0007	.0010	-.0007	.0060	.0004	-.0001
#2	-.0174	.0006	.0008	-.0010	.0059	.0015	-.0001
#3	-.0162	.0006	-.0008	-.0007	.0058	.0007	.0000

Sample Name: CALBLK1 Acquired: 8/6/2018 11:03:08 Type: Cal
Method: _2016(v705) Mode: IR Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3321.3	52910.	3782.3
Stddev	11.8	28.	47.3
%RSD	.35642	.05336	1.2507
#1	3315.5	52937.	3816.9
#2	3313.5	52881.	3801.5
#3	3334.9	52911.	3728.4

Sample Name: CAL 1 Acquired: 8/6/2018 11:07:50 Type: Cal
Method: _2016(v705) Mode: IR Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	-.0015	.0285	.0024	.0079	.3208	.0342	.0450	.4551	.0160
Stddev	.0000	.0015	.0002	.0005	.0019	.0007	.0002	.0008	.0001
%RSD	1.863	5.159	9.890	6.873	.5999	2.029	.4514	.1669	.8352
#1	-.0015	.0297	.0024	.0073	.3191	.0350	.0449	.4548	.0161
#2	-.0015	.0289	.0026	.0081	.3205	.0338	.0452	.4545	.0158
#3	-.0015	.0268	.0022	.0083	.3229	.0337	.0449	.4559	.0160

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	.0457	.0123	.0037	.0146	.2344	.0785	.0145	.0128	.0335
Stddev	.0002	.0000	.0001	.0005	.0011	.0003	.0003	.0003	.0003
%RSD	.5267	.3274	3.233	3.467	.4876	.4018	1.764	2.693	.9675
#1	.0459	.0122	.0036	.0141	.2332	.0782	.0147	.0124	.0338
#2	.0456	.0123	.0037	.0151	.2354	.0786	.0145	.0129	.0332
#3	.0454	.0123	.0038	.0147	.2347	.0788	.0142	.0130	.0336

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	.1840	.0667	.0265	.0036	.4421	.0027	.0018	.0261	.0299
Stddev	.0021	.0002	.0001	.0002	.0010	.0002	.0004	.0003	.0000
%RSD	1.127	.2352	.4524	5.962	.2158	6.848	19.55	1.237	.0814
#1	.1827	.0668	.0264	.0034	.4419	.0029	.0021	.0259	.0299
#2	.1830	.0665	.0266	.0036	.4412	.0025	.0020	.0265	.0299
#3	.1864	.0668	.0266	.0038	.4431	.0027	.0014	.0260	.0299

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	.0362	.0033	.0132	.0031	.0112	.0094	.0571
Stddev	.0012	.0000	.0007	.0002	.0000	.0001	.0003
%RSD	3.389	1.371	5.546	5.024	.2194	1.206	.4743
#1	.0371	.0033	.0134	.0031	.0112	.0093	.0571
#2	.0348	.0033	.0124	.0029	.0112	.0093	.0574
#3	.0367	.0034	.0138	.0032	.0112	.0095	.0568

Sample Name: CAL 1 Acquired: 8/6/2018 11:07:50 Type: Cal
Method: _2016(v705) Mode: IR Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3391.1	53775.	3833.2
Stddev	10.2	153.	31.6
%RSD	.29979	.28437	.82569
#1	3400.0	53835.	3863.3
#2	3393.4	53601.	3800.2
#3	3380.0	53888.	3836.1

Sample Name: Cal 2 Acquired: 8/6/2018 11:12:34 Type: Cal
Method: _2016(v705) Mode: IR Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	**.1602**	**6.214**	**.9131**	**.0842**	**31.75**	**34.76**	**1.119**	**22.38**	**15.37**
Stddev	.0002	.024	.0023	.0006	.09	.09	.004	.07	.04
%RSD	.1068	.3905	.2545	.6623	.2853	.2646	.3256	.2998	.2782
#1	.1604	6.191	.9142	.0835	31.67	34.69	1.122	22.41	15.39
#2	.1600	6.210	.9148	.0844	31.74	34.72	1.118	22.43	15.39
#3	.1603	6.240	.9105	.0846	31.85	34.87	1.115	22.31	15.32

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	**4.285**	**6.016**	**.9078**	**7.237**	**2.269**	**6.191**	**.7581**	**4.418**	**.8636**
Stddev	.012	.015	.0030	.019	.010	.021	.0056	.012	.0023
%RSD	.2755	.2537	.3316	.2573	.4297	.3367	.7401	.2609	.2702
#1	4.289	6.026	.9096	7.219	2.259	6.175	.7524	4.407	.8650
#2	4.295	6.023	.9094	7.236	2.273	6.184	.7584	4.417	.8649
#3	4.272	5.998	.9043	7.256	2.277	6.215	.7636	4.430	.8609

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	**7.359**	**8.074**	**8.559**	**1.410**	**4.661**	**.2205**	**.1284**	**.3342**	**1.444**
Stddev	.024	.020	.022	.003	.011	.0012	.0007	.0011	.004
%RSD	.3201	.2430	.2602	.2190	.2373	.5456	.5526	.3265	.2592
#1	7.336	8.088	8.573	1.412	4.672	.2217	.1286	.3330	1.443
#2	7.358	8.084	8.572	1.412	4.662	.2206	.1290	.3350	1.448
#3	7.383	8.052	8.534	1.407	4.650	.2193	.1277	.3347	1.441

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	**53.43**	**.0705**	**3.222**	**.1869**	**.0644**	**.9008**	**14.09**
Stddev	.12	.0002	.007	.0009	.0003	.0031	.03
%RSD	.2177	.3010	.2109	.4800	.4622	.3459	.2307
#1	53.36	.0707	3.215	.1863	.0647	.8976	14.11
#2	53.36	.0705	3.221	.1879	.0641	.9010	14.11
#3	53.56	.0703	3.229	.1865	.0645	.9039	14.05

Sample Name: Cal 2 Acquired: 8/6/2018 11:12:34 Type: Cal
Method: _2016(v705) Mode: IR Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3161.7	50005.	3704.5
Stddev	6.2	212.	56.6
%RSD	.19757	.42344	1.5273
#1	3162.3	50245.	3768.1
#2	3155.2	49842.	3685.4
#3	3167.6	49929.	3659.9

Sample Name: Cal 3 Acquired: 8/6/2018 11:16:47 Type: Cal
Method: _2016(v705) Mode: IR Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	.3320	12.79	1.894	.1731	64.95	70.51	2.315	45.11	31.58
Stddev	.0008	.02	.006	.0005	.09	.04	.011	.19	.10
%RSD	.2447	.1847	.3061	.2673	.1352	.0633	.4728	.4125	.3118
#1	.3323	12.79	1.901	.1736	65.05	70.49	2.328	45.26	31.69
#2	.3327	12.77	1.890	.1730	64.90	70.47	2.309	44.90	31.50
#3	.3311	12.82	1.893	.1727	64.90	70.56	2.308	45.17	31.55

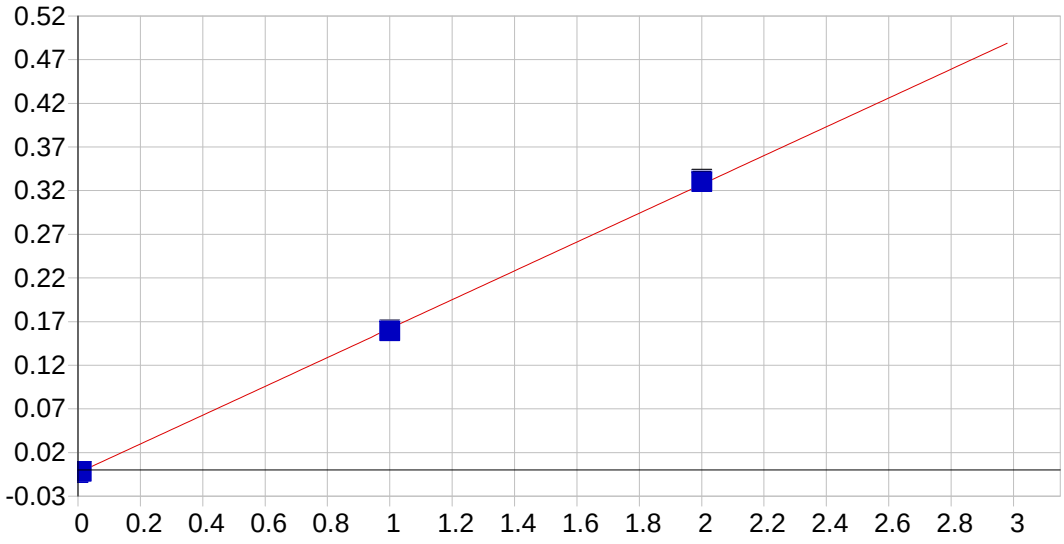
Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	8.742	12.38	1.883	14.70	4.661	12.72	1.553	9.054	1.788
Stddev	.025	.04	.006	.02	.005	.03	.006	.004	.006
%RSD	.2823	.3234	.3470	.1538	.1090	.2359	.3584	.0481	.3544
#1	8.766	12.42	1.889	14.70	4.665	12.74	1.555	9.055	1.795
#2	8.717	12.34	1.882	14.72	4.656	12.68	1.557	9.050	1.784
#3	8.743	12.37	1.876	14.67	4.662	12.73	1.546	9.059	1.785

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	15.05	16.41	16.90	2.850	9.656	.4574	.2655	.6824	2.940
Stddev	.01	.04	.05	.006	.016	.0020	.0018	.0009	.006
%RSD	.0852	.2255	.2827	.2196	.1646	.4333	.6896	.1334	.1989
#1	15.06	16.44	16.93	2.855	9.674	.4595	.2672	.6814	2.946
#2	15.04	16.37	16.84	2.843	9.644	.4570	.2636	.6832	2.934
#3	15.05	16.41	16.91	2.853	9.649	.4556	.2657	.6825	2.940

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	107.1	.1430	6.593	.3763	.1250	1.839	28.52
Stddev	.6	.0005	.010	.0004	.0004	.005	.08
%RSD	.5187	.3714	.1462	.1163	.3324	.2932	.2783
#1	106.7	.1428	6.592	.3768	.1248	1.835	28.60
#2	107.7	.1436	6.584	.3760	.1254	1.837	28.44
#3	106.9	.1425	6.603	.3762	.1247	1.845	28.51

Sample Name: Cal 3 Acquired: 8/6/2018 11:16:47 Type: Cal
Method: _2016(v705) Mode: IR Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**2943.8**	**48342.**	**3538.1**
Stddev	14.5	185.	43.3
%RSD	.49182	.38344	1.2246
#1	2943.9	48429.	3537.8
#2	2958.2	48129.	3494.9
#3	2929.3	48468.	3581.6

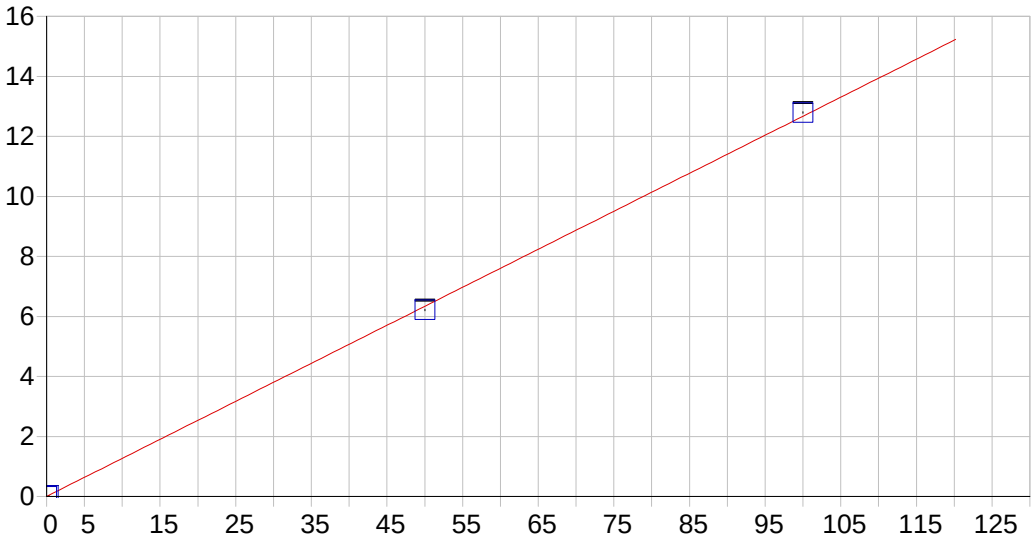


Ag 328.068 {103}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.003165	Re-Slope:	1.000000
A1 (Gain):	0.165121	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999923	Status:	OK.
Std Error of Est:	0.000016		
Predicted MDL:	0.000907		
Predicted MQL:	0.003025		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00317	.000	1
CAL 1	.01000	.00939	-.001	-6.15	-.00151	.000	1
Cal 2	1.0000	.98320	-.017	-1.68	.16023	.000	1
Cal 3	2.0000	2.0174	.017	.872	.33205	.001	1



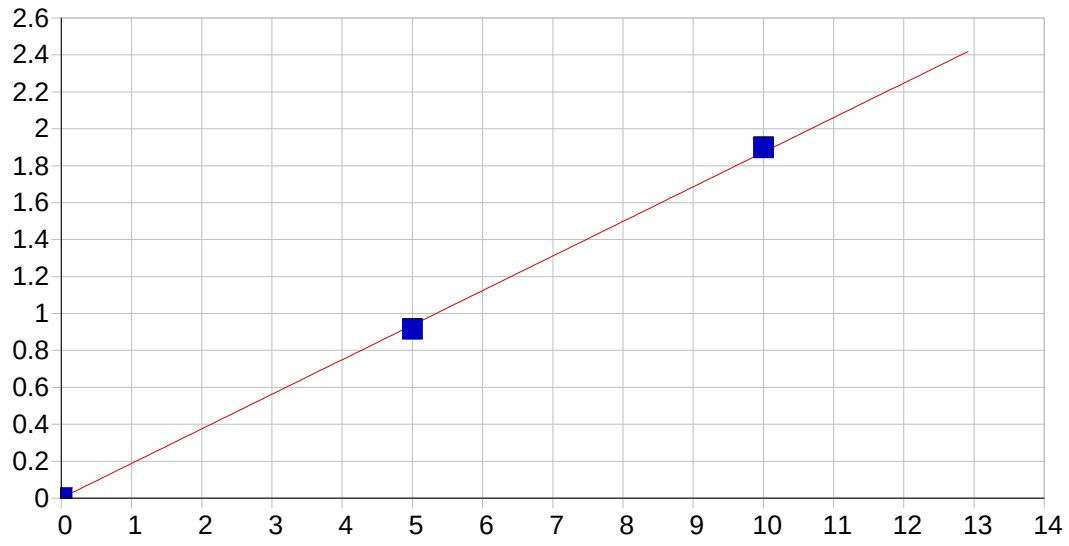
Al 396.152 { 85}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.002357	Re-Slope:	1.000000

A1 (Gain):	0.126685	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999906	Status:	OK.
Std Error of Est:	0.000426		
Predicted MDL:	0.015040		
Predicted MQL:	0.050133		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	-.00000	-.000	.000	.00236	.001	1
CAL 1	.20000	.20622	.006	3.11	.02848	.001	1
Cal 2	50.000	49.030	-.970	-1.94	6.2137	.024	1
Cal 3	100.00	100.96	.964	.964	12.793	.024	1

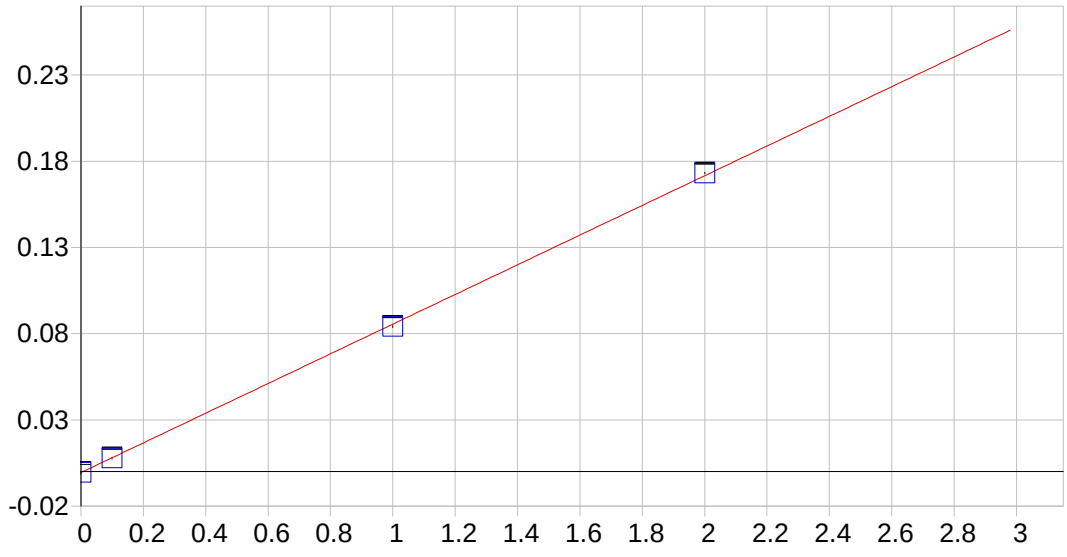


As 189.042 {478}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000513	Re-Slope:	1.000000
A1 (Gain):	0.187254	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999851	Status:	OK.
Std Error of Est:	0.000056		
Predicted MDL:	0.001426		
Predicted MQL:	0.004752		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	-.00000	-.000	.000	.00051	.000	1
CAL 1	.01000	.01015	.000	1.46	.00241	.000	1
Cal 2	5.0000	4.8778	-.122	-2.44	.91315	.002	1
Cal 3	10.000	10.122	.122	1.22	1.8944	.006	1

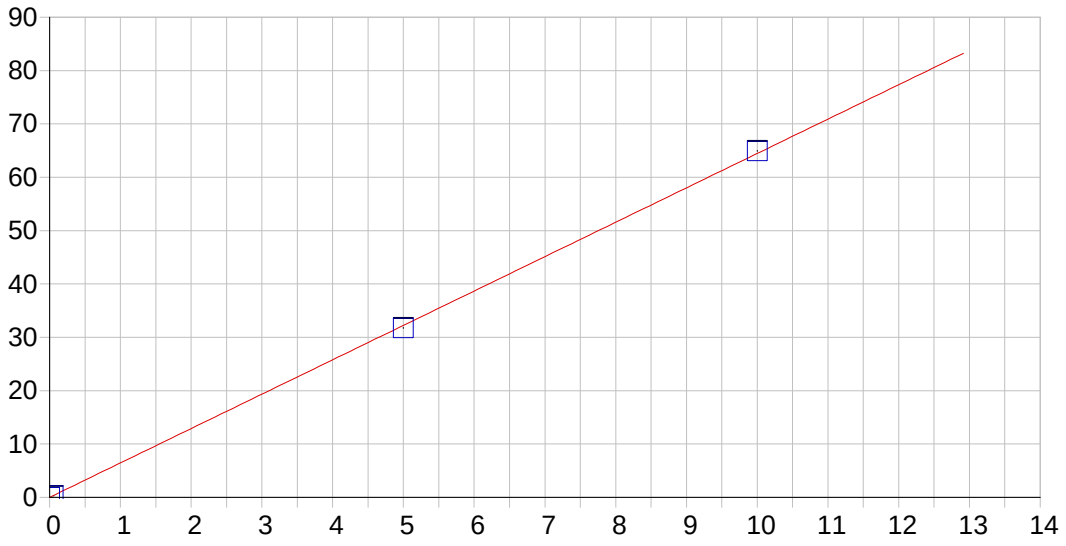


B 249.678 {135}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000555	Re-Slope:	1.000000
A1 (Gain):	0.086095	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999931	Status:	OK.
Std Error of Est:	0.000025		
Predicted MDL:	0.006586		
Predicted MQL:	0.021953		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00055	.001	1
CAL 1	.10000	.09840	-.002	-1.60	.00792	.001	1
Cal 2	1.0000	.98419	-.016	-1.58	.08418	.001	1
Cal 3	2.0000	2.0174	.017	.871	.17313	.000	1



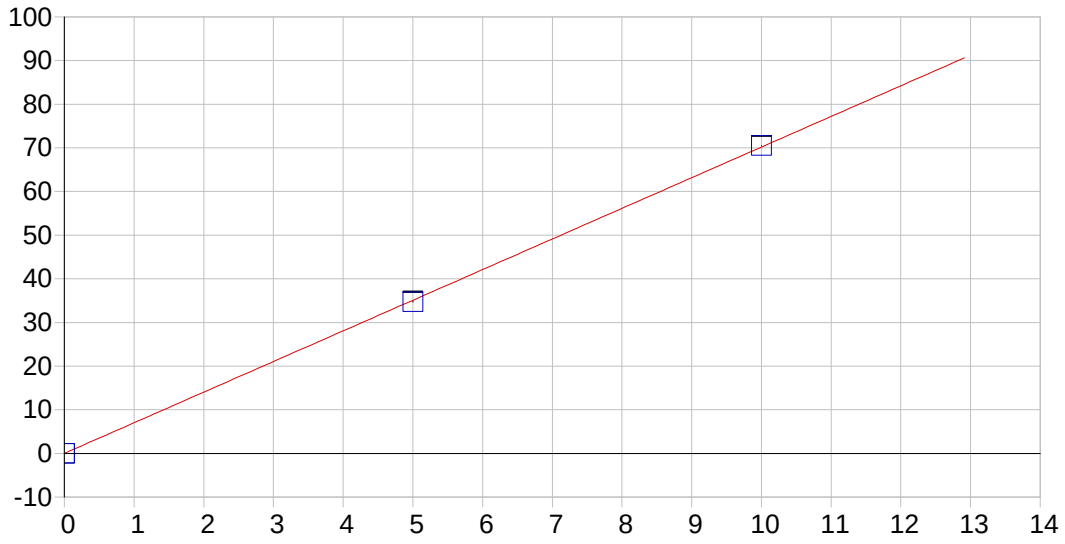
Ba 455.403 { 74}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.005929	Re-Slope:	1.000000
A1 (Gain):	6.445355	Y-int:	0.000000

A2 (Curvature):	0.000000						
n (Exponent):	1.000000						
Correlation:	0.999943			Status:	OK.		
Std Error of Est:	0.002677						
Predicted MDL:	0.000399						
Predicted MQL:	0.001330						

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00594	.003	1
CAL 1	.05000	.04885	-.001	-2.29	.32081	.002	1
Cal 2	5.0000	4.9251	-.075	-1.50	31.750	.091	1
Cal 3	10.000	10.076	.076	.761	64.950	.088	1

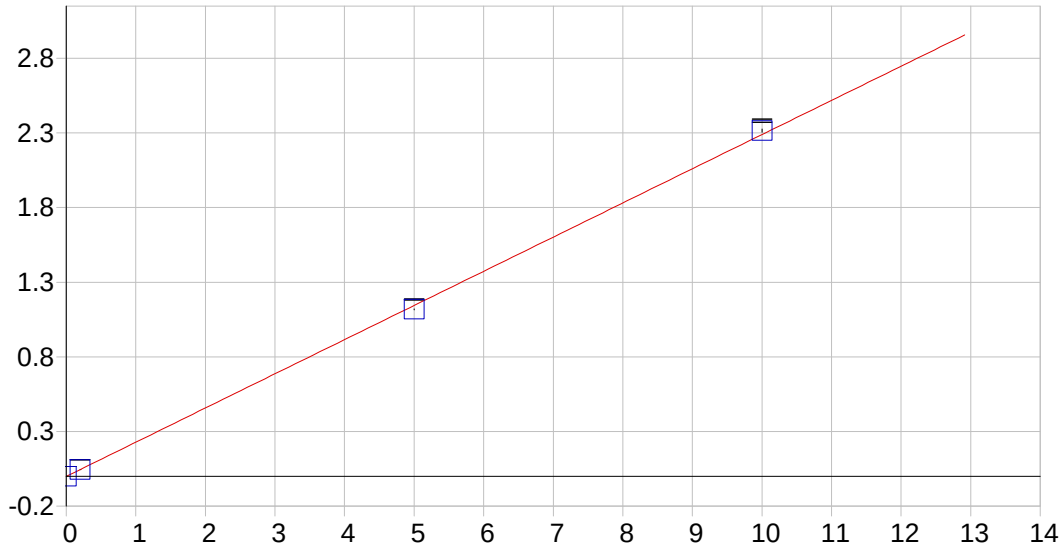


Be 313.042 {108}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000068	Re-Slope:	1.000000
A1 (Gain):	7.017910	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999978	Status:	OK.
Std Error of Est:	0.000571		
Predicted MDL:	0.000125		
Predicted MQL:	0.000417		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00007	.001	1
CAL 1	.00500	.00486	-.000	-2.76	.03419	.001	1
Cal 2	5.0000	4.9532	-.047	-.936	34.761	.092	1
Cal 3	10.000	10.047	.047	.469	70.509	.045	1

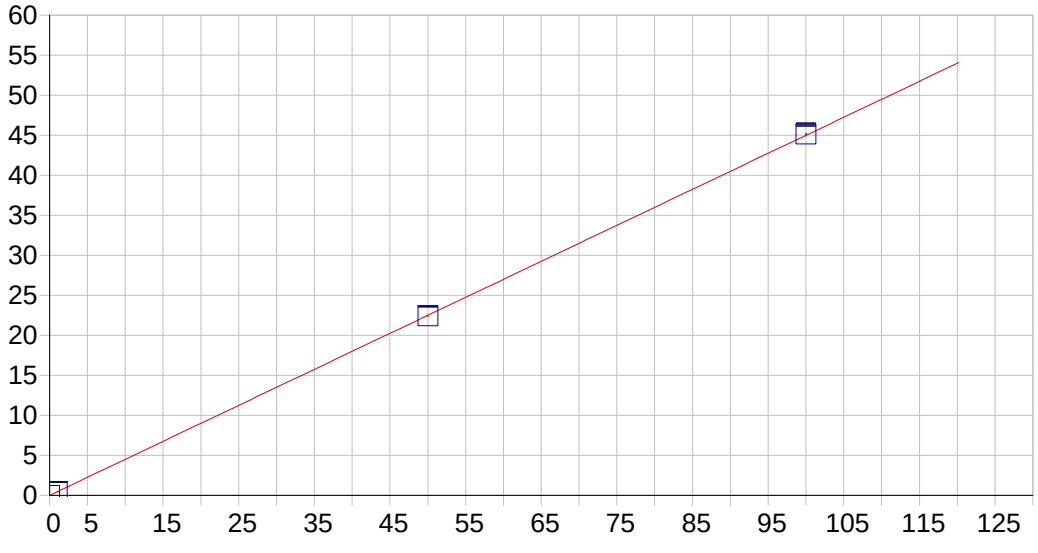


Bi 223.061 {451}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000696	Re-Slope:	1.000000
A1 (Gain):	0.228992	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999875	Status:	OK.
Std Error of Est:	0.000282		
Predicted MDL:	0.001973		
Predicted MQL:	0.006577		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00070	.001	1
CAL 1	.20000	.19955	-.000	-.224	.04500	.000	1
Cal 2	5.0000	4.8875	-.112	-2.25	1.1185	.004	1
Cal 3	10.000	10.113	.113	1.13	2.3151	.011	1



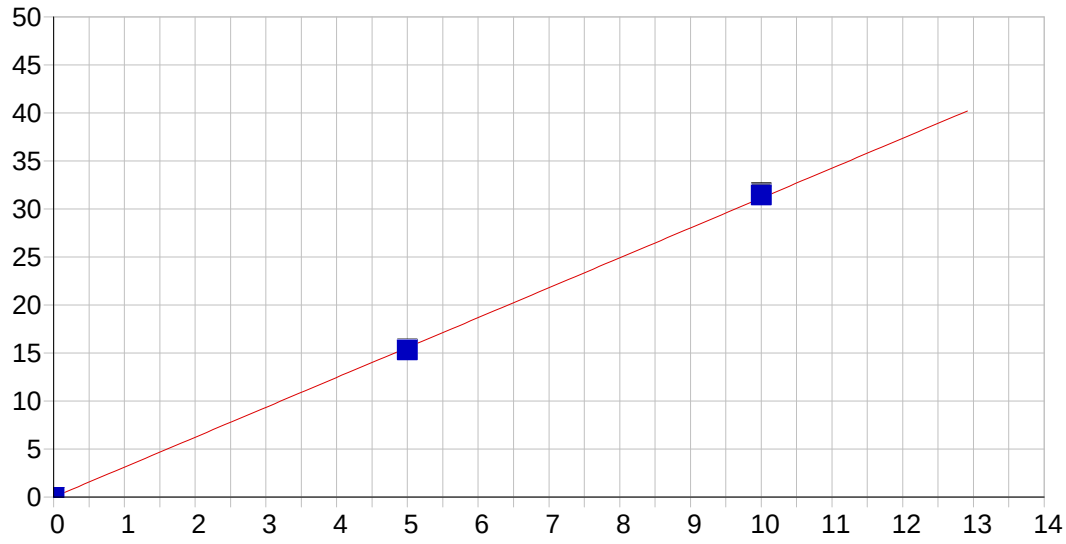
Ca 184.006 {483}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.002572	Re-Slope:	1.000000
A1 (Gain):	0.449922	Y-int:	0.000000

A2 (Curvature):	0.000000			
n (Exponent):	1.000000			
Correlation:	0.999993	Status:	OK.	
Std Error of Est:	0.000903			
Predicted MDL:	0.000575			
Predicted MQL:	0.001917			

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	-.00000	-.000	.000	.00257	.000	1
CAL 1	1.0000	1.0057	.006	.569	.45505	.001	1
Cal 2	50.000	49.741	-.259	-.518	22.382	.067	1
Cal 3	100.00	100.25	.253	.253	45.109	.186	1

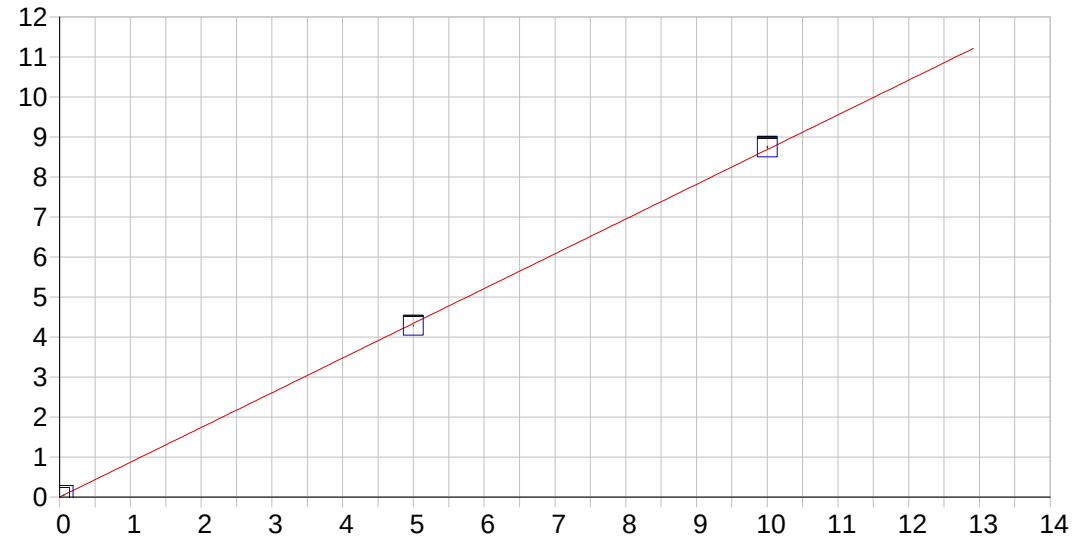


Cd 228.802 {447}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000900	Re-Slope:	1.000000
A1 (Gain):	3.113591	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999918	Status:	OK.
Std Error of Est:	0.000490		
Predicted MDL:	0.000154		
Predicted MQL:	0.000512		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00090	.000	1
CAL 1	.00500	.00479	-.000	-4.27	.01596	.000	1
Cal 2	5.0000	4.9093	-.091	-1.81	15.365	.043	1
Cal 3	10.000	10.091	.091	.909	31.577	.098	1

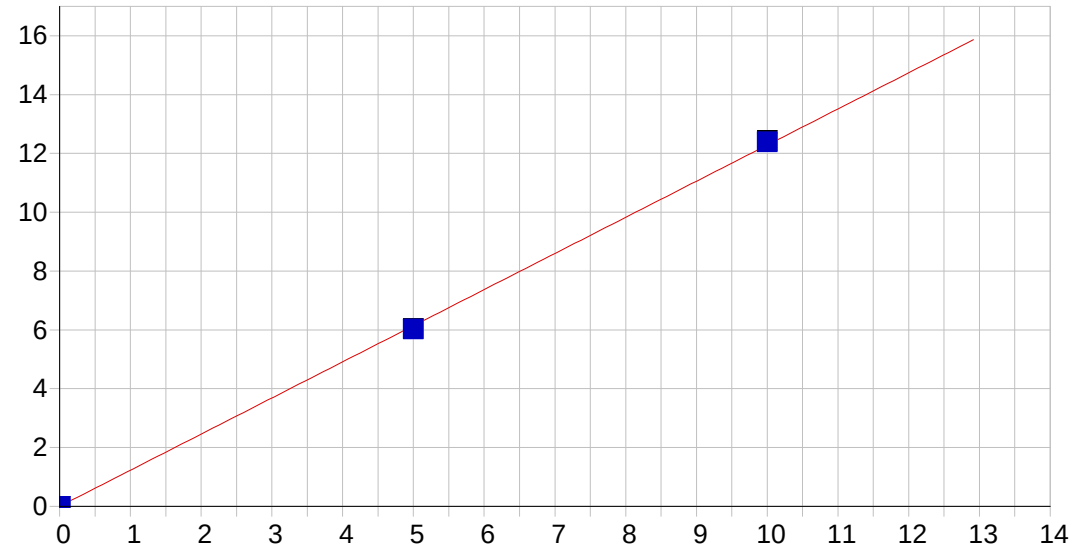


Co 228.616 {448}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.001912	Re-Slope:	1.000000
A1 (Gain):	0.868239	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999956	Status:	OK.
Std Error of Est:	0.000316		
Predicted MDL:	0.000373		
Predicted MQL:	0.001242		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	-.00000	-.000	.000	.00191	.000	1
CAL 1	.05000	.05039	.000	.783	.04566	.000	1
Cal 2	5.0000	4.9334	-.067	-1.33	4.2852	.012	1
Cal 3	10.000	10.066	.066	.662	8.7418	.025	1



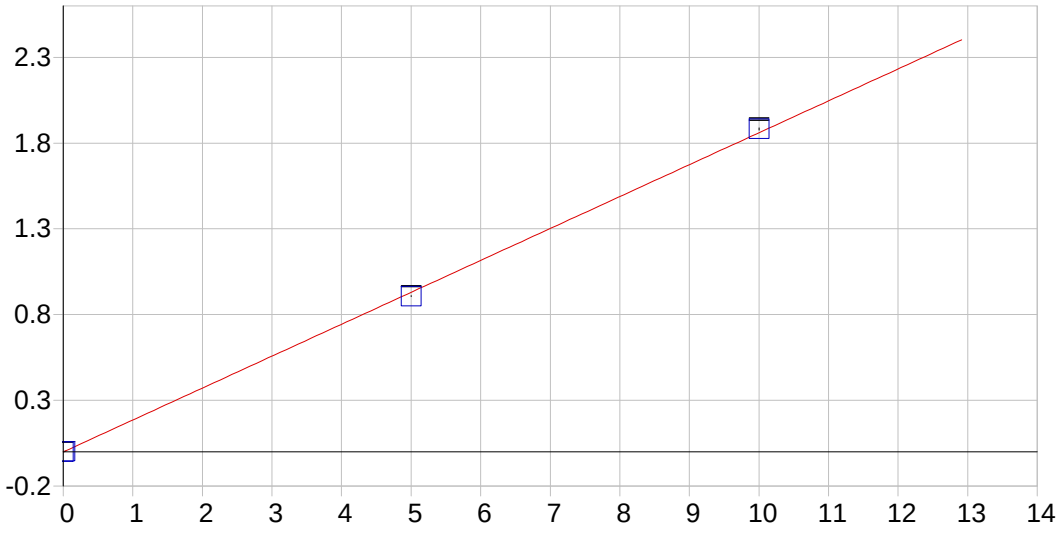
Cr 205.560 {464}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000094	Re-Slope:	1.000000
A1 (Gain):	1.228422	Y-int:	0.000000

A2 (Curvature):	0.000000						
n (Exponent):	1.000000						
Correlation:	0.999911			Status:	OK.		
Std Error of Est:	0.000283						
Predicted MDL:	0.000167						
Predicted MQL:	0.000556						

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00009	.000	1
CAL 1	.01000	.00991	-.000	-.875	.01226	.000	1
Cal 2	5.0000	4.9059	-.094	-1.88	6.0157	.015	1
Cal 3	10.000	10.094	.094	.942	12.378	.040	1

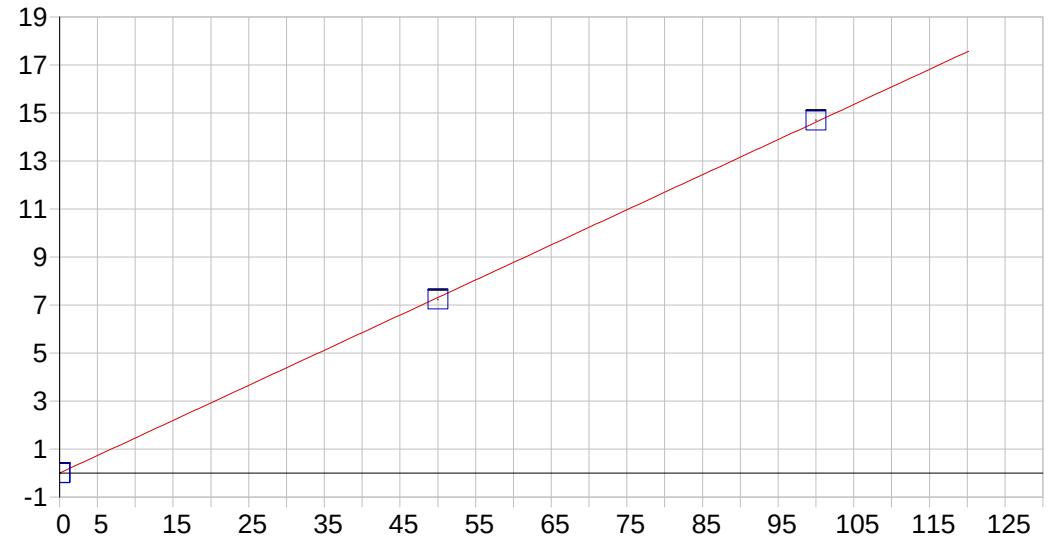


Cu 217.894 {455}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000704	Re-Slope:	1.000000
A1 (Gain):	0.186097	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999857	Status:	OK.
Std Error of Est:	0.000086		
Predicted MDL:	0.001989		
Predicted MQL:	0.006631		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00070	.000	1
CAL 1	.02500	.02357	-.001	-5.70	.00368	.000	1
Cal 2	5.0000	4.8819	-.118	-2.36	.90780	.003	1
Cal 3	10.000	10.120	.120	1.20	1.8825	.007	1

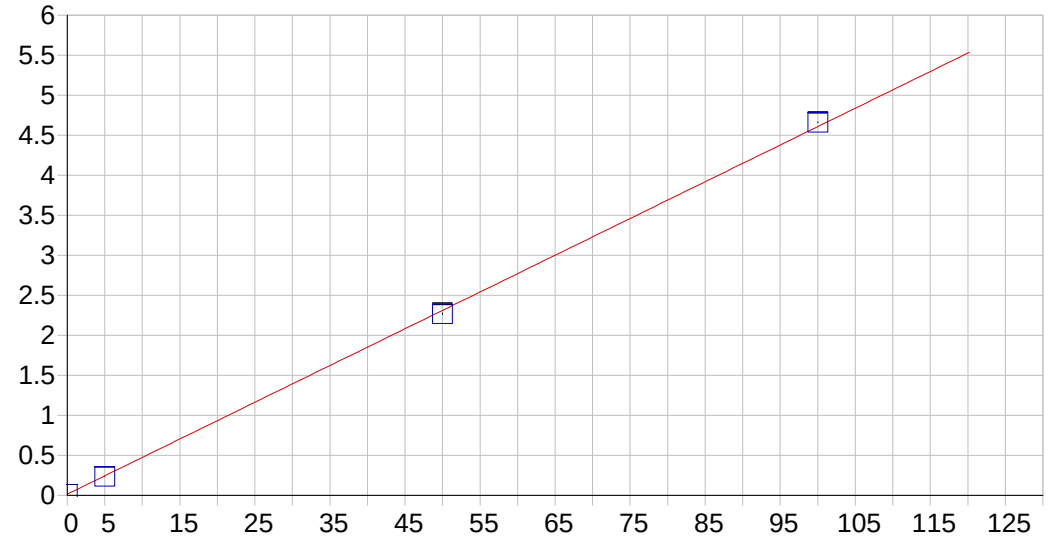


Fe 259.940 {130}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000012	Re-Slope:	1.000000
A1 (Gain):	0.146233	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999974	Status:	OK.
Std Error of Est:	0.000183		
Predicted MDL:	0.003832		
Predicted MQL:	0.012775		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00001	.000	1
CAL 1	.10000	.10009	.000	.087	.01462	.001	1
Cal 2	50.000	49.490	-.510	-1.02	7.2370	.019	1
Cal 3	100.00	100.51	.510	.510	14.698	.023	1



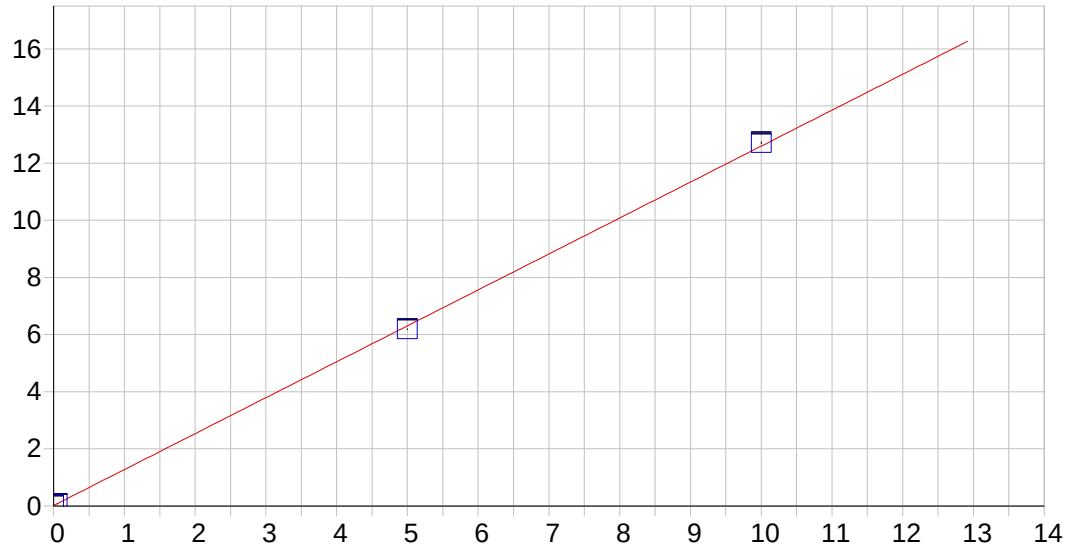
K 766.490 { 44}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.015528	Re-Slope:	1.000000
A1 (Gain):	0.045925	Y-int:	0.000000

A2 (Curvature):		0.000000					
n (Exponent):		1.000000					
Correlation:		0.999867		Status:	OK.		
Std Error of Est:		0.000932					
Predicted MDL:		0.059761					
Predicted MQL:		0.199203					

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00027	.000	.000	.01554	.002	1
CAL 1	5.0000	4.7664	-.234	-4.67	.23442	.001	1
Cal 2	50.000	49.079	-.921	-1.84	2.2695	.010	1
Cal 3	100.00	101.15	1.15	1.15	4.6611	.005	1

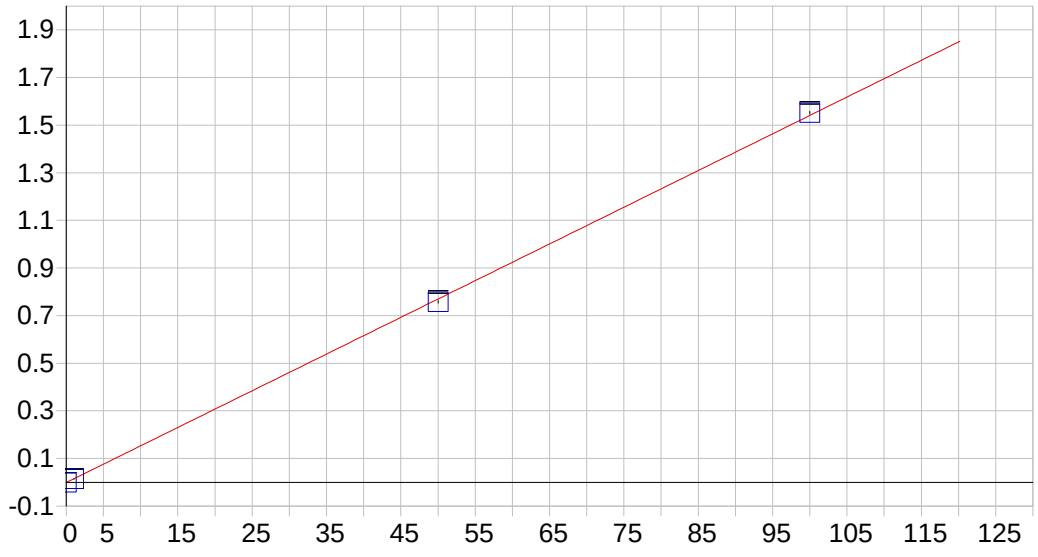


Li 670.784 { 50}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.018567	Re-Slope:	1.000000
A1 (Gain):	1.257942	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999909	Status:	OK.
Std Error of Est:	0.000659		
Predicted MDL:	0.002352		
Predicted MQL:	0.007841		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.01857	.003	1
CAL 1	.05000	.04768	-.002	-4.65	.07854	.000	1
Cal 2	5.0000	4.9069	-.093	-1.86	6.1912	.021	1
Cal 3	10.000	10.095	.095	.954	12.718	.030	1

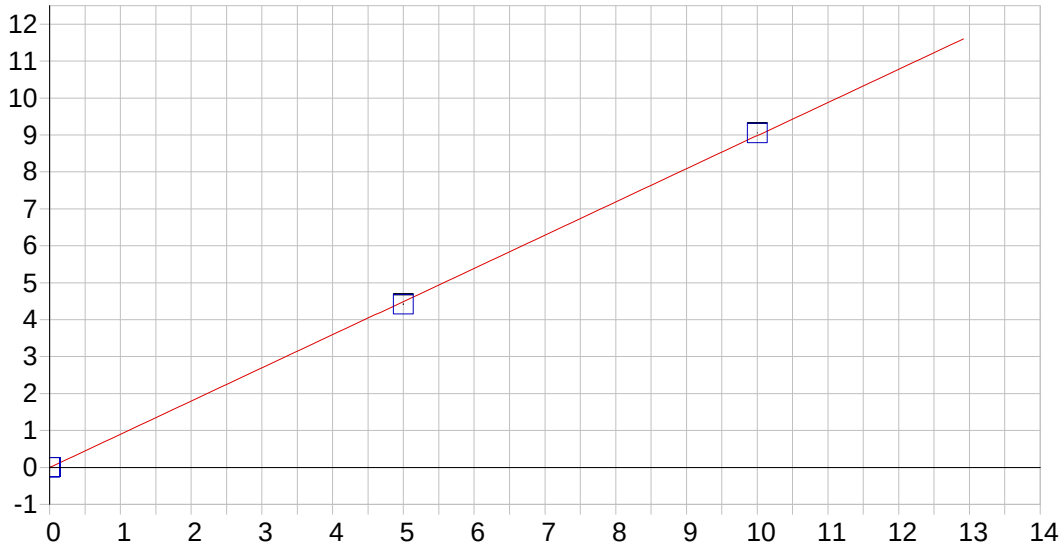


Mg 279.806 {121}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000896	Re-Slope:	1.000000
A1 (Gain):	0.015417	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999941	Status:	OK.
Std Error of Est:	0.000092		
Predicted MDL:	0.034788		
Predicted MQL:	0.115962		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00001	.000	.000	-.00090	.000	1
CAL 1	1.0000	.99708	-.003	-.292	.01448	.000	1
Cal 2	50.000	49.234	-.766	-1.53	.75814	.006	1
Cal 3	100.00	100.77	.769	.769	1.5527	.006	1



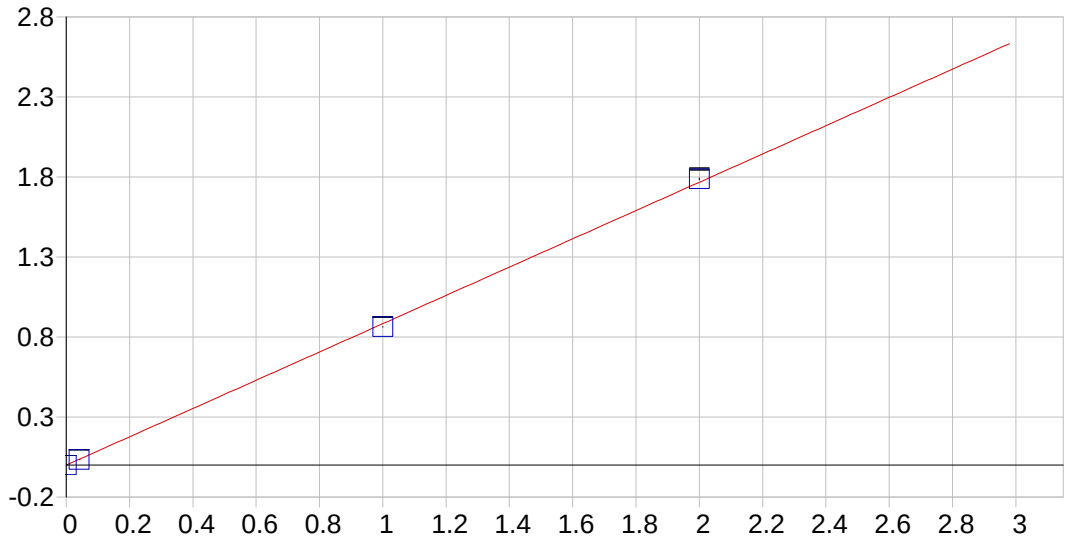
Mn 257.610 {131}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000303	Re-Slope:	1.000000
A1 (Gain):	0.898196	Y-int:	0.000000

A2 (Curvature):	0.000000						
n (Exponent):	1.000000						
Correlation:	0.999934			Status:	OK.		
Std Error of Est:	0.000218						
Predicted MDL:	0.000627						
Predicted MQL:	0.002089						

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00030	.000	1
CAL 1	.01500	.01455	-.000	-3.03	.01276	.000	1
Cal 2	5.0000	4.9194	-.081	-1.61	4.4183	.012	1
Cal 3	10.000	10.081	.081	.810	9.0544	.004	1

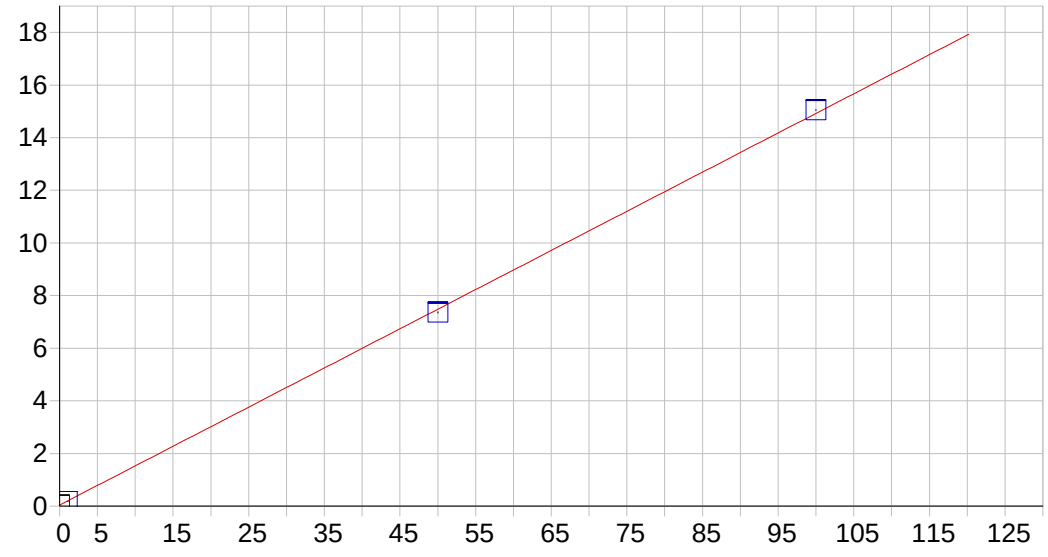


Mo 202.030 {467}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000324	Re-Slope:	1.000000
A1 (Gain):	0.883625	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999859	Status:	OK.
Std Error of Est:	0.000231		
Predicted MDL:	0.000344		
Predicted MQL:	0.001148		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00032	.000	1
CAL 1	.04000	.03832	-.002	-4.19	.03354	.000	1
Cal 2	1.0000	.97771	-.022	-2.23	.86360	.002	1
Cal 3	2.0000	2.0240	.024	1.20	1.7881	.006	1

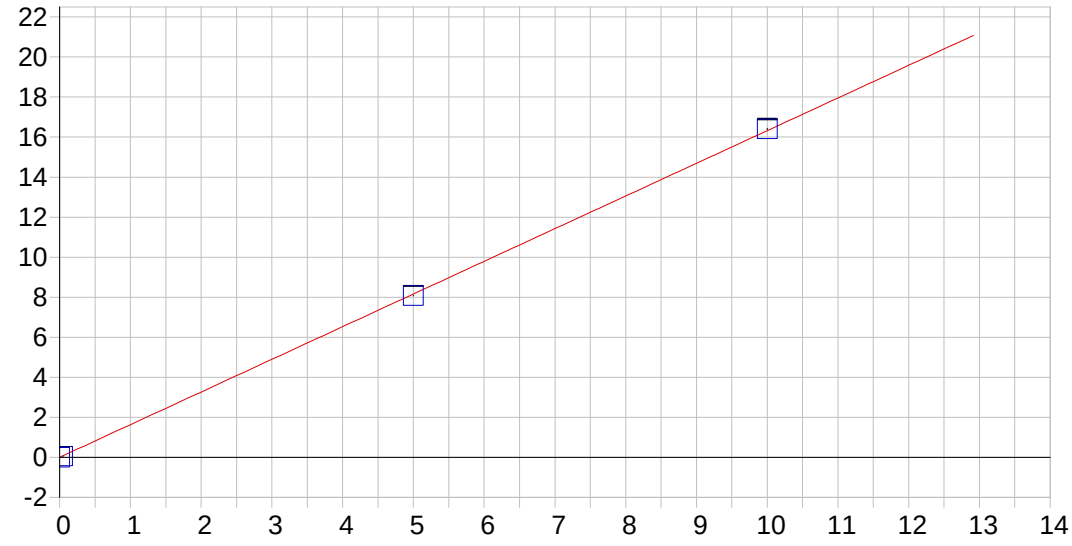


Na 589.592 { 57}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.040649	Re-Slope:	1.000000
A1 (Gain):	0.148832	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999925	Status:	OK.
Std Error of Est:	0.000999		
Predicted MDL:	0.017779		
Predicted MQL:	0.059263		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00004	.000	.000	.04066	.002	1
CAL 1	1.0000	.96349	-.037	-3.65	.18405	.002	1
Cal 2	50.000	49.172	-.828	-1.66	7.3590	.024	1
Cal 3	100.00	100.86	.865	.865	15.053	.013	1



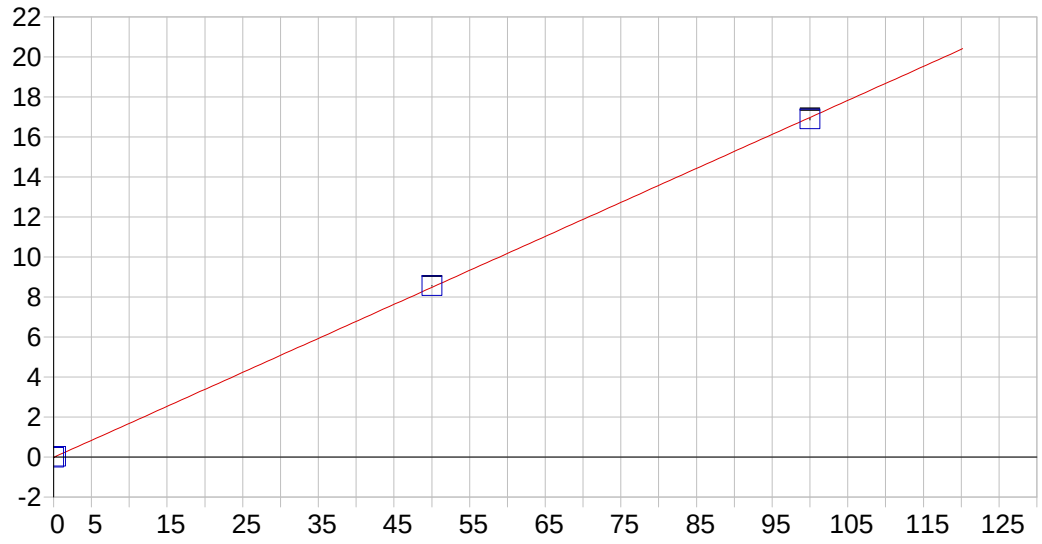
Ni 221.647 {452}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000076	Re-Slope:	1.000000
A1 (Gain):	1.632114	Y-int:	0.000000

A2 (Curvature):	0.000000						
n (Exponent):	1.000000						
Correlation:	0.999972			Status:	OK.		
Std Error of Est:	0.000424						
Predicted MDL:	0.000272						
Predicted MQL:	0.000906						

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	-.00000	-.000	.000	.00008	.000	1
CAL 1	.04000	.04081	.001	2.03	.06668	.000	1
Cal 2	5.0000	4.9472	-.053	-1.06	8.0745	.020	1
Cal 3	10.000	10.052	.052	.520	16.406	.037	1

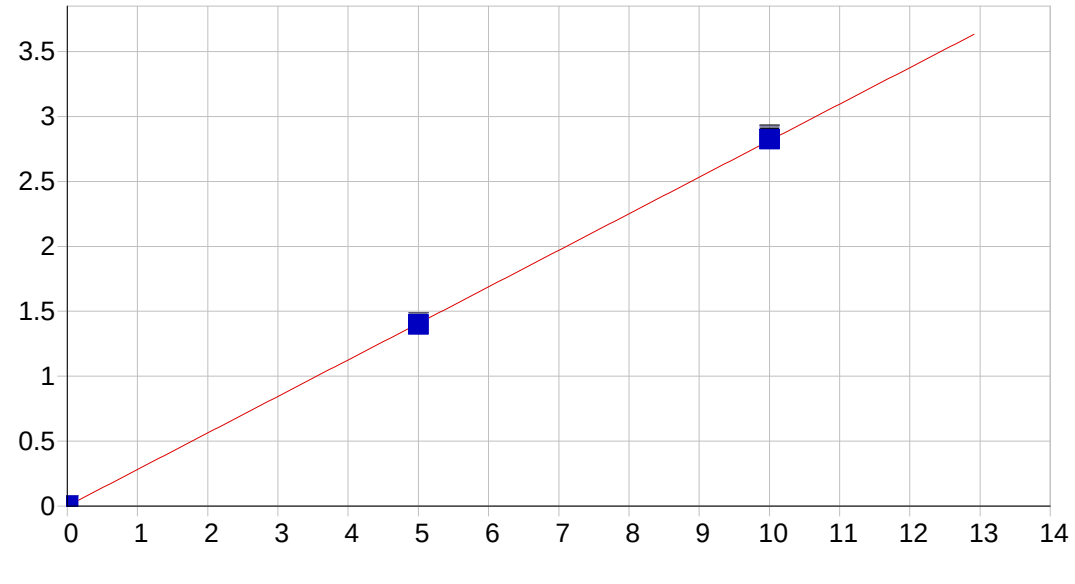


P 177.495 {490}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.016960	Re-Slope:	1.000000
A1 (Gain):	0.169935	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999977	Status:	OK.
Std Error of Est:	0.000313		
Predicted MDL:	0.001716		
Predicted MQL:	0.005720		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	-.00001	-.000	.000	-.01696	.000	1
CAL 1	.25000	.25587	.006	2.35	.02652	.000	1
Cal 2	50.000	50.468	.468	.936	8.5593	.022	1
Cal 3	100.00	99.526	-.474	-.474	16.896	.048	1

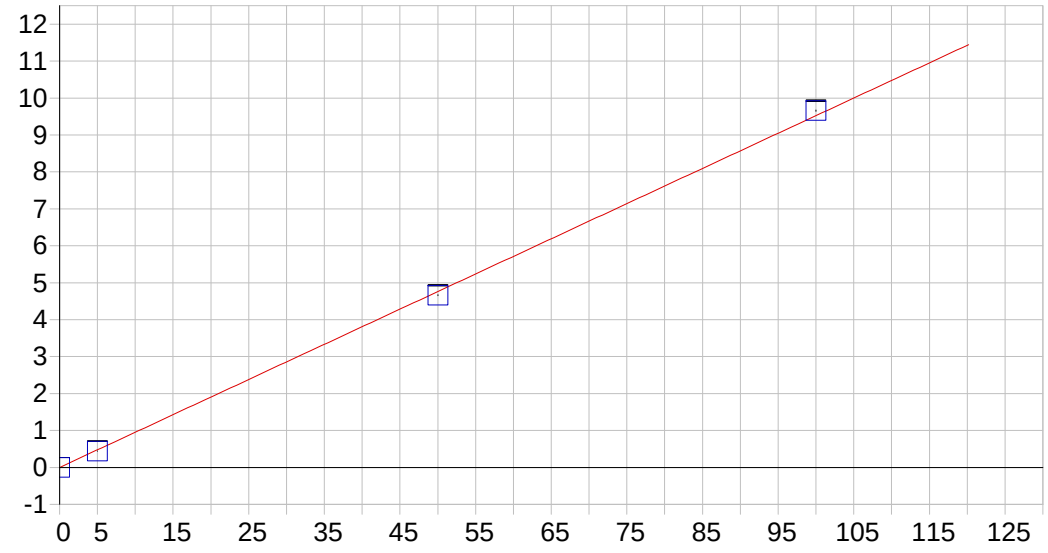


Pb 220.353 {453}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000394	Re-Slope:	1.000000
A1 (Gain):	0.281332	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999987	Status:	OK.
Std Error of Est:	0.000025		
Predicted MDL:	0.001243		
Predicted MQL:	0.004143		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00039	.000	1
CAL 1	.01000	.00995	-.000	-.450	.00361	.000	1
Cal 2	5.0000	4.9636	-.036	-.727	1.4101	.003	1
Cal 3	10.000	10.036	.036	.364	2.8505	.006	1



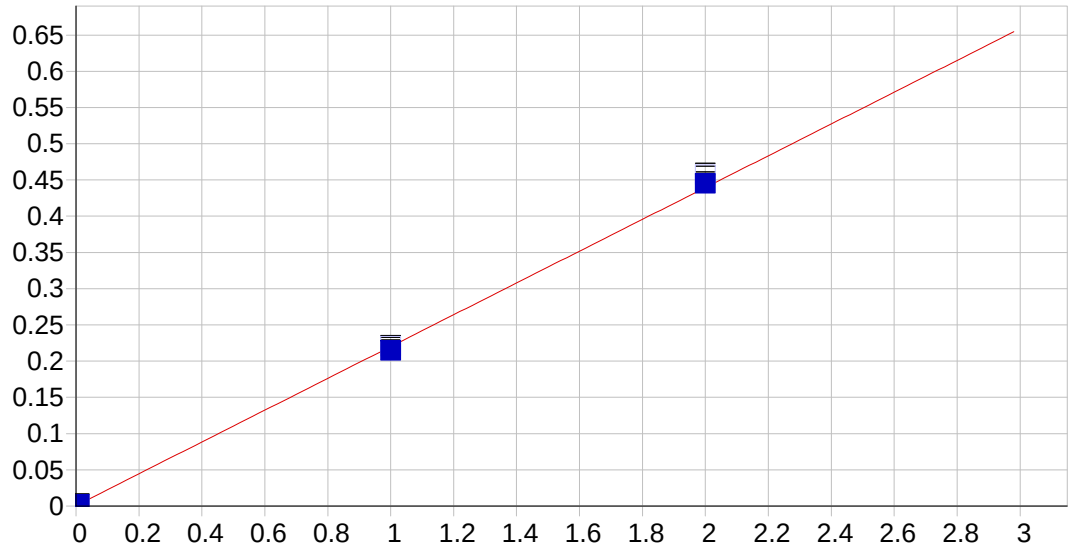
S 182.034 {485}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000571	Re-Slope:	1.000000
A1 (Gain):	0.095231	Y-int:	0.000000

A2 (Curvature):		0.000000					
n (Exponent):		1.000000					
Correlation:		0.999787		Status:	OK.		
Std Error of Est:		0.002448					
Predicted MDL:		0.002635					
Predicted MQL:		0.008782					

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00039	.000	.000	-.00053	.000	1
CAL 1	5.0000	4.6480	-.352	-7.04	.44206	.001	1
Cal 2	50.000	48.955	-1.05	-2.09	4.6615	.011	1
Cal 3	100.00	101.40	1.40	1.40	9.6556	.016	1

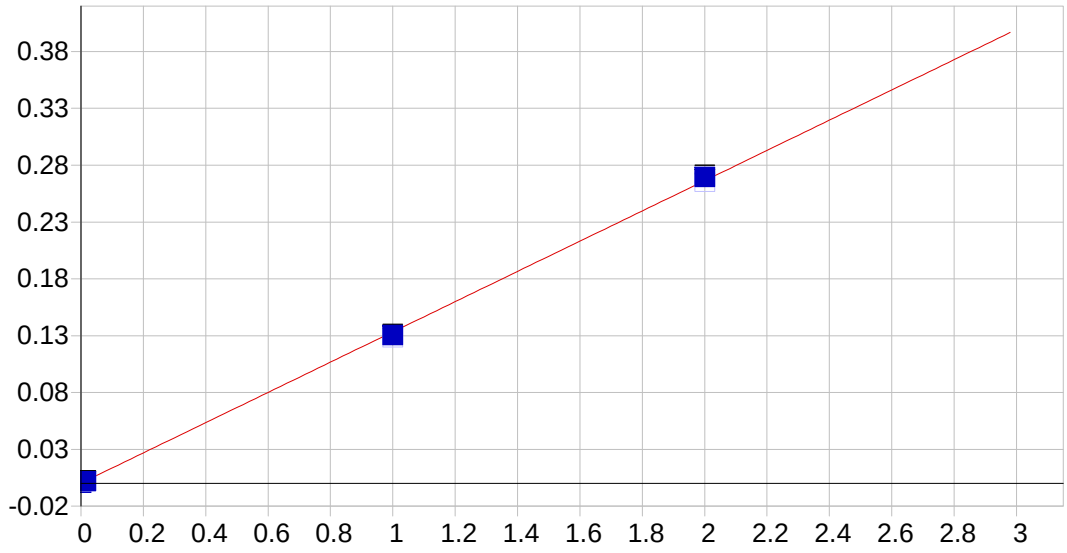


Sb 206.833 {463}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000694	Re-Slope:	1.000000
A1 (Gain):	0.219418	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999827	Status:	OK.
Std Error of Est:	0.000032		
Predicted MDL:	0.001653		
Predicted MQL:	0.005511		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00069	.000	1
CAL 1	.01000	.00906	-.001	-9.42	.00269	.000	1
Cal 2	1.0000	.97437	-.026	-2.56	.22049	.001	1
Cal 3	2.0000	2.0265	.027	1.33	.45735	.002	1

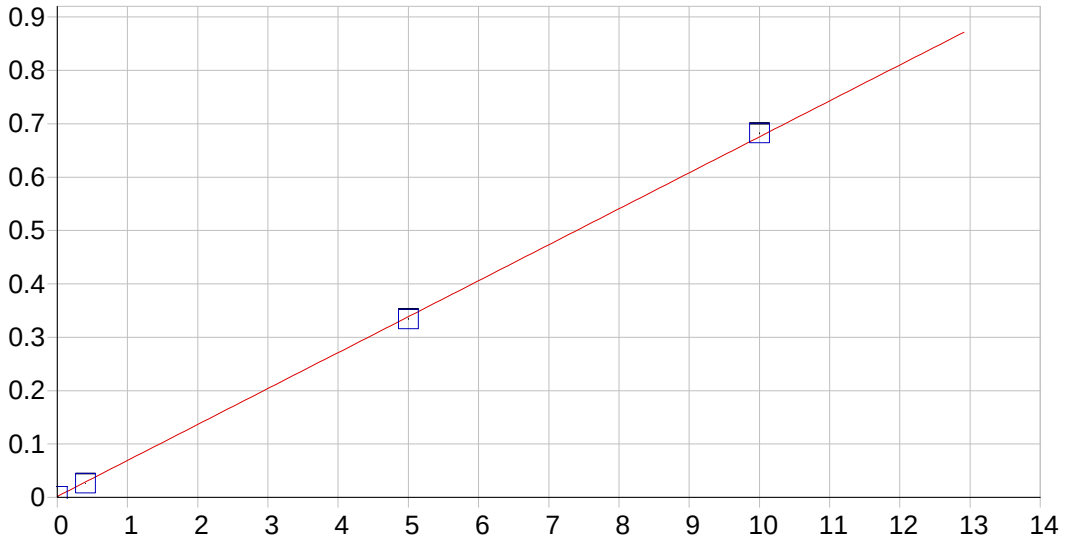


Se 196.090 {472}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000209	Re-Slope:	1.000000
A1 (Gain):	0.133090	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999853	Status:	OK.
Std Error of Est:	0.000021		
Predicted MDL:	0.002292		
Predicted MQL:	0.007640		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00021	.000	1
CAL 1	.01500	.01361	-.001	-9.26	.00182	.000	1
Cal 2	1.0000	.97836	-.022	-2.16	.12844	.001	1
Cal 3	2.0000	2.0229	.023	1.15	.26548	.002	1



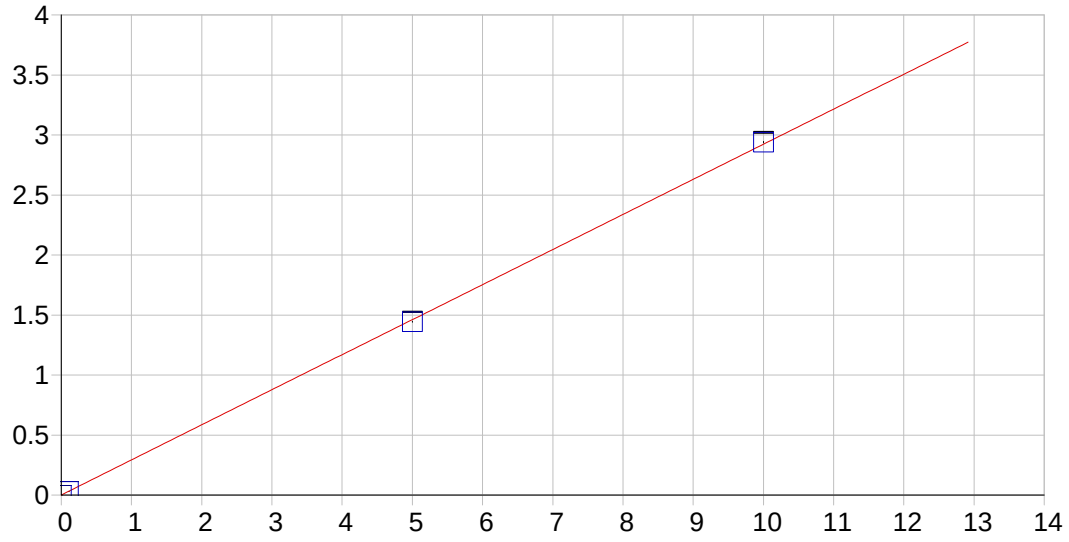
Si 251.611 {134}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.001792	Re-Slope:	1.000000
A1 (Gain):	0.067361	Y-int:	0.000000

A2 (Curvature):	0.000000						
n (Exponent):	1.000000						
Correlation:	0.999818			Status:	OK.		
Std Error of Est:	0.000143						
Predicted MDL:	0.008405						
Predicted MQL:	0.028018						

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00004	.000	.000	.00179	.000	1
CAL 1	.40000	.36147	-.039	-9.63	.02614	.000	1
Cal 2	5.0000	4.9354	-.065	-1.29	.33425	.001	1
Cal 3	10.000	10.103	.103	1.03	.68235	.001	1

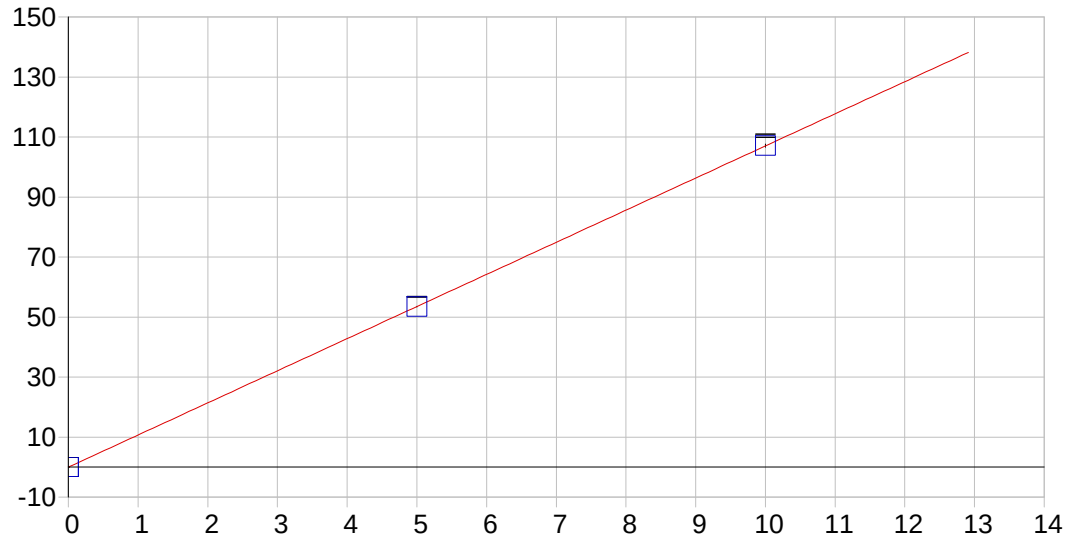


Sn 189.989 {478}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.001054	Re-Slope:	1.000000
A1 (Gain):	0.292101	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999963	Status:	OK.
Std Error of Est:	0.000138		
Predicted MDL:	0.000725		
Predicted MQL:	0.002418		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00105	.000	1
CAL 1	.10000	.09877	-.001	-1.23	.02990	.000	1
Cal 2	5.0000	4.9399	-.060	-1.20	1.4440	.004	1
Cal 3	10.000	10.061	.061	.614	2.9400	.006	1

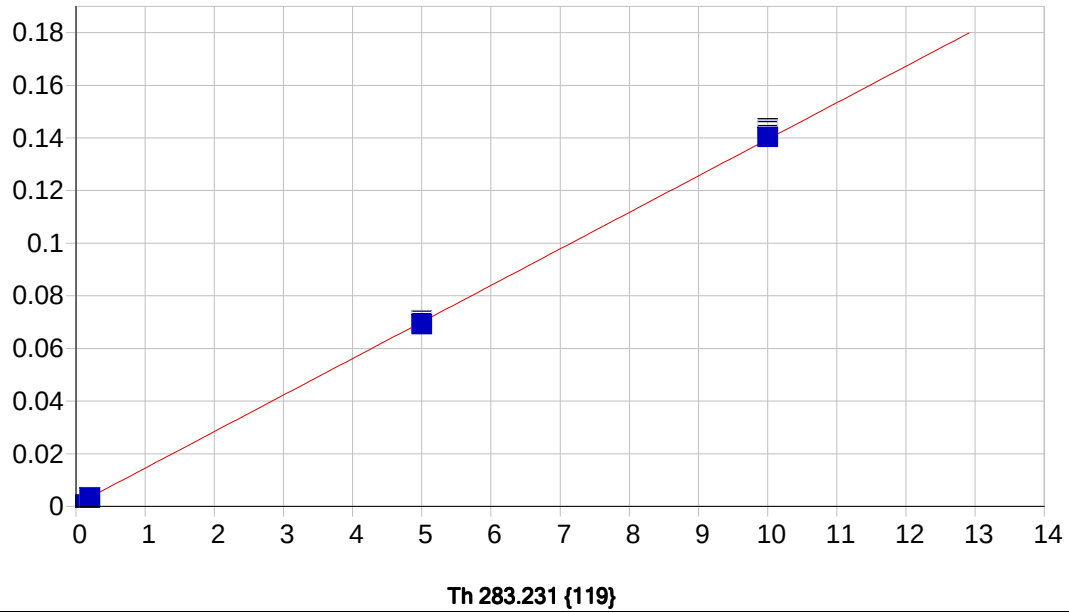


Sr 407.771 { 83}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.017026	Re-Slope:	1.000000
A1 (Gain):	10.704038	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	1.000000	Status:	OK.
Std Error of Est:	0.000130		
Predicted MDL:	0.000154		
Predicted MQL:	0.000513		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.01703	.001	1
CAL 1	.00500	.00497	-.000	-.500	.03623	.001	1
Cal 2	5.0000	4.9930	-.007	-.140	53.428	.116	1
Cal 3	10.000	10.007	.007	.070	107.10	.555	1



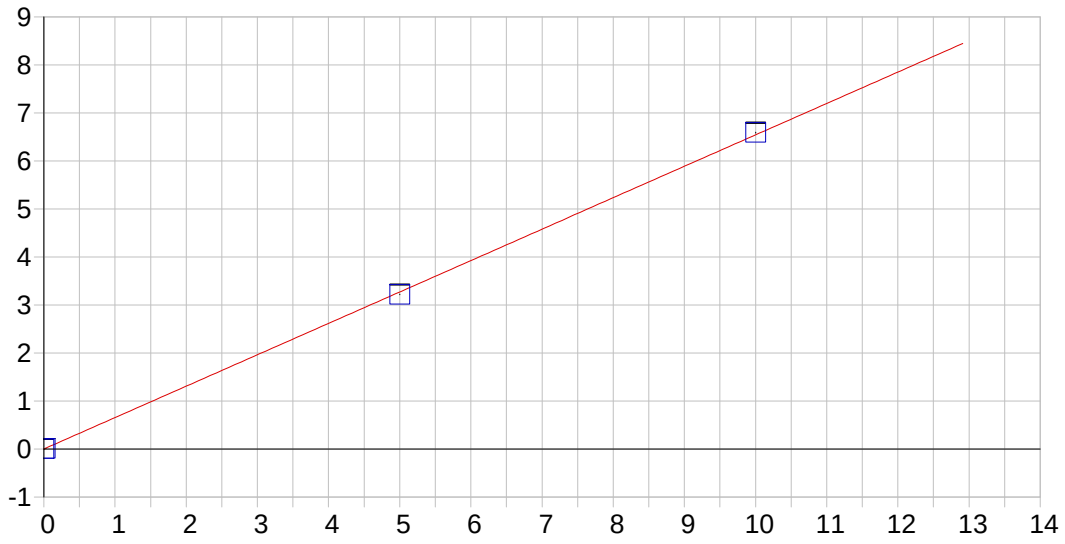
Th 283.231 {119}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000648	Re-Slope:	1.000000
A1 (Gain):	0.013883	Y-int:	0.000000

A2 (Curvature):	0.000000			
n (Exponent):	1.000000			
Correlation:	0.999955	Status:	OK.	
Std Error of Est:	0.000010			
Predicted MDL:	0.002727			
Predicted MQL:	0.009090			

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00001	.000	.000	.00065	.000	1
CAL 1	.20000	.19352	-.006	-3.24	.00330	.000	1
Cal 2	5.0000	4.9385	-.062	-1.23	.07049	.000	1
Cal 3	10.000	10.068	.068	.678	.14298	.001	1

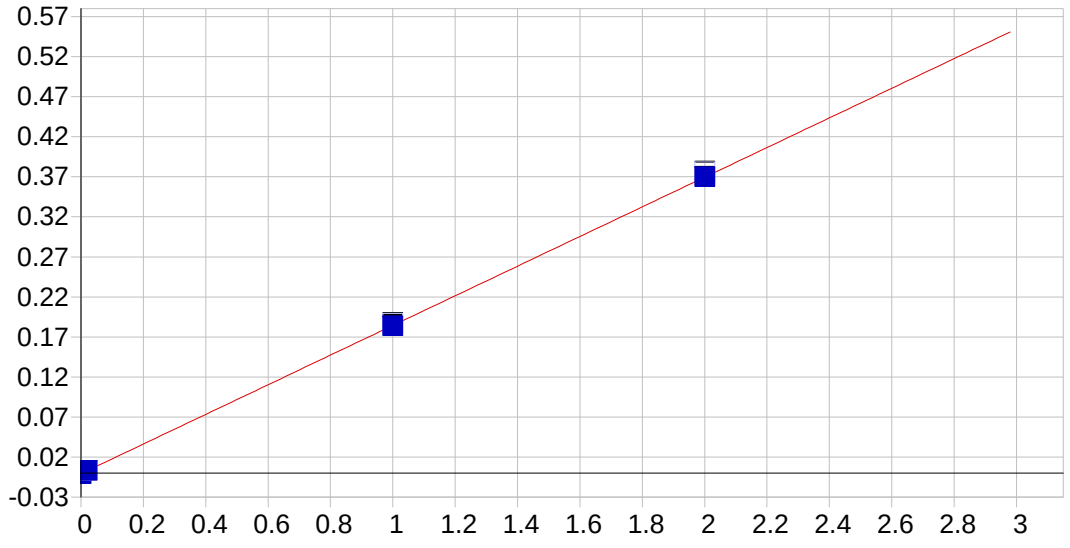


Ti 334.941 {101}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000358	Re-Slope:	1.000000
A1 (Gain):	0.654246	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999942	Status:	OK.
Std Error of Est:	0.000173		
Predicted MDL:	0.001449		
Predicted MQL:	0.004831		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00036	.001	1
CAL 1	.02000	.01961	-.000	-1.94	.01319	.001	1
Cal 2	5.0000	4.9238	-.076	-1.52	3.2217	.007	1
Cal 3	10.000	10.077	.077	.766	6.5929	.010	1

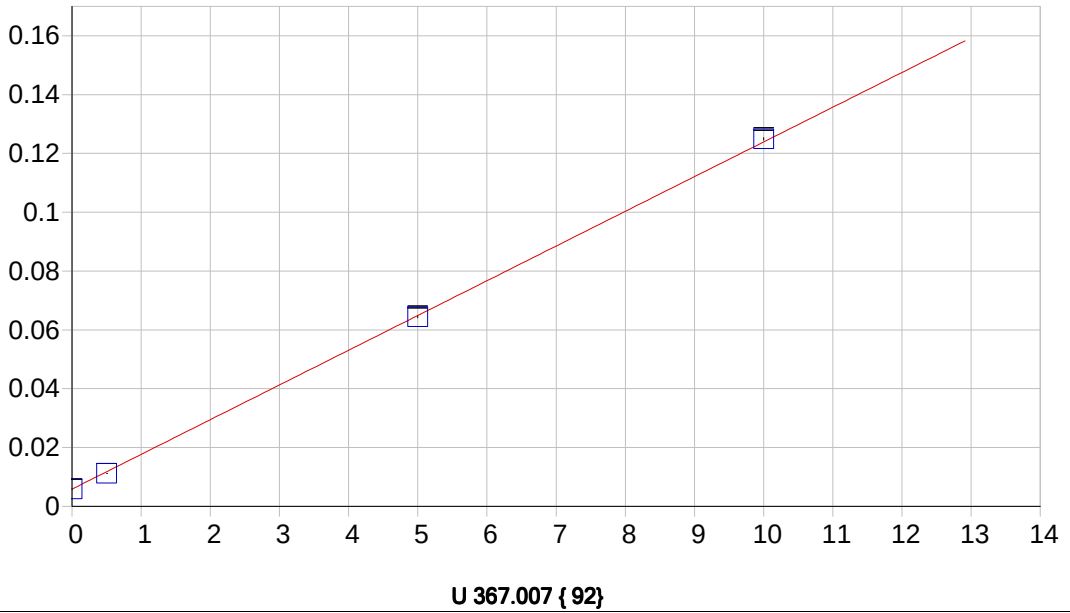


Tl 190.856 {477}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000781	Re-Slope:	1.000000
A1 (Gain):	0.185128	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999994	Status:	OK.
Std Error of Est:	0.000007		
Predicted MDL:	0.001375		
Predicted MQL:	0.004584		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	-.00000	-.000	.000	-.00078	.000	1
CAL 1	.02000	.02066	.001	3.31	.00308	.000	1
Cal 2	1.0000	.99660	-.003	-.340	.18689	.001	1
Cal 3	2.0000	2.0027	.003	.137	.37633	.000	1



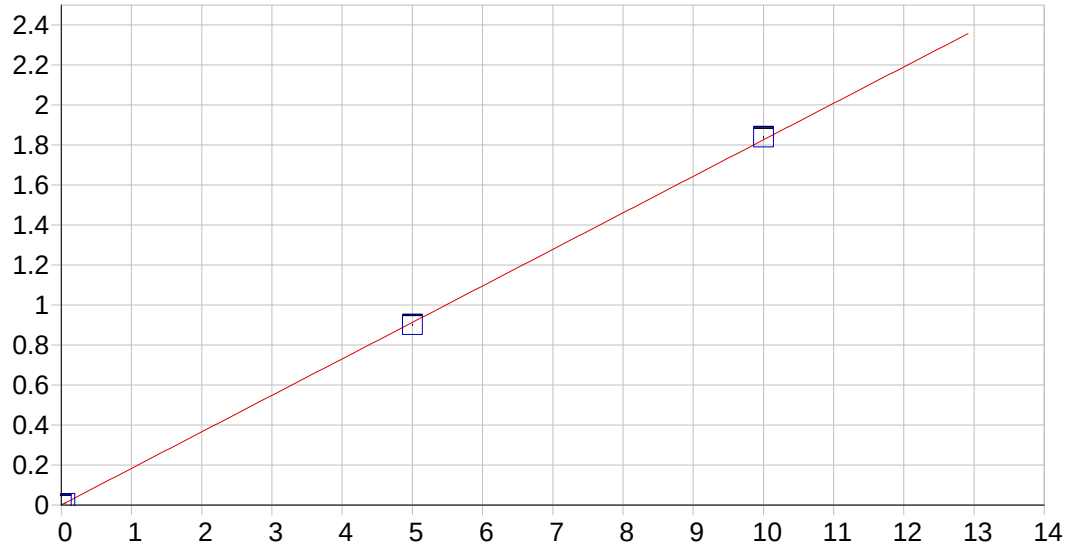
U 367.007 { 92}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.005887	Re-Slope:	1.000000
A1 (Gain):	0.011802	Y-int:	0.000000

A2 (Curvature):	0.000000						
n (Exponent):	1.000000						
Correlation:	0.999809			Status:	OK.		
Std Error of Est:	0.000029						
Predicted MDL:	0.016099						
Predicted MQL:	0.053664						

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00005	.000	.000	.00589	.000	1
CAL 1	.50000	.45107	-.049	-9.79	.01121	.000	1
Cal 2	5.0000	4.9593	-.041	-.814	.06442	.000	1
Cal 3	10.000	10.090	.090	.896	.12497	.000	1

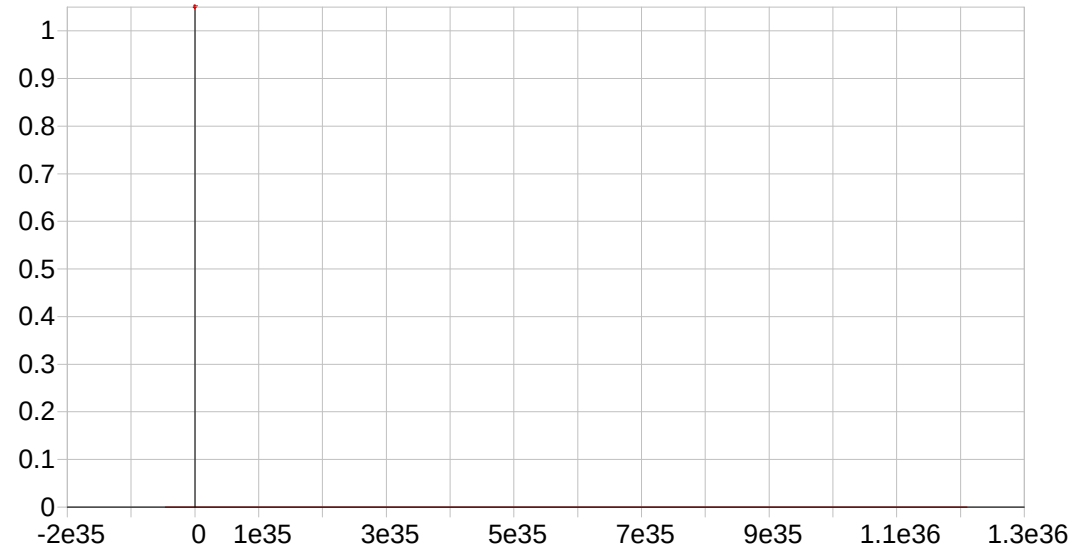


V 290.882 {116}

Date of Fit:	8/6/2018 11:21:07	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000855	Re-Slope:	1.000000
A1 (Gain):	0.182503	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999944	Status:	OK.
Std Error of Est:	0.000075		
Predicted MDL:	0.004729		
Predicted MQL:	0.015763		

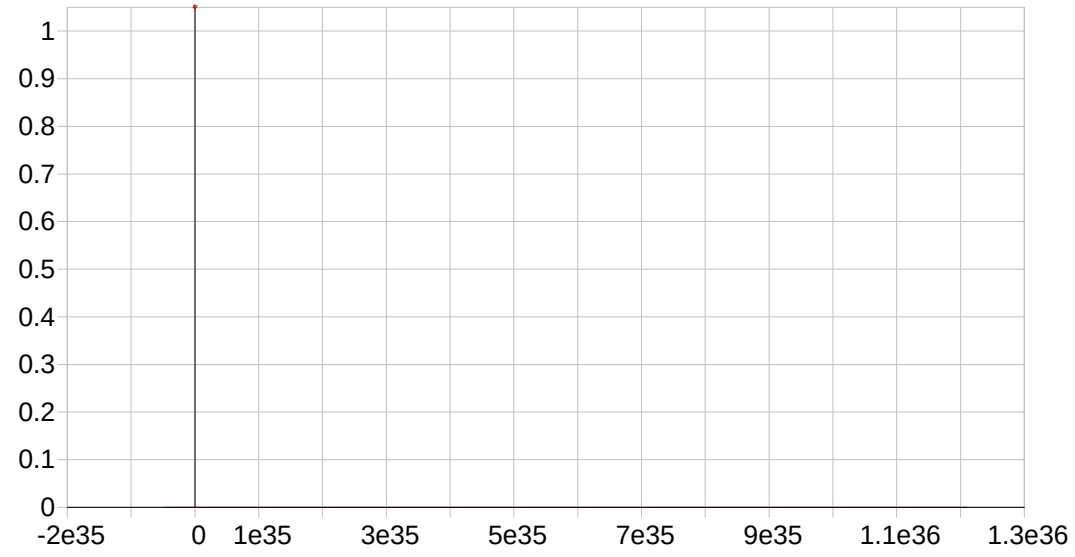
Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00086	.001	1
CAL 1	.05000	.04669	-.003	-6.61	.00938	.000	1
Cal 2	5.0000	4.9313	-.069	-1.37	.90084	.003	1
Cal 3	10.000	10.072	.072	.720	1.8390	.005	1



Y 224.306 {450}*

Date of Fit:	<not fit>	Type of Fit:	Linear	Weighting:	1/Conc
A0 (Offset):	0.000000		Re-Slope:	1.000000	
A1 (Gain):	0.000000		Y-int:	0.000000	
A2 (Curvature):	0.000000				
n (Exponent):	1.000000				
Correlation:	0.000000		Status:	Warning	Zero Gain
Std Error of Est:	0.000000				
Predicted MDL:	n/a				
Predicted MQL:	n/a				

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis

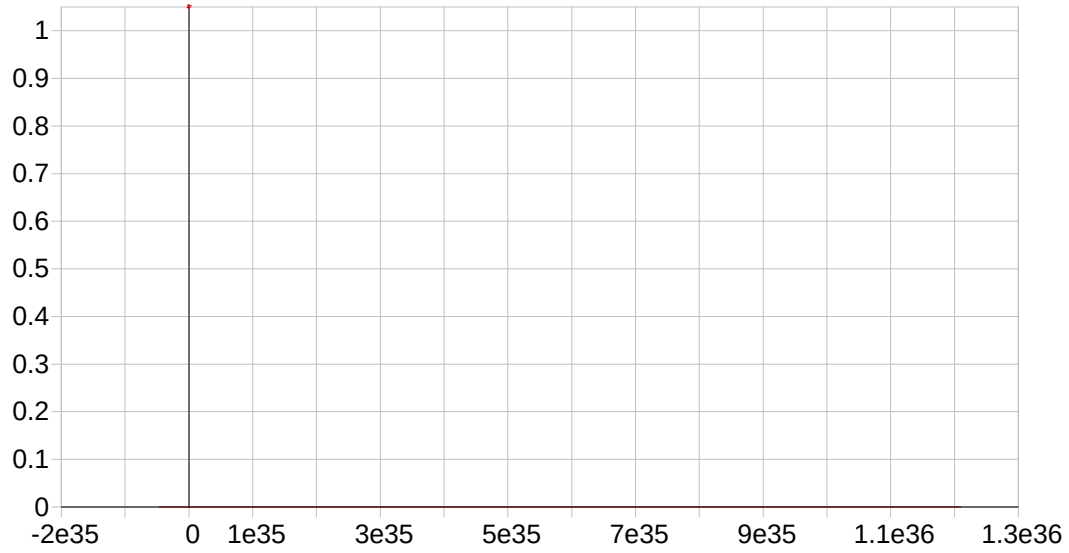


Y 360.073 { 94}*

Date of Fit:	7/25/2018 13:40:04	Type of Fit:	Linear	Weighting:	1/Conc
A0 (Offset):	0.000000		Re-Slope:	1.000000	
A1 (Gain):	0.000000		Y-int:	0.000000	
A2 (Curvature):	0.000000				
n (Exponent):	1.000000				
Correlation:	0.000000		Status:	Warning	Zero Gain
Std Error of Est:	0.000000				

Predicted MDL: n/a
Predicted MQL: n/a

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis

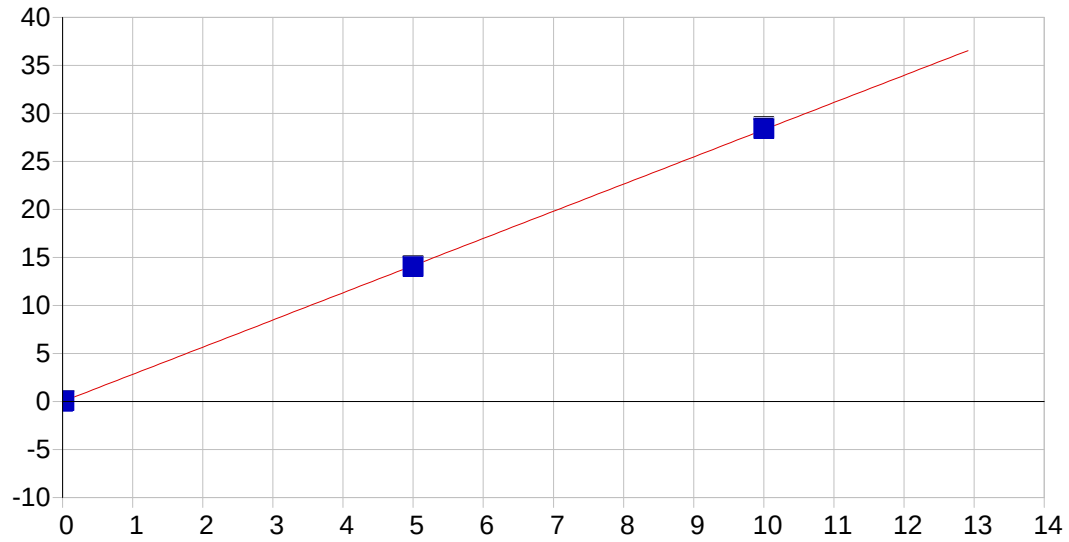


Y 360.073 { 94}2*

Date of Fit: 7/25/2018 13:40:04 Type of Fit: Linear Weighting: 1/Conc

A0 (Offset): 0.000000 Re-Slope: 1.000000
A1 (Gain): 0.000000 Y-int: 0.000000
A2 (Curvature): 0.000000
n (Exponent): 1.000000
Correlation: 0.000000 Status: Warning Zero Gain
Std Error of Est: 0.000000
Predicted MDL: n/a
Predicted MQL: n/a

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis



Zn 213.856 {458}

Date of Fit: 8/6/2018 11:21:07 Type of Fit: Linear Weighting: 1/Conc

A0 (Offset):	-0.000056	Re-Slope:	1.000000
A1 (Gain):	2.830114	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999984	Status:	OK.
Std Error of Est:	0.000390		
Predicted MDL:	0.000119		
Predicted MQL:	0.000397		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00006	.000	1
CAL 1	.02000	.02001	.000	.043	.05710	.000	1
Cal 2	5.0000	4.9602	-.040	-.797	14.090	.033	1
Cal 3	10.000	10.040	.040	.398	28.519	.079	1

Sample Name: ICV Acquired: 8/6/2018 11:21:14 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9934**	**49.78**	**5.008**	**1.034**	**4.978**	**4.950**	**5.019**	**50.08**	**5.025**
Stddev	.0022	.03	.012	.004	.006	.007	.017	.09	.013
%RSD	.2215	.0698	.2479	.4360	.1202	.1324	.3362	.1768	.2501
#1	.9932	49.77	5.010	1.030	4.980	4.943	5.032	50.00	5.021
#2	.9913	49.75	4.994	1.038	4.971	4.953	5.000	50.06	5.015
#3	.9957	49.82	5.019	1.033	4.983	4.955	5.025	50.17	5.040
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**5.014**	**4.992**	**4.961**	**51.96**	**49.71**	**4.990**	**49.76**	**5.020**	**.9751**
Stddev	.009	.008	.013	.04	.09	.010	.07	.007	.0026
%RSD	.1890	.1557	.2697	.0861	.1862	.1997	.1354	.1450	.2642
#1	5.011	4.993	4.971	51.93	49.64	4.991	49.81	5.014	.9747
#2	5.006	4.984	4.946	52.01	49.68	4.979	49.78	5.028	.9727
#3	5.025	4.999	4.966	51.95	49.82	4.999	49.68	5.019	.9778
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**49.69**	**5.041**	**51.76**	**5.060**	**49.89**	**.9802**	**.9875**	**4.935**	**4.926**
Stddev	.04	.014	.10	.006	.11	.0018	.0028	.015	.012
%RSD	.0889	.2688	.1939	.1273	.2203	.1802	.2797	.3040	.2477
#1	49.69	5.029	51.70	5.054	49.91	.9804	.9852	4.932	4.916
#2	49.64	5.037	51.69	5.059	49.77	.9784	.9906	4.922	4.924
#3	49.73	5.056	51.87	5.067	49.99	.9819	.9867	4.951	4.940
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: ICV Acquired: 8/6/2018 11:21:14 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**5.055**	**5.035**	**5.064**	**1.048**	**4.988**	**4.979**	**5.034**
Stddev	.007	.008	.003	.002	.014	.004	.010
%RSD	.1395	.1671	.0651	.1883	.2739	.0902	.2037
#1	5.055	5.031	5.063	1.046	4.974	4.983	5.029
#2	5.048	5.045	5.061	1.048	4.990	4.980	5.027
#3	5.062	5.029	5.067	1.050	5.001	4.974	5.046
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3140.7**	**50743.**	**3681.0**
Stddev	13.7	154.	33.8
%RSD	.43493	.30350	.91781
#1	3156.5	50836.	3705.5
#2	3133.5	50827.	3642.5
#3	3132.2	50565.	3695.2

Sample Name: ICB Acquired: 8/6/2018 11:25:30 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0004**	**.0052**	**.0017**	**.0093**	**-.0000**	**.0000**	**-.0004**	**.0019**	**-.0001**
Stddev	.0007	.0060	.0001	.0072	.0003	.0000	.0016	.0002	.0000
%RSD	186.7	115.9	3.724	77.79	742.0	222.4	420.0	9.980	19.61
#1	-.0005	.0036	.0016	.0173	.0000	.0000	.0010	.0020	-.0001
#2	.0004	.0119	.0017	.0072	-.0004	.0001	-.0022	.0017	-.0001
#3	-.0010	.0001	.0017	.0033	.0003	-.0000	.0000	.0019	-.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0001**	**.0000**	**.0013**	**.0039**	**.0373**	**.0025**	**.0159**	**.0003**	**.0008**
Stddev	.0000	.0000	.0015	.0008	.0338	.0009	.0189	.0006	.0001
%RSD	36.51	19.23	111.0	21.30	90.75	36.94	119.2	207.5	17.27
#1	-.0001	.0000	.0026	.0045	.0755	.0035	.0118	.0000	.0007
#2	-.0001	.0000	.0017	.0030	.0112	.0026	-.0007	-.0001	.0009
#3	-.0001	.0000	-.0003	.0044	.0252	.0016	.0365	.0009	.0007
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0132**	**.0001**	**.0031**	**.0002**	**.0053**	**.0000**	**-.0004**	**.0012**	**.0008**
Stddev	.0083	.0003	.0011	.0009	.0009	.0024	.0009	.0071	.0008
%RSD	62.82	493.1	35.17	513.5	17.81	6801.	262.3	589.0	104.3
#1	.0037	-.0002	.0018	.0002	.0048	.0022	-.0011	-.0027	.0017
#2	.0171	-.0000	.0036	-.0007	.0048	.0004	.0007	.0093	.0001
#3	.0190	.0004	.0038	.0010	.0064	-.0025	-.0007	-.0030	.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: ICB Acquired: 8/6/2018 11:25:30 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0000**	**.0017**	**.0003**	**.0014**	**-.0056**	**-.0027**	**.0003**
Stddev	.0001	.0033	.0016	.0003	.0154	.0026	.0001
%RSD	671.7	193.5	603.9	19.60	272.9	94.64	32.25
#1	.0001	.0049	.0017	.0011	.0104	-.0003	.0004
#2	-.0001	.0020	.0005	.0015	-.0071	-.0025	.0002
#3	.0000	-.0018	-.0015	.0017	-.0202	-.0054	.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3304.1**	**51662.**	**3718.0**
Stddev	15.0	220.	24.3
%RSD	.45308	.42489	.65408
#1	3287.7	51915.	3746.1
#2	3307.6	51542.	3704.7
#3	3317.0	51529.	3703.4

Sample Name: LLC Acquired: 8/6/2018 11:30:16 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0098**	**.1980**	**.0109**	**.1079**	**.0494**	**.0049**	**.2019**	**1.043**	**.0049**
Stddev	.0010	.0064	.0006	.0069	.0002	.0001	.0016	.002	.0002
%RSD	9.699	3.249	5.244	6.402	.4044	1.720	.7914	.2120	4.951
#1	.0101	.2049	.0106	.1030	.0496	.0049	.2037	1.043	.0051
#2	.0088	.1922	.0116	.1049	.0493	.0049	.2006	1.045	.0049
#3	.0106	.1968	.0106	.1158	.0492	.0050	.2015	1.040	.0046
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0516**	**.0102**	**.0253**	**.1002**	**4.866**	**.0518**	**1.018**	**.0149**	**.0395**
Stddev	.0004	.0002	.0018	.0045	.016	.0011	.013	.0004	.0001
%RSD	.7384	2.323	7.255	4.442	.3180	2.061	1.304	2.660	.1699
#1	.0520	.0105	.0271	.1049	4.859	.0509	1.003	.0153	.0394
#2	.0516	.0101	.0234	.0961	4.855	.0530	1.027	.0149	.0395
#3	.0512	.0101	.0253	.0997	4.884	.0515	1.024	.0145	.0394
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9879**	**.0421**	**.2635**	**.0104**	**4.746**	**.0091**	**.0149**	**.3781**	**.1016**
Stddev	.0043	.0001	.0010	.0005	.009	.0006	.0009	.0069	.0004
%RSD	.4314	.2585	.3672	4.934	.1834	6.130	6.207	1.815	.4124
#1	.9888	.0423	.2645	.0109	4.755	.0095	.0158	.3706	.1012
#2	.9833	.0421	.2626	.0103	4.738	.0084	.0151	.3798	.1021
#3	.9917	.0421	.2634	.0099	4.746	.0093	.0139	.3840	.1015
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: LLC Acquired: 8/6/2018 11:30:16 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0051**	**.1952**	**.0200**	**.0210**	**.4539**	**.0500**	**.0215**
Stddev	.0000	.0019	.0012	.0006	.0186	.0017	.0002
%RSD	.6487	.9532	5.965	2.650	4.106	3.404	1.067
#1	.0052	.1939	.0214	.0216	.4690	.0490	.0218
#2	.0051	.1973	.0192	.0211	.4597	.0490	.0214
#3	.0051	.1944	.0193	.0205	.4331	.0520	.0214
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3276.2**	**53204.**	**3850.9**
Stddev	12.8	168.	36.8
%RSD	.39102	.31550	.95688
#1	3285.7	53014.	3884.2
#2	3261.6	53267.	3857.1
#3	3281.3	53331.	3811.3

Sample Name: ICSA Acquired: 8/6/2018 11:34:58 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0006**	**100.3**	**.0061**	**-.0293**	**-.0000**	**-.0000**	**.0134**	**98.28**	**-.0002**
Stddev	.0007	.4	.0022	.0029	.0005	.0001	.0019	.16	.0003
%RSD	111.4	.3715	36.10	9.907	1509.	245.9	14.00	.1586	146.6
#1	.0001	99.93	.0036	-.0307	.0004	-.0000	.0127	98.40	-.0001
#2	-.0006	100.7	.0077	-.0260	-.0000	.0000	.0155	98.33	.0000
#3	-.0013	100.2	.0071	-.0313	-.0005	-.0001	.0120	98.11	-.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0058**	**-.0003**	**-.0089**	**100.00**	**100.5**	**.0287**	**100.4**	**.0006**	**-.0010**
Stddev	.0002	.0003	.0032	.308	.4	.0018	.5	.0004	.0005
%RSD	4.293	77.41	35.59	.3083	.3899	6.222	.5325	65.90	45.72
#1	.0061	-.0002	-.0053	99.69	100.1	.0290	99.83	.0009	-.0014
#2	.0056	-.0006	-.0105	100.3	100.9	.0268	100.9	.0007	-.0012
#3	.0057	-.0002	-.0110	99.98	100.6	.0303	100.5	.0002	-.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**100.2**	**.0048**	**98.38**	**-.0062**	**99.44**	**.0046**	**.0001**	**-.0107**	**.0003**
Stddev	.4	.0002	.15	.0003	.16	.0008	.0005	.0117	.0008
%RSD	.4039	4.554	.1479	4.133	.1588	18.01	851.4	108.8	245.0
#1	99.89	.0049	98.47	-.0065	99.59	.0056	-.0005	.0004	-.0005
#2	100.7	.0049	98.45	-.0060	99.46	.0043	.0004	-.0097	.0003
#3	100.2	.0045	98.21	-.0062	99.27	.0040	.0003	-.0229	.0012
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: ICSA Acquired: 8/6/2018 11:34:58 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0009	.0355	.0031	.0015	.3571	.0031	.0137
Stddev	.0001	.0015	.0019	.0009	.0062	.0017	.0002
%RSD	6.500	4.105	62.21	60.31	1.725	55.32	1.211
#1	.0010	.0361	.0020	.0022	.3521	.0013	.0138
#2	.0009	.0365	.0019	.0005	.3640	.0032	.0139
#3	.0008	.0338	.0053	.0017	.3552	.0047	.0136
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3126.4	48853.	3647.6
Stddev	2.5	244.	48.6
%RSD	.08037	.49946	1.3321
#1	3128.0	49125.	3703.3
#2	3123.5	48780.	3625.5
#3	3127.7	48654.	3614.0

Sample Name: ICSAB Acquired: 8/6/2018 11:39:37 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.5082**	**99.43**	**2.507**	**.4765**	**2.497**	**2.533**	**2.511**	**95.86**	**2.522**
Stddev	.0021	.40	.001	.0062	.006	.007	.003	.05	.002
%RSD	.4180	.3993	.0334	1.306	.2370	.2930	.1233	.0534	.0658
#1	.5068	99.36	2.507	.4837	2.497	2.533	2.511	95.89	2.521
#2	.5106	99.07	2.508	.4732	2.491	2.525	2.514	95.89	2.524
#3	.5072	99.86	2.507	.4727	2.503	2.540	2.507	95.80	2.520
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**2.467**	**2.461**	**2.485**	**99.04**	**99.86**	**2.567**	**101.0**	**2.491**	**.4920**
Stddev	.003	.002	.003	.25	.31	.006	.3	.005	.0011
%RSD	.1171	.0858	.1308	.2557	.3061	.2280	.3336	.2014	.2142
#1	2.465	2.462	2.487	98.95	99.88	2.568	101.0	2.486	.4925
#2	2.470	2.463	2.487	98.84	99.55	2.561	100.6	2.492	.4926
#3	2.465	2.459	2.481	99.32	100.2	2.572	101.3	2.496	.4907
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**99.37**	**2.456**	**98.14**	**2.446**	**100.4**	**.5022**	**.5040**	**2.421**	**2.481**
Stddev	.28	.001	.05	.004	.1	.0028	.0019	.030	.003
%RSD	.2788	.0394	.0505	.1770	.0902	.5657	.3826	1.233	.1170
#1	99.37	2.455	98.10	2.443	100.3	.5023	.5051	2.399	2.481
#2	99.09	2.457	98.20	2.451	100.5	.5050	.5051	2.408	2.483
#3	99.64	2.456	98.12	2.445	100.3	.4993	.5018	2.455	2.477
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: ICSAB Acquired: 8/6/2018 11:39:37 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**2.547**	**2.567**	**2.522**	**.4949**	**2.789**	**2.509**	**2.565**
Stddev	.009	.012	.007	.0023	.003	.009	.002
%RSD	.3519	.4846	.2725	.4675	.0950	.3415	.0747
#1	2.547	2.554	2.520	.4955	2.788	2.503	2.565
#2	2.538	2.579	2.517	.4969	2.791	2.505	2.567
#3	2.556	2.567	2.530	.4924	2.786	2.519	2.564
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3149.2**	**49383.**	**3675.5**
Stddev	3.3	256.	22.3
%RSD	.10564	.51927	.60745
#1	3152.5	49241.	3700.7
#2	3149.3	49230.	3667.9
#3	3145.8	49680.	3658.0

Sample Name: CCVL Acquired: 8/6/2018 11:43:55 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0093**	**.2010**	**.0121**	**.1080**	**.0493**	**.0048**	**.2001**	**1.034**	**.0050**
Stddev	.0004	.0047	.0002	.0032	.0004	.0000	.0009	.024	.0005
%RSD	4.119	2.323	1.955	2.928	.8013	1.019	.4666	2.276	10.37
#1	.0097	.2010	.0124	.1044	.0497	.0049	.1999	1.020	.0049
#2	.0092	.2057	.0120	.1093	.0489	.0048	.2011	1.061	.0056
#3	.0090	.1964	.0120	.1104	.0495	.0048	.1992	1.021	.0046
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0513**	**.0104**	**.0259**	**.1071**	**4.940**	**.0516**	**1.029**	**.0151**	**.0391**
Stddev	.0005	.0005	.0014	.0029	.060	.0030	.034	.0008	.0001
%RSD	.9272	4.580	5.540	2.740	1.220	5.768	3.300	4.972	.2984
#1	.0509	.0102	.0274	.1085	4.871	.0504	.9925	.0147	.0393
#2	.0518	.0110	.0246	.1038	4.975	.0494	1.034	.0160	.0390
#3	.0512	.0101	.0257	.1091	4.976	.0550	1.060	.0147	.0391
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.032**	**.0416**	**.2811**	**.0105**	**4.704**	**.0091**	**.0144**	**.3665**	**.1007**
Stddev	.020	.0003	.0251	.0006	.007	.0028	.0034	.0065	.0002
%RSD	1.961	.6094	8.928	6.087	.1484	31.28	23.39	1.780	.1765
#1	1.038	.0418	.2668	.0099	4.705	.0064	.0128	.3726	.1006
#2	1.049	.0417	.3101	.0112	4.711	.0087	.0121	.3673	.1009
#3	1.010	.0413	.2666	.0103	4.697	.0121	.0182	.3596	.1007
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCVL Acquired: 8/6/2018 11:43:55 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0052**	**.1943**	**.0197**	**.0204**	**.4271**	**.0533**	**.0207**
Stddev	.0001	.0011	.0011	.0013	.0057	.0027	.0005
%RSD	2.259	.5763	5.585	6.277	1.328	4.978	2.437
#1	.0051	.1938	.0186	.0203	.4236	.0508	.0203
#2	.0051	.1956	.0208	.0218	.4337	.0531	.0212
#3	.0053	.1936	.0195	.0192	.4241	.0561	.0204
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3277.9**	**52015.**	**3635.3**
Stddev	4.7	201.	18.1
%RSD	.14450	.38605	.49793
#1	3281.6	52097.	3645.1
#2	3272.6	52162.	3614.4
#3	3279.6	51786.	3646.3

Sample Name: CCV Acquired: 8/6/2018 11:48:40 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.001**	**50.61**	**5.042**	**1.015**	**5.028**	**5.102**	**5.063**	**51.05**	**5.064**
Stddev	.002	.01	.015	.005	.009	.009	.030	.06	.020
%RSD	.1984	.0245	.2983	.5280	.1758	.1667	.6001	.1260	.3918
#1	1.002	50.60	5.026	1.016	5.037	5.102	5.032	50.97	5.043
#2	1.003	50.62	5.044	1.019	5.026	5.110	5.066	51.08	5.066
#3	.9991	50.62	5.056	1.009	5.020	5.093	5.092	51.09	5.083
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**5.075**	**5.068**	**5.043**	**50.86**	**50.46**	**5.040**	**50.64**	**5.076**	**1.012**
Stddev	.017	.016	.031	.01	.03	.003	.22	.005	.004
%RSD	.3289	.3069	.6091	.0160	.0521	.0606	.4403	.0972	.4478
#1	5.061	5.051	5.012	50.87	50.43	5.042	50.41	5.073	1.007
#2	5.072	5.070	5.042	50.86	50.46	5.041	50.66	5.082	1.013
#3	5.093	5.082	5.074	50.85	50.48	5.036	50.85	5.075	1.016
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**50.63**	**5.082**	**52.44**	**5.072**	**50.54**	**1.011**	**1.012**	**5.119**	**5.079**
Stddev	.04	.008	.17	.013	.21	.010	.009	.012	.018
%RSD	.0814	.1642	.3194	.2540	.4155	.9646	.8480	.2299	.3556
#1	50.66	5.074	52.25	5.064	50.31	1.001	1.005	5.107	5.061
#2	50.64	5.080	52.47	5.065	50.58	1.011	1.010	5.131	5.079
#3	50.58	5.091	52.59	5.087	50.72	1.021	1.022	5.118	5.097
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCV Acquired: 8/6/2018 11:48:40 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**5.130**	**5.043**	**5.066**	**1.031**	**5.033**	**5.084**	**5.116**
Stddev	.008	.007	.006	.004	.007	.010	.019
%RSD	.1492	.1384	.1281	.4290	.1456	.2007	.3690
#1	5.132	5.035	5.068	1.026	5.027	5.086	5.097
#2	5.137	5.046	5.070	1.033	5.042	5.073	5.116
#3	5.122	5.047	5.058	1.035	5.031	5.093	5.134
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3090.9**	**49144.**	**3537.1**
Stddev	1.6	129.	27.8
%RSD	.05178	.26164	.78672
#1	3089.6	49288.	3567.7
#2	3092.7	49043.	3530.4
#3	3090.6	49100.	3513.3

Sample Name: CCB Acquired: 8/6/2018 11:52:54 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0004**	**.0323**	**.0018**	**.0083**	**.0003**	**.0001**	**-.0000**	**.0042**	**-.0000**
Stddev	.0007	.0070	.0025	.0024	.0001	.0000	.0015	.0007	.0001
%RSD	175.0	21.63	136.0	28.86	23.36	61.38	75330.	17.90	219.7
#1	-.0012	.0252	.0007	.0102	.0004	.0000	-.0012	.0036	.0000
#2	-.0001	.0324	.0001	.0090	.0003	.0001	.0017	.0038	-.0001
#3	.0001	.0392	.0047	.0056	.0004	.0001	-.0004	.0050	-.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0004**	**.0000**	**-.0002**	**.0046**	**.0747**	**.0002**	**.0316**	**-.0003**	**.0005**
Stddev	.0003	.0001	.0031	.0011	.0335	.0036	.0186	.0004	.0003
%RSD	68.58	751.9	1810.	23.64	44.84	2255.	58.85	145.8	49.38
#1	-.0001	.0001	.0032	.0039	.0456	.0037	.0350	-.0001	.0004
#2	-.0005	-.0001	-.0029	.0059	.1113	.0002	.0115	-.0000	.0004
#3	-.0005	.0000	-.0008	.0041	.0671	-.0035	.0482	-.0007	.0008
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0169**	**.0001**	**.0040**	**-.0003**	**.0073**	**-.0000**	**-.0020**	**-.0078**	**-.0003**
Stddev	.0041	.0003	.0016	.0008	.0018	.0012	.0009	.0081	.0003
%RSD	24.34	209.5	40.13	322.8	24.83	3700.	47.61	102.9	102.9
#1	.0198	.0000	.0039	-.0007	.0064	-.0014	-.0020	-.0171	.0001
#2	.0122	.0005	.0056	.0007	.0093	.0004	-.0029	-.0041	-.0004
#3	.0186	-.0001	.0024	-.0008	.0061	.0009	-.0010	-.0024	-.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: CCB Acquired: 8/6/2018 11:52:54 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0001**	**-.0010**	**.0002**	**-.0003**	**.0089**	**-.0041**	**.0006**
Stddev	.0000	.0011	.0006	.0006	.0121	.0019	.0002
%RSD	25.63	115.1	289.2	211.3	135.7	45.74	27.36
#1	.0002	.0003	-.0002	.0002	-.0048	-.0057	.0004
#2	.0001	-.0020	-.0000	-.0000	.0184	-.0020	.0005
#3	.0002	-.0013	.0009	-.0010	.0132	-.0044	.0007
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3307.1**	**53340.**	**3858.4**
Stddev	29.9	286.	28.4
%RSD	.90316	.53678	.73537
#1	3327.5	53009.	3861.6
#2	3321.0	53509.	3828.5
#3	3272.8	53502.	3885.0

Sample Name: MB 160-379537/1-A Acquired: 8/6/2018 12:32:23 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment: 379537

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0007**	**.0063**	**.0007**	**-.0017**	**-.0001**	**.0000**	**-.0010**	**.0083**	**.0001**
Stddev	.0003	.0150	.0013	.0014	.0002	.0000	.0006	.0002	.0001
%RSD	51.28	239.2	199.9	84.12	353.6	142.5	64.21	2.147	77.94
#1	.0009	.0212	.0010	-.0017	.0002	.0001	-.0005	.0084	.0002
#2	.0008	-.0088	-.0008	-.0030	-.0001	-.0000	-.0008	.0084	.0000
#3	.0003	.0065	.0017	-.0002	-.0002	.0000	-.0017	.0081	.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0000**	**.0000**	**.0012**	**.0023**	**-.0146**	**-.0012**	**.0049**	**-.0004**	**.0007**
Stddev	.0003	.0001	.0003	.0016	.0268	.0005	.0220	.0003	.0001
%RSD	1183.	463.1	26.42	70.55	183.1	39.66	452.0	67.36	21.67
#1	.0001	.0001	.0012	.0009	.0121	-.0007	.0271	-.0001	.0006
#2	-.0003	.0001	.0008	.0018	-.0415	-.0013	.0043	-.0005	.0007
#3	.0001	-.0001	.0014	.0040	-.0145	-.0016	-.0169	-.0006	.0009
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0006**	**.0000**	**.0101**	**.0004**	**.0034**	**.0000**	**-.0016**	**.0033**	**.0003**
Stddev	.0209	.0001	.0008	.0008	.0018	.0018	.0016	.0034	.0009
%RSD	3707.	3525.	8.273	212.2	52.93	53510.	98.93	104.2	288.9
#1	-.0109	.0001	.0093	.0013	.0045	.0020	-.0009	.0021	-.0005
#2	-.0121	-.0002	.0109	-.0001	.0044	-.0016	-.0005	.0006	.0014
#3	.0247	.0001	.0100	-.0000	.0013	-.0004	-.0034	.0071	.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: MB 160-379537/1-A Acquired: 8/6/2018 12:32:23 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment: 379537

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0000**	**-.0011**	**-.0005**	**-.0016**	**-.0212**	**.0028**	**.0004**
Stddev	.0001	.0004	.0007	.0008	.0095	.0037	.0001
%RSD	361.8	33.19	139.0	46.69	44.84	132.9	35.89
#1	-.0001	-.0010	-.0008	-.0023	-.0243	-.0013	.0003
#2	-.0000	-.0009	.0003	-.0017	-.0105	.0058	.0005
#3	.0001	-.0016	-.0010	-.0008	-.0288	.0039	.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3156.7**	**51674.**	**3787.7**
Stddev	10.9	415.	42.9
%RSD	.34627	.80374	1.1330
#1	3148.8	52084.	3831.0
#2	3152.2	51254.	3787.1
#3	3169.2	51683.	3745.2

Sample Name: LCS 160-379537/2-A Acquired: 8/6/2018 12:37:04 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2069**	**10.30**	**.9953**	**.2035**	**.9927**	**.1005**	**1.026**	**10.69**	**1.010**
Stddev	.0011	.01	.0023	.0028	.0013	.0002	.003	.05	.001
%RSD	.5123	.0735	.2294	1.386	.1285	.1772	.2487	.4251	.1075
#1	.2065	10.30	.9968	.2055	.9918	.1004	1.024	10.73	1.008
#2	.2081	10.29	.9927	.2048	.9921	.1004	1.025	10.71	1.010
#3	.2061	10.31	.9965	.2003	.9942	.1007	1.029	10.64	1.011
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.046**	**1.038**	**1.005**	**10.24**	**9.950**	**.1070**	**10.26**	**1.026**	**.5093**
Stddev	.001	.001	.007	.01	.094	.0027	.03	.004	.0003
%RSD	.0534	.1212	.6927	.0675	.9470	2.541	.2570	.3714	.0545
#1	1.045	1.039	.9975	10.25	9.959	.1101	10.24	1.022	.5094
#2	1.046	1.039	1.005	10.24	10.04	.1060	10.29	1.026	.5095
#3	1.046	1.037	1.011	10.24	9.852	.1050	10.24	1.030	.5090
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**10.08**	**1.048**	**1.102**	**1.030**	**9.690**	**.4943**	**.5043**	**4.813**	**1.029**
Stddev	.03	.003	.003	.003	.022	.0028	.0020	.021	.001
%RSD	.2634	.2405	.2337	.2649	.2248	.5760	.3943	.4281	.1344
#1	10.09	1.049	1.103	1.033	9.673	.4911	.5057	4.790	1.028
#2	10.05	1.050	1.104	1.030	9.683	.4954	.5020	4.820	1.030
#3	10.09	1.045	1.099	1.027	9.715	.4964	.5052	4.830	1.028
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: LCS 160-379537/2-A Acquired: 8/6/2018 12:37:04 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.037**	**1.015**	**1.008**	**.2161**	**.9850**	**1.017**	**1.025**
Stddev	.001	.006	.004	.0011	.0032	.003	.001
%RSD	.1281	.5726	.3512	.5087	.3287	.3205	.0446
#1	1.038	1.021	1.012	.2153	.9840	1.020	1.025
#2	1.038	1.012	1.006	.2173	.9886	1.018	1.025
#3	1.036	1.010	1.007	.2156	.9823	1.014	1.026
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3173.9**	**50907.**	**3677.0**
Stddev	16.3	75.	24.7
%RSD	.51355	.14749	.67042
#1	3163.6	50843.	3694.2
#2	3165.4	50989.	3688.1
#3	3192.7	50888.	3648.8

Sample Name: 160-29476-L-1-C Acquired: 8/6/2018 12:41:23 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0005**	**.3073**	**.0023**	**.0680**	**.0165**	**-.0000**	**-.0039**	**72.84**	**-.0001**
Stddev	.0003	.0079	.0022	.0034	.0003	.0001	.0018	.13	.0001
%RSD	57.88	2.578	94.54	5.040	2.039	364.3	45.62	.1719	68.32
#1	.0002	.3019	.0048	.0659	.0165	.0000	-.0019	72.71	-.0002
#2	.0008	.3036	.0017	.0661	.0169	.0000	-.0053	72.96	-.0000
#3	.0005	.3164	.0005	.0720	.0162	-.0001	-.0045	72.86	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0007**	**.0006**	**.0025**	**.5465**	**4.156**	**.0249**	**24.04**	**.1031**	**.0191**
Stddev	.0003	.0001	.0013	.0105	.019	.0003	.19	.0012	.0003
%RSD	40.33	20.96	51.19	1.929	.4612	1.082	.8048	1.158	1.711
#1	.0004	.0007	.0011	.5347	4.164	.0248	23.89	.1017	.0189
#2	.0008	.0008	.0029	.5550	4.134	.0246	24.26	.1039	.0188
#3	.0010	.0005	.0035	.5497	4.170	.0252	23.97	.1036	.0194
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**28.82**	**.0044**	**.0247**	**-.0077**	**10.51**	**.0005**	**.0014**	**7.192**	**-.0015**
Stddev	.13	.0003	.0016	.0016	.01	.0011	.0030	.017	.0009
%RSD	.4666	7.213	6.620	20.47	.0507	230.3	215.0	.2343	57.25
#1	28.67	.0044	.0234	-.0077	10.50	.0004	.0040	7.173	-.0012
#2	28.94	.0047	.0241	-.0092	10.51	-.0006	.0021	7.198	-.0009
#3	28.85	.0041	.0265	-.0061	10.51	.0017	-.0019	7.204	-.0025
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29476-L-1-C Acquired: 8/6/2018 12:41:23 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1637**	**.0075**	**.0096**	**-.0001**	**.5259**	**.0567**	**.0093**
Stddev	.0008	.0034	.0015	.0007	.0151	.0028	.0001
%RSD	.4740	45.30	15.19	825.7	2.880	5.012	1.523
#1	.1628	.0036	.0088	.0007	.5247	.0539	.0091
#2	.1643	.0095	.0087	-.0007	.5114	.0565	.0093
#3	.1639	.0095	.0112	-.0002	.5416	.0596	.0094
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3174.3**	**51046.**	**3674.0**
Stddev	9.1	148.	30.3
%RSD	.28561	.28999	.82401
#1	3184.7	50875.	3656.8
#2	3168.3	51138.	3656.3
#3	3169.8	51124.	3709.0

Sample Name: 160-29476-L-1-CSD@5 Acquired: 8/6/2018 12:46:04 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0003**	**.0687**	**-.0000**	**.0112**	**.0034**	**-.0000**	**-.0015**	**14.82**	**-.0002**
Stddev	.0008	.0047	.0010	.0020	.0005	.0001	.0007	.04	.0001
%RSD	259.2	6.804	12210.	18.06	13.30	472.0	48.28	.2982	45.65
#1	.0005	.0670	-.0002	.0132	.0032	.0000	-.0017	14.83	-.0003
#2	-.0009	.0651	-.0009	.0111	.0032	.0000	-.0021	14.85	-.0002
#3	-.0005	.0739	.0010	.0092	.0040	-.0001	-.0007	14.77	-.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0002**	**.0001**	**.0013**	**.1103**	**.8698**	**.0048**	**4.930**	**.0206**	**.0038**
Stddev	.0001	.0002	.0012	.0041	.0510	.0025	.025	.0002	.0004
%RSD	29.17	197.1	98.01	3.701	5.865	52.50	.4998	1.085	10.90
#1	-.0002	.0003	.0018	.1086	.8323	.0022	4.901	.0209	.0042
#2	-.0002	.0002	-.0001	.1074	.9279	.0073	4.946	.0205	.0034
#3	-.0003	-.0002	.0022	.1150	.8493	.0048	4.942	.0206	.0038
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**5.786**	**.0009**	**.0060**	**-.0023**	**2.054**	**-.0000**	**-.0000**	**1.428**	**-.0001**
Stddev	.011	.0003	.0013	.0007	.012	.0013	.0017	.010	.0005
%RSD	.1838	30.26	22.33	31.49	.5659	13560.	4563.	.7083	333.6
#1	5.779	.0009	.0045	-.0030	2.064	.0013	-.0004	1.437	.0004
#2	5.780	.0006	.0067	-.0015	2.057	-.0013	-.0015	1.417	-.0003
#3	5.798	.0011	.0069	-.0024	2.042	-.0000	.0018	1.431	-.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29476-L-1-CSD@5 Acquired: 8/6/2018 12:46:04 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0330**	**.0004**	**.0018**	**-.0008**	**.0918**	**.0125**	**.0021**
Stddev	.0003	.0025	.0012	.0010	.0096	.0015	.0000
%RSD	.7575	682.0	66.59	124.5	10.42	11.84	.9923
#1	.0333	-.0021	.0030	-.0011	.1015	.0142	.0021
#2	.0329	.0003	.0008	-.0016	.0915	.0113	.0021
#3	.0328	.0029	.0015	.0003	.0824	.0122	.0021
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3327.2**	**52236.**	**3753.4**
Stddev	11.2	64.	46.8
%RSD	.33765	.12160	1.2476
#1	3340.1	52233.	3805.8
#2	3322.4	52301.	3738.8
#3	3319.2	52174.	3715.6

Sample Name: 160-29476-L-1-D MS Acquired: 8/6/2018 12:50:47 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2073**	**10.35**	**.9759**	**.2712**	**1.012**	**.0991**	**.9819**	**80.31**	**.9831**
Stddev	.0000	.02	.0047	.0068	.002	.0002	.0059	.32	.0025
%RSD	.0240	.2143	.4854	2.501	.1803	.1688	.6003	.3936	.2571
#1	.2072	10.33	.9704	.2673	1.012	.0989	.9751	80.09	.9804
#2	.2073	10.35	.9788	.2791	1.014	.0992	.9855	80.67	.9855
#3	.2073	10.38	.9784	.2674	1.011	.0991	.9851	80.17	.9834
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9847**	**.9845**	**.9788**	**10.60**	**14.09**	**.1308**	**33.54**	**1.093**	**.5057**
Stddev	.0030	.0031	.0050	.01	.02	.0011	.24	.002	.0025
%RSD	.3093	.3176	.5106	.0967	.1657	.8331	.7171	.1601	.4951
#1	.9822	.9812	.9737	10.59	14.11	.1321	33.41	1.092	.5028
#2	.9881	.9874	.9837	10.60	14.10	.1300	33.39	1.092	.5074
#3	.9838	.9850	.9790	10.61	14.06	.1304	33.82	1.095	.5069
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**38.63**	**.9900**	**1.100**	**.9697**	**20.16**	**.4790**	**.4928**	F **12.13**	**.9768**
Stddev	.06	.0026	.005	.0003	.06	.0025	.0016	.04	.0026
%RSD	.1478	.2653	.4807	.0326	.2966	.5227	.3337	.3064	.2681
#1	38.57	.9879	1.095	.9694	20.10	.4761	.4915	12.09	.9745
#2	38.67	.9929	1.106	.9700	20.21	.4804	.4946	12.15	.9797
#3	38.66	.9890	1.098	.9697	20.18	.4804	.4922	12.16	.9763
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass
High Limit								10.00	
Low Limit								-500.0	

Sample Name: 160-29476-L-1-D MS Acquired: 8/6/2018 12:50:47 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.170**	**.9976**	**.9946**	**.2036**	**1.504**	**1.048**	**1.006**
Stddev	.003	.0041	.0026	.0013	.014	.001	.003
%RSD	.2401	.4100	.2621	.6439	.9525	.1262	.3016
#1	1.168	.9968	.9955	.2038	1.498	1.047	1.004
#2	1.173	.9939	.9916	.2048	1.493	1.047	1.010
#3	1.168	1.002	.9965	.2022	1.520	1.050	1.006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3227.4**	**50645.**	**3763.4**
Stddev	10.7	97.	67.7
%RSD	.33001	.19112	1.7986
#1	3232.3	50753.	3796.2
#2	3215.1	50567.	3808.5
#3	3234.7	50616.	3685.6

Sample Name: 160-29476-L-1-E MSD Acquired: 8/6/2018 12:55:06 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2093**	**10.63**	**1.003**	**.2720**	**1.021**	**.1005**	**1.007**	**83.06**	**1.007**
Stddev	.0005	.03	.004	.0113	.002	.0001	.004	.43	.005
%RSD	.2567	.2888	.4417	4.150	.2264	.1393	.3641	.5155	.4681
#1	.2096	10.60	1.004	.2730	1.018	.1005	1.004	83.16	1.007
#2	.2096	10.66	1.007	.2828	1.023	.1004	1.011	83.43	1.012
#3	.2087	10.64	.9984	.2603	1.020	.1007	1.006	82.59	1.002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.006**	**1.011**	**1.001**	**10.80**	**14.52**	**.1334**	**34.77**	**1.116**	**.5213**
Stddev	.004	.005	.008	.03	.10	.0023	.22	.004	.0029
%RSD	.3697	.4758	.7577	.2747	.6614	1.706	.6192	.3564	.5620
#1	1.007	1.012	1.005	10.77	14.46	.1351	34.53	1.112	.5228
#2	1.009	1.015	1.006	10.81	14.47	.1343	34.95	1.118	.5233
#3	1.002	1.006	.9928	10.83	14.63	.1309	34.84	1.119	.5180
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**39.74**	**1.013**	**1.128**	**.9867**	**20.69**	**.4960**	**.5036**	F **12.55**	**1.002**
Stddev	.14	.003	.004	.0023	.06	.0042	.0036	.05	.005
%RSD	.3609	.3313	.3251	.2298	.2894	.8405	.7133	.4130	.4980
#1	39.58	1.013	1.132	.9886	20.71	.4973	.5023	12.51	1.004
#2	39.86	1.016	1.129	.9872	20.73	.4994	.5077	12.52	1.005
#3	39.77	1.009	1.124	.9842	20.62	.4914	.5009	12.60	.9962
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass
High Limit								10.00	
Low Limit								-500.0	

Sample Name: 160-29476-L-1-E MSD Acquired: 8/6/2018 12:55:06 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.190**	**1.021**	**1.017**	**.2083**	**1.523**	**1.067**	**1.030**
Stddev	.001	.009	.003	.0024	.013	.006	.004
%RSD	.1200	.9049	.2862	1.176	.8782	.5271	.4314
#1	1.190	1.029	1.014	.2099	1.530	1.061	1.031
#2	1.192	1.025	1.017	.2095	1.531	1.073	1.033
#3	1.189	1.011	1.020	.2055	1.507	1.067	1.025
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3177.7**	**50439.**	**3584.0**
Stddev	13.8	338.	43.9
%RSD	.43434	.67085	1.2249
#1	3175.1	50081.	3634.6
#2	3165.4	50484.	3561.2
#3	3192.6	50753.	3556.2

Sample Name: LB 160-378221/1-C Acquired: 8/6/2018 12:59:23 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment: 380009

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0009**	**.0191**	**.0039**	**.0048**	**.0002**	**-.0000**	**-.0013**	**.0382**	**.0002**
Stddev	.0005	.0012	.0012	.0025	.0001	.0000	.0004	.0200	.0001
%RSD	61.11	6.435	31.64	52.91	59.73	86.11	32.84	52.34	62.85
#1	-.0014	.0203	.0054	.0026	.0001	-.0000	-.0009	.0613	.0003
#2	-.0005	.0178	.0030	.0076	.0001	-.0000	-.0013	.0270	.0002
#3	-.0007	.0193	.0034	.0042	.0003	-.0000	-.0017	.0263	.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0001**	**.0005**	**-.0012**	**.0020**	**.3725**	**.0091**	**.0379**	**-.0000**	**.0005**
Stddev	.0002	.0004	.0010	.0039	.0328	.0010	.0127	.0003	.0001
%RSD	346.5	76.90	83.60	196.8	8.804	11.58	33.41	1218.	29.88
#1	-.0002	.0008	-.0013	-.0021	.3385	.0091	.0265	-.0002	.0004
#2	.0002	.0006	-.0022	.0024	.4039	.0101	.0357	-.0003	.0006
#3	.0002	.0001	-.0002	.0057	.3751	.0080	.0515	.0003	.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **511.3**	**.0003**	**.0151**	**.0010**	**.0157**	**-.0008**	**.0006**	**.0249**	**.0017**
Stddev	6.2	.0003	.0011	.0010	.0065	.0005	.0013	.0014	.0005
%RSD	1.208	85.98	7.463	104.5	41.24	63.17	205.2	5.789	31.20
#1	511.9	.0007	.0164	.0002	.0228	-.0009	.0016	.0233	.0012
#2	504.8	.0001	.0145	.0021	.0143	-.0003	-.0008	.0255	.0015
#3	517.1	.0002	.0144	.0007	.0101	-.0013	.0011	.0259	.0023
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0								
Low Limit	-500.0								

Sample Name: LB 160-378221/1-C Acquired: 8/6/2018 12:59:23 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment: 380009

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0003	.0017	.0001	-.0024	-.0226	-.0005	.0009
Stddev	.0000	.0010	.0015	.0013	.0294	.0007	.0003
%RSD	11.48	61.56	1278.	55.53	129.8	151.0	33.71
#1	.0004	.0028	.0015	-.0012	.0109	.0003	.0012
#2	.0003	.0007	-.0014	-.0038	-.0352	-.0005	.0008
#3	.0003	.0016	.0003	-.0022	-.0437	-.0012	.0007
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3063.3	50120.	3876.1
Stddev	28.2	280.	16.4
%RSD	.91927	.55835	.42386
#1	3094.7	50106.	3879.9
#2	3055.1	49848.	3890.3
#3	3040.2	50407.	3858.1

Sample Name: LCS 160-380009/2-A Acquired: 8/6/2018 13:04:17 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2074**	**9.867**	**1.002**	**.2016**	**.9805**	**.0993**	**.9649**	**9.886**	**.9882**
Stddev	.0013	.018	.004	.0042	.0021	.0003	.0036	.053	.0040
%RSD	.6161	.1821	.4013	2.087	.2144	.2963	.3699	.5409	.4032
#1	.2081	9.887	1.005	.1988	.9828	.0996	.9683	9.868	.9883
#2	.2059	9.853	1.004	.1996	.9801	.0990	.9653	9.947	.9922
#3	.2081	9.861	.9976	.2065	.9786	.0992	.9612	9.845	.9842
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9835**	**.9848**	**.9786**	**10.05**	**10.54**	**.1172**	**9.648**	**.9911**	**.4889**
Stddev	.0037	.0043	.0021	.03	.03	.0005	.034	.0013	.0027
%RSD	.3803	.4396	.2159	.3393	.2889	.4523	.3468	.1316	.5513
#1	.9824	.9863	.9803	10.09	10.56	.1178	9.686	.9908	.4893
#2	.9876	.9882	.9792	10.03	10.50	.1168	9.631	.9899	.4914
#3	.9804	.9799	.9762	10.03	10.55	.1169	9.626	.9925	.4860
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **523.9**	**.9915**	**1.117**	**.9578**	**9.857**	**.4807**	**.5188**	**4.804**	**.9728**
Stddev	4.1	.0040	.007	.0019	.024	.0023	.0011	.006	.0039
%RSD	.7755	.4022	.6175	.1953	.2395	.4855	.2053	.1254	.4034
#1	528.3	.9907	1.119	.9558	9.879	.4806	.5186	4.807	.9738
#2	520.3	.9958	1.122	.9595	9.860	.4831	.5200	4.797	.9762
#3	523.2	.9879	1.109	.9580	9.832	.4784	.5179	4.808	.9685
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0								
Low Limit	-500.0								

Sample Name: LCS 160-380009/2-A Acquired: 8/6/2018 13:04:17 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.000**	**.9960**	**.9969**	**.1880**	**.9484**	**.9864**	**1.018**
Stddev	.002	.0039	.0041	.0027	.0013	.0022	.004
%RSD	.1972	.3904	.4146	1.459	.1423	.2280	.3430
#1	1.003	.9950	.9956	.1868	.9471	.9854	1.018
#2	.9995	1.000	1.002	.1912	.9498	.9890	1.022
#3	.9989	.9928	.9936	.1861	.9483	.9848	1.015
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3086.2**	**48951.**	**3685.2**
Stddev	21.1	118.	28.2
%RSD	.68459	.24167	.76417
#1	3104.3	48822.	3653.3
#2	3063.0	48976.	3696.1
#3	3091.3	49054.	3706.3

Sample Name: 160-29687-B-1-E Acquired: 8/6/2018 13:08:45 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0007**	**.0890**	**.0069**	**.2211**	**.0789**	**-.0002**	**-.0015**	F **462.1**	**.0381**
Stddev	.0002	.0137	.0012	.0053	.0006	.0001	.0012	1.1	.0002
%RSD	27.70	15.36	17.88	2.381	.7234	48.62	78.51	.2343	.4862
#1	-.0005	.0912	.0058	.2270	.0791	-.0001	-.0021	462.4	.0379
#2	-.0007	.0743	.0066	.2168	.0794	-.0001	-.0022	463.1	.0383
#3	-.0009	.1014	.0082	.2194	.0783	-.0003	-.0001	461.0	.0380
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass
High Limit								100.0	
Low Limit								-500.0	

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0752**	**.0042**	**.0200**	**.0177**	**5.046**	**.1709**	**41.33**	**.5281**	**.0012**
Stddev	.0006	.0002	.0007	.0029	.053	.0019	.25	.0020	.0001
%RSD	.7660	3.834	3.652	16.30	1.043	1.101	.6115	.3844	11.33
#1	.0757	.0042	.0200	.0166	4.988	.1731	41.12	.5296	.0011
#2	.0753	.0044	.0207	.0156	5.061	.1700	41.61	.5288	.0013
#3	.0746	.0041	.0193	.0210	5.090	.1697	41.25	.5258	.0012
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **512.1**	**.0127**	**.0516**	**.4066**	F **204.8**	**.0043**	**.0032**	**1.513**	**-.0007**
Stddev	4.3	.0002	.0024	.0015	.2	.0026	.0012	.014	.0001
%RSD	.8442	1.471	4.610	.3616	.0945	60.81	37.56	.9273	16.14
#1	507.4	.0129	.0527	.4064	204.6	.0013	.0024	1.529	-.0006
#2	515.9	.0126	.0489	.4082	205.0	.0061	.0045	1.506	-.0008
#3	513.1	.0126	.0532	.4052	204.9	.0056	.0026	1.503	-.0006
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0				100.0				
Low Limit	-500.0				-500.0				

Sample Name: 160-29687-B-1-E Acquired: 8/6/2018 13:08:45 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F 11.86	.0075	.0044	-.0012	-.0184	-.0052	8.376
Stddev	.06	.0011	.0019	.0003	.0173	.0038	.020
%RSD	.4928	14.06	42.01	23.97	93.86	73.36	.2376
#1	11.91	.0079	.0049	-.0015	-.0297	-.0052	8.383
#2	11.80	.0083	.0024	-.0013	-.0272	-.0014	8.392
#3	11.88	.0063	.0061	-.0009	.0015	-.0090	8.354
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	10.00						
Low Limit	-500.0						

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	2892.2	46810.	3616.0
Stddev	3.6	98.	19.3
%RSD	.12586	.20923	.53292
#1	2896.4	46867.	3634.0
#2	2889.9	46866.	3595.7
#3	2890.3	46697.	3618.4

Sample Name: 160-29687-B-1-ESD@5 Acquired: 8/6/2018 13:13:48 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0002**	**.0193**	**.0007**	**.0421**	**.0152**	**-.0001**	**-.0014**	F **115.2**	**.0073**
Stddev	.0007	.0007	.0012	.0036	.0003	.0001	.0012	.9	.0001
%RSD	323.8	3.412	179.8	8.441	2.209	120.5	85.21	.7987	1.980
#1	.0000	.0199	.0020	.0404	.0149	-.0001	-.0001	116.2	.0073
#2	-.0004	.0186	.0003	.0462	.0156	-.0001	-.0025	114.9	.0074
#3	.0010	.0194	-.0003	.0397	.0151	.0000	-.0018	114.4	.0071
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass
High Limit								100.0	
Low Limit								-500.0	

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0152**	**.0011**	**.0061**	**.0033**	**.9884**	**.0341**	**8.453**	**.1068**	**.0005**
Stddev	.0004	.0000	.0018	.0045	.0460	.0013	.049	.0007	.0002
%RSD	2.757	3.973	29.83	135.0	4.652	3.951	.5757	.6457	48.00
#1	.0157	.0011	.0075	.0069	.9887	.0352	8.474	.1074	.0002
#2	.0149	.0011	.0067	-.0017	.9422	.0345	8.488	.1061	.0005
#3	.0150	.0011	.0040	.0048	1.034	.0326	8.398	.1071	.0007
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **102.6**	**.0026**	**.0086**	**.0844**	**39.09**	**.0009**	**-.0008**	**.2914**	**-.0014**
Stddev	.6	.0002	.0007	.0015	.07	.0005	.0020	.0075	.0003
%RSD	.6232	6.497	8.105	1.832	.1752	60.39	254.6	2.565	18.98
#1	103.3	.0026	.0081	.0854	39.14	.0003	.0015	.2999	-.0015
#2	102.5	.0025	.0083	.0851	39.11	.0012	-.0016	.2859	-.0016
#3	102.0	.0028	.0094	.0826	39.01	.0011	-.0022	.2883	-.0011
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0								
Low Limit	-500.0								

Sample Name: 160-29687-B-1-ESD@5 Acquired: 8/6/2018 13:13:48 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**2.387**	**.0023**	**.0039**	**.0004**	**-.0215**	**.0001**	**1.665**
Stddev	.012	.0012	.0016	.0008	.0074	.0055	.006
%RSD	.5101	50.56	42.13	199.0	34.46	9616.	.3567
#1	2.401	.0011	.0021	.0002	-.0167	.0043	1.670
#2	2.382	.0023	.0053	.0013	-.0178	.0021	1.666
#3	2.378	.0035	.0043	-.0003	-.0300	-.0062	1.658
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3164.0**	**51212.**	**3691.0**
Stddev	22.5	400.	71.6
%RSD	.71135	.78164	1.9400
#1	3138.0	50964.	3612.0
#2	3177.3	50999.	3709.3
#3	3176.6	51674.	3751.7

Sample Name: CCVL Acquired: 8/6/2018 13:18:29 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0088**	**.2145**	**.0106**	**.0981**	**.0490**	**.0049**	**.2016**	**1.040**	**.0049**
Stddev	.0004	.0191	.0009	.0016	.0002	.0000	.0011	.013	.0001
%RSD	3.990	8.900	8.261	1.652	.4095	.4117	.5397	1.237	1.613
#1	.0084	.2231	.0102	.0981	.0492	.0049	.2005	1.027	.0050
#2	.0091	.1926	.0100	.0998	.0489	.0049	.2027	1.043	.0049
#3	.0089	.2278	.0116	.0965	.0488	.0049	.2015	1.052	.0049
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0517**	**.0102**	**.0266**	**.0996**	**4.946**	**.0499**	**1.003**	**.0149**	**.0394**
Stddev	.0009	.0002	.0005	.0008	.071	.0011	.026	.0005	.0005
%RSD	1.726	2.027	1.856	.8341	1.429	2.145	2.568	3.298	1.272
#1	.0506	.0099	.0262	.0988	5.025	.0510	1.032	.0150	.0390
#2	.0520	.0103	.0272	.1005	4.922	.0488	.9840	.0154	.0393
#3	.0523	.0103	.0265	.0995	4.890	.0499	.9921	.0144	.0400
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.240**	**.0420**	**.2645**	**.0113**	**4.803**	**.0102**	**.0139**	**.3669**	**.1021**
Stddev	.154	.0003	.0027	.0008	.058	.0005	.0015	.0073	.0022
%RSD	12.38	.8150	1.016	6.937	1.199	5.025	10.90	1.982	2.166
#1	1.143	.0416	.2618	.0121	4.739	.0104	.0128	.3708	.0998
#2	1.160	.0422	.2645	.0105	4.819	.0096	.0133	.3585	.1022
#3	1.417	.0422	.2671	.0114	4.851	.0105	.0156	.3713	.1042
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCVL Acquired: 8/6/2018 13:18:29 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F .0070	.1931	.0188	.0212	.4189	.0488	.0210
Stddev	.0034	.0013	.0020	.0010	.0086	.0015	.0003
%RSD	48.51	.6947	10.68	4.530	2.061	3.117	1.387
#1	.0051	.1916	.0199	.0202	.4283	.0487	.0207
#2	.0051	.1937	.0201	.0221	.4170	.0504	.0212
#3	.0110	.1941	.0165	.0215	.4114	.0473	.0211
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value	.0050						
Range	30.00%						

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3235.3	51937.	3692.8
Stddev	34.0	120.	5.0
%RSD	1.0523	.23087	.13561
#1	3270.7	51876.	3689.3
#2	3232.4	51860.	3690.6
#3	3202.8	52076.	3698.6

Sample Name: CCV Acquired: 8/6/2018 13:23:13 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9977**	**50.46**	**5.074**	**1.008**	**5.009**	**5.050**	**5.076**	**51.23**	**5.085**
Stddev	.0012	.27	.007	.006	.010	.018	.012	.10	.013
%RSD	.1156	.5380	.1361	.6326	.2007	.3530	.2403	.1986	.2467
#1	.9989	50.15	5.078	1.001	5.007	5.029	5.079	51.31	5.090
#2	.9966	50.67	5.066	1.014	5.000	5.059	5.062	51.12	5.071
#3	.9975	50.56	5.079	1.008	5.020	5.061	5.086	51.28	5.095
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**5.099**	**5.095**	**5.050**	**50.34**	**50.30**	**5.031**	**50.50**	**5.011**	**1.019**
Stddev	.011	.009	.015	.17	.26	.014	.38	.019	.004
%RSD	.2122	.1863	.3038	.3383	.5107	.2826	.7505	.3869	.3575
#1	5.105	5.101	5.057	50.18	50.02	5.020	50.07	4.989	1.022
#2	5.087	5.084	5.032	50.34	50.36	5.027	50.65	5.025	1.015
#3	5.106	5.100	5.061	50.52	50.53	5.047	50.79	5.018	1.021
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**50.37**	**5.105**	**53.65**	**5.095**	**50.87**	**1.019**	**1.021**	**5.047**	**5.127**
Stddev	.18	.007	.10	.011	.10	.005	.004	.039	.009
%RSD	.3517	.1394	.1870	.2224	.1949	.5424	.3771	.7732	.1670
#1	50.18	5.107	53.68	5.100	50.89	1.021	1.022	5.002	5.129
#2	50.40	5.097	53.53	5.082	50.76	1.013	1.017	5.075	5.118
#3	50.53	5.110	53.73	5.103	50.95	1.023	1.025	5.064	5.135
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCV Acquired: 8/6/2018 13:23:13 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**5.099**	**5.033**	**5.015**	**1.039**	**5.038**	**5.047**	**5.141**
Stddev	.017	.003	.026	.003	.007	.027	.009
%RSD	.3360	.0633	.5121	.3058	.1373	.5283	.1778
#1	5.079	5.036	4.986	1.040	5.032	5.021	5.147
#2	5.110	5.030	5.031	1.035	5.045	5.045	5.130
#3	5.107	5.033	5.029	1.041	5.035	5.075	5.145
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3032.8**	**49046.**	**3565.6**
Stddev	4.1	509.	41.0
%RSD	.13406	1.0385	1.1498
#1	3028.1	48474.	3612.3
#2	3035.1	49451.	3535.3
#3	3035.2	49211.	3549.2

Sample Name: CCB Acquired: 8/6/2018 13:27:28 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0005**	**.0170**	**.0013**	**.0053**	**.0001**	**-.0000**	**.0011**	**.0038**	**-.0001**
Stddev	.0003	.0104	.0015	.0055	.0006	.0001	.0002	.0006	.0001
%RSD	55.41	61.58	110.6	105.1	570.8	902.1	14.17	17.23	90.63
#1	.0003	.0200	.0001	.0051	-.0001	-.0000	.0010	.0042	-.0001
#2	.0004	.0053	.0009	-.0002	.0008	.0001	.0013	.0030	.0000
#3	.0008	.0255	.0029	.0109	-.0004	-.0001	.0011	.0041	-.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0002**	**.0000**	**.0008**	**.0047**	**.0961**	**.0029**	**.0416**	**.0001**	**.0003**
Stddev	.0004	.0001	.0007	.0029	.0475	.0011	.0039	.0004	.0002
%RSD	236.8	211.0	90.71	61.41	49.43	39.57	9.301	371.1	64.62
#1	.0001	.0002	.0015	.0063	.0614	.0035	.0372	.0006	.0006
#2	-.0006	-.0000	.0009	.0014	.1503	.0036	.0440	-.0000	.0002
#3	.0000	.0000	.0000	.0065	.0768	.0016	.0438	-.0002	.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0952**	**-.0000**	**-.0013**	**.0009**	**.0090**	**.0005**	**-.0008**	**-.0027**	**.0001**
Stddev	.0174	.0000	.0011	.0011	.0014	.0018	.0017	.0037	.0008
%RSD	18.23	112.0	84.06	131.9	15.92	356.8	198.2	139.2	662.7
#1	.1107	-.0000	-.0000	.0011	.0075	-.0001	.0011	-.0005	-.0008
#2	.0764	-.0000	-.0019	.0019	.0092	.0025	-.0021	-.0069	.0008
#3	.0986	-.0001	-.0020	-.0004	.0104	-.0009	-.0015	-.0005	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: CCB Acquired: 8/6/2018 13:27:28 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0002**	**.0001**	**-.0002**	**-.0001**	**-.0044**	**-.0022**	**.0003**
Stddev	.0002	.0015	.0009	.0004	.0160	.0036	.0001
%RSD	104.0	1619.	552.2	437.6	366.2	165.1	44.04
#1	.0000	.0016	-.0010	-.0006	-.0194	.0009	.0001
#2	.0004	-.0014	.0008	.0002	-.0062	-.0013	.0004
#3	.0001	.0000	-.0003	.0001	.0125	-.0061	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3273.9**	**51652.**	**3680.9**
Stddev	11.2	365.	62.6
%RSD	.34104	.70571	1.7007
#1	3274.1	51861.	3631.9
#2	3285.1	51231.	3659.4
#3	3262.7	51865.	3751.5

Sample Name: 160-29687-B-1-F MS Acquired: 8/6/2018 13:32:15 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2129**	**10.13**	**1.067**	**.4085**	**1.062**	**.0964**	**1.032**	F **453.3**	**1.075**
Stddev	.0005	.06	.016	.0103	.003	.0006	.015	3.6	.014
%RSD	.2282	.5934	1.472	2.524	.3095	.6271	1.485	.7989	1.291
#1	.2129	10.18	1.050	.4024	1.065	.0967	1.015	450.9	1.060
#2	.2135	10.14	1.080	.4204	1.062	.0969	1.039	457.4	1.086
#3	.2125	10.06	1.073	.4027	1.059	.0957	1.043	451.5	1.081
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass
High Limit								100.0	
Low Limit								-500.0	

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.053**	**.9991**	**1.042**	**9.713**	**15.24**	**.2716**	**49.29**	**1.473**	**.5044**
Stddev	.012	.0123	.018	.050	.06	.0007	.24	.011	.0063
%RSD	1.101	1.235	1.675	.5132	.3993	.2731	.4914	.7748	1.241
#1	1.040	.9858	1.022	9.742	15.25	.2711	49.56	1.477	.4972
#2	1.063	1.010	1.051	9.741	15.30	.2714	49.10	1.481	.5089
#3	1.057	1.001	1.053	9.655	15.18	.2725	49.20	1.460	.5070
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **500.4**	**.9848**	**1.224**	**1.342**	F **211.5**	**.5204**	**.5563**	**6.233**	**.9705**
Stddev	3.9	.0122	.018	.013	3.0	.0081	.0116	.024	.0120
%RSD	.7780	1.234	1.450	.9687	1.438	1.561	2.084	.3766	1.237
#1	497.7	.9718	1.204	1.328	208.0	.5112	.5433	6.260	.9587
#2	498.7	.9958	1.234	1.353	213.4	.5266	.5600	6.223	.9827
#3	504.9	.9870	1.235	1.343	213.1	.5234	.5656	6.216	.9701
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0				100.0				
Low Limit	-500.0				-500.0				

Sample Name: 160-29687-B-1-F MS Acquired: 8/6/2018 13:32:15 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F 12.48	.9912	.9916	.1878	.9894	.9766	9.126
Stddev	.12	.0018	.0033	.0036	.0229	.0064	.108
%RSD	.9634	.1792	.3356	1.902	2.311	.6573	1.183
#1	12.61	.9923	.9929	.1837	1.012	.9840	9.007
#2	12.46	.9921	.9941	.1905	.9662	.9721	9.217
#3	12.37	.9891	.9878	.1891	.9901	.9739	9.156
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	10.00						
Low Limit	-500.0						

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	2934.3	48596.	3767.5
Stddev	16.8	81.	6.5
%RSD	.57319	.16732	.17252
#1	2946.0	48680.	3772.5
#2	2915.0	48591.	3760.2
#3	2942.0	48518.	3770.0

Sample Name: 160-29687-B-1-G MSD Acquired: 8/6/2018 13:36:58 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2151**	**10.17**	**1.067**	**.4111**	**1.067**	**.0967**	**1.035**	F **451.4**	**1.072**
Stddev	.0016	.05	.001	.0012	.003	.0003	.004	7.6	.004
%RSD	.7220	.5175	.1197	.3021	.3039	.2627	.3647	1.694	.3269
#1	.2135	10.12	1.068	.4110	1.065	.0967	1.037	459.1	1.076
#2	.2166	10.23	1.066	.4099	1.071	.0965	1.031	451.2	1.072
#3	.2152	10.17	1.066	.4124	1.066	.0970	1.037	443.8	1.069
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass
High Limit								100.0	
Low Limit								-500.0	

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.049**	**.9956**	**1.045**	**9.711**	**15.46**	**.2746**	**50.01**	**1.483**	**.5033**
Stddev	.004	.0038	.005	.031	.09	.0011	.19	.005	.0019
%RSD	.3787	.3867	.5074	.3178	.5993	.3929	.3885	.3348	.3690
#1	1.052	.9992	1.046	9.704	15.39	.2734	49.88	1.477	.5054
#2	1.049	.9961	1.050	9.745	15.56	.2755	50.24	1.486	.5027
#3	1.044	.9916	1.039	9.685	15.42	.2749	49.93	1.485	.5018
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **503.6**	**.9772**	**1.224**	**1.332**	F **214.9**	**.5206**	**.5584**	**6.261**	**.9628**
Stddev	1.8	.0062	.003	.008	.2	.0006	.0035	.014	.0046
%RSD	.3479	.6327	.2579	.5855	.0944	.1211	.6246	.2211	.4745
#1	502.0	.9833	1.228	1.340	215.1	.5208	.5563	6.247	.9658
#2	505.5	.9773	1.223	1.333	214.9	.5199	.5624	6.274	.9651
#3	503.2	.9709	1.222	1.324	214.7	.5211	.5565	6.261	.9575
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0				100.0				
Low Limit	-500.0				-500.0				

Sample Name: 160-29687-B-1-G MSD Acquired: 8/6/2018 13:36:58 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F 12.68	1.000	.9969	.1875	.9792	.9852	9.233
Stddev	.01	.003	.0027	.0004	.0101	.0059	.043
%RSD	.0668	.3437	.2747	.2329	1.032	.5971	.4666
#1	12.68	1.001	.9960	.1880	.9728	.9842	9.274
#2	12.69	1.003	.9999	.1871	.9739	.9915	9.236
#3	12.68	.9966	.9947	.1874	.9908	.9798	9.188
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	10.00						
Low Limit	-500.0						

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	2948.4	48143.	3823.3
Stddev	24.7	159.	26.4
%RSD	.83851	.33022	.68997
#1	2923.3	47963.	3795.3
#2	2949.3	48265.	3826.8
#3	2972.7	48200.	3847.7

Sample Name: 160-29687-B-1-EPDS Acquired: 8/6/2018 13:41:42 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0936**	**1.925**	**.1034**	**1.110**	**.5212**	**.0439**	**1.874**	F **430.8**	**.0819**
Stddev	.0007	.018	.0008	.007	.0020	.0004	.001	1.1	.0003
%RSD	.7767	.9534	.8204	.6090	.3870	.8270	.0528	.2533	.3336
#1	.0941	1.910	.1038	1.104	.5205	.0436	1.873	430.3	.0817
#2	.0940	1.946	.1040	1.108	.5197	.0437	1.873	432.1	.0822
#3	.0928	1.920	.1024	1.118	.5235	.0443	1.875	430.0	.0817
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass
High Limit								100.0	
Low Limit								-500.0	

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.5175**	**.0951**	**.2550**	**.9069**	**51.66**	**.6276**	**46.23**	**.6126**	**.3650**
Stddev	.0001	.0005	.0014	.0046	.19	.0022	.34	.0028	.0002
%RSD	.0270	.4868	.5426	.5059	.3678	.3428	.7460	.4598	.0586
#1	.5176	.0953	.2537	.9100	51.62	.6261	46.00	.6114	.3648
#2	.5176	.0955	.2549	.9091	51.49	.6266	46.06	.6106	.3650
#3	.5174	.0946	.2565	.9017	51.87	.6300	46.62	.6158	.3652
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **470.4**	**.3688**	**2.711**	**.4558**	F **235.0**	**.0950**	**.1523**	**4.819**	**.8839**
Stddev	5.1	.0008	.005	.0028	.1	.0016	.0024	.018	.0018
%RSD	1.088	.2138	.2010	.6080	.0551	1.713	1.553	.3729	.2041
#1	466.0	.3694	2.716	.4590	235.1	.0963	.1549	4.807	.8840
#2	469.3	.3690	2.705	.4540	234.9	.0956	.1502	4.811	.8856
#3	476.0	.3679	2.712	.4544	235.0	.0932	.1517	4.840	.8820
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0				100.0				
Low Limit	-500.0				-500.0				

Sample Name: 160-29687-B-1-EPDS Acquired: 8/6/2018 13:41:42 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **10.93**	**1.806**	**.1857**	**.1698**	**4.001**	**.4458**	**7.882**
Stddev	.15	.002	.0019	.0025	.009	.0022	.006
%RSD	1.387	.1339	1.019	1.445	.2114	.5035	.0764
#1	10.78	1.808	.1859	.1672	3.991	.4446	7.885
#2	10.94	1.808	.1838	.1720	4.007	.4484	7.885
#3	11.08	1.804	.1875	.1702	4.003	.4445	7.875
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	10.00						
Low Limit	-500.0						

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**2899.4**	**46955.**	**3710.2**
Stddev	5.8	425.	41.9
%RSD	.19999	.90578	1.1298
#1	2893.0	46469.	3723.7
#2	2904.3	47140.	3743.8
#3	2900.8	47257.	3663.2

Sample Name: MB 160-380003/1-A Acquired: 8/6/2018 13:46:31 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment: 380003

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0001**	**.0166**	**-.0010**	**.0066**	**-.0003**	**-.0000**	**-.0018**	**.0710**	**.0001**
Stddev	.0004	.0100	.0008	.0011	.0004	.0001	.0020	.0902	.0001
%RSD	380.5	60.11	87.29	16.36	139.5	203.4	111.8	127.0	87.77
#1	.0001	.0268	-.0001	.0058	-.0004	-.0000	-.0005	.1752	.0002
#2	.0005	.0068	-.0018	.0079	.0001	-.0001	-.0041	.0190	-.0000
#3	-.0003	.0162	-.0010	.0063	-.0006	.0000	-.0008	.0189	.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0002**	**.0001**	**.0006**	**-.0001**	**.0486**	**-.0012**	**.0237**	**-.0001**	**.0003**
Stddev	.0002	.0001	.0009	.0025	.0141	.0022	.0354	.0002	.0001
%RSD	95.32	85.55	139.3	1814.	28.98	178.4	149.5	212.6	22.55
#1	-.0003	.0001	.0008	.0017	.0323	-.0026	-.0141	-.0001	.0004
#2	.0000	.0002	.0014	-.0030	.0571	-.0024	.0290	-.0003	.0003
#3	-.0003	.0001	-.0003	.0009	.0563	.0013	.0561	.0001	.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.3268**	**-.0001**	**.0128**	**-.0000**	**.0518**	**-.0003**	**-.0032**	**.0247**	**.0003**
Stddev	.0148	.0003	.0013	.0006	.0373	.0004	.0026	.0037	.0001
%RSD	4.526	504.6	10.43	1914.	72.05	124.6	81.39	14.90	22.21
#1	.3130	.0003	.0144	-.0008	.0949	-.0002	-.0033	.0289	.0003
#2	.3424	-.0002	.0121	.0003	.0313	.0001	-.0058	.0235	.0002
#3	.3252	-.0002	.0120	.0004	.0292	-.0006	-.0006	.0218	.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: MB 160-380003/1-A Acquired: 8/6/2018 13:46:31 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment: 380003

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0005**	**.0010**	**-.0000**	**.0004**	**.0216**	**-.0004**	**.0011**
Stddev	.0003	.0018	.0004	.0003	.0187	.0054	.0013
%RSD	53.62	181.4	1046.	68.72	86.76	1215.	114.7
#1	.0002	-.0003	-.0003	.0003	.0383	-.0065	.0026
#2	.0006	.0002	-.0002	.0008	.0014	.0036	.0003
#3	.0008	.0031	.0004	.0002	.0250	.0016	.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3293.4**	**54268.**	**4015.3**
Stddev	46.0	107.	27.3
%RSD	1.3973	.19765	.67961
#1	3286.2	54149.	4014.8
#2	3251.5	54298.	4042.9
#3	3342.6	54357.	3988.3

Sample Name: LCS 160-380003/2-A Acquired: 8/6/2018 13:51:18 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2010**	**10.05**	**.9749**	**.2039**	**.9955**	**.0979**	**1.014**	**10.05**	**.9815**
Stddev	.0004	.01	.0060	.0069	.0042	.0006	.006	.11	.0066
%RSD	.2119	.1484	.6199	3.399	.4171	.5928	.6198	1.101	.6707
#1	.2013	10.05	.9742	.2082	.9995	.0984	1.013	9.982	.9785
#2	.2005	10.04	.9693	.2076	.9958	.0982	1.009	9.984	.9770
#3	.2013	10.07	.9813	.1959	.9912	.0973	1.021	10.17	.9891
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.018**	**1.013**	**.9915**	**10.03**	**9.837**	**.1043**	**9.891**	**.9996**	**.5075**
Stddev	.006	.007	.0031	.04	.040	.0012	.019	.0027	.0038
%RSD	.6328	.6730	.3083	.3773	.4085	1.150	.1906	.2676	.7499
#1	1.014	1.011	.9926	10.04	9.879	.1052	9.876	1.002	.5061
#2	1.013	1.007	.9880	10.05	9.799	.1048	9.886	1.001	.5045
#3	1.025	1.020	.9939	9.984	9.834	.1029	9.912	.9966	.5118
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**10.03**	**1.014**	**1.090**	**.9942**	**9.576**	**.4932**	**.4957**	**4.710**	**1.011**
Stddev	.03	.008	.006	.0085	.048	.0035	.0028	.008	.009
%RSD	.3240	.7724	.5848	.8584	.4971	.7037	.5716	.1714	.9018
#1	10.05	1.011	1.086	.9879	9.569	.4939	.4939	4.719	1.007
#2	10.06	1.008	1.087	.9906	9.532	.4894	.4943	4.708	1.004
#3	9.998	1.023	1.097	1.004	9.627	.4962	.4990	4.704	1.021
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: LCS 160-380003/2-A Acquired: 8/6/2018 13:51:18 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.023**	**.9862**	**1.001**	**.2112**	**1.004**	**.9876**	**.9977**
Stddev	.003	.0032	.005	.0019	.009	.0069	.0069
%RSD	.2902	.3224	.5214	.9129	.9011	.6962	.6879
#1	1.026	.9838	1.006	.2105	1.011	.9903	.9951
#2	1.022	.9851	1.001	.2097	.9941	.9927	.9925
#3	1.021	.9898	.9954	.2134	1.008	.9798	1.005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3323.3**	**54606.**	**4018.1**
Stddev	35.5	70.	9.9
%RSD	1.0688	.12780	.24721
#1	3346.2	54526.	4014.0
#2	3341.3	54634.	4010.8
#3	3282.4	54657.	4029.4

Sample Name: 680-155956-G-1-A@10 Acquired: 8/6/2018 13:55:37 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0001**	**.0244**	**.0012**	**.0654**	**.0147**	**-.0001**	**.0001**	**11.06**	**-.0000**
Stddev	.0005	.0105	.0014	.0023	.0002	.0001	.0009	.05	.0001
%RSD	781.3	43.10	113.0	3.514	1.231	184.8	751.7	.4276	313.4
#1	.0000	.0125	.0014	.0629	.0148	-.0002	-.0002	11.10	-.0002
#2	.0006	.0285	-.0002	.0658	.0147	.0000	.0011	11.06	.0001
#3	-.0004	.0323	.0025	.0674	.0145	-.0001	-.0005	11.01	-.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2218**	**.0001**	**.0027**	**.0167**	**.5447**	**.0154**	**39.41**	**.0058**	**.0028**
Stddev	.0011	.0001	.0020	.0040	.0765	.0007	.07	.0002	.0002
%RSD	.5088	128.8	72.63	23.79	14.04	4.658	.1665	3.615	7.716
#1	.2217	.0002	.0004	.0204	.5761	.0159	39.47	.0061	.0026
#2	.2230	.0001	.0037	.0125	.4575	.0158	39.34	.0056	.0030
#3	.2208	-.0000	.0040	.0171	.6006	.0146	39.40	.0058	.0027
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**59.42**	**.0097**	**.0029**	**-.0033**	**2.499**	**.0011**	**-.0004**	**2.145**	**-.0007**
Stddev	.08	.0002	.0002	.0020	.008	.0009	.0011	.013	.0005
%RSD	.1394	2.506	8.301	59.22	.3103	82.38	285.1	.6051	61.59
#1	59.50	.0099	.0031	-.0044	2.507	.0020	-.0010	2.154	-.0010
#2	59.42	.0096	.0029	-.0010	2.499	.0011	-.0010	2.130	-.0010
#3	59.33	.0094	.0027	-.0045	2.491	.0002	.0009	2.150	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 680-155956-G-1-A@10 Acquired: 8/6/2018 13:55:37 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0787**	**.0043**	**.0001**	**.0000**	**.0216**	**-.0009**	**.0010**
Stddev	.0003	.0026	.0008	.0010	.0053	.0021	.0000
%RSD	.4298	60.40	825.1	2158.	24.37	234.8	1.717
#1	.0790	.0044	-.0003	.0005	.0189	-.0022	.0010
#2	.0788	.0017	-.0004	-.0011	.0276	.0015	.0010
#3	.0784	.0069	.0010	.0007	.0181	-.0021	.0010
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3265.7**	**54433.**	**4157.3**
Stddev	6.7	55.	7.6
%RSD	.20489	.10107	.18315
#1	3258.1	54480.	4158.7
#2	3268.3	54445.	4164.1
#3	3270.7	54372.	4149.1

Sample Name: 680-155956-G-1ASD@50 Acquired: 8/6/2018 14:00:17 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0004**	**.0124**	**-.0002**	**.0148**	**.0029**	**-.0000**	**-.0011**	**2.231**	**-.0000**
Stddev	.0003	.0052	.0009	.0022	.0002	.0001	.0003	.018	.0001
%RSD	64.17	42.14	555.4	15.03	7.130	132.6	28.86	.8305	754.6
#1	-.0002	.0120	.0006	.0157	.0031	-.0001	-.0007	2.221	-.0000
#2	-.0007	.0074	.0000	.0123	.0027	.0000	-.0012	2.221	-.0001
#3	-.0003	.0178	-.0012	.0165	.0029	-.0001	-.0012	2.253	.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0443**	**.0001**	**.0028**	**.0031**	**.0588**	**.0039**	**7.983**	**.0011**	**.0007**
Stddev	.0002	.0001	.0010	.0041	.0250	.0003	.016	.0008	.0004
%RSD	.4292	71.73	35.79	129.8	42.45	8.375	.1968	66.92	56.00
#1	.0441	.0001	.0029	.0056	.0851	.0038	7.979	.0020	.0003
#2	.0445	.0001	.0017	-.0016	.0355	.0037	8.001	.0008	.0007
#3	.0442	.0002	.0037	.0054	.0557	.0043	7.970	.0006	.0011
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**12.03**	**.0022**	**-.0008**	**-.0005**	**.4917**	**.0004**	**-.0000**	**.4174**	**-.0005**
Stddev	.06	.0003	.0012	.0004	.0054	.0003	.0019	.0074	.0004
%RSD	.5209	13.62	152.2	80.16	1.092	64.41	18780.	1.762	89.50
#1	12.04	.0025	-.0015	-.0001	.4899	.0001	-.0019	.4230	-.0006
#2	12.08	.0020	.0006	-.0005	.4875	.0005	.0020	.4201	-.0008
#3	11.96	.0020	-.0013	-.0010	.4978	.0007	-.0001	.4091	-.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 680-155956-G-1ASD@50 Acquired: 8/6/2018 14:00:17 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0156	.0001	-.0006	-.0002	.0359	.0000	.0006
Stddev	.0001	.0008	.0003	.0008	.0065	.0040	.0002
%RSD	.3941	748.2	54.48	401.4	18.21	10660.	36.79
#1	.0155	.0010	-.0007	-.0001	.0429	-.0026	.0005
#2	.0157	-.0005	-.0008	-.0010	.0300	.0046	.0005
#3	.0156	-.0002	-.0002	.0005	.0347	-.0019	.0009
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3354.1	55515.	4039.2
Stddev	11.2	220.	30.9
%RSD	.33245	.39686	.76549
#1	3359.2	55295.	4028.5
#2	3361.7	55513.	4015.0
#3	3341.3	55736.	4074.0

Sample Name: 680-155956-G-1BMS@10 Acquired: 8/6/2018 14:05:01 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0209**	**1.038**	**.1029**	**.0809**	**.1182**	**.0103**	**.1087**	**12.26**	**.1044**
Stddev	.0003	.008	.0003	.0019	.0001	.0000	.0004	.09	.0006
%RSD	1.518	.8109	.3196	2.371	.0542	.4804	.3302	.7060	.5490
#1	.0206	1.047	.1026	.0827	.1181	.0103	.1091	12.32	.1047
#2	.0213	1.036	.1029	.0813	.1182	.0102	.1084	12.29	.1048
#3	.0209	1.030	.1033	.0789	.1182	.0103	.1087	12.16	.1037
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.3308**	**.1049**	**.1102**	**1.044**	**1.572**	**.0278**	**41.83**	**.1074**	**.0546**
Stddev	.0011	.0005	.0007	.003	.010	.0013	.33	.0008	.0007
%RSD	.3340	.4928	.6672	.2515	.6119	4.671	.7995	.7568	1.225
#1	.3317	.1053	.1108	1.045	1.562	.0287	42.19	.1081	.0554
#2	.3313	.1050	.1103	1.041	1.571	.0284	41.75	.1076	.0541
#3	.3296	.1043	.1094	1.045	1.582	.0263	41.53	.1065	.0543
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**62.78**	**.1134**	**.1175**	**.0978**	**3.571**	**.0540**	**.0544**	**2.680**	**.1033**
Stddev	.28	.0006	.0011	.0012	.012	.0012	.0005	.019	.0002
%RSD	.4470	.5068	.9298	1.241	.3301	2.197	.8657	.6984	.2334
#1	63.11	.1137	.1163	.0992	3.583	.0535	.0544	2.702	.1034
#2	62.64	.1136	.1183	.0973	3.571	.0532	.0540	2.670	.1034
#3	62.61	.1127	.1180	.0970	3.559	.0554	.0549	2.669	.1030
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 680-155956-G-1BMS@10 Acquired: 8/6/2018 14:05:01 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.1865	.1069	.1033	.0208	.1296	.1056	.1069
Stddev	.0007	.0005	.0012	.0008	.0096	.0041	.0006
%RSD	.3949	.4253	1.147	3.973	7.435	3.928	.5191
#1	.1873	.1064	.1043	.0217	.1230	.1047	.1072
#2	.1859	.1070	.1020	.0203	.1407	.1019	.1072
#3	.1862	.1073	.1037	.0203	.1252	.1101	.1062
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3287.5	54528.	4110.0
Stddev	15.9	353.	21.9
%RSD	.48401	.64818	.53380
#1	3277.3	54136.	4085.0
#2	3279.3	54626.	4119.0
#3	3305.8	54822.	4126.0

Sample Name: 680-155956-G1CMSD@10 Acquired: 8/6/2018 14:09:36 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0213**	**1.009**	**.1015**	**.0845**	**.1152**	**.0099**	**.1052**	**11.85**	**.1016**
Stddev	.0006	.014	.0004	.0015	.0003	.0001	.0014	.05	.0002
%RSD	2.609	1.369	.4156	1.780	.2826	.9840	1.374	.4079	.1954
#1	.0216	1.009	.1018	.0845	.1156	.0100	.1068	11.82	.1016
#2	.0216	1.023	.1018	.0860	.1150	.0098	.1041	11.82	.1014
#3	.0206	.9953	.1011	.0830	.1151	.0099	.1047	11.90	.1018
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.3190**	**.1022**	**.1058**	**1.015**	**1.526**	**.0246**	**40.20**	**.1045**	**.0529**
Stddev	.0009	.0004	.0009	.005	.021	.0020	.20	.0008	.0002
%RSD	.2808	.3543	.8531	.4548	1.341	8.063	.4968	.7509	.3119
#1	.3196	.1026	.1063	1.020	1.513	.0225	40.24	.1042	.0530
#2	.3180	.1019	.1064	1.016	1.515	.0264	40.38	.1054	.0527
#3	.3195	.1021	.1048	1.011	1.550	.0248	39.99	.1039	.0530
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**60.51**	**.1104**	**.1127**	**.0959**	**3.432**	**.0509**	**.0529**	**2.570**	**.1002**
Stddev	.16	.0003	.0009	.0016	.015	.0007	.0010	.009	.0006
%RSD	.2712	.2546	.7956	1.641	.4348	1.302	1.924	.3476	.5592
#1	60.61	.1105	.1121	.0942	3.441	.0504	.0529	2.577	.0998
#2	60.59	.1101	.1138	.0973	3.415	.0507	.0519	2.560	.1008
#3	60.32	.1107	.1123	.0962	3.441	.0516	.0539	2.574	.1001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 680-155956-G1CMSD@10 Acquired: 8/6/2018 14:09:36 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1814**	**.1018**	**.0996**	**.0202**	**.1383**	**.1002**	**.1040**
Stddev	.0003	.0036	.0001	.0010	.0064	.0013	.0006
%RSD	.1446	3.542	.0748	4.905	4.645	1.282	.5574
#1	.1817	.1060	.0997	.0206	.1420	.1006	.1041
#2	.1813	.0995	.0996	.0208	.1420	.0987	.1033
#3	.1812	.0999	.0996	.0190	.1309	.1011	.1045
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3316.9**	**55029.**	**4252.8**
Stddev	13.4	232.	33.7
%RSD	.40275	.42074	.79231
#1	3326.3	54817.	4229.0
#2	3322.9	54993.	4238.0
#3	3301.6	55276.	4291.3

Sample Name: MB Acquired: 8/6/2018 14:14:11 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment: 378338 Ni Carrier

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0006**	**.0243**	**-.0005**	**-.0011**	**.0005**	**-.0001**	**-.0011**	**.0325**	**-.0001**
Stddev	.0006	.0111	.0012	.0087	.0004	.0001	.0006	.0001	.0001
%RSD	111.9	45.62	244.6	769.9	77.40	57.79	52.91	.4335	203.1
#1	-.0001	.0131	-.0019	.0043	.0001	-.0000	-.0008	.0326	.0001
#2	.0011	.0352	-.0002	-.0112	.0007	-.0002	-.0018	.0323	-.0001
#3	.0007	.0245	.0005	.0035	.0007	-.0001	-.0007	.0325	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0001**	**.0001**	**.0008**	**.0101**	**.0031**	**-.0021**	**.0360**	**-.0005**	**-.0001**
Stddev	.0000	.0001	.0012	.0010	.0414	.0017	.0237	.0005	.0002
%RSD	29.61	102.2	149.8	9.818	1338.	80.75	65.77	91.47	210.6
#1	-.0001	.0002	.0019	.0107	.0509	-.0041	.0404	-.0010	-.0000
#2	-.0001	-.0000	.0010	.0090	-.0196	-.0012	.0571	-.0006	.0001
#3	-.0000	.0001	-.0005	.0107	-.0220	-.0011	.0104	-.0000	-.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0947**	**.1605**	**-.0030**	**.0005**	**.0293**	**.0010**	**-.0004**	**-.0001**	**-.0007**
Stddev	.0113	.0005	.0004	.0015	.0014	.0026	.0010	.0069	.0002
%RSD	11.94	.3034	11.78	306.6	4.869	261.4	215.4	10030.	23.63
#1	.1075	.1602	-.0031	-.0005	.0280	.0034	-.0013	-.0041	-.0009
#2	.0860	.1602	-.0027	.0022	.0290	-.0018	-.0006	.0079	-.0007
#3	.0906	.1610	-.0034	-.0002	.0308	.0014	.0006	-.0041	-.0006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: MB Acquired: 8/6/2018 14:14:11 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment: 378338 Ni Carrier

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0001	-.0011	.0004	.0003	.0213	.0015	.0075
Stddev	.0001	.0022	.0005	.0015	.0065	.0022	.0001
%RSD	126.0	202.8	133.6	490.0	30.54	149.1	.7573
#1	.0002	.0002	.0006	-.0008	.0207	.0038	.0074
#2	-.0000	.0002	-.0002	.0020	.0282	.0012	.0075
#3	.0001	-.0036	.0008	-.0003	.0152	-.0006	.0075
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3359.4	55024.	3997.9
Stddev	6.3	219.	29.9
%RSD	.18685	.39812	.74684
#1	3363.6	55186.	4014.9
#2	3362.3	55112.	3963.4
#3	3352.2	54775.	4015.4

Sample Name: CCVL Acquired: 8/6/2018 14:18:57 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0100**	**.1991**	**.0107**	**.0993**	**.0499**	**.0048**	**.2075**	**1.024**	**.0049**
Stddev	.0009	.0035	.0006	.0019	.0003	.0001	.0005	.006	.0001
%RSD	8.727	1.751	5.798	1.932	.5597	1.800	.2500	.6111	2.418
#1	.0093	.1960	.0101	.1015	.0501	.0047	.2081	1.032	.0048
#2	.0096	.2029	.0113	.0981	.0496	.0048	.2072	1.022	.0048
#3	.0110	.1984	.0106	.0983	.0499	.0049	.2073	1.020	.0050
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0524**	**.0104**	**.0268**	**.0997**	**4.874**	**.0479**	**1.003**	**.0152**	**.0405**
Stddev	.0004	.0002	.0020	.0023	.035	.0018	.013	.0007	.0007
%RSD	.8022	2.012	7.278	2.347	.7212	3.721	1.337	4.750	1.683
#1	.0528	.0106	.0268	.1003	4.880	.0459	.9879	.0143	.0412
#2	.0521	.0102	.0248	.0971	4.836	.0489	1.011	.0155	.0399
#3	.0522	.0103	.0287	.1016	4.906	.0490	1.011	.0157	.0404
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.059**	**.0420**	**.2726**	**.0097**	**4.911**	**.0096**	**.0154**	**.3642**	**.1019**
Stddev	.013	.0002	.0035	.0007	.039	.0007	.0004	.0042	.0015
%RSD	1.216	.4119	1.273	7.696	.7992	6.993	2.715	1.160	1.482
#1	1.058	.0422	.2765	.0089	4.956	.0089	.0157	.3661	.1036
#2	1.047	.0419	.2710	.0100	4.893	.0103	.0156	.3594	.1016
#3	1.073	.0419	.2702	.0103	4.883	.0095	.0149	.3672	.1006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCVL Acquired: 8/6/2018 14:18:57 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0052**	**.1973**	**.0188**	**.0211**	**.4636**	**.0511**	**.0213**
Stddev	.0001	.0018	.0005	.0010	.0045	.0026	.0002
%RSD	1.473	.9350	2.557	4.850	.9740	5.161	.8303
#1	.0052	.1982	.0185	.0206	.4622	.0541	.0215
#2	.0051	.1952	.0185	.0203	.4599	.0502	.0211
#3	.0052	.1985	.0194	.0222	.4686	.0491	.0213
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3338.3**	**53924.**	**4037.6**
Stddev	11.9	393.	50.4
%RSD	.35637	.72919	1.2486
#1	3325.3	53589.	4068.6
#2	3348.6	53826.	4064.7
#3	3340.9	54357.	3979.4

Sample Name: CCV Acquired: 8/6/2018 14:23:41 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9814**	**50.07**	**5.194**	**.9924**	**5.005**	**4.995**	**5.268**	**50.89**	**5.175**
Stddev	.0035	.40	.052	.0115	.039	.038	.058	.51	.049
%RSD	.3576	.8055	.9949	1.156	.7807	.7661	1.102	1.008	.9406
#1	.9775	50.52	5.140	1.006	5.044	5.038	5.211	50.37	5.125
#2	.9844	49.92	5.199	.9873	5.004	4.983	5.266	50.92	5.179
#3	.9821	49.76	5.243	.9843	4.966	4.965	5.327	51.39	5.222
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**5.175**	**5.193**	**5.206**	**49.45**	**49.75**	**5.027**	**48.82**	**4.926**	**1.044**
Stddev	.048	.051	.054	.36	.42	.042	.41	.042	.012
%RSD	.9344	.9748	1.039	.7288	.8414	.8318	.8419	.8600	1.099
#1	5.126	5.141	5.153	49.86	50.21	5.073	49.29	4.973	1.032
#2	5.176	5.196	5.205	49.34	49.64	5.014	48.61	4.915	1.045
#3	5.223	5.243	5.261	49.16	49.39	4.993	48.56	4.890	1.055
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**49.74**	**5.149**	**54.94**	**5.126**	**52.32**	**1.054**	**1.051**	**4.956**	**5.195**
Stddev	.39	.045	.51	.039	.48	.012	.014	.022	.054
%RSD	.7833	.8750	.9295	.7571	.9159	1.109	1.311	.4482	1.039
#1	50.18	5.103	54.43	5.085	51.84	1.042	1.036	4.961	5.139
#2	49.61	5.149	54.93	5.130	52.30	1.054	1.055	4.975	5.199
#3	49.44	5.194	55.46	5.162	52.80	1.066	1.062	4.931	5.246
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCV Acquired: 8/6/2018 14:23:41 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**5.116**	**4.990**	**4.991**	**1.063**	**5.077**	**4.999**	**5.221**
Stddev	.039	.014	.039	.010	.034	.031	.049
%RSD	.7534	.2889	.7852	.9512	.6627	.6283	.9309
#1	5.158	4.974	5.034	1.052	5.039	5.034	5.172
#2	5.106	4.998	4.981	1.063	5.102	4.987	5.223
#3	5.083	4.999	4.957	1.072	5.090	4.975	5.269
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3091.4**	**52543.**	**3975.2**
Stddev	21.9	130.	34.1
%RSD	.70732	.24726	.85713
#1	3114.1	52680.	3936.1
#2	3089.7	52421.	3991.0
#3	3070.5	52530.	3998.6

Sample Name: CCB Acquired: 8/6/2018 14:27:54 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0001**	**.0243**	**.0018**	**.0043**	**-.0001**	**.0001**	**-.0002**	**.0031**	**.0001**
Stddev	.0006	.0093	.0005	.0043	.0004	.0002	.0024	.0005	.0001
%RSD	805.9	38.33	25.72	101.1	848.0	293.2	1245.	16.54	105.2
#1	.0004	.0328	.0020	.0090	.0004	.0003	-.0004	.0036	.0001
#2	-.0006	.0144	.0022	.0033	-.0005	-.0000	.0023	.0026	.0002
#3	.0005	.0256	.0013	.0005	-.0001	-.0001	-.0026	.0032	-.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0001**	**.0000**	**.0006**	**.0028**	**.0120**	**-.0027**	**.0153**	**.0001**	**.0006**
Stddev	.0002	.0001	.0007	.0036	.0324	.0013	.0287	.0003	.0002
%RSD	178.3	268.0	111.5	127.7	270.5	46.74	187.2	446.7	31.59
#1	-.0000	.0001	-.0001	.0069	.0283	-.0027	.0316	.0003	.0004
#2	.0000	-.0000	.0013	.0014	-.0253	-.0014	-.0178	-.0002	.0008
#3	-.0003	.0001	.0007	.0001	.0330	-.0040	.0323	.0001	.0007
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0639**	**.0001**	**-.0009**	**-.0002**	**.0082**	**.0006**	**-.0014**	**-.0056**	**-.0000**
Stddev	.0062	.0001	.0014	.0009	.0029	.0007	.0022	.0080	.0004
%RSD	9.759	75.86	160.4	495.5	35.15	119.0	155.6	144.0	1731.
#1	.0591	.0002	.0002	-.0004	.0102	.0001	-.0000	.0025	-.0002
#2	.0709	.0000	-.0003	-.0009	.0049	.0014	-.0003	-.0136	-.0003
#3	.0616	.0002	-.0024	.0008	.0095	.0003	-.0040	-.0057	.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: CCB Acquired: 8/6/2018 14:27:54 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0001**	**-.0019**	**.0007**	**.0008**	**.0067**	**-.0005**	**.0004**
Stddev	.0003	.0030	.0004	.0007	.0116	.0019	.0002
%RSD	457.0	156.4	65.95	91.78	172.1	369.0	44.41
#1	.0004	.0011	.0002	.0000	.0074	-.0015	.0006
#2	-.0002	-.0049	.0009	.0009	-.0052	-.0017	.0003
#3	-.0000	-.0020	.0009	.0015	.0179	.0016	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3337.6**	**54370.**	**3984.0**
Stddev	7.6	120.	44.3
%RSD	.22910	.21985	1.1116
#1	3344.5	54463.	3933.9
#2	3339.0	54412.	4018.0
#3	3329.4	54235.	4000.1

Sample Name: LCS Acquired: 8/6/2018 14:32:41 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0002**	**.0048**	**.0014**	**.0066**	**.0002**	**-.0001**	**.0001**	**.0266**	**-.0000**
Stddev	.0008	.0081	.0005	.0016	.0002	.0002	.0015	.0020	.0002
%RSD	510.7	170.4	32.49	24.73	74.63	278.4	1982.	7.362	362.1
#1	-.0002	.0082	.0011	.0082	.0002	.0001	-.0016	.0250	-.0000
#2	.0011	.0105	.0013	.0049	.0001	-.0002	.0009	.0259	-.0002
#3	-.0004	-.0045	.0020	.0067	.0004	-.0001	.0009	.0288	.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0000**	**.0003**	**.0017**	**.0029**	**-.0185**	**-.0006**	**.0188**	**-.0000**	**.0001**
Stddev	.0004	.0001	.0006	.0022	.0102	.0017	.0205	.0005	.0003
%RSD	905.0	29.45	35.15	75.57	55.40	280.6	108.6	1504.	216.6
#1	.0003	.0002	.0016	.0049	-.0159	-.0026	.0096	.0005	.0004
#2	-.0005	.0002	.0024	.0032	-.0098	.0007	.0423	-.0004	.0000
#3	.0001	.0003	.0012	.0006	-.0297	.0001	.0046	-.0001	-.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0432**	**.1724**	**-.0009**	**.0008**	**.0159**	**-.0000**	**-.0008**	**-.0021**	**-.0001**
Stddev	.0119	.0011	.0034	.0003	.0024	.0010	.0012	.0086	.0002
%RSD	27.52	.6497	370.1	41.44	15.27	3070.	161.3	410.8	173.0
#1	.0513	.1711	-.0034	.0005	.0132	-.0011	-.0009	-.0088	.0000
#2	.0296	.1729	-.0023	.0009	.0163	.0001	-.0019	.0076	-.0004
#3	.0488	.1732	.0030	.0011	.0180	.0009	.0005	-.0051	-.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: LCS Acquired: 8/6/2018 14:32:41 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0001	-.0019	-.0009	-.0001	.0205	-.0043	.0051
Stddev	.0001	.0028	.0003	.0013	.0232	.0012	.0002
%RSD	169.2	147.1	31.51	1735.	112.8	28.52	3.613
#1	.0000	-.0007	-.0007	-.0006	-.0032	-.0048	.0049
#2	-.0000	.0001	-.0012	-.0010	.0217	-.0053	.0051
#3	.0002	-.0050	-.0008	.0014	.0431	-.0029	.0053
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3469.6	56363.	4102.3
Stddev	13.0	74.	11.3
%RSD	.37464	.13161	.27432
#1	3481.3	56424.	4115.0
#2	3471.9	56384.	4098.3
#3	3455.6	56281.	4093.6

Sample Name: LCSD Acquired: 8/6/2018 14:37:26 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0003**	**.0057**	**-.0004**	**.0059**	**-.0001**	**-.0001**	**.0003**	**.0175**	**.0000**
Stddev	.0003	.0028	.0013	.0019	.0002	.0000	.0008	.0001	.0001
%RSD	95.49	49.33	280.6	31.50	232.5	54.71	299.5	.6397	916.0
#1	.0006	.0088	-.0007	.0063	-.0002	-.0000	-.0007	.0174	-.0000
#2	.0000	.0045	.0009	.0039	.0001	-.0001	.0008	.0175	-.0001
#3	.0003	.0037	-.0015	.0076	-.0002	-.0001	.0006	.0176	.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0004**	**.0001**	**.0001**	**.0014**	**-.0348**	**-.0010**	**.0204**	**.0005**	**.0002**
Stddev	.0004	.0000	.0004	.0033	.0604	.0008	.0176	.0003	.0002
%RSD	93.72	18.05	478.7	240.8	173.6	76.40	86.56	48.48	133.4
#1	-.0007	.0002	-.0004	.0032	.0226	-.0004	.0067	.0006	.0001
#2	-.0005	.0001	.0001	-.0024	-.0292	-.0019	.0403	.0008	.0004
#3	.0000	.0001	.0005	.0033	-.0978	-.0007	.0142	.0003	.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0275**	**.1623**	**-.0019**	**.0003**	**.0105**	**-.0012**	**-.0033**	**-.0052**	**-.0001**
Stddev	.0040	.0008	.0010	.0008	.0020	.0004	.0014	.0046	.0001
%RSD	14.44	.5102	52.77	258.1	19.37	37.73	43.51	89.20	110.6
#1	.0231	.1614	-.0007	-.0001	.0083	-.0014	-.0026	-.0007	.0000
#2	.0308	.1626	-.0023	.0013	.0122	-.0015	-.0049	-.0049	-.0001
#3	.0286	.1630	-.0026	-.0002	.0110	-.0007	-.0023	-.0099	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: LCSD Acquired: 8/6/2018 14:37:26 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0000**	**-.0039**	**-.0009**	**.0008**	**.0453**	**.0010**	**.0047**
Stddev	.0001	.0011	.0011	.0003	.0036	.0037	.0001
%RSD	648.4	28.71	120.5	31.01	8.021	381.3	1.578
#1	.0000	-.0029	-.0017	.0007	.0416	.0025	.0046
#2	.0001	-.0051	-.0015	.0011	.0455	-.0032	.0047
#3	-.0001	-.0036	.0004	.0006	.0489	.0036	.0048
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3469.8**	**57360.**	**4254.8**
Stddev	29.1	255.	10.7
%RSD	.83905	.44432	.25146
#1	3495.6	57447.	4258.0
#2	3475.6	57560.	4263.6
#3	3438.2	57073.	4242.9

Sample Name: 160-29595-B-1 Acquired: 8/6/2018 14:42:12 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0001**	**.0106**	**.0001**	**.0039**	**.0005**	**-.0001**	**-.0002**	**.0371**	**-.0001**
Stddev	.0003	.0109	.0004	.0026	.0005	.0000	.0019	.0008	.0001
%RSD	504.7	102.7	369.2	67.67	94.77	88.38	855.6	2.158	70.94
#1	-.0002	.0225	.0005	.0034	.0011	-.0001	-.0000	.0368	-.0001
#2	.0003	.0083	-.0003	.0067	.0001	-.0000	.0015	.0366	-.0000
#3	-.0003	.0011	.0001	.0016	.0004	-.0001	-.0022	.0380	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0004**	**.0002**	**.0018**	**.0059**	**.0334**	**-.0011**	**.0401**	**.0002**	**.0001**
Stddev	.0002	.0001	.0017	.0049	.0446	.0018	.0226	.0005	.0002
%RSD	43.00	72.44	94.12	81.86	133.4	170.9	56.19	277.1	217.3
#1	-.0005	.0001	.0007	.0009	.0412	-.0031	.0365	.0006	.0003
#2	-.0005	.0003	.0039	.0063	.0736	.0000	.0196	-.0003	-.0001
#3	-.0002	.0001	.0010	.0106	-.0145	-.0000	.0643	.0001	.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0560**	**.1451**	**-.0035**	**.0002**	**.0179**	**.0000**	**-.0008**	**.0010**	**.0001**
Stddev	.0142	.0002	.0010	.0008	.0022	.0004	.0001	.0024	.0005
%RSD	25.28	.1444	26.94	355.1	12.06	2000.	9.156	246.0	607.1
#1	.0402	.1452	-.0046	.0006	.0186	-.0002	-.0008	.0005	.0003
#2	.0605	.1448	-.0032	.0008	.0155	.0005	-.0009	.0035	.0004
#3	.0674	.1452	-.0028	-.0007	.0196	-.0003	-.0007	-.0011	-.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29595-B-1 Acquired: 8/6/2018 14:42:12 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0000**	**-.0013**	**-.0014**	**.0005**	**.0331**	**-.0015**	**.0095**
Stddev	.0001	.0001	.0002	.0008	.0058	.0036	.0001
%RSD	286.8	11.34	13.47	163.4	17.42	241.4	1.212
#1	.0001	-.0014	-.0012	.0008	.0308	-.0042	.0095
#2	-.0000	-.0013	-.0015	.0010	.0397	-.0029	.0096
#3	-.0000	-.0011	-.0015	-.0004	.0288	.0026	.0094
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3456.9**	**55002.**	**3976.1**
Stddev	12.9	214.	37.2
%RSD	.37179	.38938	.93437
#1	3455.2	55158.	3992.4
#2	3470.4	54758.	4002.3
#3	3444.9	55091.	3933.5

Sample Name: MB 160-380005/1-A Acquired: 8/6/2018 14:46:57 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment: 380005/380006 PT

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0002**	**.0071**	**.0002**	**.0014**	**.0000**	**-.0000**	**-.0013**	**.0167**	**.0001**
Stddev	.0007	.0126	.0010	.0010	.0002	.0000	.0013	.0005	.0001
%RSD	340.8	176.4	501.7	76.07	911.1	29.67	102.7	2.830	122.8
#1	.0004	.0214	-.0008	.0025	-.0000	-.0000	-.0028	.0168	.0001
#2	-.0009	.0021	.0003	.0005	-.0002	-.0000	-.0008	.0162	.0000
#3	-.0000	-.0022	.0011	.0011	.0003	-.0001	-.0003	.0171	.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0004**	**.0000**	**.0013**	**.0015**	**-.0465**	**-.0021**	**.0252**	**-.0000**	**.0000**
Stddev	.0002	.0000	.0021	.0019	.0541	.0024	.0025	.0002	.0002
%RSD	41.30	113.0	160.6	128.3	116.5	112.8	10.06	320.2	531.8
#1	-.0004	.0000	.0036	-.0007	-.1055	-.0027	.0275	-.0001	-.0002
#2	-.0003	.0001	-.0001	.0027	-.0349	.0005	.0256	.0001	.0003
#3	-.0007	.0000	.0003	.0023	.0009	-.0042	.0225	-.0002	.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0267**	**.0001**	**.0126**	**-.0001**	**.0053**	**-.0011**	**-.0008**	**.0151**	**-.0002**
Stddev	.0152	.0003	.0011	.0011	.0020	.0017	.0004	.0067	.0003
%RSD	56.97	413.3	8.705	1739.	36.98	151.5	48.02	44.51	167.2
#1	.0140	-.0001	.0125	.0011	.0068	.0008	-.0007	.0205	-.0005
#2	.0436	-.0001	.0138	-.0008	.0060	-.0024	-.0006	.0172	-.0002
#3	.0225	.0004	.0116	-.0006	.0031	-.0017	-.0013	.0076	.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: MB 160-380005/1-A Acquired: 8/6/2018 14:46:57 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment: 380005/380006 PT

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0002**	**-.0016**	**.0001**	**-.0002**	**.0346**	**-.0026**	**.0004**
Stddev	.0001	.0012	.0005	.0003	.0092	.0020	.0000
%RSD	36.09	73.93	907.6	203.3	26.68	75.48	9.093
#1	.0001	-.0018	.0005	-.0004	.0403	-.0006	.0004
#2	.0002	-.0003	.0001	.0002	.0240	-.0045	.0004
#3	.0002	-.0027	-.0005	-.0003	.0396	-.0028	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3416.7**	**56351.**	**4148.4**
Stddev	10.9	204.	32.1
%RSD	.31800	.36170	.77471
#1	3404.1	56524.	4141.1
#2	3422.5	56403.	4120.6
#3	3423.4	56127.	4183.6

Sample Name: LCS 160-380005/2-A Acquired: 8/6/2018 14:51:43 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2022**	**9.955**	**.9868**	**.2012**	**.9908**	**.0973**	**1.025**	**10.22**	**.9919**
Stddev	.0020	.073	.0097	.0049	.0068	.0006	.009	.08	.0081
%RSD	.9679	.7320	.9849	2.455	.6831	.5679	.8884	.7451	.8186
#1	.2008	10.04	.9916	.2041	.9986	.0979	1.028	10.26	.9950
#2	.2015	9.922	.9932	.1955	.9865	.0972	1.032	10.27	.9980
#3	.2045	9.904	.9756	.2040	.9873	.0969	1.014	10.13	.9827
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.029**	**1.025**	**1.003**	**9.942**	**9.710**	**.1036**	**9.805**	**.9913**	**.5055**
Stddev	.011	.009	.011	.051	.079	.0014	.077	.0059	.0043
%RSD	1.100	.9139	1.135	.5156	.8157	1.383	.7856	.5938	.8515
#1	1.033	1.030	1.009	9.999	9.793	.1041	9.874	.9974	.5069
#2	1.038	1.031	1.011	9.930	9.702	.1047	9.820	.9908	.5088
#3	1.017	1.014	.9902	9.899	9.636	.1020	9.722	.9857	.5006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**9.893**	**1.028**	**1.108**	**1.011**	**9.704**	**.4919**	**.5003**	**4.616**	**1.013**
Stddev	.067	.009	.013	.007	.097	.0043	.0054	.006	.009
%RSD	.6780	.8290	1.149	.6958	1.002	.8797	1.088	.1283	.8363
#1	9.971	1.033	1.112	1.014	9.750	.4940	.5058	4.622	1.018
#2	9.855	1.034	1.118	1.016	9.769	.4948	.5003	4.614	1.019
#3	9.854	1.019	1.093	1.003	9.592	.4870	.4949	4.611	1.004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: LCS 160-380005/2-A Acquired: 8/6/2018 14:51:43 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.018**	**.9985**	**.9826**	**.2141**	**1.030**	**.9825**	**1.009**
Stddev	.007	.0063	.0062	.0022	.014	.0048	.009
%RSD	.7404	.6322	.6312	1.006	1.374	.4886	.8962
#1	1.026	.9930	.9881	.2138	1.039	.9878	1.013
#2	1.016	.9973	.9838	.2164	1.014	.9811	1.016
#3	1.011	1.005	.9759	.2122	1.038	.9785	.9989
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3281.8**	**54418.**	**4046.5**
Stddev	15.6	387.	17.2
%RSD	.47544	.71133	.42530
#1	3273.2	54709.	4028.5
#2	3272.4	54568.	4048.0
#3	3299.8	53979.	4062.9

Sample Name: 160-29429-A-1-A@5 Acquired: 8/6/2018 14:56:02 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1401**	**.4417**	**.0703**	**.2992**	**.0608**	**.0457**	**-.0004**	**.0149**	**.0918**
Stddev	.0008	.0036	.0013	.0053	.0006	.0002	.0005	.0004	.0002
%RSD	.5692	.8081	1.849	1.768	.9172	.3848	124.8	2.492	.1891
#1	.1397	.4418	.0716	.2933	.0602	.0455	-.0007	.0144	.0916
#2	.1396	.4452	.0703	.3011	.0613	.0456	.0002	.0151	.0918
#3	.1410	.4381	.0690	.3033	.0610	.0459	-.0006	.0150	.0920
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0806**	**.0930**	**.0919**	**.6182**	**.0006**	**.0013**	**.0067**	**.3226**	**.0120**
Stddev	.0004	.0003	.0001	.0042	.0134	.0010	.0024	.0015	.0001
%RSD	.4415	.3502	.1264	.6812	2068.	77.85	35.80	.4708	.9633
#1	.0806	.0934	.0920	.6192	-.0099	.0002	.0040	.3211	.0120
#2	.0809	.0928	.0918	.6218	-.0039	.0022	.0074	.3241	.0122
#3	.0802	.0929	.0918	.6136	.0158	.0014	.0086	.3227	.0119
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0401**	**.3595**	**.0006**	**.1103**	**.0073**	**.0463**	**.0361**	**.0271**	**-.0007**
Stddev	.0121	.0004	.0004	.0015	.0014	.0028	.0038	.0044	.0002
%RSD	30.09	.1061	69.33	1.327	19.45	5.995	10.42	16.29	27.68
#1	.0491	.3597	.0001	.1097	.0075	.0442	.0330	.0221	-.0005
#2	.0448	.3596	.0007	.1119	.0058	.0495	.0403	.0288	-.0009
#3	.0264	.3590	.0009	.1091	.0086	.0453	.0350	.0305	-.0008
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29429-A-1-A@5 Acquired: 8/6/2018 14:56:02 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0770**	**-.0019**	**.0005**	**.0712**	**.0187**	**.0528**	**.1103**
Stddev	.0002	.0012	.0003	.0011	.0227	.0019	.0003
%RSD	.2359	65.14	61.12	1.560	121.3	3.515	.3090
#1	.0770	-.0027	.0002	.0707	.0343	.0532	.1099
#2	.0768	-.0005	.0004	.0725	.0291	.0507	.1105
#3	.0772	-.0025	.0008	.0705	-.0073	.0544	.1105
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3454.4**	**55793.**	**3980.3**
Stddev	6.4	108.	17.8
%RSD	.18557	.19380	.44746
#1	3447.2	55731.	3989.7
#2	3459.4	55918.	3959.7
#3	3456.7	55729.	3991.4

Sample Name: 160-29429-A-1-ASD@25 Acquired: 8/6/2018 15:00:39 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0291**	**.0982**	**.0151**	**.0703**	**.0126**	**.0093**	**-.0006**	**.0112**	**.0190**
Stddev	.0005	.0013	.0013	.0026	.0003	.0001	.0002	.0001	.0002
%RSD	1.546	1.283	8.530	3.680	2.129	1.518	33.97	.9163	.9629
#1	.0297	.0981	.0139	.0730	.0123	.0095	-.0006	.0112	.0192
#2	.0289	.0996	.0150	.0700	.0125	.0093	-.0004	.0111	.0189
#3	.0288	.0971	.0164	.0678	.0129	.0092	-.0008	.0113	.0188
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0166**	**.0192**	**.0225**	**.1240**	**-.0214**	**.0000**	**.0213**	**.0667**	**.0028**
Stddev	.0005	.0000	.0004	.0031	.0369	.0032	.0297	.0007	.0001
%RSD	2.727	.2345	1.837	2.490	172.8	12400.	139.5	.9985	2.767
#1	.0171	.0193	.0225	.1230	.0094	.0027	.0389	.0668	.0028
#2	.0162	.0192	.0221	.1275	-.0623	-.0035	-.0130	.0660	.0027
#3	.0164	.0192	.0229	.1215	-.0112	.0009	.0379	.0673	.0028
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0526**	**.0738**	**-.0021**	**.0233**	**.0061**	**.0105**	**.0067**	**.0026**	**-.0002**
Stddev	.0145	.0006	.0025	.0010	.0024	.0007	.0017	.0113	.0002
%RSD	27.53	.7570	121.5	4.503	39.14	6.410	25.42	431.7	141.3
#1	.0646	.0744	-.0050	.0244	.0036	.0113	.0085	-.0103	-.0001
#2	.0365	.0733	-.0003	.0224	.0084	.0100	.0052	.0102	-.0004
#3	.0567	.0737	-.0010	.0231	.0063	.0103	.0063	.0079	.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29429-A-1-ASD@25 Acquired: 8/6/2018 15:00:39 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0159**	**-.0000**	**-.0007**	**.0137**	**.0232**	**.0104**	**.0231**
Stddev	.0002	.0005	.0010	.0014	.0084	.0022	.0001
%RSD	1.053	1112.	136.1	10.37	36.20	21.08	.2695
#1	.0160	-.0003	-.0006	.0152	.0264	.0129	.0231
#2	.0157	-.0004	-.0018	.0136	.0295	.0087	.0232
#3	.0160	.0005	.0002	.0123	.0137	.0097	.0231
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3332.1**	**53598.**	**3902.9**
Stddev	11.1	102.	9.6
%RSD	.33408	.19084	.24700
#1	3320.4	53486.	3906.9
#2	3333.5	53687.	3891.9
#3	3342.5	53619.	3909.9

Sample Name: 160-29429-A-1-B MS@5 Acquired: 8/6/2018 15:05:23 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1785**	**2.422**	**.2643**	**.3433**	**.2613**	**.0649**	**.2042**	**2.068**	**.2869**
Stddev	.0007	.018	.0017	.0072	.0009	.0001	.0011	.005	.0009
%RSD	.3736	.7605	.6599	2.094	.3575	.1004	.5462	.2514	.3060
#1	.1791	2.433	.2656	.3494	.2611	.0650	.2054	2.074	.2879
#2	.1778	2.400	.2623	.3354	.2623	.0649	.2040	2.067	.2863
#3	.1785	2.432	.2650	.3450	.2605	.0649	.2032	2.064	.2864
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2840**	**.2951**	**.2887**	**2.609**	**1.925**	**.0187**	**1.999**	**.5185**	**.1103**
Stddev	.0006	.0012	.0009	.004	.082	.0015	.013	.0007	.0004
%RSD	.2223	.3995	.3075	.1474	4.239	8.169	.6582	.1420	.3909
#1	.2847	.2965	.2897	2.605	1.845	.0205	2.013	.5177	.1107
#2	.2834	.2942	.2882	2.613	1.922	.0178	1.997	.5191	.1103
#3	.2839	.2947	.2881	2.611	2.008	.0178	1.987	.5186	.1098
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**2.032**	**.5604**	**.2121**	**.3109**	**1.911**	**.1436**	**.1339**	**.9318**	**.2006**
Stddev	.007	.0007	.0015	.0004	.008	.0019	.0015	.0015	.0013
%RSD	.3319	.1195	.6958	.1178	.4192	1.306	1.121	.1571	.6394
#1	2.032	.5610	.2127	.3105	1.918	.1445	.1343	.9327	.2004
#2	2.039	.5597	.2131	.3112	1.903	.1448	.1351	.9301	.2020
#3	2.025	.5605	.2104	.3111	1.913	.1414	.1322	.9326	.1994
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29429-A-1-B MS@5 Acquired: 8/6/2018 15:05:23 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.2799	.1954	.1933	.1130	.2061	.2495	.3098
Stddev	.0005	.0012	.0012	.0011	.0090	.0060	.0009
%RSD	.1898	.6001	.6097	.9748	4.387	2.391	.2744
#1	.2803	.1966	.1943	.1133	.1957	.2536	.3106
#2	.2801	.1953	.1920	.1139	.2122	.2427	.3089
#3	.2793	.1942	.1936	.1117	.2104	.2523	.3098
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3350.7	54442.	3930.3
Stddev	1.3	134.	24.8
%RSD	.03924	.24564	.63209
#1	3350.4	54291.	3958.1
#2	3352.1	54545.	3910.1
#3	3349.6	54490.	3922.8

Sample Name: 160-29429-A-1-CMSD@5 Acquired: 8/6/2018 15:09:54 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1741**	**2.400**	**.2589**	**.3408**	**.2579**	**.0640**	**.1999**	**2.007**	**.2802**
Stddev	.0002	.013	.0015	.0052	.0009	.0003	.0007	.002	.0002
%RSD	.1277	.5542	.5909	1.530	.3453	.4811	.3588	.1019	.0616
#1	.1742	2.412	.2592	.3364	.2590	.0643	.1998	2.009	.2804
#2	.1741	2.404	.2603	.3465	.2576	.0638	.2006	2.007	.2801
#3	.1738	2.386	.2573	.3393	.2573	.0638	.1992	2.005	.2801
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2780**	**.2884**	**.2807**	**2.568**	**1.943**	**.0202**	**1.984**	**.5106**	**.1088**
Stddev	.0007	.0002	.0022	.004	.013	.0005	.026	.0010	.0002
%RSD	.2469	.0703	.7814	.1723	.6832	2.390	1.318	.1973	.1717
#1	.2783	.2883	.2800	2.565	1.940	.0199	2.014	.5117	.1086
#2	.2784	.2886	.2832	2.573	1.957	.0207	1.968	.5103	.1089
#3	.2772	.2883	.2790	2.565	1.931	.0198	1.970	.5098	.1089
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**2.011**	**.5469**	**.2094**	**.3032**	**1.873**	**.1392**	**.1301**	**.9388**	**.1972**
Stddev	.010	.0009	.0002	.0012	.004	.0010	.0018	.0018	.0007
%RSD	.5037	.1634	.0753	.3812	.2323	.7213	1.346	.1875	.3381
#1	2.020	.5478	.2094	.3045	1.876	.1382	.1320	.9408	.1977
#2	2.000	.5469	.2092	.3029	1.876	.1402	.1285	.9378	.1975
#3	2.014	.5460	.2096	.3022	1.868	.1393	.1297	.9377	.1964
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29429-A-1-CMSD@5 Acquired: 8/6/2018 15:09:54 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2756**	**.1922**	**.1931**	**.1105**	**.2058**	**.2460**	**.3024**
Stddev	.0008	.0030	.0006	.0019	.0063	.0033	.0005
%RSD	.2909	1.548	.3176	1.709	3.063	1.348	.1594
#1	.2762	.1943	.1938	.1126	.2131	.2494	.3026
#2	.2759	.1936	.1925	.1093	.2021	.2460	.3027
#3	.2746	.1888	.1931	.1095	.2022	.2428	.3018
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3414.7**	**55356.**	**3937.2**
Stddev	2.4	217.	14.9
%RSD	.06912	.39162	.37940
#1	3414.7	55178.	3925.0
#2	3417.1	55292.	3932.9
#3	3412.4	55598.	3953.9

Sample Name: 160-29429-A-3-A@5 Acquired: 8/6/2018 15:14:24 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0005**	**.0169**	**-.0001**	**.0366**	**.0004**	**-.0002**	**-.0002**	**.0090**	**-.0000**
Stddev	.0007	.0051	.0008	.0031	.0004	.0001	.0019	.0004	.0001
%RSD	131.7	29.94	798.0	8.599	102.2	33.47	864.8	3.920	327.1
#1	.0001	.0228	.0005	.0399	.0002	-.0002	-.0015	.0086	.0001
#2	-.0004	.0143	.0003	.0361	.0008	-.0001	-.0011	.0093	-.0000
#3	-.0012	.0137	-.0010	.0337	.0001	-.0002	.0020	.0091	-.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0003**	**-.0001**	**.0043**	**-.0000**	**-.0159**	**-.0015**	**.0203**	**-.0001**	**.0001**
Stddev	.0002	.0001	.0005	.0008	.0200	.0013	.0279	.0006	.0002
%RSD	79.87	90.77	11.06	6523.	125.8	86.75	137.5	394.9	283.1
#1	-.0000	-.0001	.0038	.0009	-.0331	-.0001	-.0116	-.0008	-.0000
#2	-.0005	-.0003	.0045	-.0007	.0060	-.0017	.0402	.0001	.0003
#3	-.0004	-.0000	.0047	-.0002	-.0206	-.0027	.0323	.0003	-.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0748**	**.0001**	**-.0040**	**.0009**	**.0036**	**-.0009**	**-.0007**	**.2241**	**.2991**
Stddev	.0155	.0002	.0015	.0005	.0027	.0001	.0018	.0051	.0019
%RSD	20.78	288.4	38.16	63.46	76.56	13.18	252.3	2.283	.6312
#1	.0662	-.0001	-.0023	.0004	.0067	-.0009	-.0017	.2294	.3009
#2	.0927	.0003	-.0043	.0008	.0023	-.0008	.0014	.2238	.2991
#3	.0654	.0001	-.0053	.0014	.0018	-.0011	-.0019	.2191	.2971
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29429-A-3-A@5 Acquired: 8/6/2018 15:14:24 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0001**	**-.0000**	**.0430**	**-.0005**	**.0191**	**-.0033**	**.0004**
Stddev	.0001	.0015	.0006	.0008	.0114	.0025	.0001
%RSD	91.68	7801.	1.397	165.2	59.39	74.08	26.81
#1	.0000	-.0008	.0423	-.0013	.0164	-.0007	.0004
#2	.0002	-.0011	.0433	-.0004	.0094	-.0038	.0003
#3	.0000	.0017	.0434	.0002	.0316	-.0055	.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3322.1**	**53564.**	**3839.6**
Stddev	34.2	195.	32.2
%RSD	1.0295	.36448	.83851
#1	3304.6	53736.	3867.4
#2	3300.3	53606.	3804.3
#3	3361.6	53352.	3847.1

Sample Name: CCVL Acquired: 8/6/2018 15:19:11 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0099**	**.2034**	**.0097**	**.0990**	**.0495**	**.0047**	**.2076**	**1.039**	**.0049**
Stddev	.0003	.0144	.0006	.0050	.0009	.0001	.0015	.010	.0001
%RSD	3.509	7.102	5.738	5.058	1.755	2.151	.7050	.9278	1.068
#1	.0095	.2045	.0094	.1033	.0505	.0048	.2062	1.029	.0049
#2	.0099	.2173	.0094	.0935	.0490	.0046	.2074	1.048	.0048
#3	.0102	.1885	.0104	.1002	.0489	.0048	.2091	1.041	.0049
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0521**	**.0105**	**.0267**	**.0987**	**4.868**	**.0477**	**1.011**	**.0151**	**.0404**
Stddev	.0006	.0002	.0018	.0028	.075	.0023	.010	.0003	.0004
%RSD	1.156	2.376	6.815	2.787	1.549	4.882	.9577	2.107	.9160
#1	.0514	.0103	.0250	.1001	4.953	.0459	1.022	.0155	.0399
#2	.0524	.0108	.0286	.0956	4.842	.0503	1.009	.0151	.0404
#3	.0524	.0103	.0266	.1005	4.810	.0468	1.003	.0149	.0407
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.019**	**.0421**	**.2697**	**.0109**	**4.869**	**.0092**	**.0129**	**.3658**	**.1024**
Stddev	.003	.0003	.0018	.0006	.045	.0011	.0007	.0050	.0004
%RSD	.2914	.8214	.6520	5.363	.9294	12.20	5.788	1.376	.3861
#1	1.022	.0418	.2686	.0112	4.819	.0104	.0131	.3714	.1019
#2	1.018	.0421	.2717	.0112	4.907	.0092	.0136	.3644	.1026
#3	1.016	.0424	.2687	.0102	4.882	.0081	.0121	.3616	.1026
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCVL Acquired: 8/6/2018 15:19:11 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0051**	**.1973**	**.0193**	**.0211**	**.4654**	**.0508**	**.0212**
Stddev	.0001	.0035	.0007	.0003	.0157	.0060	.0002
%RSD	2.084	1.761	3.392	1.603	3.370	11.84	.8067
#1	.0050	.1936	.0194	.0212	.4742	.0534	.0212
#2	.0052	.1978	.0186	.0213	.4473	.0440	.0214
#3	.0050	.2005	.0199	.0207	.4747	.0551	.0211
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3280.1**	**53956.**	**3895.0**
Stddev	22.5	215.	24.6
%RSD	.68574	.39771	.63124
#1	3305.3	54201.	3867.5
#2	3262.0	53799.	3902.7
#3	3273.0	53870.	3914.9

Sample Name: CCV Acquired: 8/6/2018 15:23:55 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9900**	**50.44**	**5.148**	**.9951**	**5.031**	**5.016**	**5.180**	**51.07**	**5.127**
Stddev	.0013	.48	.013	.0068	.057	.055	.009	.05	.008
%RSD	.1285	.9497	.2611	.6866	1.130	1.086	.1770	.1043	.1554
#1	.9908	50.99	5.144	1.001	5.095	5.079	5.186	51.04	5.132
#2	.9885	50.23	5.163	.9965	5.007	4.987	5.185	51.13	5.131
#3	.9907	50.10	5.136	.9876	4.989	4.983	5.170	51.04	5.118
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**5.139**	**5.158**	**5.127**	**49.72**	**50.35**	**5.067**	**49.71**	**4.945**	**1.035**
Stddev	.006	.009	.016	.61	.59	.054	.57	.047	.001
%RSD	.1118	.1674	.3105	1.223	1.175	1.059	1.142	.9455	.0795
#1	5.141	5.157	5.136	50.42	51.03	5.128	50.36	4.999	1.035
#2	5.143	5.167	5.137	49.40	50.07	5.044	49.43	4.917	1.035
#3	5.133	5.150	5.109	49.34	49.95	5.028	49.33	4.919	1.034
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**50.41**	**5.122**	**54.94**	**5.111**	**51.92**	**1.039**	**1.038**	**4.966**	**5.178**
Stddev	.52	.007	.09	.006	.10	.002	.003	.038	.004
%RSD	1.032	.1344	.1697	.1128	.1917	.1685	.2495	.7728	.0837
#1	51.00	5.123	54.95	5.111	51.94	1.038	1.040	5.010	5.181
#2	50.21	5.129	55.02	5.118	52.01	1.038	1.037	4.947	5.180
#3	50.02	5.115	54.84	5.106	51.81	1.041	1.035	4.941	5.173
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCV Acquired: 8/6/2018 15:23:55 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**5.131**	**5.037**	**4.998**	**1.051**	**5.055**	**4.994**	**5.181**
Stddev	.052	.002	.053	.001	.014	.036	.008
%RSD	1.011	.0318	1.058	.1335	.2696	.7308	.1475
#1	5.191	5.039	5.059	1.051	5.046	5.036	5.183
#2	5.109	5.036	4.974	1.053	5.047	4.973	5.188
#3	5.095	5.037	4.961	1.050	5.070	4.973	5.173
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3076.3**	**51285.**	**3815.8**
Stddev	5.0	216.	39.2
%RSD	.16140	.42102	1.0266
#1	3077.9	51372.	3775.1
#2	3080.2	51444.	3818.9
#3	3070.7	51039.	3853.3

Sample Name: CCB Acquired: 8/6/2018 15:28:11 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0005**	**.0189**	**.0014**	**.0065**	**.0002**	**.0002**	**-.0007**	**.0032**	**.0001**
Stddev	.0008	.0097	.0012	.0083	.0001	.0002	.0004	.0002	.0000
%RSD	150.8	51.42	84.11	127.9	49.30	137.4	58.43	6.952	45.56
#1	-.0002	.0302	.0026	.0107	.0001	.0004	-.0009	.0034	.0001
#2	-.0014	.0130	.0002	-.0031	.0003	.0000	-.0009	.0029	.0000
#3	.0000	.0137	.0016	.0119	.0002	.0000	-.0002	.0032	.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0001**	**.0001**	**.0014**	**.0028**	**.0419**	**.0013**	**.0108**	**-.0001**	**.0005**
Stddev	.0002	.0001	.0001	.0016	.0261	.0008	.0227	.0013	.0000
%RSD	250.6	86.72	6.297	56.40	62.24	59.59	209.8	1373.	8.214
#1	.0002	.0000	.0014	.0012	.0157	.0020	.0343	.0013	.0004
#2	-.0003	.0002	.0015	.0029	.0421	.0015	-.0111	-.0013	.0005
#3	-.0001	.0001	.0014	.0044	.0679	.0005	.0093	-.0003	.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0435**	**.0002**	**-.0003**	**.0005**	**.0051**	**-.0005**	**-.0016**	**-.0019**	**-.0003**
Stddev	.0138	.0004	.0023	.0012	.0013	.0016	.0017	.0012	.0002
%RSD	31.76	234.9	764.0	226.3	26.05	350.6	105.8	63.91	60.23
#1	.0582	.0005	-.0029	.0018	.0054	-.0013	-.0016	-.0032	-.0004
#2	.0308	-.0003	.0014	.0003	.0037	.0014	.0001	-.0008	-.0001
#3	.0416	.0003	.0006	-.0005	.0064	-.0015	-.0034	-.0016	-.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: CCB Acquired: 8/6/2018 15:28:11 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0001**	**.0015**	**.0009**	**.0012**	**.0174**	**-.0036**	**.0004**
Stddev	.0003	.0005	.0009	.0006	.0099	.0009	.0000
%RSD	215.6	30.78	94.45	50.04	56.53	25.46	8.052
#1	.0004	.0010	.0001	.0007	.0064	-.0035	.0004
#2	-.0002	.0018	.0008	.0018	.0253	-.0046	.0004
#3	.0002	.0018	.0019	.0010	.0207	-.0028	.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3335.7**	**53081.**	**3836.7**
Stddev	30.4	148.	16.5
%RSD	.91157	.27906	.43080
#1	3305.0	53242.	3838.1
#2	3365.8	53052.	3852.5
#3	3336.3	52950.	3819.6

Sample Name: 160-29429-A-7-A@5 Acquired: 8/6/2018 15:32:58 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0005**	**-.0014**	**.0013**	**.0067**	**.0002**	**-.0001**	**-.0010**	**2.861**	**-.0000**
Stddev	.0002	.0032	.0008	.0062	.0002	.0001	.0010	.015	.0001
%RSD	29.42	238.0	59.98	93.12	125.6	120.7	101.1	.5331	345.0
#1	-.0004	-.0036	.0005	.0100	.0003	-.0001	-.0018	2.861	-.0001
#2	-.0007	-.0028	.0013	-.0005	.0002	.0000	-.0013	2.876	.0001
#3	-.0005	.0024	.0020	.0106	-.0001	-.0002	.0001	2.845	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0003**	**.0001**	**.0029**	**-.0005**	**5.573**	**.0007**	**6.960**	**.0003**	**.0000**
Stddev	.0003	.0001	.0003	.0020	.084	.0006	.071	.0000	.0002
%RSD	103.0	117.7	8.757	411.1	1.501	79.32	1.021	15.65	489.9
#1	-.0006	.0001	.0031	.0012	5.556	.0013	6.886	.0002	.0002
#2	-.0005	-.0000	.0031	.0000	5.664	.0002	7.028	.0003	.0000
#3	.0001	.0002	.0026	-.0028	5.500	.0006	6.965	.0002	-.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**12.30**	**.0004**	**-.0013**	**.0002**	**.0054**	**.0005**	**-.0015**	**.0021**	**-.0003**
Stddev	.01	.0001	.0007	.0001	.0012	.0018	.0010	.0031	.0002
%RSD	.1146	35.67	53.88	34.43	22.22	382.5	70.93	148.1	72.75
#1	12.32	.0005	-.0005	.0001	.0061	-.0005	-.0020	.0028	-.0005
#2	12.30	.0004	-.0014	.0002	.0040	.0026	-.0003	-.0013	-.0001
#3	12.29	.0002	-.0018	.0003	.0061	-.0006	-.0021	.0049	-.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29429-A-7-A@5 Acquired: 8/6/2018 15:32:58 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0013**	**-.0013**	**-.0010**	**.0001**	**.0320**	**-.0006**	**.0003**
Stddev	.0001	.0013	.0005	.0001	.0048	.0029	.0001
%RSD	6.874	99.09	54.68	239.9	15.13	469.4	32.39
#1	.0014	-.0025	-.0016	.0001	.0312	-.0024	.0002
#2	.0012	-.0015	-.0006	.0001	.0276	-.0022	.0004
#3	.0013	.0001	-.0007	-.0001	.0371	.0028	.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3397.4**	**54326.**	**3902.1**
Stddev	13.7	41.	11.5
%RSD	.40242	.07541	.29565
#1	3405.6	54359.	3894.1
#2	3381.6	54280.	3915.3
#3	3405.0	54339.	3896.9

Sample Name: 160-29429-A-21-A@5 Acquired: 8/6/2018 15:37:44 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0006**	**.0057**	**.0004**	**.0040**	**.0001**	**-.0001**	**-.0016**	**.0105**	**-.0000**
Stddev	.0003	.0024	.0005	.0014	.0002	.0001	.0004	.0004	.0001
%RSD	51.19	43.07	114.6	35.15	141.9	96.93	22.29	3.576	520.6
#1	-.0002	.0034	.0005	.0024	-.0000	-.0001	-.0020	.0101	-.0001
#2	-.0008	.0054	-.0001	.0051	.0001	-.0003	-.0015	.0108	-.0001
#3	-.0007	.0082	.0008	.0045	.0003	-.0000	-.0013	.0105	.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0003**	**.0002**	**.0002**	**.0002**	**.0027**	**.0006**	**.0250**	**-.0000**	**-.0001**
Stddev	.0002	.0001	.0005	.0018	.0303	.0015	.0058	.0002	.0004
%RSD	69.54	44.26	247.4	994.3	1123.	249.9	22.98	1235.	455.3
#1	-.0001	.0002	.0002	-.0018	-.0311	.0023	.0184	.0001	-.0004
#2	-.0004	.0001	.0006	.0018	.0274	.0003	.0282	-.0003	-.0002
#3	-.0003	.0003	-.0003	.0006	.0117	-.0007	.0285	.0001	.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**35.73**	**.0072**	**.0006**	**-.0249**	**.0049**	**-.0013**	**-.0016**	F **20.05**	**-.0004**
Stddev	.05	.0001	.0010	.0007	.0013	.0009	.0013	.10	.0005
%RSD	.1424	1.474	179.4	2.696	27.35	65.14	77.88	.4760	110.0
#1	35.69	.0073	.0012	-.0244	.0063	-.0003	-.0030	20.01	-.0008
#2	35.79	.0071	.0011	-.0256	.0037	-.0020	-.0013	20.15	-.0007
#3	35.72	.0071	-.0006	-.0247	.0046	-.0017	-.0006	19.97	.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass
High Limit								10.00	
Low Limit								-500.0	

Sample Name: 160-29429-A-21-A@5 Acquired: 8/6/2018 15:37:44 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0000**	**-.0024**	**.0017**	**.0007**	**.0043**	**-.0013**	**.0003**
Stddev	.0002	.0026	.0012	.0008	.0144	.0012	.0000
%RSD	1593.	106.4	70.89	118.6	335.9	90.66	8.886
#1	-.0001	-.0027	.0019	.0002	-.0112	-.0024	.0003
#2	-.0001	.0003	.0028	.0017	.0173	-.0015	.0003
#3	.0002	-.0048	.0004	.0003	.0068	-.0000	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3355.9**	**53424.**	**3841.3**
Stddev	16.7	586.	26.2
%RSD	.49716	1.0966	.68077
#1	3375.1	52780.	3871.2
#2	3347.7	53925.	3822.4
#3	3345.0	53566.	3830.4

Sample Name: 160-29429-A-22-A@5 Acquired: 8/6/2018 15:42:30 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0001**	**.0025**	**.0003**	**.0076**	**.0002**	**-.0001**	**-.0016**	**.0084**	**-.0001**
Stddev	.0003	.0121	.0002	.0006	.0001	.0001	.0020	.0002	.0001
%RSD	238.5	490.1	48.84	7.488	25.09	108.3	126.0	2.277	145.5
#1	-.0002	.0142	.0002	.0075	.0002	-.0002	-.0036	.0082	-.0002
#2	.0004	-.0100	.0005	.0070	.0001	-.0001	.0003	.0084	-.0001
#3	.0003	.0032	.0002	.0081	.0002	-.0000	-.0013	.0086	.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0002**	**.0001**	**.0019**	**.0003**	**-.0145**	**.0307**	**.0310**	**-.0004**	**.0003**
Stddev	.0001	.0000	.0011	.0033	.0684	.0021	.0380	.0005	.0003
%RSD	47.61	31.57	58.85	1232.	470.5	6.767	122.9	131.0	112.0
#1	-.0002	.0001	.0012	-.0034	.0322	.0296	-.0079	.0001	-.0001
#2	-.0002	.0002	.0013	.0014	.0172	.0331	.0328	-.0003	.0006
#3	-.0004	.0002	.0032	.0028	-.0931	.0294	.0681	-.0010	.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0307**	**-.0001**	**-.0014**	**.0007**	**.0034**	**.0005**	**-.0016**	**.0149**	**-.0009**
Stddev	.0121	.0001	.0006	.0004	.0006	.0022	.0016	.0041	.0006
%RSD	39.40	182.3	38.86	57.84	18.21	485.2	100.0	27.40	68.50
#1	.0364	-.0002	-.0021	.0005	.0027	.0027	-.0007	.0124	-.0011
#2	.0168	.0000	-.0011	.0012	.0039	.0004	-.0034	.0126	-.0002
#3	.0388	.0000	-.0011	.0005	.0036	-.0017	-.0006	.0196	-.0014
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29429-A-22-A@5 Acquired: 8/6/2018 15:42:30 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0001**	**-.0022**	**.0003**	**.0007**	**.0053**	**-.0028**	**.0004**
Stddev	.0001	.0016	.0009	.0011	.0111	.0030	.0001
%RSD	84.58	74.35	315.1	153.2	210.0	106.7	31.85
#1	-.0000	-.0017	-.0008	-.0002	-.0067	-.0002	.0002
#2	-.0002	-.0040	.0007	.0004	.0151	-.0061	.0004
#3	-.0001	-.0009	.0009	.0019	.0075	-.0022	.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3378.7**	**53779.**	**3903.7**
Stddev	14.8	231.	61.6
%RSD	.43903	.42881	1.5771
#1	3368.1	54034.	3973.9
#2	3372.4	53586.	3878.4
#3	3395.6	53717.	3858.9

Sample Name: 160-29429-A-1-A@10 Acquired: 8/6/2018 15:47:18 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0716**	**.2359**	**.0342**	**.1557**	**.0312**	**.0233**	**.0014**	**.0087**	**.0461**
Stddev	.0008	.0123	.0009	.0059	.0004	.0002	.0014	.0005	.0002
%RSD	1.076	5.211	2.608	3.790	1.243	.7757	100.0	5.505	.4828
#1	.0718	.2273	.0335	.1494	.0308	.0233	.0011	.0086	.0462
#2	.0722	.2304	.0340	.1612	.0312	.0231	.0002	.0092	.0463
#3	.0707	.2499	.0352	.1565	.0316	.0235	.0030	.0082	.0458
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0402**	**.0467**	**.0470**	**.3152**	**-.0047**	**-.0019**	**.0420**	**.1647**	**.0060**
Stddev	.0005	.0003	.0020	.0026	.0360	.0023	.0302	.0008	.0003
%RSD	1.140	.5507	4.254	.8252	759.4	122.7	71.86	.5038	4.602
#1	.0405	.0469	.0493	.3163	-.0211	-.0040	.0589	.1656	.0061
#2	.0404	.0467	.0457	.3123	-.0296	-.0022	.0072	.1639	.0062
#3	.0397	.0464	.0460	.3171	.0365	.0006	.0599	.1647	.0057
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0431**	**.1804**	**.0007**	**.0547**	**.0044**	**.0227**	**.0158**	**.0124**	**-.0001**
Stddev	.0139	.0005	.0010	.0005	.0007	.0016	.0009	.0059	.0005
%RSD	32.18	.2825	143.5	.8499	15.83	6.867	5.433	47.99	499.4
#1	.0287	.1810	-.0005	.0550	.0052	.0244	.0148	.0140	-.0006
#2	.0563	.1800	.0013	.0550	.0039	.0221	.0163	.0058	.0005
#3	.0444	.1803	.0013	.0542	.0042	.0215	.0162	.0173	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29429-A-1-A@10 Acquired: 8/6/2018 15:47:18 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0391**	**-.0007**	**-.0004**	**.0347**	**.0201**	**.0258**	**.0555**
Stddev	.0003	.0023	.0007	.0011	.0134	.0022	.0002
%RSD	.6715	328.3	193.7	3.233	66.52	8.339	.3819
#1	.0393	-.0028	-.0010	.0360	.0158	.0244	.0558
#2	.0388	.0017	.0004	.0341	.0351	.0283	.0554
#3	.0391	-.0010	-.0004	.0340	.0094	.0248	.0555
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3433.8**	**54689.**	**3894.9**
Stddev	5.5	417.	39.9
%RSD	.15874	.76207	1.0243
#1	3429.3	54247.	3860.2
#2	3439.9	54744.	3938.5
#3	3432.3	55076.	3886.0

Sample Name: 160-29429-A-1-ASD@50 Acquired: 8/6/2018 15:52:00 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0140**	**.0532**	**.0070**	**.0356**	**.0061**	**.0046**	**-.0002**	**.0109**	**.0090**
Stddev	.0006	.0120	.0010	.0041	.0004	.0002	.0016	.0006	.0001
%RSD	4.222	22.56	14.96	11.56	6.495	4.205	775.1	5.394	1.117
#1	.0134	.0471	.0071	.0397	.0060	.0044	.0006	.0105	.0089
#2	.0146	.0670	.0079	.0315	.0058	.0046	-.0020	.0116	.0091
#3	.0140	.0454	.0059	.0357	.0066	.0048	.0007	.0107	.0090
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0078**	**.0092**	**.0116**	**.0712**	**.0218**	**.0012**	**.0173**	**.0325**	**.0011**
Stddev	.0001	.0001	.0012	.0043	.0666	.0009	.0340	.0003	.0001
%RSD	1.672	.8294	10.04	6.083	305.1	69.00	196.8	1.059	10.91
#1	.0078	.0092	.0114	.0668	.0590	.0003	.0279	.0322	.0010
#2	.0076	.0093	.0105	.0715	.0616	.0015	.0447	.0325	.0012
#3	.0079	.0091	.0128	.0754	-.0551	.0019	-.0208	.0329	.0011
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0203**	**.0355**	**-.0014**	**.0117**	**.0042**	**.0055**	**.0026**	**.0026**	**-.0002**
Stddev	.0027	.0002	.0002	.0010	.0014	.0002	.0004	.0033	.0006
%RSD	13.42	.6563	13.22	8.419	33.38	2.756	15.08	129.9	332.6
#1	.0232	.0354	-.0012	.0128	.0057	.0057	.0027	.0062	-.0006
#2	.0200	.0354	-.0014	.0109	.0041	.0054	.0030	.0019	-.0005
#3	.0178	.0358	-.0016	.0115	.0029	.0055	.0022	-.0004	.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29429-A-1-ASD@50 Acquired: 8/6/2018 15:52:00 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0077**	**-.0022**	**-.0010**	**.0082**	**.0211**	**.0044**	**.0113**
Stddev	.0002	.0022	.0012	.0009	.0111	.0013	.0001
%RSD	2.203	101.3	119.5	10.64	52.36	29.24	1.231
#1	.0078	.0004	.0004	.0073	.0088	.0050	.0113
#2	.0078	-.0035	-.0015	.0084	.0243	.0029	.0114
#3	.0075	-.0034	-.0018	.0090	.0302	.0052	.0112
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3421.5**	**54250.**	**3871.4**
Stddev	7.8	425.	19.0
%RSD	.22761	.78363	.48957
#1	3412.5	53952.	3863.3
#2	3425.2	54737.	3857.9
#3	3426.6	54060.	3893.1

Sample Name: 160-29429-A-1-BMS@10 Acquired: 8/6/2018 15:56:47 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0934**	**1.241**	**.1341**	**.1795**	**.1373**	**.0332**	**.1046**	**1.048**	**.1458**
Stddev	.0006	.015	.0007	.0044	.0005	.0001	.0014	.005	.0002
%RSD	.6010	1.185	.4996	2.437	.3648	.2726	1.347	.4494	.1198
#1	.0937	1.224	.1347	.1771	.1379	.0333	.1030	1.047	.1457
#2	.0936	1.249	.1334	.1769	.1369	.0331	.1052	1.053	.1460
#3	.0927	1.251	.1343	.1846	.1373	.0333	.1057	1.044	.1457
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1442**	**.1496**	**.1501**	**1.344**	**.9934**	**.0098**	**1.000**	**.2668**	**.0556**
Stddev	.0005	.0005	.0012	.005	.0397	.0010	.004	.0014	.0003
%RSD	.3485	.3456	.7775	.3881	3.992	10.54	.4349	.5154	.4943
#1	.1446	.1495	.1506	1.344	.9670	.0089	.9952	.2683	.0559
#2	.1443	.1501	.1488	1.349	.9741	.0109	1.003	.2657	.0554
#3	.1436	.1490	.1510	1.339	1.039	.0096	1.002	.2664	.0554
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.043**	**.2865**	**.1092**	**.1580**	**.9745**	**.0729**	**.0662**	**.4748**	**.1017**
Stddev	.010	.0011	.0017	.0007	.0046	.0022	.0010	.0048	.0009
%RSD	.9640	.3935	1.533	.4690	.4724	2.955	1.582	1.007	.8936
#1	1.036	.2864	.1074	.1574	.9780	.0704	.0653	.4694	.1008
#2	1.054	.2876	.1096	.1588	.9763	.0737	.0674	.4784	.1026
#3	1.039	.2854	.1106	.1578	.9693	.0745	.0660	.4766	.1016
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29429-A-1-BMS@10 Acquired: 8/6/2018 15:56:47 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.1438	.1014	.0992	.0572	.1350	.1250	.1575
Stddev	.0002	.0013	.0007	.0009	.0100	.0019	.0004
%RSD	.1402	1.233	.6707	1.549	7.435	1.544	.2821
#1	.1438	.1025	.0991	.0563	.1395	.1227	.1576
#2	.1437	.1000	.0986	.0573	.1419	.1259	.1579
#3	.1441	.1018	.0999	.0581	.1235	.1262	.1570
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3389.8	54106.	3932.4
Stddev	18.5	247.	26.2
%RSD	.54666	.45592	.66620
#1	3388.3	54003.	3903.4
#2	3372.0	53927.	3939.8
#3	3409.0	54388.	3954.2

Sample Name: 160-29429-A-1CMSD@10 Acquired: 8/6/2018 16:01:21 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0889**	**1.193**	**.1298**	**.1704**	**.1336**	**.0325**	**.1005**	**1.006**	**.1412**
Stddev	.0009	.006	.0002	.0031	.0002	.0000	.0010	.001	.0002
%RSD	1.047	.5290	.1746	1.833	.1579	.0797	1.009	.0942	.1439
#1	.0900	1.185	.1300	.1722	.1333	.0324	.1016	1.007	.1412
#2	.0885	1.196	.1299	.1723	.1336	.0325	.0997	1.006	.1414
#3	.0883	1.196	.1296	.1668	.1337	.0325	.1002	1.006	.1410
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1403**	**.1443**	**.1452**	**1.321**	**.9851**	**.0098**	**1.016**	**.2602**	**.0545**
Stddev	.0009	.0003	.0005	.004	.0113	.0021	.005	.0004	.0002
%RSD	.6106	.2055	.3665	.2937	1.152	21.41	.5328	.1380	.3466
#1	.1412	.1446	.1453	1.318	.9741	.0074	1.015	.2602	.0543
#2	.1403	.1443	.1456	1.325	.9843	.0112	1.012	.2606	.0545
#3	.1395	.1441	.1446	1.319	.9967	.0108	1.022	.2599	.0546
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.026**	**.2761**	**.1058**	**.1533**	**.9473**	**.0693**	**.0645**	**.4674**	**.1003**
Stddev	.005	.0007	.0003	.0004	.0012	.0009	.0026	.0128	.0005
%RSD	.5060	.2497	.2801	.2405	.1274	1.252	4.096	2.733	.4827
#1	1.022	.2768	.1062	.1533	.9468	.0684	.0630	.4532	.1000
#2	1.024	.2761	.1058	.1536	.9487	.0701	.0675	.4779	.1001
#3	1.032	.2755	.1056	.1529	.9465	.0692	.0629	.4710	.1009
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29429-A-1CMSD@10 Acquired: 8/6/2018 16:01:21 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1397**	**.0970**	**.0970**	**.0550**	**.1271**	**.1229**	**.1525**
Stddev	.0005	.0021	.0022	.0004	.0099	.0027	.0004
%RSD	.3863	2.176	2.292	.7528	7.815	2.203	.2399
#1	.1398	.0952	.0995	.0554	.1370	.1258	.1526
#2	.1402	.0994	.0957	.0546	.1171	.1224	.1528
#3	.1392	.0965	.0957	.0552	.1273	.1205	.1521
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3443.6**	**54370.**	**3919.5**
Stddev	8.0	20.	5.6
%RSD	.23365	.03731	.14351
#1	3434.4	54346.	3913.7
#2	3448.0	54378.	3919.9
#3	3448.6	54384.	3925.0

Sample Name: 160-29429-A-3-A@10 Acquired: 8/6/2018 16:05:54 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0011**	**.0040**	**-.0001**	**.0181**	**-.0000**	**-.0001**	**-.0017**	**.0073**	**-.0001**
Stddev	.0005	.0143	.0012	.0074	.0001	.0001	.0009	.0003	.0002
%RSD	41.69	360.3	1843.	41.06	447.6	117.1	51.61	4.037	197.0
#1	-.0009	.0154	-.0014	.0179	.0000	-.0002	-.0014	.0073	-.0001
#2	-.0007	.0086	.0011	.0256	.0000	-.0000	-.0011	.0070	.0001
#3	-.0016	-.0120	.0000	.0108	-.0001	-.0000	-.0028	.0076	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0001**	**-.0000**	**.0029**	**-.0008**	**.0471**	**.0001**	**.0296**	**-.0006**	**.0001**
Stddev	.0003	.0002	.0009	.0029	.0424	.0005	.0361	.0002	.0002
%RSD	219.4	503.0	30.76	367.8	90.06	608.9	122.0	27.02	213.3
#1	-.0000	-.0000	.0026	-.0018	.0300	.0007	.0405	-.0004	-.0000
#2	.0001	-.0002	.0040	-.0030	.0159	-.0002	.0589	-.0006	-.0000
#3	-.0005	.0001	.0022	.0025	.0954	-.0002	-.0107	-.0007	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0236**	**-.0000**	**-.0010**	**.0005**	**.0034**	**.0000**	**-.0017**	**.1029**	**.1474**
Stddev	.0075	.0001	.0015	.0003	.0012	.0009	.0015	.0056	.0008
%RSD	31.96	332.4	155.2	50.98	33.91	2891.	87.28	5.454	.5698
#1	.0196	-.0001	-.0016	.0002	.0037	-.0010	-.0027	.1093	.1483
#2	.0188	-.0000	-.0020	.0007	.0022	.0008	-.0024	.0995	.1466
#3	.0322	.0000	.0008	.0007	.0045	.0003	.0000	.0997	.1472
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29429-A-3-A@10 Acquired: 8/6/2018 16:05:54 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0000**	**.0002**	**.0215**	**.0001**	**.0250**	**-.0012**	**.0003**
Stddev	.0002	.0017	.0010	.0013	.0178	.0014	.0001
%RSD	524.9	945.7	4.704	1146.	71.32	114.8	20.38
#1	.0000	.0001	.0221	.0016	.0442	-.0027	.0004
#2	.0001	.0020	.0221	-.0010	.0218	-.0000	.0003
#3	-.0002	-.0015	.0204	-.0002	.0090	-.0009	.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3400.2**	**53789.**	**3873.3**
Stddev	7.3	287.	10.7
%RSD	.21596	.53363	.27583
#1	3393.1	53797.	3862.5
#2	3407.8	53498.	3883.9
#3	3399.8	54072.	3873.5

Sample Name: 160-29429-A-7-A@10 Acquired: 8/6/2018 16:10:41 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0003**	**-.0092**	**.0003**	**.0001**	**.0001**	**-.0001**	**-.0011**	**1.467**	**-.0002**
Stddev	.0001	.0085	.0015	.0064	.0002	.0000	.0023	.002	.0000
%RSD	38.60	92.42	430.1	4961.	138.1	79.92	214.0	.1342	24.52
#1	-.0004	-.0130	-.0010	.0045	.0004	-.0000	-.0033	1.465	-.0002
#2	-.0003	-.0152	.0019	.0032	.0001	-.0001	.0013	1.468	-.0001
#3	-.0002	.0005	.0001	-.0073	-.0000	-.0000	-.0012	1.469	-.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0003**	**.0000**	**.0037**	**-.0004**	**2.840**	**-.0012**	**3.558**	**.0001**	**.0002**
Stddev	.0001	.0001	.0007	.0028	.039	.0004	.022	.0003	.0001
%RSD	42.00	264.1	19.45	787.3	1.356	35.44	.6193	387.6	38.10
#1	-.0004	.0001	.0045	.0028	2.881	-.0007	3.567	.0004	.0001
#2	-.0002	.0001	.0035	-.0016	2.834	-.0014	3.533	.0001	.0002
#3	-.0004	-.0001	.0031	-.0023	2.805	-.0014	3.574	-.0003	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**6.246**	**.0001**	**-.0014**	**.0012**	**.0049**	**.0009**	**-.0016**	**-.0027**	**-.0002**
Stddev	.001	.0003	.0012	.0004	.0011	.0019	.0000	.0013	.0007
%RSD	.0192	281.6	85.04	34.34	22.84	205.0	1.249	46.77	344.2
#1	6.247	-.0001	-.0003	.0015	.0051	-.0009	-.0016	-.0014	.0004
#2	6.245	.0004	-.0013	.0007	.0037	.0007	-.0016	-.0028	-.0010
#3	6.246	.0000	-.0027	.0013	.0060	.0029	-.0016	-.0039	.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29429-A-7-A@10 Acquired: 8/6/2018 16:10:41 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0006**	**-.0008**	**.0012**	**.0005**	**.0233**	**-.0010**	**.0003**
Stddev	.0001	.0008	.0009	.0008	.0038	.0036	.0000
%RSD	8.942	103.2	79.55	157.9	16.09	362.9	2.013
#1	.0006	.0000	.0001	.0008	.0204	.0030	.0003
#2	.0007	-.0008	.0019	.0012	.0276	-.0020	.0003
#3	.0006	-.0016	.0014	-.0004	.0221	-.0039	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3375.0**	**54318.**	**3891.9**
Stddev	7.5	195.	16.4
%RSD	.22231	.35928	.42177
#1	3383.7	54388.	3887.2
#2	3370.3	54098.	3878.4
#3	3371.1	54469.	3910.2

Sample Name: 160-29429-A-21-A@10 Acquired: 8/6/2018 16:15:27 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0009**	**.0144**	**.0007**	**-.0000**	**-.0000**	**-.0001**	**-.0016**	**.0078**	**-.0000**
Stddev	.0010	.0089	.0007	.0065	.0003	.0001	.0006	.0002	.0002
%RSD	110.8	61.43	100.9	20580.	735.5	151.4	35.82	3.102	2488.
#1	-.0004	.0244	.0001	-.0038	.0003	-.0001	-.0020	.0078	-.0002
#2	-.0003	.0076	.0015	-.0037	-.0002	.0000	-.0017	.0076	.0002
#3	-.0021	.0112	.0005	.0075	-.0002	-.0002	-.0009	.0081	.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0004**	**.0001**	**.0020**	**-.0017**	**.0144**	**.0003**	**.0348**	**-.0004**	**-.0002**
Stddev	.0001	.0000	.0012	.0035	.0365	.0024	.0280	.0002	.0002
%RSD	32.70	32.75	59.89	213.2	254.0	945.5	80.44	54.43	120.8
#1	-.0002	.0002	.0025	-.0055	.0505	.0026	.0481	-.0002	-.0003
#2	-.0004	.0001	.0006	-.0008	.0151	.0004	.0537	-.0004	.0001
#3	-.0004	.0001	.0029	.0014	-.0225	-.0022	.0026	-.0007	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**17.94**	**.0035**	**-.0009**	**-.0131**	**.0030**	**-.0011**	**-.0000**	**9.999**	**-.0008**
Stddev	.07	.0001	.0011	.0006	.0007	.0007	.0021	.009	.0004
%RSD	.3851	2.689	121.5	4.600	22.83	63.48	4308.	.0948	47.78
#1	18.02	.0034	.0003	-.0138	.0032	-.0004	.0005	10.01	-.0006
#2	17.89	.0034	-.0018	-.0127	.0023	-.0012	.0017	9.991	-.0012
#3	17.91	.0036	-.0012	-.0127	.0036	-.0018	-.0024	9.996	-.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29429-A-21-A@10 Acquired: 8/6/2018 16:15:27 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0000**	**-.0020**	**.0012**	**.0011**	**.0255**	**.0001**	**.0003**
Stddev	.0001	.0013	.0004	.0003	.0167	.0030	.0001
%RSD	1538.	63.39	32.41	26.51	65.34	3891.	30.79
#1	-.0001	-.0006	.0012	.0008	.0063	.0024	.0002
#2	-.0000	-.0023	.0016	.0014	.0353	.0012	.0003
#3	.0001	-.0031	.0008	.0010	.0349	-.0034	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3421.8**	**54013.**	**3871.2**
Stddev	6.9	99.	30.3
%RSD	.20113	.18316	.78331
#1	3418.6	54125.	3836.1
#2	3429.7	53973.	3888.2
#3	3417.1	53939.	3889.2

Sample Name: CCVL Acquired: 8/6/2018 16:20:14 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0099**	**.2056**	**.0113**	**.1033**	**.0497**	**.0049**	**.2003**	**1.004**	**.0048**
Stddev	.0007	.0015	.0005	.0052	.0006	.0001	.0018	.003	.0001
%RSD	6.579	.7054	4.243	4.989	1.270	1.876	.8825	.2790	2.060
#1	.0102	.2048	.0117	.1028	.0504	.0048	.1998	1.007	.0049
#2	.0104	.2073	.0107	.1087	.0492	.0050	.1987	1.002	.0047
#3	.0092	.2047	.0113	.0984	.0495	.0049	.2022	1.004	.0048
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0509**	**.0101**	**.0256**	**.1014**	**4.907**	**.0488**	**1.019**	**.0148**	**.0392**
Stddev	.0001	.0001	.0004	.0048	.077	.0024	.024	.0004	.0001
%RSD	.2270	.9188	1.662	4.711	1.566	4.936	2.336	2.876	.1537
#1	.0510	.0101	.0253	.1062	4.995	.0509	1.047	.0152	.0391
#2	.0508	.0100	.0261	.1013	4.867	.0492	1.010	.0148	.0392
#3	.0509	.0101	.0255	.0967	4.858	.0462	1.002	.0143	.0392
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.025**	**.0412**	**.2671**	**.0097**	**4.779**	**.0095**	**.0143**	**.3680**	**.1006**
Stddev	.012	.0001	.0018	.0017	.011	.0003	.0017	.0121	.0002
%RSD	1.163	.3477	.6657	17.19	.2228	3.375	12.17	3.282	.1853
#1	1.018	.0410	.2651	.0092	4.770	.0098	.0126	.3813	.1004
#2	1.039	.0412	.2678	.0084	4.777	.0094	.0160	.3652	.1007
#3	1.018	.0413	.2685	.0116	4.790	.0092	.0143	.3577	.1008
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCVL Acquired: 8/6/2018 16:20:14 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0052**	**.1951**	**.0186**	**.0205**	**.4885**	**.0482**	**.0207**
Stddev	.0002	.0022	.0007	.0007	.0157	.0046	.0000
%RSD	2.942	1.121	3.747	3.336	3.212	9.447	.0624
#1	.0053	.1971	.0189	.0212	.4761	.0534	.0207
#2	.0052	.1927	.0191	.0199	.4833	.0452	.0207
#3	.0050	.1954	.0178	.0204	.5062	.0459	.0207
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3366.3**	**53462.**	**3785.3**
Stddev	5.5	108.	26.0
%RSD	.16368	.20173	.68796
#1	3359.9	53366.	3765.3
#2	3369.1	53578.	3775.7
#3	3369.8	53441.	3814.7

Sample Name: CCV Acquired: 8/6/2018 16:24:59 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.008**	**50.24**	**5.012**	**.9894**	**5.023**	**5.004**	**5.010**	**50.09**	**5.012**
Stddev	.004	.28	.034	.0177	.021	.020	.036	.33	.033
%RSD	.4487	.5645	.6816	1.788	.4137	.3993	.7263	.6672	.6531
#1	1.003	50.10	5.023	.9766	5.012	4.992	5.019	50.27	5.024
#2	1.012	50.05	5.040	.9821	5.010	4.993	5.041	50.29	5.037
#3	1.008	50.56	4.974	1.010	5.047	5.027	4.970	49.70	4.975
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**5.036**	**5.033**	**5.001**	**50.18**	**50.75**	**5.038**	**50.71**	**4.969**	**1.008**
Stddev	.029	.034	.031	.22	.25	.024	.38	.019	.006
%RSD	.5808	.6688	.6179	.4443	.4997	.4704	.7484	.3772	.6443
#1	5.050	5.046	5.012	50.05	50.67	5.029	50.59	4.964	1.011
#2	5.055	5.058	5.026	50.07	50.55	5.019	50.40	4.954	1.013
#3	5.002	4.994	4.967	50.44	51.03	5.064	51.13	4.990	1.001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**50.67**	**5.035**	**53.90**	**5.048**	**50.77**	**1.006**	**1.013**	**5.051**	**5.092**
Stddev	.24	.028	.33	.030	.31	.007	.005	.032	.025
%RSD	.4643	.5576	.6061	.5945	.6012	.6898	.4774	.6418	.4917
#1	50.54	5.049	54.04	5.064	50.88	1.007	1.015	5.029	5.102
#2	50.53	5.053	54.14	5.066	51.01	1.013	1.017	5.037	5.111
#3	50.95	5.003	53.53	5.013	50.43	.9990	1.008	5.088	5.064
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCV Acquired: 8/6/2018 16:24:59 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**5.072**	**5.103**	**4.978**	**1.024**	**5.112**	**4.993**	**5.071**
Stddev	.021	.030	.022	.004	.044	.024	.028
%RSD	.4054	.5935	.4431	.4118	.8619	.4777	.5505
#1	5.067	5.074	4.961	1.025	5.065	4.977	5.084
#2	5.055	5.134	4.969	1.028	5.120	4.982	5.091
#3	5.095	5.102	5.003	1.019	5.152	5.021	5.039
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3099.6**	**48671.**	**3479.4**
Stddev	13.7	266.	25.0
%RSD	.44152	.54720	.71850
#1	3090.1	48510.	3489.4
#2	3093.3	48524.	3497.8
#3	3115.3	48978.	3450.9

Sample Name: CCB Acquired: 8/6/2018 16:29:14 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0002**	**.0043**	**.0017**	**.0024**	**.0004**	**.0003**	**-.0009**	**.0030**	**.0001**
Stddev	.0005	.0043	.0013	.0022	.0003	.0004	.0021	.0007	.0001
%RSD	303.8	98.92	74.24	91.17	71.43	161.0	225.9	24.99	150.0
#1	-.0001	.0092	.0023	.0048	.0006	.0008	.0002	.0033	.0001
#2	-.0008	.0019	.0026	.0019	.0005	.0000	-.0033	.0021	.0002
#3	.0003	.0018	.0003	.0005	.0001	.0000	.0003	.0035	-.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0004**	**.0001**	**.0013**	**.0068**	**-.0075**	**.0001**	**.0312**	**.0008**	**.0004**
Stddev	.0003	.0001	.0011	.0034	.0571	.0015	.0439	.0005	.0001
%RSD	86.02	95.38	85.67	50.95	763.6	2662.	140.5	62.64	35.86
#1	-.0003	.0001	.0000	.0105	.0575	-.0016	.0819	.0013	.0003
#2	-.0007	.0002	.0020	.0060	-.0306	.0012	.0069	.0010	.0006
#3	-.0001	.0000	.0017	.0037	-.0493	.0006	.0049	.0003	.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0301**	**.0002**	**-.0019**	**.0006**	**.0077**	**-.0005**	**-.0019**	**.0015**	**-.0004**
Stddev	.0075	.0003	.0007	.0017	.0014	.0008	.0008	.0066	.0006
%RSD	25.02	220.8	35.05	271.3	17.94	167.4	43.52	425.7	132.4
#1	.0234	-.0002	-.0026	-.0008	.0078	-.0002	-.0019	.0059	-.0010
#2	.0382	.0003	-.0015	.0001	.0090	.0001	-.0028	.0048	-.0003
#3	.0286	.0004	-.0015	.0025	.0062	-.0014	-.0011	-.0060	.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: CCB Acquired: 8/6/2018 16:29:14 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0002	-.0005	.0008	.0006	.0042	-.0012	.0003
Stddev	.0004	.0007	.0009	.0002	.0075	.0005	.0001
%RSD	272.4	128.8	112.1	41.59	179.0	43.97	26.74
#1	.0007	-.0001	.0019	.0003	-.0029	-.0010	.0002
#2	-.0000	-.0013	.0005	.0006	.0121	-.0019	.0004
#3	-.0002	-.0002	.0001	.0008	.0034	-.0009	.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3340.9	52860.	3814.4
Stddev	15.1	141.	49.7
%RSD	.45281	.26741	1.3017
#1	3326.7	52903.	3871.5
#2	3339.1	52975.	3781.1
#3	3356.8	52702.	3790.6

Sample Name: 160-29429-A-22-A@10 Acquired: 8/6/2018 16:34:01 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0006**	**.0087**	**-.0003**	**.0033**	**.0002**	**-.0000**	**.0008**	**.0084**	**-.0000**
Stddev	.0002	.0161	.0004	.0019	.0005	.0001	.0009	.0002	.0000
%RSD	38.88	186.2	130.6	58.34	236.8	707.6	109.2	2.200	27.42
#1	-.0008	.0183	-.0007	.0043	.0008	.0001	.0015	.0084	-.0000
#2	-.0006	-.0100	-.0003	.0046	-.0000	-.0001	.0010	.0083	-.0001
#3	-.0004	.0176	.0001	.0011	-.0001	-.0001	-.0002	.0086	-.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0005**	**-.0000**	**.0039**	**.0048**	**-.0497**	**.0155**	**.0426**	**-.0001**	**.0002**
Stddev	.0002	.0001	.0005	.0043	.0325	.0002	.0188	.0004	.0003
%RSD	33.74	258.0	12.75	89.55	65.33	1.602	44.19	877.4	128.5
#1	-.0007	-.0001	.0044	.0095	-.0329	.0158	.0599	-.0004	.0003
#2	-.0006	-.0000	.0035	.0039	-.0871	.0155	.0226	.0004	-.0001
#3	-.0003	.0000	.0036	.0011	-.0290	.0153	.0452	-.0002	.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0293**	**-.0000**	**-.0006**	**.0005**	**.0040**	**.0002**	**-.0024**	**.0112**	**-.0003**
Stddev	.0063	.0002	.0015	.0008	.0027	.0019	.0005	.0055	.0003
%RSD	21.39	11740.	275.6	167.9	67.92	1108.	22.48	49.18	109.1
#1	.0365	-.0002	-.0012	-.0002	.0068	-.0016	-.0018	.0131	-.0007
#2	.0257	-.0000	-.0016	.0014	.0041	.0000	-.0028	.0155	.0000
#3	.0256	.0002	.0012	.0003	.0013	.0021	-.0027	.0050	-.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29429-A-22-A@10 Acquired: 8/6/2018 16:34:01 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0001**	**-.0019**	**.0003**	**-.0001**	**.0245**	**.0005**	**.0004**
Stddev	.0003	.0011	.0003	.0009	.0175	.0035	.0001
%RSD	431.8	60.00	124.0	1794.	71.28	654.7	21.38
#1	.0004	-.0006	.0003	-.0007	.0361	-.0006	.0005
#2	-.0001	-.0029	.0006	-.0004	.0330	-.0022	.0003
#3	-.0000	-.0021	-.0001	.0010	.0044	.0044	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3449.1**	**54882.**	**3912.3**
Stddev	8.9	181.	20.3
%RSD	.25783	.32926	.51868
#1	3444.3	55041.	3894.1
#2	3443.7	54686.	3908.4
#3	3459.4	54920.	3934.2

Sample Name: LRC Acquired: 8/6/2018 16:38:48 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment: LRC

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.940**	**98.23**	**9.929**	**1.938**	**9.847**	**9.632**	**9.970**	**94.78**	**9.785**
Stddev	.002	.08	.048	.002	.094	.020	.062	.41	.048
%RSD	.1210	.0864	.4785	.1206	.9493	.2066	.6250	.4340	.4918
#1	1.941	98.32	9.972	1.936	9.922	9.650	10.04	95.22	9.834
#2	1.942	98.16	9.937	1.939	9.742	9.610	9.962	94.71	9.783
#3	1.938	98.20	9.878	1.940	9.876	9.636	9.912	94.41	9.738
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**9.761**	F **9.832**	**9.939**	**96.09**	**99.32**	**9.947**	**96.55**	**9.609**	**1.986**
Stddev	.044	.049	.056	.21	.15	.026	.28	.011	.013
%RSD	.4470	.4945	.5609	.2184	.1517	.2634	.2875	.1117	.6614
#1	9.805	9.881	9.990	96.32	99.47	9.972	96.37	9.614	2.000
#2	9.759	9.831	9.947	95.91	99.17	9.919	96.87	9.597	1.984
#3	9.718	9.784	9.879	96.05	99.30	9.950	96.41	9.617	1.974
Check ?	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit		2.000							
Low Limit		-500.0							

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**98.66**	**9.685**	F **100.8**	**9.662**	F **100.8**	F **2.007**	**1.997**	**9.610**	**9.784**
Stddev	.21	.036	.4	.031	.4	.016	.011	.019	.046
%RSD	.2140	.3723	.4019	.3175	.4190	.8016	.5664	.1941	.4693
#1	98.89	9.719	101.2	9.690	101.3	2.024	2.007	9.631	9.831
#2	98.48	9.689	100.7	9.667	100.8	2.005	1.999	9.600	9.782
#3	98.62	9.647	100.4	9.629	100.4	1.992	1.985	9.598	9.739
Check ?	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Fail	Chk Fail	Chk Pass	Chk Pass	Chk Pass
High Limit			100.0		100.0	2.000			
Low Limit			-500.0		-500.0	-500.0			

Sample Name: LRC Acquired: 8/6/2018 16:38:48 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment: LRC

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**9.905**	**9.790**	**9.690**	**1.953**	**9.876**	**9.686**	**9.744**
Stddev	.082	.010	.028	.007	.010	.022	.045
%RSD	.8271	.1050	.2897	.3727	.0979	.2268	.4630
#1	9.913	9.798	9.719	1.960	9.866	9.666	9.791
#2	9.820	9.793	9.663	1.954	9.886	9.710	9.741
#3	9.983	9.778	9.690	1.946	9.877	9.683	9.700
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3038.0**	**50420.**	**3738.2**
Stddev	11.2	72.	14.7
%RSD	.36819	.14299	.39235
#1	3027.1	50423.	3747.9
#2	3037.4	50490.	3721.4
#3	3049.4	50346.	3745.4

Sample Name: LB 160-379782/1-B Acquired: 8/6/2018 16:43:13 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment: 380213

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0006**	**.0756**	**.0041**	**.0691**	**.0013**	**.0002**	**-.0003**	**.6004**	**.0002**
Stddev	.0015	.0048	.0011	.0014	.0001	.0001	.0002	.0039	.0001
%RSD	268.4	6.283	26.75	2.071	7.304	54.05	67.23	.6564	59.06
#1	.0001	.0805	.0044	.0688	.0013	.0003	-.0005	.6040	.0001
#2	-.0007	.0753	.0029	.0706	.0013	.0003	-.0003	.6009	.0003
#3	.0023	.0710	.0050	.0678	.0012	.0001	-.0001	.5962	.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0004**	**.0006**	**.0012**	**.0102**	**.4650**	**.0108**	**.1708**	**.0004**	**.0009**
Stddev	.0003	.0000	.0006	.0031	.0127	.0015	.0294	.0001	.0003
%RSD	87.93	1.294	50.87	30.80	2.723	13.42	17.19	30.32	35.18
#1	-.0000	.0006	.0013	.0138	.4654	.0092	.1772	.0003	.0006
#2	-.0007	.0006	.0017	.0078	.4774	.0115	.1388	.0005	.0009
#3	-.0005	.0006	.0005	.0090	.4521	.0118	.1965	.0005	.0012
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **470.8**	**.0013**	**.0158**	**.0009**	**.2066**	**-.0013**	**.0007**	**.3257**	**.0012**
Stddev	8.0	.0001	.0024	.0012	.0015	.0014	.0017	.0010	.0001
%RSD	1.694	9.509	14.91	137.8	.7119	105.3	236.8	.3073	11.64
#1	464.8	.0012	.0143	.0009	.2061	-.0020	.0022	.3245	.0012
#2	479.8	.0015	.0146	-.0004	.2083	.0003	.0011	.3262	.0011
#3	467.7	.0014	.0185	.0020	.2055	-.0023	-.0011	.3263	.0014
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0								
Low Limit	-500.0								

Sample Name: LB 160-379782/1-B Acquired: 8/6/2018 16:43:13 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment: 380213

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0026	.0077	-.0006	-.0025	.0119	-.0006	.0037
Stddev	.0000	.0069	.0008	.0006	.0145	.0062	.0000
%RSD	1.780	89.04	138.2	21.71	122.1	996.3	1.142
#1	.0026	.0018	-.0012	-.0032	.0128	.0045	.0037
#2	.0025	.0061	.0003	-.0023	-.0031	.0011	.0037
#3	.0026	.0152	-.0007	-.0022	.0258	-.0075	.0038
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3257.1	50669.	3811.8
Stddev	19.3	550.	38.7
%RSD	.59316	1.0853	1.0151
#1	3239.6	50318.	3853.7
#2	3254.0	50385.	3804.1
#3	3277.8	51302.	3777.5

Sample Name: LCS 160-380213/2-A Acquired: 8/6/2018 16:48:07 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1970**	**9.360**	**.9418**	**.2483**	**.9497**	**.0929**	**.9148**	**9.522**	**.9243**
Stddev	.0007	.024	.0051	.0002	.0011	.0002	.0046	.065	.0046
%RSD	.3558	.2589	.5459	.0856	.1205	.2577	.5004	.6792	.4932
#1	.1969	9.381	.9469	.2484	.9485	.0931	.9197	9.596	.9288
#2	.1977	9.366	.9366	.2481	.9508	.0929	.9107	9.481	.9197
#3	.1963	9.334	.9419	.2484	.9498	.0926	.9139	9.488	.9244
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9186**	**.9186**	**.9313**	**9.399**	**10.11**	**.1115**	**9.189**	**.9196**	**.4587**
Stddev	.0041	.0043	.0030	.020	.03	.0014	.020	.0033	.0024
%RSD	.4451	.4682	.3207	.2085	.3213	1.262	.2200	.3601	.5186
#1	.9232	.9234	.9329	9.421	10.15	.1109	9.166	.9229	.4610
#2	.9155	.9151	.9278	9.384	10.10	.1131	9.202	.9198	.4563
#3	.9170	.9173	.9331	9.393	10.08	.1105	9.199	.9163	.4589
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **467.7**	**.9232**	**1.072**	**.8966**	**9.590**	**.4497**	**.4942**	**4.724**	**.9093**
Stddev	4.2	.0045	.001	.0033	.044	.0023	.0020	.016	.0044
%RSD	.9045	.4897	.0646	.3682	.4582	.5068	.4065	.3293	.4813
#1	471.2	.9284	1.073	.9003	9.625	.4516	.4959	4.725	.9141
#2	463.0	.9203	1.071	.8956	9.540	.4472	.4920	4.708	.9056
#3	468.9	.9209	1.072	.8939	9.603	.4504	.4948	4.739	.9081
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0								
Low Limit	-500.0								

Sample Name: LCS 160-380213/2-A Acquired: 8/6/2018 16:48:07 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9516**	**.9478**	**.9331**	**.1763**	**.9820**	**.9266**	**.9563**
Stddev	.0013	.0016	.0031	.0018	.0046	.0030	.0043
%RSD	.1389	.1673	.3307	.9984	.4638	.3257	.4531
#1	.9531	.9460	.9361	.1783	.9828	.9300	.9605
#2	.9509	.9486	.9299	.1759	.9771	.9256	.9519
#3	.9508	.9489	.9334	.1748	.9861	.9242	.9566
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3313.6**	**52438.**	**4056.2**
Stddev	19.5	20.	32.6
%RSD	.58806	.03901	.80376
#1	3291.2	52421.	4020.1
#2	3322.9	52432.	4065.0
#3	3326.7	52460.	4083.5

Sample Name: 160-29879-A-1-B Acquired: 8/6/2018 16:52:35 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0001**	**1.075**	**.0049**	**.1797**	**.1077**	**.0012**	**-.0008**	**1.799**	**.0000**
Stddev	.0006	.014	.0007	.0073	.0006	.0000	.0013	.016	.0001
%RSD	742.0	1.307	14.23	4.083	.5320	2.284	169.9	.8764	348.1
#1	.0005	1.090	.0041	.1724	.1081	.0012	-.0015	1.816	.0000
#2	-.0007	1.074	.0052	.1797	.1080	.0012	-.0015	1.798	-.0000
#3	-.0001	1.062	.0055	.1871	.1071	.0011	.0007	1.784	.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0038**	**.0384**	**.0015**	**2.985**	**.6440**	**.0756**	**.2248**	**.7090**	**.0020**
Stddev	.0004	.0004	.0005	.012	.0559	.0011	.0226	.0023	.0002
%RSD	11.34	.9483	31.79	.3884	8.676	1.400	10.07	.3192	11.13
#1	.0042	.0387	.0011	2.975	.5804	.0745	.1987	.7069	.0023
#2	.0039	.0384	.0020	2.997	.6850	.0766	.2373	.7114	.0020
#3	.0034	.0380	.0014	2.982	.6667	.0758	.2385	.7089	.0018
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **479.0**	**.1454**	**.0218**	**-.0001**	**.3249**	**-.0003**	**.0030**	**.7401**	**.0014**
Stddev	7.0	.0012	.0011	.0009	.0054	.0011	.0010	.0038	.0001
%RSD	1.460	.8262	4.901	975.7	1.664	320.1	32.90	.5130	8.883
#1	485.8	.1466	.0230	-.0001	.3307	.0001	.0040	.7386	.0013
#2	479.3	.1454	.0210	-.0010	.3241	-.0016	.0020	.7445	.0016
#3	471.8	.1441	.0213	.0008	.3199	.0004	.0031	.7373	.0014
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0								
Low Limit	-500.0								

Sample Name: 160-29879-A-1-B Acquired: 8/6/2018 16:52:35 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0833**	**.0085**	**.0225**	**-.0032**	**.0654**	**-.0003**	**.0164**
Stddev	.0000	.0004	.0017	.0008	.0124	.0025	.0002
%RSD	.0500	5.019	7.530	25.58	18.97	745.3	1.484
#1	.0833	.0088	.0208	-.0023	.0523	-.0031	.0166
#2	.0833	.0080	.0242	-.0032	.0668	.0017	.0165
#3	.0832	.0086	.0227	-.0039	.0770	.0004	.0161
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3377.4**	**52050.**	**3976.0**
Stddev	12.2	337.	33.0
%RSD	.36091	.64678	.82886
#1	3363.4	52433.	4008.0
#2	3385.2	51799.	3942.2
#3	3383.7	51919.	3977.7

Sample Name: 160-29879-A-1-BSD@5 Acquired: 8/6/2018 16:57:25 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0006**	**.2394**	**.0014**	**.0431**	**.0222**	**.0002**	**-.0005**	**.3901**	**.0000**
Stddev	.0001	.0115	.0007	.0028	.0003	.0001	.0011	.0003	.0001
%RSD	19.57	4.821	52.18	6.573	1.355	90.88	207.3	.0745	928.4
#1	-.0006	.2497	.0014	.0463	.0219	.0003	-.0015	.3899	-.0000
#2	-.0005	.2269	.0007	.0411	.0221	.0002	-.0007	.3900	.0001
#3	-.0007	.2415	.0022	.0418	.0225	.0000	.0006	.3904	-.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0005**	**.0081**	**.0009**	**.6150**	**.1350**	**.0111**	**.0545**	**.1456**	**.0003**
Stddev	.0002	.0001	.0015	.0044	.0253	.0011	.0159	.0016	.0004
%RSD	45.20	.8262	173.6	.7221	18.71	9.667	29.16	1.119	129.1
#1	.0003	.0081	-.0003	.6195	.1373	.0114	.0404	.1474	.0005
#2	.0008	.0080	.0026	.6106	.1087	.0119	.0717	.1451	-.0001
#3	.0005	.0080	.0003	.6148	.1591	.0099	.0513	.1443	.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **101.6**	**.0306**	**.0037**	**.0000**	**.0692**	**.0009**	**-.0023**	**.1420**	**.0003**
Stddev	.5	.0001	.0014	.0004	.0023	.0003	.0015	.0040	.0005
%RSD	.4507	.2151	38.13	1767.	3.393	32.48	67.95	2.793	161.0
#1	102.1	.0305	.0052	-.0002	.0667	.0012	-.0014	.1436	.0003
#2	101.2	.0306	.0036	.0004	.0696	.0007	-.0040	.1449	.0009
#3	101.4	.0305	.0024	-.0001	.0713	.0007	-.0014	.1375	-.0002
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0								
Low Limit	-500.0								

Sample Name: 160-29879-A-1-BSD@5 Acquired: 8/6/2018 16:57:25 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0171	.0002	.0042	-.0008	.0512	-.0012	.0037
Stddev	.0001	.0024	.0013	.0006	.0108	.0032	.0002
%RSD	.5347	1242.	30.15	77.68	21.04	259.9	4.020
#1	.0171	-.0025	.0044	-.0015	.0547	.0010	.0039
#2	.0171	.0012	.0029	-.0003	.0598	-.0049	.0036
#3	.0170	.0019	.0055	-.0006	.0391	.0002	.0038
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3403.6	54077.	3994.7
Stddev	5.5	112.	36.0
%RSD	.16263	.20633	.90108
#1	3409.9	54194.	3954.0
#2	3401.3	53972.	4007.8
#3	3399.5	54064.	4022.3

Sample Name: 160-29879-A-1-C MS Acquired: 8/6/2018 17:02:10 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2004**	**10.81**	**.9559**	**.3856**	**1.084**	**.0971**	**.9265**	**10.90**	**.9365**
Stddev	.0001	.03	.0027	.0007	.002	.0005	.0020	.01	.0022
%RSD	.0711	.3080	.2861	.1752	.2244	.4685	.2177	.0943	.2373
#1	.2003	10.84	.9527	.3864	1.086	.0976	.9255	10.91	.9343
#2	.2005	10.81	.9573	.3852	1.084	.0968	.9252	10.89	.9364
#3	.2004	10.77	.9576	.3852	1.081	.0969	.9288	10.91	.9388
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9302**	**.9681**	**.9438**	**12.78**	**10.73**	**.1843**	**9.532**	**1.701**	**.4611**
Stddev	.0022	.0019	.0034	.04	.07	.0015	.042	.010	.0028
%RSD	.2409	.1912	.3566	.2736	.6374	.8017	.4428	.6126	.6072
#1	.9276	.9668	.9406	12.82	10.81	.1858	9.483	1.713	.4580
#2	.9314	.9674	.9437	12.77	10.70	.1842	9.559	1.696	.4621
#3	.9315	.9702	.9473	12.76	10.69	.1829	9.553	1.694	.4633
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **517.4**	**1.078**	**1.079**	**.8989**	**9.821**	**.4552**	**.5000**	**5.346**	**.9077**
Stddev	4.6	.001	.002	.0006	.032	.0016	.0024	.028	.0006
%RSD	.8954	.1298	.1802	.0691	.3267	.3563	.4867	.5183	.0690
#1	522.3	1.077	1.079	.8991	9.803	.4533	.4976	5.370	.9082
#2	516.8	1.078	1.077	.8994	9.802	.4562	.5025	5.316	.9080
#3	513.1	1.080	1.081	.8982	9.858	.4560	.4998	5.353	.9070
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0								
Low Limit	-500.0								

Sample Name: 160-29879-A-1-C MS Acquired: 8/6/2018 17:02:10 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.067**	**.9645**	**.9873**	**.1782**	**.9751**	**.9547**	**.9811**
Stddev	.006	.0037	.0063	.0023	.0054	.0048	.0021
%RSD	.5718	.3833	.6345	1.280	.5533	.5068	.2103
#1	1.073	.9687	.9941	.1756	.9813	.9603	.9790
#2	1.066	.9624	.9862	.1797	.9726	.9517	.9810
#3	1.061	.9622	.9817	.1793	.9715	.9521	.9831
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3278.2**	**51036.**	**3843.8**
Stddev	4.4	217.	8.2
%RSD	.13304	.42554	.21402
#1	3273.3	50879.	3835.0
#2	3279.6	50945.	3845.2
#3	3281.7	51284.	3851.2

Sample Name: 160-29879-A-1-D MSD Acquired: 8/6/2018 17:06:38 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.3833**	**19.88**	**1.927**	**.5602**	**2.014**	**.1899**	**1.876**	**20.39**	**1.901**
Stddev	.0012	.05	.007	.0028	.004	.0002	.007	.04	.004
%RSD	.3034	.2450	.3550	.4974	.2213	.0792	.3874	.1942	.2109
#1	.3820	19.85	1.931	.5576	2.011	.1900	1.882	20.35	1.903
#2	.3838	19.94	1.919	.5599	2.019	.1897	1.868	20.39	1.896
#3	.3841	19.86	1.930	.5631	2.012	.1900	1.879	20.43	1.903
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.886**	**1.926**	**1.915**	**22.03**	**20.43**	**.2860**	**18.55**	**2.608**	**.0011**
Stddev	.002	.003	.008	.04	.08	.0005	.09	.005	.0002
%RSD	.1209	.1447	.3976	.1770	.4003	.1577	.4586	.1952	17.38
#1	1.887	1.927	1.923	21.99	20.34	.2865	18.45	2.604	.0013
#2	1.883	1.924	1.908	22.06	20.47	.2858	18.60	2.605	.0012
#3	1.887	1.929	1.914	22.05	20.49	.2857	18.60	2.613	.0009
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **521.5**	**2.042**	**2.162**	**1.860**	**19.47**	**.0007**	**.9889**	**.8038**	**.0015**
Stddev	8.4	.003	.005	.001	.03	.0008	.0065	.0110	.0003
%RSD	1.612	.1365	.2421	.0492	.1428	116.0	.6619	1.368	20.41
#1	511.8	2.040	2.165	1.860	19.49	.0015	.9951	.7917	.0018
#2	526.6	2.042	2.156	1.859	19.44	.0003	.9821	.8063	.0012
#3	526.1	2.045	2.166	1.861	19.48	.0001	.9895	.8133	.0016
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0								
Low Limit	-500.0								

Sample Name: 160-29879-A-1-D MSD Acquired: 8/6/2018 17:06:38 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**2.012**	**1.917**	**.0303**	**.3656**	**1.911**	**1.882**	**1.968**
Stddev	.004	.001	.0012	.0012	.002	.001	.003
%RSD	.1919	.0691	3.807	.3397	.1025	.0501	.1336
#1	2.011	1.918	.0295	.3653	1.909	1.883	1.969
#2	2.016	1.918	.0298	.3645	1.913	1.882	1.965
#3	2.008	1.916	.0317	.3670	1.911	1.882	1.969
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3166.5**	**50745.**	**3841.1**
Stddev	9.3	185.	50.9
%RSD	.29495	.36406	1.3252
#1	3176.9	50558.	3888.0
#2	3163.9	50749.	3848.3
#3	3158.7	50927.	3787.0

Sample Name: 160-29879-A-2-B Acquired: 8/6/2018 17:11:09 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0008**	**.3757**	**.0060**	**.1590**	**.1165**	**.0008**	**.0145**	**8.972**	**-.0004**
Stddev	.0004	.0086	.0005	.0037	.0005	.0001	.0019	.013	.0000
%RSD	45.59	2.277	8.514	2.307	.4478	7.307	13.32	.1427	11.29
#1	-.0011	.3854	.0064	.1632	.1167	.0007	.0166	8.986	-.0004
#2	-.0007	.3694	.0054	.1578	.1159	.0008	.0143	8.962	-.0005
#3	-.0004	.3724	.0061	.1562	.1168	.0008	.0127	8.967	-.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1353**	**.0859**	**-.0094**	F **124.1**	**.9940**	**.0454**	**1.194**	**1.122**	**.0039**
Stddev	.0004	.0002	.0017	.3	.0801	.0019	.033	.003	.0001
%RSD	.3034	.2299	17.55	.2387	8.058	4.110	2.776	.2298	1.623
#1	.1357	.0860	-.0098	124.2	.9886	.0435	1.205	1.122	.0040
#2	.1350	.0856	-.0109	123.8	1.077	.0456	1.157	1.119	.0039
#3	.1351	.0860	-.0076	124.3	.9167	.0472	1.220	1.124	.0038
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit				100.0					
Low Limit				-500.0					

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **472.5**	F **19.92**	**.3978**	**-.0039**	**.8764**	**.0047**	**.0041**	**3.355**	**.0042**
Stddev	5.7	.02	.0019	.0007	.0035	.0009	.0020	.016	.0003
%RSD	1.199	.1215	.4693	18.41	.4030	19.39	48.87	.4732	6.304
#1	466.0	19.94	.3998	-.0043	.8783	.0058	.0019	3.357	.0043
#2	475.1	19.92	.3962	-.0044	.8723	.0040	.0058	3.338	.0038
#3	476.3	19.89	.3974	-.0031	.8785	.0045	.0047	3.369	.0043
Check ?	Chk Fail	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0	10.00							
Low Limit	-500.0	-500.0							

Sample Name: 160-29879-A-2-B Acquired: 8/6/2018 17:11:09 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1381**	**.0227**	**.0055**	**-.0024**	**.4736**	**.0061**	**.3318**
Stddev	.0003	.0039	.0006	.0010	.0048	.0014	.0002
%RSD	.2504	17.23	11.16	43.50	1.011	22.66	.0707
#1	.1381	.0190	.0062	-.0017	.4708	.0077	.3319
#2	.1378	.0223	.0052	-.0019	.4791	.0052	.3319
#3	.1385	.0267	.0050	-.0036	.4708	.0054	.3315
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3247.7**	**51425.**	**3908.4**
Stddev	2.9	467.	9.4
%RSD	.08782	.90739	.23946
#1	3247.6	51903.	3918.7
#2	3250.6	51400.	3900.3
#3	3244.9	50971.	3906.2

Sample Name: 160-29879-A-3-B Acquired: 8/6/2018 17:15:54 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0006**	**.8416**	**.0054**	**.1803**	**.1560**	**.0012**	**.0035**	**7.037**	**-.0004**
Stddev	.0004	.0051	.0012	.0023	.0004	.0000	.0004	.033	.0001
%RSD	67.22	.6072	22.91	1.269	.2855	3.867	12.79	.4681	35.19
#1	-.0007	.8472	.0060	.1825	.1564	.0013	.0038	7.074	-.0005
#2	-.0009	.8372	.0039	.1803	.1556	.0012	.0030	7.024	-.0002
#3	-.0001	.8403	.0061	.1779	.1559	.0012	.0037	7.012	-.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1703**	**.2319**	**-.0034**	**57.13**	**.8477**	**.0570**	**.8159**	**.8424**	**.0036**
Stddev	.0007	.0009	.0024	.15	.0190	.0025	.0196	.0032	.0001
%RSD	.4174	.3780	71.10	.2623	2.243	4.424	2.401	.3790	2.459
#1	.1711	.2326	-.0017	57.27	.8305	.0548	.8354	.8453	.0036
#2	.1700	.2322	-.0061	57.14	.8443	.0564	.7962	.8429	.0036
#3	.1698	.2310	-.0023	56.98	.8681	.0597	.8160	.8390	.0037
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **478.2**	F **21.12**	**.0984**	**-.0045**	**.6971**	**.0021**	**.0032**	**2.109**	**.0020**
Stddev	3.4	.07	.0010	.0006	.0072	.0019	.0004	.011	.0009
%RSD	.7067	.3290	1.064	12.70	1.035	90.23	12.87	.4995	43.48
#1	477.9	21.18	.0979	-.0048	.7001	.0029	.0037	2.120	.0011
#2	481.7	21.12	.0996	-.0049	.7024	-.0000	.0030	2.109	.0029
#3	474.9	21.04	.0976	-.0038	.6889	.0036	.0030	2.099	.0021
Check ?	Chk Fail	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0	10.00							
Low Limit	-500.0	-500.0							

Sample Name: 160-29879-A-3-B Acquired: 8/6/2018 17:15:54 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1483**	**.0108**	**.0043**	**-.0025**	**.2007**	**.0062**	**.1509**
Stddev	.0004	.0008	.0008	.0006	.0096	.0021	.0004
%RSD	.2631	7.739	19.72	22.92	4.796	33.22	.2886
#1	.1487	.0112	.0034	-.0019	.1977	.0054	.1513
#2	.1483	.0113	.0051	-.0029	.2115	.0085	.1510
#3	.1479	.0098	.0044	-.0029	.1930	.0047	.1504
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3280.4**	**50949.**	**3799.7**
Stddev	8.4	205.	44.7
%RSD	.25573	.40242	1.1759
#1	3271.1	51178.	3772.1
#2	3282.9	50782.	3775.7
#3	3287.3	50888.	3851.2

Sample Name: CCVL Acquired: 8/6/2018 17:20:41 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0094**	**.2077**	**.0105**	**.0998**	**.0505**	**.0049**	**.1936**	**.9692**	**.0046**
Stddev	.0004	.0191	.0008	.0056	.0001	.0000	.0015	.0009	.0002
%RSD	4.466	9.210	7.294	5.564	.2483	.9509	.7513	.0968	3.836
#1	.0096	.2088	.0104	.1024	.0506	.0049	.1921	.9681	.0044
#2	.0089	.1880	.0113	.0935	.0504	.0048	.1950	.9697	.0046
#3	.0097	.2262	.0098	.1037	.0506	.0049	.1938	.9699	.0048
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0493**	**.0098**	**.0259**	**.1052**	**5.047**	**.0515**	**1.038**	**.0144**	**.0376**
Stddev	.0004	.0001	.0026	.0027	.047	.0016	.020	.0006	.0002
%RSD	.8208	1.374	10.15	2.570	.9252	3.088	1.941	4.437	.5649
#1	.0489	.0096	.0289	.1059	5.092	.0506	1.047	.0144	.0378
#2	.0497	.0099	.0249	.1022	4.999	.0507	1.015	.0138	.0375
#3	.0492	.0098	.0240	.1075	5.050	.0534	1.052	.0150	.0375
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **1.344**	**.0405**	**.2619**	**.0091**	**4.642**	**.0087**	**.0123**	**.3688**	**.0967**
Stddev	.022	.0001	.0025	.0007	.010	.0009	.0010	.0070	.0007
%RSD	1.667	.1752	.9661	7.963	.2073	10.43	8.097	1.903	.7478
#1	1.370	.0405	.2597	.0092	4.631	.0079	.0113	.3703	.0973
#2	1.330	.0404	.2613	.0083	4.650	.0085	.0133	.3749	.0970
#3	1.332	.0406	.2646	.0098	4.645	.0097	.0122	.3611	.0959
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value	1.000								
Range	30.00%								

Sample Name: CCVL Acquired: 8/6/2018 17:20:41 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0051**	**.1976**	**.0193**	**.0207**	**.4690**	**.0470**	**.0202**
Stddev	.0001	.0033	.0015	.0009	.0136	.0008	.0002
%RSD	2.704	1.678	7.910	4.578	2.903	1.675	.7870
#1	.0053	.2006	.0201	.0218	.4583	.0465	.0200
#2	.0051	.1940	.0201	.0200	.4843	.0466	.0202
#3	.0050	.1982	.0175	.0204	.4643	.0479	.0203
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3423.6**	**52321.**	**3602.3**
Stddev	10.6	516.	34.8
%RSD	.30870	.98629	.96720
#1	3429.9	51778.	3562.2
#2	3429.6	52805.	3619.6
#3	3411.4	52381.	3625.1

Sample Name: CCV Acquired: 8/6/2018 17:25:24 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.004**	**49.59**	**4.852**	**.9797**	**5.121**	**5.012**	**4.864**	**47.69**	**4.872**
Stddev	.005	.40	.020	.0092	.038	.035	.024	.15	.023
%RSD	.5511	.8113	.4094	.9349	.7421	.6922	.4822	.3080	.4744
#1	.9992	49.81	4.871	.9875	5.154	5.035	4.884	47.84	4.893
#2	1.010	49.82	4.853	.9820	5.130	5.030	4.871	47.68	4.875
#3	1.004	49.12	4.831	.9696	5.080	4.972	4.838	47.55	4.847
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**4.893**	**4.866**	**4.916**	**50.26**	**50.62**	**5.106**	**49.41**	**4.950**	**.9702**
Stddev	.022	.020	.026	.33	.37	.036	.40	.033	.0049
%RSD	.4464	.4070	.5310	.6595	.7389	.7028	.8124	.6575	.5030
#1	4.914	4.884	4.944	50.55	50.85	5.128	49.70	4.972	.9744
#2	4.894	4.870	4.912	50.32	50.82	5.126	49.58	4.965	.9714
#3	4.870	4.845	4.892	49.90	50.19	5.065	48.95	4.912	.9649
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**50.70**	**4.906**	**52.31**	**4.935**	**49.65**	**.9678**	**.9773**	**4.964**	**4.895**
Stddev	.38	.018	.21	.019	.20	.0067	.0005	.045	.017
%RSD	.7479	.3582	.4027	.3889	.4075	.6923	.0522	.9150	.3550
#1	50.93	4.924	52.51	4.955	49.85	.9729	.9778	4.982	4.912
#2	50.91	4.905	52.33	4.933	49.66	.9702	.9771	4.998	4.895
#3	50.26	4.888	52.09	4.917	49.45	.9602	.9768	4.912	4.878
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCV Acquired: 8/6/2018 17:25:24 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**5.062**	**5.000**	**4.971**	**.9826**	**5.167**	**4.920**	**4.924**
Stddev	.039	.027	.044	.0051	.052	.045	.023
%RSD	.7647	.5403	.8898	.5184	1.012	.9128	.4705
#1	5.085	4.972	5.000	.9881	5.107	4.957	4.947
#2	5.084	5.026	4.993	.9816	5.197	4.934	4.925
#3	5.017	5.001	4.920	.9780	5.198	4.870	4.900
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3230.8**	**50853.**	**3655.4**
Stddev	6.4	264.	31.4
%RSD	.19833	.51930	.85996
#1	3223.8	50726.	3642.6
#2	3232.2	50677.	3632.4
#3	3236.4	51157.	3691.2

Sample Name: CCB Acquired: 8/6/2018 17:29:40 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0002**	**.0112**	**.0020**	**.0039**	**.0000**	**.0001**	**-.0012**	**.0027**	**.0000**
Stddev	.0007	.0043	.0011	.0006	.0002	.0001	.0004	.0000	.0001
%RSD	440.4	38.70	55.51	15.31	1000.	226.3	32.20	.9499	3023.
#1	-.0003	.0139	.0011	.0032	.0001	-.0001	-.0008	.0027	.0001
#2	-.0007	.0062	.0033	.0041	-.0002	.0001	-.0014	.0027	-.0001
#3	.0006	.0134	.0017	.0043	.0002	.0002	-.0015	.0027	.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0002**	**.0000**	**.0003**	**.0076**	**.0351**	**.0022**	**.0037**	**.0008**	**.0004**
Stddev	.0002	.0001	.0005	.0037	.0596	.0028	.0191	.0002	.0002
%RSD	120.7	166.6	170.9	49.07	170.1	127.1	516.7	29.72	60.93
#1	-.0000	.0001	.0009	.0037	-.0321	-.0009	.0229	.0006	.0001
#2	-.0001	-.0000	.0001	.0079	.0818	.0043	.0034	.0010	.0004
#3	-.0004	.0000	-.0001	.0111	.0554	.0031	-.0153	.0007	.0006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1557**	**-.0000**	**.0042**	**.0003**	**.0039**	**-.0006**	**-.0019**	**-.0020**	**-.0000**
Stddev	.0036	.0000	.0008	.0008	.0030	.0004	.0021	.0081	.0003
%RSD	2.310	39.85	19.34	311.8	76.69	56.12	110.5	411.3	755.5
#1	.1526	-.0000	.0041	.0002	.0064	-.0003	-.0007	-.0030	.0001
#2	.1548	-.0000	.0035	.0011	.0045	-.0010	-.0007	.0066	.0002
#3	.1596	-.0001	.0051	-.0005	.0006	-.0006	-.0044	-.0094	-.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: CCB Acquired: 8/6/2018 17:29:40 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0002**	**.0005**	**.0008**	**.0003**	**.0162**	**-.0040**	**.0002**
Stddev	.0001	.0034	.0015	.0010	.0197	.0066	.0001
%RSD	32.42	717.7	191.9	293.5	121.5	166.1	23.89
#1	.0002	.0005	-.0003	.0013	.0331	.0007	.0002
#2	.0002	-.0029	.0001	.0002	.0209	-.0116	.0002
#3	.0003	.0039	.0024	-.0006	-.0054	-.0010	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3446.5**	**53395.**	**3764.2**
Stddev	41.6	653.	47.4
%RSD	1.2072	1.2232	1.2583
#1	3408.2	54070.	3718.5
#2	3440.5	53351.	3761.0
#3	3490.7	52766.	3813.1

Sample Name: 160-29879-A-4-B Acquired: 8/6/2018 17:34:28 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0007**	**.6212**	**.0050**	**.1367**	**.3706**	**.0012**	**.0023**	**6.224**	**-.0002**
Stddev	.0004	.0156	.0004	.0061	.0008	.0001	.0011	.026	.0000
%RSD	52.81	2.509	8.549	4.441	.2189	6.566	47.37	.4116	7.996
#1	-.0007	.6243	.0054	.1369	.3703	.0013	.0034	6.249	-.0002
#2	-.0003	.6350	.0048	.1306	.3716	.0011	.0012	6.198	-.0002
#3	-.0010	.6043	.0046	.1427	.3700	.0012	.0022	6.225	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**3.849**	**.1563**	**-.0156**	**53.65**	**.7451**	**.0468**	**.8228**	**.6974**	**.0297**
Stddev	.003	.0001	.0008	.06	.0428	.0032	.0316	.0013	.0002
%RSD	.0886	.0473	5.310	.1053	5.748	6.785	3.845	.1892	.5365
#1	3.852	.1564	-.0159	53.61	.6959	.0434	.7997	.6978	.0296
#2	3.846	.1563	-.0162	53.64	.7655	.0474	.8098	.6959	.0296
#3	3.850	.1563	-.0146	53.72	.7740	.0497	.8589	.6985	.0299
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **468.3**	F **18.03**	**.2240**	**-.0147**	**.5784**	**.0033**	**.0172**	**1.920**	**.0066**
Stddev	8.0	.04	.0008	.0010	.0014	.0004	.0012	.004	.0002
%RSD	1.714	.2038	.3701	6.774	.2428	11.62	6.819	.1975	2.721
#1	465.4	18.06	.2247	-.0158	.5790	.0036	.0186	1.923	.0068
#2	462.2	17.99	.2231	-.0139	.5794	.0029	.0164	1.916	.0066
#3	477.4	18.02	.2241	-.0144	.5768	.0034	.0167	1.922	.0064
Check ?	Chk Fail	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0	10.00							
Low Limit	-500.0	-500.0							

Sample Name: 160-29879-A-4-B Acquired: 8/6/2018 17:34:28 Type: Unk
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1280**	**.0131**	**.0360**	**-.0014**	**.2025**	**.0055**	**.1670**
Stddev	.0006	.0012	.0009	.0003	.0089	.0057	.0001
%RSD	.4330	9.254	2.460	20.21	4.416	103.7	.0415
#1	.1281	.0145	.0366	-.0011	.2048	.0068	.1670
#2	.1284	.0128	.0365	-.0016	.1926	-.0007	.1670
#3	.1274	.0121	.0350	-.0016	.2100	.0105	.1669
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3355.4**	**52143.**	**3920.4**
Stddev	18.2	315.	44.5
%RSD	.54330	.60502	1.1340
#1	3342.1	51779.	3942.3
#2	3376.2	52335.	3949.6
#3	3348.0	52316.	3869.2

Sample Name: CCVL Acquired: 8/6/2018 17:39:15 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0091**	**.2106**	**.0106**	**.0958**	**.0506**	**.0048**	**.1982**	**.9807**	**.0047**
Stddev	.0001	.0065	.0005	.0028	.0006	.0000	.0019	.0038	.0001
%RSD	1.110	3.097	5.080	2.970	1.148	.9498	.9672	.3888	1.690
#1	.0090	.2137	.0109	.0969	.0511	.0048	.1983	.9811	.0046
#2	.0091	.2149	.0109	.0926	.0508	.0049	.2001	.9844	.0048
#3	.0091	.2031	.0100	.0980	.0500	.0048	.1963	.9768	.0047
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0500**	**.0100**	**.0259**	**.1049**	**5.035**	**.0519**	**1.053**	**.0149**	**.0381**
Stddev	.0003	.0000	.0015	.0002	.031	.0004	.039	.0004	.0001
%RSD	.6614	.3251	5.763	.2218	.6235	.6955	3.718	2.914	.3832
#1	.0502	.0100	.0273	.1051	5.019	.0523	1.097	.0152	.0381
#2	.0496	.0100	.0259	.1049	5.016	.0518	1.040	.0144	.0383
#3	.0501	.0100	.0243	.1046	5.072	.0516	1.022	.0149	.0380
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.287**	**.0410**	**.2683**	**.0097**	**4.728**	**.0079**	**.0154**	**.3686**	**.0988**
Stddev	.032	.0002	.0010	.0007	.023	.0001	.0017	.0008	.0005
%RSD	2.488	.3874	.3699	7.538	.4859	.8277	11.00	.2254	.5100
#1	1.320	.0412	.2695	.0096	4.736	.0078	.0173	.3686	.0993
#2	1.285	.0410	.2678	.0105	4.746	.0079	.0143	.3677	.0983
#3	1.256	.0409	.2677	.0090	4.702	.0079	.0145	.3694	.0989
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCVL Acquired: 8/6/2018 17:39:15 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0050**	**.1941**	**.0188**	**.0197**	**.4653**	**.0433**	**.0205**
Stddev	.0002	.0015	.0003	.0008	.0070	.0010	.0001
%RSD	3.500	.7833	1.530	4.307	1.508	2.224	.2696
#1	.0049	.1945	.0185	.0195	.4734	.0424	.0205
#2	.0052	.1924	.0190	.0190	.4608	.0431	.0205
#3	.0050	.1954	.0190	.0207	.4616	.0443	.0204
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3414.4**	**53663.**	**3710.5**
Stddev	2.2	173.	34.4
%RSD	.06434	.32327	.92612
#1	3417.0	53793.	3672.9
#2	3413.4	53730.	3718.4
#3	3413.0	53466.	3740.3

Sample Name: CCV Acquired: 8/6/2018 17:44:00 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.004**	**50.20**	**4.911**	**.9905**	**5.100**	**5.023**	**4.896**	**48.88**	**4.938**
Stddev	.006	.26	.003	.0038	.020	.031	.009	.06	.006
%RSD	.5823	.5231	.0565	.3878	.3819	.6131	.1727	.1188	.1178
#1	.9989	50.31	4.909	.9862	5.103	5.039	4.888	48.85	4.933
#2	1.004	50.39	4.914	.9935	5.118	5.042	4.905	48.95	4.944
#3	1.011	49.90	4.910	.9919	5.079	4.987	4.895	48.84	4.937
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**4.957**	**4.941**	**4.939**	**50.49**	**51.34**	**5.123**	**50.50**	**4.966**	**.9854**
Stddev	.008	.008	.008	.30	.31	.026	.33	.034	.0008
%RSD	.1621	.1701	.1632	.6001	.6132	.5133	.6541	.6771	.0779
#1	4.952	4.934	4.932	50.65	51.49	5.127	50.80	4.991	.9851
#2	4.966	4.950	4.948	50.68	51.55	5.148	50.54	4.980	.9863
#3	4.954	4.938	4.938	50.14	50.98	5.096	50.15	4.928	.9849
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**51.18**	**4.976**	**53.08**	**5.007**	**49.89**	**.9780**	**.9870**	**5.025**	**4.993**
Stddev	.29	.009	.10	.010	.07	.0034	.0021	.048	.011
%RSD	.5593	.1723	.1865	.2071	.1464	.3470	.2169	.9538	.2182
#1	51.35	4.968	52.99	5.000	49.85	.9750	.9857	5.053	4.982
#2	51.35	4.985	53.19	5.018	49.97	.9773	.9858	5.053	5.004
#3	50.85	4.973	53.06	5.001	49.84	.9817	.9895	4.970	4.993
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCV Acquired: 8/6/2018 17:44:00 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**5.073**	**5.018**	**4.986**	**1.000**	**5.088**	**4.971**	**4.995**
Stddev	.026	.023	.029	.002	.013	.035	.008
%RSD	.5129	.4504	.5783	.2198	.2567	.7120	.1623
#1	5.080	4.996	4.996	1.001	5.082	4.988	4.987
#2	5.095	5.016	5.009	1.001	5.080	4.995	5.003
#3	5.044	5.041	4.954	.9975	5.103	4.930	4.994
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3130.9**	**49071.**	**3428.6**
Stddev	6.6	284.	51.6
%RSD	.21097	.57807	1.5051
#1	3137.7	49360.	3370.5
#2	3124.5	49061.	3446.2
#3	3130.5	48793.	3469.1

Sample Name: CCB Acquired: 8/6/2018 17:48:15 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0005**	**.0285**	**.0018**	**.0058**	**.0002**	**.0001**	**-.0011**	**.0027**	**-.0002**
Stddev	.0007	.0186	.0013	.0013	.0003	.0000	.0014	.0002	.0000
%RSD	139.2	65.43	71.75	21.52	176.6	38.95	135.0	8.345	25.34
#1	-.0005	.0447	.0003	.0046	.0003	.0001	-.0010	.0024	-.0002
#2	.0002	.0081	.0024	.0057	-.0002	.0001	-.0025	.0027	-.0002
#3	-.0012	.0327	.0027	.0071	.0004	.0001	.0003	.0029	-.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0001**	**.0000**	**.0008**	**.0055**	**.0020**	**.0024**	**.0166**	**-.0000**	**.0003**
Stddev	.0002	.0001	.0020	.0018	.0439	.0017	.0176	.0008	.0002
%RSD	204.0	339.3	245.4	33.31	2237.	72.35	105.9	1939.	61.83
#1	-.0001	-.0000	-.0015	.0061	.0123	.0043	.0325	-.0001	.0001
#2	.0001	-.0000	.0016	.0069	.0398	.0019	-.0023	.0008	.0005
#3	-.0004	.0001	.0024	.0034	-.0462	.0010	.0195	-.0009	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1649**	**.0002**	**.0034**	**-.0006**	**.0034**	**-.0015**	**-.0001**	**-.0000**	**-.0005**
Stddev	.0127	.0001	.0007	.0005	.0032	.0016	.0013	.0078	.0007
%RSD	7.695	66.89	21.45	76.61	95.43	104.5	1461.	17670.	141.2
#1	.1793	.0001	.0029	-.0010	.0071	-.0016	-.0001	.0088	-.0013
#2	.1600	.0001	.0042	-.0001	.0018	.0001	.0012	-.0062	.0000
#3	.1554	.0004	.0030	-.0007	.0013	-.0030	-.0014	-.0027	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: CCB Acquired: 8/6/2018 17:48:15 Type: QC
Method: _2016(v705) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: ICP6500#1: ICP6500#1
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0002	.0011	.0007	.0004	.0111	.0015	.0005
Stddev	.0001	.0025	.0009	.0014	.0051	.0023	.0001
%RSD	36.79	222.6	121.8	345.0	46.38	155.1	15.93
#1	.0001	.0038	.0016	.0015	.0053	.0024	.0004
#2	.0002	.0005	.0008	.0009	.0153	.0031	.0005
#3	.0001	-.0010	-.0002	-.0012	.0125	-.0011	.0006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3368.7	52556.	3623.7
Stddev	8.2	389.	25.5
%RSD	.24429	.74018	.70439
#1	3376.0	52204.	3608.2
#2	3370.2	52490.	3609.7
#3	3359.8	52974.	3653.2

Element, Wavelength and Order	Date of Fit	Date of Cal.	Type of Fit	Weighting	A0	A1	A2	n (Exponent)
Ag 328.068 {103}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	-0.003165	0.165121	0.000000	1.000000
Al 396.152 { 85}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.002357	0.126685	0.000000	1.000000
As 189.042 {478}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.000513	0.187254	0.000000	1.000000
B 249.678 {135}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	-0.000555	0.086095	0.000000	1.000000
Ba 455.403 { 74}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.005929	6.445355	0.000000	1.000000
Be 313.042 {108}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.000068	7.017910	0.000000	1.000000
Bi 223.061 {451}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	-0.000696	0.228992	0.000000	1.000000
Ca 184.006 {483}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.002572	0.449922	0.000000	1.000000
Cd 228.802 {447}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.000900	3.113591	0.000000	1.000000
Co 228.616 {448}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.001912	0.868239	0.000000	1.000000
Cr 205.560 {464}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.000094	1.228422	0.000000	1.000000
Cu 217.894 {455}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	-0.000704	0.186097	0.000000	1.000000
Fe 259.940 {130}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	-0.000012	0.146233	0.000000	1.000000
K 766.490 { 44}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.015528	0.045925	0.000000	1.000000
Li 670.784 { 50}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.018567	1.257942	0.000000	1.000000
Mg 279.806 {121}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	-0.000896	0.015417	0.000000	1.000000
Mn 257.610 {131}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	-0.000303	0.898196	0.000000	1.000000
Mo 202.030 {467}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	-0.000324	0.883625	0.000000	1.000000
Na 589.592 { 57}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.040649	0.148832	0.000000	1.000000
Ni 221.647 {452}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.000076	1.632114	0.000000	1.000000
P 177.495 {490}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	-0.016960	0.169935	0.000000	1.000000
Pb 220.353 {453}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.000394	0.281332	0.000000	1.000000
S 182.034 {485}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	-0.000571	0.095231	0.000000	1.000000
Sb 206.833 {463}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.000694	0.219418	0.000000	1.000000
Se 196.090 {472}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.000209	0.133090	0.000000	1.000000
Si 251.611 {134}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.001792	0.067361	0.000000	1.000000
Sn 189.989 {478}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.001054	0.292101	0.000000	1.000000
Sr 407.771 { 83}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	-0.017026	10.704038	0.000000	1.000000
Th 283.231 {119}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.000648	0.013883	0.000000	1.000000
Ti 334.941 {101}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.000358	0.654246	0.000000	1.000000
Tl 190.856 {477}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	-0.000781	0.185128	0.000000	1.000000
U 367.007 { 92}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.005887	0.011802	0.000000	1.000000
V 290.882 {116}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	0.000855	0.182503	0.000000	1.000000
Y 224.306 {450}*	<not fit>	<Never Calibrated>	Linear	1/Conc	0.000000	0.000000	0.000000	1.000000
Y 360.073 { 94}*	7/25/2018 13:40:04	6/22/2018 11:30:38	Linear	1/Conc	0.000000	0.000000	0.000000	1.000000
Y 360.073 { 94}2*	7/25/2018 13:40:04	6/22/2018 11:30:38	Linear	1/Conc	0.000000	0.000000	0.000000	1.000000
Zn 213.856 {458}	8/6/2018 11:21:07	8/6/2018 11:21:07	Linear	1/Conc	-0.000056	2.830114	0.000000	1.000000

Element, Wavelength and Order	Correlation	Std Error of Est	Predicted MDL	Predicted MQL	Status	Reslope		QC Norm	
						Slope	Y-int	Slope factor	Offset
Ag 328.068 {103}	0.999923	0.000016	0.000907	0.003025	OK.	1.000000	0.000000	1	0
Al 396.152 { 85}	0.999906	0.000426	0.015040	0.050133	OK.	1.000000	0.000000	1	0
As 189.042 {478}	0.999851	0.000056	0.001426	0.004752	OK.	1.000000	0.000000	1	0
B 249.678 {135}	0.999931	0.000025	0.006586	0.021953	OK.	1.000000	0.000000	1	0
Ba 455.403 { 74}	0.999943	0.002677	0.000399	0.001330	OK.	1.000000	0.000000	1	0
Be 313.042 {108}	0.999978	0.000571	0.000125	0.000417	OK.	1.000000	0.000000	1	0
Bi 223.061 {451}	0.999875	0.000282	0.001973	0.006577	OK.	1.000000	0.000000	1	0
Ca 184.006 {483}	0.999993	0.000903	0.000575	0.001917	OK.	1.000000	0.000000	1	0
Cd 228.802 {447}	0.999918	0.000490	0.000154	0.000512	OK.	1.000000	0.000000	1	0
Co 228.616 {448}	0.999956	0.000316	0.000373	0.001242	OK.	1.000000	0.000000	1	0
Cr 205.560 {464}	0.999911	0.000283	0.000167	0.000556	OK.	1.000000	0.000000	1	0
Cu 217.894 {455}	0.999857	0.000086	0.001989	0.006631	OK.	1.000000	0.000000	1	0
Fe 259.940 {130}	0.999974	0.000183	0.003832	0.012775	OK.	1.000000	0.000000	1	0
K 766.490 { 44}	0.999867	0.000932	0.059761	0.199203	OK.	1.000000	0.000000	1	0
Li 670.784 { 50}	0.999909	0.000659	0.002352	0.007841	OK.	1.000000	0.000000	1	0
Mg 279.806 {121}	0.999941	0.000092	0.034788	0.115962	OK.	1.000000	0.000000	1	0
Mn 257.610 {131}	0.999934	0.000218	0.000627	0.002089	OK.	1.000000	0.000000	1	0
Mo 202.030 {467}	0.999859	0.000231	0.000344	0.001148	OK.	1.000000	0.000000	1	0
Na 589.592 { 57}	0.999925	0.000999	0.017779	0.059263	OK.	1.000000	0.000000	1	0
Ni 221.647 {452}	0.999972	0.000424	0.000272	0.000906	OK.	1.000000	0.000000	1	0
P 177.495 {490}	0.999977	0.000313	0.001716	0.005720	OK.	1.000000	0.000000	1	0
Pb 220.353 {453}	0.999987	0.000025	0.001243	0.004143	OK.	1.000000	0.000000	1	0
S 182.034 {485}	0.999787	0.002448	0.002635	0.008782	OK.	1.000000	0.000000	1	0
Sb 206.833 {463}	0.999827	0.000032	0.001653	0.005511	OK.	1.000000	0.000000	1	0
Se 196.090 {472}	0.999853	0.000021	0.002292	0.007640	OK.	1.000000	0.000000	1	0
Si 251.611 {134}	0.999818	0.000143	0.008405	0.028018	OK.	1.000000	0.000000	1	0
Sn 189.989 {478}	0.999963	0.000138	0.000725	0.002418	OK.	1.000000	0.000000	1	0
Sr 407.771 { 83}	1.000000	0.000130	0.000154	0.000513	OK.	1.000000	0.000000	1	0
Th 283.231 {119}	0.999955	0.000010	0.002727	0.009090	OK.	1.000000	0.000000	1	0
Ti 334.941 {101}	0.999942	0.000173	0.001449	0.004831	OK.	1.000000	0.000000	1	0
Tl 190.856 {477}	0.999994	0.000007	0.001375	0.004584	OK.	1.000000	0.000000	1	0
U 367.007 { 92}	0.999809	0.000029	0.016099	0.053664	OK.	1.000000	0.000000	1	0
V 290.882 {116}	0.999944	0.000075	0.004729	0.015763	OK.	1.000000	0.000000	1	0
Y 224.306 {450}*	0.000000	0.000000	-1.000000	-1.000000	Warnin	1.000000	0.000000	1	0
Y 360.073 { 94}*	0.000000	0.000000	-1.000000	-1.000000	Warnin	1.000000	0.000000	1	0
Y 360.073 { 94}2*	0.000000	0.000000	-1.000000	-1.000000	Warnin	1.000000	0.000000	1	0
Zn 213.856 {458}	0.999984	0.000390	0.000119	0.000397	OK.	1.000000	0.000000	1	0

SFF 8/7/18 File: 080618E2 A, Batch: 380741 & 380753 Inst: 6800-2

	Pos ID	Rack	Row	Col	Type	Samplename	Comment	Custom ID1	Custom ID2
1	1001	3	1	1	Unk	MB 160-379537/1-A	379537		
2	1002	3	1	2	Unk	LCS 160-379537/2-A			
3	1003	3	1	3	Unk	160-29476-L-1-C			
4	1004	3	1	4	Unk	160-29476-L-1-CSD@5			
5	1005	3	1	5	Unk	160-29476-L-1-D MS			
6	1006	3	1	6	Unk	160-29476-L-1-E MSD			
7	1007	3	1	7	Unk	LB 160-378221/1-C	380009		
8	1008	3	1	8	Unk	LCS 160-380009/2-A			
9	1009	3	1	9	Unk	160-29687-B-1-E			
10	1010	3	1	10	Unk	160-29687-B-1-ESD@5			
11	1011	3	1	11	Unk	160-29687-B-1-F MS			
12	1012	3	1	12	Unk	160-29687-B-1-G MSD			
13	1013	3	2	1	Unk	160-29687-B-1-EPDS			
14	1014	3	2	2	Unk	MB 160-380003/1-A	380003		
15	1015	3	2	3	Unk	LCS 160-380003/2-A			
16	1016	3	2	4	Unk	680-155956-G-1-A@10			
17	1017	3	2	5	Unk	680-155956-G-1ASD@50			
18	1018	3	2	6	Unk	680-155956-G-1BMS@10			
19	1019	3	2	7	Unk	680-155956-G1CMSD@10			
20	1020	3	2	8	Unk	MB	378338 Ni Carrier		
21	1021	3	2	9	Unk	LCS			
22	1022	3	2	10	Unk	LCSD			
23	1023	3	2	11	Unk	160-29595-B-1			
24	1024	3	2	12	Unk	MB 160-380005/1-A	380005/380006 PT		
25	1025	3	3	1	Unk	LCS 160-380005/2-A			
26	1026	3	3	2	Unk	160-29429-A-1-A@5			
27	1027	3	3	3	Unk	160-29429-A-1-ASD@25			
28	1028	3	3	4	Unk	160-29429-A-1-B MS@5			
29	1029	3	3	5	Unk	160-29429-A-1-CMSD@5			
30	1030	3	3	6	Unk	160-29429-A-3-A@5			
31	1031	3	3	7	Unk	160-29429-A-7-A@5			
32	1032	3	3	8	Unk	~~160-29429-A-21-A@5~~ SFF 8/7/18			
33	1033	3	3	9	Unk	160-29429-A-22-A@5			
34	1034	3	3	10	Unk	160-29429-A-1-A@10			
35	1035	3	3	11	Unk	160-29429-A-1-ASD@50			
36	1036	3	3	12	Unk	160-29429-A-1-BMS@10			
37	1037	3	4	1	Unk	160-29429-A-1CMSD@10			
38	1038	3	4	2	Unk	160-29429-A-3-A@10			
39	1039	3	4	3	Unk	160-29429-A-7-A@10			
40	1040	3	4	4	Unk	160-29429-A-21-A@10			
41	1041	3	4	5	Unk	160-29429-A-22-A@10			
42	1042	3	4	6	Unk	LRC	LRC		
43	1043	3	4	7	Unk	~~LB 160-379782/1-B~~	380213		
44	1044	3	4	8	Unk	LCS 160-380213/2-A			
45	1045	3	4	9	Unk	160-29879-A-1-B			
46	1046	3	4	10	Unk	160-29879-A-1-BSD@5			
47	1047	3	4	11	Unk	160-29879-A-1-C MS			
48	1048	3	4	12	Unk	160-29879-A-1-D MSD			
49	1049	3	5	1	Unk	160-29879-A-2-B			
50	1050	3	5	2	Unk	160-29879-A-3-B			
51	1051	3	5	3	Unk	~~160-29879-A-4-B~~			

-As & Se

-All

-All

-Ni

-All for 380005 & 380006

-All for 380006

-All for 380005

SFF 8/7/18

Sample Name: CALBLK1 Acquired: 8/2/2018 15:06:17 Type: Cal
Method: _2016(v681) Mode: IR Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	**-.0037**	**.0010**	**-.0000**	**-.0007**	**.0252**	**-.0023**	**-.0006**	**.0027**	**-.0004**
Stddev	.0001	.0024	.0001	.0005	.0039	.0007	.0002	.0002	.0001
%RSD	3.818	242.1	333.3	64.48	15.49	32.62	37.40	5.628	26.03
#1	-.0038	.0037	-.0002	-.0008	.0232	-.0032	-.0004	.0028	-.0003
#2	-.0037	-.0006	-.0000	-.0012	.0226	-.0019	-.0007	.0025	-.0003
#3	-.0036	-.0001	.0001	-.0003	.0296	-.0019	-.0008	.0028	-.0005

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	**.0007**	**.0003**	**-.0006**	**-.0003**	**.0401**	**.0072**	**-.0009**	**.0014**	**-.0006**
Stddev	.0001	.0001	.0000	.0014	.0059	.0040	.0004	.0009	.0001
%RSD	20.00	21.59	5.391	429.4	14.77	54.85	49.79	64.81	21.24
#1	.0008	.0002	-.0006	-.0010	.0333	.0112	-.0004	.0021	-.0005
#2	.0008	.0002	-.0006	-.0012	.0427	.0072	-.0013	.0017	-.0005
#3	.0005	.0003	-.0005	.0012	.0443	.0033	-.0010	.0004	-.0007

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	**.0982**	**.0007**	**-.0030**	**-.0004**	**.0006**	**-.0001**	**.0002**	**.0019**	**.0003**
Stddev	.0032	.0004	.0001	.0003	.0001	.0004	.0001	.0007	.0002
%RSD	3.266	55.15	1.929	68.87	21.80	423.5	36.05	37.94	74.87
#1	.1019	.0008	-.0029	-.0001	.0005	-.0004	.0003	.0011	.0003
#2	.0960	.0010	-.0029	-.0005	.0008	.0003	.0003	.0023	.0001
#3	.0967	.0003	-.0030	-.0007	.0006	-.0001	.0001	.0024	.0006

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	**-.0203**	**.0018**	**-.0003**	**-.0003**	**.0023**	**-.0006**	**.0013**
Stddev	.0023	.0000	.0006	.0001	.0001	.0007	.0001
%RSD	11.46	1.408	232.2	21.98	5.179	111.6	10.50
#1	-.0213	.0018	-.0005	-.0003	.0024	.0001	.0013
#2	-.0218	.0018	-.0007	-.0004	.0022	-.0012	.0013
#3	-.0176	.0017	.0004	-.0002	.0023	-.0008	.0011

Sample Name: CALBLK1 Acquired: 8/2/2018 15:06:17 Type: Cal
Method: _2016(v681) Mode: IR Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3652.9	33607.	3579.1
Stddev	48.0	212.	19.2
%RSD	1.3148	.63033	.53518
#1	3611.3	33385.	3572.0
#2	3642.1	33807.	3564.5
#3	3705.5	33629.	3600.8

Sample Name: CAL 1 Acquired: 8/2/2018 15:10:57 Type: Cal
Method: _2016(v681) Mode: IR Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	**-.0021**	**.0237**	**.0003**	**.0094**	**.2810**	**.0442**	**.0181**	**.1105**	**.0052**
Stddev	.0001	.0027	.0000	.0002	.0014	.0003	.0003	.0007	.0004
%RSD	4.778	11.60	12.57	2.040	.4907	.5664	1.417	.6291	8.272
#1	-.0021	.0205	.0002	.0091	.2799	.0439	.0181	.1100	.0054
#2	-.0020	.0247	.0003	.0095	.2806	.0442	.0184	.1113	.0056
#3	-.0022	.0257	.0003	.0095	.2826	.0444	.0179	.1103	.0048

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	**.0213**	**.0059**	**.0019**	**.0184**	**.2019**	**.0484**	**.0208**	**.0230**	**.0148**
Stddev	.0000	.0002	.0002	.0009	.0035	.0046	.0007	.0006	.0002
%RSD	.2248	3.290	11.22	4.728	1.756	9.476	3.495	2.704	1.320
#1	.0213	.0057	.0020	.0194	.2033	.0441	.0211	.0235	.0146
#2	.0213	.0061	.0016	.0178	.1979	.0532	.0200	.0223	.0149
#3	.0212	.0059	.0020	.0180	.2045	.0478	.0214	.0230	.0150

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	**.2000**	**.0271**	**.0037**	**.0015**	**.0944**	**.0009**	**.0008**	**.0326**	**.0119**
Stddev	.0010	.0002	.0002	.0001	.0002	.0002	.0001	.0009	.0002
%RSD	.5039	.6085	4.836	9.462	.2589	19.60	17.87	2.719	1.273
#1	.2007	.0272	.0039	.0017	.0941	.0007	.0006	.0329	.0121
#2	.2004	.0269	.0038	.0015	.0946	.0009	.0009	.0316	.0119
#3	.1988	.0271	.0035	.0014	.0943	.0011	.0009	.0334	.0118

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	**.0336**	**.0034**	**.0119**	**.0012**	**.0070**	**.0096**	**.0240**
Stddev	.0010	.0000	.0012	.0001	.0002	.0008	.0003
%RSD	2.861	.5802	9.902	10.27	2.943	8.408	1.164
#1	.0327	.0034	.0112	.0011	.0068	.0105	.0237
#2	.0346	.0034	.0113	.0014	.0070	.0092	.0243
#3	.0335	.0034	.0133	.0012	.0073	.0091	.0240

Sample Name: CAL 1 Acquired: 8/2/2018 15:10:57 Type: Cal
Method: _2016(v681) Mode: IR Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3767.7	35110.	3965.1
Stddev	20.3	485.	24.9
%RSD	.53757	1.3825	.62883
#1	3786.7	35669.	3955.1
#2	3746.4	34795.	3993.5
#3	3769.8	34866.	3946.8

Sample Name: Cal 2 Acquired: 8/2/2018 15:15:35 Type: Cal
Method: _2016(v681) Mode: IR Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	.1400	5.417	.2681	.0981	26.99	47.70	.4536	5.355	5.909
Stddev	.0007	.016	.0012	.0005	.12	.20	.0025	.012	.024
%RSD	.4935	.2871	.4390	.5298	.4419	.4135	.5518	.2203	.4067
#1	.1394	5.424	.2690	.0976	27.12	47.84	.4561	5.361	5.933
#2	.1399	5.428	.2685	.0987	26.97	47.78	.4536	5.362	5.909
#3	.1408	5.399	.2667	.0980	26.88	47.47	.4511	5.341	5.885

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	2.071	2.820	.5105	9.312	1.714	4.058	1.072	7.114	.3946
Stddev	.006	.006	.0011	.043	.008	.015	.002	.024	.0014
%RSD	.2836	.2098	.2194	.4595	.4879	.3613	.2029	.3370	.3509
#1	2.076	2.827	.5114	9.355	1.715	4.069	1.073	7.128	.3960
#2	2.072	2.820	.5109	9.313	1.722	4.064	1.073	7.128	.3946
#3	2.065	2.815	.5093	9.269	1.705	4.042	1.069	7.086	.3932

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	5.863	3.281	1.376	.8825	1.005	.0917	.0434	.4294	.5858
Stddev	.016	.011	.006	.0024	.006	.0003	.0002	.0008	.0004
%RSD	.2664	.3337	.4438	.2733	.6099	.2995	.3850	.1777	.0599
#1	5.864	3.289	1.382	.8844	1.012	.0919	.0436	.4286	.5858
#2	5.879	3.286	1.376	.8833	1.005	.0916	.0433	.4296	.5861
#3	5.847	3.268	1.370	.8798	.9998	.0914	.0434	.4301	.5854

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	53.45	.0513	3.176	.0751	.0524	.9735	6.070
Stddev	.24	.0005	.018	.0003	.0004	.0030	.026
%RSD	.4427	1.035	.5803	.3523	.8061	.3057	.4247
#1	53.67	.0511	3.194	.0751	.0519	.9727	6.094
#2	53.49	.0508	3.178	.0754	.0526	.9768	6.073
#3	53.20	.0519	3.157	.0749	.0527	.9710	6.043

Sample Name: Cal 2 Acquired: 8/2/2018 15:15:35 Type: Cal
Method: _2016(v681) Mode: IR Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3480.4	31689.	3676.7
Stddev	31.7	199.	95.4
%RSD	.90967	.62664	2.5938
#1	3510.9	31493.	3784.8
#2	3482.5	31684.	3640.8
#3	3447.7	31890.	3604.6

Sample Name: Cal 3 Acquired: 8/2/2018 15:19:47 Type: Cal
Method: _2016(v681) Mode: IR Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	.2947	11.06	.5609	.2039	55.22	96.45	.9429	11.01	12.38
Stddev	.0008	.08	.0012	.0015	.31	.52	.0017	.02	.00
%RSD	.2633	.7379	.2158	.7210	.5616	.5427	.1850	.2021	.0350
#1	.2941	11.14	.5611	.2043	55.50	96.93	.9448	11.02	12.38
#2	.2944	10.98	.5596	.2022	54.89	95.89	.9415	11.02	12.37
#3	.2956	11.05	.5621	.2051	55.28	96.54	.9423	10.98	12.38

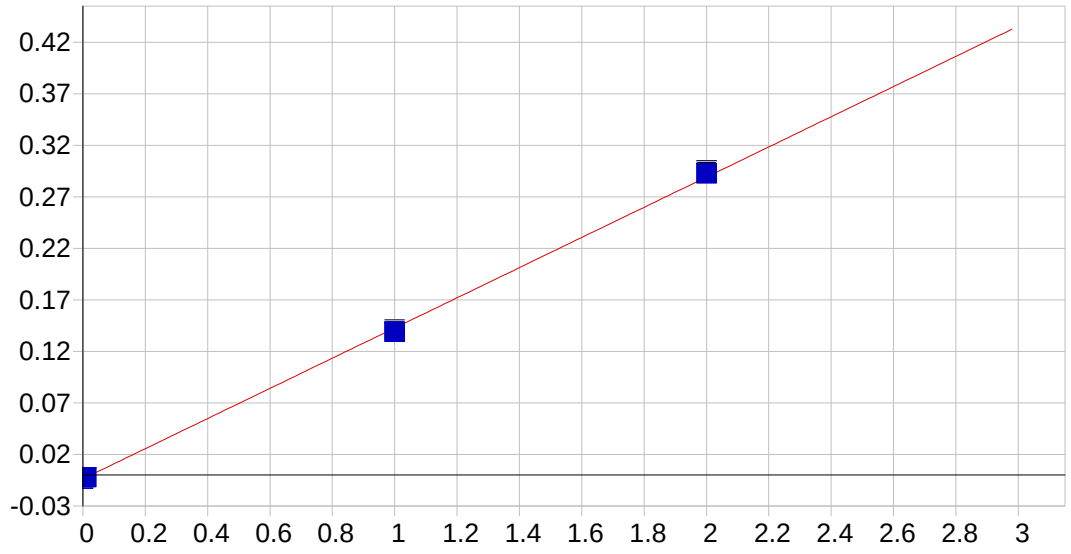
Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	4.303	5.865	1.056	19.00	3.468	8.283	2.173	14.38	.8234
Stddev	.003	.013	.001	.09	.023	.057	.015	.09	.0010
%RSD	.0736	.2139	.0613	.4535	.6602	.6912	.6932	.6457	.1237
#1	4.304	5.878	1.057	19.08	3.488	8.327	2.189	14.45	.8241
#2	4.306	5.865	1.056	18.91	3.443	8.218	2.159	14.28	.8237
#3	4.300	5.853	1.057	19.02	3.472	8.303	2.170	14.41	.8222

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	11.81	6.816	2.791	1.799	2.099	.1909	.0905	.8696	1.209
Stddev	.09	.004	.006	.004	.002	.0008	.0003	.0083	.003
%RSD	.7420	.0660	.2162	.2021	.0855	.4325	.3708	.9594	.2772
#1	11.90	6.821	2.797	1.802	2.100	.1913	.0904	.8747	1.211
#2	11.72	6.816	2.790	1.799	2.097	.1900	.0908	.8600	1.210
#3	11.82	6.812	2.785	1.795	2.100	.1915	.0901	.8741	1.205

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	109.0	.1039	6.507	.1510	.1048	1.980	12.68
Stddev	1.0	.0002	.036	.0000	.0006	.017	.01
%RSD	.9088	.1997	.5531	.0286	.5732	.8743	.0664
#1	109.3	.1039	6.540	.1510	.1042	1.996	12.69
#2	107.9	.1037	6.468	.1510	.1054	1.962	12.68
#3	109.8	.1041	6.512	.1510	.1048	1.981	12.68

Sample Name: Cal 3 Acquired: 8/2/2018 15:19:47 Type: Cal
Method: _2016(v681) Mode: IR Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3223.7	29977.	3460.2
Stddev	27.0	849.	72.3
%RSD	.83734	2.8309	2.0898
#1	3211.0	28998.	3382.4
#2	3205.5	30503.	3525.3
#3	3254.8	30430.	3472.9

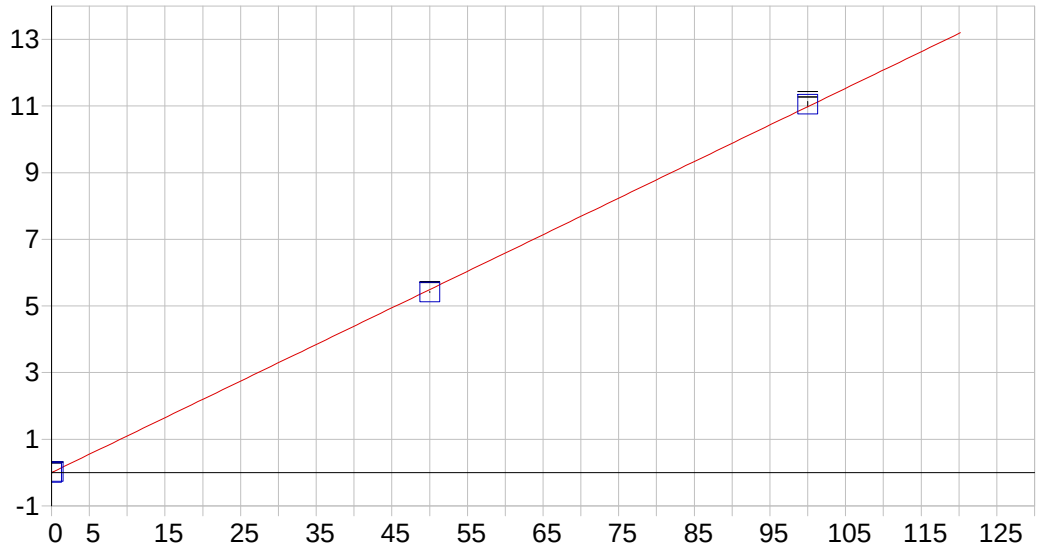


Ag 328.068 {103}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.003704	Re-Slope:	1.000000
A1 (Gain):	0.146410	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999846	Status:	OK.
Std Error of Est:	0.000020		
Predicted MDL:	0.001587		
Predicted MQL:	0.005290		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	-.00000	-.000	.000	-.00370	.000	1
CAL 1	.01000	.01029	.000	2.93	-.00210	.000	1
Cal 2	1.0000	.97496	-.025	-2.50	.14003	.001	1
Cal 3	2.0000	2.0247	.025	1.24	.29471	.001	1

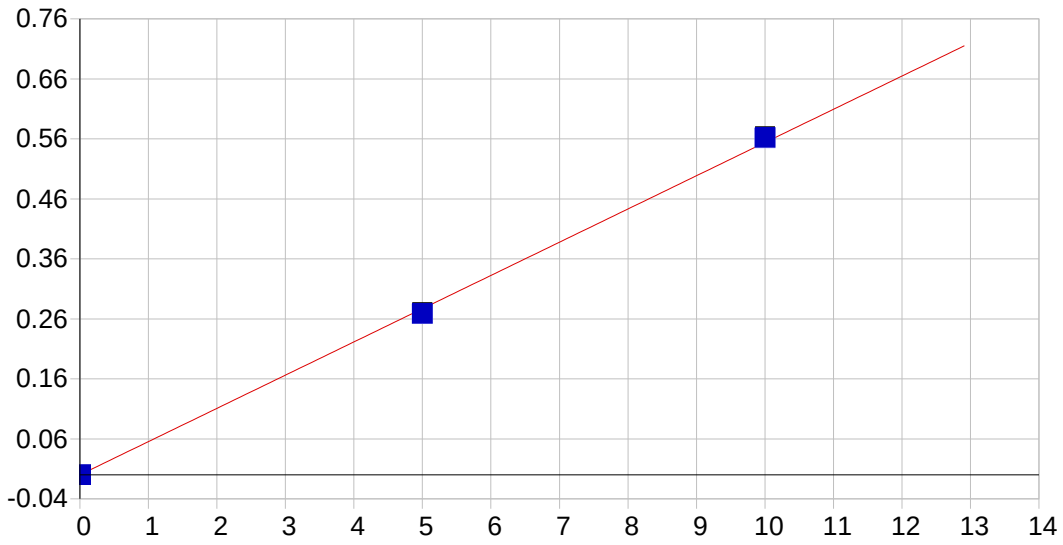


Al 396.152 { 85}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000975	Re-Slope:	1.000000
A1 (Gain):	0.109809	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999954	Status:	OK.
Std Error of Est:	0.000259		
Predicted MDL:	0.022592		
Predicted MQL:	0.075308		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	-.00001	-.000	.000	.00097	.002	1
CAL 1	.20000	.20656	.007	3.28	.02366	.003	1
Cal 2	50.000	49.322	-.678	-1.36	5.4170	.016	1
Cal 3	100.00	100.67	.671	.671	11.056	.082	1

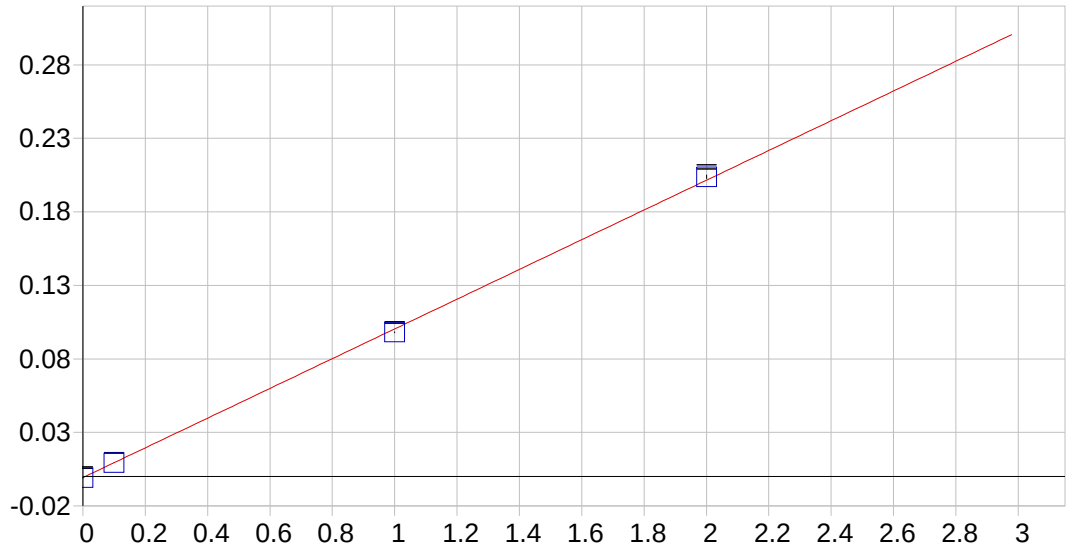


As 189.042 {478}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000039	Re-Slope:	1.000000
A1 (Gain):	0.055375	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999707	Status:	OK.
Std Error of Est:	0.000023		
Predicted MDL:	0.003573		
Predicted MQL:	0.011909		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00004	.000	1
CAL 1	.01000	.00541	-.005	-45.9	.00026	.000	1
Cal 2	5.0000	4.8526	-.147	-2.95	.26807	.001	1
Cal 3	10.000	10.152	.152	1.52	.56093	.001	1

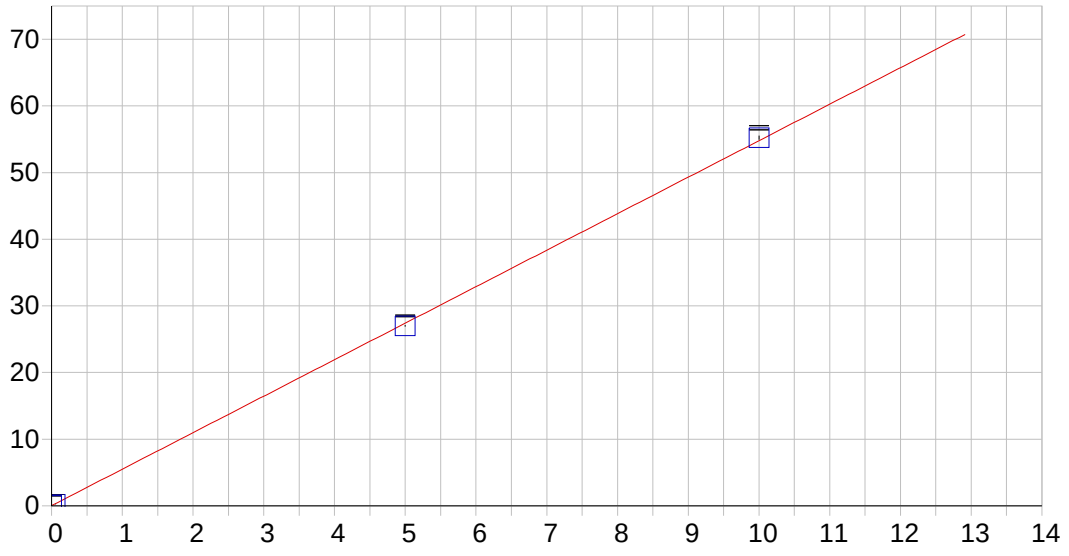


B 249.678 {135}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000748	Re-Slope:	1.000000
A1 (Gain):	0.101148	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999874	Status:	OK.
Std Error of Est:	0.000040		
Predicted MDL:	0.008559		
Predicted MQL:	0.028529		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00075	.000	1
CAL 1	.10000	.09994	-.000	-.064	.00936	.000	1
Cal 2	1.0000	.97720	-.023	-2.28	.09809	.001	1
Cal 3	2.0000	2.0229	.023	1.14	.20386	.001	1

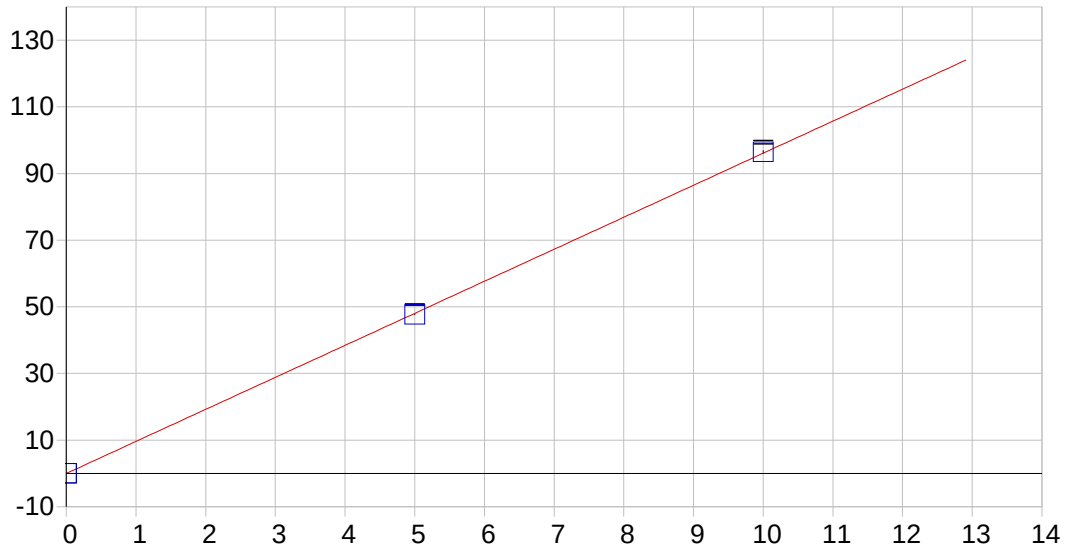


Ba 455.403 { 74}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.025137	Re-Slope:	1.000000
A1 (Gain):	5.476337	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999933	Status:	OK.
Std Error of Est:	0.002456		
Predicted MDL:	0.000594		
Predicted MQL:	0.001980		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.02516	.004	1
CAL 1	.05000	.04673	-.003	-6.55	.28103	.001	1
Cal 2	5.0000	4.9237	-.076	-1.53	26.989	.119	1
Cal 3	10.000	10.080	.080	.796	55.225	.310	1

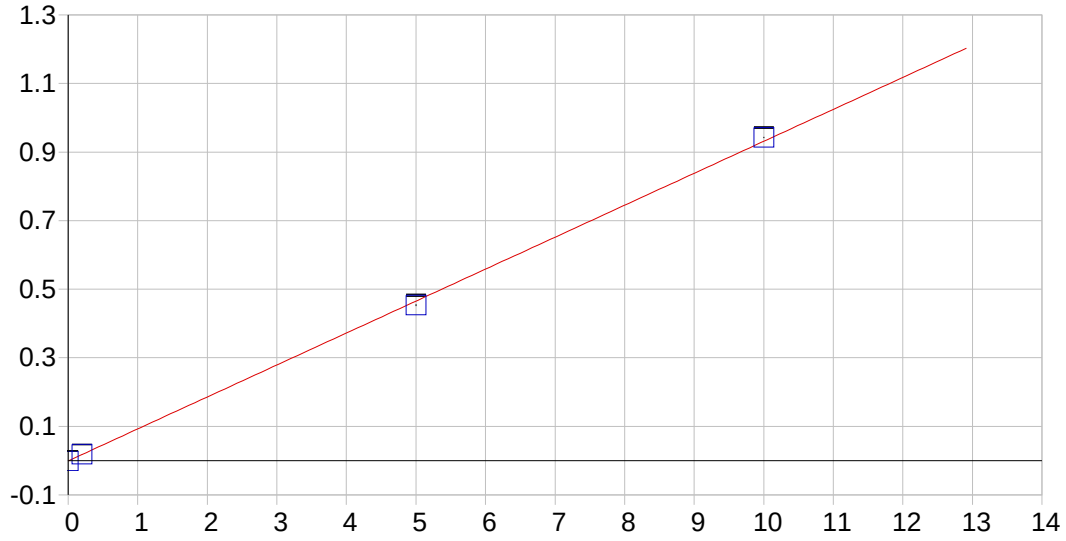


Be 313.042 {108}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.002297	Re-Slope:	1.000000
A1 (Gain):	9.610270	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999986	Status:	OK.
Std Error of Est:	0.000614		
Predicted MDL:	0.000136		
Predicted MQL:	0.000453		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00230	.001	1
CAL 1	.00500	.00484	-.000	-3.26	.04419	.000	1
Cal 2	5.0000	4.9634	-.037	-.732	47.697	.197	1
Cal 3	10.000	10.037	.037	.368	96.454	.523	1

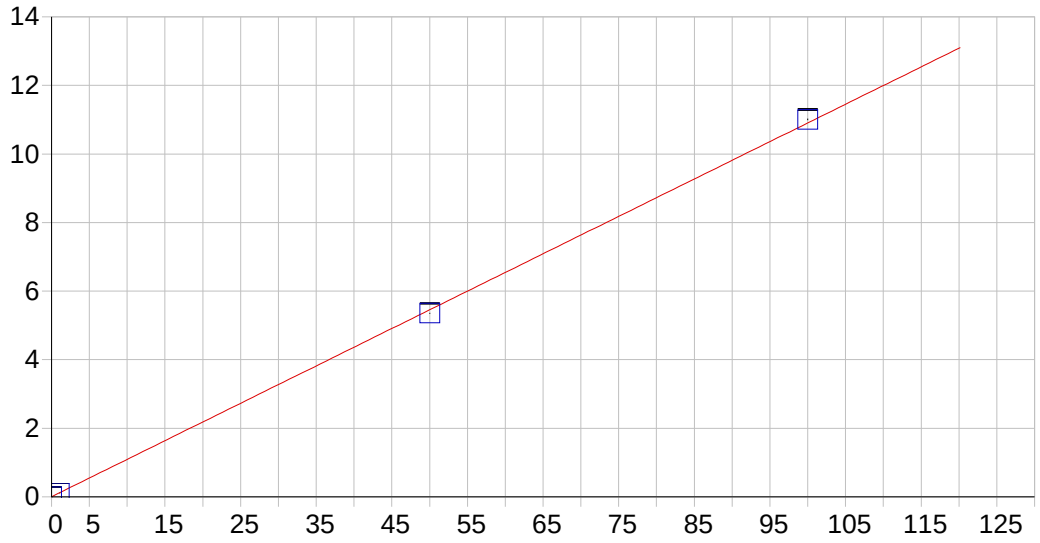


Bi 223.061 {451}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000647	Re-Slope:	1.000000
A1 (Gain):	0.093195	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999845	Status:	OK.
Std Error of Est:	0.000128		
Predicted MDL:	0.004172		
Predicted MQL:	0.013907		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00065	.000	1
CAL 1	.20000	.20166	.002	.832	.01815	.000	1
Cal 2	5.0000	4.8742	-.126	-2.52	.45360	.003	1
Cal 3	10.000	10.124	.124	1.24	.94287	.002	1

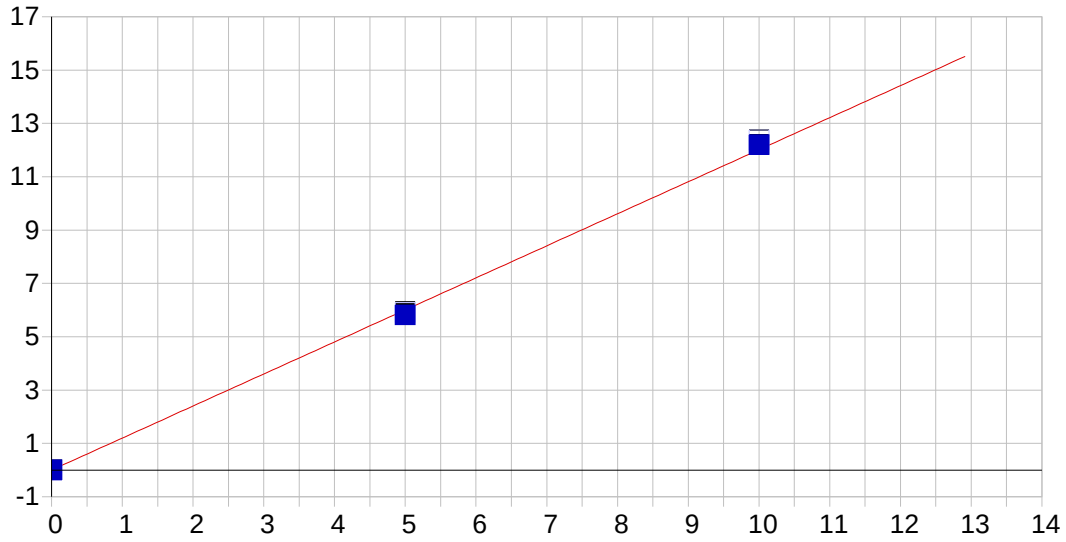


Ca 184.006 {483}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.002695	Re-Slope:	1.000000
A1 (Gain):	0.109026	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999916	Status:	OK.
Std Error of Est:	0.000774		
Predicted MDL:	0.001611		
Predicted MQL:	0.005371		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00002	.000	.000	.00270	.000	1
CAL 1	1.0000	.98910	-.011	-1.09	.11053	.001	1
Cal 2	50.000	49.088	-.912	-1.82	5.3546	.012	1
Cal 3	100.00	100.92	.923	.923	11.006	.022	1

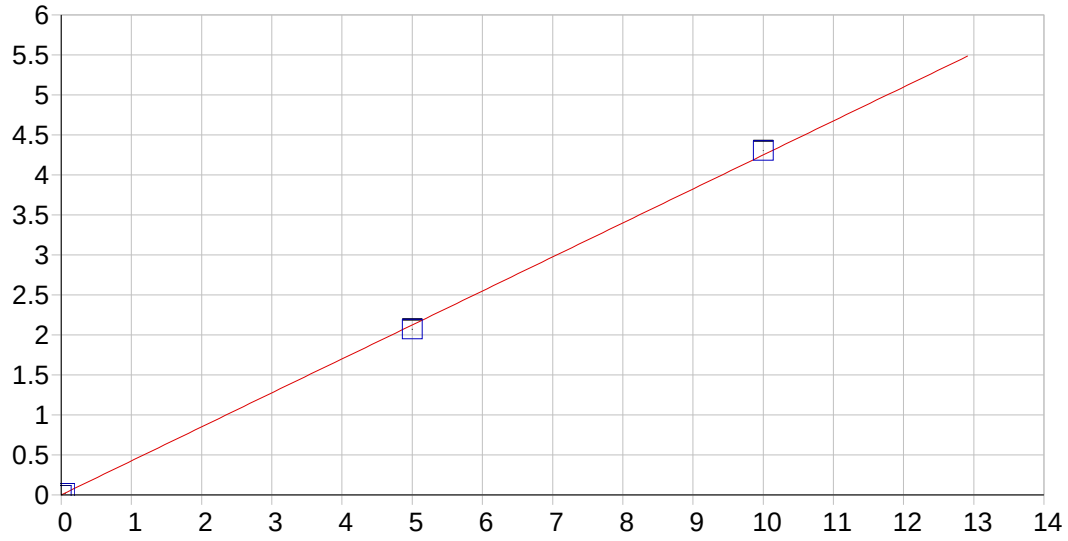


Cd 228.802 {447}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000355	Re-Slope:	1.000000
A1 (Gain):	1.201448	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999765	Status:	OK.
Std Error of Est:	0.000324		
Predicted MDL:	0.000338		
Predicted MQL:	0.001128		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00035	.000	1
CAL 1	.00500	.00451	-.000	-9.90	.00523	.000	1
Cal 2	5.0000	4.8451	-.155	-3.10	5.9087	.024	1
Cal 3	10.000	10.155	.155	1.55	12.377	.004	1

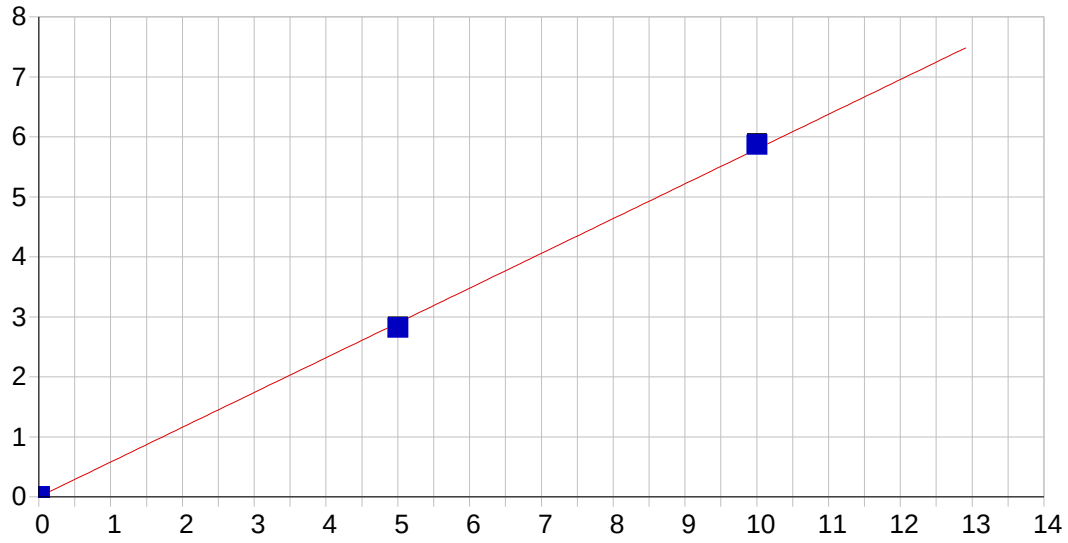


Co 228.616 {448}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000697	Re-Slope:	1.000000
A1 (Gain):	0.424824	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999838	Status:	OK.
Std Error of Est:	0.000296		
Predicted MDL:	0.000705		
Predicted MQL:	0.002349		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00070	.000	1
CAL 1	.05000	.04844	-.002	-3.12	.02128	.000	1
Cal 2	5.0000	4.8737	-.126	-2.53	2.0712	.006	1
Cal 3	10.000	10.128	.128	1.28	4.3033	.003	1

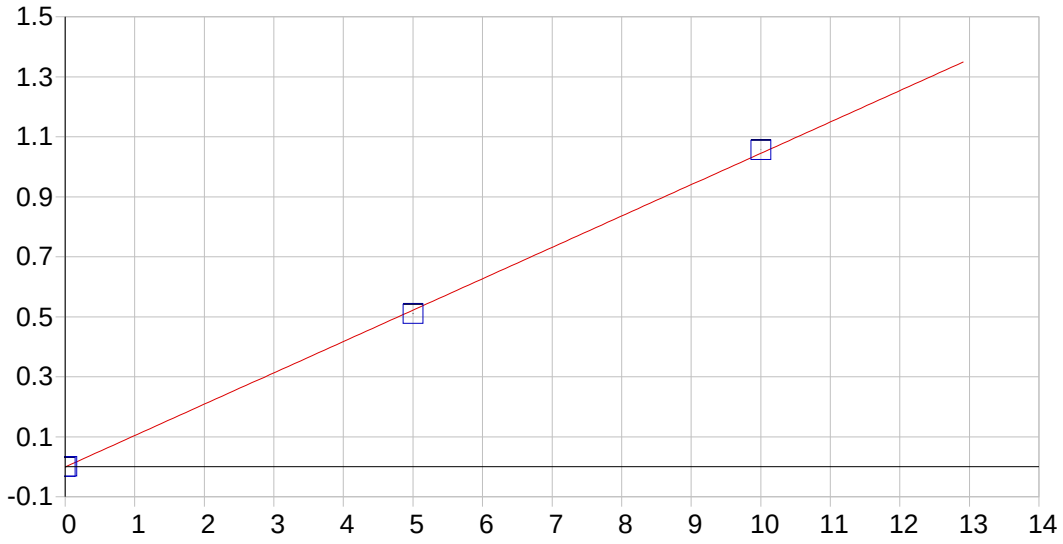


Cr 205.560 {464}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000265	Re-Slope:	1.000000
A1 (Gain):	0.579578	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999832	Status:	OK.
Std Error of Est:	0.000184		
Predicted MDL:	0.000294		
Predicted MQL:	0.000981		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00027	.000	1
CAL 1	.01000	.00979	-.000	-2.06	.00594	.000	1
Cal 2	5.0000	4.8707	-.129	-2.59	2.8204	.006	1
Cal 3	10.000	10.129	.129	1.29	5.8653	.013	1

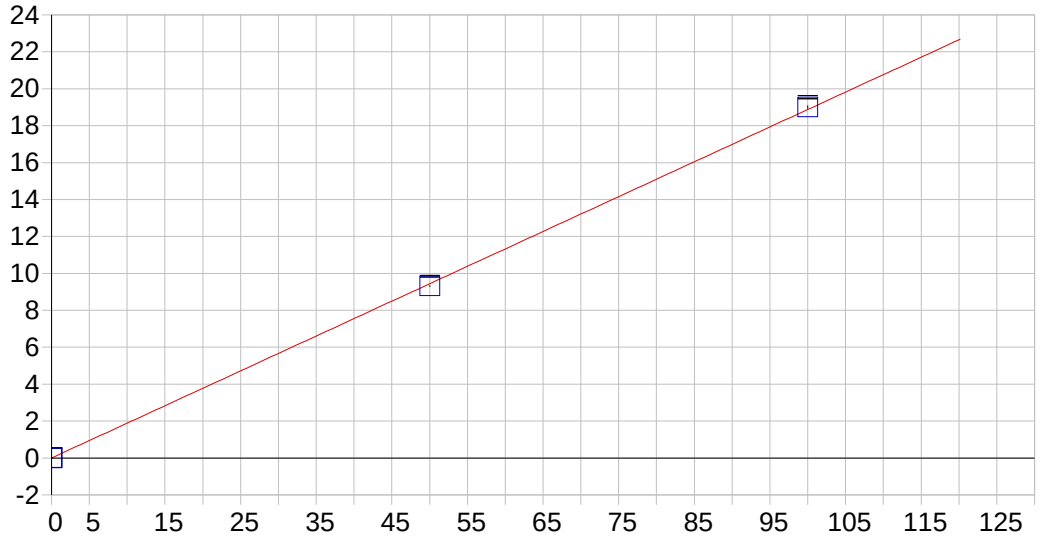


Cu 217.894 {455}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000574	Re-Slope:	1.000000
A1 (Gain):	0.104532	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999873	Status:	OK.
Std Error of Est:	0.000046		
Predicted MDL:	0.003148		
Predicted MQL:	0.010494		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00057	.000	1
CAL 1	.02500	.02330	-.002	-6.81	.00186	.000	1
Cal 2	5.0000	4.8895	-.111	-2.21	.51053	.001	1
Cal 3	10.000	10.112	.112	1.12	1.0565	.001	1

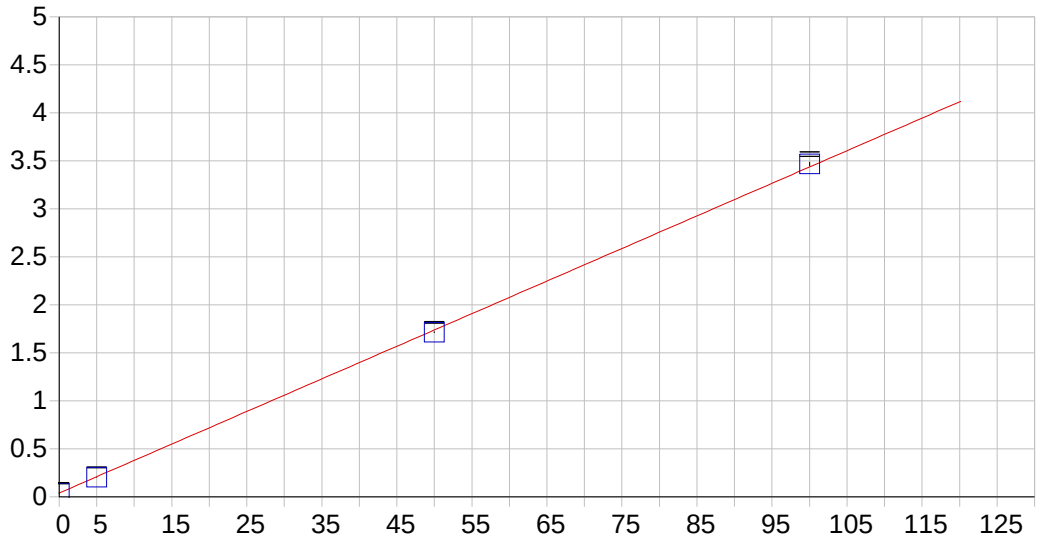


Fe 259.940 {130}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000315	Re-Slope:	1.000000
A1 (Gain):	0.188763	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999956	Status:	OK.
Std Error of Est:	0.000307		
Predicted MDL:	0.004197		
Predicted MQL:	0.013990		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00032	.001	1
CAL 1	.10000	.09896	-.001	-1.04	.01837	.001	1
Cal 2	50.000	49.335	-.665	-1.33	9.3124	.043	1
Cal 3	100.00	100.67	.666	.666	19.002	.086	1

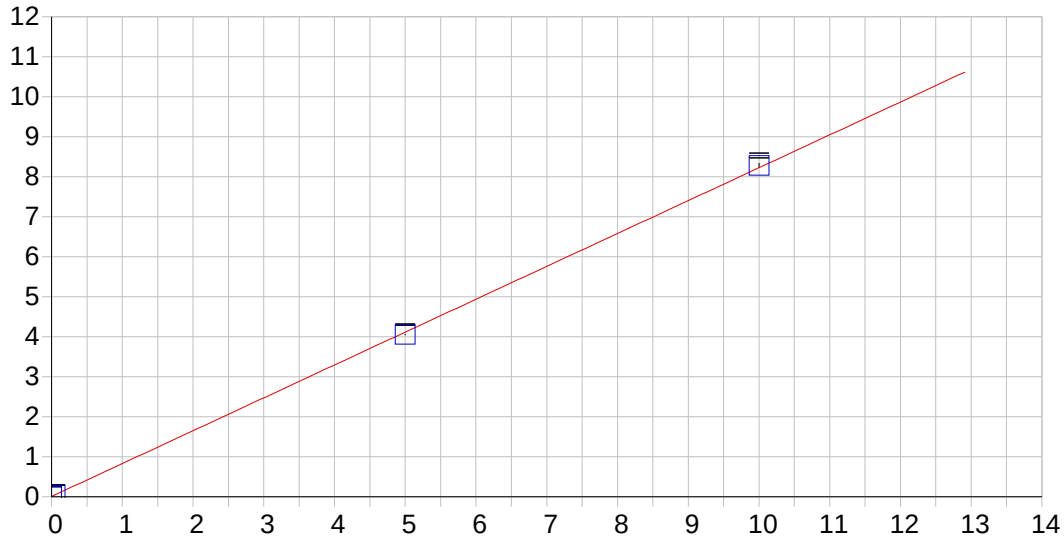


K 766.490 { 44}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.040111	Re-Slope:	1.000000
A1 (Gain):	0.033956	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999903	Status:	OK.
Std Error of Est:	0.000588		
Predicted MDL:	0.098538		
Predicted MQL:	0.328459		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00026	.000	.000	.04012	.006	1
CAL 1	5.0000	4.7646	-.235	-4.71	.20190	.004	1
Cal 2	50.000	49.292	-.708	-1.42	1.7139	.008	1
Cal 3	100.00	100.94	.943	.943	3.4678	.023	1

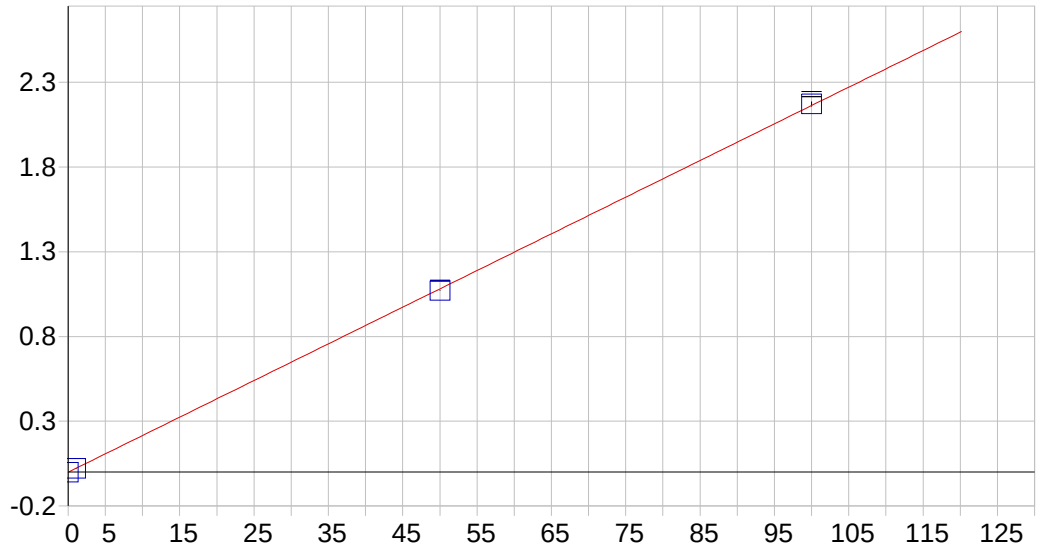


Li 670.784 { 50}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.007234	Re-Slope:	1.000000
A1 (Gain):	0.821788	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999951	Status:	OK.
Std Error of Est:	0.000316		
Predicted MDL:	0.004346		
Predicted MQL:	0.014486		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00723	.004	1
CAL 1	.05000	.05007	.000	.144	.04838	.005	1
Cal 2	5.0000	4.9297	-.070	-1.41	4.0584	.015	1
Cal 3	10.000	10.070	.070	.702	8.2828	.057	1

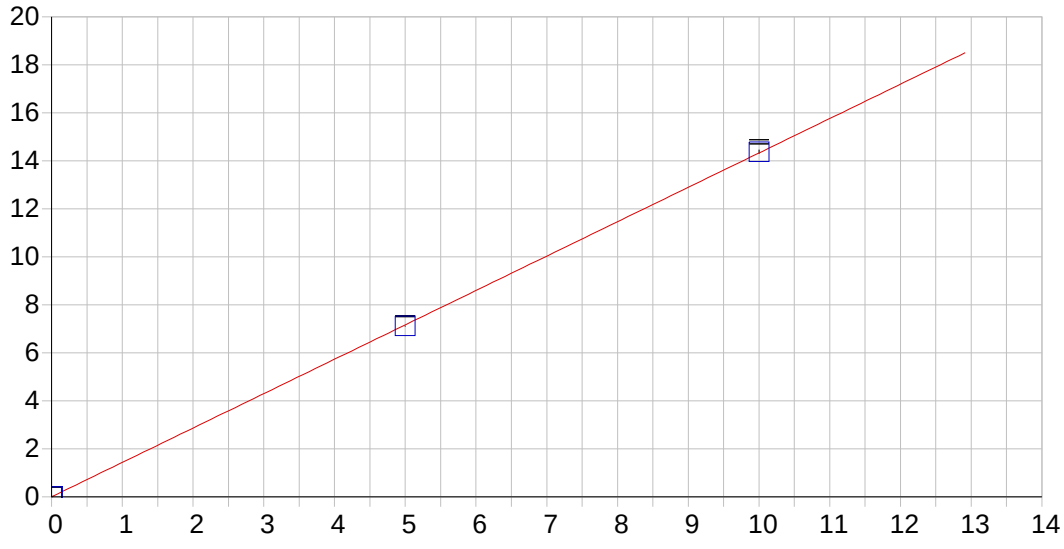


Mg 279.806 {121}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000876	Re-Slope:	1.000000
A1 (Gain):	0.021640	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999981	Status:	OK.
Std Error of Est:	0.000074		
Predicted MDL:	0.033301		
Predicted MQL:	0.111002		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00088	.000	1
CAL 1	1.0000	1.0030	.003	.304	.02083	.001	1
Cal 2	50.000	49.560	-.440	-.880	1.0716	.002	1
Cal 3	100.00	100.44	.437	.437	2.1726	.015	1

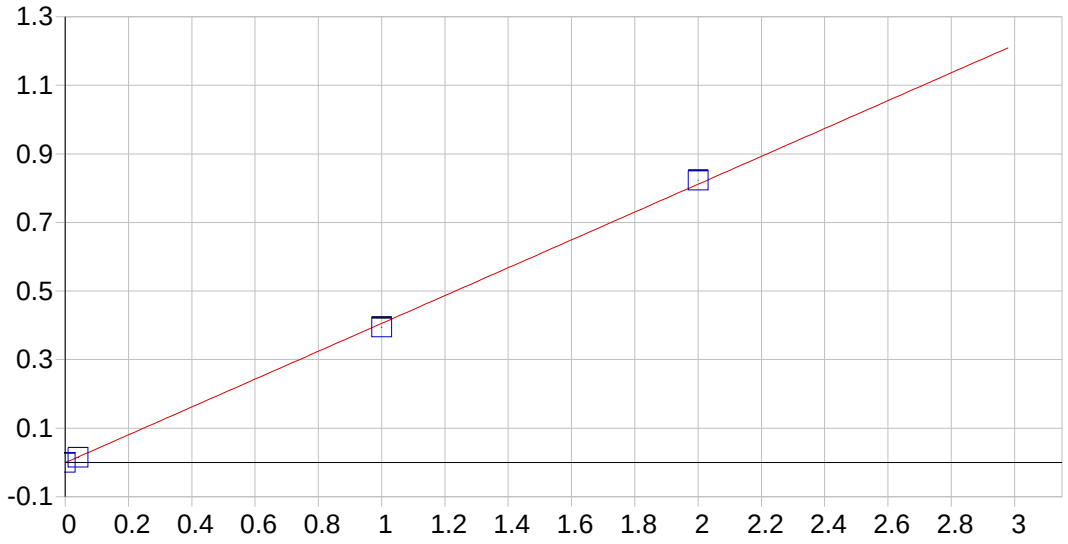


Mn 257.610 {131}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.001388	Re-Slope:	1.000000
A1 (Gain):	1.432763	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999987	Status:	OK.
Std Error of Est:	0.000153		
Predicted MDL:	0.000625		
Predicted MQL:	0.002082		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	-.00000	-.000	.000	.00139	.001	1
CAL 1	.01500	.01506	.000	.402	.02297	.001	1
Cal 2	5.0000	4.9644	-.036	-.713	7.1142	.024	1
Cal 3	10.000	10.036	.036	.356	14.380	.093	1

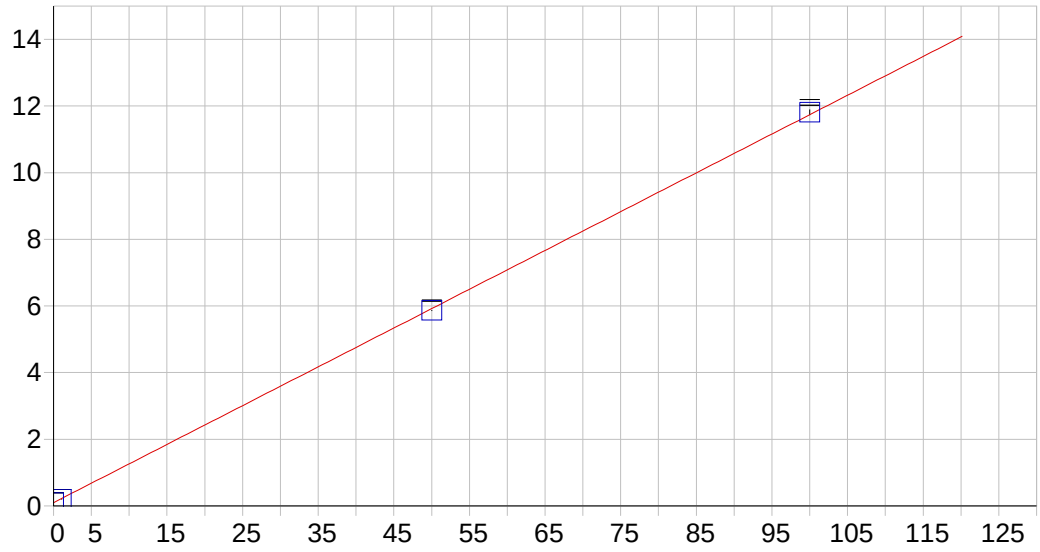


Mo 202.030 {467}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000596	Re-Slope:	1.000000
A1 (Gain):	0.406108	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999795	Status:	OK.
Std Error of Est:	0.000128		
Predicted MDL:	0.000622		
Predicted MQL:	0.002074		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00059	.000	1
CAL 1	.04000	.03794	-.002	-5.14	.01481	.000	1
Cal 2	1.0000	.97315	-.027	-2.69	.39461	.001	1
Cal 3	2.0000	2.0289	.029	1.45	.82336	.001	1

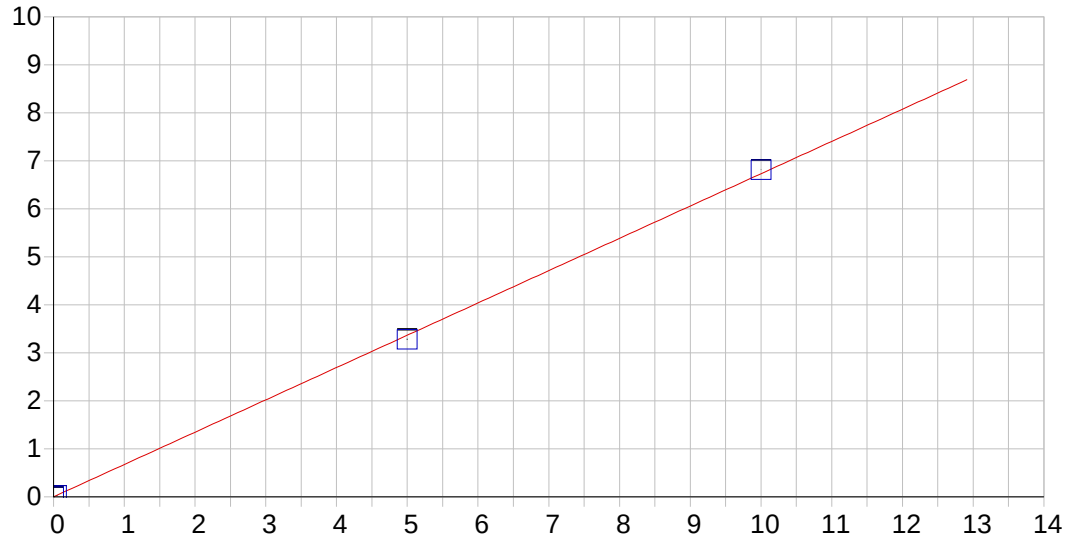


Na 589.592 { 57}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.098206	Re-Slope:	1.000000
A1 (Gain):	0.116434	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999919	Status:	OK.
Std Error of Est:	0.000812		
Predicted MDL:	0.027769		
Predicted MQL:	0.092563		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00013	.000	.000	.09822	.003	1
CAL 1	1.0000	.87423	-.126	-12.6	.20000	.001	1
Cal 2	50.000	49.513	-.487	-.973	5.8632	.016	1
Cal 3	100.00	100.61	.612	.612	11.813	.088	1

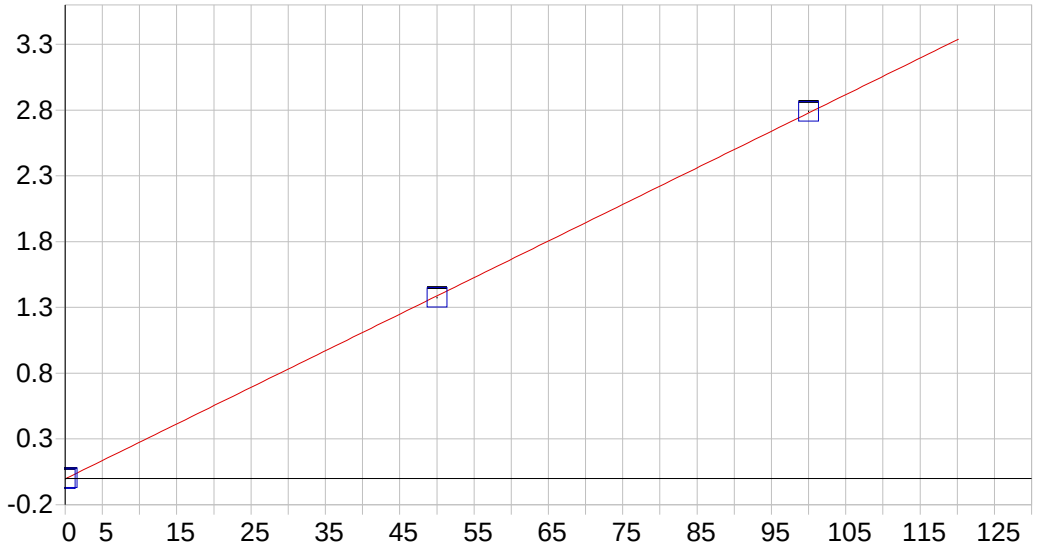


Ni 221.647 {452}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000692	Re-Slope:	1.000000
A1 (Gain):	0.673014	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999841	Status:	OK.
Std Error of Est:	0.000417		
Predicted MDL:	0.000564		
Predicted MQL:	0.001879		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00069	.000	1
CAL 1	.04000	.03920	-.001	-1.99	.02708	.000	1
Cal 2	5.0000	4.8741	-.126	-2.52	3.2810	.011	1
Cal 3	10.000	10.127	.127	1.27	6.8161	.005	1

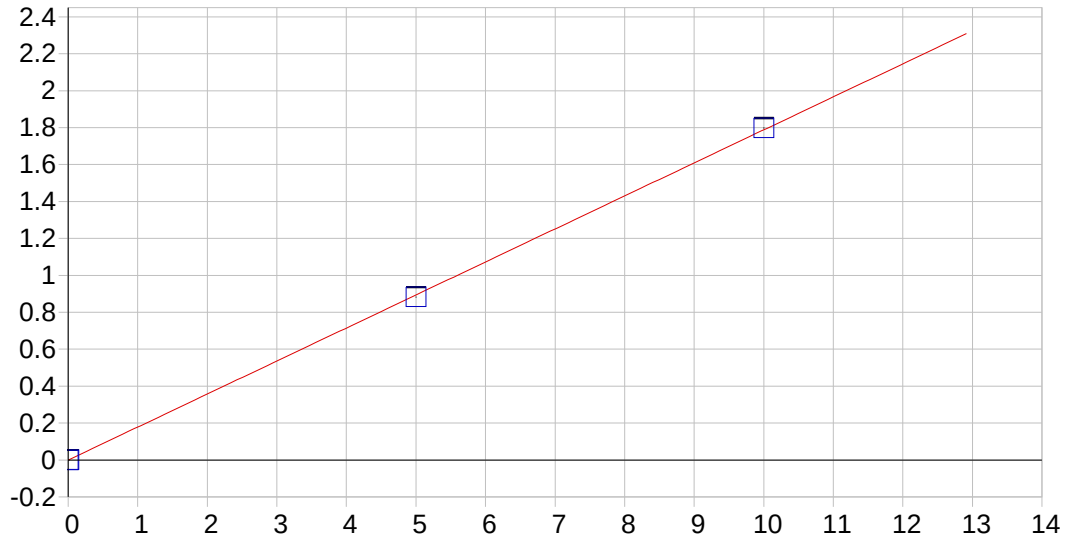


P 177.495 {490}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.002956	Re-Slope:	1.000000
A1 (Gain):	0.027815	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999980	Status:	OK.
Std Error of Est:	0.000048		
Predicted MDL:	0.005764		
Predicted MQL:	0.019213		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00001	.000	.000	-.00296	.000	1
CAL 1	.25000	.23969	-.010	-4.12	.00371	.000	1
Cal 2	50.000	49.572	-.428	-.857	1.3759	.006	1
Cal 3	100.00	100.44	.439	.439	2.7907	.006	1

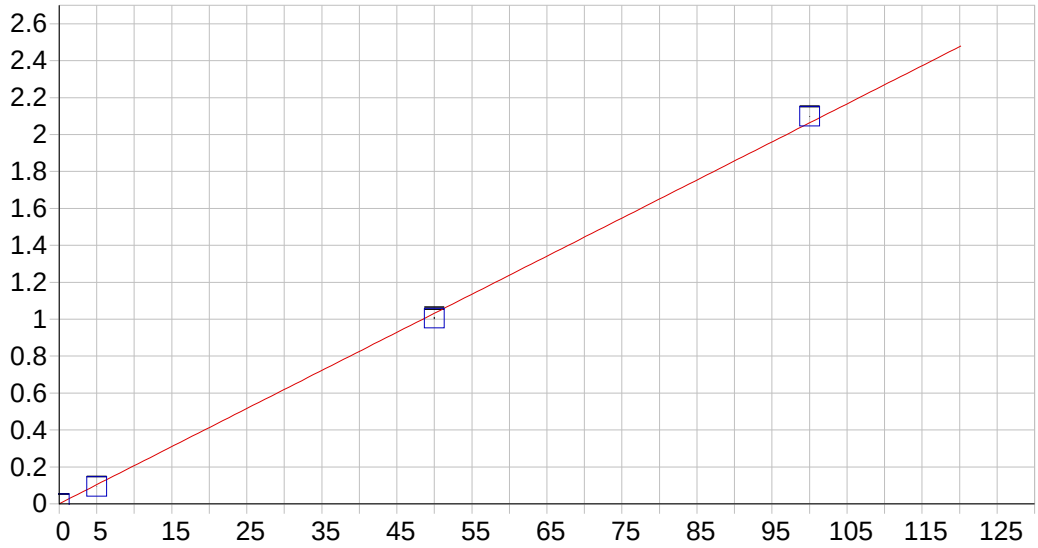


Pb 220.353 {453}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000437	Re-Slope:	1.000000
A1 (Gain):	0.178830	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999958	Status:	OK.
Std Error of Est:	0.000028		
Predicted MDL:	0.001707		
Predicted MQL:	0.005692		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	-.00000	-.000	.000	-.00044	.000	1
CAL 1	.01000	.01091	.001	9.10	.00151	.000	1
Cal 2	5.0000	4.9372	-.063	-1.26	.88247	.002	1
Cal 3	10.000	10.062	.062	.619	1.7989	.004	1

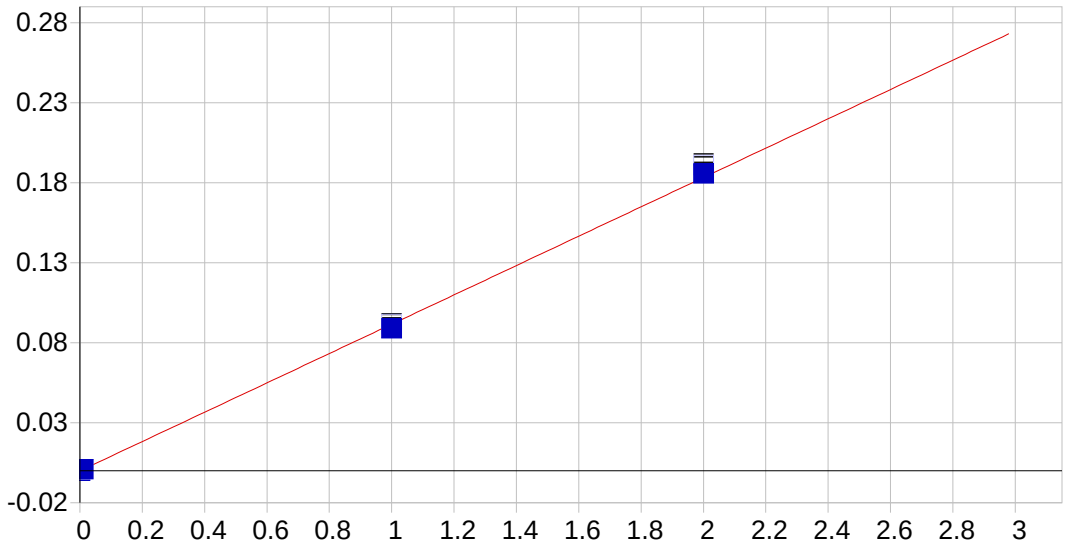


S 182.034 {485}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000604	Re-Slope:	1.000000
A1 (Gain):	0.020626	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999664	Status:	OK.
Std Error of Est:	0.000666		
Predicted MDL:	0.007992		
Predicted MQL:	0.026641		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00050	.000	.000	.00061	.000	1
CAL 1	5.0000	4.5452	-.455	-9.10	.09435	.000	1
Cal 2	50.000	48.720	-1.28	-2.56	1.0055	.006	1
Cal 3	100.00	101.73	1.73	1.73	2.0990	.002	1

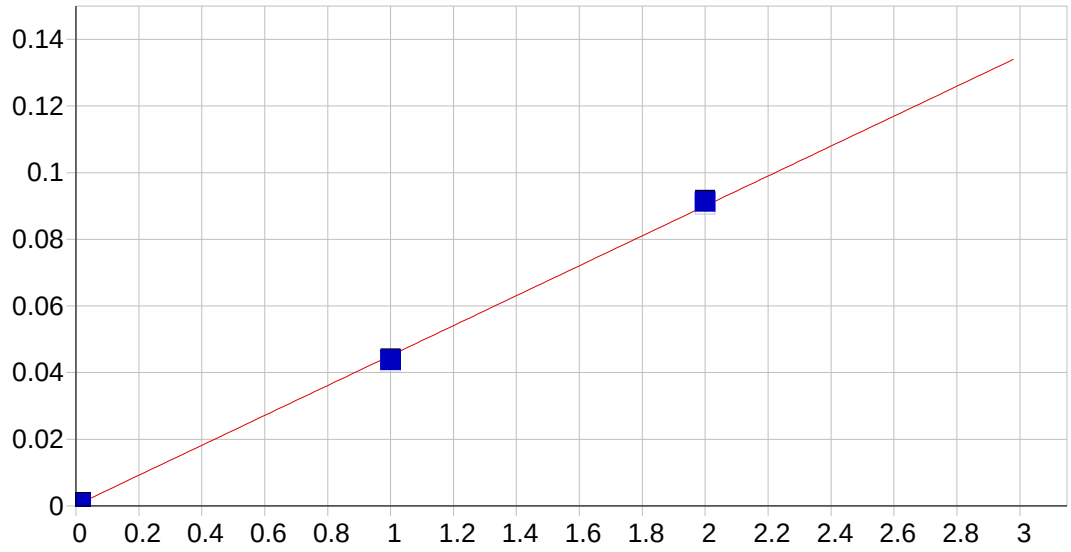


Sb 206.833 {463}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000084	Re-Slope:	1.000000
A1 (Gain):	0.091677	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999808	Status:	OK.
Std Error of Est:	0.000014		
Predicted MDL:	0.003300		
Predicted MQL:	0.011000		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	-.00000	-.000	.000	-.00008	.000	1
CAL 1	.01000	.01099	.001	9.93	.00090	.000	1
Cal 2	1.0000	.97231	-.028	-2.77	.09165	.000	1
Cal 3	2.0000	2.0268	.027	1.34	.19091	.001	1

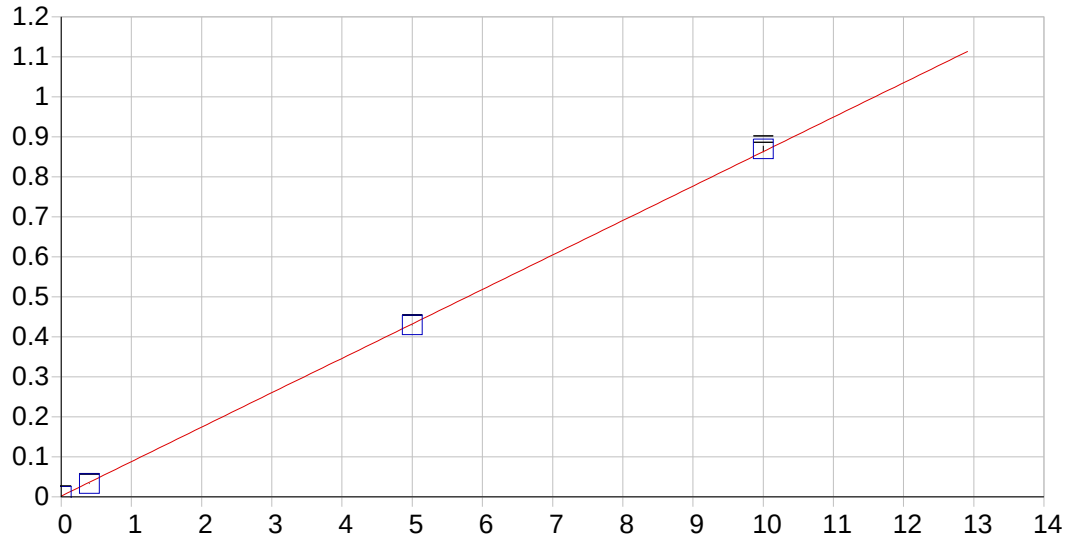


Se 196.090 {472}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000227	Re-Slope:	1.000000
A1 (Gain):	0.044901	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999784	Status:	OK.
Std Error of Est:	0.000009		
Predicted MDL:	0.005268		
Predicted MQL:	0.017559		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00023	.000	1
CAL 1	.01500	.01403	-.001	-6.45	.00081	.000	1
Cal 2	1.0000	.97184	-.028	-2.82	.04342	.000	1
Cal 3	2.0000	2.0291	.029	1.45	.09045	.000	1

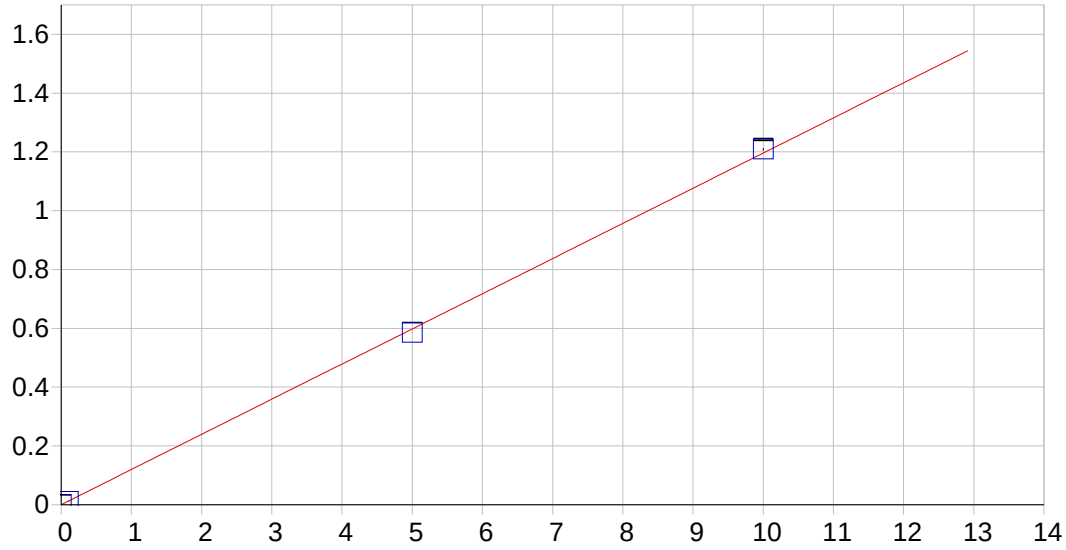


Si 251.611 {134}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.001916	Re-Slope:	1.000000
A1 (Gain):	0.086099	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999820	Status:	OK.
Std Error of Est:	0.000181		
Predicted MDL:	0.010184		
Predicted MQL:	0.033946		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00004	.000	.000	.00192	.001	1
CAL 1	.40000	.35667	-.043	-10.8	.03262	.001	1
Cal 2	5.0000	4.9656	-.034	-.688	.42945	.001	1
Cal 3	10.000	10.078	.078	.777	.86960	.008	1

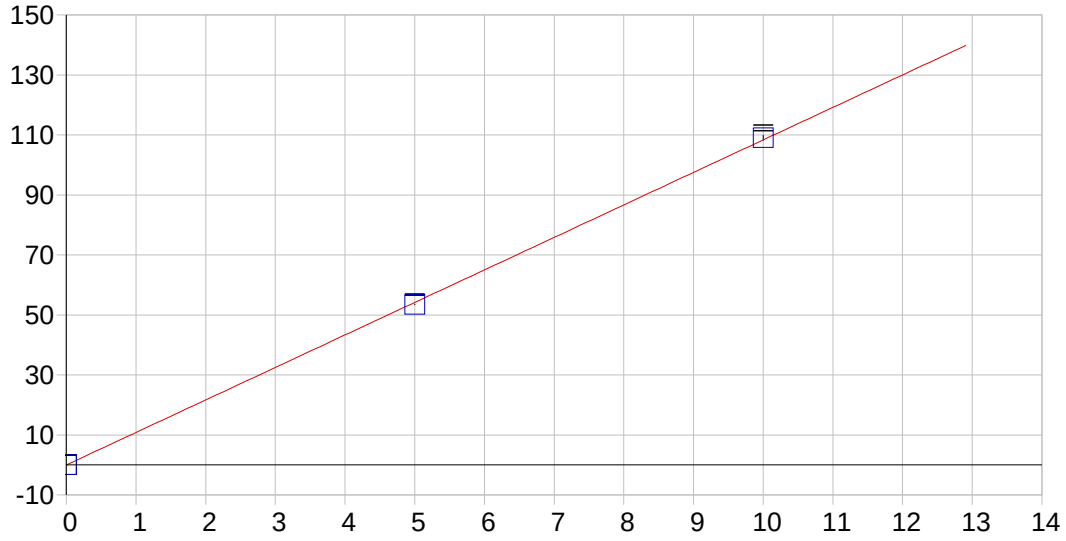


Sn 189.989 {478}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000328	Re-Slope:	1.000000
A1 (Gain):	0.119559	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999889	Status:	OK.
Std Error of Est:	0.000098		
Predicted MDL:	0.001433		
Predicted MQL:	0.004776		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00033	.000	1
CAL 1	.10000	.09693	-.003	-3.07	.01192	.000	1
Cal 2	5.0000	4.8968	-.103	-2.06	.58579	.000	1
Cal 3	10.000	10.106	.106	1.06	1.2086	.003	1

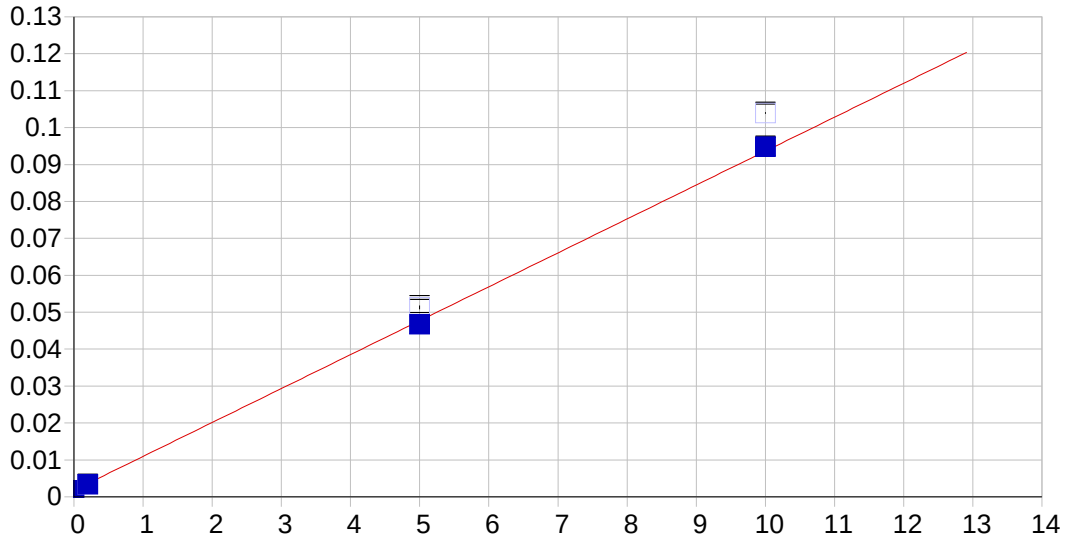


Sr 407.771 { 83}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.020253	Re-Slope:	1.000000
A1 (Gain):	10.835094	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999958	Status:	OK.
Std Error of Est:	0.001215		
Predicted MDL:	0.000204		
Predicted MQL:	0.000679		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.02025	.002	1
CAL 1	.00500	.00497	-.000	-.606	.03359	.001	1
Cal 2	5.0000	4.9352	-.065	-1.30	53.454	.237	1
Cal 3	10.000	10.065	.065	.648	109.03	.991	1

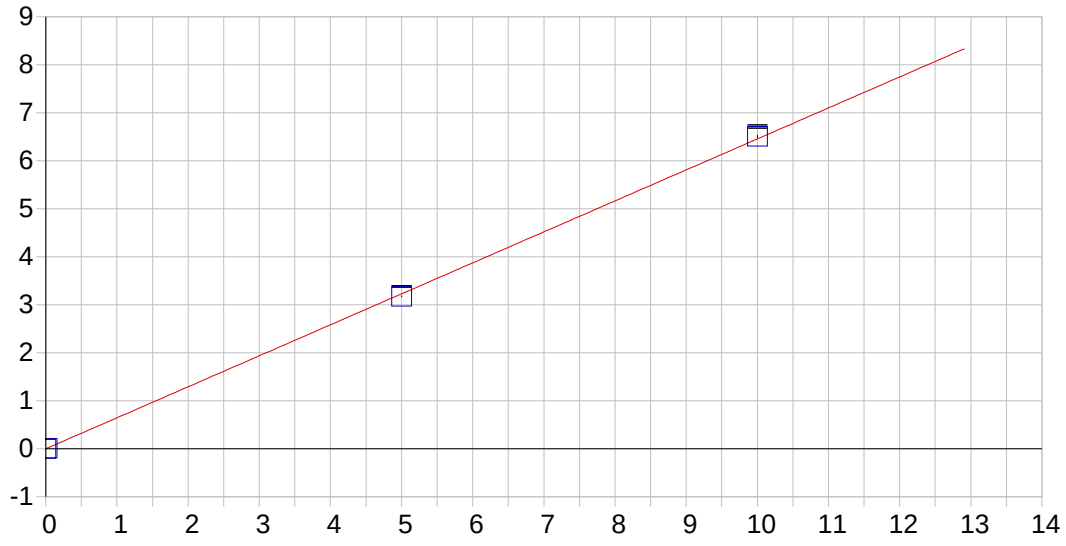


Th 283.231 {119}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.001770	Re-Slope:	1.000000
A1 (Gain):	0.009186	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999812	Status:	OK.
Std Error of Est:	0.000015		
Predicted MDL:	0.006350		
Predicted MQL:	0.021168		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00003	.000	.000	.00177	.000	1
CAL 1	.20000	.17565	-.024	-12.2	.00340	.000	1
Cal 2	5.0000	4.8937	-.106	-2.13	.05129	.001	1
Cal 3	10.000	10.129	.129	1.29	.10393	.000	1

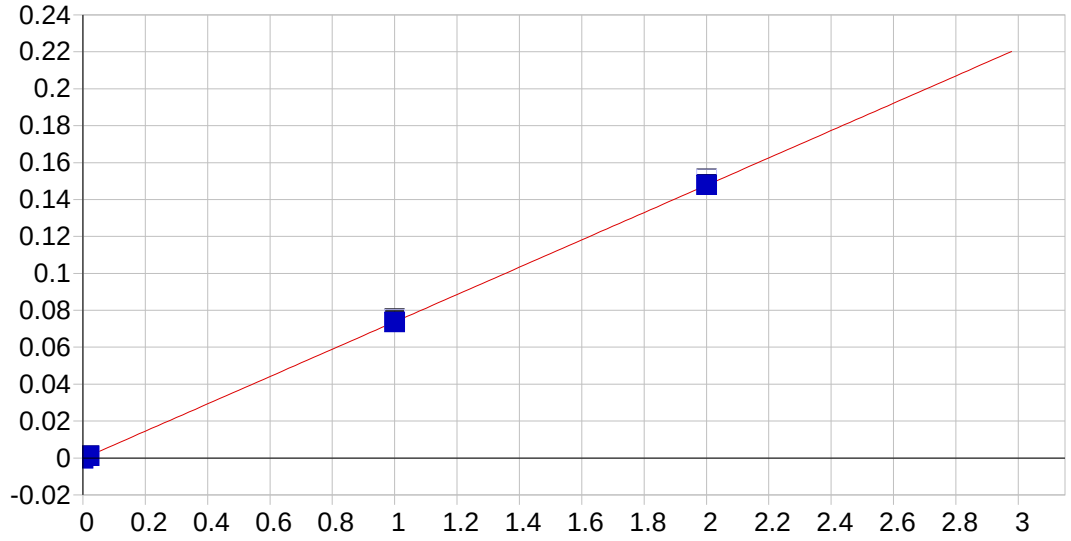


Ti 334.941 {101}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000258	Re-Slope:	1.000000
A1 (Gain):	0.645523	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999935	Status:	OK.
Std Error of Est:	0.000180		
Predicted MDL:	0.001995		
Predicted MQL:	0.006651		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	-.00026	.001	1
CAL 1	.02000	.01891	-.001	-5.44	.01195	.001	1
Cal 2	5.0000	4.9210	-.079	-1.58	3.1764	.018	1
Cal 3	10.000	10.080	.080	.801	6.5067	.036	1

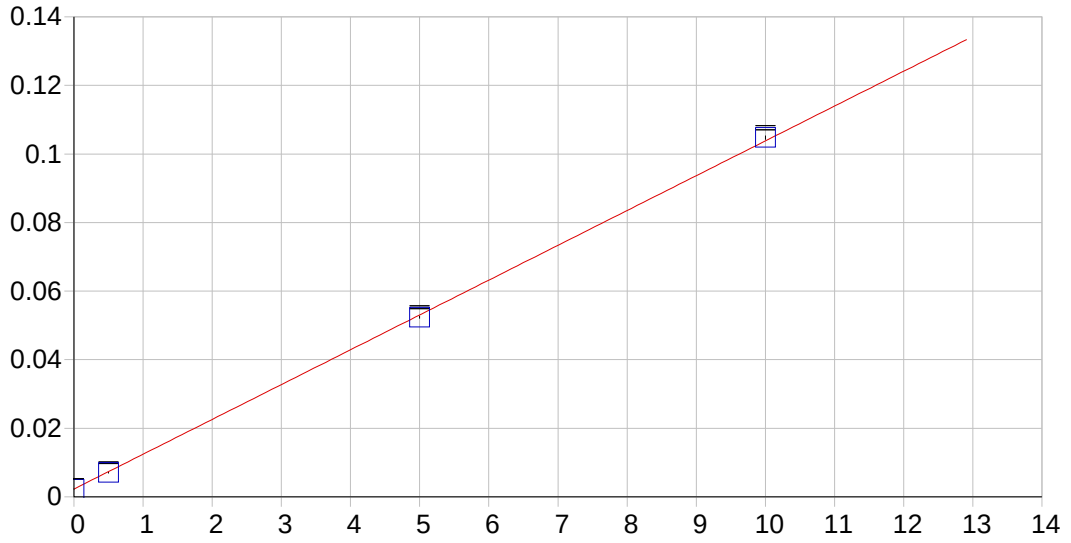


Tl 190.856 {477}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000293	Re-Slope:	1.000000
A1 (Gain):	0.074019	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999999	Status:	OK.
Std Error of Est:	0.000001		
Predicted MDL:	0.002684		
Predicted MQL:	0.008947		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	-.00000	-.000	.000	-.00029	.000	1
CAL 1	.02000	.02019	.000	.969	.00122	.000	1
Cal 2	1.0000	.99785	-.002	-.215	.07513	.000	1
Cal 3	2.0000	2.0020	.002	.098	.15102	.000	1

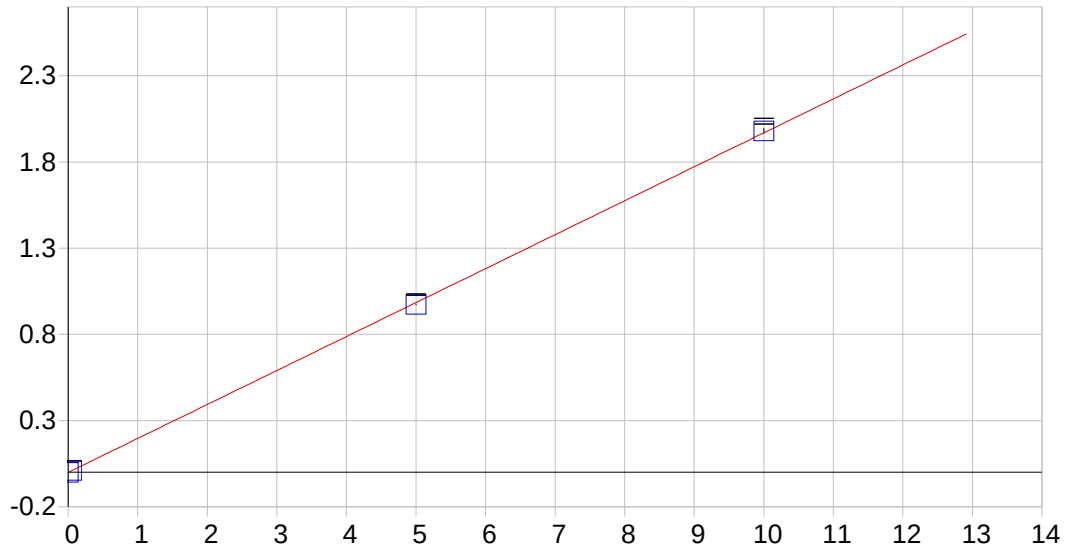


U 367.007 { 92}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.002284	Re-Slope:	1.000000
A1 (Gain):	0.010154	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999884	Status:	OK.
Std Error of Est:	0.000019		
Predicted MDL:	0.030150		
Predicted MQL:	0.100501		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00003	.000	.000	.00228	.000	1
CAL 1	.50000	.46943	-.031	-6.11	.00705	.000	1
Cal 2	5.0000	4.9359	-.064	-1.28	.05240	.000	1
Cal 3	10.000	10.095	.095	.947	.10478	.001	1

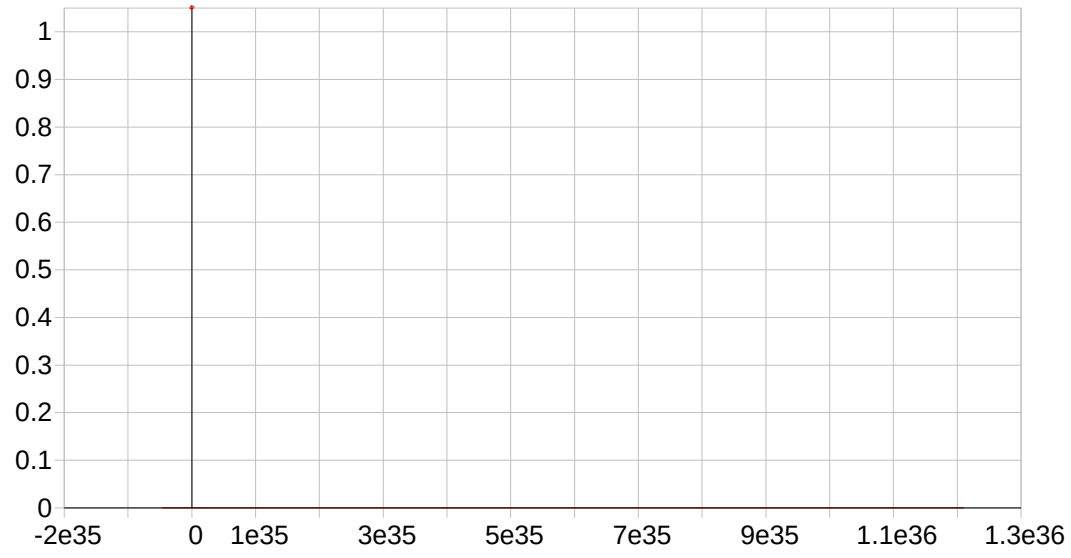


V 290.882 {116}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	-0.000613	Re-Slope:	1.000000
A1 (Gain):	0.196987	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999969	Status:	OK.
Std Error of Est:	0.000061		
Predicted MDL:	0.006128		
Predicted MQL:	0.020427		

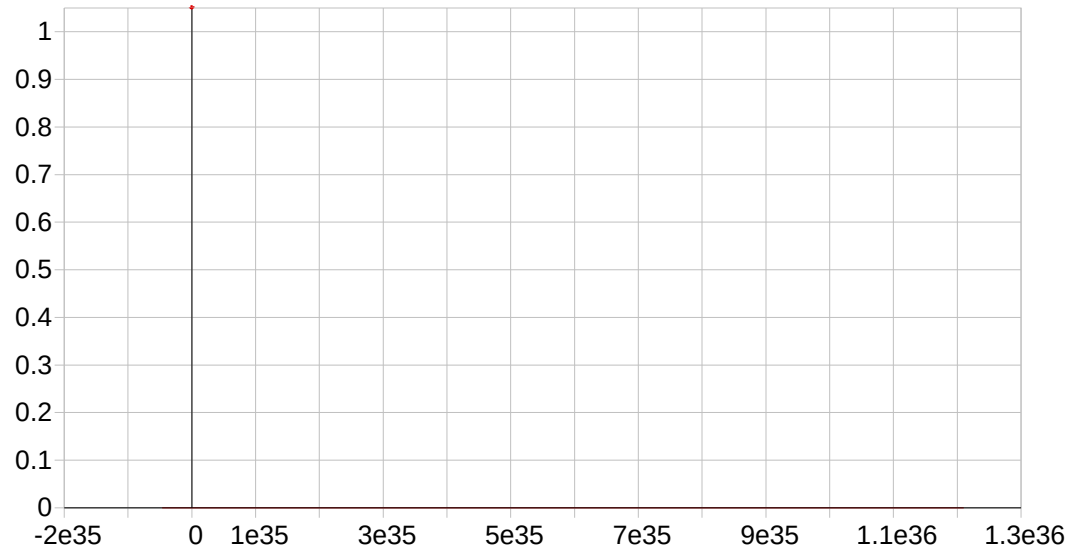
Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	-.00000	-.000	.000	-.00061	.001	1
CAL 1	.05000	.05178	.002	3.56	.00959	.001	1
Cal 2	5.0000	4.9452	-.055	-1.10	.97353	.003	1
Cal 3	10.000	10.053	.053	.530	1.9797	.017	1



Y 224.306 {450}*

Date of Fit:	<not fit>	Type of Fit:	Linear	Weighting:	1/Conc	
A0 (Offset):	0.000000		Re-Slope:	1.000000		
A1 (Gain):	0.000000		Y-int:	0.000000		
A2 (Curvature):	0.000000					
n (Exponent):	1.000000					
Correlation:	0.000000		Status:	Warning	Zero Gain	
Std Error of Est:	0.000000					
Predicted MDL:	n/a					
Predicted MQL:	n/a					

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis

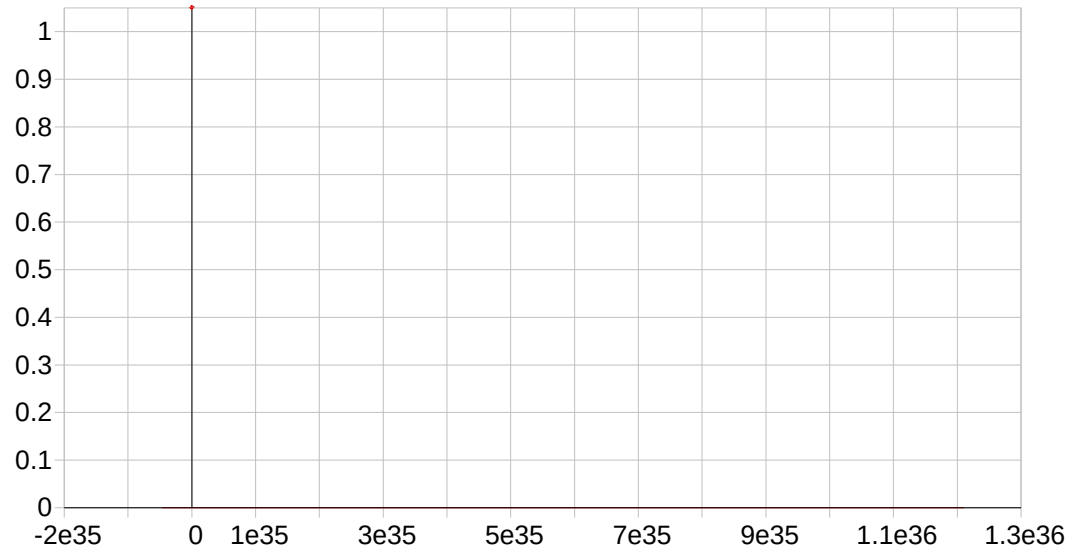


Y 360.073 { 94}*

Date of Fit:	5/30/2018 13:35:48	Type of Fit:	Linear	Weighting:	1/Conc	
A0 (Offset):	0.000000		Re-Slope:	1.000000		
A1 (Gain):	0.000000		Y-int:	0.000000		

A2 (Curvature):	0.000000					
n (Exponent):	1.000000					
Correlation:	0.000000		Status:	Warning	Zero Gain	
Std Error of Est:	0.000000					
Predicted MDL:	n/a					
Predicted MQL:	n/a					

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis

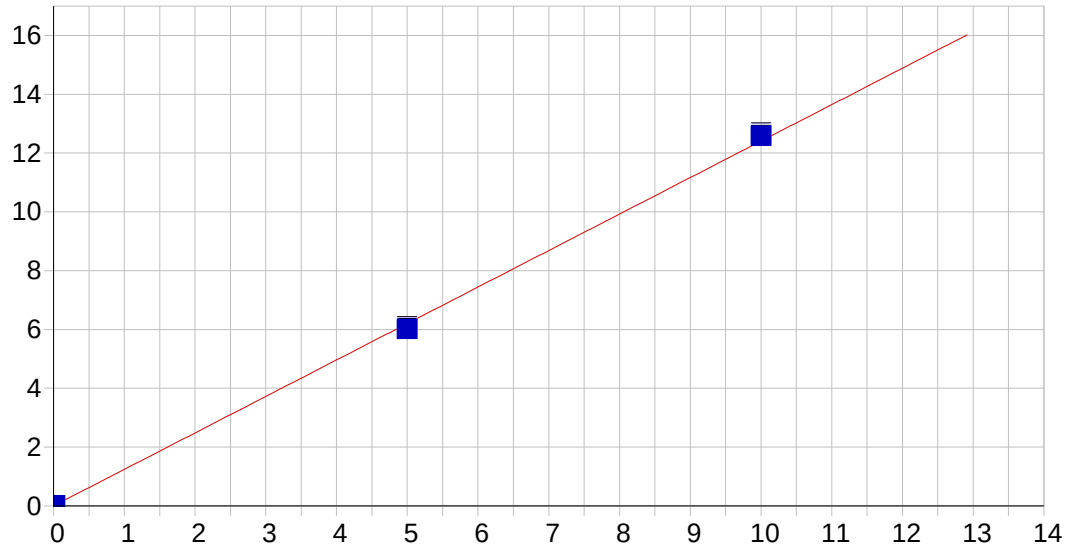


Y 360.073 { 94}2*

Date of Fit:	5/30/2018 13:35:48	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.000000	Re-Slope:	1.000000
A1 (Gain):	0.000000	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.000000	Status:	Warning Zero Gain
Std Error of Est:	0.000000		
Predicted MDL:	n/a		
Predicted MQL:	n/a		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis



Zn 213.856 {458}

Date of Fit:	8/2/2018 15:23:55	Type of Fit:	Linear	Weighting:	1/Conc

A0 (Offset):	0.001252	Re-Slope:	1.000000
A1 (Gain):	1.240585	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999784	Status:	OK.
Std Error of Est:	0.000636		
Predicted MDL:	0.000239		
Predicted MQL:	0.000798		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
CALBLK1	.00000	.00000	.000	.000	.00126	.000	1
CAL 1	.02000	.01803	-.002	-9.84	.02399	.000	1
Cal 2	5.0000	4.8547	-.145	-2.91	6.0699	.026	1
Cal 3	10.000	10.147	.147	1.47	12.682	.008	1

Sample Name: ICV Acquired: 8/2/2018 15:24:00 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.9870	49.41	4.867	1.004	4.923	4.928	4.921	49.12	4.898
Stddev	.0028	.28	.011	.002	.020	.019	.012	.07	.004
%RSD	.2848	.5726	.2200	.1831	.4128	.3934	.2449	.1528	.0738
#1	.9840	49.09	4.875	1.006	4.905	4.909	4.935	49.04	4.902
#2	.9896	49.61	4.854	1.003	4.945	4.948	4.916	49.19	4.895
#3	.9874	49.54	4.870	1.003	4.920	4.926	4.913	49.13	4.897
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	4.912	4.861	4.860	51.43	49.18	4.980	49.38	4.994	.9514
Stddev	.005	.003	.008	.16	.24	.018	.32	.022	.0005
%RSD	.0960	.0649	.1683	.3125	.4832	.3594	.6424	.4479	.0545
#1	4.912	4.860	4.851	51.26	48.90	4.959	49.03	4.972	.9510
#2	4.917	4.864	4.861	51.58	49.32	4.993	49.65	5.017	.9513
#3	4.908	4.858	4.868	51.45	49.31	4.987	49.47	4.994	.9520
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	49.12	4.926	49.42	4.956	48.43	.9532	.9651	4.852	4.835
Stddev	.26	.004	.01	.006	.18	.0063	.0067	.041	.006
%RSD	.5263	.0798	.0231	.1178	.3640	.6613	.6942	.8404	.1274
#1	48.83	4.925	49.41	4.950	48.62	.9581	.9727	4.809	4.839
#2	49.32	4.930	49.43	4.962	48.28	.9461	.9622	4.857	4.837
#3	49.22	4.923	49.43	4.956	48.39	.9554	.9603	4.891	4.828
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: ICV Acquired: 8/2/2018 15:24:00 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**4.932**	**4.987**	**5.021**	**1.029**	**4.950**	**4.913**	**4.872**
Stddev	.019	.017	.023	.005	.032	.040	.003
%RSD	.3886	.3491	.4512	.5031	.6478	.8200	.0654
#1	4.914	4.971	5.002	1.025	4.963	4.880	4.876
#2	4.952	4.985	5.046	1.027	4.974	4.958	4.872
#3	4.929	5.005	5.015	1.035	4.914	4.903	4.869
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3462.0**	**31911.**	**3679.2**
Stddev	34.8	134.	84.1
%RSD	1.0041	.41914	2.2850
#1	3499.5	31886.	3774.7
#2	3430.9	31792.	3646.5
#3	3455.5	32056.	3616.3

Sample Name: ICB Acquired: 8/2/2018 15:28:13 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0001**	**.0235**	**.0004**	**.0081**	**-.0002**	**.0000**	**-.0030**	**-.0212**	**-.0005**
Stddev	.0017	.0165	.0034	.0094	.0004	.0000	.0013	.0008	.0002
%RSD	1184.	70.39	778.2	116.1	183.2	458.1	43.46	3.723	41.90
#1	-.0013	.0099	.0030	.0073	.0001	.0001	-.0024	-.0220	-.0008
#2	.0020	.0187	.0017	.0179	-.0007	-.0000	-.0021	-.0205	-.0004
#3	-.0003	.0418	-.0034	-.0009	-.0000	.0000	-.0045	-.0210	-.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0002**	**-.0003**	**.0014**	**.0018**	**-.0742**	**-.0007**	**-.0107**	**-.0001**	**.0002**
Stddev	.0005	.0002	.0030	.0038	.0660	.0033	.0309	.0007	.0005
%RSD	226.1	60.63	221.7	217.2	88.98	486.5	289.4	503.1	277.0
#1	-.0002	-.0001	-.0012	.0059	-.1460	-.0044	-.0334	-.0005	.0005
#2	-.0008	-.0003	.0047	.0008	-.0161	.0006	.0245	-.0006	-.0004
#3	.0003	-.0004	.0006	-.0015	-.0604	.0017	-.0231	.0007	.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0479**	**-.0003**	**-.0005**	**.0006**	**.0123**	**-.0008**	**-.0020**	**.0063**	**.0006**
Stddev	.0240	.0000	.0050	.0022	.0053	.0025	.0008	.0138	.0003
%RSD	50.09	14.03	1041.	342.0	42.57	299.2	42.66	220.3	48.97
#1	-.0714	-.0004	-.0051	.0032	.0132	-.0034	-.0018	-.0038	.0008
#2	-.0235	-.0003	.0049	-.0007	.0171	-.0006	-.0029	.0220	.0006
#3	-.0487	-.0003	-.0012	-.0005	.0067	.0015	-.0012	.0006	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: ICB Acquired: 8/2/2018 15:28:13 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0002	-.0061	.0018	-.0009	.0085	.0059	-.0010
Stddev	.0002	.0046	.0010	.0033	.0268	.0056	.0001
%RSD	105.5	75.37	55.16	373.7	316.4	95.53	13.09
#1	.0004	-.0015	.0015	-.0009	.0318	.0114	-.0008
#2	.0001	-.0060	.0029	.0025	.0143	.0061	-.0011
#3	.0001	-.0106	.0010	-.0042	-.0208	.0001	-.0010
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3602.7	33295.	3572.0
Stddev	26.8	93.	9.6
%RSD	.74509	.27994	.26899
#1	3572.1	33240.	3563.0
#2	3622.4	33402.	3570.9
#3	3613.6	33242.	3582.1

Sample Name: LLC Acquired: 8/2/2018 15:32:53 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0109**	**.2104**	F **.0064**	**.1017**	**.0471**	**.0049**	**.2073**	**1.018**	**.0045**
Stddev	.0007	.0238	.0039	.0092	.0007	.0002	.0037	.004	.0003
%RSD	6.003	11.31	60.14	9.057	1.519	3.471	1.799	.3995	6.471
#1	.0108	.2093	.0090	.1063	.0478	.0051	.2037	1.021	.0042
#2	.0104	.2347	.0020	.0911	.0463	.0050	.2072	1.013	.0048
#3	.0117	.1872	.0082	.1077	.0472	.0048	.2111	1.019	.0046
Check ?	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value			.0100						
Range			-30.00%						

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0508**	**.0098**	**.0261**	**.1048**	**4.968**	**.0526**	**1.011**	**.0147**	**.0384**
Stddev	.0006	.0001	.0021	.0015	.144	.0035	.026	.0008	.0004
%RSD	1.112	1.258	8.172	1.448	2.908	6.591	2.536	5.539	1.060
#1	.0502	.0100	.0243	.1031	5.108	.0557	1.041	.0139	.0388
#2	.0511	.0097	.0255	.1058	4.977	.0534	.9949	.0156	.0384
#3	.0513	.0098	.0284	.1056	4.820	.0489	.9984	.0147	.0380
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9244**	**.0407**	**.2489**	**.0116**	**4.622**	**.0112**	**.0140**	**.3639**	**.0993**
Stddev	.0233	.0000	.0047	.0015	.014	.0029	.0016	.0102	.0021
%RSD	2.517	.1090	1.881	12.63	.3094	26.16	11.56	2.812	2.102
#1	.9333	.0406	.2531	.0099	4.621	.0140	.0156	.3697	.1004
#2	.9419	.0407	.2438	.0126	4.637	.0113	.0123	.3698	.0969
#3	.8980	.0407	.2498	.0124	4.609	.0082	.0140	.3520	.1006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: LLC Acquired: 8/2/2018 15:32:53 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0051	.1930	.0189	.0192	.4395	.0527	.0188
Stddev	.0001	.0018	.0009	.0017	.0042	.0079	.0001
%RSD	2.783	.9463	4.825	9.052	.9479	15.05	.4631
#1	.0052	.1949	.0179	.0173	.4388	.0614	.0187
#2	.0050	.1912	.0194	.0199	.4357	.0510	.0188
#3	.0051	.1927	.0195	.0205	.4440	.0458	.0188
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3565.1	33693.	3664.9
Stddev	28.7	49.	5.4
%RSD	.80568	.14462	.14724
#1	3568.1	33637.	3671.1
#2	3592.1	33726.	3662.5
#3	3534.9	33715.	3661.2

Sample Name: ICSA Acquired: 8/2/2018 15:37:31 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0003**	**98.26**	**-.0070**	**-.0403**	**-.0004**	**-.0000**	**.0165**	**97.21**	**-.0004**
Stddev	.0005	.19	.0034	.0046	.0004	.0001	.0026	.14	.0003
%RSD	138.7	.1889	47.85	11.40	97.39	173.6	15.62	.1441	92.51
#1	-.0006	98.21	-.0033	-.0415	-.0002	-.0001	.0173	97.35	-.0006
#2	.0002	98.47	-.0081	-.0441	-.0009	.0000	.0185	97.07	.0000
#3	-.0007	98.11	-.0098	-.0352	-.0002	-.0001	.0136	97.20	-.0006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0073**	**-.0044**	**-.0131**	**99.80**	**99.96**	**.0097**	**98.96**	**.0016**	**-.0011**
Stddev	.0003	.0004	.0026	.28	.17	.0058	.14	.0003	.0005
%RSD	4.656	9.249	20.04	.2825	.1737	59.27	.1416	19.15	42.65
#1	.0075	-.0039	-.0127	99.78	99.96	.0065	99.09	.0013	-.0008
#2	.0074	-.0047	-.0106	100.1	100.1	.0164	98.98	.0019	-.0008
#3	.0069	-.0046	-.0158	99.52	99.79	.0063	98.81	.0017	-.0016
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**99.04**	**.0039**	**96.96**	**-.0065**	**97.07**	**.0027**	**-.0003**	**-.0025**	**-.0032**
Stddev	.18	.0008	.08	.0004	.06	.0022	.0036	.0103	.0018
%RSD	.1809	19.59	.0805	6.290	.0651	80.97	1072.	406.2	57.12
#1	98.93	.0034	97.04	-.0063	97.09	.0048	.0010	-.0081	-.0013
#2	99.25	.0036	96.89	-.0063	97.11	.0030	-.0044	-.0089	-.0049
#3	98.94	.0048	96.96	-.0070	96.99	.0004	.0024	.0094	-.0035
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: ICSA Acquired: 8/2/2018 15:37:31 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0011	.0597	-.0004	.0009	.4117	.0021	.0141
Stddev	.0001	.0059	.0004	.0046	.0345	.0080	.0003
%RSD	12.62	9.834	89.93	488.4	8.383	377.5	1.883
#1	.0012	.0544	-.0000	-.0007	.4015	-.0071	.0138
#2	.0009	.0660	-.0005	-.0026	.3835	.0072	.0144
#3	.0011	.0587	-.0007	.0061	.4502	.0064	.0142
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3410.2	31113.	3594.2
Stddev	14.4	222.	9.6
%RSD	.42319	.71328	.26693
#1	3398.8	30888.	3583.3
#2	3426.4	31119.	3601.2
#3	3405.3	31332.	3598.1

Sample Name: ICSAB Acquired: 8/2/2018 15:42:05 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.5142**	**97.97**	**2.479**	**.4759**	**2.462**	**2.531**	**2.499**	**97.11**	**2.508**
Stddev	.0017	.51	.013	.0068	.009	.012	.014	.24	.005
%RSD	.3397	.5239	.5353	1.423	.3460	.4691	.5652	.2471	.1852
#1	.5140	97.43	2.466	.4709	2.452	2.518	2.486	97.04	2.505
#2	.5126	98.05	2.478	.4732	2.468	2.537	2.498	96.92	2.505
#3	.5161	98.44	2.492	.4836	2.467	2.540	2.514	97.38	2.513
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**2.481**	**2.450**	**2.459**	**99.20**	**99.14**	**2.530**	**99.17**	**2.507**	**.4890**
Stddev	.001	.010	.005	.42	.64	.010	.60	.013	.0021
%RSD	.0455	.4172	.2192	.4216	.6434	.3937	.6072	.5045	.4249
#1	2.481	2.444	2.459	98.73	98.43	2.519	98.49	2.493	.4876
#2	2.480	2.445	2.453	99.50	99.33	2.538	99.62	2.512	.4879
#3	2.482	2.462	2.464	99.39	99.66	2.532	99.41	2.516	.4914
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**98.49**	**2.474**	**98.50**	**2.441**	**100.2**	**.4974**	**.5023**	**2.425**	**2.474**
Stddev	.56	.003	.52	.007	.3	.0043	.0017	.016	.009
%RSD	.5711	.1271	.5305	.3071	.2710	.8581	.3404	.6678	.3644
#1	97.85	2.475	98.17	2.439	100.1	.4967	.5039	2.406	2.468
#2	98.71	2.471	98.24	2.434	100.1	.5020	.5005	2.436	2.470
#3	98.91	2.477	99.11	2.449	100.5	.4936	.5027	2.432	2.485
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: ICSAB Acquired: 8/2/2018 15:42:05 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**2.485**	**2.555**	**2.508**	**.4897**	**2.819**	**2.474**	**2.529**
Stddev	.011	.005	.007	.0006	.010	.008	.003
%RSD	.4474	.1879	.2946	.1174	.3405	.3055	.1206
#1	2.472	2.551	2.499	.4895	2.808	2.472	2.529
#2	2.491	2.560	2.513	.4892	2.826	2.483	2.526
#3	2.492	2.554	2.511	.4903	2.823	2.468	2.532
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3512.4**	**31723.**	**3721.8**
Stddev	17.3	213.	53.7
%RSD	.49325	.67258	1.4435
#1	3522.5	31507.	3776.0
#2	3522.3	31729.	3721.0
#3	3492.4	31934.	3668.5

Sample Name: CCVL Acquired: 8/2/2018 15:46:19 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0109**	**.2148**	**.0092**	**.1000**	**.0466**	**.0049**	**.2030**	**1.012**	**.0046**
Stddev	.0010	.0073	.0023	.0014	.0002	.0001	.0036	.001	.0004
%RSD	9.372	3.414	25.02	1.417	.3636	1.576	1.797	.1014	8.980
#1	.0119	.2069	.0067	.1006	.0466	.0049	.2054	1.013	.0042
#2	.0099	.2214	.0098	.1010	.0468	.0050	.1988	1.013	.0046
#3	.0109	.2163	.0112	.0984	.0465	.0049	.2049	1.011	.0051
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0499**	**.0097**	**.0278**	**.1031**	**5.057**	**.0544**	**1.011**	**.0151**	**.0386**
Stddev	.0006	.0003	.0021	.0018	.072	.0017	.023	.0006	.0003
%RSD	1.229	2.629	7.388	1.786	1.423	3.114	2.239	3.774	.6549
#1	.0501	.0096	.0290	.1051	5.113	.0559	.9948	.0157	.0387
#2	.0492	.0094	.0255	.1015	5.082	.0526	1.002	.0152	.0383
#3	.0503	.0099	.0291	.1028	4.976	.0547	1.037	.0145	.0388
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9418**	**.0408**	**.2412**	**.0102**	**4.615**	**.0090**	**.0109**	**.3617**	**.0988**
Stddev	.0400	.0002	.0107	.0011	.026	.0034	.0075	.0215	.0005
%RSD	4.244	.5119	4.433	11.15	.5682	38.20	68.55	5.948	.5067
#1	.9712	.0406	.2371	.0093	4.637	.0070	.0052	.3838	.0993
#2	.9579	.0409	.2533	.0098	4.622	.0129	.0194	.3604	.0985
#3	.8963	.0409	.2331	.0115	4.586	.0070	.0081	.3408	.0984
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCVL Acquired: 8/2/2018 15:46:19 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0048	.1811	.0201	.0191	.4768	.0491	.0189
Stddev	.0001	.0023	.0014	.0018	.0038	.0049	.0002
%RSD	2.693	1.259	6.944	9.259	.8010	10.03	.9423
#1	.0050	.1834	.0205	.0209	.4784	.0439	.0191
#2	.0048	.1812	.0185	.0173	.4796	.0496	.0187
#3	.0047	.1788	.0211	.0192	.4725	.0537	.0190
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3709.0	34054.	3593.6
Stddev	9.8	140.	124.7
%RSD	.26346	.40980	3.4689
#1	3719.6	33968.	3523.6
#2	3700.3	33978.	3519.7
#3	3707.0	34215.	3737.5

Sample Name: CCV Acquired: 8/2/2018 15:50:58 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9782**	**47.90**	**4.758**	**.9804**	**4.798**	**4.863**	**4.862**	**48.94**	**4.846**
Stddev	.0021	.06	.008	.0068	.008	.005	.004	.11	.006
%RSD	.2106	.1223	.1682	.6956	.1735	.1002	.0930	.2293	.1181
#1	.9778	47.95	4.768	.9813	4.807	4.864	4.866	49.03	4.847
#2	.9805	47.91	4.755	.9867	4.790	4.858	4.864	48.98	4.851
#3	.9764	47.83	4.753	.9732	4.797	4.867	4.857	48.82	4.840
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**4.894**	**4.787**	**4.801**	**48.76**	**48.86**	**4.898**	**48.26**	**4.863**	**.9539**
Stddev	.003	.007	.010	.03	.16	.006	.13	.003	.0026
%RSD	.0501	.1511	.2157	.0617	.3339	.1301	.2595	.0676	.2752
#1	4.893	4.794	4.807	48.80	48.99	4.904	48.35	4.861	.9548
#2	4.893	4.789	4.807	48.75	48.92	4.891	48.32	4.866	.9559
#3	4.897	4.779	4.789	48.74	48.68	4.899	48.12	4.861	.9509
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**48.58**	**4.899**	**48.66**	**4.834**	**48.37**	**.9532**	**.9635**	**4.841**	**4.837**
Stddev	.05	.002	.09	.010	.09	.0049	.0062	.017	.005
%RSD	.0973	.0487	.1878	.2122	.1761	.5158	.6481	.3575	.1043
#1	48.63	4.899	48.75	4.842	48.35	.9556	.9599	4.860	4.841
#2	48.57	4.896	48.64	4.836	48.30	.9476	.9598	4.829	4.838
#3	48.53	4.901	48.57	4.822	48.47	.9566	.9707	4.832	4.831
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCV Acquired: 8/2/2018 15:50:58 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**4.812**	**4.756**	**4.814**	**.9753**	**4.983**	**4.787**	**4.868**
Stddev	.003	.030	.009	.0057	.018	.009	.001
%RSD	.0712	.6405	.1812	.5816	.3515	.1915	.0111
#1	4.815	4.722	4.823	.9752	4.980	4.794	4.867
#2	4.808	4.778	4.805	.9809	4.966	4.789	4.868
#3	4.811	4.770	4.814	.9696	5.001	4.776	4.868
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3535.7**	**32283.**	**3614.2**
Stddev	31.7	208.	41.9
%RSD	.89527	.64548	1.1591
#1	3511.2	32283.	3594.4
#2	3524.5	32075.	3585.9
#3	3571.4	32492.	3662.3

Sample Name: CCB Acquired: 8/2/2018 15:55:10 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0011**	**-.0020**	**-.0025**	**-.0012**	**-.0010**	**.0001**	**-.0023**	**-.0244**	**-.0001**
Stddev	.0007	.0043	.0023	.0024	.0004	.0002	.0023	.0006	.0002
%RSD	66.10	218.9	91.52	200.2	44.63	243.8	97.28	2.552	201.1
#1	.0004	-.0069	-.0007	.0005	-.0015	.0002	.0002	-.0248	.0001
#2	.0011	.0013	-.0017	-.0039	-.0008	-.0001	-.0042	-.0246	-.0003
#3	.0019	-.0003	-.0051	-.0001	-.0007	.0001	-.0030	-.0237	-.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0002**	**-.0005**	**.0006**	**.0024**	**.0999**	**.0013**	**-.0006**	**.0002**	**.0005**
Stddev	.0005	.0001	.0007	.0008	.0307	.0030	.0124	.0005	.0001
%RSD	308.6	30.98	107.7	34.11	30.72	239.3	1972.	215.1	19.11
#1	.0004	-.0006	.0011	.0033	.1268	-.0022	-.0038	-.0002	.0004
#2	-.0005	-.0003	-.0002	.0021	.1063	.0026	-.0112	.0008	.0005
#3	-.0005	-.0004	.0010	.0018	.0665	.0034	.0131	.0001	.0006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0362**	**-.0008**	**-.0017**	**-.0006**	**-.0070**	**.0023**	**-.0022**	**-.0046**	**-.0004**
Stddev	.0461	.0002	.0019	.0019	.0056	.0021	.0037	.0019	.0004
%RSD	127.3	23.07	112.2	335.5	79.66	94.02	166.1	41.56	79.69
#1	.0170	-.0009	-.0009	.0016	-.0028	.0014	-.0061	-.0068	-.0003
#2	-.0643	-.0006	-.0038	-.0016	-.0133	.0047	-.0017	-.0035	-.0002
#3	-.0613	-.0010	-.0003	-.0017	-.0049	.0007	.0012	-.0034	-.0008
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: CCB Acquired: 8/2/2018 15:55:10 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0002	.0003	.0011	-.0007	.0043	-.0009	-.0014
Stddev	.0002	.0060	.0013	.0005	.0167	.0099	.0002
%RSD	102.8	2288.	121.5	72.23	393.3	1130.	11.24
#1	.0002	-.0003	.0009	-.0012	-.0072	-.0080	-.0015
#2	.0000	-.0054	-.0001	-.0001	-.0035	.0104	-.0013
#3	.0005	.0065	.0024	-.0009	.0234	-.0050	-.0012
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3657.8	33538.	3547.6
Stddev	9.7	246.	20.1
%RSD	.26531	.73481	.56680
#1	3663.9	33269.	3568.0
#2	3646.6	33752.	3547.2
#3	3662.8	33593.	3527.8

Sample Name: Rinse1 Acquired: 8/2/2018 16:01:44 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0010**	**.0134**	**-.0018**	**.0030**	**-.0011**	**.0000**	**-.0008**	**-.0259**	**-.0004**
Stddev	.0005	.0217	.0014	.0018	.0001	.0000	.0033	.0013	.0002
%RSD	44.40	162.7	77.30	60.24	12.15	106.7	395.7	5.084	59.99
#1	.0014	.0245	-.0003	.0039	-.0013	.0000	-.0024	-.0274	-.0004
#2	.0012	.0273	-.0020	.0009	-.0010	-.0000	.0030	-.0250	-.0007
#3	.0005	-.0117	-.0030	.0040	-.0011	.0000	-.0030	-.0253	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0004**	**-.0002**	**.0006**	**.0006**	**-.0622**	**-.0007**	**-.0077**	**-.0004**	**.0004**
Stddev	.0004	.0002	.0019	.0024	.0708	.0033	.0176	.0005	.0000
%RSD	104.6	92.96	295.6	395.7	113.9	505.6	229.3	137.3	11.76
#1	-.0009	.0000	.0022	.0005	-.0401	.0029	.0062	.0001	.0004
#2	-.0003	-.0003	.0012	-.0017	-.1414	-.0037	-.0275	-.0010	.0003
#3	-.0001	-.0002	-.0015	.0031	-.0050	-.0012	-.0017	-.0003	.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.1189**	**-.0008**	**-.0016**	**-.0006**	**-.0038**	**-.0007**	**-.0018**	**-.0055**	**-.0001**
Stddev	.0083	.0003	.0042	.0009	.0062	.0050	.0019	.0011	.0011
%RSD	6.944	41.15	263.5	151.5	162.3	700.4	102.4	20.37	986.5
#1	-.1116	-.0005	-.0064	.0000	-.0109	-.0027	-.0028	-.0044	-.0003
#2	-.1173	-.0007	.0009	-.0016	-.0011	.0050	-.0031	-.0067	.0011
#3	-.1279	-.0012	.0008	-.0002	.0006	-.0044	.0003	-.0055	-.0011
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: Rinse1 Acquired: 8/2/2018 16:01:44 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0000	-.0002	.0000	-.0023	.0112	.0037	-.0013
Stddev	.0000	.0062	.0013	.0020	.0150	.0048	.0001
%RSD	149.3	3593.	415800.	87.32	133.3	128.8	10.22
#1	.0000	-.0070	-.0008	-.0037	.0279	.0018	-.0014
#2	-.0000	.0052	-.0007	.0000	.0070	.0002	-.0013
#3	.0000	.0014	.0014	-.0032	-.0012	.0091	-.0011
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3653.8	33883.	3822.9
Stddev	42.4	621.	25.3
%RSD	1.1618	1.8329	.66142
#1	3612.8	34575.	3829.3
#2	3650.9	33700.	3795.0
#3	3697.6	33374.	3844.3

Sample Name: CCVL Acquired: 8/2/2018 16:06:25 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0104**	**.2045**	**.0085**	**.1040**	**.0474**	**.0050**	**.2050**	**1.022**	**.0043**
Stddev	.0007	.0268	.0022	.0054	.0004	.0001	.0012	.006	.0004
%RSD	6.486	13.13	25.51	5.147	.8893	2.252	.6066	.5726	9.857
#1	.0102	.2192	.0081	.1017	.0474	.0050	.2056	1.027	.0046
#2	.0099	.2207	.0108	.1102	.0470	.0049	.2036	1.022	.0038
#3	.0112	.1735	.0065	.1002	.0478	.0051	.2058	1.016	.0045
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0505**	**.0102**	**.0251**	**.1051**	**5.056**	**.0531**	**1.007**	**.0150**	**.0384**
Stddev	.0008	.0004	.0030	.0019	.095	.0019	.017	.0004	.0004
%RSD	1.558	3.649	11.96	1.848	1.879	3.583	1.677	2.456	.9177
#1	.0502	.0100	.0234	.1042	4.991	.0547	.9964	.0154	.0388
#2	.0499	.0100	.0285	.1073	5.012	.0510	1.027	.0147	.0384
#3	.0514	.0106	.0233	.1037	5.165	.0536	.9984	.0148	.0380
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9413**	**.0414**	**.2390**	**.0102**	**4.601**	**.0105**	**.0138**	**.3626**	**.0993**
Stddev	.0384	.0004	.0005	.0006	.011	.0016	.0041	.0179	.0010
%RSD	4.080	.9504	.2151	5.798	.2478	15.57	29.40	4.943	.9693
#1	.9226	.0418	.2387	.0106	4.588	.0118	.0156	.3479	.0982
#2	.9158	.0414	.2396	.0104	4.610	.0087	.0168	.3573	.0999
#3	.9854	.0410	.2386	.0095	4.604	.0111	.0092	.3826	.0998
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCVL Acquired: 8/2/2018 16:06:25 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0049	.1883	.0187	.0233	.4405	.0524	.0187
Stddev	.0002	.0077	.0008	.0018	.0163	.0056	.0001
%RSD	4.498	4.085	4.254	7.908	3.705	10.69	.4390
#1	.0051	.1887	.0178	.0216	.4554	.0477	.0188
#2	.0046	.1804	.0188	.0230	.4431	.0509	.0188
#3	.0049	.1957	.0194	.0252	.4231	.0586	.0186
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3577.8	32325.	3585.8
Stddev	54.8	135.	61.1
%RSD	1.5325	.41878	1.7039
#1	3551.6	32452.	3628.5
#2	3540.9	32182.	3613.2
#3	3640.8	32341.	3515.9

Sample Name: CCV Acquired: 8/2/2018 16:11:04 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9846**	**48.18**	**4.793**	**.9842**	**4.824**	**4.874**	**4.882**	**49.40**	**4.869**
Stddev	.0041	.05	.023	.0057	.007	.004	.025	.13	.016
%RSD	.4157	.0967	.4776	.5828	.1382	.0917	.5140	.2715	.3240
#1	.9884	48.22	4.768	.9871	4.818	4.873	4.853	49.28	4.851
#2	.9803	48.13	4.797	.9776	4.823	4.880	4.895	49.54	4.878
#3	.9852	48.20	4.813	.9880	4.831	4.871	4.897	49.36	4.877
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**4.914**	**4.829**	**4.840**	**48.91**	**48.93**	**4.914**	**48.62**	**4.868**	**.9616**
Stddev	.021	.021	.020	.13	.06	.008	.06	.006	.0027
%RSD	.4167	.4336	.4041	.2612	.1315	.1616	.1222	.1203	.2841
#1	4.892	4.805	4.818	48.77	48.90	4.905	48.67	4.862	.9592
#2	4.921	4.839	4.854	48.92	49.01	4.921	48.56	4.870	.9646
#3	4.931	4.842	4.848	49.03	48.89	4.916	48.65	4.873	.9611
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**48.83**	**4.921**	**49.19**	**4.890**	**48.50**	**.9588**	**.9652**	**4.845**	**4.884**
Stddev	.05	.014	.26	.022	.30	.0039	.0102	.010	.023
%RSD	.0930	.2845	.5219	.4457	.6113	.4034	1.058	.2148	.4788
#1	48.81	4.906	48.89	4.867	48.22	.9555	.9561	4.856	4.857
#2	48.80	4.924	49.32	4.910	48.49	.9578	.9763	4.844	4.897
#3	48.88	4.933	49.35	4.894	48.81	.9630	.9633	4.836	4.897
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCV Acquired: 8/2/2018 16:11:04 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**4.822**	**4.800**	**4.847**	**.9890**	**4.981**	**4.809**	**4.886**
Stddev	.003	.004	.010	.0061	.020	.004	.017
%RSD	.0629	.0905	.2031	.6123	.4045	.0763	.3473
#1	4.821	4.805	4.846	.9873	4.958	4.813	4.868
#2	4.826	4.797	4.838	.9957	4.989	4.807	4.890
#3	4.821	4.798	4.858	.9840	4.995	4.807	4.901
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3437.7**	**31519.**	**3567.9**
Stddev	54.3	221.	12.0
%RSD	1.5781	.70159	.33564
#1	3421.1	31498.	3569.7
#2	3393.7	31308.	3578.9
#3	3498.3	31749.	3555.2

Sample Name: CCB Acquired: 8/2/2018 16:15:17 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0001**	**-.0061**	**-.0017**	**-.0018**	**.0002**	**.0001**	**.0001**	**-.0247**	**-.0003**
Stddev	.0002	.0207	.0028	.0092	.0002	.0001	.0017	.0019	.0003
%RSD	125.9	342.2	163.5	506.2	97.39	69.15	1508.	7.583	95.26
#1	.0001	-.0178	.0002	-.0110	.0001	.0000	-.0000	-.0234	-.0007
#2	.0003	.0179	-.0004	.0074	.0001	.0001	-.0015	-.0268	-.0003
#3	-.0000	-.0183	-.0050	-.0018	.0004	.0001	.0019	-.0239	-.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0001**	**-.0003**	**.0016**	**.0083**	**-.0903**	**.0002**	**.0027**	**.0000**	**-.0001**
Stddev	.0008	.0003	.0015	.0028	.0542	.0024	.0129	.0009	.0004
%RSD	1260.	107.5	93.68	34.36	59.95	1355.	476.3	2886.	338.9
#1	-.0002	-.0005	.0003	.0091	-.1411	-.0026	-.0029	.0009	.0000
#2	.0008	-.0004	.0012	.0106	-.0333	.0017	-.0064	.0001	-.0006
#3	-.0008	.0001	.0033	.0051	-.0965	.0014	.0175	-.0009	.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0389**	**-.0008**	**-.0009**	**-.0003**	**-.0022**	**.0014**	**-.0034**	**-.0003**	**.0001**
Stddev	.0144	.0002	.0043	.0005	.0013	.0029	.0038	.0076	.0010
%RSD	37.13	28.41	493.6	179.2	58.07	213.6	111.3	2618.	1025.
#1	-.0457	-.0008	.0022	-.0003	-.0034	.0008	.0008	-.0089	.0000
#2	-.0223	-.0010	-.0058	.0002	-.0024	.0045	-.0065	.0025	-.0008
#3	-.0487	-.0006	.0010	-.0008	-.0008	-.0012	-.0046	.0056	.0011
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: CCB Acquired: 8/2/2018 16:15:17 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0000**	**-.0082**	**.0005**	**.0005**	**.0015**	**.0031**	**-.0010**
Stddev	.0003	.0027	.0007	.0025	.0186	.0001	.0001
%RSD	2417.	32.37	149.8	481.0	1267.	4.623	11.03
#1	-.0002	-.0102	.0000	-.0021	.0054	.0031	-.0010
#2	.0003	-.0093	.0014	.0008	-.0188	.0033	-.0010
#3	-.0001	-.0052	.0001	.0028	.0178	.0030	-.0012
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3563.6**	**33905.**	**3543.3**
Stddev	33.2	207.	36.1
%RSD	.93226	.60961	1.0184
#1	3552.0	33917.	3556.3
#2	3537.7	34106.	3502.5
#3	3601.1	33693.	3571.1

Sample Name: LB 160-378221/1-B Acquired: 8/2/2018 16:51:17 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment: 379539

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0010**	**.0067**	**-.0035**	**.0018**	**.0038**	**-.0001**	**.0003**	**.0017**	**-.0001**
Stddev	.0017	.0143	.0029	.0081	.0001	.0001	.0003	.0004	.0003
%RSD	160.7	214.1	83.20	452.9	3.647	137.6	100.5	23.68	227.1
#1	-.0006	.0189	-.0047	-.0033	.0040	-.0002	.0006	.0014	-.0004
#2	.0010	-.0090	-.0057	.0112	.0037	.0000	.0002	.0016	.0002
#3	.0027	.0102	-.0002	-.0025	.0037	-.0000	.0000	.0022	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0000**	**-.0000**	**.0027**	**.0080**	**.0109**	**-.0017**	**.0065**	**.0005**	**-.0000**
Stddev	.0005	.0003	.0017	.0043	.0574	.0079	.0089	.0004	.0003
%RSD	1267.	1457.	62.17	53.48	527.8	460.8	136.3	77.80	956.6
#1	-.0006	-.0002	.0043	.0127	.0631	.0030	-.0014	.0001	-.0003
#2	.0002	.0003	.0027	.0046	.0202	.0027	.0161	.0006	-.0001
#3	.0002	-.0001	.0010	.0066	-.0507	-.0108	.0049	.0008	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **500.6**	**-.0004**	**.0166**	**.0012**	**.0084**	**.0024**	**.0007**	**.0163**	**.0002**
Stddev	4.6	.0001	.0053	.0018	.0050	.0038	.0018	.0031	.0012
%RSD	.9218	35.55	31.62	150.7	59.07	158.5	257.2	19.21	730.6
#1	505.9	-.0006	.0212	.0033	.0104	-.0020	.0025	.0128	-.0011
#2	498.2	-.0004	.0109	.0006	.0027	.0047	-.0012	.0173	.0003
#3	497.6	-.0003	.0178	-.0002	.0120	.0044	.0008	.0188	.0012
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0								
Low Limit	-500.0								

Sample Name: LB 160-378221/1-B Acquired: 8/2/2018 16:51:17 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment: 379539

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0020	.0241	.0016	-.0006	-.0306	.0051	-.0007
Stddev	.0001	.0046	.0017	.0010	.0068	.0043	.0000
%RSD	2.643	18.95	103.2	161.5	22.32	84.38	7.230
#1	.0020	.0259	.0020	-.0018	-.0245	.0101	-.0007
#2	.0020	.0189	.0030	-.0002	-.0379	.0025	-.0007
#3	.0021	.0275	-.0002	.0001	-.0293	.0028	-.0006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3393.8	30455.	3495.3
Stddev	36.9	173.	72.4
%RSD	1.0873	.56958	2.0719
#1	3371.3	30257.	3423.0
#2	3373.7	30583.	3495.1
#3	3436.4	30524.	3567.8

Sample Name: LCS 160-379539/2-A Acquired: 8/2/2018 16:56:05 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2100**	**9.668**	**.9629**	**.2030**	**.9500**	**.0983**	**.9408**	**9.875**	**.9736**
Stddev	.0019	.084	.0021	.0067	.0059	.0007	.0044	.018	.0001
%RSD	.8949	.8718	.2220	3.278	.6197	.6940	.4677	.1804	.0077
#1	.2083	9.586	.9615	.2079	.9441	.0975	.9444	9.879	.9735
#2	.2097	9.664	.9618	.1954	.9501	.0986	.9422	9.890	.9737
#3	.2121	9.754	.9653	.2057	.9558	.0988	.9359	9.855	.9736
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9832**	**.9644**	**.9560**	**9.963**	**9.948**	**.1049**	**9.622**	**.9805**	**.4744**
Stddev	.0013	.0016	.0055	.042	.152	.0103	.072	.0077	.0012
%RSD	.1318	.1634	.5768	.4243	1.527	9.808	.7456	.7823	.2432
#1	.9823	.9639	.9498	9.915	9.807	.0983	9.540	.9725	.4738
#2	.9826	.9662	.9604	9.988	10.11	.1167	9.674	.9811	.4757
#3	.9847	.9632	.9577	9.988	9.928	.0997	9.653	.9878	.4736
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **514.7**	**.9961**	**1.022**	**.9359**	**9.672**	**.4639**	**.5040**	**4.657**	**.9521**
Stddev	18.9	.0011	.004	.0021	.045	.0018	.0095	.018	.0028
%RSD	3.668	.1083	.3540	.2254	.4610	.3818	1.887	.3954	.2991
#1	536.0	.9966	1.019	.9362	9.632	.4626	.5096	4.638	.9524
#2	500.2	.9969	1.021	.9378	9.664	.4631	.4930	4.660	.9547
#3	507.9	.9949	1.026	.9336	9.720	.4659	.5094	4.674	.9491
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0								
Low Limit	-500.0								

Sample Name: LCS 160-379539/2-A Acquired: 8/2/2018 16:56:05 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.9653	.9831	.9741	.1835	.9832	.9672	.9938
Stddev	.0058	.0125	.0088	.0014	.0233	.0054	.0007
%RSD	.5977	1.276	.9061	.7796	2.367	.5554	.0657
#1	.9593	.9707	.9649	.1841	.9893	.9625	.9935
#2	.9658	.9958	.9748	.1819	.9575	.9661	.9933
#3	.9708	.9829	.9825	.1846	1.003	.9730	.9945
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3364.7	30170.	3445.4
Stddev	38.7	227.	54.0
%RSD	1.1509	.75236	1.5668
#1	3344.3	30178.	3507.6
#2	3340.5	29939.	3410.4
#3	3409.4	30393.	3418.2

Sample Name: 160-29687-B-1-B Acquired: 8/2/2018 17:00:31 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0000**	**.0808**	**-.0030**	**.2172**	**.0748**	**-.0000**	**-.0024**	F **499.2**	**.0367**
Stddev	.0013	.0111	.0005	.0097	.0005	.0002	.0030	2.3	.0002
%RSD	3114.	13.80	16.11	4.476	.7192	495.1	127.5	.4643	.5382
#1	-.0013	.0928	-.0028	.2072	.0750	-.0001	.0011	501.4	.0369
#2	-.0001	.0788	-.0027	.2179	.0752	.0002	-.0036	496.8	.0366
#3	.0013	.0707	-.0036	.2266	.0742	-.0002	-.0046	499.5	.0365
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass
High Limit								100.0	
Low Limit								-500.0	

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0744**	**.0039**	**.0167**	**.0193**	**4.249**	**.0815**	**40.51**	**.5244**	**.0010**
Stddev	.0008	.0002	.0009	.0031	.115	.0004	.07	.0018	.0008
%RSD	1.086	5.758	5.316	15.86	2.699	.5098	.1779	.3429	78.62
#1	.0753	.0040	.0176	.0158	4.143	.0816	40.57	.5258	.0009
#2	.0740	.0036	.0158	.0203	4.371	.0811	40.43	.5251	.0003
#3	.0738	.0041	.0167	.0217	4.232	.0819	40.53	.5224	.0019
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **496.5**	**.0113**	**.0484**	**.3943**	F **197.2**	**.0080**	**-.0011**	**1.480**	**-.0030**
Stddev	5.8	.0003	.0032	.0034	.5	.0020	.0030	.011	.0003
%RSD	1.167	2.238	6.565	.8553	.2678	25.21	282.9	.7274	9.784
#1	503.0	.0116	.0518	.3982	197.5	.0102	.0024	1.475	-.0032
#2	494.6	.0111	.0480	.3920	197.4	.0063	-.0033	1.472	-.0031
#3	491.9	.0114	.0454	.3927	196.5	.0075	-.0024	1.492	-.0027
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0				100.0				
Low Limit	-500.0				-500.0				

Sample Name: 160-29687-B-1-B Acquired: 8/2/2018 17:00:31 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F 11.36	.0204	.0013	-.0029	-.0227	.0034	8.337
Stddev	.06	.0084	.0004	.0017	.0196	.0015	.009
%RSD	.5409	41.05	29.67	59.47	86.14	44.04	.1134
#1	11.37	.0109	.0016	-.0009	-.0304	.0017	8.347
#2	11.41	.0265	.0008	-.0038	-.0373	.0045	8.334
#3	11.29	.0239	.0014	-.0041	-.0005	.0039	8.329
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	10.00						
Low Limit	-500.0						

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3220.4	29622.	3457.9
Stddev	32.7	362.	27.9
%RSD	1.0168	1.2222	.80585
#1	3195.0	29346.	3482.8
#2	3257.4	29489.	3463.1
#3	3208.9	30032.	3427.8

Sample Name: 160-29687-B-1-BSD@5 Acquired: 8/2/2018 17:05:21 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0012**	**.0451**	**-.0045**	**.0459**	**.0150**	**.0001**	**-.0046**	F **118.7**	**.0073**
Stddev	.0010	.0062	.0023	.0068	.0004	.0001	.0032	.2	.0004
%RSD	83.97	13.81	50.02	14.79	2.510	118.0	68.97	.1441	5.441
#1	-.0004	.0380	-.0051	.0524	.0154	-.0000	-.0057	118.7	.0078
#2	-.0009	.0473	-.0065	.0388	.0147	.0001	-.0010	118.5	.0071
#3	-.0023	.0498	-.0020	.0463	.0148	.0002	-.0071	118.9	.0071
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass
High Limit								100.0	
Low Limit								-500.0	

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0153**	**.0006**	**.0052**	**.0049**	**.8870**	**.0217**	**8.455**	**.1089**	**.0004**
Stddev	.0003	.0001	.0012	.0031	.1714	.0096	.052	.0008	.0003
%RSD	1.778	21.95	23.29	64.14	19.32	44.36	.6170	.7290	71.83
#1	.0152	.0005	.0045	.0052	.6891	.0287	8.451	.1092	.0007
#2	.0155	.0006	.0066	.0079	.9896	.0107	8.509	.1095	.0002
#3	.0150	.0008	.0045	.0016	.9824	.0257	8.405	.1080	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **104.4**	**.0016**	**.0106**	**.0833**	**38.60**	**.0020**	**.0011**	**.2921**	**-.0031**
Stddev	.1	.0003	.0051	.0007	.15	.0027	.0013	.0078	.0002
%RSD	.1265	17.48	48.49	.8516	.3847	131.7	111.8	2.675	6.864
#1	104.3	.0017	.0122	.0831	38.43	.0001	-.0002	.3001	-.0033
#2	104.6	.0018	.0049	.0840	38.66	.0051	.0013	.2845	-.0032
#3	104.4	.0013	.0148	.0827	38.70	.0009	.0024	.2917	-.0029
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0								
Low Limit	-500.0								

Sample Name: 160-29687-B-1-BSD@5 Acquired: 8/2/2018 17:05:21 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**2.325**	**.0186**	**.0015**	**-.0007**	**.0312**	**.0060**	**1.659**
Stddev	.002	.0062	.0013	.0008	.0153	.0071	.003
%RSD	.0744	33.34	83.24	111.8	48.99	117.9	.1545
#1	2.326	.0233	.0020	-.0015	.0481	.0011	1.657
#2	2.325	.0115	.0001	-.0009	.0270	.0028	1.658
#3	2.323	.0209	.0026	.0002	.0184	.0141	1.662
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3451.5**	**31741.**	**3628.9**
Stddev	26.1	94.	59.8
%RSD	.75594	.29475	1.6492
#1	3434.5	31758.	3696.1
#2	3481.5	31825.	3581.4
#3	3438.4	31640.	3609.1

Sample Name: 160-29687-B-1-C MS Acquired: 8/2/2018 17:09:56 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.2187	9.791	.9904	.4152	1.035	.0984	.9656	F 514.0	1.045
Stddev	.0016	.048	.0025	.0047	.005	.0005	.0013	2.3	.003
%RSD	.7141	.4937	.2479	1.129	.4734	.4606	.1362	.4496	.2405
#1	.2204	9.757	.9882	.4103	1.031	.0979	.9661	512.0	1.044
#2	.2175	9.847	.9930	.4155	1.040	.0988	.9666	516.5	1.048
#3	.2182	9.771	.9899	.4197	1.032	.0985	.9641	513.5	1.044
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass
High Limit								100.0	
Low Limit								-500.0	

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	1.056	.9696	.9776	9.883	14.60	.1883	49.39	1.496	.4719
Stddev	.004	.0034	.0028	.011	.10	.0045	.07	.003	.0023
%RSD	.3649	.3556	.2831	.1135	.6924	2.380	.1347	.2149	.4796
#1	1.055	.9662	.9745	9.891	14.48	.1895	49.33	1.493	.4693
#2	1.061	.9731	.9800	9.888	14.66	.1921	49.38	1.494	.4735
#3	1.054	.9697	.9782	9.870	14.65	.1834	49.46	1.499	.4728
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F 494.5	1.001	1.078	1.313	F 203.9	.4756	.5084	6.065	.9281
Stddev	24.1	.004	.007	.006	.6	.0027	.0094	.013	.0043
%RSD	4.880	.4319	.6270	.4394	.2837	.5597	1.853	.2155	.4628
#1	498.4	.9996	1.071	1.307	203.6	.4775	.4978	6.057	.9255
#2	468.7	1.006	1.081	1.319	204.6	.4769	.5157	6.058	.9331
#3	516.5	.9979	1.083	1.312	203.6	.4726	.5119	6.080	.9258
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0				100.0				
Low Limit	-500.0				-500.0				

Sample Name: 160-29687-B-1-C MS Acquired: 8/2/2018 17:09:56 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F 12.07	.9587	.9609	.1765	.9989	.9608	9.284
Stddev	.44	.0106	.0059	.0014	.0374	.0026	.031
%RSD	3.685	1.105	.6191	.8193	3.743	.2728	.3337
#1	12.27	.9701	.9577	.1748	1.041	.9580	9.261
#2	11.56	.9492	.9678	.1773	.9716	.9631	9.319
#3	12.38	.9568	.9573	.1774	.9835	.9612	9.272
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	10.00						
Low Limit	-500.0						

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3085.4	29024.	3685.9
Stddev	20.8	202.	126.1
%RSD	.67363	.69457	3.4202
#1	3107.8	29243.	3614.9
#2	3066.8	28984.	3831.4
#3	3081.4	28846.	3611.3

Sample Name: 160-29687-B-1-D MSD Acquired: 8/2/2018 17:14:32 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2204**	**9.971**	**1.017**	**.4213**	**1.043**	**.0989**	**.9955**	F **508.6**	**1.066**
Stddev	.0004	.022	.005	.0142	.006	.0009	.0056	2.8	.003
%RSD	.1982	.2171	.5209	3.372	.5929	.9361	.5618	.5531	.2837
#1	.2206	9.966	1.020	.4264	1.040	.0984	1.002	511.3	1.067
#2	.2200	9.952	1.019	.4322	1.039	.0984	.9942	508.9	1.067
#3	.2208	9.995	1.011	.4052	1.050	.1000	.9907	505.7	1.062
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass
High Limit								100.0	
Low Limit								-500.0	

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.065**	**.9783**	**.9948**	**10.01**	**14.73**	**.1918**	**49.79**	**1.507**	**.4735**
Stddev	.004	.0042	.0058	.07	.11	.0058	.33	.006	.0014
%RSD	.3516	.4319	.5880	.6971	.7532	3.036	.6699	.4181	.3033
#1	1.066	.9819	.9890	9.970	14.60	.1968	49.97	1.504	.4742
#2	1.068	.9794	1.001	9.959	14.81	.1854	49.40	1.503	.4745
#3	1.060	.9737	.9947	10.09	14.77	.1933	50.00	1.514	.4719
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **500.5**	**1.012**	**1.110**	**1.327**	F **208.7**	**.4820**	**.5253**	**6.137**	**.9347**
Stddev	12.9	.003	.011	.006	.6	.0010	.0022	.051	.0041
%RSD	2.573	.2892	.9838	.4495	.2867	.2045	.4208	.8341	.4367
#1	504.1	1.013	1.101	1.333	208.4	.4826	.5278	6.128	.9363
#2	486.3	1.014	1.122	1.328	209.4	.4808	.5238	6.091	.9378
#3	511.3	1.009	1.108	1.321	208.4	.4825	.5243	6.192	.9301
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0				100.0				
Low Limit	-500.0				-500.0				

Sample Name: 160-29687-B-1-D MSD Acquired: 8/2/2018 17:14:32 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F 12.21	.9792	.9721	.1770	1.016	.9704	9.394
Stddev	.10	.0084	.0075	.0027	.020	.0062	.032
%RSD	.8016	.8528	.7710	1.508	1.972	.6382	.3416
#1	12.32	.9776	.9658	.1785	1.022	.9677	9.411
#2	12.20	.9717	.9701	.1785	1.033	.9660	9.414
#3	12.12	.9882	.9804	.1739	.9939	.9775	9.357
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	10.00						
Low Limit	-500.0						

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3213.8	29297.	3540.2
Stddev	35.2	76.	82.3
%RSD	1.0952	.25902	2.3259
#1	3174.1	29218.	3448.8
#2	3226.4	29302.	3563.3
#3	3241.0	29370.	3608.6

Sample Name: 160-29687-B-1-BPDS Acquired: 8/2/2018 17:19:07 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0933**	**1.851**	**.0853**	**1.112**	**.4914**	**.0438**	**1.734**	F **470.7**	**.0777**
Stddev	.0014	.030	.0036	.004	.0023	.0002	.004	2.2	.0002
%RSD	1.490	1.606	4.239	.3950	.4615	.3637	.2376	.4767	.3047
#1	.0940	1.842	.0890	1.112	.4910	.0439	1.734	468.1	.0774
#2	.0941	1.885	.0850	1.115	.4938	.0439	1.739	472.0	.0779
#3	.0917	1.827	.0818	1.107	.4893	.0437	1.731	471.9	.0777
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass
High Limit								100.0	
Low Limit								-500.0	

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.5037**	**.0891**	**.2293**	**.8992**	**49.63**	**.5313**	**44.93**	**.6104**	**.3405**
Stddev	.0021	.0004	.0027	.0071	.27	.0014	.20	.0036	.0012
%RSD	.4081	.4244	1.181	.7864	.5364	.2579	.4465	.5849	.3487
#1	.5014	.0888	.2324	.9072	49.67	.5328	44.96	.6099	.3401
#2	.5052	.0895	.2278	.8964	49.88	.5303	45.12	.6142	.3419
#3	.5045	.0890	.2276	.8939	49.35	.5306	44.72	.6072	.3396
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **464.3**	**.3632**	**2.365**	**.4468**	F **221.9**	**.0924**	**.1328**	**4.728**	**.8404**
Stddev	3.3	.0017	.014	.0016	.9	.0024	.0025	.026	.0014
%RSD	.7078	.4569	.5792	.3585	.3844	2.554	1.856	.5597	.1659
#1	467.4	.3614	2.359	.4467	221.8	.0924	.1354	4.746	.8389
#2	464.5	.3645	2.381	.4452	222.8	.0900	.1325	4.740	.8416
#3	460.9	.3637	2.357	.4484	221.1	.0947	.1305	4.698	.8408
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0				100.0				
Low Limit	-500.0				-500.0				

Sample Name: 160-29687-B-1-BPDS Acquired: 8/2/2018 17:19:07 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F 10.51	1.668	.1765	.1550	4.002	.4350	7.748
Stddev	.10	.008	.0014	.0019	.045	.0076	.023
%RSD	.9610	.4606	.8175	1.221	1.127	1.758	.2971
#1	10.62	1.673	.1764	.1572	3.998	.4321	7.727
#2	10.42	1.671	.1780	.1542	4.049	.4292	7.773
#3	10.49	1.659	.1751	.1537	3.959	.4437	7.744
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	10.00						
Low Limit	-500.0						

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3174.1	30497.	3485.8
Stddev	25.3	403.	20.6
%RSD	.79621	1.3229	.59071
#1	3201.2	30638.	3488.3
#2	3169.9	30812.	3464.2
#3	3151.2	30042.	3505.1

Sample Name: MB 160-379537/1-A Acquired: 8/2/2018 17:23:48 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment: 379537

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0013**	**-.0018**	**-.0017**	**.0061**	**-.0004**	**-.0000**	**-.0000**	**-.0181**	**-.0001**
Stddev	.0007	.0074	.0010	.0023	.0005	.0001	.0023	.0008	.0003
%RSD	53.85	416.6	58.33	37.28	134.8	325.2	24490.	4.652	401.0
#1	-.0020	.0028	-.0026	.0051	.0002	-.0000	-.0026	-.0179	-.0003
#2	-.0008	.0022	-.0006	.0045	-.0006	.0001	.0007	-.0191	-.0003
#3	-.0010	-.0103	-.0019	.0087	-.0006	-.0001	.0018	-.0174	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0007**	**-.0002**	**-.0005**	**.0054**	**.0610**	**.0053**	**.0050**	**-.0001**	**.0004**
Stddev	.0005	.0002	.0021	.0046	.0553	.0031	.0180	.0006	.0007
%RSD	72.92	115.1	401.0	85.20	90.59	58.75	358.4	640.4	153.4
#1	-.0008	-.0004	.0009	.0107	.0544	.0060	-.0002	-.0005	-.0003
#2	-.0012	-.0001	-.0029	.0034	.1193	.0080	.0251	-.0004	.0010
#3	-.0001	-.0001	.0004	.0022	.0094	.0019	-.0098	.0006	.0006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0733**	**-.0011**	**.0127**	**.0004**	**.0044**	**.0010**	**-.0033**	**.0145**	**.0003**
Stddev	.0574	.0002	.0052	.0006	.0054	.0050	.0059	.0107	.0012
%RSD	78.30	22.83	40.67	154.4	123.7	513.3	179.5	74.20	392.5
#1	.1395	-.0012	.0069	.0003	.0095	.0048	-.0016	.0138	-.0001
#2	.0396	-.0008	.0169	.0011	-.0013	.0029	.0016	.0255	.0016
#3	.0407	-.0012	.0142	-.0001	.0049	-.0047	-.0098	.0041	-.0006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: MB 160-379537/1-A Acquired: 8/2/2018 17:23:48 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment: 379537

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0001	-.0050	.0016	-.0030	.0777	.0007	-.0008
Stddev	.0002	.0046	.0012	.0007	.0169	.0075	.0001
%RSD	235.3	91.44	73.44	22.44	21.77	1145.	14.36
#1	.0002	-.0098	.0014	-.0034	.0892	.0039	-.0007
#2	-.0001	-.0007	.0029	-.0034	.0855	-.0079	-.0010
#3	.0002	-.0046	.0005	-.0022	.0583	.0060	-.0008
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3689.0	34542.	3569.2
Stddev	13.0	342.	139.8
%RSD	.35285	.99147	3.9167
#1	3697.9	34189.	3415.6
#2	3674.1	34564.	3603.0
#3	3695.1	34872.	3689.0

Sample Name: LCS 160-379537/2-A Acquired: 8/2/2018 17:28:27 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2058**	**9.607**	**.9056**	**.2021**	**.9459**	**.0974**	**.9829**	**10.29**	**.9633**
Stddev	.0035	.025	.0022	.0108	.0026	.0001	.0044	.02	.0022
%RSD	1.715	.2553	.2460	5.362	.2749	.1537	.4485	.1723	.2295
#1	.2093	9.634	.9065	.1903	.9482	.0976	.9877	10.30	.9647
#2	.2057	9.586	.9073	.2043	.9431	.0974	.9819	10.28	.9645
#3	.2023	9.601	.9031	.2116	.9464	.0973	.9791	10.27	.9608
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.014**	**.9670**	**.9689**	**9.992**	**9.981**	**.1106**	**9.672**	**.9871**	**.4682**
Stddev	.002	.0019	.0017	.019	.167	.0050	.057	.0034	.0011
%RSD	.1777	.1949	.1804	.1883	1.669	4.525	.5928	.3425	.2264
#1	1.016	.9689	.9709	10.00	9.793	.1065	9.673	.9837	.4694
#2	1.013	.9652	.9675	10.00	10.11	.1092	9.729	.9869	.4677
#3	1.014	.9669	.9685	9.971	10.04	.1162	9.614	.9905	.4675
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**9.949**	**1.020**	**.9559**	**.9770**	**9.022**	**.4510**	**.4656**	**4.513**	**.9616**
Stddev	.088	.002	.0049	.0011	.010	.0017	.0009	.009	.0021
%RSD	.8809	.1630	.5108	.1107	.1071	.3692	.1934	.1876	.2211
#1	9.854	1.022	.9543	.9772	9.031	.4513	.4656	4.505	.9591
#2	9.968	1.020	.9520	.9779	9.023	.4492	.4665	4.513	.9628
#3	10.03	1.018	.9613	.9758	9.012	.4525	.4647	4.522	.9628
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: LCS 160-379537/2-A Acquired: 8/2/2018 17:28:27 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9645**	**.9218**	**.9566**	**.2032**	**1.067**	**.9458**	**.9629**
Stddev	.0016	.0061	.0033	.0019	.026	.0068	.0004
%RSD	.1651	.6580	.3456	.9570	2.478	.7242	.0397
#1	.9646	.9232	.9593	.2017	1.037	.9502	.9633
#2	.9628	.9151	.9529	.2054	1.080	.9379	.9626
#3	.9660	.9270	.9576	.2027	1.085	.9492	.9628
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3481.8**	**32373.**	**3699.7**
Stddev	9.2	493.	137.5
%RSD	.26426	1.5240	3.7166
#1	3471.2	32694.	3849.4
#2	3487.9	32620.	3670.8
#3	3486.2	31805.	3579.0

Sample Name: 160-29476-L-1-C Acquired: 8/2/2018 17:32:45 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0010**	**.3318**	**.0009**	**.0733**	**.0154**	**.0001**	**.0002**	**71.40**	**.0000**
Stddev	.0016	.0270	.0014	.0026	.0001	.0001	.0039	.05	.0002
%RSD	152.9	8.123	148.6	3.562	.8488	90.50	1916.	.0714	508.7
#1	-.0015	.3162	.0021	.0712	.0155	.0001	.0046	71.45	.0003
#2	.0007	.3163	.0014	.0726	.0154	.0000	-.0010	71.39	.0000
#3	-.0024	.3629	-.0006	.0762	.0152	.0002	-.0029	71.35	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0004**	**.0005**	**.0021**	**.5399**	**3.968**	**.0163**	**22.67**	**.0998**	**.0180**
Stddev	.0002	.0001	.0021	.0075	.145	.0018	.11	.0011	.0005
%RSD	57.86	21.33	99.65	1.394	3.665	11.27	.4756	1.142	2.966
#1	.0005	.0004	.0044	.5385	3.801	.0160	22.67	.1008	.0184
#2	.0006	.0004	.0008	.5332	4.068	.0182	22.56	.0986	.0182
#3	.0001	.0006	.0009	.5480	4.034	.0146	22.77	.1000	.0174
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**28.11**	**.0063**	**.0232**	**.0022**	**10.09**	**.0014**	**.0001**	**6.903**	**-.0020**
Stddev	.09	.0003	.0009	.0012	.03	.0006	.0036	.020	.0004
%RSD	.3121	5.180	4.047	54.13	.3096	42.65	5881.	.2835	20.75
#1	28.10	.0066	.0239	.0035	10.07	.0020	-.0037	6.886	-.0016
#2	28.02	.0061	.0221	.0015	10.13	.0008	.0034	6.898	-.0024
#3	28.20	.0061	.0236	.0014	10.07	.0013	.0005	6.924	-.0020
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29476-L-1-C Acquired: 8/2/2018 17:32:45 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.1544	.0087	.0096	-.0010	.5602	.0564	.0081
Stddev	.0010	.0044	.0016	.0015	.0218	.0045	.0001
%RSD	.6370	50.20	16.97	154.2	3.894	7.979	1.016
#1	.1543	.0038	.0100	-.0025	.5417	.0542	.0081
#2	.1534	.0100	.0078	-.0008	.5843	.0534	.0082
#3	.1554	.0122	.0110	.0005	.5548	.0616	.0081
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3689.4	33812.	3720.0
Stddev	35.2	167.	7.2
%RSD	.95405	.49382	.19380
#1	3652.2	33884.	3728.4
#2	3722.1	33931.	3715.7
#3	3693.9	33621.	3716.1

Sample Name: CCVL Acquired: 8/2/2018 17:37:20 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0094**	**.2068**	F **.0065**	**.0992**	**.0467**	**.0048**	**.2040**	**1.013**	**.0047**
Stddev	.0005	.0141	.0019	.0078	.0010	.0002	.0074	.004	.0004
%RSD	5.487	6.799	29.61	7.907	2.101	3.485	3.621	.4089	8.184
#1	.0096	.1907	.0069	.1043	.0474	.0050	.2097	1.018	.0051
#2	.0098	.2167	.0082	.1032	.0456	.0047	.2067	1.011	.0046
#3	.0088	.2130	.0044	.0902	.0471	.0047	.1956	1.010	.0044
Check ?	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value			.0100						
Range			-30.00%						

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0510**	**.0094**	**.0263**	**.1017**	**5.042**	**.0544**	**.9717**	**.0148**	**.0372**
Stddev	.0003	.0002	.0029	.0043	.022	.0068	.0183	.0013	.0003
%RSD	.5983	2.280	11.03	4.242	.4291	12.50	1.885	8.783	.9020
#1	.0508	.0095	.0258	.0970	5.032	.0622	.9901	.0163	.0374
#2	.0513	.0092	.0236	.1054	5.027	.0499	.9716	.0141	.0374
#3	.0508	.0095	.0293	.1027	5.067	.0511	.9534	.0139	.0369
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.099**	**.0405**	**.2318**	**.0106**	**4.504**	**.0111**	**.0123**	**.3629**	**.0986**
Stddev	.030	.0003	.0081	.0016	.015	.0013	.0026	.0106	.0002
%RSD	2.744	.7539	3.502	15.01	.3411	11.47	21.02	2.922	.1631
#1	1.085	.0405	.2295	.0088	4.489	.0097	.0148	.3516	.0988
#2	1.134	.0402	.2251	.0119	4.519	.0115	.0096	.3727	.0985
#3	1.079	.0408	.2409	.0111	4.504	.0122	.0123	.3645	.0985
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCVL Acquired: 8/2/2018 17:37:20 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0049	.1760	.0205	.0211	.4860	.0487	.0187
Stddev	.0001	.0016	.0007	.0021	.0192	.0039	.0002
%RSD	1.228	.9217	3.565	9.872	3.944	8.059	.9249
#1	.0049	.1776	.0210	.0188	.5078	.0530	.0186
#2	.0049	.1744	.0197	.0228	.4717	.0477	.0186
#3	.0048	.1759	.0209	.0216	.4786	.0453	.0189
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3651.9	32556.	3358.0
Stddev	28.5	183.	7.1
%RSD	.77929	.56185	.21224
#1	3623.9	32386.	3366.1
#2	3651.1	32532.	3352.6
#3	3680.8	32749.	3355.3

Sample Name: CCV Acquired: 8/2/2018 17:41:59 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9834**	**46.32**	**4.624**	**.9757**	**4.674**	**4.781**	**4.777**	**49.19**	**4.833**
Stddev	.0018	.10	.011	.0073	.005	.004	.010	.12	.003
%RSD	.1826	.2076	.2470	.7456	.1116	.0826	.2120	.2473	.0695
#1	.9846	46.37	4.633	.9699	4.670	4.781	4.771	49.33	4.837
#2	.9813	46.21	4.629	.9839	4.672	4.777	4.771	49.12	4.831
#3	.9843	46.38	4.611	.9733	4.680	4.785	4.789	49.12	4.832
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**4.919**	**4.703**	**4.651**	**48.17**	**48.73**	**4.938**	**46.44**	**4.740**	**.9325**
Stddev	.006	.008	.004	.10	.24	.012	.16	.008	.0031
%RSD	.1150	.1707	.0885	.2091	.4916	.2437	.3502	.1641	.3288
#1	4.921	4.711	4.647	48.11	48.91	4.928	46.51	4.743	.9360
#2	4.913	4.695	4.650	48.12	48.46	4.935	46.26	4.731	.9301
#3	4.924	4.705	4.655	48.29	48.81	4.951	46.56	4.746	.9314
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**48.00**	**4.935**	**47.29**	**4.728**	**47.04**	**.9240**	**.9405**	**4.680**	**4.777**
Stddev	.14	.009	.13	.009	.12	.0016	.0005	.017	.013
%RSD	.2987	.1933	.2696	.1943	.2568	.1778	.0515	.3614	.2633
#1	48.08	4.946	47.35	4.737	46.95	.9222	.9410	4.676	4.790
#2	47.84	4.930	47.14	4.726	46.99	.9254	.9405	4.665	4.765
#3	48.09	4.929	47.37	4.719	47.18	.9245	.9400	4.698	4.776
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCV Acquired: 8/2/2018 17:41:59 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**4.682**	F **4.459**	**4.697**	**.9509**	**5.138**	**4.618**	**4.866**
Stddev	.008	.028	.010	.0019	.020	.011	.007
%RSD	.1620	.6197	.2040	.1971	.3825	.2280	.1346
#1	4.682	4.490	4.692	.9521	5.145	4.618	4.872
#2	4.674	4.451	4.691	.9518	5.116	4.607	4.859
#3	4.689	4.437	4.708	.9487	5.153	4.628	4.867
Check ?	Chk Pass	Chk Fail	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value		5.000					
Range		-10.00%					

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3444.1**	**32817.**	**3710.5**
Stddev	26.4	703.	63.2
%RSD	.76604	2.1408	1.7042
#1	3420.9	33018.	3670.7
#2	3438.6	33398.	3783.4
#3	3472.8	32036.	3677.3

Sample Name: CCB Acquired: 8/2/2018 17:46:13 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0000**	**.0097**	**-.0031**	**.0065**	**-.0005**	**.0001**	**-.0006**	**-.0170**	**-.0004**
Stddev	.0007	.0195	.0018	.0026	.0007	.0000	.0009	.0003	.0001
%RSD	13400.	200.9	58.25	40.50	148.0	16.68	155.9	1.596	34.93
#1	.0001	-.0091	-.0011	.0085	-.0011	.0001	-.0015	-.0169	-.0004
#2	.0006	.0085	-.0037	.0035	-.0005	.0001	.0002	-.0169	-.0003
#3	-.0008	.0297	-.0045	.0076	.0003	.0001	-.0004	-.0174	-.0006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0006**	**-.0002**	**.0015**	**.0010**	**.0554**	**.0038**	**.0009**	**-.0001**	**.0001**
Stddev	.0006	.0001	.0015	.0037	.1348	.0036	.0401	.0009	.0004
%RSD	93.33	59.05	101.4	362.0	243.2	96.76	4434.	1658.	385.1
#1	-.0013	-.0002	.0031	-.0030	.2023	.0044	.0240	.0004	-.0002
#2	-.0006	-.0001	.0010	.0041	-.0626	.0070	-.0454	.0005	.0006
#3	-.0001	-.0003	.0003	.0020	.0266	-.0002	.0241	-.0010	-.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0080**	**-.0005**	**-.0033**	**.0002**	**-.0078**	**.0012**	**-.0011**	**.0056**	**-.0007**
Stddev	.0390	.0005	.0034	.0015	.0032	.0036	.0045	.0077	.0002
%RSD	487.5	96.90	102.8	960.7	41.46	291.4	411.4	139.0	31.85
#1	-.0369	-.0009	-.0070	-.0015	-.0041	.0040	.0017	.0102	-.0008
#2	.0333	-.0007	-.0030	.0006	-.0100	.0025	.0013	-.0034	-.0008
#3	.0276	.0001	-.0001	.0013	-.0093	-.0028	-.0062	.0098	-.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: CCB Acquired: 8/2/2018 17:46:13 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0003	.0111	.0008	-.0023	.0582	.0038	-.0007
Stddev	.0002	.0033	.0013	.0024	.0152	.0015	.0002
%RSD	53.21	29.36	164.6	104.1	26.03	38.34	32.88
#1	.0002	.0074	.0014	-.0045	.0745	.0026	-.0010
#2	.0002	.0133	.0017	-.0028	.0444	.0055	-.0005
#3	.0005	.0127	-.0007	.0003	.0558	.0034	-.0006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3674.7	33551.	3493.3
Stddev	20.0	188.	6.7
%RSD	.54532	.56077	.19055
#1	3684.0	33371.	3500.2
#2	3688.4	33536.	3492.6
#3	3651.7	33746.	3486.9

Sample Name: 160-29476-L-1-CSD@5 Acquired: 8/2/2018 17:50:54 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0009**	**.0806**	**-.0011**	**.0167**	**.0026**	**.0001**	**.0018**	**14.94**	**-.0003**
Stddev	.0005	.0181	.0007	.0077	.0006	.0000	.0002	.08	.0004
%RSD	55.82	22.48	62.71	45.87	24.11	30.58	10.77	.5086	130.5
#1	-.0005	.0932	-.0005	.0252	.0026	.0001	.0016	14.95	-.0001
#2	-.0015	.0889	-.0019	.0103	.0032	.0002	.0019	14.86	-.0001
#3	-.0008	.0598	-.0009	.0146	.0019	.0001	.0018	15.01	-.0008
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0007**	**-.0002**	**.0045**	**.1102**	**.6736**	**.0068**	**4.674**	**.0207**	**.0034**
Stddev	.0003	.0001	.0024	.0016	.0840	.0035	.018	.0002	.0003
%RSD	36.91	38.85	53.59	1.452	12.47	50.74	.3877	1.140	8.815
#1	-.0007	-.0001	.0050	.1095	.7619	.0029	4.656	.0210	.0031
#2	-.0005	-.0001	.0019	.1091	.6642	.0093	4.676	.0208	.0037
#3	-.0010	-.0003	.0067	.1121	.5947	.0083	4.692	.0205	.0034
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**5.689**	**.0004**	**.0073**	**.0021**	**1.969**	**.0003**	**.0020**	**1.375**	**-.0016**
Stddev	.003	.0005	.0037	.0010	.010	.0034	.0026	.015	.0016
%RSD	.0593	133.4	51.08	47.08	.4883	1108.	130.1	1.082	99.55
#1	5.689	.0007	.0115	.0012	1.964	-.0032	-.0008	1.370	-.0017
#2	5.692	-.0002	.0059	.0020	1.980	.0036	.0043	1.392	-.0032
#3	5.686	.0006	.0044	.0031	1.962	.0005	.0026	1.363	.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29476-L-1-CSD@5 Acquired: 8/2/2018 17:50:54 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0315	.0022	.0025	-.0010	.1458	.0161	.0009
Stddev	.0002	.0035	.0009	.0015	.0222	.0033	.0001
%RSD	.5279	160.3	33.74	147.0	15.25	20.24	6.029
#1	.0316	.0033	.0027	.0002	.1693	.0166	.0008
#2	.0317	.0049	.0033	-.0006	.1251	.0126	.0009
#3	.0313	-.0017	.0016	-.0026	.1429	.0191	.0008
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3739.2	34308.	3809.3
Stddev	87.0	569.	67.9
%RSD	2.3261	1.6578	1.7812
#1	3724.2	34439.	3864.5
#2	3832.7	33686.	3733.6
#3	3660.7	34800.	3829.9

Sample Name: 160-29476-L-1-D MS Acquired: 8/2/2018 17:55:32 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2098**	**9.908**	**.9331**	**.2710**	**.9586**	**.0975**	**.9774**	**81.05**	**.9749**
Stddev	.0022	.039	.0010	.0016	.0047	.0005	.0033	.11	.0026
%RSD	1.032	.3933	.1101	.5909	.4902	.5374	.3367	.1384	.2657
#1	.2101	9.892	.9337	.2708	.9564	.0972	.9790	81.13	.9774
#2	.2076	9.879	.9338	.2727	.9554	.0973	.9795	81.10	.9751
#3	.2119	9.952	.9320	.2695	.9640	.0981	.9736	80.92	.9723
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9932**	**.9528**	**.9582**	**10.39**	**14.14**	**.1253**	**32.20**	**1.066**	**.4848**
Stddev	.0019	.0016	.0012	.04	.12	.0039	.14	.007	.0004
%RSD	.1912	.1699	.1281	.3579	.8683	3.109	.4321	.6450	.0754
#1	.9947	.9538	.9569	10.36	14.10	.1272	32.16	1.062	.4852
#2	.9937	.9537	.9592	10.37	14.04	.1278	32.09	1.063	.4846
#3	.9910	.9509	.9586	10.43	14.28	.1208	32.36	1.074	.4846
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**38.17**	**1.003**	**.9960**	**.9506**	**19.63**	**.4619**	**.4823**	F **11.65**	**.9501**
Stddev	.23	.002	.0020	.0020	.04	.0036	.0049	.11	.0013
%RSD	.5988	.2209	.2018	.2144	.2027	.7835	1.007	.9270	.1332
#1	38.06	1.004	.9947	.9496	19.66	.4604	.4866	11.62	.9486
#2	38.02	1.004	.9950	.9529	19.65	.4592	.4770	11.56	.9508
#3	38.43	1.000	.9983	.9492	19.58	.4660	.4832	11.77	.9508
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass
High Limit								10.00	
Low Limit								-500.0	

Sample Name: 160-29476-L-1-D MS Acquired: 8/2/2018 17:55:32 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	1.111	.9194	.9639	.1940	1.599	.9993	.9850
Stddev	.006	.0026	.0022	.0012	.010	.0134	.0026
%RSD	.5622	.2788	.2255	.5956	.6463	1.341	.2605
#1	1.108	.9224	.9644	.1938	1.610	.9958	.9877
#2	1.107	.9178	.9615	.1952	1.597	.9880	.9849
#3	1.118	.9181	.9657	.1929	1.589	1.014	.9825
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3601.6	33300.	3707.3
Stddev	21.7	215.	31.0
%RSD	.60215	.64599	.83653
#1	3603.4	33482.	3740.3
#2	3622.3	33355.	3702.8
#3	3579.0	33063.	3678.8

Sample Name: 160-29476-L-1-E MSD Acquired: 8/2/2018 17:59:49 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2093**	**9.969**	**.9131**	**.2725**	**.9552**	**.0971**	**.9497**	**80.59**	**.9555**
Stddev	.0013	.052	.0114	.0054	.0005	.0005	.0113	1.36	.0142
%RSD	.6431	.5231	1.247	1.965	.0558	.5021	1.186	1.690	1.488
#1	.2085	9.988	.9239	.2783	.9555	.0969	.9623	82.12	.9716
#2	.2086	9.910	.9012	.2678	.9545	.0968	.9404	79.51	.9445
#3	.2109	10.01	.9140	.2713	.9554	.0977	.9465	80.14	.9505
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9788**	**.9388**	**.9355**	**10.45**	**14.24**	**.1262**	**32.60**	**1.069**	**.4764**
Stddev	.0159	.0143	.0105	.02	.06	.0027	.13	.003	.0068
%RSD	1.623	1.524	1.121	.1603	.4529	2.152	.3850	.2780	1.432
#1	.9968	.9552	.9464	10.46	14.17	.1285	32.56	1.070	.4842
#2	.9665	.9294	.9254	10.43	14.24	.1232	32.50	1.066	.4730
#3	.9732	.9317	.9348	10.45	14.30	.1269	32.74	1.071	.4719
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**38.48**	**.9918**	**.9721**	**.9347**	**19.27**	**.4471**	**.4673**	F **11.79**	**.9380**
Stddev	.08	.0152	.0119	.0127	.20	.0068	.0045	.01	.0127
%RSD	.2184	1.529	1.221	1.357	1.057	1.523	.9643	.1268	1.352
#1	38.51	1.009	.9852	.9491	19.50	.4543	.4713	11.80	.9523
#2	38.39	.9793	.9620	.9254	19.18	.4407	.4624	11.77	.9282
#3	38.55	.9875	.9692	.9294	19.12	.4463	.4683	11.79	.9334
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass
High Limit								10.00	
Low Limit								-500.0	

Sample Name: 160-29476-L-1-E MSD Acquired: 8/2/2018 17:59:49 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	1.109	.9102	.9688	.1891	1.559	.9869	.9690
Stddev	.003	.0025	.0007	.0023	.007	.0040	.0144
%RSD	.2361	.2700	.0764	1.220	.4292	.4067	1.489
#1	1.110	.9093	.9683	.1916	1.562	.9911	.9854
#2	1.106	.9084	.9684	.1888	1.552	.9831	.9582
#3	1.111	.9130	.9696	.1870	1.564	.9865	.9633
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3610.6	32128.	3591.4
Stddev	91.8	368.	15.5
%RSD	2.5419	1.1464	.43192
#1	3513.5	32507.	3575.6
#2	3695.8	32106.	3592.0
#3	3622.5	31772.	3606.6

Sample Name: MB 160-379477/1-A Acquired: 8/2/2018 18:04:06 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment: 379477

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0004**	**.0104**	**-.0005**	**.0136**	**-.0003**	**.0000**	**-.0037**	**.0356**	**-.0002**
Stddev	.0018	.0233	.0003	.0079	.0004	.0001	.0015	.0016	.0002
%RSD	395.6	222.6	64.96	58.39	127.3	366.1	41.53	4.556	98.28
#1	-.0021	-.0164	-.0005	.0199	.0002	.0001	-.0041	.0338	-.0002
#2	.0014	.0229	-.0002	.0162	-.0006	-.0001	-.0020	.0369	.0000
#3	-.0006	.0249	-.0009	.0047	-.0005	.0001	-.0050	.0362	-.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0004**	**-.0002**	**.0023**	**.0032**	**.0582**	**.0051**	**-.0107**	**.0003**	**.0001**
Stddev	.0004	.0002	.0005	.0014	.1025	.0016	.0200	.0004	.0008
%RSD	116.2	89.67	20.43	43.88	176.0	31.65	186.5	121.0	652.9
#1	-.0004	-.0004	.0018	.0036	.0911	.0037	.0040	.0005	.0007
#2	.0001	-.0001	.0028	.0017	-.0567	.0048	-.0027	.0006	-.0008
#3	-.0008	-.0001	.0024	.0044	.1403	.0069	-.0334	-.0001	.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0458**	**-.0009**	**.0084**	**-.0002**	**.0005**	**.0019**	**-.0035**	**.0225**	**.0001**
Stddev	.0249	.0004	.0027	.0014	.0058	.0026	.0030	.0031	.0008
%RSD	54.32	41.18	32.26	690.2	1276.	139.0	84.50	13.83	890.0
#1	-.0223	-.0013	.0064	-.0000	.0029	.0048	-.0009	.0195	-.0007
#2	-.0432	-.0007	.0115	-.0017	-.0062	.0010	-.0068	.0223	.0001
#3	-.0719	-.0006	.0074	.0011	.0047	-.0002	-.0030	.0258	.0010
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: MB 160-379477/1-A Acquired: 8/2/2018 18:04:06 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment: 379477

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0002	-.0037	.0018	-.0011	.0488	.0008	-.0007
Stddev	.0001	.0051	.0017	.0033	.0164	.0017	.0002
%RSD	58.47	138.0	92.15	316.2	33.71	217.3	27.77
#1	.0001	.0006	.0019	.0014	.0563	.0001	-.0008
#2	.0003	-.0094	.0001	.0003	.0299	-.0005	-.0005
#3	.0001	-.0024	.0035	-.0048	.0601	.0028	-.0009
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3671.5	34264.	3613.1
Stddev	28.7	75.	22.9
%RSD	.78241	.21944	.63414
#1	3646.9	34272.	3596.9
#2	3664.5	34334.	3603.1
#3	3703.1	34184.	3639.3

Sample Name: LCS 160-379477/2-A Acquired: 8/2/2018 18:08:46 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2029**	**9.299**	**.8776**	**.1993**	**.9213**	**.0941**	**.9653**	**10.04**	**.9430**
Stddev	.0006	.073	.0063	.0080	.0021	.0005	.0056	.05	.0044
%RSD	.3187	.7834	.7202	4.005	.2328	.5578	.5771	.4894	.4645
#1	.2036	9.261	.8767	.2061	.9191	.0938	.9621	10.06	.9441
#2	.2024	9.383	.8717	.2014	.9233	.0947	.9622	9.985	.9382
#3	.2027	9.253	.8843	.1905	.9214	.0937	.9718	10.08	.9468
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9953**	**.9404**	**.9406**	**9.761**	**9.792**	**.1040**	**9.493**	**.9566**	**.4558**
Stddev	.0044	.0047	.0035	.025	.046	.0033	.086	.0056	.0027
%RSD	.4470	.4967	.3738	.2584	.4693	3.157	.9024	.5824	.5831
#1	.9950	.9420	.9399	9.739	9.835	.1002	9.409	.9553	.4561
#2	.9910	.9352	.9374	9.755	9.796	.1065	9.581	.9627	.4530
#3	.9999	.9441	.9444	9.788	9.744	.1051	9.489	.9517	.4582
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**9.675**	**.9983**	**.9306**	**.9471**	**8.866**	**.4373**	**.4616**	**4.394**	**.9395**
Stddev	.064	.0040	.0048	.0022	.042	.0013	.0009	.024	.0047
%RSD	.6601	.4050	.5172	.2310	.4707	.3044	.2013	.5467	.4958
#1	9.619	1.001	.9299	.9487	8.885	.4372	.4619	4.395	.9402
#2	9.745	.9936	.9357	.9446	8.819	.4360	.4624	4.418	.9345
#3	9.663	1.000	.9262	.9479	8.895	.4387	.4606	4.370	.9437
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: LCS 160-379477/2-A Acquired: 8/2/2018 18:08:46 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.9342	.8826	.9350	.1973	1.074	.9114	.9451
Stddev	.0037	.0052	.0032	.0025	.015	.0066	.0039
%RSD	.3970	.5836	.3392	1.271	1.399	.7189	.4116
#1	.9326	.8882	.9347	.1950	1.081	.9118	.9484
#2	.9385	.8814	.9384	.1968	1.056	.9177	.9408
#3	.9316	.8781	.9320	.2000	1.083	.9046	.9460
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3603.6	33629.	3539.2
Stddev	10.1	284.	60.0
%RSD	.28066	.84307	1.6961
#1	3597.4	33327.	3606.2
#2	3615.2	33671.	3490.4
#3	3598.1	33889.	3520.8

Sample Name: LCSD 160-379477/3-A Acquired: 8/2/2018 18:13:03 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2046**	**9.412**	**.8921**	**.1950**	**.9260**	**.0948**	**.9783**	**10.14**	**.9530**
Stddev	.0002	.060	.0061	.0040	.0036	.0005	.0042	.02	.0023
%RSD	.1049	.6404	.6884	2.060	.3897	.5056	.4331	.1948	.2459
#1	.2044	9.434	.8990	.1906	.9292	.0949	.9829	10.14	.9555
#2	.2048	9.458	.8901	.1958	.9268	.0952	.9746	10.12	.9508
#3	.2047	9.344	.8872	.1985	.9221	.0942	.9774	10.16	.9526
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.007**	**.9517**	**.9504**	**9.806**	**9.856**	**.1079**	**9.491**	**.9632**	**.4612**
Stddev	.002	.0030	.0058	.067	.057	.0067	.044	.0056	.0016
%RSD	.1522	.3128	.6057	.6855	.5794	6.240	.4680	.5836	.3403
#1	1.007	.9544	.9519	9.818	9.921	.1078	9.529	.9631	.4630
#2	1.008	.9485	.9440	9.866	9.835	.1147	9.500	.9689	.4607
#3	1.005	.9522	.9552	9.733	9.813	.1012	9.442	.9577	.4600
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**9.755**	**1.010**	**.9442**	**.9573**	**8.992**	**.4473**	**.4630**	**4.447**	**.9521**
Stddev	.096	.001	.0063	.0018	.046	.0063	.0067	.018	.0023
%RSD	.9850	.1290	.6674	.1887	.5118	1.413	1.438	.4129	.2413
#1	9.791	1.012	.9515	.9593	9.045	.4496	.4682	4.459	.9517
#2	9.827	1.010	.9410	.9559	8.972	.4401	.4555	4.455	.9501
#3	9.646	1.009	.9402	.9566	8.960	.4521	.4653	4.426	.9546
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: LCSD 160-379477/3-A Acquired: 8/2/2018 18:13:03 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9413**	**.8855**	**.9406**	**.2013**	**1.072**	**.9138**	**.9557**
Stddev	.0041	.0067	.0058	.0032	.016	.0041	.0009
%RSD	.4343	.7567	.6125	1.597	1.480	.4497	.0953
#1	.9424	.8829	.9419	.2028	1.061	.9136	.9567
#2	.9447	.8805	.9457	.2035	1.090	.9097	.9550
#3	.9368	.8932	.9344	.1976	1.066	.9179	.9553
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3648.1**	**33693.**	**3492.9**
Stddev	32.9	876.	56.4
%RSD	.90242	2.5986	1.6137
#1	3684.3	32692.	3495.9
#2	3640.0	34067.	3435.1
#3	3619.9	34319.	3547.8

Sample Name: 160-29824-A-1-B@100 Acquired: 8/2/2018 18:17:21 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0018**	**-.0041**	**-.0019**	**.0072**	**-.0010**	**.0000**	**-.0022**	**.1350**	**-.0001**
Stddev	.0018	.0206	.0051	.0092	.0002	.0001	.0046	.0002	.0002
%RSD	100.8	498.9	275.3	127.7	20.06	2486.	212.2	.1626	183.4
#1	-.0039	.0167	-.0025	.0080	-.0010	.0001	-.0045	.1353	-.0001
#2	-.0008	-.0046	.0035	-.0024	-.0012	.0000	-.0052	.1348	-.0003
#3	-.0007	-.0245	-.0066	.0161	-.0008	-.0001	.0031	.1350	.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0007**	**-.0002**	**.0022**	**.2083**	**.9046**	**.0038**	**2.577**	**.1436**	**-.0001**
Stddev	.0004	.0002	.0016	.0010	.0992	.0030	.021	.0005	.0004
%RSD	56.70	114.3	74.74	.4608	10.96	79.53	.8265	.3815	498.4
#1	-.0003	.0000	.0014	.2091	.9462	.0054	2.585	.1430	.0001
#2	-.0010	-.0004	.0040	.2073	.7913	.0003	2.592	.1441	.0002
#3	-.0007	-.0001	.0011	.2087	.9761	.0058	2.552	.1438	-.0006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **333.8**	**-.0007**	**.0002**	**.0010**	F **237.2**	**-.0002**	**-.0002**	**-.0056**	**-.0002**
Stddev	5.9	.0005	.0049	.0015	2.0	.0029	.0064	.0076	.0004
%RSD	1.772	77.48	2646.	143.9	.8325	1769.	2611.	136.7	150.1
#1	339.5	-.0013	.0036	.0026	237.7	.0013	-.0075	.0021	-.0005
#2	334.1	-.0002	.0025	.0010	238.9	.0017	.0047	-.0058	-.0004
#3	327.7	-.0006	-.0055	-.0005	235.1	-.0035	.0021	-.0131	.0002
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0				100.0				
Low Limit	-500.0				-500.0				

Sample Name: 160-29824-A-1-B@100 Acquired: 8/2/2018 18:17:21 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0008	.0208	.0004	.0004	.0324	.0025	-.0008
Stddev	.0001	.0060	.0008	.0035	.0094	.0046	.0001
%RSD	17.16	29.03	196.3	829.4	28.89	180.8	15.35
#1	.0009	.0208	-.0000	-.0021	.0410	.0062	-.0009
#2	.0007	.0147	-.0001	-.0011	.0338	.0040	-.0006
#3	.0009	.0268	.0014	.0045	.0224	-.0026	-.0008
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3666.1	32556.	3669.3
Stddev	64.2	581.	62.9
%RSD	1.7501	1.7849	1.7156
#1	3677.8	32080.	3733.1
#2	3723.7	33204.	3607.3
#3	3596.9	32385.	3667.4

Sample Name: 160-29824-A-1BSD@500 Acquired: 8/2/2018 18:22:08 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0010**	**-.0116**	**-.0046**	**-.0011**	**.0001**	**.0000**	**.0011**	**.0151**	**-.0001**
Stddev	.0006	.0341	.0008	.0097	.0016	.0001	.0021	.0016	.0001
%RSD	55.60	293.2	17.55	854.8	1725.	325.5	184.9	10.79	129.6
#1	-.0012	-.0496	-.0038	-.0102	-.0011	-.0001	.0000	.0162	.0000
#2	-.0004	-.0020	-.0055	.0091	.0019	.0000	.0035	.0132	-.0001
#3	-.0016	.0167	-.0046	-.0023	-.0005	.0002	-.0002	.0158	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0004**	**.0000**	**.0027**	**.0431**	**.1200**	**.0052**	**.4926**	**.0293**	**-.0003**
Stddev	.0002	.0001	.0018	.0025	.0931	.0035	.0229	.0004	.0006
%RSD	59.84	450.0	63.92	5.704	77.54	68.70	4.650	1.201	225.5
#1	-.0007	.0001	.0014	.0448	.2258	.0048	.4704	.0295	.0002
#2	-.0003	.0001	.0047	.0442	.0836	.0018	.4913	.0295	-.0000
#3	-.0002	-.0001	.0020	.0403	.0507	.0089	.5162	.0289	-.0009
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**68.27**	**-.0005**	**.0009**	**.0011**	**45.86**	**-.0032**	**-.0011**	**-.0027**	**-.0007**
Stddev	.18	.0006	.0033	.0004	.37	.0016	.0024	.0032	.0008
%RSD	.2614	103.0	372.5	35.67	.8126	51.39	224.5	119.0	108.1
#1	68.36	-.0008	-.0016	.0015	46.25	-.0013	-.0016	-.0017	-.0014
#2	68.38	.0001	.0046	.0010	45.50	-.0044	-.0032	-.0001	.0001
#3	68.06	-.0009	-.0003	.0007	45.84	-.0039	.0016	-.0062	-.0009
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29824-A-1BSD@500 Acquired: 8/2/2018 18:22:08 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0002	.0100	-.0002	.0009	.0630	.0014	-.0007
Stddev	.0001	.0074	.0023	.0003	.0259	.0043	.0001
%RSD	30.70	73.73	1297.	35.81	41.02	315.4	18.63
#1	.0003	.0033	.0023	.0009	.0824	.0001	-.0005
#2	.0002	.0088	-.0007	.0006	.0337	-.0021	-.0006
#3	.0001	.0180	-.0021	.0013	.0730	.0061	-.0008
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3600.8	34909.	3531.8
Stddev	136.6	54.	81.4
%RSD	3.7926	.15507	2.3052
#1	3758.3	34970.	3605.9
#2	3529.8	34887.	3444.6
#3	3514.4	34868.	3544.9

Sample Name: 160-29824-A-2-B@100 Acquired: 8/2/2018 18:26:46 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0008**	**-.0074**	**.0003**	**-.0005**	**-.0001**	**.0000**	**.0002**	**.0621**	**-.0004**
Stddev	.0016	.0122	.0053	.0020	.0004	.0001	.0033	.0017	.0003
%RSD	200.1	166.5	1557.	380.0	331.1	2394.	1631.	2.663	70.54
#1	-.0007	-.0149	.0053	.0015	-.0006	.0001	.0039	.0639	-.0006
#2	-.0025	.0068	.0009	-.0006	-.0000	-.0001	-.0024	.0615	-.0005
#3	.0007	-.0139	-.0052	-.0025	.0003	-.0001	-.0009	.0608	-.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0006**	**-.0001**	**.0031**	**.1033**	**.5263**	**.0037**	**1.385**	**.0798**	**.0004**
Stddev	.0002	.0002	.0017	.0030	.0469	.0041	.022	.0002	.0005
%RSD	35.01	153.0	54.65	2.893	8.913	112.4	1.613	.2087	112.2
#1	-.0007	.0001	.0042	.1019	.5167	.0014	1.398	.0797	.0009
#2	-.0008	-.0002	.0012	.1068	.4849	.0084	1.399	.0799	.0002
#3	-.0004	-.0003	.0041	.1014	.5773	.0012	1.360	.0797	.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **175.1**	**-.0006**	**-.0014**	**-.0003**	F **121.4**	**.0011**	**.0001**	**-.0072**	**-.0006**
Stddev	.3	.0003	.0029	.0012	.8	.0024	.0030	.0026	.0014
%RSD	.1758	56.71	199.6	361.8	.6455	211.7	2193.	35.45	232.0
#1	175.5	-.0002	-.0007	-.0017	120.6	.0037	-.0030	-.0084	.0010
#2	174.9	-.0008	-.0046	.0001	121.5	-.0010	.0031	-.0043	-.0014
#3	175.1	-.0008	.0010	.0006	122.2	.0007	.0003	-.0089	-.0015
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	100.0				100.0				
Low Limit	-500.0				-500.0				

Sample Name: 160-29824-A-2-B@100 Acquired: 8/2/2018 18:26:46 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0004	.0194	.0004	.0002	.0582	-.0015	-.0008
Stddev	.0002	.0034	.0026	.0027	.0172	.0072	.0003
%RSD	53.04	17.67	695.7	1617.	29.53	470.8	33.14
#1	.0005	.0155	-.0019	.0031	.0445	-.0085	-.0006
#2	.0005	.0220	.0032	-.0022	.0527	.0058	-.0007
#3	.0001	.0205	-.0001	-.0005	.0775	-.0019	-.0011
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3650.3	32454.	3471.8
Stddev	56.1	90.	22.9
%RSD	1.5355	.27630	.65969
#1	3593.7	32366.	3487.4
#2	3651.6	32451.	3482.5
#3	3705.8	32546.	3445.5

Sample Name: 160-29824-A-3-B@20 Acquired: 8/2/2018 18:31:25 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0008**	**-.0069**	**.0002**	**-.0014**	**-.0002**	**.0000**	**-.0024**	**.0315**	**-.0002**
Stddev	.0010	.0071	.0037	.0018	.0005	.0000	.0028	.0009	.0002
%RSD	130.8	102.2	1684.	131.5	271.7	183.8	117.6	2.851	93.24
#1	-.0019	-.0151	-.0025	.0005	.0002	.0001	-.0056	.0314	-.0001
#2	.0000	-.0031	-.0013	-.0016	-.0000	.0000	-.0014	.0307	-.0001
#3	-.0004	-.0026	.0044	-.0031	-.0007	-.0000	-.0002	.0325	-.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0003**	**-.0001**	**.0025**	**.0351**	**.0493**	**-.0023**	**1.359**	**.0911**	**.0005**
Stddev	.0000	.0002	.0039	.0007	.1031	.0040	.025	.0005	.0001
%RSD	4.064	282.3	155.6	2.048	208.9	173.7	1.848	.5472	21.20
#1	-.0003	-.0003	-.0017	.0355	.0140	.0008	1.351	.0906	.0004
#2	-.0003	.0001	.0060	.0355	-.0314	-.0068	1.387	.0911	.0005
#3	-.0003	-.0000	.0033	.0343	.1654	-.0009	1.338	.0916	.0007
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**78.35**	**-.0006**	**-.0019**	**-.0005**	**54.47**	**-.0021**	**.0025**	**.0043**	**-.0007**
Stddev	.28	.0008	.0004	.0007	.23	.0022	.0026	.0086	.0008
%RSD	.3547	147.6	22.45	156.0	.4284	107.0	102.6	199.5	108.4
#1	78.04	.0004	-.0020	-.0004	54.23	-.0025	.0026	.0030	.0002
#2	78.43	-.0012	-.0014	-.0012	54.49	-.0040	.0050	.0136	-.0011
#3	78.58	-.0009	-.0022	.0002	54.70	.0003	-.0001	-.0035	-.0013
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29824-A-3-B@20 Acquired: 8/2/2018 18:31:25 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0001	.0109	.0001	-.0004	.0400	.0003	-.0010
Stddev	.0001	.0022	.0012	.0015	.0054	.0022	.0002
%RSD	79.81	20.13	954.4	337.8	13.51	712.2	19.64
#1	.0003	.0098	.0011	.0013	.0457	-.0002	-.0010
#2	.0001	.0094	.0004	-.0011	.0350	.0028	-.0011
#3	.0001	.0134	-.0012	-.0015	.0393	-.0016	-.0007
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3697.6	32966.	3730.1
Stddev	36.3	63.	72.8
%RSD	.98049	.19164	1.9525
#1	3655.8	32986.	3807.6
#2	3717.6	32895.	3719.9
#3	3719.5	33016.	3663.0

Sample Name: CCVL Acquired: 8/2/2018 18:36:05 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0093**	**.1645**	**.0070**	**.0976**	**.0461**	**.0048**	**.2017**	**1.019**	**.0045**
Stddev	.0006	.0347	.0014	.0008	.0005	.0000	.0023	.002	.0002
%RSD	6.285	21.06	20.16	.8338	1.056	.8615	1.139	.2103	3.710
#1	.0090	.2011	.0076	.0968	.0457	.0048	.2018	1.020	.0044
#2	.0089	.1602	.0081	.0975	.0467	.0048	.2039	1.020	.0044
#3	.0099	.1322	.0054	.0984	.0460	.0048	.1993	1.016	.0047
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0512**	**.0095**	**.0259**	**.0996**	**4.982**	**.0547**	**.9779**	**.0152**	**.0372**
Stddev	.0002	.0003	.0016	.0005	.095	.0009	.0171	.0003	.0009
%RSD	.3629	3.656	6.169	.4699	1.900	1.628	1.747	1.790	2.548
#1	.0512	.0097	.0272	.1000	4.932	.0557	.9696	.0149	.0366
#2	.0510	.0091	.0263	.0998	5.091	.0539	.9666	.0154	.0383
#3	.0513	.0097	.0241	.0991	4.922	.0546	.9976	.0153	.0367
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9610**	**.0405**	**.2405**	**.0101**	**4.537**	**.0106**	F **.0093**	**.3484**	**.0968**
Stddev	.0320	.0002	.0023	.0007	.014	.0020	.0064	.0128	.0012
%RSD	3.329	.4955	.9547	6.794	.3108	19.04	68.81	3.674	1.270
#1	.9976	.0407	.2379	.0100	4.545	.0088	.0139	.3464	.0966
#2	.9385	.0403	.2424	.0109	4.546	.0128	.0020	.3621	.0956
#3	.9469	.0406	.2411	.0095	4.521	.0102	.0119	.3367	.0981
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass
Value							.0150		
Range							-30.00%		

Sample Name: CCVL Acquired: 8/2/2018 18:36:05 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0049	.1778	.0187	.0193	.4994	.0465	.0187
Stddev	.0004	.0044	.0019	.0015	.0168	.0058	.0001
%RSD	7.607	2.483	10.42	7.631	3.369	12.56	.2782
#1	.0053	.1760	.0166	.0180	.4926	.0411	.0187
#2	.0050	.1829	.0190	.0209	.4871	.0527	.0186
#3	.0045	.1746	.0204	.0191	.5186	.0459	.0187
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3677.7	33956.	3640.9
Stddev	6.0	268.	14.5
%RSD	.16342	.79005	.39956
#1	3684.7	34243.	3626.4
#2	3674.1	33711.	3640.7
#3	3674.4	33915.	3655.5

Sample Name: CCV Acquired: 8/2/2018 18:40:44 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9906**	**46.99**	**4.644**	**.9812**	**4.724**	**4.815**	**4.789**	**49.27**	**4.834**
Stddev	.0007	.10	.026	.0083	.022	.009	.022	.11	.016
%RSD	.0734	.2121	.5545	.8428	.4654	.1981	.4670	.2171	.3296
#1	.9908	47.08	4.643	.9900	4.748	4.824	4.796	49.24	4.835
#2	.9898	46.89	4.671	.9799	4.705	4.805	4.808	49.39	4.849
#3	.9913	47.00	4.619	.9736	4.718	4.817	4.764	49.18	4.818
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**4.915**	**4.718**	**4.677**	**48.43**	**49.55**	**4.983**	**47.24**	**4.771**	**.9347**
Stddev	.010	.016	.027	.14	.17	.012	.18	.006	.0038
%RSD	.2113	.3285	.5776	.2834	.3501	.2304	.3718	.1245	.4029
#1	4.920	4.718	4.680	48.59	49.62	4.991	47.44	4.777	.9347
#2	4.921	4.733	4.703	48.34	49.35	4.970	47.18	4.765	.9384
#3	4.903	4.702	4.649	48.37	49.67	4.987	47.10	4.772	.9309
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**48.82**	**4.929**	**47.79**	**4.753**	**47.32**	**.9225**	**.9398**	**4.719**	**4.789**
Stddev	.12	.014	.23	.022	.18	.0036	.0057	.021	.018
%RSD	.2423	.2768	.4826	.4727	.3817	.3953	.6040	.4389	.3703
#1	48.89	4.932	47.78	4.752	47.39	.9252	.9459	4.726	4.789
#2	48.68	4.940	48.03	4.775	47.45	.9241	.9389	4.696	4.806
#3	48.88	4.914	47.57	4.731	47.11	.9184	.9346	4.736	4.771
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCV Acquired: 8/2/2018 18:40:44 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**4.736**	**4.556**	**4.748**	**.9559**	**5.071**	**4.667**	**4.862**
Stddev	.014	.033	.018	.0022	.031	.025	.014
%RSD	.2980	.7194	.3681	.2335	.6172	.5427	.2956
#1	4.750	4.549	4.767	.9573	5.081	4.688	4.863
#2	4.722	4.527	4.733	.9571	5.096	4.639	4.876
#3	4.734	4.592	4.743	.9533	5.036	4.674	4.848
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3401.8**	**30942.**	**3464.2**
Stddev	20.8	97.	16.9
%RSD	.61275	.31421	.48836
#1	3425.1	30892.	3464.5
#2	3395.5	31054.	3447.1
#3	3384.9	30879.	3480.9

Sample Name: CCB Acquired: 8/2/2018 18:44:56 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0003**	**.0051**	**-.0008**	**-.0054**	**-.0005**	**.0001**	**-.0020**	**-.0170**	**-.0003**
Stddev	.0010	.0040	.0016	.0068	.0003	.0001	.0023	.0011	.0002
%RSD	354.6	79.19	198.4	125.1	54.53	70.25	117.8	6.254	52.98
#1	.0000	.0026	-.0021	.0023	-.0002	.0001	.0003	-.0168	-.0004
#2	-.0014	.0097	-.0013	-.0105	-.0008	.0001	-.0043	-.0161	-.0001
#3	.0005	.0029	.0010	-.0081	-.0005	.0002	-.0020	-.0182	-.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0009**	**-.0002**	**.0006**	**.0048**	**-.0463**	**.0019**	**.0115**	**.0003**	**.0004**
Stddev	.0006	.0002	.0034	.0037	.0199	.0039	.0076	.0002	.0001
%RSD	63.72	110.8	600.8	76.13	43.03	204.1	65.91	84.50	37.79
#1	-.0006	-.0004	-.0033	.0086	-.0534	.0027	.0184	.0001	.0004
#2	-.0006	-.0003	.0019	.0013	-.0617	.0054	.0125	.0002	.0005
#3	-.0016	.0000	.0031	.0046	-.0238	-.0023	.0034	.0005	.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0331**	**-.0004**	**-.0026**	**.0008**	**-.0143**	**.0005**	**-.0056**	**-.0022**	**-.0001**
Stddev	.0370	.0005	.0063	.0007	.0059	.0043	.0048	.0080	.0008
%RSD	111.5	109.9	244.4	86.54	41.45	833.5	85.33	362.1	1414.
#1	-.0110	.0001	-.0093	.0009	-.0133	.0052	-.0045	.0037	.0008
#2	-.0126	-.0008	.0032	.0000	-.0089	-.0006	-.0108	.0010	-.0002
#3	-.0758	-.0006	-.0016	.0013	-.0207	-.0031	-.0015	-.0114	-.0008
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: CCB Acquired: 8/2/2018 18:44:56 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0001	.0051	-.0003	.0001	.0533	.0017	-.0008
Stddev	.0001	.0045	.0012	.0036	.0233	.0047	.0001
%RSD	100.4	89.65	390.9	2789.	43.68	278.9	9.330
#1	.0000	.0101	-.0016	-.0024	.0323	.0020	-.0007
#2	.0001	.0039	.0005	-.0015	.0784	.0062	-.0008
#3	.0001	.0012	.0003	.0043	.0493	-.0032	-.0007
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3688.2	34406.	3636.1
Stddev	22.1	173.	57.9
%RSD	.59822	.50300	1.5919
#1	3711.9	34288.	3633.3
#2	3668.3	34326.	3579.7
#3	3684.3	34605.	3695.4

Sample Name: MB 160-379677/1-A Acquired: 8/2/2018 18:49:37 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment: 379677

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0004**	**.0008**	**-.0038**	**.0040**	**-.0004**	**-.0000**	**-.0050**	**.0195**	**-.0001**
Stddev	.0015	.0108	.0044	.0111	.0009	.0001	.0034	.0005	.0002
%RSD	347.5	1296.	116.3	276.1	246.8	1487.	67.31	2.441	192.6
#1	-.0013	.0111	-.0076	.0002	-.0003	-.0001	-.0083	.0193	.0001
#2	.0016	-.0104	-.0048	.0165	.0005	-.0001	-.0051	.0192	-.0002
#3	.0010	.0018	.0010	-.0047	-.0013	.0001	-.0016	.0200	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0003**	**.0003**	**.0043**	**.0205**	**-.0525**	**.0042**	**-.0055**	**.0012**	**.0003**
Stddev	.0006	.0001	.0010	.0024	.0844	.0057	.0287	.0002	.0004
%RSD	186.9	55.35	23.06	11.65	160.8	136.8	517.3	16.50	134.5
#1	-.0011	.0001	.0034	.0213	.0304	-.0017	.0242	.0013	.0004
#2	.0000	.0002	.0053	.0178	-.1384	.0046	-.0330	.0010	.0006
#3	.0000	.0004	.0043	.0223	-.0494	.0096	-.0079	.0014	-.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0472**	**-.0004**	**.0113**	**.0000**	**-.0114**	**.0011**	**-.0006**	**-.0005**	**.0128**
Stddev	.0164	.0003	.0017	.0012	.0008	.0036	.0023	.0017	.0012
%RSD	34.75	78.41	14.89	3449.	6.732	335.3	415.4	339.0	9.612
#1	-.0660	-.0000	.0132	.0007	-.0114	-.0026	.0021	-.0000	.0128
#2	-.0392	-.0004	.0102	.0007	-.0106	.0012	-.0021	.0009	.0116
#3	-.0363	-.0006	.0104	-.0014	-.0121	.0045	-.0017	-.0023	.0140
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: MB 160-379677/1-A Acquired: 8/2/2018 18:49:37 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment: 379677

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0002	.0011	.0017	-.0006	.0496	-.0012	-.0004
Stddev	.0001	.0020	.0028	.0015	.0265	.0029	.0001
%RSD	55.10	176.8	170.6	256.3	53.36	246.5	30.83
#1	.0001	.0023	-.0008	-.0015	.0767	.0013	-.0005
#2	.0002	.0022	.0010	.0011	.0237	-.0044	-.0005
#3	.0003	-.0012	.0047	-.0014	.0485	-.0005	-.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3725.9	35141.	3680.7
Stddev	146.3	229.	31.8
%RSD	3.9276	.65250	.86270
#1	3796.4	35061.	3680.2
#2	3823.6	34963.	3649.2
#3	3557.6	35400.	3712.7

Sample Name: LCSSRM 160-3796772@2 Acquired: 8/2/2018 18:54:17 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.2085**	**33.79**	**.4731**	**.3820**	**1.024**	**.7186**	**.0037**	**29.25**	**.4070**
Stddev	.0011	.12	.0004	.0054	.005	.0023	.0023	.02	.0008
%RSD	.5260	.3496	.0931	1.407	.5369	.3262	62.34	.0846	.2038
#1	.2087	33.89	.4728	.3760	1.030	.7213	.0011	29.27	.4062
#2	.2073	33.82	.4729	.3864	1.020	.7172	.0049	29.23	.4069
#3	.2094	33.66	.4736	.3837	1.021	.7173	.0053	29.27	.4078
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.6352**	**.5019**	**.7764**	**70.41**	**12.49**	**.0433**	**14.04**	**1.492**	**.2524**
Stddev	.0012	.0010	.0021	.28	.05	.0046	.05	.006	.0013
%RSD	.1936	.2064	.2692	.4023	.3866	10.57	.3742	.3852	.5114
#1	.6360	.5011	.7740	70.73	12.53	.0386	14.07	1.498	.2525
#2	.6338	.5016	.7775	70.23	12.43	.0477	14.06	1.491	.2510
#3	.6358	.5031	.7778	70.25	12.50	.0437	13.98	1.487	.2535
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.117**	**.2541**	**3.011**	**.4311**	**.5535**	**.2898**	**.4340**	**1.014**	**.7517**
Stddev	.013	.0002	.007	.0010	.0071	.0032	.0035	.013	.0021
%RSD	1.169	.0920	.2410	.2434	1.285	1.099	.8088	1.288	.2833
#1	1.104	.2544	3.002	.4323	.5453	.2896	.4300	1.002	.7505
#2	1.118	.2540	3.015	.4304	.5576	.2867	.4354	1.011	.7505
#3	1.130	.2540	3.015	.4305	.5576	.2931	.4365	1.028	.7542
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: LCSSRM 160-3796772@2 Acquired: 8/2/2018 18:54:17 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.2846	.0750	1.576	.3031	.6019	.6455	.7375
Stddev	.0012	.0062	.005	.0015	.0215	.0089	.0005
%RSD	.4362	8.259	.2995	.4879	3.568	1.379	.0612
#1	.2860	.0683	1.581	.3043	.6180	.6490	.7375
#2	.2840	.0806	1.571	.3035	.6103	.6354	.7371
#3	.2838	.0760	1.576	.3014	.5775	.6522	.7380
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3782.9	34071.	3679.2
Stddev	18.1	104.	71.2
%RSD	.47976	.30540	1.9339
#1	3779.1	34188.	3760.3
#2	3802.7	33988.	3650.2
#3	3767.0	34038.	3627.1

Sample Name: 160-29847-A-1-A@10 Acquired: 8/2/2018 18:58:42 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0006**	**19.06**	**.0138**	**-.1050**	**.2576**	**.0002**	**.0382**	**2.872**	**.0040**
Stddev	.0006	.06	.0035	.0056	.0009	.0001	.0005	.007	.0002
%RSD	115.1	.3367	25.54	5.313	.3353	57.24	1.210	.2513	3.826
#1	-.0001	19.04	.0097	-.0993	.2586	.0003	.0377	2.880	.0042
#2	-.0002	19.13	.0158	-.1053	.2572	.0001	.0386	2.870	.0040
#3	-.0013	19.01	.0158	-.1104	.2570	.0002	.0384	2.866	.0039
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0586**	**.4833**	**.0634**	F **278.2**	**.3892**	**.0106**	**3.048**	**2.272**	**.0087**
Stddev	.0004	.0024	.0026	1.6	.0337	.0024	.014	.011	.0003
%RSD	.6388	.5047	4.158	.5581	8.656	22.59	.4668	.4961	3.694
#1	.0587	.4861	.0657	278.2	.4132	.0093	3.041	2.272	.0091
#2	.0582	.4815	.0605	279.7	.4037	.0091	3.065	2.284	.0087
#3	.0589	.4824	.0640	276.6	.3507	.0133	3.040	2.261	.0085
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit				100.0					
Low Limit				-500.0					

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.8949**	**.0697**	**.3791**	**.1724**	**.6892**	**.0118**	**.0035**	**.1533**	**.0158**
Stddev	.0534	.0006	.0074	.0017	.0101	.0039	.0025	.0088	.0006
%RSD	5.968	.9094	1.951	.9690	1.470	32.65	71.55	5.761	3.908
#1	.8512	.0703	.3749	.1735	.6984	.0150	.0012	.1547	.0154
#2	.8791	.0690	.3748	.1705	.6909	.0075	.0063	.1439	.0154
#3	.9544	.0698	.3877	.1732	.6783	.0129	.0031	.1614	.0165
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29847-A-1-A@10 Acquired: 8/2/2018 18:58:42 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0164	.0770	.1113	.0033	1.353	.0168	1.780
Stddev	.0003	.0018	.0009	.0023	.017	.0070	.008
%RSD	1.555	2.326	.7788	69.41	1.280	41.79	.4653
#1	.0166	.0754	.1103	.0046	1.351	.0117	1.789
#2	.0166	.0765	.1120	.0007	1.372	.0138	1.773
#3	.0161	.0789	.1115	.0046	1.337	.0248	1.777
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3810.7	35591.	3877.0
Stddev	65.1	519.	103.0
%RSD	1.7092	1.4592	2.6569
#1	3885.8	34997.	3993.7
#2	3769.6	35818.	3838.5
#3	3776.6	35959.	3798.8

Sample Name: 160-29847-A-2-B@10 Acquired: 8/2/2018 19:03:15 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0007**	**63.56**	**-.0002**	**-.0006**	**5.883**	**.0000**	**.0023**	**1.606**	**.0025**
Stddev	.0010	.04	.0031	.0034	.011	.0001	.0016	.005	.0002
%RSD	153.5	.0582	1781.	548.9	.1851	1309.	70.75	.3039	6.511
#1	.0004	63.55	-.0009	-.0026	5.879	.0001	.0041	1.600	.0025
#2	-.0009	63.60	-.0029	-.0026	5.875	-.0001	.0015	1.608	.0026
#3	-.0016	63.53	.0032	.0033	5.895	.0001	.0012	1.609	.0023
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0697**	**.0134**	**.0236**	**4.827**	**-.0050**	**.0104**	**2.433**	**.1010**	**-.0001**
Stddev	.0002	.0000	.0003	.018	.0280	.0023	.022	.0004	.0008
%RSD	.2389	.1562	1.454	.3628	557.9	22.11	.9030	.3621	745.0
#1	.0695	.0134	.0239	4.830	.0243	.0131	2.429	.1012	.0003
#2	.0698	.0134	.0232	4.808	-.0079	.0093	2.456	.1005	-.0010
#3	.0698	.0134	.0237	4.843	-.0315	.0089	2.413	.1012	.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0657**	**.0043**	**.4637**	**8.978**	**1.590**	**.0038**	**.0006**	**.1086**	**.0043**
Stddev	.0429	.0006	.0061	.010	.003	.0020	.0031	.0102	.0004
%RSD	65.29	13.74	1.317	.1148	.2053	52.08	500.8	9.350	8.733
#1	.0737	.0048	.4658	8.987	1.591	.0020	.0016	.0999	.0044
#2	.1041	.0036	.4568	8.980	1.586	.0059	-.0028	.1063	.0046
#3	.0194	.0044	.4685	8.966	1.592	.0034	.0031	.1198	.0039
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29847-A-2-B@10 Acquired: 8/2/2018 19:03:15 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0859	.0095	.0757	-.0011	.0739	.0076	3.739
Stddev	.0004	.0047	.0002	.0015	.0067	.0014	.003
%RSD	.4474	49.41	.2195	141.6	9.046	18.41	.0686
#1	.0862	.0133	.0758	-.0002	.0677	.0063	3.736
#2	.0855	.0109	.0755	-.0028	.0729	.0074	3.741
#3	.0861	.0043	.0756	-.0002	.0810	.0091	3.740
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3811.9	33774.	3568.8
Stddev	8.2	810.	48.7
%RSD	.21465	2.3990	1.3646
#1	3817.8	33203.	3556.3
#2	3815.5	33418.	3527.6
#3	3802.6	34701.	3622.5

Sample Name: 160-29847-A-3-B@50 Acquired: 8/2/2018 19:07:49 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0002**	**7.103**	**-.0018**	**-.0000**	**1.349**	**.0000**	**.0003**	**.1775**	**.0031**
Stddev	.0007	.021	.0011	.0048	.007	.0000	.0036	.0012	.0002
%RSD	272.6	.2997	61.17	15640.	.5596	144.8	1075.	.6714	6.717
#1	-.0010	7.081	-.0021	-.0056	1.346	.0001	-.0003	.1781	.0034
#2	-.0001	7.124	-.0006	.0032	1.357	-.0000	-.0029	.1761	.0030
#3	.0004	7.104	-.0026	.0023	1.343	.0000	.0042	.1782	.0031
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0142**	**.4484**	**.0057**	**6.839**	**.0537**	**.0014**	**.5972**	**.0431**	**.0002**
Stddev	.0001	.0006	.0005	.024	.0400	.0015	.0333	.0006	.0004
%RSD	.8573	.1270	8.127	.3467	74.44	108.8	5.576	1.490	237.9
#1	.0143	.4480	.0058	6.854	.0341	.0023	.6167	.0437	.0004
#2	.0143	.4491	.0062	6.852	.0273	.0021	.6162	.0424	-.0003
#3	.0141	.4482	.0052	6.812	.0998	-.0003	.5588	.0432	.0004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.1183**	**.0006**	**.0947**	**5.520**	**.3565**	**.0027**	**.0025**	**.0349**	**.0008**
Stddev	.0279	.0005	.0039	.007	.0009	.0013	.0015	.0075	.0014
%RSD	23.56	84.17	4.112	.1353	.2561	47.17	60.17	21.43	165.9
#1	-.1012	.0012	.0978	5.514	.3565	.0014	.0040	.0435	.0015
#2	-.1505	.0004	.0961	5.518	.3556	.0040	.0027	.0311	.0017
#3	-.1033	.0003	.0904	5.529	.3574	.0029	.0009	.0301	-.0008
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29847-A-3-B@50 Acquired: 8/2/2018 19:07:49 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0184	-.0044	.0178	-.0025	.1000	-.0019	3.007
Stddev	.0000	.0042	.0014	.0018	.0117	.0039	.004
%RSD	.0895	96.17	7.797	73.72	11.71	205.6	.1379
#1	.0184	-.0039	.0169	-.0028	.0973	-.0049	3.002
#2	.0184	-.0004	.0194	-.0005	.0898	.0025	3.010
#3	.0184	-.0087	.0172	-.0041	.1128	-.0033	3.009
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3913.6	36096.	3959.0
Stddev	75.3	276.	73.7
%RSD	1.9248	.76452	1.8621
#1	3947.3	35855.	3964.8
#2	3966.1	36397.	4029.6
#3	3827.3	36036.	3882.5

Sample Name: 160-29847-A-3BSD@250 Acquired: 8/2/2018 19:12:24 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0009**	**1.416**	**-.0023**	**.0009**	**.2640**	**-.0000**	**-.0016**	**.0208**	**.0005**
Stddev	.0006	.019	.0028	.0052	.0011	.0001	.0020	.0014	.0002
%RSD	69.38	1.364	121.6	606.3	.4119	384.2	126.9	6.873	37.37
#1	-.0005	1.406	.0001	.0058	.2642	.0001	-.0028	.0206	.0004
#2	-.0006	1.439	-.0054	-.0045	.2650	-.0002	.0008	.0195	.0003
#3	-.0017	1.405	-.0017	.0012	.2629	-.0000	-.0028	.0223	.0006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0027**	**.0882**	**.0057**	**1.352**	**-.0493**	**.0060**	**.1311**	**.0089**	**.0002**
Stddev	.0004	.0003	.0012	.011	.1312	.0071	.0275	.0004	.0002
%RSD	16.19	.3326	21.22	.8006	265.9	118.8	20.96	4.113	90.65
#1	.0028	.0885	.0046	1.354	-.0161	.0017	.1090	.0085	.0005
#2	.0031	.0880	.0055	1.362	-.1940	.0141	.1619	.0089	.0001
#3	.0022	.0880	.0070	1.341	.0620	.0020	.1224	.0093	.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0787**	**-.0006**	**.0119**	**1.096**	**.0595**	**.0016**	**.0006**	**-.0052**	**-.0008**
Stddev	.0142	.0005	.0036	.000	.0072	.0021	.0057	.0038	.0006
%RSD	18.07	83.00	29.99	.0408	12.08	135.9	929.5	72.25	73.38
#1	-.0778	-.0002	.0078	1.096	.0672	.0010	-.0054	-.0095	-.0014
#2	-.0934	-.0012	.0140	1.096	.0529	.0040	.0059	-.0034	-.0009
#3	-.0650	-.0005	.0139	1.095	.0583	-.0002	.0014	-.0027	-.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29847-A-3BSD@250 Acquired: 8/2/2018 19:12:24 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0039	-.0007	.0053	.0009	.0693	-.0002	.5961
Stddev	.0002	.0009	.0008	.0023	.0031	.0056	.0007
%RSD	4.496	130.7	15.16	253.7	4.468	2634.	.1151
#1	.0039	-.0003	.0048	.0013	.0658	.0057	.5953
#2	.0037	-.0016	.0062	.0030	.0713	-.0007	.5963
#3	.0040	-.0000	.0048	-.0016	.0710	-.0056	.5967
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3886.7	36101.	3767.1
Stddev	10.8	739.	29.6
%RSD	.27706	2.0463	.78620
#1	3898.8	36874.	3766.8
#2	3878.1	36026.	3737.7
#3	3883.4	35402.	3796.9

Sample Name: 160-29847-A-3-CMS@50 Acquired: 8/2/2018 19:16:59 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0040**	**8.109**	**.0105**	**.0064**	**1.390**	**.0019**	**.0202**	**.3598**	**.0195**
Stddev	.0009	.044	.0009	.0030	.005	.0001	.0029	.0019	.0001
%RSD	23.79	.5448	8.855	47.35	.3880	3.646	14.20	.5414	.5162
#1	.0049	8.068	.0112	.0031	1.384	.0019	.0192	.3576	.0196
#2	.0039	8.156	.0095	.0072	1.394	.0019	.0179	.3611	.0194
#3	.0030	8.104	.0110	.0091	1.393	.0018	.0234	.3609	.0195
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0371**	**.5624**	**.0334**	**3.125**	**.2625**	**.0101**	**.7585**	**.0467**	**.0076**
Stddev	.0004	.0007	.0014	.014	.0326	.0048	.0295	.0010	.0003
%RSD	.9430	.1200	4.103	.4591	12.40	47.21	3.895	2.178	3.886
#1	.0372	.5620	.0319	3.110	.2395	.0137	.7372	.0457	.0073
#2	.0374	.5620	.0344	3.139	.2997	.0119	.7922	.0478	.0079
#3	.0367	.5631	.0340	3.126	.2482	.0047	.7460	.0466	.0077
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1664**	**.0196**	**.0855**	**3.161**	**.5130**	**.0029**	**.0053**	**.0642**	**.0159**
Stddev	.0337	.0005	.0018	.002	.0066	.0021	.0014	.0056	.0012
%RSD	20.23	2.526	2.097	.0734	1.278	74.81	25.71	8.682	7.437
#1	.1705	.0201	.0873	3.163	.5191	.0029	.0056	.0588	.0172
#2	.1978	.0192	.0854	3.162	.5137	.0050	.0066	.0699	.0149
#3	.1309	.0194	.0837	3.158	.5061	.0007	.0039	.0641	.0155
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29847-A-3-CMS@50 Acquired: 8/2/2018 19:16:59 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0374	.0153	.0408	.0021	.1071	.0205	2.111
Stddev	.0002	.0021	.0005	.0011	.0091	.0026	.001
%RSD	.5248	13.78	1.246	53.32	8.522	12.49	.0567
#1	.0372	.0175	.0413	.0013	.1165	.0219	2.112
#2	.0373	.0133	.0403	.0034	.0982	.0221	2.113
#3	.0376	.0150	.0408	.0016	.1065	.0176	2.110
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3827.5	35750.	3832.1
Stddev	22.9	329.	70.1
%RSD	.59768	.91978	1.8296
#1	3842.9	35745.	3799.1
#2	3801.2	35424.	3784.6
#3	3838.4	36081.	3912.6

Sample Name: 160-29847-A-3DMSD@50 Acquired: 8/2/2018 19:21:33 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0038**	**7.560**	**.0126**	**.0068**	**1.569**	**.0019**	**.0217**	**.3999**	**.0215**
Stddev	.0010	.036	.0021	.0119	.005	.0001	.0019	.0016	.0002
%RSD	25.78	.4709	16.96	175.5	.2981	3.963	8.734	.3890	1.125
#1	.0027	7.520	.0111	-.0041	1.567	.0018	.0220	.3983	.0218
#2	.0046	7.571	.0117	.0049	1.574	.0019	.0234	.4002	.0213
#3	.0041	7.588	.0151	.0195	1.566	.0019	.0197	.4014	.0214
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0383**	**.9122**	**.0303**	**6.568**	**.4381**	**.0024**	**.8664**	**.0687**	**.0079**
Stddev	.0007	.0019	.0051	.028	.0301	.0050	.0180	.0003	.0003
%RSD	1.758	.2121	16.85	.4220	6.868	205.4	2.073	.4713	3.948
#1	.0375	.9101	.0281	6.583	.4058	-.0033	.8460	.0689	.0075
#2	.0388	.9123	.0362	6.586	.4431	.0058	.8798	.0684	.0079
#3	.0386	.9140	.0267	6.536	.4654	.0048	.8735	.0690	.0081
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.1366**	**.0208**	**.0983**	**4.482**	**.5696**	**.0023**	**.0065**	**.0775**	**.0176**
Stddev	.0162	.0002	.0025	.009	.0069	.0011	.0039	.0041	.0003
%RSD	11.84	1.060	2.535	.1926	1.208	49.05	59.28	5.233	1.953
#1	.1480	.0210	.0957	4.472	.5617	.0016	.0079	.0806	.0173
#2	.1438	.0206	.0986	4.489	.5730	.0035	.0022	.0790	.0179
#3	.1181	.0209	.1007	4.484	.5742	.0017	.0095	.0729	.0176
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29847-A-3DMSD@50 Acquired: 8/2/2018 19:21:33 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0399	.0136	.0460	.0019	.1425	.0208	3.471
Stddev	.0002	.0027	.0012	.0022	.0124	.0070	.005
%RSD	.4738	19.95	2.561	119.8	8.736	33.61	.1596
#1	.0397	.0106	.0472	.0020	.1563	.0289	3.467
#2	.0401	.0144	.0448	-.0005	.1322	.0166	3.478
#3	.0400	.0159	.0459	.0040	.1389	.0169	3.470
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3908.3	36176.	3710.2
Stddev	11.0	280.	86.0
%RSD	.28194	.77526	2.3185
#1	3920.0	36469.	3639.6
#2	3906.8	35911.	3685.1
#3	3898.2	36146.	3806.0

Sample Name: 160-29847-A-4-A Acquired: 8/2/2018 19:26:07 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0581	55.74	.0093	F 15.80	F 121.3	.0006	.0139	21.77	.0208
Stddev	.0006	.18	.0018	.07	1.5	.0001	.0052	.06	.0003
%RSD	.9844	.3276	19.13	.4145	1.207	11.86	37.72	.2753	1.614
#1	.0587	55.72	.0089	15.80	120.1	.0007	.0156	21.70	.0211
#2	.0576	55.58	.0078	15.74	123.0	.0005	.0181	21.78	.0204
#3	.0581	55.94	.0113	15.87	121.0	.0006	.0080	21.82	.0208
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit				2.000	10.00				
Low Limit				-500.0	-500.0				

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	2.190	F 24.41	.1080	42.95	11.12	.4391	91.70	1.001	1.465
Stddev	.009	.11	.0018	.13	.15	.0012	.46	.003	.009
%RSD	.4249	.4355	1.702	.3139	1.320	.2708	.5029	.2704	.6232
#1	2.180	24.30	.1060	42.88	10.95	.4380	91.19	1.002	1.455
#2	2.196	24.51	.1083	42.88	11.21	.4390	91.83	.9977	1.474
#3	2.195	24.44	.1096	43.11	11.20	.4404	92.09	1.003	1.467
Check ?	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit		2.000							
Low Limit		-500.0							

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	2.167	.0454	7.561	7.116	6.854	.0083	.0008	1.428	.3180
Stddev	.079	.0002	.039	.029	.064	.0019	.0098	.006	.0004
%RSD	3.626	.4741	.5158	.4038	.9316	22.83	1185.	.4248	.1329
#1	2.078	.0452	7.521	7.084	6.788	.0082	.0122	1.422	.3185
#2	2.201	.0453	7.599	7.141	6.916	.0102	-.0042	1.429	.3176
#3	2.224	.0456	7.563	7.122	6.856	.0064	-.0054	1.434	.3180
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29847-A-4-A Acquired: 8/2/2018 19:26:07 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**2.106**	**.0754**	**6.096**	**-.0005**	**.2611**	**.0224**	F **80.46**
Stddev	.006	.0078	.015	.0029	.0122	.0058	.20
%RSD	.2892	10.33	.2434	582.2	4.664	26.09	.2482
#1	2.111	.0777	6.096	-.0031	.2527	.0217	80.68
#2	2.100	.0818	6.081	-.0011	.2750	.0170	80.42
#3	2.108	.0667	6.111	.0027	.2555	.0286	80.29
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail
High Limit							10.00
Low Limit							-500.0

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3555.6**	**32686.**	**3579.3**
Stddev	42.3	1010.	192.6
%RSD	1.1890	3.0909	5.3796
#1	3511.7	31535.	3781.7
#2	3596.1	33096.	3557.8
#3	3558.9	33427.	3398.4

Sample Name: 160-29824-A-1-B@500 Acquired: 8/2/2018 19:30:46 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment: 379477

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0009**	**.0045**	**-.0021**	**.0294**	**.0008**	**.0001**	**.0014**	**.0081**	**-.0004**
Stddev	.0006	.0095	.0015	.0115	.0003	.0001	.0025	.0006	.0002
%RSD	69.96	210.3	73.35	39.16	35.69	240.7	181.9	6.921	48.63
#1	-.0014	-.0061	-.0039	.0425	.0010	.0002	.0007	.0075	-.0005
#2	-.0011	.0074	-.0013	.0249	.0010	-.0001	-.0007	.0081	-.0002
#3	-.0002	.0122	-.0012	.0208	.0005	.0001	.0041	.0086	-.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0000**	**-.0000**	**.0023**	**.0420**	**.2915**	**.0037**	**.4907**	**.0288**	**.0001**
Stddev	.0008	.0001	.0022	.0056	.0131	.0037	.0475	.0003	.0003
%RSD	2382.	255.1	93.18	13.40	4.495	100.1	9.679	1.071	235.9
#1	.0008	.0001	.0049	.0378	.2933	.0047	.4766	.0285	.0003
#2	-.0007	-.0000	.0009	.0484	.3036	-.0004	.5437	.0291	-.0002
#3	-.0002	-.0002	.0012	.0399	.2776	.0069	.4519	.0289	.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**67.81**	**-.0003**	**-.0025**	**-.0008**	**45.49**	**.0003**	**.0006**	**-.0067**	**-.0012**
Stddev	.45	.0002	.0004	.0008	.46	.0034	.0025	.0140	.0006
%RSD	.6679	75.42	16.45	102.8	1.003	1253.	397.8	207.1	47.20
#1	68.33	-.0001	-.0029	-.0017	45.29	-.0011	.0025	-.0083	-.0006
#2	67.54	-.0004	-.0024	-.0003	46.02	.0041	.0015	.0079	-.0013
#3	67.55	-.0005	-.0021	-.0003	45.18	-.0022	-.0022	-.0199	-.0017
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29824-A-1-B@500 Acquired: 8/2/2018 19:30:46 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment: 379477

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0001	.0029	.0007	.0004	.0191	.0019	-.0010
Stddev	.0002	.0050	.0014	.0038	.0416	.0071	.0001
%RSD	150.7	175.1	206.1	870.9	218.5	375.0	12.48
#1	.0001	.0010	.0022	.0048	-.0028	.0054	-.0009
#2	-.0001	-.0009	-.0006	-.0013	.0671	-.0063	-.0008
#3	.0004	.0086	.0004	-.0021	-.0071	.0066	-.0011
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3544.4	32094.	3370.3
Stddev	53.9	549.	27.3
%RSD	1.5213	1.7105	.81144
#1	3542.2	31943.	3340.3
#2	3599.4	32703.	3376.8
#3	3491.6	31637.	3393.9

Sample Name: CCVL Acquired: 8/2/2018 19:35:24 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0081**	**.1852**	**.0081**	**.1079**	**.0452**	**.0048**	**.2083**	**1.014**	**.0046**
Stddev	.0009	.0055	.0026	.0094	.0004	.0001	.0025	.003	.0001
%RSD	11.14	2.995	32.25	8.703	.9909	2.104	1.178	.2437	2.551
#1	.0080	.1872	.0104	.1182	.0447	.0049	.2059	1.017	.0045
#2	.0073	.1895	.0087	.0998	.0455	.0048	.2081	1.014	.0047
#3	.0091	.1789	.0052	.1058	.0454	.0047	.2108	1.012	.0046
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0510**	**.0092**	**.0257**	**.1016**	**4.958**	**.0564**	**.9351**	**.0142**	**.0371**
Stddev	.0008	.0004	.0017	.0018	.071	.0016	.0294	.0002	.0004
%RSD	1.544	4.899	6.550	1.763	1.426	2.869	3.149	1.579	1.151
#1	.0511	.0089	.0275	.1029	4.958	.0553	.9293	.0143	.0366
#2	.0501	.0089	.0242	.1024	5.029	.0557	.9670	.0139	.0374
#3	.0517	.0097	.0254	.0996	4.887	.0583	.9090	.0143	.0373
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9393**	**.0411**	**.2359**	**.0107**	**4.509**	**.0080**	**.0126**	**.3502**	**.0975**
Stddev	.0225	.0004	.0021	.0006	.006	.0015	.0057	.0061	.0015
%RSD	2.394	1.072	.8766	5.615	.1340	18.85	44.79	1.751	1.571
#1	.9269	.0416	.2336	.0108	4.503	.0079	.0063	.3449	.0968
#2	.9652	.0408	.2377	.0112	4.514	.0065	.0143	.3487	.0993
#3	.9256	.0408	.2362	.0100	4.511	.0095	.0173	.3569	.0966
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCVL Acquired: 8/2/2018 19:35:24 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0049	.1754	.0199	.0199	.5290	.0478	.0189
Stddev	.0002	.0066	.0019	.0021	.0188	.0018	.0001
%RSD	4.692	3.781	9.625	10.32	3.563	3.790	.3497
#1	.0051	.1775	.0213	.0217	.5154	.0481	.0189
#2	.0049	.1679	.0177	.0205	.5212	.0459	.0189
#3	.0047	.1807	.0207	.0177	.5506	.0495	.0190
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3694.5	34133.	3654.6
Stddev	6.6	454.	16.8
%RSD	.17880	1.3290	.45832
#1	3692.4	33807.	3673.7
#2	3689.3	33941.	3647.7
#3	3702.0	34651.	3642.5

Sample Name: CCV Acquired: 8/2/2018 19:40:04 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9900**	**45.92**	**4.555**	**.9662**	**4.656**	**4.741**	**4.736**	**49.02**	**4.803**
Stddev	.0083	.36	.008	.0098	.024	.021	.011	.08	.003
%RSD	.8379	.7796	.1819	1.014	.5240	.4508	.2408	.1545	.0699
#1	.9975	45.91	4.562	.9734	4.664	4.754	4.736	48.95	4.800
#2	.9811	45.56	4.556	.9702	4.628	4.716	4.747	49.10	4.804
#3	.9915	46.28	4.546	.9550	4.675	4.752	4.724	49.01	4.806
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**4.903**	**4.649**	**4.564**	**47.92**	**48.75**	**4.959**	**46.18**	**4.678**	**.9194**
Stddev	.010	.007	.009	.17	.26	.030	.38	.021	.0021
%RSD	.2044	.1456	.1892	.3454	.5251	.6146	.8325	.4577	.2245
#1	4.895	4.641	4.558	47.83	48.68	4.958	45.99	4.674	.9186
#2	4.914	4.654	4.574	47.82	48.55	4.929	45.94	4.658	.9217
#3	4.899	4.651	4.560	48.11	49.04	4.990	46.63	4.700	.9178
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**48.09**	**4.924**	**46.71**	**4.654**	**46.63**	**.9060**	**.9311**	**4.595**	**4.726**
Stddev	.30	.009	.04	.003	.02	.0021	.0037	.030	.008
%RSD	.6155	.1883	.0911	.0648	.0488	.2337	.3925	.6568	.1665
#1	48.06	4.913	46.72	4.651	46.64	.9059	.9291	4.591	4.723
#2	47.80	4.931	46.75	4.657	46.60	.9082	.9353	4.567	4.735
#3	48.39	4.926	46.67	4.655	46.64	.9040	.9288	4.627	4.721
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCV Acquired: 8/2/2018 19:40:04 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**4.653**	F **4.397**	**4.682**	**.9345**	**5.113**	**4.541**	**4.844**
Stddev	.024	.049	.021	.0005	.028	.033	.003
%RSD	.5233	1.124	.4452	.0496	.5403	.7220	.0534
#1	4.661	4.449	4.678	.9350	5.135	4.558	4.841
#2	4.625	4.351	4.663	.9341	5.121	4.503	4.846
#3	4.671	4.391	4.704	.9343	5.082	4.562	4.845
Check ?	Chk Pass	Chk Fail	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value		5.000					
Range		-10.00%					

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3464.1**	**31653.**	**3571.3**
Stddev	23.7	848.	131.1
%RSD	.68402	2.6782	3.6698
#1	3486.7	30674.	3711.6
#2	3439.5	32168.	3550.5
#3	3466.1	32116.	3451.9

Sample Name: CCB Acquired: 8/2/2018 19:44:17 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0003**	**.0287**	**-.0022**	**.0068**	**-.0003**	**-.0000**	**-.0010**	**-.0183**	**-.0002**
Stddev	.0001	.0313	.0024	.0137	.0003	.0001	.0022	.0004	.0002
%RSD	35.97	109.1	108.7	200.0	105.5	1691.	218.1	2.387	119.3
#1	.0002	.0097	-.0045	.0010	-.0004	.0001	.0015	-.0185	-.0002
#2	.0002	.0116	-.0025	-.0029	.0001	-.0001	-.0025	-.0178	-.0004
#3	.0004	.0649	.0003	.0225	-.0004	-.0001	-.0020	-.0186	.0000
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0007**	**-.0001**	**-.0007**	**.0054**	**.0303**	**.0047**	**-.0099**	**-.0002**	**-.0001**
Stddev	.0001	.0001	.0011	.0017	.0316	.0011	.0154	.0006	.0002
%RSD	8.204	152.6	152.8	31.40	104.2	23.18	156.3	333.6	408.4
#1	-.0006	.0001	-.0001	.0074	.0199	.0039	-.0267	.0003	.0001
#2	-.0008	-.0002	-.0020	.0041	.0658	.0042	.0036	-.0009	.0001
#3	-.0007	-.0002	-.0001	.0049	.0052	.0059	-.0065	.0000	-.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0240**	**-.0004**	**.0004**	**.0007**	**-.0142**	**.0001**	**-.0005**	**-.0038**	**-.0006**
Stddev	.0279	.0002	.0047	.0013	.0100	.0022	.0033	.0033	.0017
%RSD	116.4	42.20	1301.	179.1	70.25	2201.	642.9	87.44	306.4
#1	-.0560	-.0004	-.0045	.0021	-.0185	-.0024	.0010	.0000	-.0010
#2	-.0113	-.0006	.0007	-.0004	-.0028	.0012	.0017	-.0053	.0013
#3	-.0046	-.0003	.0049	.0004	-.0212	.0015	-.0043	-.0060	-.0020
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: CCB Acquired: 8/2/2018 19:44:17 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0002	.0051	.0016	-.0007	.0554	-.0017	-.0005
Stddev	.0002	.0050	.0022	.0027	.0160	.0047	.0001
%RSD	136.1	98.82	143.3	420.9	28.90	279.8	19.50
#1	.0000	.0056	-.0010	.0025	.0531	.0037	-.0004
#2	.0005	.0098	.0029	-.0023	.0407	-.0038	-.0006
#3	.0000	-.0002	.0028	-.0022	.0725	-.0050	-.0006
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3684.7	33530.	3524.1
Stddev	14.2	321.	42.8
%RSD	.38436	.95715	1.2146
#1	3677.3	33230.	3567.7
#2	3675.7	33492.	3522.5
#3	3701.0	33868.	3482.1

Sample Name: 160-29824-A1BSD@2500 Acquired: 8/2/2018 19:48:57 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0003**	**.0067**	**-.0005**	**.0031**	**-.0005**	**.0001**	**-.0006**	**-.0147**	**-.0005**
Stddev	.0008	.0197	.0028	.0066	.0002	.0001	.0009	.0014	.0004
%RSD	294.8	296.0	606.1	211.4	48.44	103.0	157.3	9.770	68.00
#1	.0005	-.0040	-.0034	.0107	-.0007	.0002	.0003	-.0141	-.0003
#2	-.0003	.0294	.0022	.0005	-.0004	.0000	-.0006	-.0137	-.0003
#3	-.0010	-.0054	-.0002	-.0017	-.0003	.0000	-.0015	-.0164	-.0010
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0005**	**-.0001**	**.0006**	**.0107**	**.0687**	**.0045**	**.1147**	**.0083**	**-.0001**
Stddev	.0004	.0001	.0011	.0034	.1122	.0031	.0256	.0002	.0004
%RSD	82.84	82.81	172.7	31.20	163.2	69.09	22.36	2.177	410.5
#1	-.0010	-.0001	-.0006	.0083	.1981	.0073	.1301	.0084	-.0002
#2	-.0004	-.0001	.0013	.0146	-.0022	.0050	.1288	.0081	.0004
#3	-.0002	-.0000	.0012	.0094	.0103	.0012	.0851	.0083	-.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**13.84**	**-.0005**	**-.0006**	**.0006**	**8.844**	**-.0018**	**.0022**	**-.0058**	**-.0001**
Stddev	.02	.0001	.0047	.0008	.014	.0003	.0033	.0105	.0012
%RSD	.1344	21.56	768.4	132.7	.1526	15.76	154.8	182.0	2138.
#1	13.83	-.0007	.0044	.0008	8.830	-.0016	-.0005	-.0169	-.0010
#2	13.83	-.0004	-.0015	-.0003	8.845	-.0016	.0011	.0039	.0013
#3	13.86	-.0005	-.0048	.0012	8.857	-.0021	.0059	-.0043	-.0005
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29824-A1BSD@2500 Acquired: 8/2/2018 19:48:57 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0002	.0040	.0009	-.0017	.0469	.0053	-.0008
Stddev	.0002	.0022	.0016	.0010	.0353	.0016	.0002
%RSD	91.73	54.56	172.3	62.20	75.35	30.00	19.65
#1	.0000	.0058	.0017	-.0028	.0787	.0070	-.0007
#2	.0004	.0048	-.0009	-.0007	.0089	.0038	-.0008
#3	.0002	.0016	.0020	-.0016	.0529	.0051	-.0010
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3613.9	33386.	3511.7
Stddev	55.9	589.	64.0
%RSD	1.5474	1.7648	1.8228
#1	3677.1	33113.	3585.6
#2	3570.9	32984.	3472.4
#3	3593.8	34063.	3477.1

Sample Name: 160-29824-A-2-B@200 Acquired: 8/2/2018 19:53:36 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0012**	**.0077**	**-.0031**	**.0028**	**.0001**	**-.0001**	**-.0034**	**.0214**	**-.0002**
Stddev	.0005	.0097	.0014	.0015	.0003	.0001	.0010	.0004	.0002
%RSD	44.04	126.1	45.32	54.78	347.4	109.7	31.16	1.826	94.46
#1	-.0007	-.0029	-.0020	.0031	.0002	-.0001	-.0041	.0219	-.0004
#2	-.0012	.0099	-.0047	.0042	.0004	-.0000	-.0038	.0213	-.0001
#3	-.0018	.0162	-.0026	.0011	-.0002	-.0003	-.0022	.0211	-.0001
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0003**	**-.0001**	**-.0013**	**.0480**	**.1929**	**.0001**	**.6873**	**.0385**	**.0001**
Stddev	.0002	.0002	.0020	.0057	.0463	.0062	.0362	.0006	.0004
%RSD	75.51	187.9	152.8	11.89	23.99	4887.	5.274	1.433	361.5
#1	-.0005	-.0002	.0002	.0511	.1944	-.0040	.6455	.0390	.0002
#2	-.0001	.0001	-.0036	.0515	.2384	.0072	.7100	.0379	.0005
#3	-.0003	-.0002	-.0005	.0414	.1459	-.0029	.7064	.0387	-.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**87.39**	**-.0005**	**.0010**	**.0001**	**58.81**	**.0007**	**.0009**	**-.0003**	**-.0021**
Stddev	.26	.0003	.0051	.0003	.18	.0033	.0082	.0045	.0007
%RSD	.2994	59.43	527.0	227.8	.3010	445.9	890.7	1785.	31.67
#1	87.60	-.0008	-.0013	.0005	58.98	.0036	.0091	.0020	-.0028
#2	87.48	-.0006	-.0026	-.0000	58.82	-.0029	-.0073	.0027	-.0019
#3	87.10	-.0002	.0068	-.0000	58.63	.0015	.0010	-.0054	-.0016
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: 160-29824-A-2-B@200 Acquired: 8/2/2018 19:53:36 Type: Unk
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0003	.0185	-.0008	.0005	.0585	.0030	-.0010
Stddev	.0002	.0076	.0011	.0007	.0318	.0020	.0002
%RSD	70.75	41.12	138.0	136.0	54.29	66.05	22.01
#1	.0001	.0105	-.0003	-.0001	.0828	.0051	-.0012
#2	.0004	.0194	-.0000	.0013	.0701	.0026	-.0007
#3	.0003	.0257	-.0020	.0003	.0226	.0012	-.0010
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3641.0	32957.	3505.0
Stddev	23.0	246.	68.2
%RSD	.63183	.74757	1.9459
#1	3661.4	33193.	3427.0
#2	3645.4	32977.	3534.7
#3	3616.1	32701.	3553.4

Sample Name: CCVL Acquired: 8/2/2018 19:58:15 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0096**	**.1867**	F **.0063**	**.1073**	**.0458**	**.0047**	**.2041**	**1.012**	**.0047**
Stddev	.0005	.0120	.0016	.0034	.0002	.0001	.0036	.002	.0001
%RSD	4.854	6.445	25.77	3.137	.3938	2.393	1.781	.1894	2.983
#1	.0096	.1739	.0082	.1108	.0456	.0046	.2001	1.013	.0045
#2	.0100	.1978	.0058	.1068	.0460	.0049	.2073	1.010	.0048
#3	.0091	.1883	.0051	.1042	.0458	.0047	.2050	1.012	.0047
Check ?	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value			.0100						
Range			-30.00%						

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.0506**	**.0093**	**.0268**	**.1015**	**4.974**	**.0583**	**.9586**	**.0148**	**.0370**
Stddev	.0008	.0001	.0019	.0024	.078	.0035	.0140	.0001	.0005
%RSD	1.504	.9967	6.955	2.350	1.574	6.060	1.465	.8904	1.225
#1	.0512	.0092	.0251	.1024	4.931	.0548	.9602	.0150	.0373
#2	.0497	.0093	.0288	.0988	5.064	.0583	.9718	.0148	.0365
#3	.0508	.0094	.0266	.1034	4.926	.0619	.9438	.0148	.0373
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**1.001**	**.0413**	**.2325**	**.0112**	**4.520**	**.0087**	**.0125**	**.3505**	**.0967**
Stddev	.004	.0003	.0017	.0010	.026	.0021	.0032	.0075	.0006
%RSD	.4174	.6721	.7265	8.569	.5772	24.38	25.94	2.147	.6281
#1	.9976	.0415	.2323	.0101	4.491	.0066	.0115	.3424	.0960
#2	1.001	.0410	.2342	.0120	4.529	.0085	.0099	.3517	.0969
#3	1.006	.0415	.2308	.0115	4.541	.0109	.0161	.3573	.0972
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCVL Acquired: 8/2/2018 19:58:15 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0050	.1743	.0178	.0201	.5253	.0453	.0186
Stddev	.0001	.0070	.0015	.0016	.0105	.0015	.0001
%RSD	2.923	3.999	8.490	8.095	2.003	3.229	.7192
#1	.0048	.1762	.0179	.0214	.5325	.0436	.0187
#2	.0051	.1666	.0162	.0206	.5302	.0459	.0187
#3	.0050	.1801	.0192	.0182	.5132	.0463	.0184
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3767.7	34995.	3443.5
Stddev	22.8	181.	22.9
%RSD	.60619	.51859	.66365
#1	3755.2	34785.	3445.0
#2	3794.1	35098.	3420.0
#3	3753.9	35101.	3465.6

Sample Name: CCV Acquired: 8/2/2018 20:02:54 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.9888**	**46.52**	**4.649**	**.9663**	**4.700**	**4.743**	**4.767**	**49.36**	**4.819**
Stddev	.0050	.16	.008	.0051	.020	.015	.009	.07	.002
%RSD	.5061	.3375	.1631	.5322	.4277	.3239	.1869	.1518	.0327
#1	.9833	46.67	4.643	.9722	4.718	4.760	4.771	49.39	4.818
#2	.9899	46.36	4.657	.9629	4.678	4.730	4.772	49.41	4.820
#3	.9931	46.54	4.645	.9638	4.702	4.740	4.756	49.27	4.820
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**4.923**	**4.711**	**4.630**	**48.08**	**49.34**	**4.952**	**47.16**	**4.723**	**.9341**
Stddev	.004	.006	.004	.08	.11	.025	.12	.014	.0009
%RSD	.0891	.1267	.0909	.1613	.2283	.4949	.2635	.3052	.1010
#1	4.927	4.717	4.631	48.16	49.43	4.970	47.29	4.737	.9352
#2	4.923	4.709	4.633	48.01	49.22	4.924	47.04	4.708	.9336
#3	4.918	4.705	4.625	48.07	49.38	4.962	47.16	4.722	.9334
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**48.59**	**4.940**	**47.93**	**4.756**	**47.52**	**.9254**	**.9429**	**4.674**	**4.806**
Stddev	.12	.001	.03	.004	.08	.0011	.0033	.007	.010
%RSD	.2525	.0263	.0649	.0858	.1671	.1200	.3483	.1598	.2171
#1	48.71	4.940	47.92	4.758	47.58	.9241	.9413	4.665	4.816
#2	48.47	4.941	47.97	4.758	47.43	.9263	.9407	4.676	4.808
#3	48.57	4.939	47.91	4.751	47.54	.9256	.9467	4.680	4.795
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value									
Range									

Sample Name: CCV Acquired: 8/2/2018 20:02:54 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**4.691**	**4.532**	**4.740**	**.9542**	**5.076**	**4.622**	**4.860**
Stddev	.017	.015	.016	.0029	.016	.027	.004
%RSD	.3684	.3342	.3427	.3002	.3164	.5880	.0718
#1	4.708	4.515	4.751	.9511	5.057	4.653	4.863
#2	4.674	4.541	4.721	.9548	5.085	4.608	4.861
#3	4.692	4.541	4.747	.9567	5.085	4.604	4.856
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
Value							
Range							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	**3447.2**	**31268.**	**3419.1**
Stddev	15.8	390.	23.0
%RSD	.45962	1.2484	.67301
#1	3445.8	30903.	3445.3
#2	3432.0	31221.	3410.0
#3	3463.6	31679.	3402.1

Sample Name: CCB Acquired: 8/2/2018 20:07:07 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3961	As1890	B_2496	Ba4554	Be3130	Bi2230	Ca1840	Cd2288
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0013**	**.0014**	**-.0016**	**.0073**	**-.0006**	**.0000**	**.0001**	**-.0161**	**-.0002**
Stddev	.0009	.0175	.0028	.0042	.0003	.0000	.0027	.0010	.0002
%RSD	64.85	1291.	178.4	58.05	46.37	197.6	2089.	6.025	105.0
#1	-.0011	-.0149	-.0045	.0036	-.0008	.0000	-.0021	-.0152	-.0002
#2	-.0006	-.0011	-.0012	.0064	-.0003	.0000	.0031	-.0171	.0000
#3	-.0023	.0200	.0010	.0119	-.0008	-.0000	-.0007	-.0159	-.0003
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu2178	Fe2599	K_7664	Li6707	Mg2798	Mn2576	Mo2020
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0002**	**-.0003**	**.0006**	**.0055**	**-.0032**	**.0023**	**-.0097**	**-.0001**	**.0000**
Stddev	.0008	.0000	.0016	.0013	.0485	.0036	.0149	.0007	.0003
%RSD	329.4	12.18	244.3	23.45	1512.	155.3	153.7	1139.	2438.
#1	-.0006	-.0003	.0012	.0070	-.0412	.0057	-.0268	.0005	.0002
#2	.0006	-.0003	-.0011	.0046	-.0199	.0027	-.0010	-.0009	-.0004
#3	-.0007	-.0003	.0019	.0049	.0514	-.0014	-.0012	.0002	.0002
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2216	P_1774	Pb2203	S_1820	Sb2068	Se1960	Si2516	Sn1899
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.0584**	**-.0004**	**-.0063**	**-.0001**	**-.0175**	**.0017**	**.0017**	**-.0106**	**-.0006**
Stddev	.0162	.0002	.0043	.0016	.0054	.0010	.0039	.0058	.0013
%RSD	27.69	60.33	69.40	1638.	30.89	58.75	231.2	54.19	228.0
#1	-.0760	-.0007	-.0022	-.0005	-.0185	.0029	-.0005	-.0168	-.0005
#2	-.0441	-.0003	-.0058	-.0014	-.0116	.0013	-.0007	-.0098	-.0020
#3	-.0552	-.0002	-.0108	.0017	-.0223	.0010	.0062	-.0054	.0007
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Sample Name: CCB Acquired: 8/2/2018 20:07:07 Type: QC
Method: _2016(v681) Mode: CONC Corr. Factor: 1.000000
User: admin Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Sr4077	Th2832	Ti3349	Tl1908	U_3670	V_2908	Zn2138
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0000	.0058	.0008	-.0008	.0448	.0036	-.0008
Stddev	.0002	.0031	.0019	.0047	.0163	.0053	.0001
%RSD	412.5	53.57	238.7	586.3	36.35	146.6	13.68
#1	.0001	.0032	.0029	.0003	.0261	.0034	-.0007
#2	-.0001	.0049	.0003	-.0060	.0556	-.0016	-.0008
#3	.0001	.0092	-.0008	.0033	.0527	.0091	-.0009
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit							
Low Limit							

Int. Std.	Y_2243	Y_3600	Y_3600-2
Units	Cts/S	Cts/S	Cts/S
Avg	3616.0	33977.	3657.9
Stddev	50.8	346.	22.1
%RSD	1.4047	1.0190	.60335
#1	3639.8	34227.	3664.7
#2	3650.5	34122.	3633.2
#3	3557.7	33582.	3675.8

Element, Wavelength and Order	Date of Fit	Date of Cal.	Type of Fit	Weighting	A0	A1	A2	n (Exponent)
Ag 328.068 {103}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.003704	0.146410	0.000000	1.000000
Al 396.152 { 85}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.000975	0.109809	0.000000	1.000000
As 189.042 {478}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.000039	0.055375	0.000000	1.000000
B 249.678 {135}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.000748	0.101148	0.000000	1.000000
Ba 455.403 { 74}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.025137	5.476337	0.000000	1.000000
Be 313.042 {108}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.002297	9.610270	0.000000	1.000000
Bi 223.061 {451}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.000647	0.093195	0.000000	1.000000
Ca 184.006 {483}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.002695	0.109026	0.000000	1.000000
Cd 228.802 {447}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.000355	1.201448	0.000000	1.000000
Co 228.616 {448}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.000697	0.424824	0.000000	1.000000
Cr 205.560 {464}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.000265	0.579578	0.000000	1.000000
Cu 217.894 {455}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.000574	0.104532	0.000000	1.000000
Fe 259.940 {130}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.000315	0.188763	0.000000	1.000000
K 766.490 { 44}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.040111	0.033956	0.000000	1.000000
Li 670.784 { 50}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.007234	0.821788	0.000000	1.000000
Mg 279.806 {121}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.000876	0.021640	0.000000	1.000000
Mn 257.610 {131}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.001388	1.432763	0.000000	1.000000
Mo 202.030 {467}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.000596	0.406108	0.000000	1.000000
Na 589.592 { 57}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.098206	0.116434	0.000000	1.000000
Ni 221.647 {452}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.000692	0.673014	0.000000	1.000000
P 177.495 {490}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.002956	0.027815	0.000000	1.000000
Pb 220.353 {453}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.000437	0.178830	0.000000	1.000000
S 182.034 {485}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.000604	0.020626	0.000000	1.000000
Sb 206.833 {463}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.000084	0.091677	0.000000	1.000000
Se 196.090 {472}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.000227	0.044901	0.000000	1.000000
Si 251.611 {134}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.001916	0.086099	0.000000	1.000000
Sn 189.989 {478}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.000328	0.119559	0.000000	1.000000
Sr 407.771 { 83}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.020253	10.835094	0.000000	1.000000
Th 283.231 {119}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.001770	0.009186	0.000000	1.000000
Ti 334.941 {101}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.000258	0.645523	0.000000	1.000000
Tl 190.856 {477}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.000293	0.074019	0.000000	1.000000
U 367.007 { 92}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.002284	0.010154	0.000000	1.000000
V 290.882 {116}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	-0.000613	0.196987	0.000000	1.000000
Y 224.306 {450}*	<not fit>	<Never Calibrated>	Linear	1/Conc	0.000000	0.000000	0.000000	1.000000
Y 360.073 { 94}*	5/30/2018 13:35:48	3/30/2018 12:28:46	Linear	1/Conc	0.000000	0.000000	0.000000	1.000000
Y 360.073 { 94}2*	5/30/2018 13:35:48	3/30/2018 12:28:46	Linear	1/Conc	0.000000	0.000000	0.000000	1.000000
Zn 213.856 {458}	8/2/2018 15:23:55	8/2/2018 15:23:55	Linear	1/Conc	0.001252	1.240585	0.000000	1.000000

Element, Wavelength and Order	Correlation	Std Error of Est	Predicted MDL	Predicted MQL	Status	Reslope		QC Norm	
						Slope	Y-int	Slope factor	Offset
Ag 328.068 {103}	0.999846	0.000020	0.001587	0.005290	OK.	1.000000	0.000000	1	0
Al 396.152 { 85}	0.999954	0.000259	0.022592	0.075308	OK.	1.000000	0.000000	1	0
As 189.042 {478}	0.999707	0.000023	0.003573	0.011909	OK.	1.000000	0.000000	1	0
B 249.678 {135}	0.999874	0.000040	0.008559	0.028529	OK.	1.000000	0.000000	1	0
Ba 455.403 { 74}	0.999933	0.002456	0.000594	0.001980	OK.	1.000000	0.000000	1	0
Be 313.042 {108}	0.999986	0.000614	0.000136	0.000453	OK.	1.000000	0.000000	1	0
Bi 223.061 {451}	0.999845	0.000128	0.004172	0.013907	OK.	1.000000	0.000000	1	0
Ca 184.006 {483}	0.999916	0.000774	0.001611	0.005371	OK.	1.000000	0.000000	1	0
Cd 228.802 {447}	0.999765	0.000324	0.000338	0.001128	OK.	1.000000	0.000000	1	0
Co 228.616 {448}	0.999838	0.000296	0.000705	0.002349	OK.	1.000000	0.000000	1	0
Cr 205.560 {464}	0.999832	0.000184	0.000294	0.000981	OK.	1.000000	0.000000	1	0
Cu 217.894 {455}	0.999873	0.000046	0.003148	0.010494	OK.	1.000000	0.000000	1	0
Fe 259.940 {130}	0.999956	0.000307	0.004197	0.013990	OK.	1.000000	0.000000	1	0
K 766.490 { 44}	0.999903	0.000588	0.098538	0.328459	OK.	1.000000	0.000000	1	0
Li 670.784 { 50}	0.999951	0.000316	0.004346	0.014486	OK.	1.000000	0.000000	1	0
Mg 279.806 {121}	0.999981	0.000074	0.033301	0.111002	OK.	1.000000	0.000000	1	0
Mn 257.610 {131}	0.999987	0.000153	0.000625	0.002082	OK.	1.000000	0.000000	1	0
Mo 202.030 {467}	0.999795	0.000128	0.000622	0.002074	OK.	1.000000	0.000000	1	0
Na 589.592 { 57}	0.999919	0.000812	0.027769	0.092563	OK.	1.000000	0.000000	1	0
Ni 221.647 {452}	0.999841	0.000417	0.000564	0.001879	OK.	1.000000	0.000000	1	0
P 177.495 {490}	0.999980	0.000048	0.005764	0.019213	OK.	1.000000	0.000000	1	0
Pb 220.353 {453}	0.999958	0.000028	0.001707	0.005692	OK.	1.000000	0.000000	1	0
S 182.034 {485}	0.999664	0.000666	0.007992	0.026641	OK.	1.000000	0.000000	1	0
Sb 206.833 {463}	0.999808	0.000014	0.003300	0.011000	OK.	1.000000	0.000000	1	0
Se 196.090 {472}	0.999784	0.000009	0.005268	0.017559	OK.	1.000000	0.000000	1	0
Si 251.611 {134}	0.999820	0.000181	0.010184	0.033946	OK.	1.000000	0.000000	1	0
Sn 189.989 {478}	0.999889	0.000098	0.001433	0.004776	OK.	1.000000	0.000000	1	0
Sr 407.771 { 83}	0.999958	0.001215	0.000204	0.000679	OK.	1.000000	0.000000	1	0
Th 283.231 {119}	0.999812	0.000015	0.006350	0.021168	OK.	1.000000	0.000000	1	0
Ti 334.941 {101}	0.999935	0.000180	0.001995	0.006651	OK.	1.000000	0.000000	1	0
Tl 190.856 {477}	0.999999	0.000001	0.002684	0.008947	OK.	1.000000	0.000000	1	0
U 367.007 { 92}	0.999884	0.000019	0.030150	0.100501	OK.	1.000000	0.000000	1	0
V 290.882 {116}	0.999969	0.000061	0.006128	0.020427	OK.	1.000000	0.000000	1	0
Y 224.306 {450}*	0.000000	0.000000	-1.000000	-1.000000	Warnin	1.000000	0.000000	1	0
Y 360.073 { 94}*	0.000000	0.000000	-1.000000	-1.000000	Warnin	1.000000	0.000000	1	0
Y 360.073 { 94}2*	0.000000	0.000000	-1.000000	-1.000000	Warnin	1.000000	0.000000	1	0
Zn 213.856 {458}	0.999784	0.000636	0.000239	0.000798	OK.	1.000000	0.000000	1	0

SFF 8/3/18 File:080218C1 A.Batch:380117 Inst:6500

	Pos ID	Rack	Row	Col	Type	Samplename	Comment	Custom ID1	Custom ID2
1	1001	3	1	1	Unk	~~LB 160-378221/1-B~~	379539		
2	1002	3	1	2	Unk	LCS 160-379539/2-A			
3	1003	3	1	3	Unk	160-29687-B-1-B			
4	1004	3	1	4	Unk	160-29687-B-1-BSD@5			
5	1005	3	1	5	Unk	160-29687-B-1-C MS			
6	1006	3	1	6	Unk	160-29687-B-1-D MSD			
7	1007	3	1	7	Unk	~~160-29687-B-1-BPDS~~	SFF 8/3/18		
8	1008	3	1	8	Unk	MB 160-379537/1-A	379537		
9	1009	3	1	9	Unk	LCS 160-379537/2-A			
10	1010	3	1	10	Unk	160-29476-L-1-C			
11	1011	3	1	11	Unk	160-29476-L-1-CSD@5			
12	1012	3	1	12	Unk	160-29476-L-1-D MS			
13	1013	3	2	1	Unk	160-29476-L-1-E MSD			
14	1014	3	2	2	Unk	MB 160-379477/1-A	379477		
15	1015	3	2	3	Unk	LCS 160-379477/2-A			
16	1016	3	2	4	Unk	LCSD 160-379477/3-A			
17	1017	3	2	5	Unk	~~160-29824-A-1-B@100~~			
18	1018	3	2	6	Unk	160-29824-A-1BSD@500			
19	1019	3	2	7	Unk	~~160-29824-A-2-B@100~~	SFF 8/3/18		
20	1020	3	2	8	Unk	160-29824-A-3-B@20			
21	1021	3	2	9	Unk	MB 160-379677/1-A	379677		
22	1022	3	2	10	Unk	LCSSRM 160-3796772@2			
23	1023	3	2	11	Unk	160-29847-A-1-A@10			
24	1024	3	2	12	Unk	160-29847-A-2-B@10			
25	1025	3	3	1	Unk	160-29847-A-3-B@50			
26	1026	3	3	2	Unk	160-29847-A-3BSD@250			
27	1027	3	3	3	Unk	160-29847-A-3-CMS@50			
28	1028	3	3	4	Unk	160-29847-A-3DMSD@50			
29	1029	3	3	5	Unk	160-29847-A-4-A			
30	1030	3	3	6	Unk	160-29824-A-1-B@500	379477		
31	1031	3	3	7	Unk	160-29824-A1BSD@2500			
32	1032	3	3	8	Unk	160-29824-A-2-B@200			

- All but As & Se
- Mn & Na
- Na
- Pb
- Mn & Na
- Na

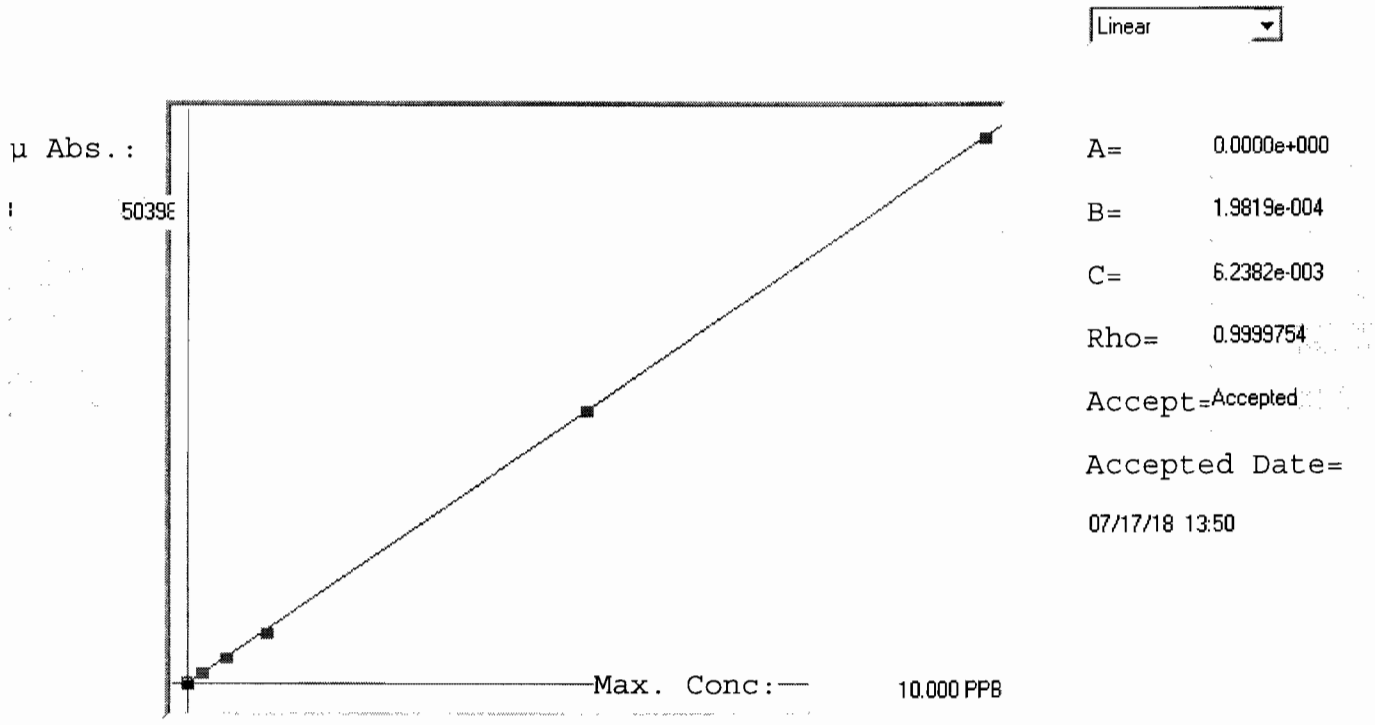
HAA071718A

Method: Initial Method Operator: Admin Date of Analysis: 17 Jul 2018 13:36:18

Sample ID	Extended ID	Mean	Stats Data	Stnd Conc	Units	Chapter
CALIBRATION BLANK		67	70, 66, 65,	0.0000	PPB	HAA071718A
CALIBRATION 1	Hg	1096	1071, 1099, 1117,	0.2000	PPB	HAA071718A
CALIBRATION 2		2456	2435, 2463, 2471,	0.5000	PPB	HAA071718A
CALIBRATION 3		4760	4763, 4747, 4771,	1.0000	PPB	HAA071718A
CALIBRATION 4		25296	24877, 25280, 25731,	5.0000	PPB	HAA071718A
CALIBRATION 5		50398	49720, 50449, 51026,	10.0000	PPB	HAA071718A
ICV		104.1% 5.2069	5.1366, 5.1943, 5.2898,	-	PPB	HAA071718A
ICB		-0.1030	-0.1026, -0.1036, -0.1030,	-	PPB	HAA071718A
MB 160-375873/1-A		0.0166	0.0167, 0.0165, 0.0165,	-	PPB	HAA071718A
LCS 160-375873/2-A		5.3593	5.3173, 5.3697, 5.3909,	-	PPB	HAA071718A
160-29274-A-1-D		-0.0818	-0.0816, -0.0824, -0.0814,	-	PPB	HAA071718A
160-29274-B-2-B		0.0236	0.0229, 0.0239, 0.0241,	-	PPB	HAA071718A
160-29274-A-3-B		0.0287	0.0276, 0.0292, 0.0292,	-	PPB	HAA071718A
160-29274-A-3-B SD	@5X	0.0015	0.0013, 0.0017, 0.0015,	-	PPB	HAA071718A
160-29274-A-3-C MS		5.4837	5.3542, 5.5124, 5.5845,	-	PPB	HAA071718A
160-29274-A-3-D MSD		5.3946	5.3189, 5.4034, 5.4614,	-	PPB	HAA071718A
160-29476-L-1-B		-0.0964	-0.0966, -0.0964, -0.0962,	-	PPB	HAA071718A
160-29226-A-1-F		0.0296	0.0294, 0.0292, 0.0302,	-	PPB	HAA071718A
CCV		116.2% 5.8084	5.7300, 5.8283, 5.8669,	-	PPB	HAA071718A
CCB		-0.0798	-0.0800, -0.0798, -0.0798,	-	PPB	HAA071718A
160-29226-A-2-D		0.0193	0.0189, 0.0197, 0.0193,	-	PPB	HAA071718A
~~MB 160-375819/1-A~~		0.0309	0.0300, 0.0308, 0.0318,	-	PPB	HAA071718A
LCS 160-375819/2-A		2.9760	2.9212, 2.9799, 3.0269,	-	PPB	HAA071718A
LCSD 160-375819/3-A		5.1328	5.0230, 5.1320, 5.2432,	-	PPB	HAA071718A
160-29453-A-1-A		-0.1073	-0.1069, -0.1073, -0.1075,	-	PPB	HAA071718A
160-29453-A-2-A		0.0313	0.0308, 0.0314, 0.0316,	-	PPB	HAA071718A
160-29453-A-3-A		0.0252	0.0249, 0.0255, 0.0253,	-	PPB	HAA071718A
160-29453-A-4-A		0.0378	0.0372, 0.0379, 0.0383,	-	PPB	HAA071718A
160-29453-A-5-A		0.0121	0.0116, 0.0120, 0.0128,	-	PPB	HAA071718A
~~160-29453-A-6-A~~ DAS 7/18/18		0.0376	0.0356, 0.0379, 0.0391,	-	PPB	HAA071718A
CCV		107.4% 5.3717	5.2844, 5.3816, 5.4491,	-	PPB	HAA071718A
CCB		-0.1175	-0.1174, -0.1176, -0.1174,	-	PPB	HAA071718A
~~160-29453-A-7-A~~		0.0176	0.0179, 0.0171, 0.0177,	-	PPB	HAA071718A
160-29453-A-8-A		0.0179	0.0177, 0.0177, 0.0181,	-	PPB	HAA071718A
160-29453-A-9-A		0.0245	0.0239, 0.0245, 0.0251,	-	PPB	HAA071718A
160-29453-A-10-A		0.0304	0.0308, 0.0296, 0.0306,	-	PPB	HAA071718A
160-29453-A-11-A		0.0261	0.0249, 0.0259, 0.0276,	-	PPB	HAA071718A
160-29453-A-12-A		0.0218	0.0215, 0.0217, 0.0221,	-	PPB	HAA071718A
160-29453-A-13-A		0.0671	0.0657, 0.0675, 0.0681,	-	PPB	HAA071718A
160-29453-A-14-A		0.0068	0.0070, 0.0070, 0.0062,	-	PPB	HAA071718A
160-29453-A-15-A		0.0189	0.0191, 0.0187, 0.0189,	-	PPB	HAA071718A
~~160-29453-A-17-A~~ DAS 7/18/18		0.0254	0.0251, 0.0257, 0.0255,	-	PPB	HAA071718A
~~CCV~~		106.4% 5.3189	5.2305, 5.3344, 5.3917,	-	PPB	HAA071718A
CCB		-0.1060	-0.1057, -0.1065, -0.1057,	-	PPB	HAA071718A
CCV		108.0% 5.4007	5.2634, 5.4347, 5.5040,	-	PPB	HAA071718A
CCB		-0.0894	-0.0895, -0.0893, -0.0893,	-	PPB	HAA071718A
CCV		107.2% 5.3597	5.3049, 5.3487, 5.4257,	-	PPB	HAA071718A
CCB		-0.0012	-0.0009, -0.0017, -0.0009,	-	PPB	HAA071718A
LCS 160-375819/2-A		2.9740	2.9274, 2.9791, 3.0156,	-	PPB	HAA071718A
CCV DAS 7/18/18		105.9% 5.2947	5.1871, 5.2882, 5.4087,	-	PPB	HAA071718A
~~CCB~~		-0.0982	-0.0980, -0.0982,	-	PPB	HAA071718A

PREP METHOD: 7470A A. BATCH: 376379 DAS 7/18/18

Initial Method



Std ID	Conc.	Calc.	Dev.	Mean	SD or %RSD	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
CALIBRATION BLANK	0.000	0.020	0.020	67	2.160	70	66	65		
CALIBRATION 1	0.200	0.223	0.023	1095	1.7 %	1071	1099	1117		
CALIBRATION 2	0.500	0.493	-0.007	2456	0.6 %	2435	2463	2471		
CALIBRATION 3	1.000	0.950	-0.050	4760	0.2 %	4763	4747	4771		
CALIBRATION 4	5.000	5.020	0.020	25296	1.4 %	24877	25280	25731		
CALIBRATION 5	10.000	9.995	-0.005	50398	1.1 %	49720	50449	51026		

HAA071718A

GENERAL CHEMISTRY

COVER PAGE
GENERAL CHEMISTRY

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG No.:

Project: Former Carnotite Site - Non-Rad Analysis

Client Sample ID	Lab Sample ID
CRC-MW-1	160-29476-1

Comments:

COVER PAGE
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job Number: 160-29476-1

SDG No.:

Project: Former Carnotite Site - Non-Rad Analysis

Client Sample ID	Lab Sample ID
CRC-MW-1	160-29476-1

Comments:

1B-IN
INORGANIC ANALYSIS DATA SHEET
GENERAL CHEMISTRY

Client Sample ID: CRC-MW-1 Lab Sample ID: 160-29476-1

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG ID.:

Matrix: Water Date Sampled: 07/11/2018 13:55

Reporting Basis: WET Date Received: 07/12/2018 09:30

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
18540-29-9	Cr (VI)	2.6	10	2.6	ug/L	U	H	1	7196A

1B-IN
INORGANIC ANALYSIS DATA SHEET
GENERAL CHEMISTRY

Client Sample ID: CRC-MW-1 Lab Sample ID: 160-29476-1

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG ID.:

Matrix: Water Date Sampled: 07/11/2018 13:55

Reporting Basis: WET Date Received: 07/12/2018 09:30

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
57-12-5	Cyanide, Total	0.0070	0.010	0.0070	mg/L	U		1	9012B
64743-03-9	Phenols, Total	0.020	0.050	0.020	mg/L	U	F1	1	9066
	HEM (Oil & Grease)	1.3	3.8	1.3	mg/L	U		1	1664B
	Total Suspended Solids	12	2.0	1.4	mg/L			1	SM 2540D
	Biochemical Oxygen Demand	2.0	2.0	2.0	mg/L	U	H *	1	SM5210B

2-IN
CALIBRATION QUALITY CONTROL
GENERAL CHEMISTRY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Analyst: NPV Batch Start Date: 07/13/2018

Reporting Units: ug/L Analytical Batch No.: 375313

Sample Number	QC Type	Time	Analyte	Result	Spike Amount	(%) Recovery	Limits	Qual	Reagent
6	ICV	07:59	Cr (VI)	51.2	50.1	102	90-110		Cr6 5ppm QC_00219
7	ICB	07:59	Cr (VI)	2.6				U	
13	CCV	07:59	Cr (VI)	51.2	50.1	102	90-110		Cr6 5ppm QC_00219
14	CCB	07:59	Cr (VI)	2.6				U	

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM II-IN

2-IN
CALIBRATION QUALITY CONTROL
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Analyst: SDL Batch Start Date: 07/24/2018

Reporting Units: mg/L Analytical Batch No.: 531193

Sample Number	QC Type	Time	Analyte	Result	Spike Amount	(%) Recovery	Limits	Qual	Reagent
1	CCV	16:45	Cyanide, Total	0.200	0.200	100	90-110		W_CN CCV_00084
2	CCB	16:46	Cyanide, Total	0.0070				U	
5	CCV	16:49	Cyanide, Total	0.196	0.200	98	90-110		W_CN CCV_00087
11	CCV	16:56	Cyanide, Total	0.198	0.200	99	90-110		W_CN CCV_00084
12	CCB	16:57	Cyanide, Total	0.0070				U	

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM II-IN

3-IN
METHOD BLANK
GENERAL CHEMISTRY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Method	Lab Sample ID	Analyte	Result	Qual	Units	RL	Dil
Batch ID: 375313 Date: 07/13/2018 07:59							
7196A	MB 160-375313/8	Cr (VI)	2.6	U	ug/L	10	1

FORM III-IN

3-IN
METHOD BLANK
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Method	Lab Sample ID	Analyte	Result	Qual	Units	RL	Dil
Batch ID: 533454	Date: 08/02/2018 13:17	Prep Batch: 533397	Date: 08/02/2018 13:17				
1664B	MB 490-533397/1-A	HEM (Oil & Grease)	1.4	U	mg/L	4.0	1
Batch ID: 531193	Date: 07/24/2018 16:47	Prep Batch: 531103	Date: 07/24/2018 12:33				
9012B	MB 490-531103/1-A	Cyanide, Total	0.0070	U	mg/L	0.010	1
Batch ID: 529799	Date: 07/18/2018 17:00						
SM 2540D	MB 490-529799/1	Total Suspended Solids	0.70	U	mg/L	1.0	1

FORM III-IN

3-IN
UNSEEDED CONTROL BLANK
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Method	Lab Sample ID	Analyte	Result	Qual	Units	RL	Dil
Batch ID: 529442 Date: 07/14/2018 18:22							
SM5210B	USB 490-529442/1	Biochemical Oxygen Demand	2.0	U	mg/L	2.0	1

FORM III-IN

5-IN
MATRIX SPIKE SAMPLE RECOVERY
GENERAL CHEMISTRY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Matrix: Water

Method	Lab Sample ID	Analyte	Result	C	Unit	Spike Amount	Pct. Rec.	Limits	RPD	RPD Limit	Q
Batch ID: 375313 Date: 07/13/2018 07:59											
7196A	160-29476-1	Cr (VI)	2.6	U	ug/L						H
7196A	160-29476-1 MS	Cr (VI)	51.2		ug/L	50.1	102	85-115			

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM V-IN

5-IN
MATRIX SPIKE SAMPLE RECOVERY
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Matrix: Water

Method	Lab Sample ID	Analyte	Result	C	Unit	Spike Amount	Pct. Rec.	Limits	RPD	RPD Limit	Q
Batch ID: 533454	Date: 08/02/2018 13:17		Prep Batch: 533397		Date: 08/02/2018 13:17						
1664B	180-80122-B-1-A	HEM (Oil & Grease)	1.3	U	mg/L						
1664B	180-80122-B-1-A MS	HEM (Oil & Grease)	37.55		mg/L	40.5	93	78-114			
Batch ID: 531193	Date: 07/24/2018 16:53		Prep Batch: 531103		Date: 07/24/2018 12:33						
9012B	160-29476-1	Cyanide, Total	0.0070	U	mg/L						
9012B	160-29476-1 MS	Cyanide, Total	0.105		mg/L	0.100	105	70-130			

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM V-IN

5-IN
MATRIX SPIKE DUPLICATE SAMPLE RECOVERY
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Matrix: Water

Method	Lab Sample ID	Analyte	Result	C	Unit	Spike Amount	Pct. Rec.	Limits	RPD	RPD Limit	Q
Batch ID: 531193	Date: 07/24/2018 16:54		Prep Batch: 531103		Date: 07/24/2018 12:33						
9012B	160-29476-1 MSD	Cyanide, Total	0.0927		mg/L	0.100	93	70-130	12	46	

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM V-IN

6-IN
DUPLICATE
GENERAL CHEMISTRY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Matrix: Water

Method	Client Sample ID	Lab Sample ID	Analyte	Result	Unit	RPD	RPD Limit	Qual
Batch ID: 375313 Date: 07/13/2018 07:59								
7196A	CRC-MW-1	160-29476-1	Cr (VI)	2.6	ug/L			U
7196A	CRC-MW-1	160-29476-1 DU	Cr (VI)	2.6	ug/L	NC	20	U

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VI-IN

6-IN
DUPLICATE
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Matrix: Water

Method	Client Sample ID	Lab Sample ID	Analyte	Result	Unit	RPD	RPD Limit	Qual
Batch ID: 531193	Date: 07/24/2018 16:52		Prep Batch: 531103	Date: 07/24/2018 12:33				
9012B	CRC-MW-1	160-29476-1	Cyanide, Total	0.0070	mg/L			U
9012B	CRC-MW-1	160-29476-1 DU	Cyanide, Total	0.0070	mg/L	NC	20	U
Batch ID: 529799	Date: 07/18/2018 17:00							
SM 2540D		490-155579-A-1	Total Suspended Solids	260	mg/L			
SM 2540D		490-155579-A-1 DU	Total Suspended Solids	316	mg/L	18	20	
Batch ID: 529799	Date: 07/18/2018 17:00							
SM 2540D		490-155733-A-1	Total Suspended Solids	79	mg/L			
SM 2540D		490-155733-A-1 DU	Total Suspended Solids	82.0	mg/L	4	20	
Batch ID: 529442	Date: 07/14/2018 14:12							
SM5210B		490-155652-F-1	Biochemical Oxygen Demand	5.0	mg/L			
SM5210B		490-155652-F-1 DU	Biochemical Oxygen Demand	5.13	mg/L	2	20	*

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VI-IN

7A-IN
LAB CONTROL SAMPLE
GENERAL CHEMISTRY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Matrix: Water

Method	Lab Sample ID	Analyte	Result	C	Unit	Spike Amount	Pct. Rec.	Limits	RPD	RPD Limit	Q
Batch ID: 375313 Date: 07/13/2018 07:59											
						LCS Source: Cr6 5ppm Cal_00224					
7196A	LCS 160-375313/9	Cr (VI)	50.0		ug/L	50.1	100	85-115			

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIIA-IN

7A-IN
LAB CONTROL SAMPLE
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Matrix: Water

Method	Lab Sample ID	Analyte	Result	C	Unit	Spike Amount	Pct. Rec.	Limits	RPD	RPD Limit	Q
Batch ID: 533454	Date: 08/02/2018 13:17		Prep Batch: 533397			Date: 08/02/2018 13:17					
						LCS Source: OP_HEM_spike_00019					
1664B	LCS 490-533397/2-A	HEM (Oil & Grease)	39.58		mg/L	41.7	95	78-114	0	18	
Batch ID: 531193	Date: 07/24/2018 16:48		Prep Batch: 531103			Date: 07/24/2018 12:33					
						LCS Source: W_CNworkLCS_00052					
9012B	LCS 490-531103/2-A	Cyanide, Total	0.0864		mg/L	0.100	86	85-115			
Batch ID: 529799	Date: 07/18/2018 17:00										
						LCS Source: W_TSS LCS_00520					
SM 2540D	LCS 490-529799/2	Total Suspended Solids	99.6		mg/L	100	100	90-110			
Batch ID: 529442	Date: 07/14/2018 18:22										
						LCS Source: W_BODGlucose_00095					
SM5210B	LCS 490-529442/2	Biochemical Oxygen Demand	4.99		mg/L	3.96	126	85-115			*

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIIA-IN

7A-IN
LAB CONTROL SAMPLE DUPLICATE
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Matrix: Water

Method	Lab Sample ID	Analyte	Result	C	Unit	Spike Amount	Pct. Rec.	Limits	RPD	RPD Limit	Q
Batch ID: 533454	Date: 08/02/2018 13:17		Prep Batch: 533397		Date: 08/02/2018 13:17						
					LCSD Source: OP_HEM_spike_00019						
1664B	LCSD 490-533397/3-A	HEM (Oil & Grease)	39.48		mg/L	41.7	95	78-114	0	18	

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIIA-IN

9-IN
DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: UV2

Method: 7196A MDL Date: 01/16/2012 15:42

Analyte	Wavelength/ Mass	RL (ug/L)	MDL (ug/L)
Cr (VI)		10	2.59

9-IN
CALIBRATION BLANK DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica St. Louis Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: UV2

Method: 7196A XMDL Date: 01/16/2012 15:41

Analyte	Wavelength/ Mass	XRL (ug/L)	XMDL (ug/L)
Cr (VI)		10	2.59

9-IN
DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: NOEQUIP

Method: 9012B MDL Date: 01/16/2012 13:42

Prep Method: 9012B

Analyte	Wavelength/ Mass	RL (mg/L)	MDL (mg/L)
Cyanide, Total		0.01	0.007

9-IN
CALIBRATION BLANK DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: NOEQUIP

Method: 9012B XMDL Date: 09/25/2014 14:05

Analyte	Wavelength/ Mass	XRL (mg/L)	XMDL (mg/L)
Cyanide, Total		0.01	0.007

9-IN
DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: NOEQUIP

Method: 9066 MDL Date: 01/16/2012 19:08

Prep Method: Distill/Phenol

Analyte	Wavelength/ Mass	RL (mg/L)	MDL (mg/L)
Phenols, Total		0.05	0.02

9-IN
CALIBRATION BLANK DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: NOEQUIP

Method: 9066 XMDL Date: 01/16/2012 19:10

Analyte	Wavelength/ Mass	XRL (mg/L)	XMDL (mg/L)
Phenols, Total		0.05	0.02

9-IN
DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: NOEQUIP

Method: 1664B MDL Date: 01/26/2012 12:56

Prep Method: 1664B

Analyte	Wavelength/ Mass	RL (mg/L)	MDL (mg/L)
HEM (Oil & Grease)		4	1.4

9-IN
CALIBRATION BLANK DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: NOEQUIP

Method: 1664B XMDL Date: 01/26/2012 13:00

Analyte	Wavelength/ Mass	XRL (mg/L)	XMDL (mg/L)
HEM (Oil & Grease)		4	1.4

9-IN
DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: NOEQUIP

Method: SM 2540D MDL Date: 07/03/2013 12:15

Analyte	Wavelength/ Mass	RL (mg/L)	MDL (mg/L)
Total Suspended Solids		1	0.7

9-IN
CALIBRATION BLANK DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: NOEQUIP

Method: SM 2540D XMDL Date: 07/03/2013 12:16

Analyte	Wavelength/ Mass	XRL (mg/L)	XMDL (mg/L)
Total Suspended Solids		1	0.7

9-IN
DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: NOEQUIP

Method: SM5210B MDL Date: 01/16/2012 10:29

Analyte	Wavelength/ Mass	RL (mg/L)	MDL (mg/L)
Biochemical Oxygen Demand		2	1.4

9-IN
CALIBRATION BLANK DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job Number: 160-29476-1

SDG Number:

Matrix: Water Instrument ID: NOEQUIP

Method: SM5210B XMDL Date: 01/16/2012 10:29

Analyte	Wavelength/ Mass	XRL (mg/L)	XMDL (mg/L)
Biochemical Oxygen Demand		2	1.4

12-IN
PREPARATION LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Prep Method: 9012B

Lab Sample ID	Preparation Date	Prep Batch	Initial Weight	Initial Volume (mL)	Final Volume (mL)
MB 490-531103/1-A	07/24/2018 12:33	531103		50	50
LCS 490-531103/2-A	07/24/2018 12:33	531103		50	50
160-29476-1	07/24/2018 12:33	531103		50	50
160-29476-1 DU	07/24/2018 12:33	531103		50	50
160-29476-1 MS	07/24/2018 12:33	531103		50	50
160-29476-1 MSD	07/24/2018 12:33	531103		50	50

12-IN
PREPARATION LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Prep Method: Distill/Phenol

Lab Sample ID	Preparation Date	Prep Batch	Initial Weight	Initial Volume (mL)	Final Volume (mL)
160-29476-1	08/03/2018 10:04	533652		50	50

FORM XII-IN

12-IN
PREPARATION LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Prep Method: 1664B

Lab Sample ID	Preparation Date	Prep Batch	Initial Weight	Initial Volume (mL)	Final Volume (mL)
MB 490-533397/1-A	08/02/2018 13:17	533397		960	960
LCS 490-533397/2-A	08/02/2018 13:17	533397		960	960
LCSD 490-533397/3-A	08/02/2018 13:17	533397		960	960
160-29476-1	08/02/2018 13:17	533397		1024	960
180-80122-B-1-A MS	08/02/2018 13:17	533397		988	960

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Instrument ID: UV2 Analysis Method: 7196A

Start Date: 07/13/2018 07:59 End Date: 07/13/2018 07:59

Lab Sample Id	D/F	Type	Time	Analytes																								
				Cr6																								
IC 160-375313/1	1		07:59	X																								
IC 160-375313/2	1		07:59	X																								
IC 160-375313/3	1		07:59	X																								
IC 160-375313/4	1		07:59	X																								
IC 160-375313/5	1		07:59	X																								
ICV 160-375313/6	1		07:59	X																								
ICB 160-375313/7	1		07:59	X																								
MB 160-375313/8	1	T	07:59	X																								
LCS 160-375313/9	1	T	07:59	X																								
160-29476-1	1	T	07:59	X																								
160-29476-1 DU	1	T	07:59	X																								
160-29476-1 MS	1	T	07:59	X																								
CCV 160-375313/13	1		07:59	X																								
CCB 160-375313/14	1		07:59	X																								

Prep Types:
T = Total/NA

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Instrument ID: NOEQUIP Analysis Method: 9012B

Start Date: 07/24/2018 16:45 End Date: 07/24/2018 16:57

Lab Sample Id	D/F	Type	Time	Analytes																								
				CN																								
CCV 490-531193/1	1		16:45	X																								
CCB 490-531193/2	1		16:46	X																								
MB 490-531103/1-A	1	T	16:47	X																								
LCS 490-531103/2-A	1	T	16:48	X																								
CCV 490-531103/3-A	1		16:49	X																								
160-29476-1	1	T	16:50	X																								
160-29476-1 DU	1	T	16:52	X																								
160-29476-1 MS	1	T	16:53	X																								
160-29476-1 MSD	1	T	16:54	X																								
ZZZZZZ			16:55																									
CCV 490-531193/11	1		16:56	X																								
CCB 490-531193/12	1		16:57	X																								

Prep Types:
T = Total/NA

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Instrument ID: NOEQUIP Analysis Method: 9066

Start Date: 08/03/2018 18:39 End Date: 08/03/2018 18:39

Lab Sample Id	D/F	Type	Time	Analytes																								
				PhenT																								
CCV 490-533852/1			18:39																									
CCB 490-533852/2			18:39																									
ZZZZZZ			18:39																									
ZZZZZZ			18:39																									
160-29476-1	1	T	18:39	X																								
ZZZZZZ			18:39																									
ZZZZZZ			18:39																									
CCV 490-533852/8			18:39																									
CCB 490-533852/9			18:39																									
ZZZZZZ			18:39																									
ZZZZZZ			18:39																									

Prep Types:
T = Total/NA

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Instrument ID: NOEQUIP Analysis Method: 1664B

Start Date: 08/02/2018 13:17 End Date: 08/02/2018 13:17

Lab Sample Id	D/F	Type	Time	Analytes																								
				HEM																								
MB 490-533397/1-A	1	T	13:17	X																								
LCS 490-533397/2-A	1	T	13:17	X																								
LCSD 490-533397/3-A	1	T	13:17	X																								
160-29476-1	1	T	13:17	X																								
ZZZZZZ			13:17																									
ZZZZZZ			13:17																									
180-80122-B-1-A MS	1	T	13:17	X																								
ZZZZZZ			13:17																									
ZZZZZZ			13:17																									
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Prep Types:
T = Total/NA

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Instrument ID: NOEQUIP Analysis Method: SM 2540D

Start Date: 07/18/2018 17:00 End Date: 07/18/2018 17:00

Lab Sample Id	D/F	Type	Time	Analytes																								
				TSS																								
MB 490-529799/1	1	T	17:00	X																								
LCS 490-529799/2	1	T	17:00	X																								
ZZZZZZ			17:00																									
ZZZZZZ			17:00																									
160-29476-1	1	T	17:00	X																								
ZZZZZZ			17:00																									
490-155579-A-1 DU	1	T	17:00	X																								
ZZZZZZ			17:00																									
ZZZZZZ			17:00																									
ZZZZZZ			17:00																									
ZZZZZZ			17:00																									
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ZZZZZZ			17:00																									
ZZZZZZ			17:00																									
490-155733-A-1 DU	1	T	17:00	X																								

Prep Types:
T = Total/NA

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Instrument ID: NOEQUIP Analysis Method: SM5210B

Start Date: 07/14/2018 14:12 End Date: 07/14/2018 18:22

Lab Sample Id	D/F	Type	Time	Analytes																								
				BOD																								
ZZZZZZ			14:12																									
490-155652-F-1 DU	1	T	14:12	X																								
ZZZZZZ			14:20																									
ZZZZZZ			14:23																									
ZZZZZZ			14:27																									
ZZZZZZ			14:29																									
160-29476-1	1	T	15:33	X																								
USB 490-529442/1	1	T	18:22	X																								
LCS 490-529442/2	1	T	18:22	X																								
ZZZZZZ			18:22																									

Prep Types:
T = Total/NA

FORM XIII-IN

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Batch Number: 375313 Batch Start Date: 07/13/18 07:59 Batch Analyst: Vassilev, Nikolay P

Batch Method: 7196A Batch End Date: 07/13/18 10:40

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	ColorBlk	UnCorResp	Cr6 5ppm Cal 00224	Cr6 5ppm QC 00219
IC 160-375313/1		7196A		50 mL	50 mL		0.000 Absorbance		
IC 160-375313/2		7196A		50 mL	50 mL		0.008 Absorbance	0.1 mL	
IC 160-375313/3		7196A		50 mL	50 mL		0.016 Absorbance	0.2 mL	
IC 160-375313/4		7196A		50 mL	50 mL		0.039 Absorbance	0.5 mL	
IC 160-375313/5		7196A		50 mL	50 mL		0.078 Absorbance	1 mL	
ICV 160-375313/6		7196A		50 mL	50 mL		0.040 Absorbance		0.5 mL
ICB 160-375313/7		7196A		50 mL	50 mL		0.000 Absorbance		
MB 160-375313/8		7196A		50 mL	50 mL		0.000 Absorbance		
LCS 160-375313/9		7196A		50 mL	50 mL		0.039 Absorbance	0.5 mL	
160-29476-P-1	CRC-MW-1	7196A	T	50 mL	50 mL	0.004 Absorbance	0.006 Absorbance		
160-29476-P-1 DU	CRC-MW-1	7196A	T	50 mL	50 mL	0.004 Absorbance	0.006 Absorbance		
160-29476-P-1 MS	CRC-MW-1	7196A	T	50 mL	50 mL	0.004 Absorbance	0.044 Absorbance	0.5 mL	
CCV 160-375313/13		7196A		50 mL	50 mL		0.040 Absorbance		0.5 mL
CCB 160-375313/14		7196A		50 mL	50 mL		0.000 Absorbance		

Batch Notes	
Acid Used for pH Adjustment ID	1444348
Batch Comment	Balance ID: 1123051741
Spectrophotometer Cell Path Length	540 nm
Color Reagent ID	1506244
Pipette/Syringe/Dispenser ID	WC-J

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Batch Number: 531103 Batch Start Date: 07/24/18 12:33 Batch Analyst: Tyus, Lashanda D

Batch Method: 9012B Batch End Date: 07/24/18 14:03

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	SulfideCheck	W_CN CCV 00087	W_CNworkLCS 00052	W_H2SO4 (50%) 00102
MB 490-531103/1		9012B, 9012B		50 mL	50 mL	ND			5 mL
LCS 490-531103/2		9012B, 9012B		50 mL	50 mL	ND		0.5 mL	5 mL
CCV 490-531103/3		9012B, 9012B		50 mL	50 mL	ND	1 mL		5 mL
160-29476-K-1	CRC-MW-1	9012B, 9012B	T	50 mL	50 mL	ND			5 mL
160-29476-K-1 DU	CRC-MW-1	9012B, 9012B	T	50 mL	50 mL	ND			5 mL
160-29476-K-1 MS	CRC-MW-1	9012B, 9012B	T	50 mL	50 mL	ND		0.5 mL	5 mL
160-29476-K-1 MSD	CRC-MW-1	9012B, 9012B	T	50 mL	50 mL	ND		0.5 mL	5 mL

Lab Sample ID	Client Sample ID	Method Chain	Basis	W_Mag. Chlori 00074	W_Sulfamic 00085				
MB 490-531103/1		9012B, 9012B		2 mL	2 mL				
LCS 490-531103/2		9012B, 9012B		2 mL	2 mL				
CCV 490-531103/3		9012B, 9012B		2 mL	2 mL				
160-29476-K-1	CRC-MW-1	9012B, 9012B	T	2 mL	2 mL				
160-29476-K-1 DU	CRC-MW-1	9012B, 9012B	T	2 mL	2 mL				
160-29476-K-1 MS	CRC-MW-1	9012B, 9012B	T	2 mL	2 mL				
160-29476-K-1 MSD	CRC-MW-1	9012B, 9012B	T	2 mL	2 mL				

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Batch Number: 531103 Batch Start Date: 07/24/18 12:33 Batch Analyst: Tyus, Lashanda D

Batch Method: 9012B Batch End Date: 07/24/18 14:03

Batch Notes	
Centrifuge Tube ID	712202
Distillation Temperature	160 Degrees C
Lead Acetate Lot #	3954997
Magnesium Chloride Reagent ID Number	4514377
Sodium Hydroxide ID	4514395
Pipette/Syringe/Dispenser ID	24051042
Sulfamic Acid ID	4411176
Sulfuric Acid Reagent ID Number	4492783

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Batch Number: 531193 Batch Start Date: 07/24/18 16:45 Batch Analyst: Loggins, Shannon D

Batch Method: 9012B Batch End Date: 07/24/18 16:59

Lab Sample ID	Client Sample ID	Method Chain	Basis	FinalAmount	W_CN CCV 00084				
CCV 490-531193/1		9012B		50 mL	1 mL				
CCB 490-531193/2		9012B		50 mL					
MB 490-531103/1-A		9012B		50 mL					
LCS 490-531103/2-A		9012B		50 mL					
CCV 490-531103/3-A		9012B		50 mL					
160-29476-K-1-A	CRC-MW-1	9012B	T	50 mL					
160-29476-K-1-B DU	CRC-MW-1	9012B	T	50 mL					
160-29476-K-1-C MS	CRC-MW-1	9012B	T	50 mL					
160-29476-K-1-D MSD	CRC-MW-1	9012B	T	50 mL					
CCV 490-531193/11		9012B		50 mL	1 mL				
CCB 490-531193/12		9012B		50 mL					

Batch Notes	
Buffer Reagent ID	4470604
Chloramine-T ID	4470558
Chlorination End Time	03/24/2018 17:32
Chlorination Start Time	03/24/2018 17:32
First End time	05/24/2018 17:32
Sodium Hydroxide ID	4470603
Pipette/Syringe/Dispenser ID	21031009
Pyridine-Barbituric Acid ID	4470532
First Start time	05/24/2018 17:32

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Batch Number: 533652 Batch Start Date: 08/03/18 10:04 Batch Analyst: Donahue, Cecilia A

Batch Method: Distill/Phenol Batch End Date: 08/03/18 11:04

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	Final pH			
160-29476-D-1	CRC-MW-1	Distill/Phenol, 9066	T	50 mL	50 mL	3.95 SU			

Batch Notes	
Acid used for pH adjustment	4492783
Base Used to Adjust pH ID	4273883
Batch Comment	Cent tube lot# 712202
pH Meter ID	AB92331859
Pipette/Syringe/Dispenser ID	24051042
Probe ID	VVR1 11442

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Batch Number: 533852 Batch Start Date: 08/03/18 18:39 Batch Analyst: Loggins, Shannon D

Batch Method: 9066 Batch End Date: 08/03/18 18:48

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount				
160-29476-D-1-A	CRC-MW-1	9066	T	50 mL	50 mL				

Batch Notes	
Buffer Reagent ID	4513063
Color Reagent 1 ID	4470762
Pipette/Syringe/Dispenser ID	21031027

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Batch Number: 533397 Batch Start Date: 08/02/18 13:17 Batch Analyst: Dunn, Bradley

Batch Method: 1664B Batch End Date:

Lab Sample ID	Client Sample ID	Method Chain	Basis	Initial pH	Final pH	GrossWeight	TareWeight	InitialAmount	FinalAmount
MB 490-533397/1		1664B, 1664B		7 SU	<2 SU			960 mL	960 mL
LCS 490-533397/2		1664B, 1664B		7 SU	<2 SU			960 mL	960 mL
LCSD 490-533397/3		1664B, 1664B		7 SU	<2 SU			960 mL	960 mL
160-29476-A-1	CRC-MW-1	1664B, 1664B	T	<2 SU	<2 SU	1522.8 g	498.9 g	1024 mL	960 mL
180-80122-B-1 MS		1664B, 1664B	T	<2 SU	<2 SU	1488.4 g	500.2 g	988 mL	960 mL

Lab Sample ID	Client Sample ID	Method Chain	Basis	ReceiverTube	SGTRecTube	O&G_Disks 00015	O&G_HCL 00004	O&G_Hexane 00015	O&G_Methanol 00006
MB 490-533397/1		1664B, 1664B		2.3300 g	2.3300 g	1 Filter	1 mL	60 mL	10 mL
LCS 490-533397/2		1664B, 1664B		2.3830 g	2.3830 g	1 Filter	1 mL	60 mL	10 mL
LCSD 490-533397/3		1664B, 1664B		2.3366 g	2.3366 g	1 Filter	1 mL	60 mL	10 mL
160-29476-A-1	CRC-MW-1	1664B, 1664B	T	2.3714 g		1 Filter		60 mL	10 mL
180-80122-B-1 MS		1664B, 1664B	T	2.4165 g	2.4165 g	1 Filter		60 mL	10 mL

Lab Sample ID	Client Sample ID	Method Chain	Basis	OP_HEM_spike 00019	pH strips 00011				
MB 490-533397/1		1664B, 1664B			1 Filter Strip				
LCS 490-533397/2		1664B, 1664B		4 mL	1 Filter Strip				
LCSD 490-533397/3		1664B, 1664B		4 mL	1 Filter Strip				
160-29476-A-1	CRC-MW-1	1664B, 1664B	T		1 Filter Strip				
180-80122-B-1 MS		1664B, 1664B	T	4 mL	1 Filter Strip				

Batch Notes	
Balance ID	AL104-1231430929
Analyst ID - HEM Extraction	BAD
Nominal Amount Used	960 mL
Weight Set ID	2004

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Batch Number: 533397 Batch Start Date: 08/02/18 13:17 Batch Analyst: Dunn, Bradley

Batch Method: 1664B Batch End Date:

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Batch Number: 533454 Batch Start Date: 08/02/18 15:15 Batch Analyst: Dunn, Bradley

Batch Method: 1664B Batch End Date:

Lab Sample ID	Client Sample ID	Method Chain	Basis	FinalAmount	ReceiverTube	HEMWgt1	HEMWgt2	Residue	Residue2
MB 490-533397/1-A		1664B		960 mL	2.3300 g	2.3301 g	2.3301 g	0.0001 g	0.0001 g
LCS 490-533397/2-A		1664B		960 mL	2.3830 g	2.4210 g	2.4210 g	0.038 g	0.038 g
LCSD 490-533397/3-A		1664B		960 mL	2.3366 g	2.3745 g	2.3745 g	0.0379 g	0.0379 g
160-29476-A-1-A	CRC-MW-1	1664B	T	960 mL	2.3714 g	2.3715 g	2.3715 g	0.0001 g	0.0001 g
180-80122-B-1-A MS		1664B	T	960 mL	2.4165 g	2.4536 g	2.4536 g	0.0371 g	0.0371 g

Lab Sample ID	Client Sample ID	Method Chain	Basis	Weight2OK	SGTRecTube	SGTWgt1	SGTWgt2	SGTResidue1	SGTResidue2
MB 490-533397/1-A		1664B		Pass 0.0005g	2.3300 g	2.3300 g	2.3300 g	0 g	0 g
LCS 490-533397/2-A		1664B		Pass 0.0005g	2.3830 g	2.4013 g	2.4013 g	0.0183 g	0.0183 g
LCSD 490-533397/3-A		1664B		Pass 0.0005g	2.3366 g	2.3546 g	2.3546 g	0.018 g	0.018 g
160-29476-A-1-A	CRC-MW-1	1664B	T	Pass 0.0005g					
180-80122-B-1-A MS		1664B	T	Pass 0.0005g	2.4165 g	2.4341 g	2.4341 g	0.0176 g	0.0176 g

Lab Sample ID	Client Sample ID	Method Chain	Basis	SGTWeightOne%Diff	CalcMsg	O&G_NaSO4 00007	O&G_SilicaGel 00008	OP_FiltPaper 00020	
MB 490-533397/1-A		1664B		Pass 0.0005g %	OK	5 g	3 g	1 Filter	
LCS 490-533397/2-A		1664B		Pass 0.0005g %	OK	5 g	3 g	1 Filter	
LCSD 490-533397/3-A		1664B		Pass 0.0005g %	OK	5 g	3 g	1 Filter	
160-29476-A-1-A	CRC-MW-1	1664B	T		HEM OK. SGT-HEM not calculated.	5 g		1 Filter	
180-80122-B-1-A MS		1664B	T	Pass 0.0005g %	OK	5 g	3 g	1 Filter	

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Batch Number: 533454 Batch Start Date: 08/02/18 15:15 Batch Analyst: Dunn, Bradley

Batch Method: 1664B Batch End Date:

Batch Notes	
Balance ID	AL104-1231430929
Cal check after 1st Weighing - 1g	1.0000 g
Cal check after 1st Weighing - 2 mg	0.0020 g
Cal check after 2nd Weighing - 1g	1.0000 g
Cal check after 2nd Weighing - 2 mg	0.0020 g
Cal check before 1st Weighing - 1g	1.0000 g
Cal check before 1st Weighing - 2 mg	0.0020 g
Cal check before 2nd Weighing - 1g	1.0000 g
Cal check before 2nd Weighing - 2 mg	0.0020 g
Batch Comment	Speed-vap temp set to 40c
Desiccator In Time - 1st Weight	15:16
Desiccator In Time - 2nd Weight	15:55
Desiccator Out Time - 1st Weight	15:48
Desiccator Out Time - 2nd Weight	16:30
Perform Calculation (0=No, 1=Yes)	1
Weight Set ID	2004

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Batch Number: 529799 Batch Start Date: 07/18/18 17:00 Batch Analyst: Cole, Bridget

Batch Method: SM 2540D Batch End Date:

Lab Sample ID	Client Sample ID	Method Chain	Basis	CrucibleID	TareWeight	InitialAmount	Weight1	Weight2	Weight3
MB 490-529799/1		SM 2540D		aLEM1	0.1321 g	1000 mL	0.1319 g	0.1324 g	0.1324 g
LCS 490-529799/2		SM 2540D		aLEM2	0.1122 g	1000 mL	0.2113 g	0.2118 g	0.2118 g
160-29476-N-1	CRC-MW-1	SM 2540D	T	aLEM5	0.1323 g	500 mL	0.1380 g	0.1385 g	0.1385 g
490-155579-A-1 DU		SM 2540D	T	aLEJX	0.1116 g	25 mL	0.1191 g	0.1195 g	0 g
490-155733-A-1 DU		SM 2540D	T	aLEMQ	0.1196 g	100 mL	0.1277 g	0.1278 g	0 g

Lab Sample ID	Client Sample ID	Method Chain	Basis	WeightOne%Diff	WeightTwo%Diff	Residue	Residue2	Residue3	FinalAmount
MB 490-529799/1		SM 2540D		Fail >=0.5mg	PASS <0.5mg	-0.0002 g	0.0003 g	0.0003 g	1000 mL
LCS 490-529799/2		SM 2540D		Fail >=0.5mg	PASS <0.5mg	0.0991 g	0.0996 g	0.0996 g	1000 mL
160-29476-N-1	CRC-MW-1	SM 2540D	T	Fail >=0.5mg	PASS <0.5mg	0.0057 g	0.0062 g	0.0062 g	1000 mL
490-155579-A-1 DU		SM 2540D	T	PASS <0.5mg		0.0075 g	0.0079 g		1000 mL
490-155733-A-1 DU		SM 2540D	T	PASS <0.5mg		0.0081 g	0.0082 g		1000 mL

Lab Sample ID	Client Sample ID	Method Chain	Basis	ResDishWt	DishWeight	W_TSS LCS 00520			
MB 490-529799/1		SM 2540D		0.1324 g	0.1321 g				
LCS 490-529799/2		SM 2540D		0.2118 g	0.1122 g	1000 mL			
160-29476-N-1	CRC-MW-1	SM 2540D	T	0.1385 g	0.1323 g				
490-155579-A-1 DU		SM 2540D	T	0.1195 g	0.1116 g				
490-155733-A-1 DU		SM 2540D	T	0.1278 g	0.1196 g				

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Batch Number: 529799 Batch Start Date: 07/18/18 17:00 Batch Analyst: Cole, Bridget

Batch Method: SM 2540D Batch End Date:

Batch Notes	
Balance ID	B207693115
Date/Time - In - CW (WT2)	07/19/2018 11:53
Date/Time - Out - CW (WT2)	07/19/2018 14:42
Temperature - Start - CW (WT2) - Correct	105 Celsius
Temperature - End - CW (WT2) - Correct	104 Celsius
Temperature - Start-CW(WT2) -Uncorrected	105 Celsius
Temperature - End-CW(WT2) -Uncorrected	104 Celsius
Temperature - Start - Corrected	105 Celsius
Temperature - End - Corrected	103 Celsius
Date/Time - In	07/18/2018 17:00
Date/Time - Out	07/19/2018 09:26
Filter ID	600012-5152-r2 100M2L
Nominal Amount Used	1000 mL
Oven ID	O4-B142322
Perform Calculation (0=No, 1=Yes)	1
Thermometer ID	O4-B142322
Temperature - Start - Uncorrected	105 Celsius
Temperature - End - Uncorrected	103 Celsius

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Batch Number: 529442 Batch Start Date: 07/17/18 12:19 Batch Analyst: Pasquerilla, Marisa S

Batch Method: SM5210B Batch End Date:

Lab Sample ID	Client Sample ID	Method Chain	Basis	Initial pH	InitialTemp	Final pH	Bot1Amt	Bot1IDO	Bot1FDO
USB 490-529442/1		SM5210B		7.04 SU	23 Celsius	7.04 SU	300 mL	7.85 mg/L	7.55 mg/L
LCS 490-529442/2		SM5210B		7.04 SU	23 Celsius	7.04 SU	300 mL	7.95 mg/L	2.04 mg/L
490-155652-F-1 DU		SM5210B	T	7.29 SU	22.8 Celsius	7.29 SU	10 mL	7.78 mg/L	6.19 mg/L
160-29476-K-1	CRC-MW-1	SM5210B	T	7.33 SU	20.3 Celsius	7.33 SU	10 mL	7.85 mg/L	6.42 mg/L

Lab Sample ID	Client Sample ID	Method Chain	Basis	Bot1Dep	Bot1BOD	Bot1Use	Bot2Amt	Bot2IDO	Bot2FDO
USB 490-529442/1		SM5210B		0.3 mg/L	0.3 mg/L	Yes. USB			
LCS 490-529442/2		SM5210B		5.91 mg/L	4.985 mg/L	YES. Pass			
490-155652-F-1 DU		SM5210B	T	1.59 mg/L	19.95 mg/L	No. DO Deplete Fail	30 mL	7.77 mg/L	5.96 mg/L
160-29476-K-1	CRC-MW-1	SM5210B	T	1.43 mg/L	15.15 mg/L	No. DO Deplete Fail	30 mL	7.82 mg/L	6.41 mg/L

Lab Sample ID	Client Sample ID	Method Chain	Basis	Bot2Dep	Bot2BOD	Bot2Use	Bot3Amt	Bot3IDO	Bot3FDO
USB 490-529442/1		SM5210B							
LCS 490-529442/2		SM5210B							
490-155652-F-1 DU		SM5210B	T	1.81 mg/L	8.85 mg/L	No. DO Deplete Fail	100 mL	7.98 mg/L	5.19 mg/L
160-29476-K-1	CRC-MW-1	SM5210B	T	1.41 mg/L	4.85 mg/L	No. DO Deplete Fail	100 mL	7.74 mg/L	6.33 mg/L

Lab Sample ID	Client Sample ID	Method Chain	Basis	Bot3Dep	Bot3BOD	Bot3Use	Bot4Amt	Bot4IDO	Bot4FDO
USB 490-529442/1		SM5210B							
LCS 490-529442/2		SM5210B							
490-155652-F-1 DU		SM5210B	T	2.79 mg/L	5.595 mg/L	YES. Pass	300 mL	8.49 mg/L	2.91 mg/L
160-29476-K-1	CRC-MW-1	SM5210B	T	1.41 mg/L	1.455 mg/L	NO. Deplete Fail	300 mL	7.44 mg/L	5.93 mg/L

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Nashville Job No.: 160-29476-1

SDG No.:

Batch Number: 529442 Batch Start Date: 07/17/18 12:19 Batch Analyst: Pasquerilla, Marisa S

Batch Method: SM5210B Batch End Date:

Lab Sample ID	Client Sample ID	Method Chain	Basis	Bot4Dep	Bot4BOD	Bot4Use	FinalAmount	W_BODGlucose 00095	
USB 490-529442/1		SM5210B					300 mL		
LCS 490-529442/2		SM5210B					300 mL	6 mL	
490-155652-F-1 DU		SM5210B	T	5.58 mg/L	4.655 mg/L	YES. Pass	300 mL		
160-29476-K-1	CRC-MW-1	SM5210B	T	1.51 mg/L	0.585 mg/L	NO. Deplete Fail	300 mL		

Batch Notes	
Barometric Pressure - Corrected	29.09 - 739
Calibration - Final Date/Time	07/17/2018 13:16
Calibration - Initial Date/Time	07/17/2018 13:16
Incubator ID	bod 8
Nominal Amount Used	300 mL
Pipette/Syringe/Dispenser ID	20101085;23091017
Probe ID	13L101225
Amount of Seed added to each Sample	2.5 mL
Seed Correction	0.925 mg/L
Seed ID	4243501
Thermometer ID	AB92337680
Barometric Pressure - Uncorrected	29.99

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Original Run Filename: OM_7-24-2018_04-45-41PM.OMN Created: 7/24/2018 4:45:41 PM
Original Run Author's Signature: [nvlwet]
Current Run Filename: OM_7-24-2018_04-45-41PM2.omn Last Modified: 7/24/2018 4:59:12 PM
Current Run Author's Signature: [macleodg]
Description: Default New Run

Sample	Rep.	Cup No.	Channel 2 Cyanide Conc. (mg/L)	Area (V.s)	Height (V)	Detection Time
CCV	1	1	0.200	6.82	0.432	7/24/2018@4:46:34 PM
CCB	1	2	1.52e-3	0.0982	6.48e-3	7/24/2018@4:47:26 PM
Calibration:			Table/Fig. : 1			
mb 490-531103/1-a	1	3	-1.60e-3	-7.55e-3	-4.25e-3	7/24/2018@4:48:18 PM
lcs 490-531103/2-a	1	4	0.0864	2.98	0.189	7/24/2018@4:49:10 PM
ccv 490-531103/3-a	1	5	0.196	6.68	0.423	7/24/2018@4:50:02 PM
160-29476-k-1-a	1	6	7.61e-4	0.0726	6.01e-3	7/24/2018@4:50:53 PM
160-29476-k-1-b du	1	7	-2.71e-3	-0.0452	-8.04e-3	7/24/2018@4:51:46 PM
160-29476-k-1-c ms	1	8	0.105	3.62	0.231	7/24/2018@4:52:37 PM
160-29476-k-1-d msd	1	9	0.0927	3.19	0.205	7/24/2018@4:53:29 PM
490-155589-d-1-a	1	10	7.18e-3	0.290	0.0162	7/24/2018@4:54:20 PM
CCV	1	1	0.198	6.76	0.426	7/24/2018@4:55:13 PM
CCB	1	2	2.53e-3	0.133	6.88e-3	7/24/2018@4:56:05 PM

Analyte Properties Table for : OM_7-24-2018_04-45-41PM2.omn

Property	Channel 2 Cyanide
Concentration Units	mg/L
Calibration Fit Type	First Order
Clear Calibration	Yes
Force through Zero	No
Calibration Weighting	None
Auto Dilution Trigger	No
% of High Standard	110
Quik Chem Method	10-204-00-1-A
Chemistry	Direct/Bipolar
Calibration by Height	No
Inject to Peak Start	35
Peak Base Width	54

Channel 2 (Cyanide) - Current View

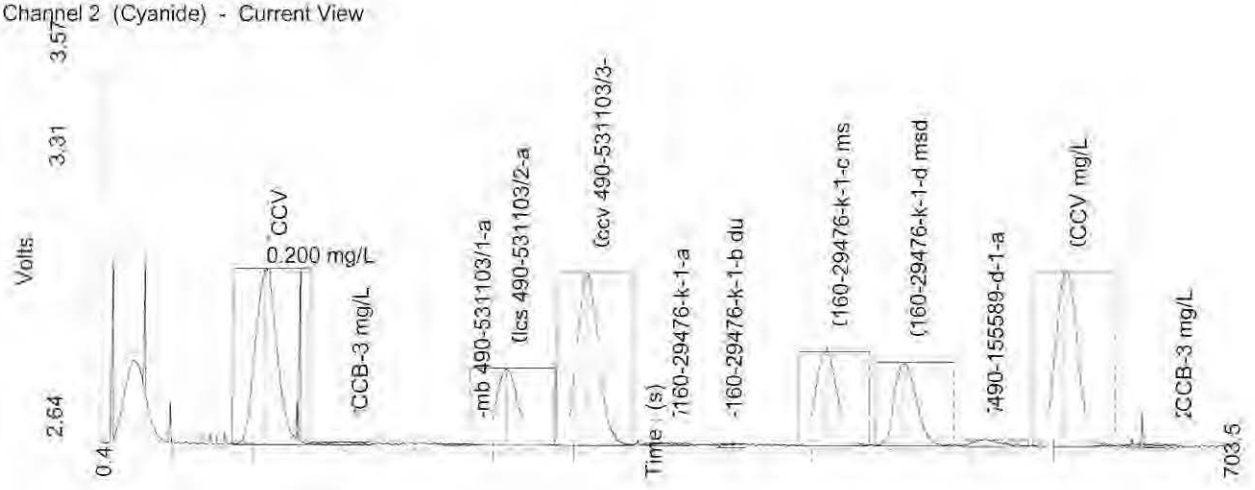
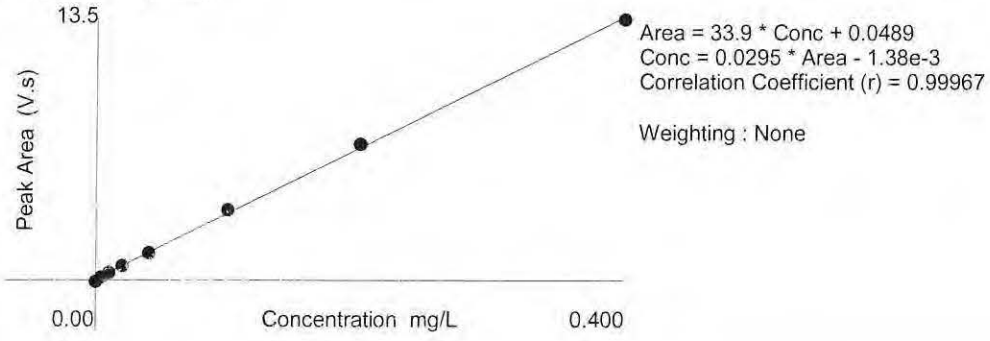


Table : 1 (Cyanide)

	Known Conc. (mg/L)	Rep.	Peak Area (V.s)	Peak Height (V)	% RSD	% Residual	Det. Conc (mg/L)	Detection Date	Detection Time
1	0.400	1	13.5	0.823	0.0	1.0	0.396	6/15/2018	2:37:29 PM
2	0.200	1	7.02	0.434	0.0	-2.8	0.206	6/15/2018	2:38:20 PM
3	0.100	1	3.60	0.220	0.0	-4.8	0.105	6/15/2018	2:39:11 PM
4	0.0400	1	1.39	0.0867	0.0	1.2	0.0395	6/15/2018	2:40:03 PM
5	0.0200	1	0.720	0.0456	0.0	0.9	0.0199	6/15/2018	2:40:56 PM
6	0.0100	1	0.379	0.0234	0.0	2.2	9.81e-3	6/15/2018	2:41:48 PM
7	4.00e-3	1	0.132	0.0240	0.0	28.4	2.52e-3	6/15/2018	2:42:41 PM
8	0.00	1	-0.0897	-4.34e-3			-4.02e-3	6/15/2018	2:43:35 PM

Figure : 1 (Cyanide)



Original Run Filename: OM_6-15-2018_02-35-46PM.OMN Created: 6/15/2018 2:35:46 PM
Original Run Author's Signature: [nvlwet]
Current Run Filename: OM_6-15-2018_02-35-46PMCAL.omn Last Modified: 6/15/2018 2:46:22 PM
Current Run Author's Signature: [NVLWET]
Description: Default New Run

Sample	Rep.	Cup No.	Channel 2 Cyanide Conc. (mg/L)	Area (V.s)	Height (V)	Detection Time
Cal Std 1	1	S1	0.400	13.5	0.823	6/15/2018@2:37:29 PM
Cal Std 2	1	S2	0.200	7.02	0.434	6/15/2018@2:38:20 PM
DQM Test: Maximum Percent Residual						
Result:			Abs(0.0) < 10.0			
Message			Pass			
Action						
DQM Test: Minimum Correlation Coefficient						
Result:			1.00000 > 0.99990			
Message			Pass			
Action						
Cal Std 3	1	S3	0.100	3.60	0.220	6/15/2018@2:39:11 PM
DQM Test: Maximum Percent Residual						
Result:			Abs(1.5) < 10.0			
Message			Pass			
Action						
DQM Test: Minimum Correlation Coefficient						
Result:			0.99990 > 0.99990			
Message			Pass			
Action						
Cal Std 4	1	S4	0.0400	1.39	0.0867	6/15/2018@2:40:03 PM
DQM Test: Maximum Percent Residual						
Result:			Abs(9.3) < 10.0			
Message			Pass			
Action						
DQM Test: Minimum Correlation Coefficient						
Result:			0.99968 < 0.99990			
Message			Fail			
Action						
Cal Std 5	1	S5	0.0200	0.720	0.0456	6/15/2018@2:40:56 PM
DQM Test: Maximum Percent Residual						
Result:			Abs(10.8) > 10.0			
Message			Fail			
Action						
DQM Test: Minimum Correlation Coefficient						
Result:			0.99970 < 0.99990			
Message			Fail			
Action						
Cal Std 6	1	S6	0.0100	0.379	0.0234	6/15/2018@2:41:48 PM
DQM Test: Maximum Percent Residual						
Result:			Abs(14.8) < 30.0			
Message			Pass			
Action						
DQM Test: Minimum Correlation Coefficient						
Result:			0.99972 < 0.99990			
Message			Fail			
Action						
Cal Std 7	1	S7	4.00e-3	0.132	0.0240	6/15/2018@2:42:41 PM
DQM Test: Maximum Percent Residual						
Result:			Abs(39.2) > 30.0			
Message			Fail			
Action						
DQM Test: Minimum Correlation Coefficient						
Result:			0.99972 < 0.99990			
Message			Fail			
Action						
Cal Std 8	1	S8	0.00	-0.0897	-4.34e-3	6/15/2018@2:43:35 PM
DQM Test: Maximum Percent Residual						
Result:			Abs(28.4) < 30.0			

Message	Pass			
Action				
DQM Test: Minimum Correlation Coefficient				
Result:	0.99967 < 0.99990			
Message	Fail			
Action				

Analyte Properties Table for : OM_6-15-2018_02-35-46PMCAL.omn

Property	Channel 2 Cyanide
Concentration Units	mg/L
Calibration Fit Type	First Order
Clear Calibration	Yes
Force through Zero	No
Calibration Weighting	None
Auto Dilution Trigger	No
% of High Standard	110
Quik Chem Method	10-204-00-1-A
Chemistry	Direct/Bipolar
Calibration by Height	No
Inject to Peak Start	42
Peak Base Width	46

Channel 2 (Cyanide) - Current View

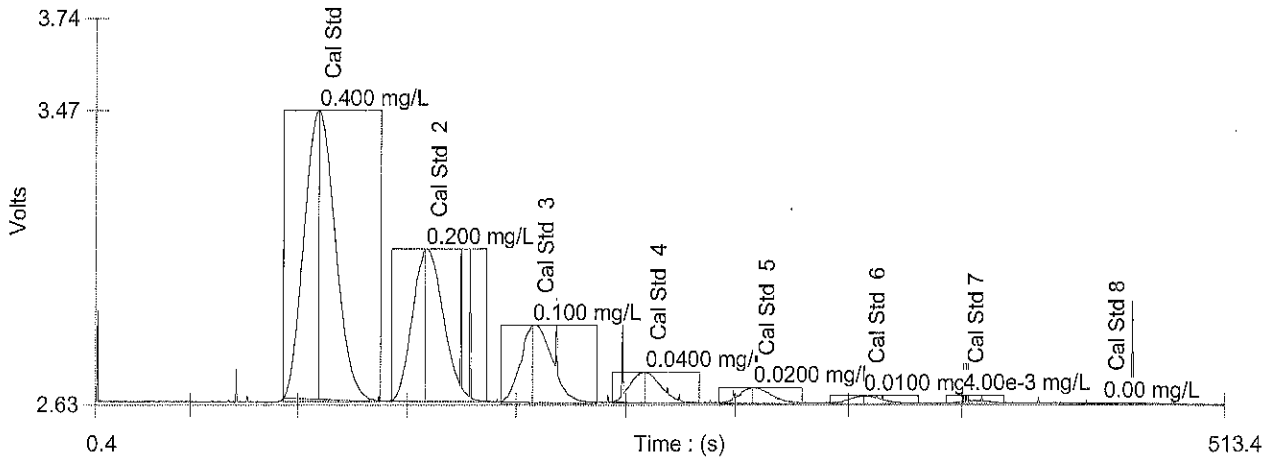
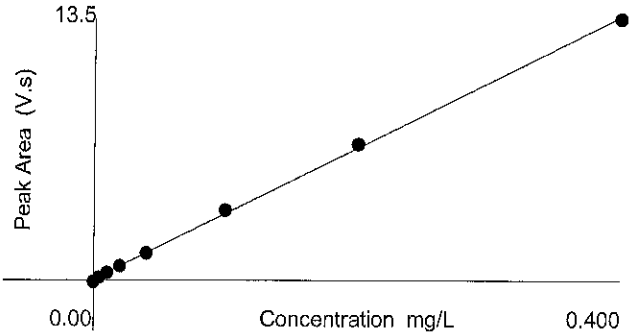


Table : 1 (Cyanide)

	Known Conc. (mg/L)	Rep.	Peak Area (V.s)	Peak Height (V)	% RSD	% Residual	Det. Conc (mg/L)	Detection Date	Detection Time
1	0.400	1	13.5	0.823	0.0	1.0	0.396	6/15/2018	2:37:29 PM
2	0.200	1	7.02	0.434	0.0	-2.8	0.206	6/15/2018	2:38:20 PM
3	0.100	1	3.60	0.220	0.0	-4.8	0.105	6/15/2018	2:39:11 PM
4	0.0400	1	1.39	0.0867	0.0	1.2	0.0395	6/15/2018	2:40:03 PM
5	0.0200	1	0.720	0.0456	0.0	0.9	0.0199	6/15/2018	2:40:56 PM
6	0.0100	1	0.379	0.0234	0.0	2.2	9.81e-3	6/15/2018	2:41:48 PM
7	4.00e-3	1	0.132	0.0240	0.0	28.4	2.52e-3	6/15/2018	2:42:41 PM
8	0.00	1	-0.0897	-4.34e-3			-4.02e-3	6/15/2018	2:43:35 PM

Figure : 1 (Cyanide)



Area = 33.9 * Conc + 0.0489
Conc = 0.0295 * Area - 1.38e-3
Correlation Coefficient (r) = 0.99967

Weighting : None

SL

CN Calibration:

0.400 - 6 mL NaOH + 4 mL 1ppm CN
0.200 - 8 mL NaOH + 2 mL 1ppm CN
0.100 - 9 mL NaOH + 1 mL 1ppm CN
0.040 - 9 mL NaOH + 1 mL 0.4ppm CN
0.020 - 9 mL NaOH + 1 mL 0.2ppm CN
0.010 - 9 mL NaOH + 1 mL 0.1 ppm CN
0.0 - 0.25 M NaOH

1ppm CN: 9 mL NaOH + 1 mL 10 ppm CN
10ppm CN: 9 mL NaOH + 1 mL 100 ppm CN
100ppm CN: 9 mL NaOH + 1 mL 1000 ppm CN
1000 ppm CN = TALS ID # ~~3565020~~ → 4387835

SL 6/15/18

ICV 2nd source TALS ID # ~~3612689~~ → 4246641

Original Run Filename: OM_8-3-2018_06-39-23PM.OMN Created: 8/3/2018 6:39:23 PM
Original Run Author's Signature: [nvlwet]
Current Run Filename: OM_8-3-2018_06-39-23PM.OMN Last Modified: 8/3/2018 6:48:44 PM
Current Run Author's Signature: [NVLWET]
Description: Default New Run

Sample	Rep.	Cup No.	Channel 3 Phenol			Detection Time
			Conc. (mg/L)	Area (V.s)	Height (V)	
CCV	1	3	1.05	1.91	0.126	8/3/2018@6:40:14 PM
Calibration:			Table/Fig. : 1			
CCB	1	4	-3.95e-3	5.09e-3	5.92e-4	8/3/2018@6:41:05 PM
MB 490-533652/1-A	1	5	-9.02e-3	-4.05e-3	-3.11e-4	8/3/2018@6:41:57 PM
LCS 490-533652/2-A	1	6	1.14	2.07	0.137	8/3/2018@6:42:49 PM
160-29476-D-1-A	1	7	-4.14e-3	4.74e-3	6.88e-4	8/3/2018@6:43:40 PM
160-29476-D-1-B MS	1	8	1.20	2.17	0.144	8/3/2018@6:44:31 PM
160-29476-D-1-C MSD	1	9	1.09	1.97	0.130	8/3/2018@6:45:22 PM
CCV	1	3	1.06	1.92	0.127	8/3/2018@6:46:14 PM
CCB	1	4	2.90e-3	0.0174	1.30e-3	8/3/2018@6:47:06 PM

Analyte Properties Table for : OM_8-3-2018_06-39-23PM.OMN

Property	Channel 3 Phenol
Concentration Units	mg/L
Calibration Fit Type	First Order
Clear Calibration	Yes
Force through Zero	No
Calibration Weighting	None
Auto Dilution Trigger	No
% of High Standard	110
Quik Chem Method	10-210-00-1-B
Chemistry	Direct/Bipolar
Calibration by Height	No
Inject to Peak Start	18
Peak Base Width	42

Channel 3 - Current View

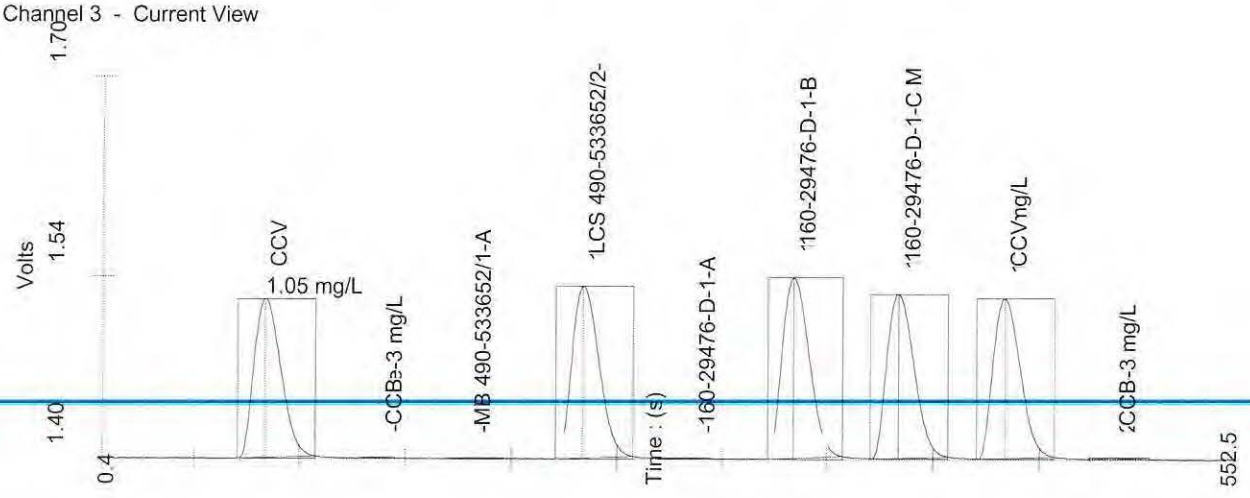
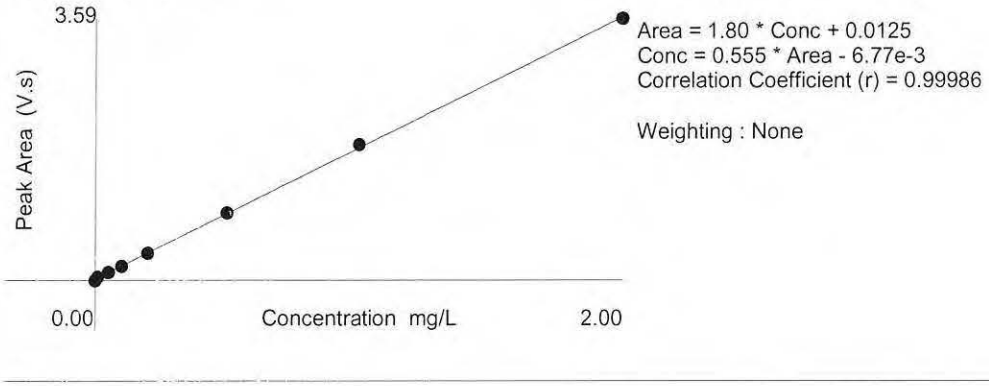


Table : 1 (Phenol)

	Known Conc. (mg/L)	Rep.	Peak Area (V.s)	Peak Height (V)	% RSD	% Residual	Det. Conc (mg/L)	Detection Date	Detection Time
1	2.00	1	3.59	0.244	0.0	0.6	1.99	8/2/2018	7:34:30 PM
2	1.00	1	1.86	0.125	0.0	-2.5	1.02	8/2/2018	7:35:22 PM
3	0.500	1	0.920	0.0623	0.0	-0.8	0.504	8/2/2018	7:36:13 PM
4	0.200	1	0.366	0.0251	0.0	1.8	0.196	8/2/2018	7:37:05 PM
5	0.100	1	0.188	0.0127	0.0	2.6	0.0973	8/2/2018	7:37:57 PM
6	0.0500	1	0.101	6.47e-3	0.0	1.0	0.0496	8/2/2018	7:38:50 PM
7	0.0100	1	0.0379	2.80e-3	0.0	-24.4	0.0143	8/2/2018	7:39:42 PM
8	0.00	1	-0.0107	-1.10e-3			-0.0127	8/2/2018	7:40:36 PM

Figure : 1 (Phenol)



General Chemistry Worksheet

Batch Number: 490-529799
Method: SM 2540D
Analyst: Cole, Bridget

Due 7/24
2540E VSS #

Date Open: Jul 18 2018 3:39PM
Batch End:

Due 7/20

Lab ID	Client ID	Method Chain	Basis	CrucibleID	Tare Weight	Initial weight/volume of sample				
MB~490-529799/1		2540D		aLEM1	0.1321 g	1000 mL				
LCS~490-529799/2		2540D		aLEM2	0.1122 g	1000 mL				
vss~lcs				aLEM3	0.1120 g	1000 mL				
490-155423-D-1	82-626C	2540D	T	aLEM4	0.1329 g	10 mL				
160-29476-N-1	CRC-MW-1	2540D	T	aLEM5	0.1323 g	500 mL				
490-155579-A-1	F1807042-01B	2540D	T	aLEJW	0.1178 g	25 mL				
490-155579-A-1~DU		2540D	T	aLEJX	0.1116 g	25 mL				
490-155605-I-1	006-PA-115-071218-15 00-01-202	2540D	T	aLEM8	0.1189 g	1000 mL	#4 Bmc	7/18/18	1700	105
490-155609-D-1	TW-01	2540D	T	aLEM9	0.1192 g	750 mL	#4 Bmc	7/19/18	1153	105
490-155610-F-1	Metering Pit Composite	2540D	T	aLEMA	0.1204 g	250 mL	A14 Bmc	7/20/18	1250	550
490-155634-E-1	ESSI MCS New	2540D	T	aLEMB	0.1193 g	1000 mL				
490-155636-A-1	ESSI MCS Fickas	2540D	T	aLEMC	0.1182 g	600 mL				
490-155639-A-1	MCS RP	2540D	T	aLEMD	0.1318 g	1000 mL				
490-155640-A-1	MCS Eville	2540D	T	aLEME	0.1150 g	700 mL				
490-155651-I-1	006-PA-115-071318-16 10-01-078	2540D	T	aLEMF	0.1204 g	1000 mL				
490-155652-G-1	#1-11	2540D	T	aLEMG	0.1193 g	1000 mL				
490-155677-C-1	Plant Effluent 071318	2540D	T	aLEJY	0.1210 g	10 mL	Bmc	7/19/18	926	103
490-155691-A-1	7-1-18	2540D	T	aLEMI	0.1196 g	500 mL	Bmc	7/19/18	1442	104
490-155732-A-1	Influent	2540D	T	aLEMJ	0.1200 g	100 mL				
490-155732-B-2	Effluent	2540D	T	aLEMK	0.1309 g	500 mL				
490-155733-A-1	Influent	2540D	T	aLEML	0.1200 g	100 mL				
490-155733-B-2	Effluent	2540D	T	aLEMM	0.1320 g	500 mL				
490-155734-C-1	001	2540D	T	aLEMN	0.1199 g	1000 mL				
490-155737-C-1	01,02,03,04,05	2540D	T	aLEJZ	0.1194 g	250 mL				
490-155733-A-1~DU		2540D	T	aLEMQ	0.1196 g	100 mL				

Perform Calculation (0=No, 1=Yes): 1
Nominal Amount Used: 1000 mL
Filter ID: 600012-5152-r2 100M2L

Sample Request Form: 284840

Wet Chemistry - TSS 7/14/2018 4:29:48 PM Assigned to:Conner, Ava E

Sample	Client Sample ID	Container	Method	Analytical Method	Hold Time	Due	PM	State Code	Storage	Hazard Level
490-155423-1	82-626C		2540D	2540D	07/17 23:59	07/23/18	JJH	KY	M196 & W740	Unconfirmed
M Ensafe requirement- TSS - must STIR and sample using a PIPETTE (rather than shake & pour)										
490-155451-1	008/012 Week 28		2540D	2540D	07/17 23:59	07/23/18	RLC	NE	W744 & HEMWed & M187	Unconfirmed
490-155453-1	001		2540D	2540D	07/16 23:59	07/23/18	SDB	TN	M192 & W741	Unconfirmed
490-155507-1	LCC-001-CP-071118		2540D	2540D	07/18 23:59	07/23/18	GAL	TN	M174 & TOC1 & W746	Unconfirmed
490-155507-2	LCC-GW INT-CP-071118		2540D	2540D	07/18 23:59	07/23/18	GAL	TN	W746 & TOC1 & M174	Unconfirmed
490-155507-3	LCC-EQB-071118		2540D	2540D	07/18 23:59	07/23/18	GAL	TN	TOC1 & W746 & M174	Unconfirmed
490-155512-1	Outfall 001		2540D	2540D	07/18 23:59	07/24/18	JAG	NC	W749 & VOA2A10 & TOC1 & HEMThurs	Unconfirmed
490-155516-1	Effluent - C 3" Parshall Flume		2540D	2540D	07/18 23:59	07/24/18	KAH	GA	M192 & W747	Unconfirmed
490-155537-1	Influent		2540D	2540D	07/18 23:59	07/24/18	QDR	TN	W751	Unconfirmed
490-155537-2	Effluent		2540D	2540D	07/18 23:59	07/24/18	QDR	TN	W751	Unconfirmed
490-155554-1	Outfall 001		2540D	2540D	07/17 23:59	07/24/18	MCG	PA	M199 & THURU & HEMThurs & W747	Unconfirmed
M Please record observations of sample/analysis										
490-155585-1	Outfall #1		2540D	2540D	07/14 23:59	07/24/18	RLC	TX	HEMThurs & W752 & TOC1	Unconfirmed
M BNSF										
490-155594-1	006-PA-015-071118-1005-1-636		2540D	2540D	07/18 23:59	07/24/18	MCG	PA	M198 & VOA2A10 & RSK14C & W750	Unconfirmed
490-155603-1	18071107801		2540D	2540D	07/18 23:59	07/25/18	MCG	PA	VOA2B4 & W752 & M197 & RSK14B	Unconfirmed

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BIOCHEMICAL OXYGEN DEMAND QC WORKSHEET

Method SM5210 B
pH Slope:

Start Incubation:
Date: 7/14/18
Time: 18:22
Analyst: msp

DO Probe Reading Day 1:
Initial DO:
Final DO:

Day 5:
Initial DO:
Final DO:

End Incubation:
Date: 7/19/18
Time: 11:00
Analyst: msp

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Nashville, TN

SAMPLE NO.	VOL.(mL)	P	INITIAL DO. mg/L	FINAL DO. mg/L	DIFF.	CORR.	NET mg/L	BOD mg/L	Range Limits mg/L	Percent Recovery
UNSEEDED BLK	300	1	7.85	7.55	0.3	0.93	-0.625	-0.625	<0.2	
GGA STANDARD	6	0.02	7.95	1.85	6.1	0.93	5.175	258.750	167.5-228.5	
GGA STANDARD	6	0.02	7.95	2.01	5.94	0.93	5.015	250.750	167.5-228.5	
GGA STANDARD	6	0.02	7.95	2.25	5.7	0.93	4.775	238.750	167.5-228.5	
GGA Standard Average:			**7.95**	**2.04**	5.91	0.93	**4.988**	**249.417**		125.97
GGA STANDARD	6	0.02			0	0.93	0.000	0.000	167.5-228.5	
GGA STANDARD	6	0.02			0	0.93	0.000	0.000	167.5-228.5	
GGA STANDARD	6	0.02			0	0.93	0.000	0.000	167.5-228.5	
GGA Standard Average:			**#DIV/0!**	**#DIV/0!**	#DIV/0!	0.93	**#DIV/0!**	**#DIV/0!**		#DIV/0!
SEEDED BLANK	300	1			0	0.93	-0.93		<2.0 mg/L	
SEED CNTRL	10	0.033	7.87	4.17	3.7	0.93			0.6-1.0	
	15	0.05	7.87	0.87	7	0.00			0.6-1.0	
	20	0.067	7.86	0.15	7.71	0.00			0.6-1.0	
			Correction Factor Average =			0.93			0.6-1.0	

Seed added per bottle: 2.5 mL
Nutrient Water = 1 ml each nutrient per liter chlorine free reagent water
Seed prep: g per 500 mL nutrient H2O. Aerate and stir 1 hour. Stop aeration / continue stirring
Calculate Seed Correction Factor = ((initial DO - final DO)(mL seed in sample)) / mL seed used in seed control
P = sample vol/300
Corr = Correction Factor Average
NET = DIFF- CORR
BOD = NET/P x Dilution

Nutrient Water	
pH	7.04
DO	7.91
Barometric Pressure	
Uncorrected	29.99
Corrected	29.09
(mmHg)	739

Comments:

Readout Thursday

BIOCHEMICAL OXYGEN DEMAND QC WORKSHEET

Method SM5210 B
pH Slope 98.7

B#529442

Start Incubation
Date 7/14/18
Time 1822
Analyst MSP

End Incubation
Date 7/19/18
Time 1100
Analyst MSP

DO Probe Reading Day 1: Initial DO 7.77 | 7.85; Final DO 7.62 | 7.85
Day 5: Initial DO 7.69 | 7.55; Final DO 7.26 | 7.50

TestAmerica
Nashville, TN

SAMPLE NO	VOL (mL)	P	INITIAL DO mg/L	FINAL DO mg/L	DILU	CORR	NET mg/L	BOD mg/L	Range Limits mg/L	Percent Recovery
DILUTION BLANK	300	1	7.85	7.55	0	#DIV/0!	#DIV/0!	#DIV/0!	>0.2	
GGA STANDARD	6	0.02	7.95	1.85	0	#DIV/0!	#DIV/0!	#DIV/0!	167.5-228.5	
GGA STANDARD	6	0.02	7.95	2.01	0	#DIV/0!	#DIV/0!	#DIV/0!	167.5-228.5	
GGA STANDARD	6	0.02	7.95	2.25	0	#DIV/0!	#DIV/0!	#DIV/0!	167.5-228.5	
GGA Standard Average:			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!
GGA STANDARD	6	0.02			0	#DIV/0!	0.000	0.000	167.5-228.5	
GGA STANDARD	6	0.02			0	#DIV/0!	0.000	0.000	167.5-228.5	
GGA STANDARD	6	0.02			0	#DIV/0!	0.000	0.000	167.5-228.5	
GGA Standard Average:			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!
SEED BLANK	300	1			0	#DIV/0!	#DIV/0!		>2.0 mg/L	
SEED CONTROL	10	0.033	7.87	4.17	0	0.00			0.6-1.0	
	15	0.05	7.87	0.87	0	0.00			0.6-1.0	
	20	0.067	7.86	0.15	0	0.00			0.6-1.0	
Correction Factor Average =						#DIV/0!			0.6-1.0	

Seed added per bottle: 2.5 mL
Nutrient Water = 1 mL each nutrient per liter chlorine free reagent water
Seed prep a2394 g per 500 mL nutrient H2O. Aerate and stir 1 hour. Stop aeration / continue stirring
Calculate Seed Correction Factor = ((initial DO - final DO)(mL seed in sample)) / mL seed used in seed control
P = sample vol/300
Corr = Correction Factor Average
NET = DILU - CORR
BOD = NET/P x Dilution

Nutrient Water	
pH	7.04
DO	7.91
Glucose/Glutamic Acid	
Uncorrected	29.99
Corrected	29.09
(300 mg)	739

Comments
Rack # T1, (1
BOD # 8

...MICAL OXYGEN DEMAND WORKLIST (SM5210 B)

START INCUBATION:	
DATE	
TIME	
ANALYST	

END INCUBATION:	
DATE	
TIME	
ANALYST	

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Nashville, TN

Blk	SAMPLE	VOL. (mL)	P	INITIAL pH	# mL Acid/ Base (*NOTE #1)	FINAL pH	#drops/ 50mL of Na_2SO_3 (OXIDATION REDOX)	Temp (°C)	INIT. DO (mg/L) (**NOTE #2)	FIN. DO (mg/L) (MIN = 2.0)	DIFF. (mg/L)	CORR.	NET (mg/L) (MIN = 1.0)	Dil.
3	490 155652 F1	300	1.000											
		10	0.033	7.29		11		22.8	7.78	6.30				1x
		30	0.100						7.77	6.08				
		100	0.333		e1412				7.98	5.35				
		300	1.000						8.54	2.66				
	DU	300	1.000											
4	490 155652 F1	10	0.033	7.29		11		22.8	7.78	6.19				1x
		30	0.100						7.77	5.96				
		100	0.333		e1412				7.98	5.19				
		300	1.000						8.49	2.91				
5	160 294176 K1	300	1.000											
		10	0.033	7.33		11		20.3	7.85	6.42				1x
		30	0.100						7.82	6.41				
		100	0.333		e1533	7/13/18			7.74	6.33				
		300	1.000						7.44	5.93				
6	490 155641 A1	300	1.000											
		10	0.033	7.26		11		28.1	7.83	4.57				50x
		30	0.100						7.82	6.52				
		100	0.333		e1420				7.77	6.35				
		300	1.000						7.55	5.97				10/500

...Dilution

CORR = seed control factor

NET = DIFF - CORR

...mL of acid/base used must be ≤0.5% or ≤2.5 mL/500 mL sample

BASE: 1N NaOH

...final DO of the sample must be between 7 and 9

Comments

IE-32

End of Form

CHEMICAL OXYGEN DEMAND WORKLIST (SM5210 B)

START INCUBATION:	
DATE	
TIME	
ANALYST	

END INCUBATION:	
DATE	
TIME	
ANALYST:	

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

Batch	SAMPLE	VOL. (mL)	P	INITIAL pH	# mL Acid/ Base *NOTE #1	FINAL pH	#drops/ 50mL of Na_2SO_3 OXIDATION CHECK	Temp (°C)	INIT. DO (mg/L) **NOTE #2	FIN. DO (mg/L) MIN = 2.0	DIFF. (mg/L)	CORR.	NET (mg/L) MIN = 1.0	DIL.
7	490 155641 A2	300	1.000											1
		10	0.033	7.15		"		28.4	7.71	6.34				50x
		30	0.100						7.63	5.55				
		100	0.333		e1423				7.57	5.51				10/500
		300	1.000						7.34	4.90				
8	490 155641 A3	300	1.000											1
		10	0.033	8.70		7.00		28.2	7.92	6.35				50x
		30	0.100						7.84	6.18				
		100	0.333		e1429				7.80	5.49				10/500
		300	1.000						7.61	3.15				
9	490 155641 A4	300	1.000											1
		10	0.033	7.65		"		28.5	7.83	6.47				50x
		30	0.100						7.82	6.61				
		100	0.333		e1427				7.76	6.02				10/500
		300	1.000						7.53	5.59				
		300	1.000											1
		10	0.033											
		30	0.100											
		100	0.333											
		300	1.000											

P = vol/300 CORR = seed control factor
DIL = P/0.100 NET = DIFF - CORR

*NOTE #1 Total mL of acid/base used must be <0.5% or <2.5 ml /500 mL sample
ACID = 1N H_2SO_4 BASE = 1N NaOH

**NOTE #2 Initial DO of the sample must be between 7 and 9

Comments.

F-32
End of Form

Sample Request Form: 284831

BOD

Wet Chemistry - BOD 7/14/2018 1:36:43 PM Assigned to:Pasquerilla, Marisa S

Sample	Client Sample ID	Container	Method	Analytical Method	Hold Time	Due	PM	State Code	Storage	Hazard Level
490-155652-F-1 3/4	#1-11 1X	490-4499371	SM5210B_ BODCalc	SM5210B_BODCalc	07/15 12:30	07/26/18	RLC	MI	W755	Unconfirmed

7.29 22.8 e1412

Sample Request Form: 284769

BOD

Wet Chemistry - BOD 7/13/2018 3:08:52 PM Assigned to:Pasquerilla, Marisa S

Sample	Client Sample ID	Container	Method	Analytical Method	Hold Time	Due	PM	State Code	Storage	Hazard Level
160-29476-K-1 5	CRC-MW-1 1x	160-1507624	SM5210B_ BODCalc	SM5210B_BODCalc	07/13 13:55	08/06/18	CYLS	IL	W759	Unconfirmed

7.33 20.3 @1533

Received out of hold

Sample Request Form: 284825

BOD

Wet Chemistry - BOD 7/14/2018 11:38:41 AM Assigned to:Pasquerilla, Marisa S

Sample	Client Sample ID	Container	Method	Analytical Method	Hold Time	Due	PM	State Code	Storage	Hazard Level
490-155641-A-1 6	AQUANOX A8820 50x	490-4498932	SM5210B_ BODCalc	SM5210B_BODCalc	07/14 14:30	07/25/18	JAG	TN	W758	Unconfirmed
				7.26	28.1			e1420		
M MX2183 & L5314 were both >60. These samples need greater dilutions.										
490-155641-A-2 7	LONOX L5611 50x	490-4498933	SM5210B_ BODCalc	SM5210B_BODCalc	07/14 14:30	07/25/18	JAG	TN	W758	Unconfirmed
				7.15	28.4			e1423		
M MX2183 & L5314 were both >60. These samples need greater dilutions.										
490-155641-A-3 8	OPTISOLV OP7168 50x	490-4498934	SM5210B_ BODCalc	SM5210B_BODCalc	07/14 14:30	07/25/18	JAG	TN	W758	Unconfirmed
				8.70	7.00	28.2		e1429		
M MX2183 & L5314 were both >60. These samples need greater dilutions.										
490-155641-A-4 9	KYZEN RINSE 20 50x	490-4498935	SM5210B_ BODCalc	SM5210B_BODCalc	07/14 14:30	07/25/18	JAG	TN	W758	Unconfirmed
				7.65	28.5			e1427		
M MX2183 & L5314 were both >60. These samples need greater dilutions.										

DO PROBE CALIBRATION REPORT

Temperature °C	Expected D.O. @760BP	Actual BP	Calculated D.O.	ACTUAL D.O.	DIFFERENCE	RESULT	PROBE ID	DATE	Analyst
22.4	8.66	739	8.42	8.28	0.14	PASS	BOD5-08C101838	7/14/2018	msp
23.5	8.50	739	8.27	8.26	0.01	PASS	BOD7-13L101225	7/14/2018	msp
22.0	8.74	738	8.49	8.42	0.07	PASS	BOD8-OOB0314	7/14/2018	ldc

Used until 8/29/18

TestAmerica

Reagents for
BOD & CBOD SM5210 B

Batch No. _____

Probe 7

Probe 5

Probe 8

1.0 N Sulfuric Acid	4337329 ID 1N Sulfuric_00023 Exp 10/19/18 Prpd REM Cn 04/10/18 1.1N sulfuric acid for BO	10N	4337344 ID 10N H2SO4_00017 Exp 11/17/19 Prpd REM Cn 04/10/18 10N Sulfuric Acid
1.0 N Sodium Hydroxide	4337351 ID W_1N NaOH_00023 Exp 10/28/19 Prpd REM Cn 04/10/18 1N Sodium Hydroxide BOD p	10N	4332551 ID OP_NaOH_00028 Exp 11/28/19 Prpd LDT Opn 04/06/18 Sodium Hydroxide 10N
Sodium Sulfite Solution	4469317 ID W_BODGlucose_00095 Exp 03/22/20 Prpd LDC W_Glucose-Glutamic Acid		
Glucose Glutamic Acid			4423390 ID Calcium CL_00050 Exp 05/09/19 Prpd LDC 5/31/18 BOD Calcium Chloride reag
Calcium Chloride	4351131 ID Mg sulfate_00018 Exp 03/19/20 Prpd LDC Opn 04/18/18 BOD reagent Mg. Sulfate		
Magnesium Sulfate			4349516 ID Ferric CL_00043 Exp 03/09/20 Prpd LDC Opn 04/17/18 BOD Ferric Chloride Regen
Ferric Chloride	4423391 ID Phos Buffer_00013 Exp 03/23/20 Prpd LDC Opn 07/07/18 BOD reagent		
Phosphate Buffer			4420850 ID W_Polyseed_00050 Exp 09/07/19 Prpd LDC S_Polyseed for BOD
Poly Seed	4351204 ID Nitrificatio_00035 Exp 05/31/21 Prpd LDC Opn 04/18/18 S_BOD Nitrification Inhib		
Nitrification Inhibitor			4420211 ID W_Nutrient_00023 Exp 08/29/18 Prpd LDC Cn 06/04/18 BOD Nutrient Mix
Nutrient Mix			

ALPHA SPECTROSCOPY

Method A-01-R Th

Isotopic Thorium (Alpha Spectrometry) by Method A-01-R

Prep Batch: 381166

Preparation, Extraction Chromatography Resin Actinide Separation

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 381166

Lab ID: MB 160-381166/1-A
Client ID:
Sigma: 2
Analyzed: 08/10/18 18:48
Detector: AV3
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	-0.03130	0.178	0.178	U	pCi/L	1.00	0.295	381888

Tracer	MB Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	10.64	0.936	1.29		pCi/L	0.157	12.1	87.9	30 - 110

Lab ID: LCS 160-381166/2-A
Client ID:
Sigma: 2
Analyzed: 08/10/18 18:48
Detector: AV4
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	9.236	0.925	1.21		pCi/L	1.00	0.283	381889

Tracer	LCS Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	11.98	1.03	1.44		pCi/L	0.163	12.1	98.9	30 - 110

Lab ID: LCSD 160-381166/3-A
Client ID:
Sigma: 2
Analyzed: 08/10/18 18:48
Detector: AV7
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	LCSD Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	7.713	0.860	1.08		pCi/L	1.00	0.285	381909

Tracer	LCSD Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	11.56	1.01	1.40		pCi/L	0.114	12.1	95.4	30 - 110

Lab ID: 160-29476-1
Client ID: CRC-MW-1
Sigma: 2
Analyzed: 08/10/18 18:48
Detector: AV8
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	0.197	0.247	0.248	U	pCi/L	1.00	0.328	381919

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	9.06	0.838	1.13		pCi/L	0.131	12.1	74.9	30 - 110

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 381166

Quality Control Summary

Method Blank ID:	Analyte	Parent Result	Spike Added	MB Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
MB 160-381166/1-A	Thorium-230			-0.03130	U	pCi/L							-.35242678

Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-381166/2-A	Thorium-230		8.03	9.236		pCi/L	115	81 - 125	18				1.5091936577

Lab Control Sample Duplicate	Analyte	Parent Result	Spike Added	LCSD Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCSD 160-381166/3-A	Thorium-230		8.03	7.713		pCi/L	96	81 - 125	18	0.67	1.88	1	-.4075591018

Glossary:

Ts = Count Duration, Sample

ALPHA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Batch Number: 381166 Batch Start Date: 08/08/18 14:32 Batch Analyst: Fox, Kassie N

Batch Method: ExtChrom Batch End Date: 08/09/18 18:23

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	Th-229 00023	Th-230 00036			
MB 160-381166/1		ExtChrom, A-01-R		500 mL	0.2 mL				
LCS 160-381166/2		ExtChrom, A-01-R		500 mL	0.2 mL	0.2 mL			
LCSD 160-381166/3		ExtChrom, A-01-R		500 mL	0.2 mL	0.2 mL			
160-29476-H-1	CRC-MW-1	ExtChrom, A-01-R	T	500.67 mL	0.2 mL				

Batch Notes	
Balance ID	1125353055
Analyst ID - Column	NMN per CMM
Column Date	08/09/2018
Analyst ID - CoPrecipitation	CMM
CoPrecipitation Date	08/09/2018
Pipette ID	RAD117
Analyst ID - Reagent Drop Witness	CMM per KNF
Analyst ID - Reagent Drop	KNF
SOP Number	ST-RC-0100, ST-RC-242

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:50:04PM 8/10/2018

Sample

Sample Name: MB 160-381166/1-A
SampleType: Blank
: MB 160-381166/1-A
Sample Collection Date: 8/9/2018 6:35:00PM

Spectrum #1 Analysis #1
Sample Volume : 0.5000L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 381166
AnalysisID: 736756

Analyst: 60040

Tracer

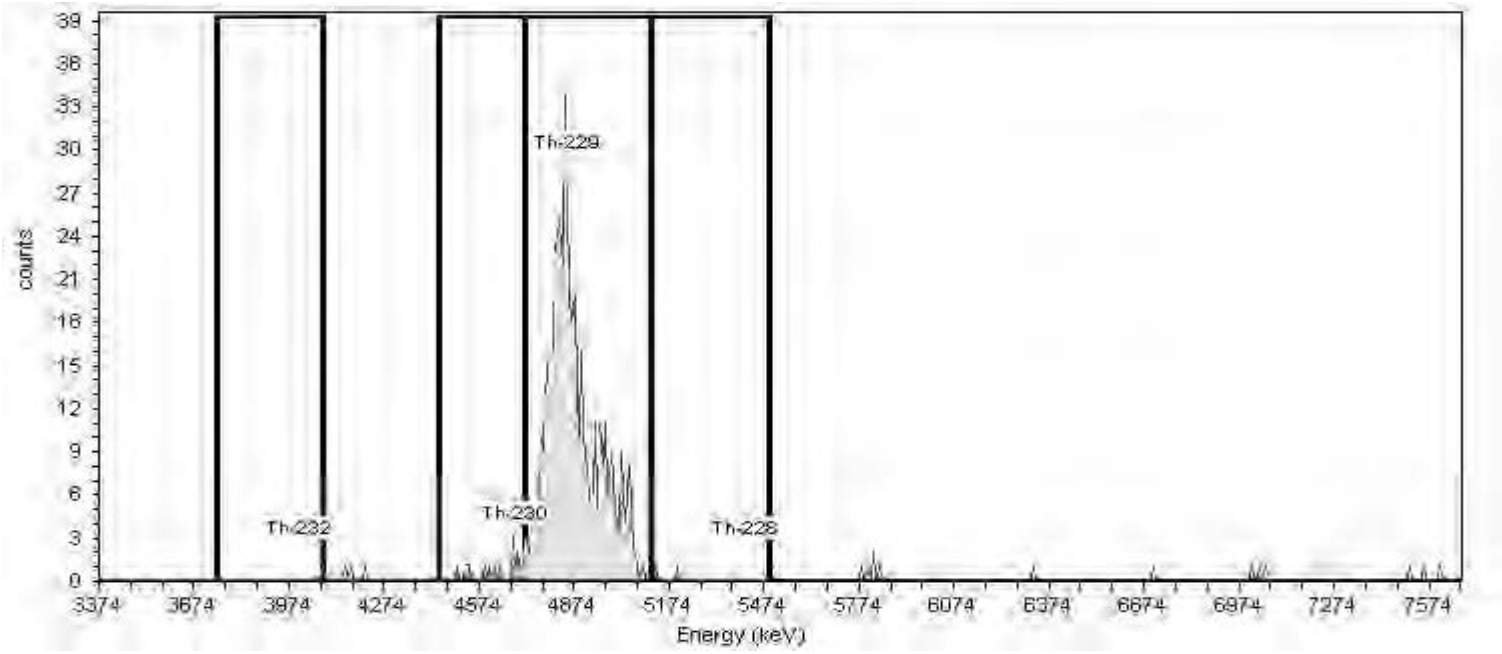
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 86.18%

Acquisition

Detector: AV3
Serial Number: 49-202 FF7
Acquisition Start Date: 8/10/2018 6:48:21PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/13/2018 12:11:20PM
Background Info: Sample: ICB;AV3; Det: AV3; Spectrum #2; Jul-13-2018 12:11

Calibration Name: IC-8877;AV3-05142018
Calibration Date: 5/14/2018 6:25:15PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 24.44% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/10/2018 6:45:52PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	.0	100.2	1	1.4140	-0.87	-0.021	pCi/L
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	27.9	99.7	18	1.8634	16.14	0.385	pCi/L
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	99.1	99.6	509	1.3009	507.70	10.440	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	23.6	99.8	2	1.3125	0.69	0.016	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
1:25:29PM 8/13/2018

Sample

Sample Name: MB 160-381166/1-A
SampleType: Blank
: MB 160-381166/1-A
Sample Collection Date: 8/9/2018 6:35:00PM

Spectrum #1 Analysis #1
Sample Volume : 0.5000L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 381166
AnalysisID: 736937

Analyst: 60040

Tracer

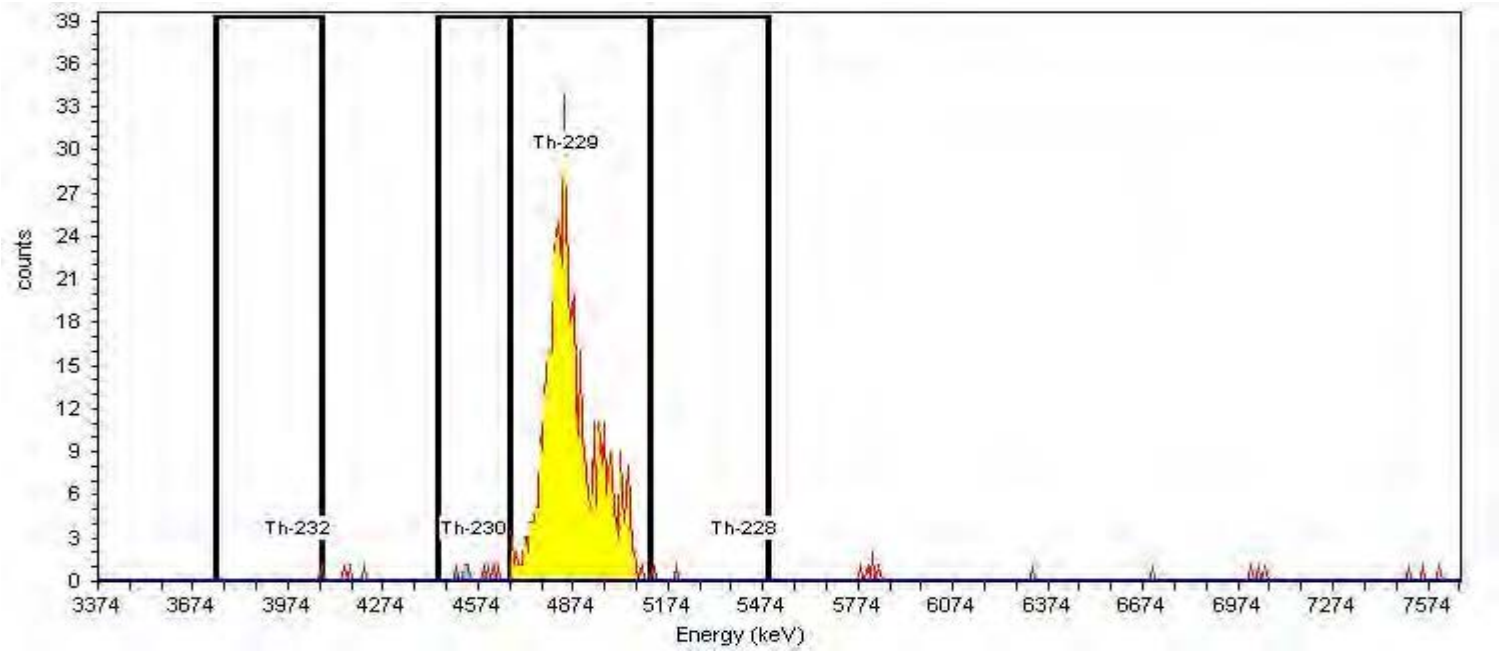
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 87.85%

Acquisition

Detector: AV3
Serial Number: 49-202 FF7
Acquisition Start Date: 8/10/2018 6:48:21PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/13/2018 12:11:20PM
Background Info: Sample: ICB;AV3; Det: AV3; Spectrum #2; Jul-13-2018 12:11

Calibration Name: IC-8877;AV3-05142018
Calibration Date: 5/14/2018 6:25:15PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.44% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/10/2018 6:45:52PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	.0	100.2	1	1.4140	-0.87	-0.020	pCi/L
Th-230	4560.2	4,687.5	-127.3	4448.3	4672.0	45.9	99.7	7	1.1250	5.88	0.137	pCi/L
Th-229	4848.0	4,845.3	2.7	4672.0	5119.5	99.1	99.8	520	1.6875	518.31	10.642	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	23.6	99.8	2	1.3125	0.69	0.016	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:50:25PM 8/10/2018

Sample

Sample Name: LCS 160-381166/2-A
SampleType: Control
: LCS 160-381166/2-A
Sample Collection Date: 8/9/2018 6:35:00PM

Spectrum #1 Analysis #1
Sample Volume : 0.5000L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 381166
AnalysisID: 736757

Analyst: 60040

Tracer

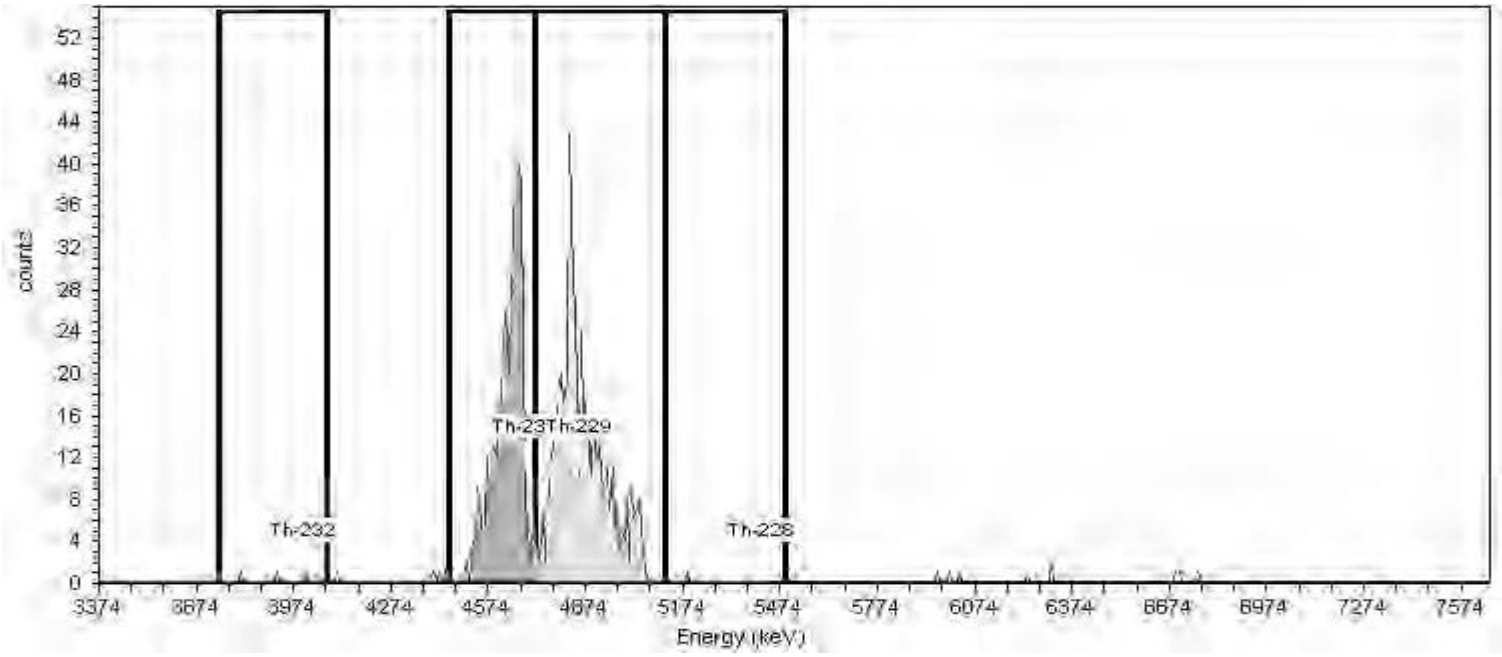
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 98.92%

Acquisition

Detector: AV4
Serial Number: 46-033Q4
Acquisition Start Date: 8/10/2018 6:48:23PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:42:06PM
Background Info: Sample: ICB;AV4; Det: AV4; Spectrum #1; Jul-12-2018 13:42

Calibration Name: IC-9520;AV4-05142018
Calibration Date: 5/14/2018 6:25:34PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 22.79% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/10/2018 6:45:51PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	44.5	100.2	3	1.3125	1.69	0.037	pCi/L
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	33.8	99.7	423	0.9375	422.31	9.405	pCi/L
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	87.6	99.6	545	1.5000	543.44	11.982	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	44.5	99.8	1	0.5625	0.44	0.010	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:50:34PM 8/10/2018

Sample

Sample Name: LCSD 160-381166/3-A
SampleType: Control
: LCSD 160-381166/3-A
Sample Collection Date: 8/9/2018 6:35:00PM

Spectrum #1 Analysis #1
Sample Volume : 0.5000L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 381166
AnalysisID: 736758

Analyst: 60040

Tracer

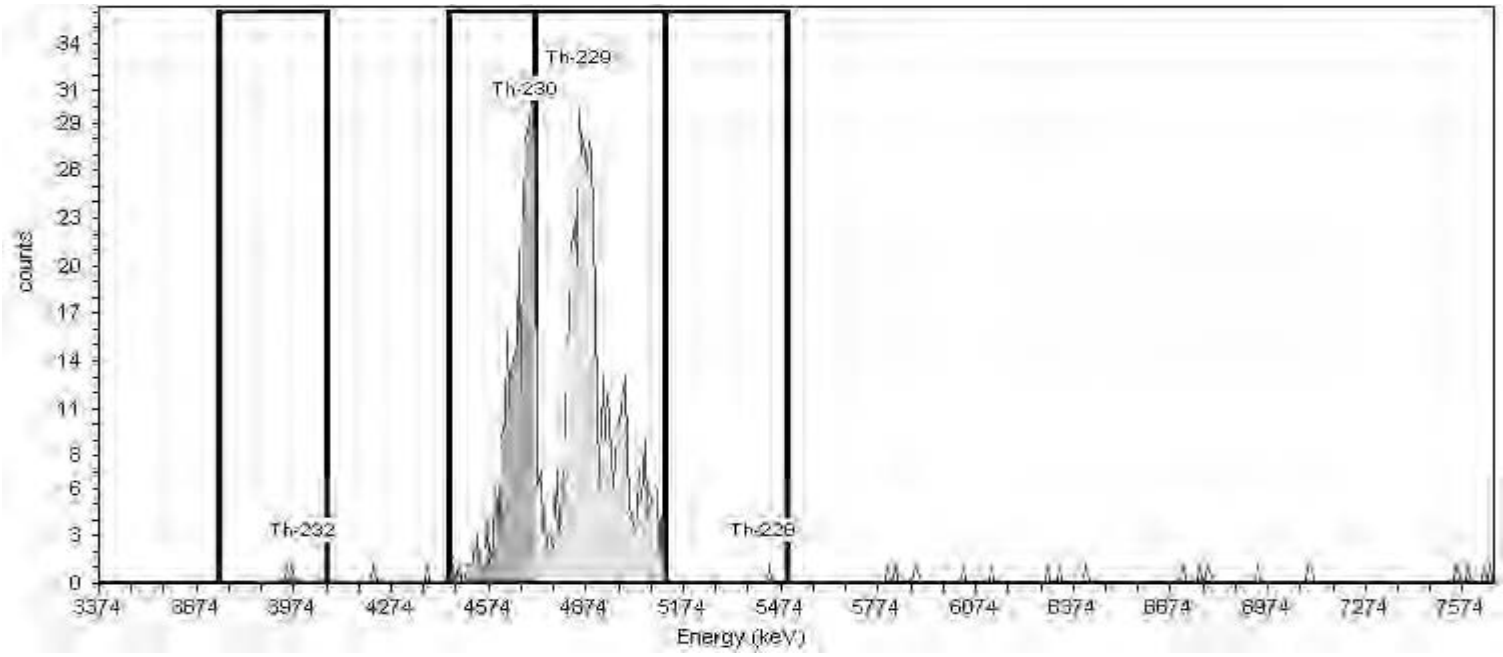
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 102.47%

Acquisition

Detector: AV7
Serial Number: 48-158EE5
Acquisition Start Date: 8/10/2018 6:48:25PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:27PM
Background Info: Sample: ICB;AV7; Det: AV7; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-9793;AV7-05142018
Calibration Date: 5/14/2018 6:26:13PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 22.98% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/10/2018 6:45:52PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	43.4	100.2	2	0.7500	1.25	0.027	pCi/L
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	344.4	99.7	322	0.3750	322.01	6.865	pCi/L
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	90.7	99.6	568	0.7500	567.63	12.413	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	39.8	99.8	1	1.6713	-0.67	-0.014	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
1:24:47PM 8/13/2018

Sample

Sample Name: LCSD 160-381166/3-A
SampleType: Control
: LCSD 160-381166/3-A
Sample Collection Date: 8/9/2018 6:35:00PM

Spectrum #1 Analysis #1
Sample Volume : 0.5000L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 381166
AnalysisID: 736936

Analyst: 60040

Tracer

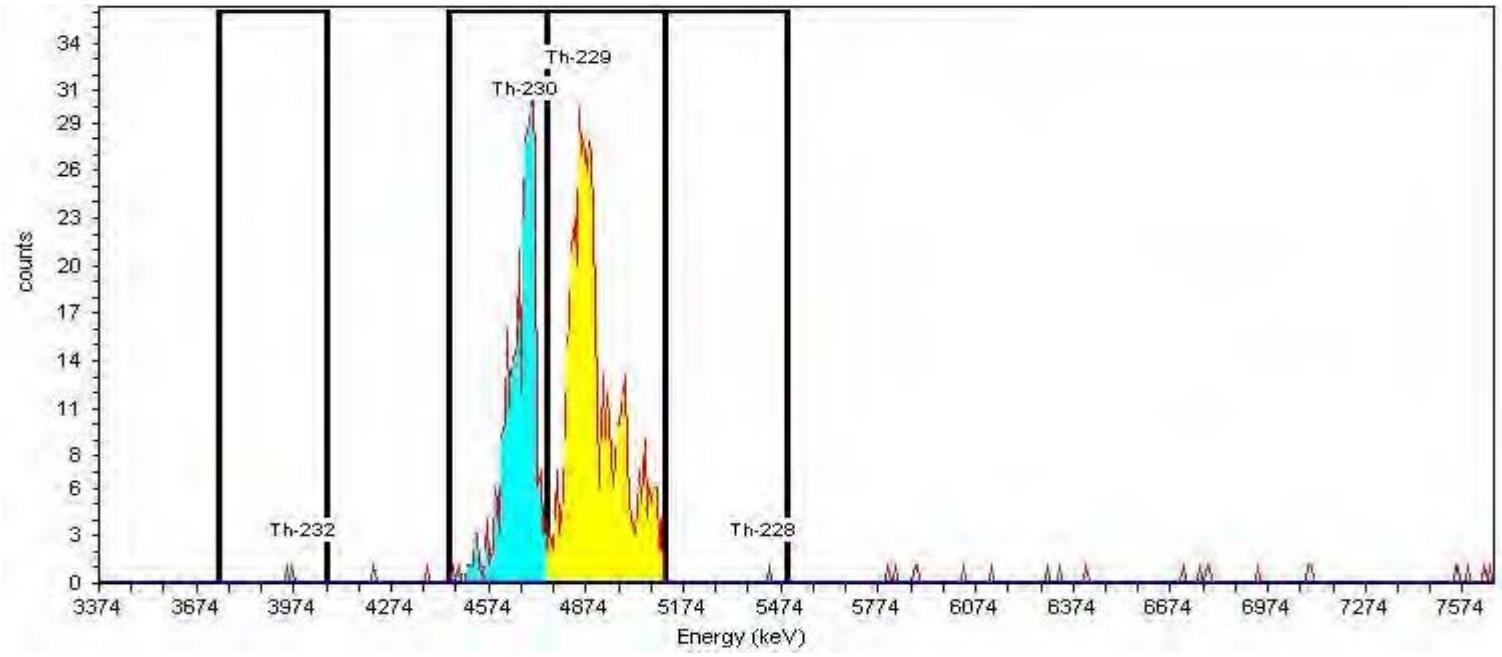
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 95.43%

Acquisition

Detector: AV7
Serial Number: 48-158EE5
Acquisition Start Date: 8/10/2018 6:48:25PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:27PM
Background Info: Sample: ICB;AV7; Det: AV7; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-9793;AV7-05142018
Calibration Date: 5/14/2018 6:26:13PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.98% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/10/2018 6:45:52PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	43.4	100.2	2	0.7500	1.25	0.028	pCi/L
Th-230	4688.0	4,687.5	0.5	4448.3	4754.1	43.4	99.7	345	0.7500	344.25	7.881	pCi/L
Th-229	4848.0	4,845.3	2.7	4754.1	5119.5	90.7	99.6	529	0.3750	528.63	11.560	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	39.8	99.8	1	1.6713	-0.67	-0.015	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:50:43PM 8/10/2018

Sample

Sample Name: 160-29476-H-1-A
SampleType: Sample
: 160-29476-H-1-A
Sample Collection Date: 7/11/2018 1:55:00PM

Spectrum #1 Analysis #1
Sample Volume : 0.5007L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 381166
AnalysisID: 736759

Analyst: 60040

Tracer

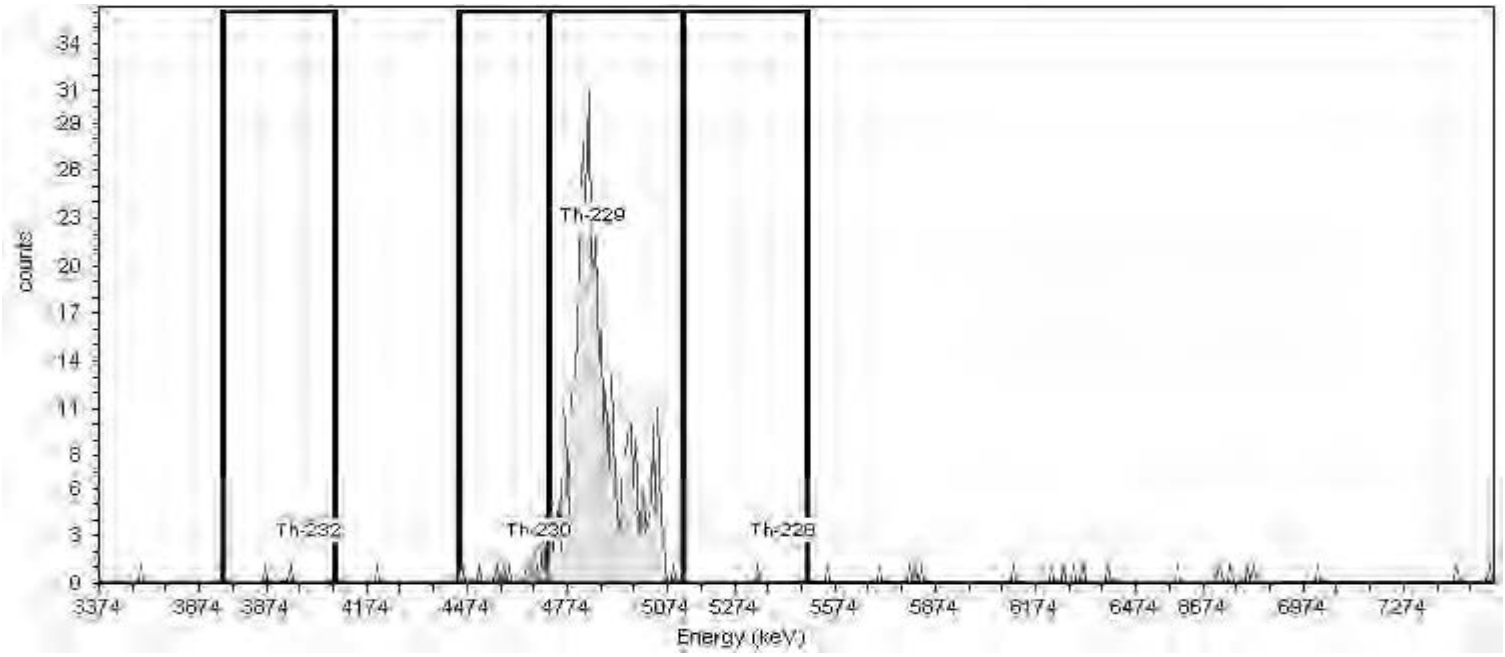
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 74.93%

Acquisition

Detector: AV8
Serial Number: 41-137Q6
Acquisition Start Date: 8/10/2018 6:48:27PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:28PM
Background Info: Sample: ICB;AV8; Det: AV8; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-9795;AV8-05142018
Calibration Date: 5/14/2018 6:26:27PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 25.96% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/10/2018 6:45:51PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	44.4	100.2	2	0.3750	1.63	0.042	pCi/L
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	38.2	99.7	16	1.8750	14.19	0.366	pCi/L
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	85.7	99.6	470	1.1250	468.94	9.064	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	44.5	99.8	1	0.7500	0.25	0.006	pCi/L

Method A-01-R U

Isotopic Uranium (Alpha Spectrometry) by Method A-01-R

Prep Batch: 377736

Preparation, Extraction Chromatography Resin Actinide Separation

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 377736

Lab ID: MB 160-377736/1-A
Client ID:
Sigma: 2
Analyzed: 08/03/18 14:29
Detector: AV147
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-234	0.02174	0.0739	0.0739	U	pCi/L	1.00	0.169	380260
Uranium-235	-0.01739	0.0201	0.0201	U	pCi/L	1.00	0.176	380260
Uranium-238	-0.01395	0.0161	0.0162	U	pCi/L	1.00	0.141	380260

Tracer	MB Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Uranium-232	11.23	0.952	1.34		pCi/L	0.177	13.8	81.0	30 - 110

Lab ID: LCS 160-377736/2-A
Client ID:
Sigma: 2
Analyzed: 08/03/18 14:29
Detector: AV148
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-234	12.62	1.18	1.59		pCi/L	1.00	0.203	380261
Uranium-238	13.18	1.20	1.63		pCi/L	1.00	0.125	380261

Tracer	LCS Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Uranium-232	9.595	0.855	1.18		pCi/L	0.155	13.8	69.2	30 - 110

Lab ID: 160-29476-1
Client ID: CRC-MW-1
Sigma: 2
Analyzed: 08/06/18 22:38
Detector: AV147
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 720

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-234	183	4.60	16.1		pCi/L	1.00	0.353	380834
Uranium-235	9.10	1.15	1.38		pCi/L	1.00	0.342	380834
Uranium-238	185	4.62	16.2		pCi/L	1.00	0.274	380834

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Uranium-232	2.41	0.224	0.302	X	pCi/L	0.0857	13.8	17.4	30 - 110

Lab ID: 160-29476-1 DU
Client ID: CRC-MW-1
Sigma: 2
Analyzed: 08/06/18 22:38
Detector: AV148
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 720

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-234	195.3	4.66	17.1		pCi/L	1.00	0.380	380835
Uranium-235	10.52	1.21	1.50		pCi/L	1.00	0.234	380835
Uranium-238	195.2	4.65	17.0		pCi/L	1.00	0.188	380835

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 377736

Tracer	DU Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Uranium-232	2.367	0.215	0.293	X	pCi/L	0.0734	13.8	17.1	30 - 110

Quality Control Summary

Method Blank ID:	Analyte	Parent Result	Spike Added	MB Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
MB 160-377736/1-A	Uranium-234			0.02174	U	pCi/L							.58828424
MB 160-377736/1-A	Uranium-235			-0.01739	U	pCi/L							-1.7274859 1
MB 160-377736/1-A	Uranium-238			-0.01395	U	pCi/L							-1.7274859 1

Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-377736/2-A	Uranium-234		12.7	12.62		pCi/L	99	84 - 120					-.0999662 896
LCS 160-377736/2-A	Uranium-238		13.0	13.18		pCi/L	101	83 - 121					.14146055 71

Duplicate ID:	Analyte	Parent Result	Spike Added	DU Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
160-29476-1	Uranium-234	183		195.3		pCi/L			6	0.36	1.03	1	
160-29476-1	Uranium-235	9.10		10.52		pCi/L			14	0.49	1.39	1	
160-29476-1	Uranium-238	185		195.2		pCi/L			5	0.29	0.83	1	

Glossary:

Ts = Count Duration, Sample

ALPHA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Batch Number: 377736 Batch Start Date: 07/24/18 18:01 Batch Analyst: Fox, Kassie N

Batch Method: ExtChrom Batch End Date: 08/03/18 08:24

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	U-232 00040	UNAT 00014			
MB 160-377736/1		ExtChrom, A-01-R		500 mL	0.2 mL				
LCS 160-377736/2		ExtChrom, A-01-R		500 mL	0.2 mL	0.2 mL			
160-29476-G-1	CRC-MW-1	ExtChrom, A-01-R	T	500.84 mL	0.2 mL				
160-29476-G-1 DU	CRC-MW-1	ExtChrom, A-01-R	T	500.49 mL	0.2 mL				

Batch Notes	
Balance ID	1125353055
Analyst ID - Column	nmn
Column Date	8/2/18
Analyst ID - CoPrecipitation	nmn
CoPrecipitation Date	8/3/18
Pipette ID	RAD117
Analyst ID - Reagent Drop Witness	CMM per KNF
Analyst ID - Reagent Drop	KNF
SOP Number	ST-RC-0100, ST-RC-0242

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:29:19PM 8/3/2018

Sample

Sample Name: MB 160-377736/1-A Type: Blank
Spectrum #1 Analysis #1
: MB 160-377736/1-A
Sample Collection Date: 8/3/2018 8:27:00AM
Comment:

Sample Volume : 0.50 Sample Units: L
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 377736
AnalysisResultsID: 224488
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

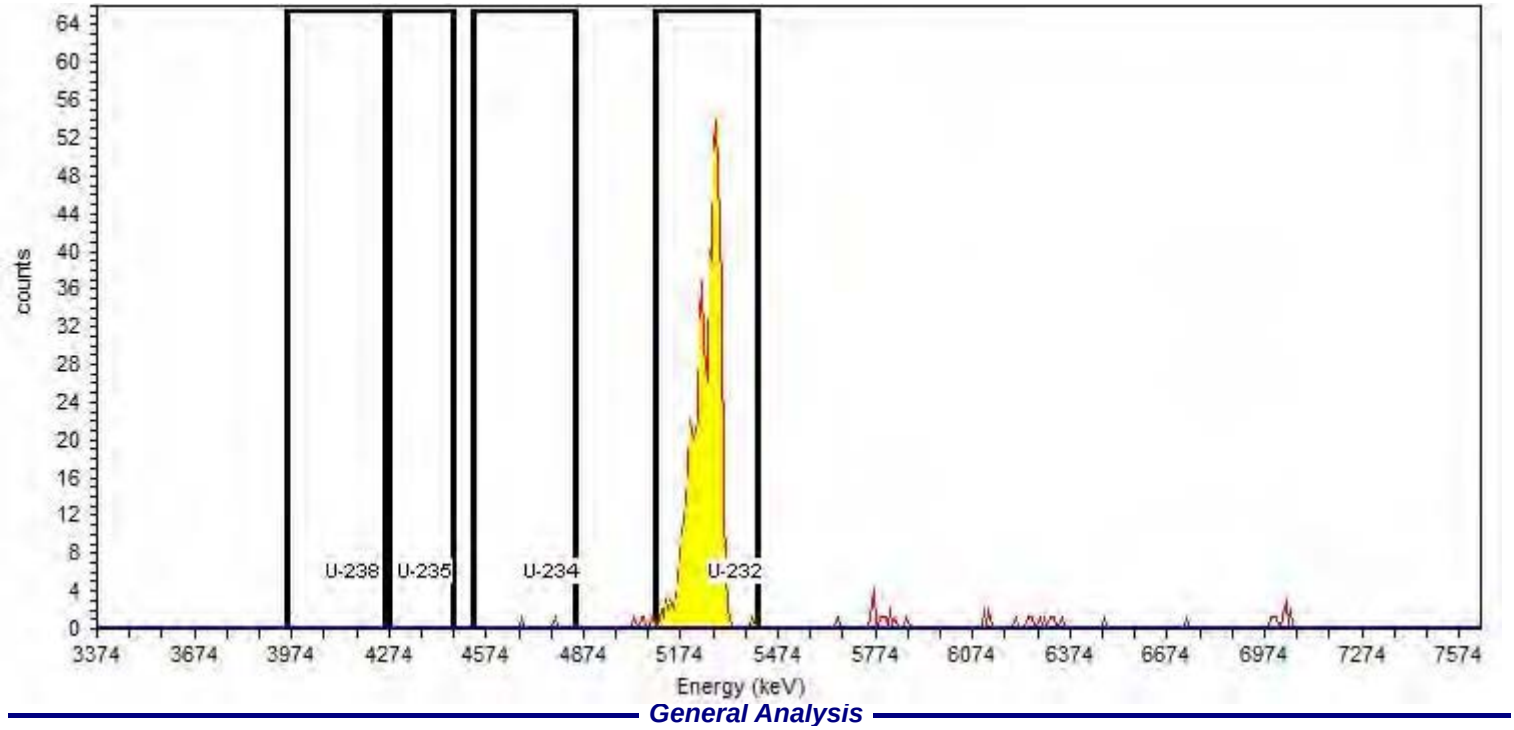
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM / mL x (Vol.) 0.20 mL = 16.45 DPM
Tracer Ref. Date: 8/25/2011 11:47:15AM

Tracer Nuclide: U-232
Tracer Recovery: 80.98%

Acquisition

Detector: AV147 SN: 50-05/R1
Acquisition Start Date: 8/3/2018 2:29:10PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/21/2018 9:28:12PM
Bkgd Info: Sample: ICB;AV147; Det: AV147; Spectrum #1; 7/21/2018 9:28:12 PM

Energy Calibration: IC-7107;AV147-20171113
Efficiency Calibration:IC-7107;AV147-20171113
Calibration Date: 11/13/2017 12:21:03PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.92% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction:8/3/2018 2:27:55PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	.0	100.0	0	0.5625	-0.56	-1.395E-002	pCi/L
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	.0	80.2	0	0.5625	-0.56	-1.739E-002	pCi/L
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	44.5	99.8	2	1.1250	0.88	2.174E-002	pCi/L
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	92.7	100.1	562	2.6250	559.38	1.200E+001	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:30:33PM 8/3/2018

Sample

Sample Name: LCS 160-377736/2-A Type: Control
Spectrum #1 Analysis #1
: LCS 160-377736/2-A
Sample Collection Date: 8/3/2018 8:27:00AM
Comment:

Sample Volume : 0.50 Sample Units: L
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 377736
AnalysisResultsID: 224489
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

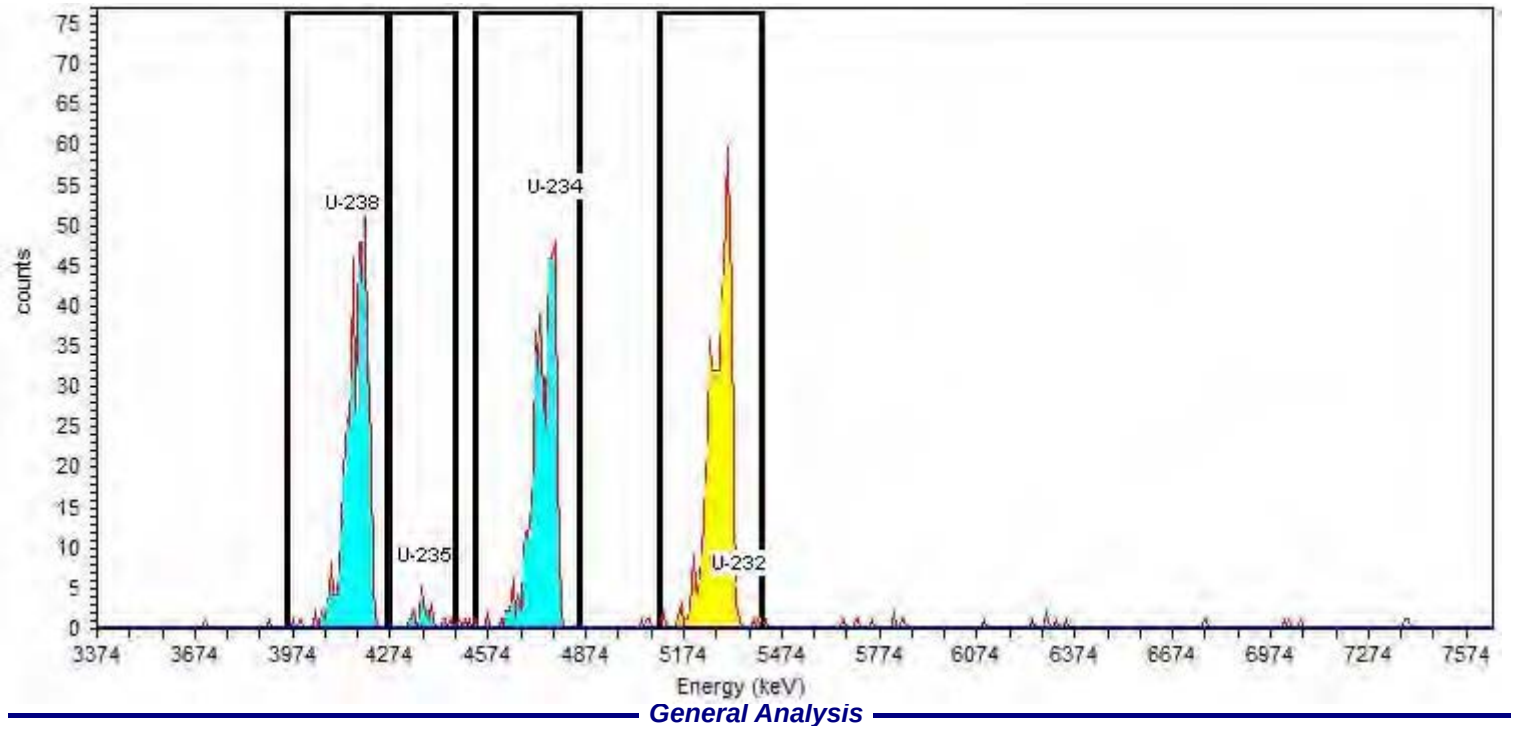
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM / mL x (Vol.) 0.20 mL = 16.45 DPM
Tracer Ref. Date: 8/25/2011 11:47:15AM

Tracer Nuclide: U-232
Tracer Recovery: 69.22%

Acquisition

Detector: AV148 SN: 50-05/R2
Acquisition Start Date: 8/3/2018 2:29:10PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/21/2018 9:28:13PM
Bkgd Info: Sample: ICB;AV148; Det: AV148; Spectrum #1; 7/21/2018 9:28:13 PM

Energy Calibration: IC-8874;AV148-20171113a
Efficiency Calibration:IC-8874;AV148-20171113a
Calibration Date: 11/13/2017 12:24:55PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.37% +/- 0.38% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction:8/3/2018 2:27:54PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV Expected	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	72.0	100.0	481	0.1875	480.81	1.318E+001	pCi/L
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	19.9	80.2	23	0.1875	22.81	7.799E-001	pCi/L
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	85.3	99.8	461	1.5000	459.50	1.262E+001	pCi/L
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	81.5	100.1	508	2.0625	505.94	1.026E+001	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:38:28AM 8/7/2018

Sample

Sample Name: 160-29476-G-1-C Type: Sample
Spectrum #1 Analysis #1
: 160-29476-G-1-C
Sample Collection Date: 7/11/2018 1:55:00PM
Comment:

Sample Volume : 0.50 Sample Units: L
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 377736
AnalysisResultsID: 224738
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

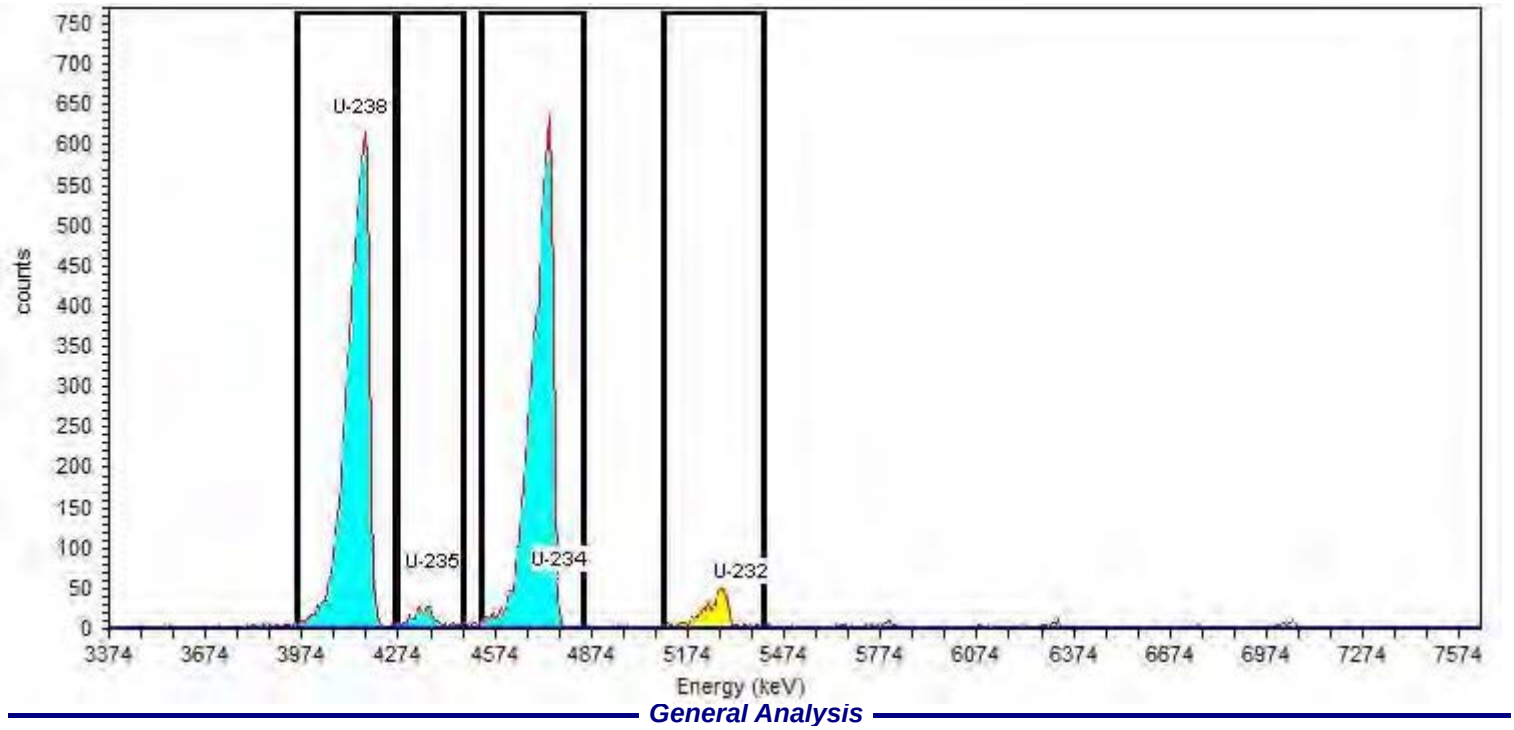
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM / mL x (Vol.) 0.20 mL = 16.45 DPM
Tracer Ref. Date: 8/25/2011 11:47:15AM

Tracer Nuclide: U-232
Tracer Recovery: 17.43%

Acquisition

Detector: AV147 SN: 50-05/R1
Acquisition Start Date: 8/6/2018 10:38:22PM
Live Time: 720.00 min.
Real Time: 720.01 min.
Background Date: 7/21/2018 9:28:12PM
Bkgd Info: Sample: ICB;AV147; Det: AV147; Spectrum #1; 7/21/2018 9:28:12 PM

Energy Calibration: IC-7107;AV147-20171113
Efficiency Calibration:IC-7107;AV147-20171113
Calibration Date: 11/13/2017 12:21:03PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.92% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction:8/6/2018 10:37:19PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	75.8	100.0	6451	2.2500	6448.75	1.855E+002	pCi/L
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	59.2	80.2	256	2.2500	253.75	9.099E+000	pCi/L
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	76.2	99.8	6362	4.5000	6357.50	1.832E+002	pCi/L
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	76.8	100.1	492	10.5000	481.50	2.578E+000	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:38:40AM 8/7/2018

Sample

Sample Name: 160-29476-G-1-D DU Type: Sample
Spectrum #1 Analysis #1
: 160-29476-G-1-D DU
Sample Collection Date: 7/11/2018 1:55:00PM
Comment:

Sample Volume : 0.50 Sample Units: L
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: 377736
AnalysisResultsID: 224739
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

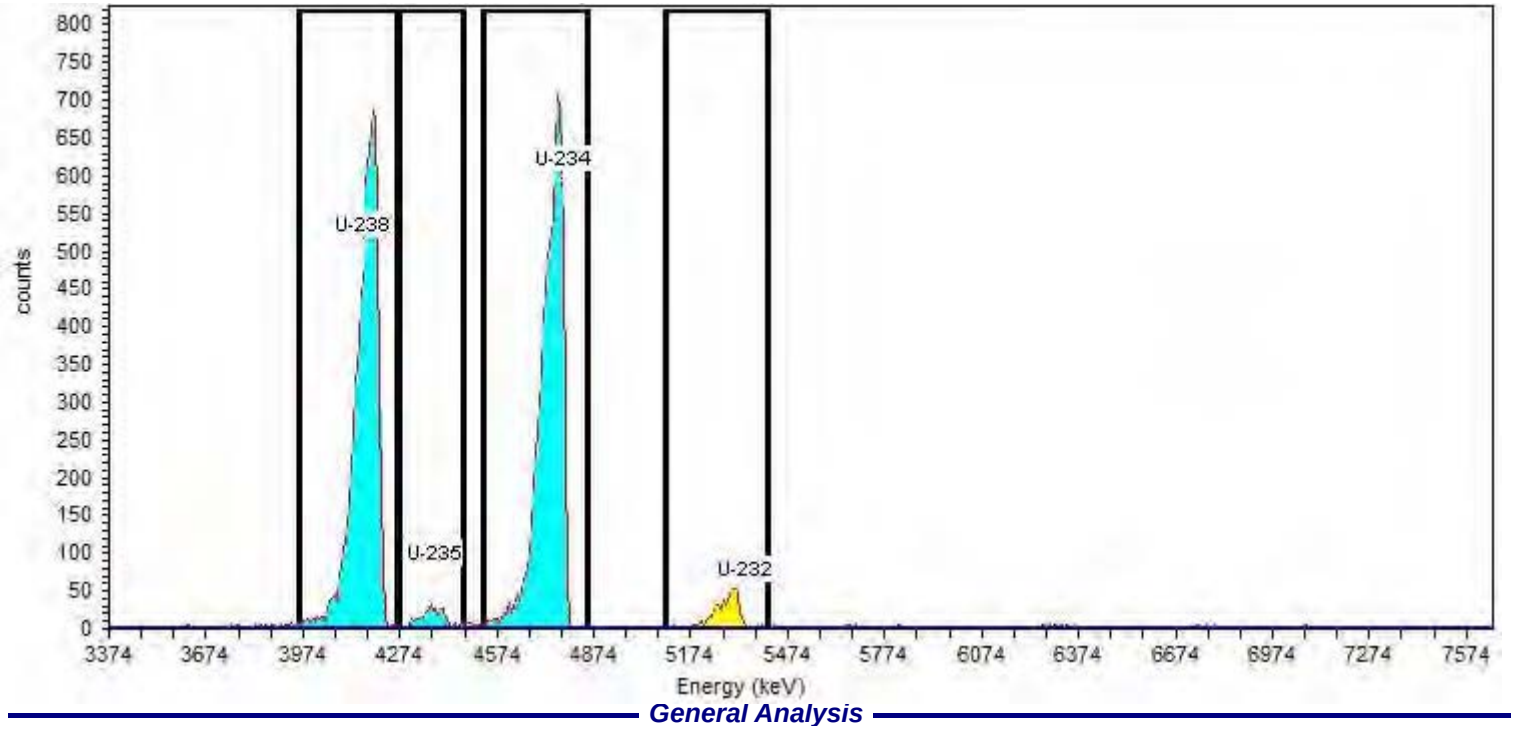
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM / mL x (Vol.) 0.20 mL = 16.45 DPM
Tracer Ref. Date: 8/25/2011 11:47:15AM

Tracer Nuclide: U-232
Tracer Recovery: 17.10%

Acquisition

Detector: AV148 SN: 50-05/R2
Acquisition Start Date: 8/6/2018 10:38:22PM
Live Time: 720.00 min.
Real Time: 720.07 min.
Background Date: 7/21/2018 9:28:13PM
Bkgd Info: Sample: ICB;AV148; Det: AV148; Spectrum #1; 7/21/2018 9:28:13 PM

Energy Calibration: IC-8874;AV148-20171113a
Efficiency Calibration:IC-8874;AV148-20171113a
Calibration Date: 11/13/2017 12:24:55PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.37% +/- 0.38% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction:8/6/2018 10:37:19PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	70.9	100.0	7042	0.7500	7041.25	1.952E+002	pCi/L
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	85.6	80.2	305	0.7500	304.25	1.052E+001	pCi/L
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	76.6	99.8	7034	6.0000	7028.00	1.953E+002	pCi/L
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	76.2	100.1	508	8.2500	499.75	2.531E+000	pCi/L

Daily Checks

Alpha Spectroscopy Daily Pulser Check

Analysis Date: 08/03/18

		Gross Counts			FWHM (keV)			Pulser Center			Energy (keV)		
Detector	**Analysis Date**	**Result**	**Criteria**	**P/F**	**Result**	**Criteria**	**P/F**	**Result**	**Criteria**	**P/F**	**Result**	**Criteria**	**P/F**
AV147	08/03/18 12:32	5999	5685.0 - 6283.4	Pass	19.6	10 - 20	Pass	215.9	211.9 - 221.9	Pass	4977	4944.8 - 5024.8	Pass
AV148	08/03/18 12:32	6013	5703.5 - 6303.9	Pass	14.4	10 - 20	Pass	222.0	216.9 - 226.9	Pass	5022	4981.7 - 5061.7	Pass

Analysis Date: 08/06/18

		Gross Counts			FWHM (keV)			Pulser Center			Energy (keV)		
Detector	**Analysis Date**	**Result**	**Criteria**	**P/F**	**Result**	**Criteria**	**P/F**	**Result**	**Criteria**	**P/F**	**Result**	**Criteria**	**P/F**
AV147	08/06/18 21:31	6002	5685.0 - 6283.4	Pass	19.8	10 - 20	Pass	216.0	211.9 - 221.9	Pass	4978	4944.8 - 5024.8	Pass
AV148	08/06/18 21:31	5979	5703.5 - 6303.9	Pass	16.2	10 - 20	Pass	222.0	216.9 - 226.9	Pass	5023	4981.7 - 5061.7	Pass

Analysis Date: 08/10/18

		Gross Counts			FWHM (keV)			Pulser Center			Energy (keV)		
Detector	**Analysis Date**	**Result**	**Criteria**	**P/F**	**Result**	**Criteria**	**P/F**	**Result**	**Criteria**	**P/F**	**Result**	**Criteria**	**P/F**
AV3	08/10/18 14:23	7228	6900.2 - 7626.5	Pass	13.2	10 - 20	Pass	225.0	220.0 - 230.0	Pass	5045	5004.9 - 5084.9	Pass
AV4	08/10/18 14:23	7393	7013.8 - 7752.1	Pass	13.6	10 - 20	Pass	225.0	220.0 - 230.0	Pass	5045	5005.1 - 5085.1	Pass
AV7	08/10/18 14:23	7342	6979.5 - 7714.2	Pass	16.5	10 - 20	Pass	233.2	226.3 - 236.3	Pass	5106	5052.3 - 5132.3	Pass
AV8	08/10/18 14:23	7378	7015.5 - 7753.9	Pass	14.9	10 - 20	Pass	224.0	219.0 - 229.0	Pass	5038	4997.4 - 5077.4	Pass

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
2:37:12PM 8/10/2018

Sample

Sample Name: Pulser;AV3
Comment:

Spectrum #25 Analysis #1

Batch

Batch Name: July2018a
Description:

Analyst: 60040

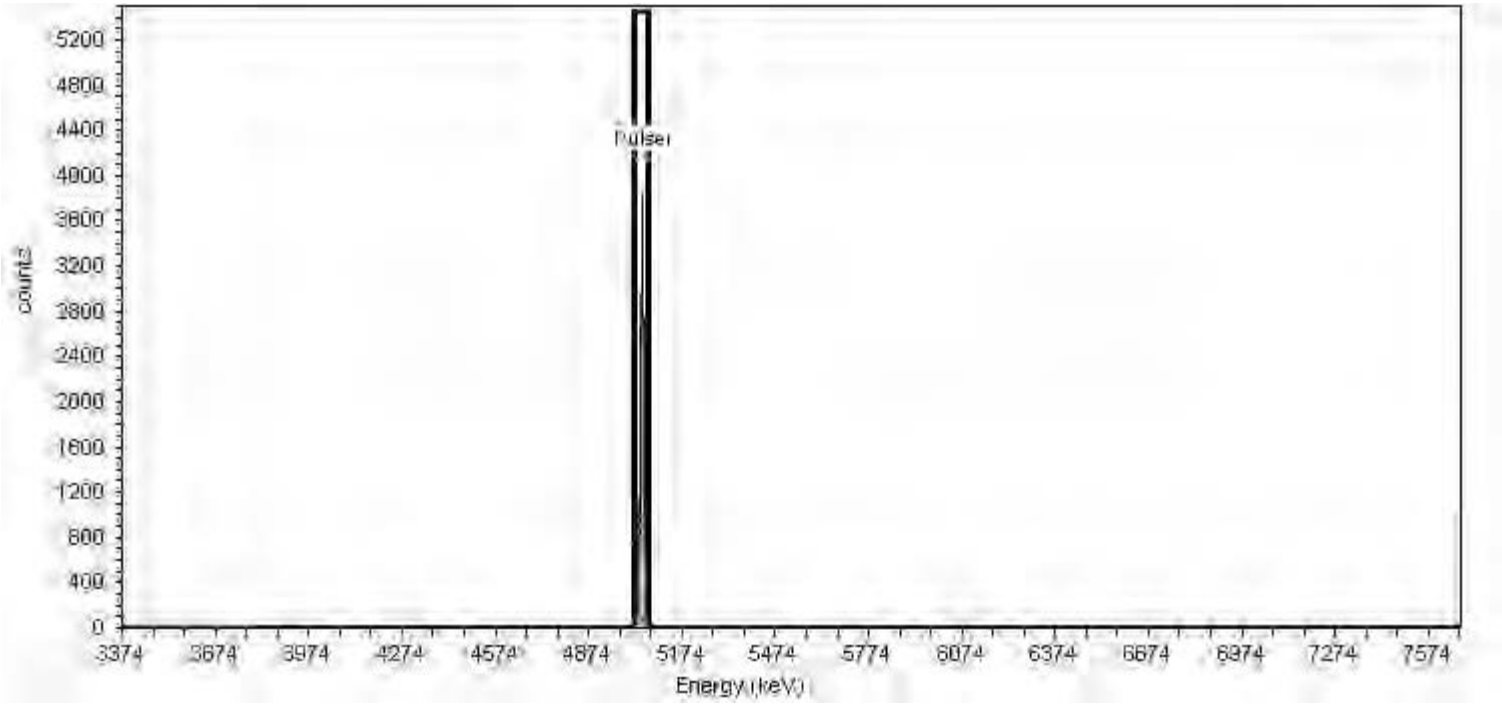
Acquisition

Detector: AV3 , SN: 49-202 FF7
Acquisition Start Date: 8/10/2018 2:23:02PM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-8877;AV3-05142018
Calibration Date: 5/14/2018 6:25:15PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.44% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5045.093	5022.652	5067.534	13.18	7,254.99	7,227.85

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
2:37:30PM 8/10/2018

Sample

Sample Name: Pulser;AV4
Comment:

Spectrum #25 Analysis #1

Batch

Batch Name: July2018a
Description:

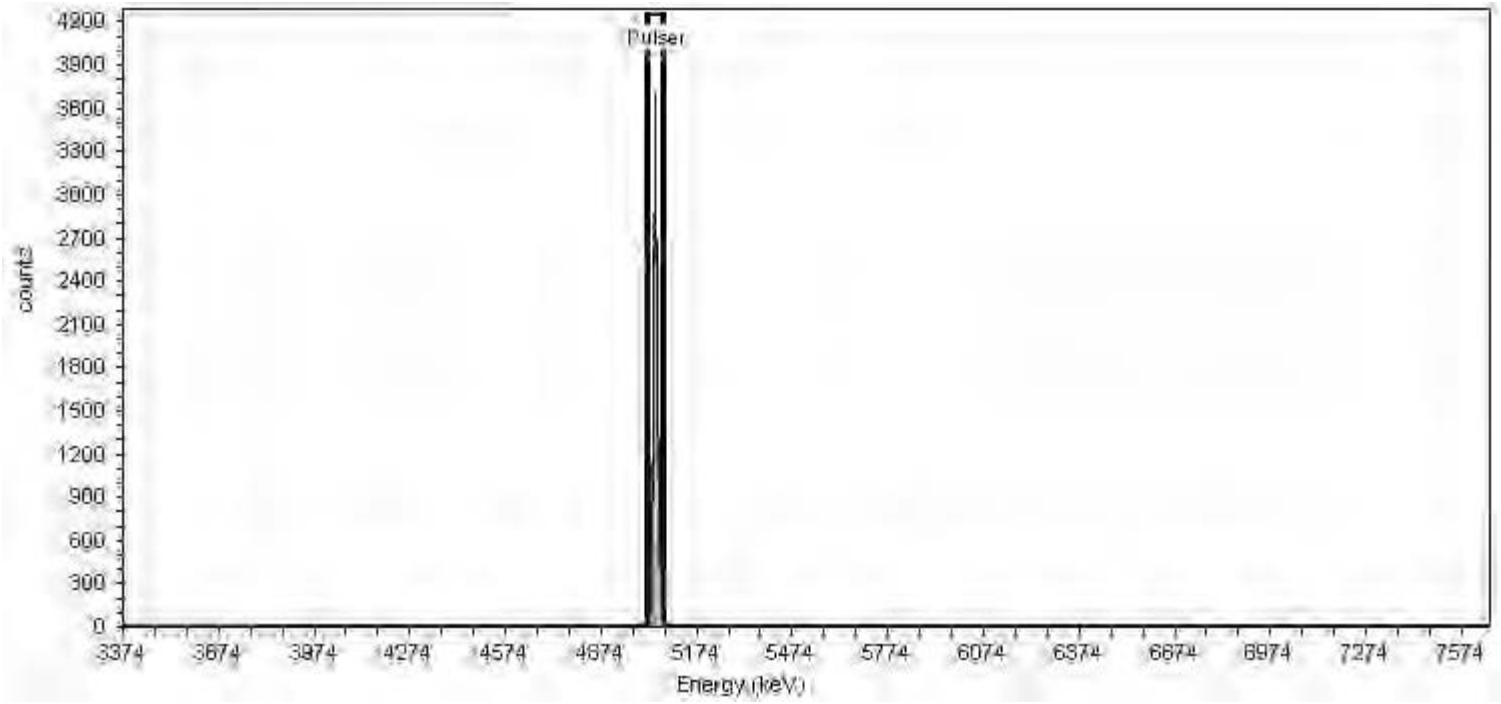
Analyst: 60040

Acquisition

Detector: AV4 , SN: 46-033Q4
Acquisition Start Date: 8/10/2018 2:23:03PM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-9520;AV4-05142018
Calibration Date: 5/14/2018 6:25:34PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 22.79% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5045.064	5021.841	5068.286	13.64	7,246.35	7,393.27

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
2:37:39PM 8/10/2018

Sample

Sample Name: Pulser;AV7
Comment:

Spectrum #25 Analysis #1

Batch

Batch Name: July2018a
Description:

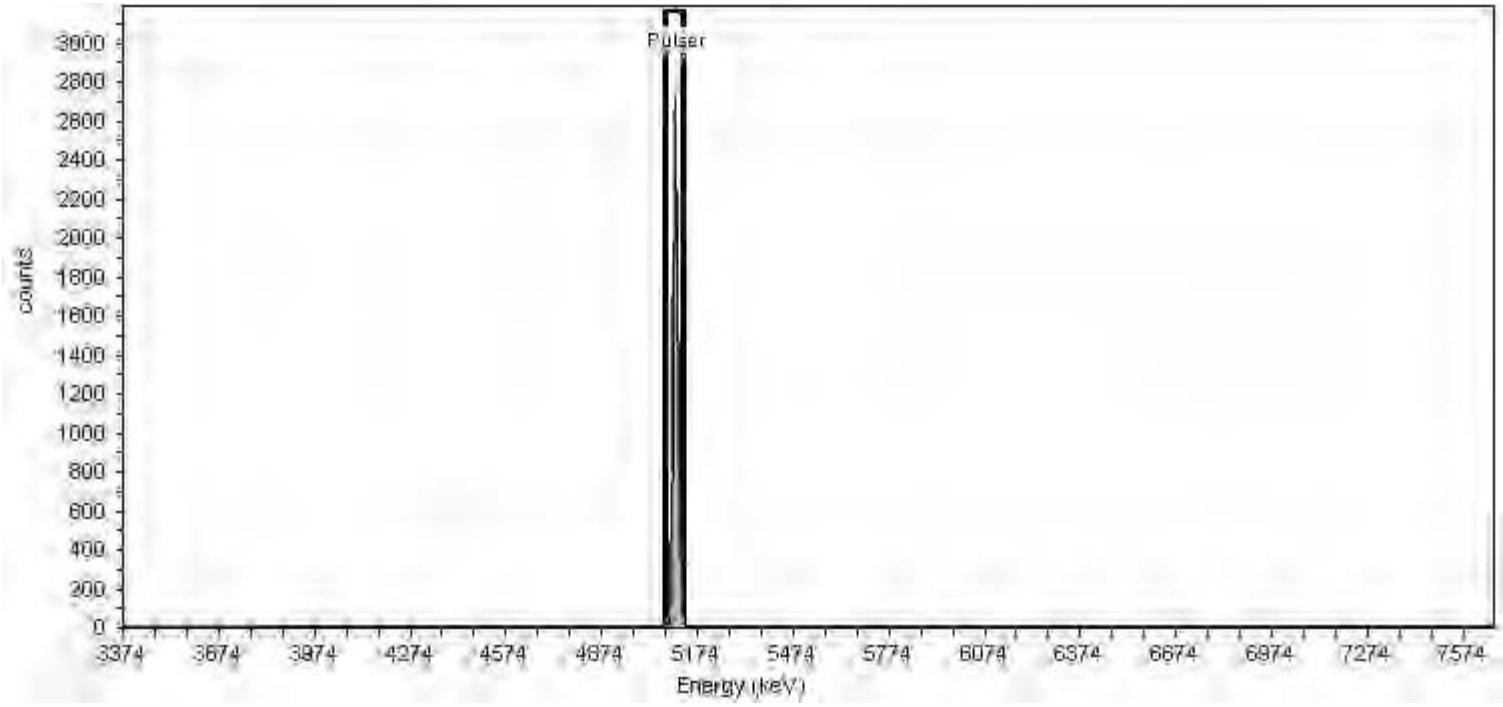
Analyst: 60040

Acquisition

Detector: AV7 , SN: 48-158EE5
Acquisition Start Date: 8/10/2018 2:23:04PM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-9793;AV7-05142018
Calibration Date: 5/14/2018 6:26:13PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 22.98% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5105.754	5077.745	5133.763	16.46	6,426.71	7,341.53

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
2:37:48PM 8/10/2018

Sample

Sample Name: Pulser;AV8
Comment:

Spectrum #25 Analysis #1

Batch

Batch Name: July2018a
Description:

Analyst: 60040

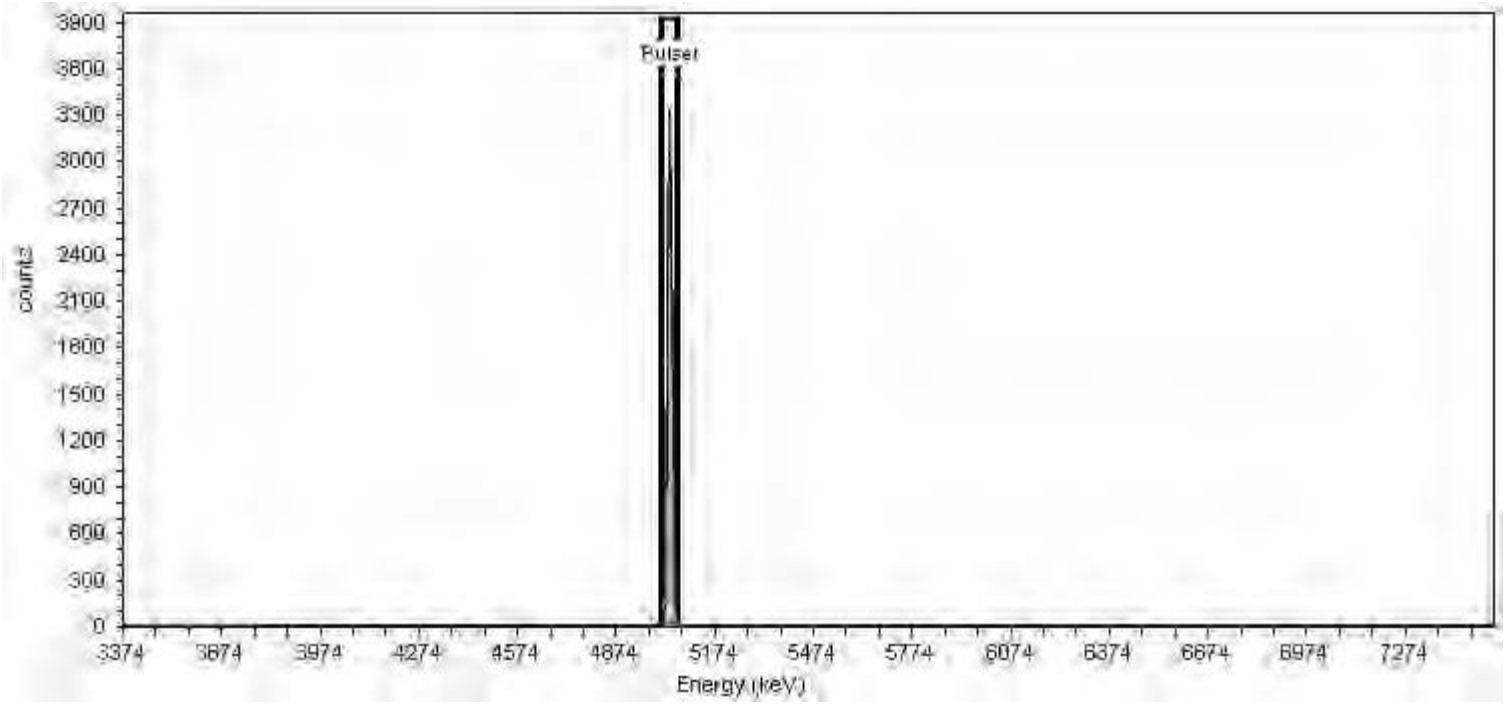
Acquisition

Detector: AV8 , SN: 41-137Q6
Acquisition Start Date: 8/10/2018 2:23:06PM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-9795;AV8-05142018
Calibration Date: 5/14/2018 6:26:27PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 25.96% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5037.807	5012.483	5063.130	14.88	7,140.19	7,377.82

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:33:41PM 8/3/2018

Sample

Sample Name: Pulser;AV147
Comment:

Spectrum #7 Analysis #1

Batch

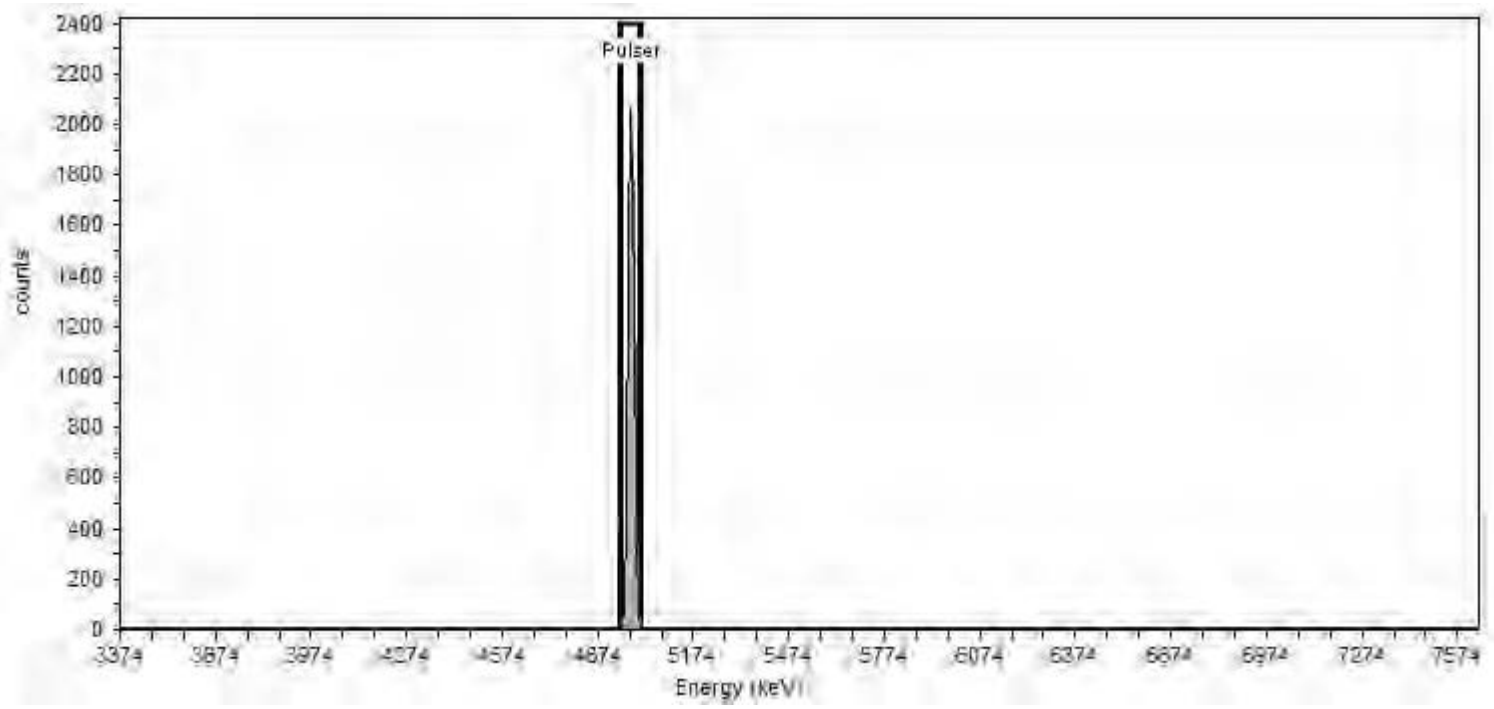
Batch Name: July2018a
Description:

Acquisition

Detector: AV147 , SN: 50-05/R1
Acquisition Start Date: 8/3/2018 12:32:39PM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-7107;AV147-20171113
Calibration Date: 11/13/2017 12:21:03PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	4977.175	4943.800	5010.551	19.61	5,826.93	5,999.39

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:32:41PM 8/6/2018

Sample

Sample Name: Pulser;AV147
Comment:

Spectrum #9 Analysis #1

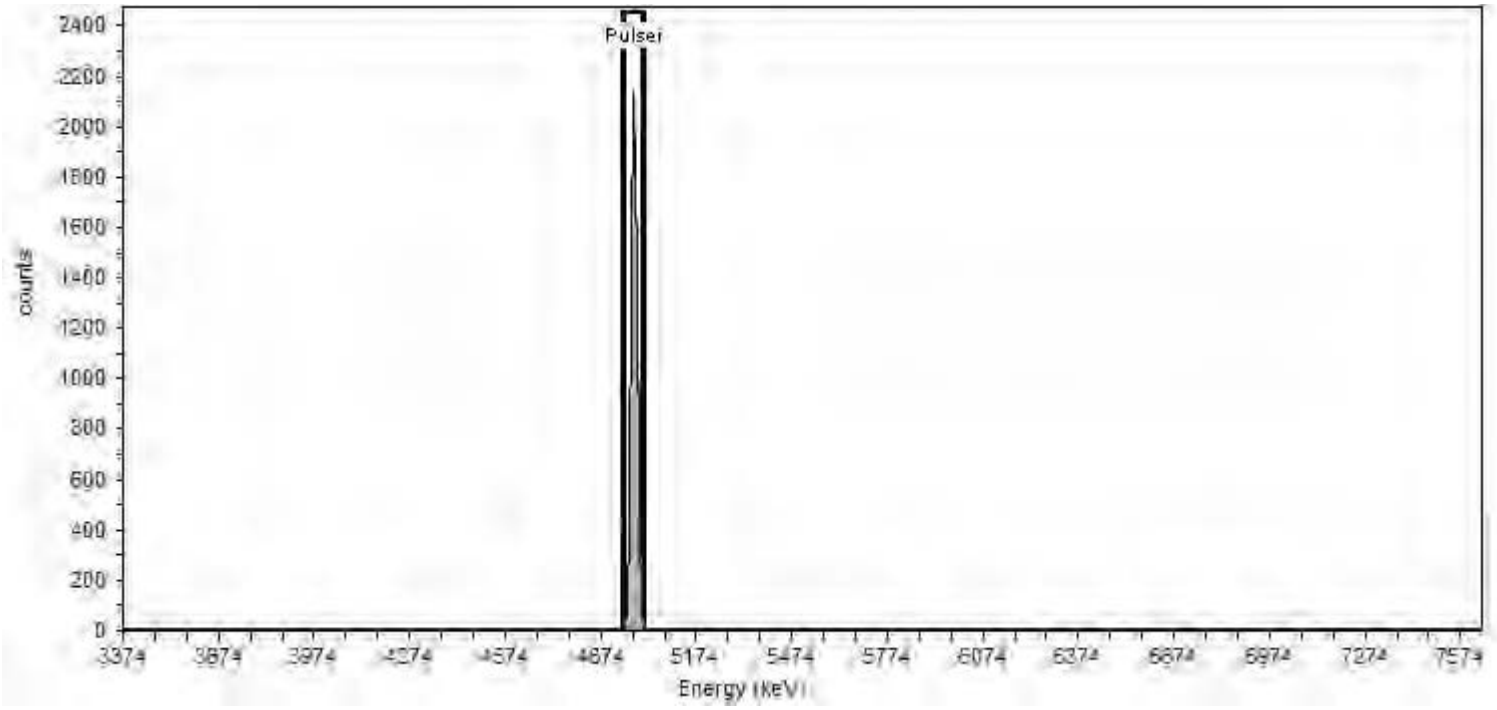
Batch

Batch Name: July2018a
Description:

Acquisition

Detector: AV147 , SN: 50-05/R1
Acquisition Start Date: 8/6/2018 9:31:26PM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-7107;AV147-20171113
Calibration Date: 11/13/2017 12:21:03PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	4977.693	4943.959	5011.428	19.82	6,073.82	6,002.37

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:45:45PM 8/3/2018

Sample

Sample Name: Pulser;AV148
Comment:

Spectrum #7 Analysis #1

Batch

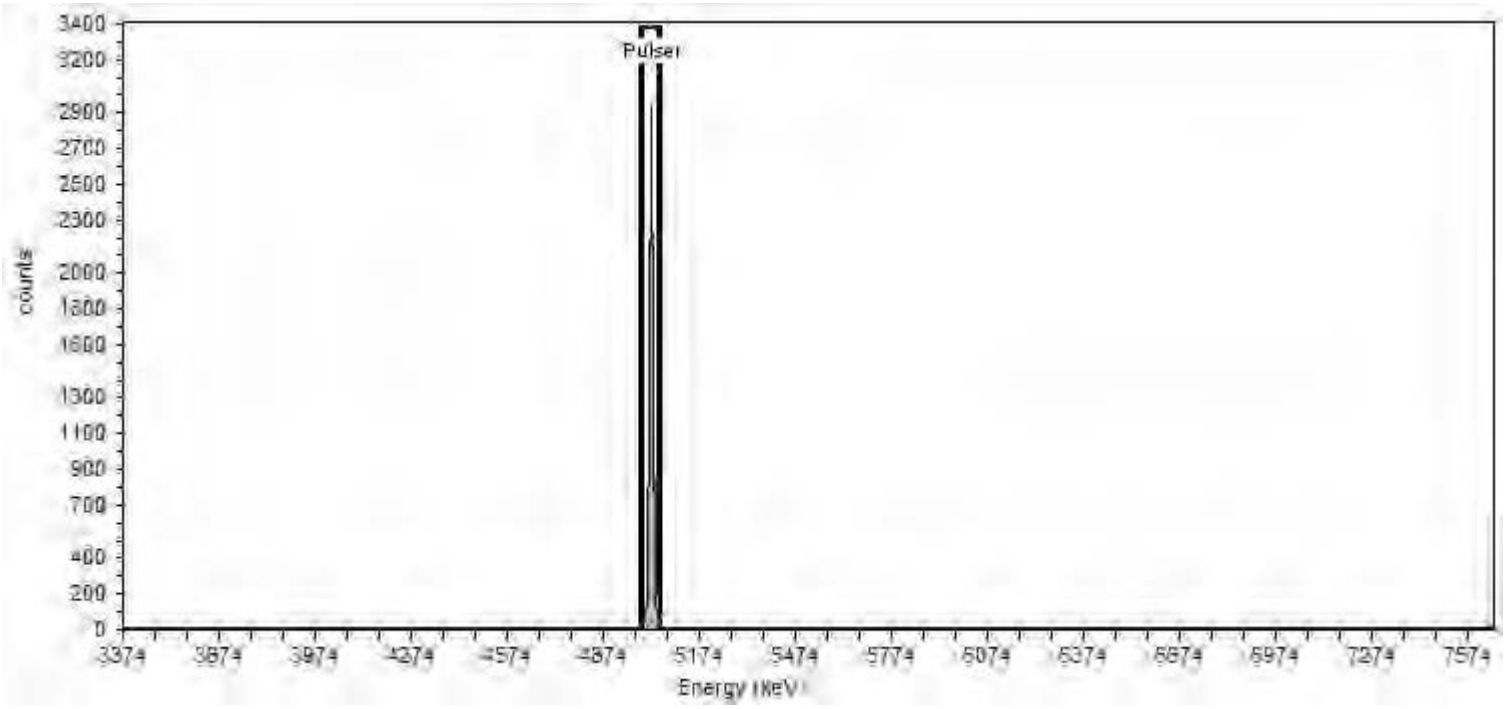
Batch Name: July2018a
Description:

Acquisition

Detector: AV148 , SN: 50-05/R2
Acquisition Start Date: 8/3/2018 12:32:34PM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-8874;AV148-20171113a
Calibration Date: 11/13/2017 12:24:55PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5022.415	4997.835	5046.995	14.44	6,077.66	6,012.63

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:42:32PM 8/6/2018

Sample

Sample Name: Pulser;AV148 Spectrum #9 Analysis #1
Comment:

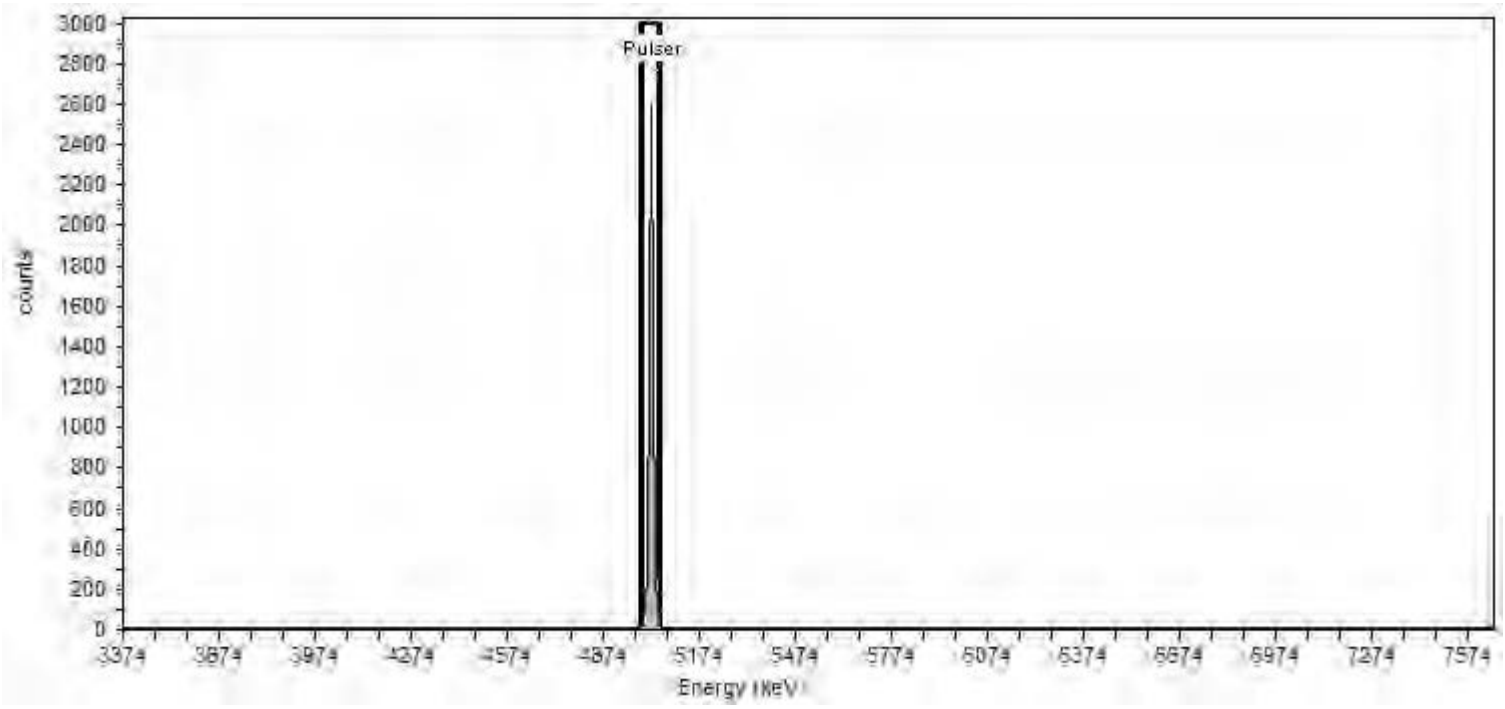
Batch

Batch Name: July2018a
Description:

Acquisition

Detector: AV148 , SN: 50-05/R2
Acquisition Start Date: 8/6/2018 9:31:26PM
Live Time: 1.00 min.
Real Time: 1.00 min.
Calibration Name: IC-8874;AV148-20171113a
Calibration Date: 11/13/2017 12:24:55PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5022.550	4995.060	5050.039	16.15	6,028.03	5,978.56

Initial Calibrations

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Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:25:19PM 5/14/2018

Calibration

Sample Name: IC-8877;AV3-05142018
Description:
Detector: AV3

Calibration Date: 5/14/2018 6:25:15PM
Analyst: 60040

Source Info

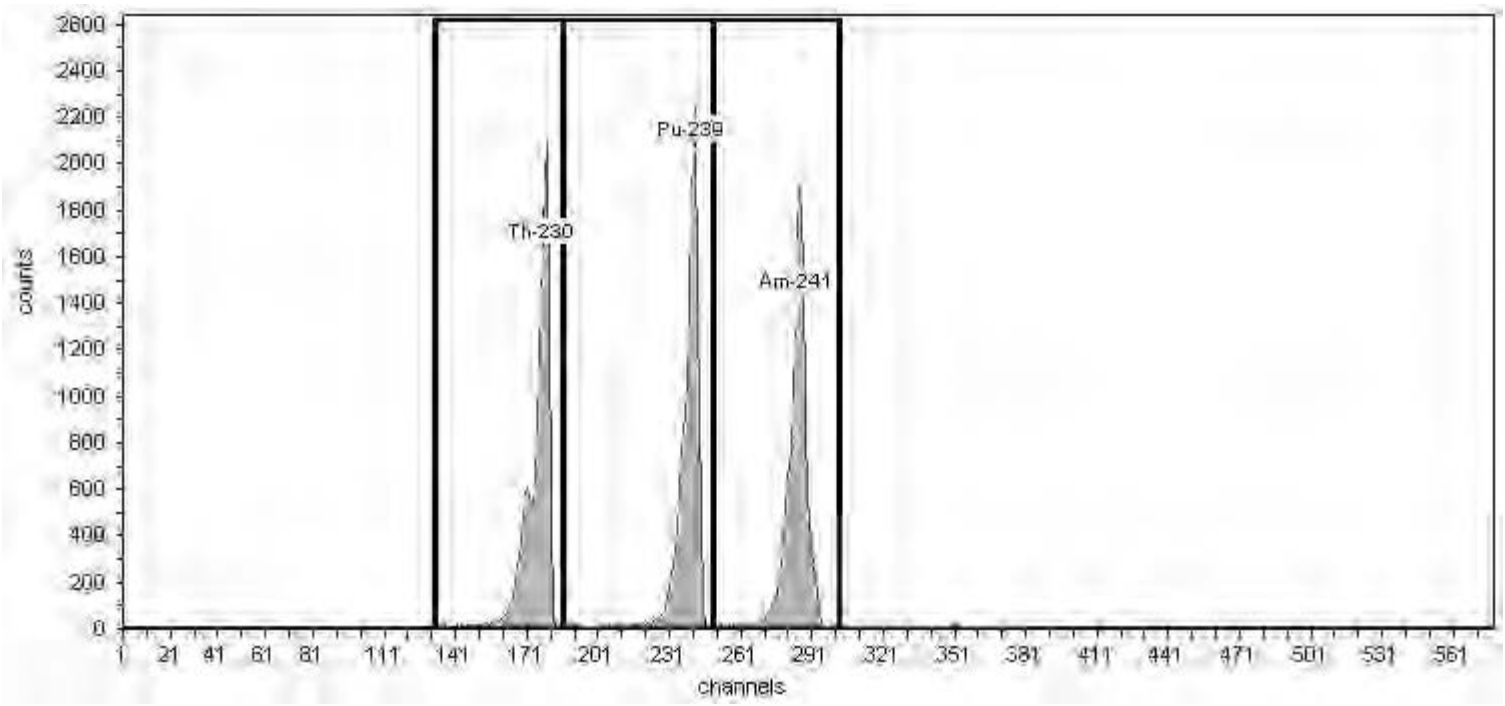
Certificate ID: 82236-334
Prepared by: Analytics

Certification Date: 6/2/2010 12:00:00PM
Description:

Acquisition

Detector: AV3 , SN: 49-202 FF7
Acquisition Start Date: 5/14/2018 3:46:06PM
Live Time: 140.00 min.
Real Time: 140.09 min.
Efficiency: 24.44% +/- 0.30% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	14,252.00	101.80
Pu-239	240	5.16	186	249	0.00	14,532.00	103.80
Am-241	284	5.49	249	303	0.00	13,591.00	97.08

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:25:38PM 5/14/2018

Calibration

Sample Name: IC-9520;AV4-05142018
Description:
Detector: AV4

Calibration Date: 5/14/2018 6:25:34PM
Analyst: 60040

Source Info

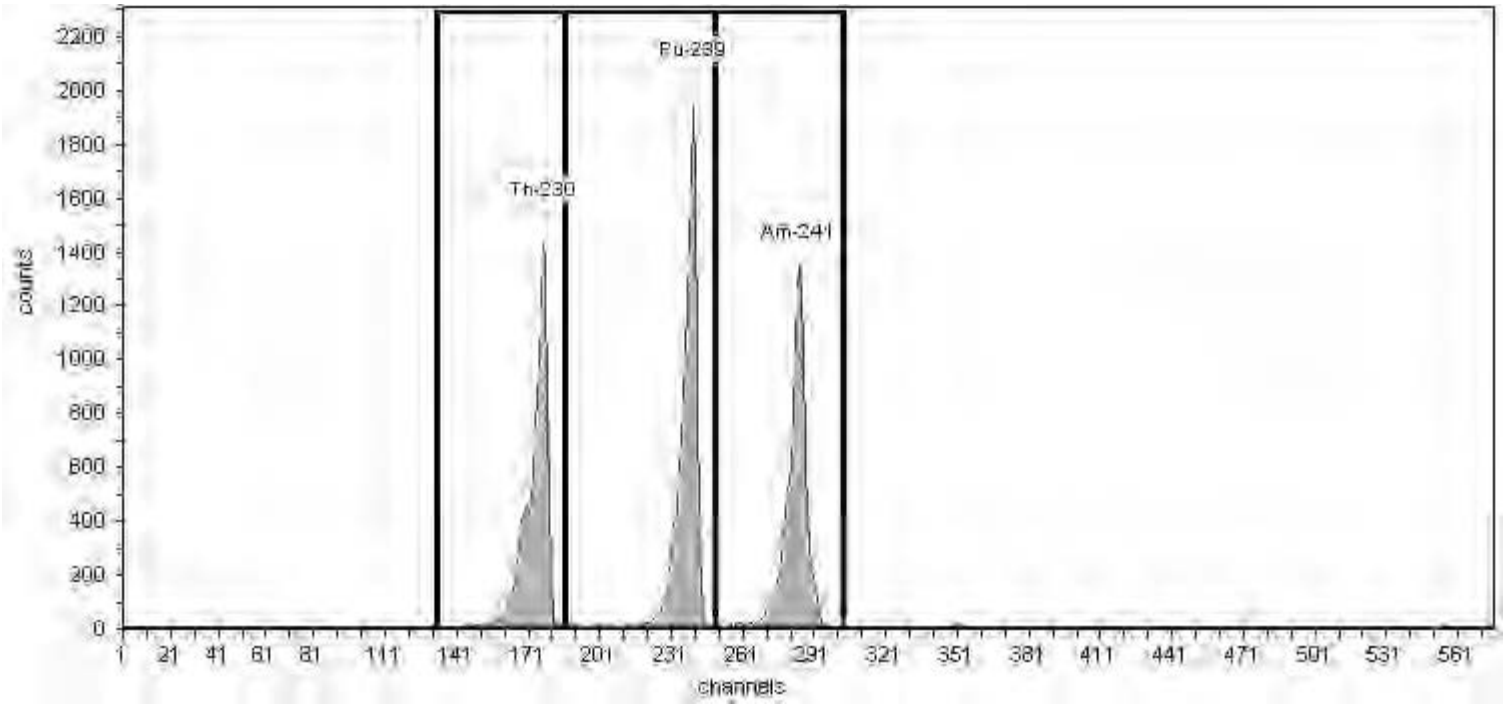
Certificate ID: 82237-334
Prepared by: Analytics

Certification Date: 6/1/2010 12:00:00PM
Description:

Acquisition

Detector: AV4 , SN: 46-033Q4
Acquisition Start Date: 5/14/2018 3:46:19PM
Live Time: 140.00 min.
Real Time: 140.09 min.
Efficiency: 22.79% +/- 0.33% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	10,751.00	76.79
Pu-239	240	5.16	186	249	0.00	13,005.00	92.89
Am-241	284	5.49	249	303	0.00	10,380.00	74.14

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:26:17PM 5/14/2018

Calibration

Sample Name: IC-9793;AV7-05142018
Description:
Detector: AV7

Calibration Date: 5/14/2018 6:26:13PM
Analyst: 60040

Source Info

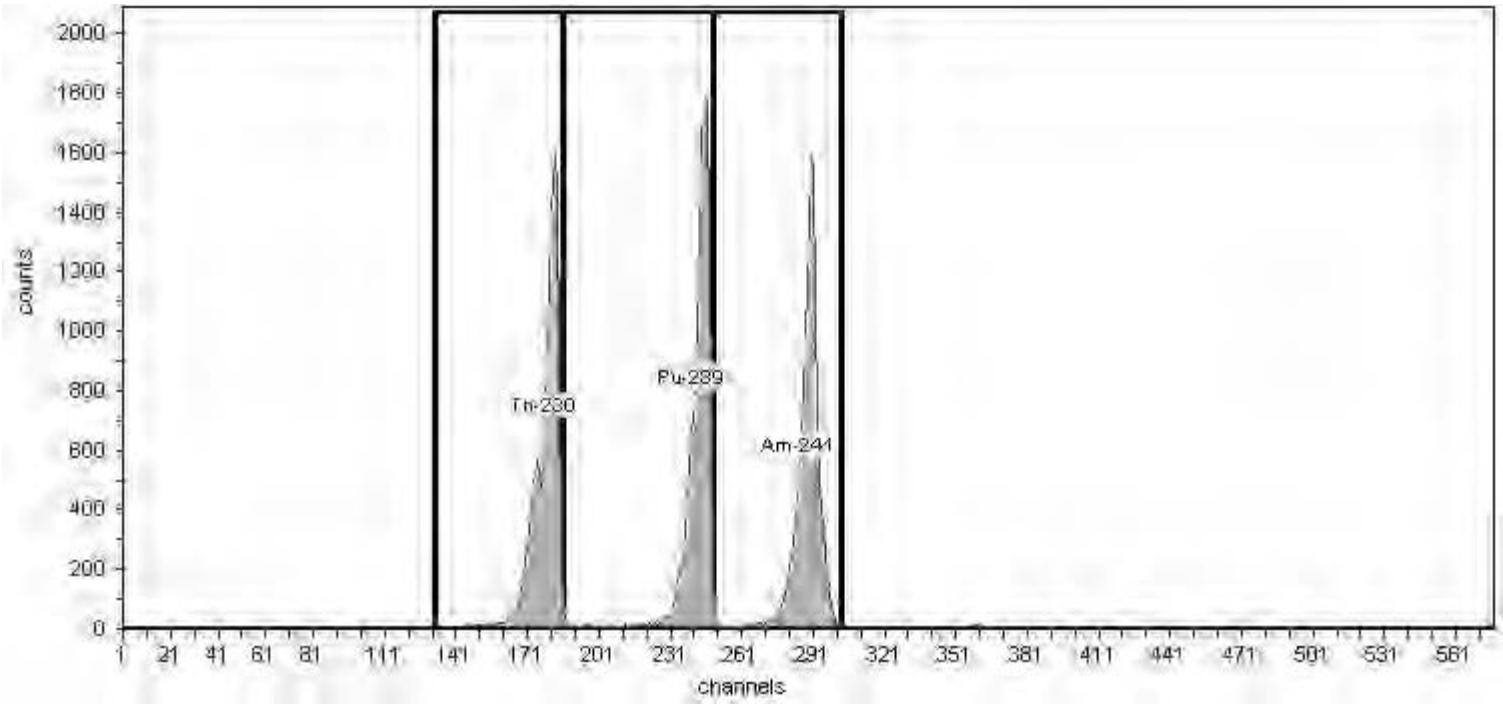
Certificate ID: 82241-334
Prepared by: Analytics

Certification Date: 6/8/2010 12:00:00PM
Description:

Acquisition

Detector: AV7 , SN: 48-158EE5
Acquisition Start Date: 5/14/2018 3:47:01PM
Live Time: 140.00 min.
Real Time: 140.09 min.
Efficiency: 22.98% +/- 0.29% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	12,677.00	90.55
Pu-239	240	5.16	186	249	0.00	13,298.00	94.99
Am-241	284	5.49	249	303	0.00	12,604.00	90.03

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:26:31PM 5/14/2018

Calibration

Sample Name: IC-9795;AV8-05142018
Description:
Detector: AV8

Calibration Date: 5/14/2018 6:26:27PM
Analyst: 60040

Source Info

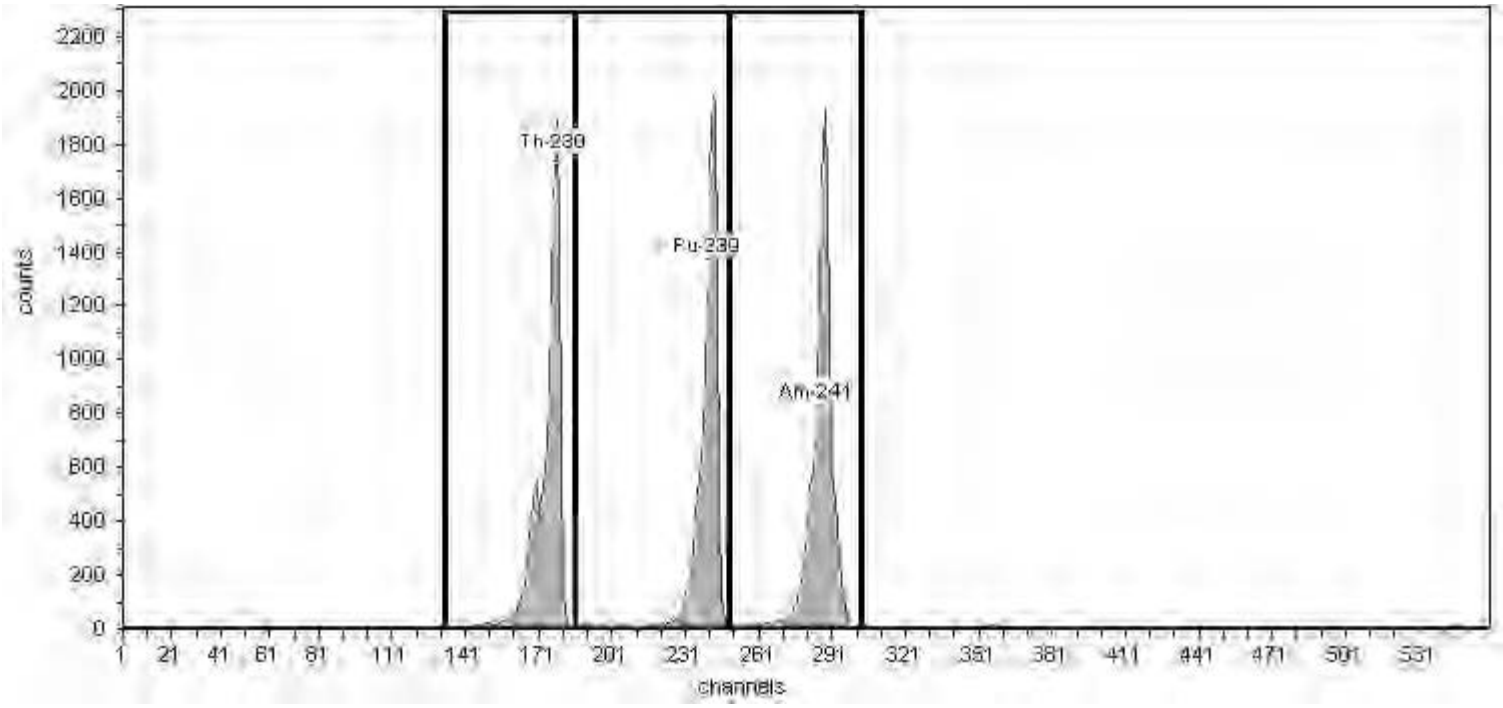
Certificate ID: 82243-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV8 , SN: 41-137Q6
Acquisition Start Date: 5/14/2018 3:47:39PM
Live Time: 140.00 min.
Real Time: 140.09 min.
Efficiency: 25.96% +/- 0.34% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	12,786.00	91.33
Pu-239	240	5.16	186	249	0.00	13,029.00	93.06
Am-241	284	5.49	249	303	0.00	13,761.00	98.29

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:34:25PM 11/13/2017

Calibration

Sample Name: IC-7107;AV147-20171113
Description:
Detector: AV147

Analyst: 60040
Analysis Date: 11/13/2017 12:21:03PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82232-334
Prepared by: Analytics
Description:

Certification Date: 6/3/2010 12:00:00PM

Acquisition

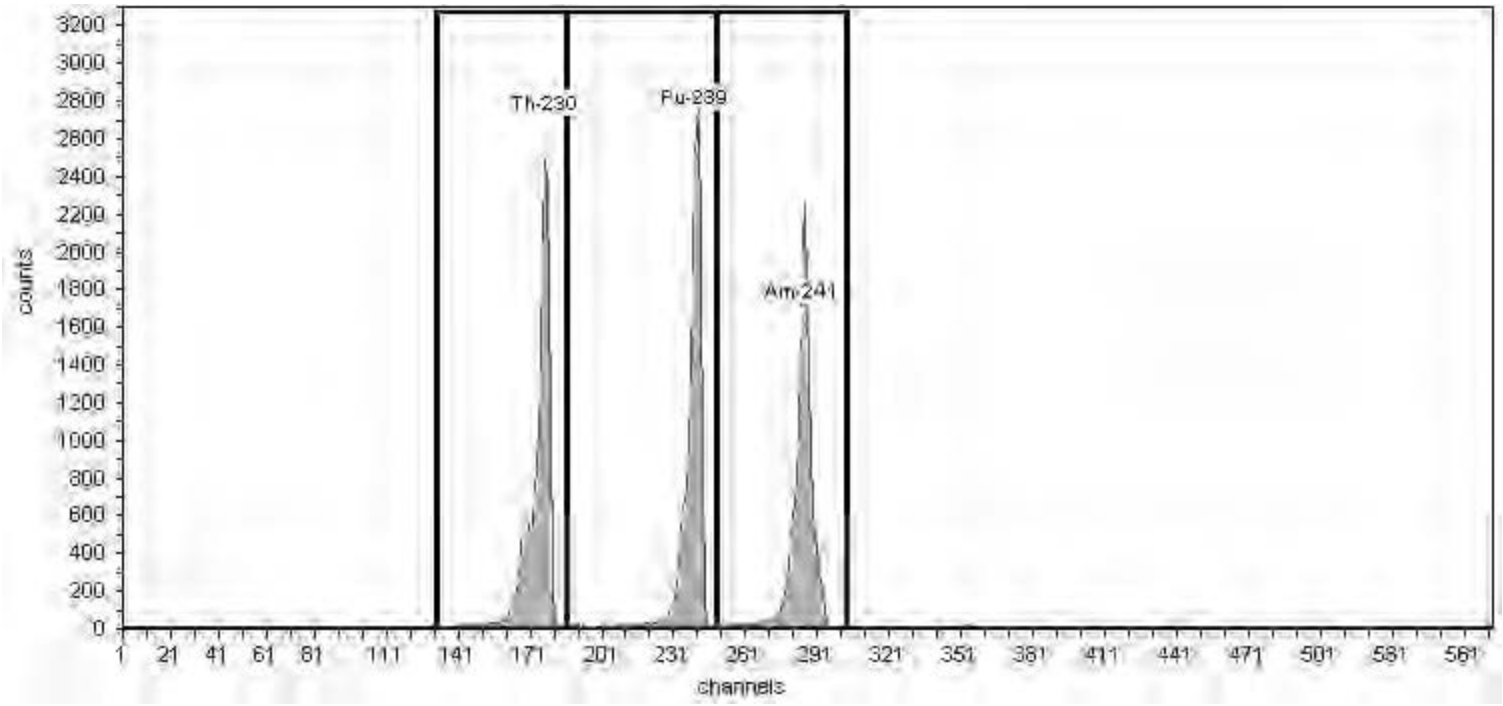
Detector: AV147 , SN: 50-05/R1
Acquisition Start Date: 11/13/2017 9:43:36AM

Live Time: 140.00 min.
Real Time: 140.01 min.

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²

Efficiency Calibration Name: IC-7107;AV147-20171113

Efficiency: 24.92% +/- 0.29% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	31.67	15,649.00	111.78
Pu-239	240	5,155.40	186	249	32.26	15,551.00	111.08
Am-241	284	5,485.70	249	303	33.76	14,845.00	106.04

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Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:24:56PM 11/13/2017

Calibration

Sample Name: IC-8874;AV148-20171113a
Description:
Detector: AV148

Analyst: 60040
Analysis Date: 11/13/2017 12:24:55PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82233-334
Prepared by: Analytics
Description:

Certification Date: 6/3/2010 12:00:00PM

Acquisition

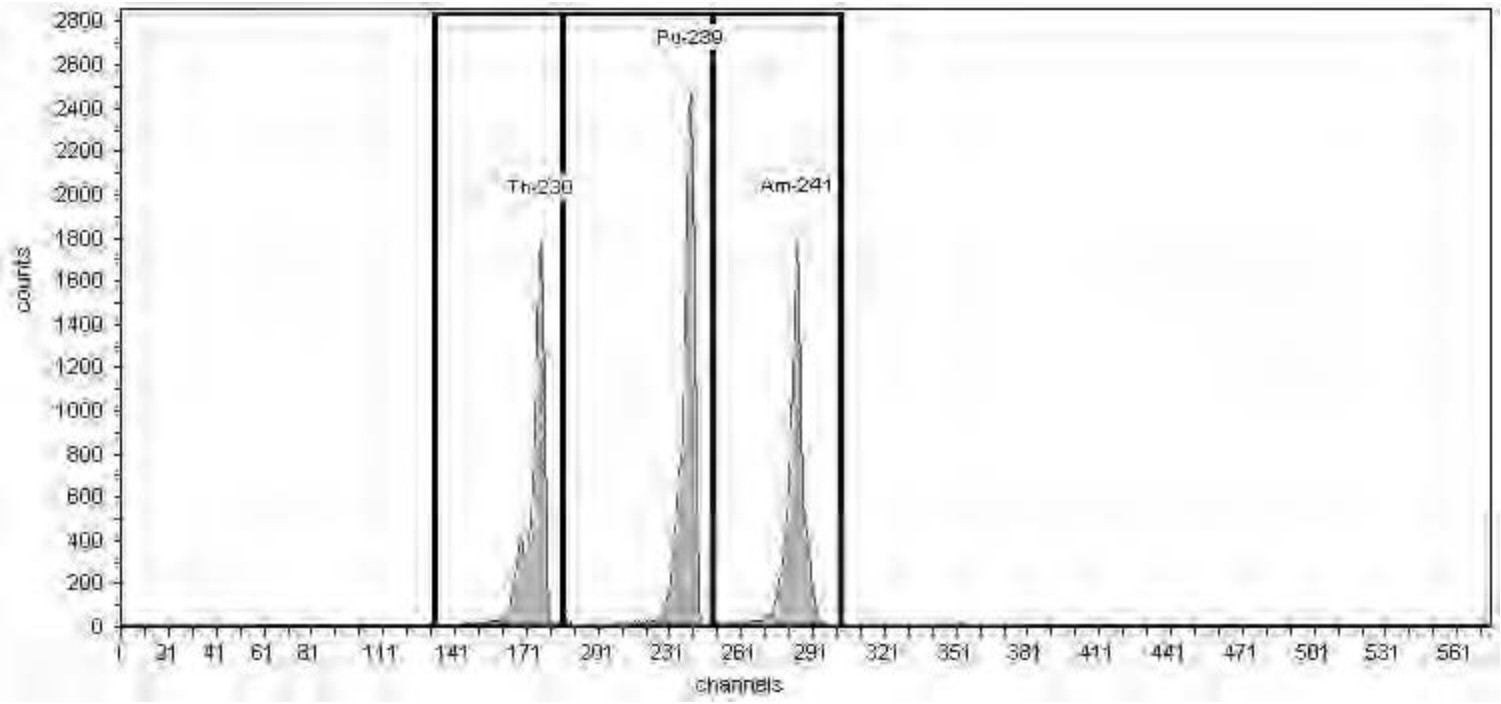
Detector: AV148 , SN: 50-05/R2
Acquisition Start Date: 11/13/2017 10:03:59AM

Live Time: 140.00 min.
Real Time: 140.01 min.

Efficiency Calibration Name: IC-8874;AV148-20171113a

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 26.37% +/- 0.38% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	30.83	10,555.00	75.39
Pu-239	240	5,155.40	186	249	33.82	13,849.00	98.92
Am-241	284	5,485.70	249	303	32.64	11,187.00	79.91

Initial Calibration Verifications

Alpha Spectroscopy Calibration Summary

Detector: AV3

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371847/1	05/14/18 15:46	82236-334_00001	0.2444	0.20-0.32		
ICV 160-371942/1	05/18/18 19:25	82232-334_00001	0.2477	0.20-0.32	101.4	95-105
CCV 160-375343/1	07/10/18 16:55	82236-334_00001	0.2469	0.20-0.32	101.0	95-105

Detector: AV4

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371848/1	05/14/18 15:46	82237-334_00003	0.2279	0.20-0.32		
ICV 160-371943/1	05/18/18 19:26	82244-334_00001	0.2237	0.20-0.32	98.2	95-105
CCV 160-375344/1	07/10/18 16:57	82237-334_00003	0.2271	0.20-0.32	99.7	95-105

Detector: AV7

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371856/1	05/14/18 15:47	82241-334_00001	0.2298	0.20-0.32		
ICV 160-371945/1	05/18/18 19:26	82237-334_00003	0.2253	0.20-0.32	98.1	95-105
CCV 160-375346/1	07/10/18 16:56	82241-334_00001	0.2277	0.20-0.32	99.1	95-105

Detector: AV8

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371857/1	05/14/18 15:47	82243-334_00001	0.2596	0.20-0.32		
ICV 160-371946/1	05/18/18 19:27	82233-334_00001	0.2661	0.20-0.32	102.5	95-105
CCV 160-375347/1	07/10/18 16:56	82243-334_00001	0.2576	0.20-0.32	99.2	95-105

Detector: AV147

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-337250/1	11/13/17 09:43	82232-334_00001	0.2492	0.20-0.32		
ICV 160-337582/1	11/15/17 11:44	82236-334_00001	0.2427	0.20-0.32	97.4	95-105
CCV 160-378429/1	07/24/18 10:31	82232-334_00001	0.2431	0.20-0.32	97.5	95-105

Detector: AV148

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-337251/1	11/13/17 10:03	82233-334_00001	0.2637	0.20-0.32		
ICV 160-337583/1	11/15/17 11:50	82243-334_00001	0.2573	0.20-0.32	97.6	95-105
CCV 160-378430/1	07/24/18 10:32	82233-334_00001	0.2626	0.20-0.32	99.6	95-105

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:58:37PM 5/19/2018

Calibration

Sample Name: ICV-7107;AV3-05182018
Description:
Detector: AV3

Calibration Date: 5/19/2018 3:58:34PM
Analyst: 60040

Source Info

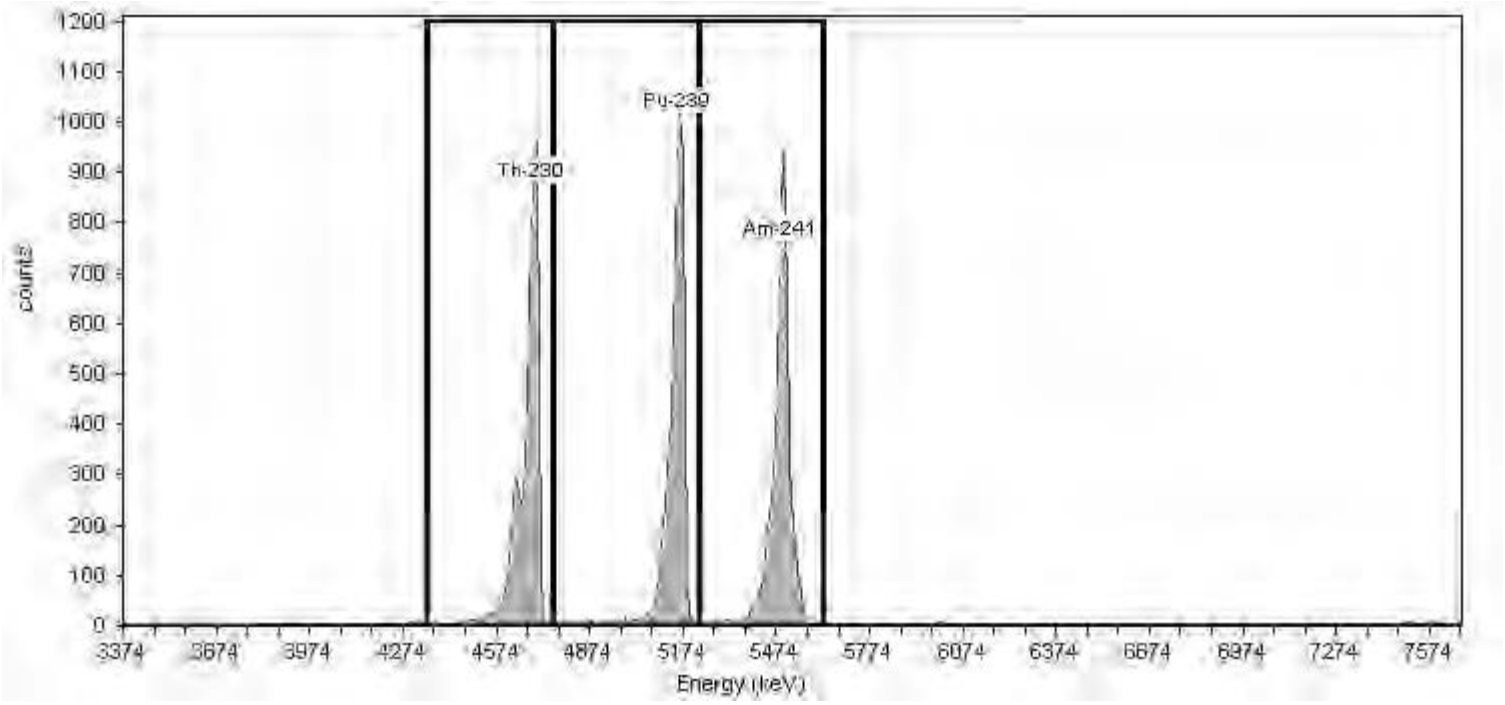
Certificate ID: 82232-334
Prepared by: Analytics

Certification Date: 6/3/2010 12:00:00PM
Description:

Acquisition

Detector: AV3 , SN: 49-202 FF7
Acquisition Start Date: 5/18/2018 7:25:51PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 24.77% +/- 0.39% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,662.00	111.03
Pu-239	240	5.16	186	249	0.00	6,545.00	109.08
Am-241	284	5.49	249	303	0.00	6,389.00	106.48

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:58:48PM 5/19/2018

Calibration

Sample Name: ICV-9817;AV4-05182018
Description:
Detector: AV4

Calibration Date: 5/19/2018 3:58:45PM
Analyst: 60040

Source Info

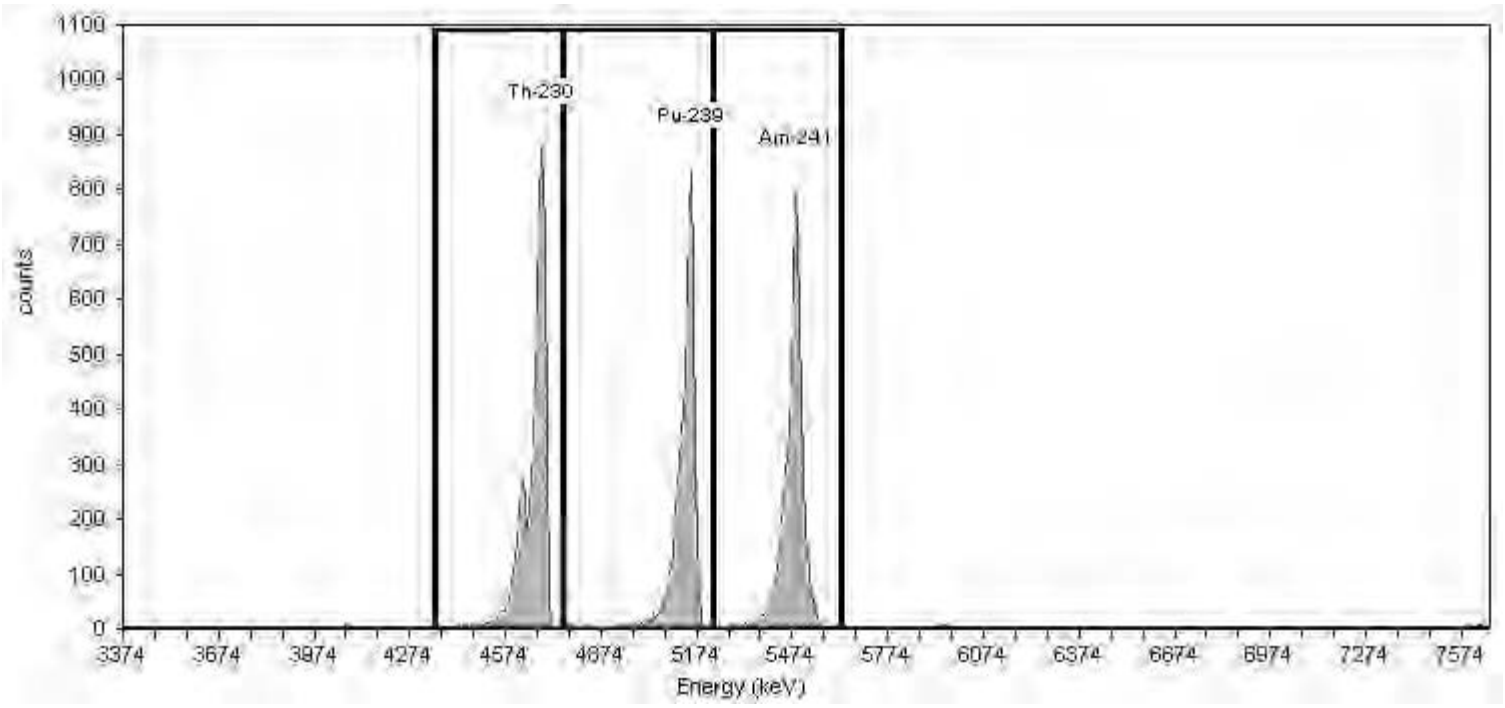
Certificate ID: 82244-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV4 , SN: 46-033Q4
Acquisition Start Date: 5/18/2018 7:26:15PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 22.37% +/- 0.38% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,064.00	101.07
Pu-239	240	5.16	186	249	0.00	5,321.00	88.68
Am-241	284	5.49	249	303	0.00	5,439.00	90.65

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:59:12PM 5/19/2018

Calibration

Sample Name: ICV-9520;AV7-05182018
Description:
Detector: AV7

Calibration Date: 5/19/2018 3:59:09PM
Analyst: 60040

Source Info

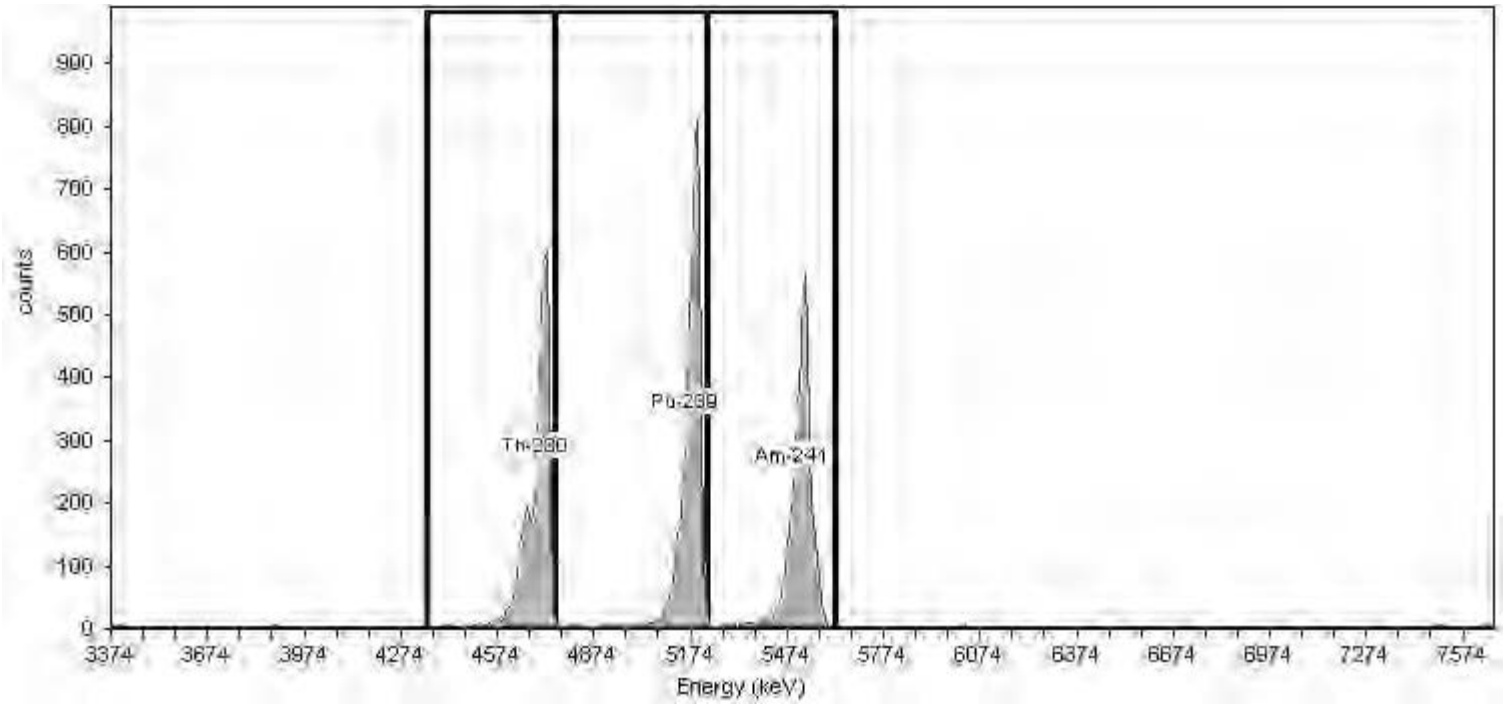
Certificate ID: 82237-334
Prepared by: Analytics

Certification Date: 6/1/2010 12:00:00PM
Description:

Acquisition

Detector: AV7 , SN: 48-158EE5
Acquisition Start Date: 5/18/2018 7:26:58PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 22.53% +/- 0.43% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	4,559.00	75.98
Pu-239	240	5.16	186	249	0.00	5,466.00	91.10
Am-241	284	5.49	249	303	0.00	4,443.00	74.05

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:59:31PM 5/19/2018

Calibration

Sample Name: ICV-8874;AV8-05182018
Description:
Detector: AV8

Calibration Date: 5/19/2018 3:59:26PM
Analyst: 60040

Source Info

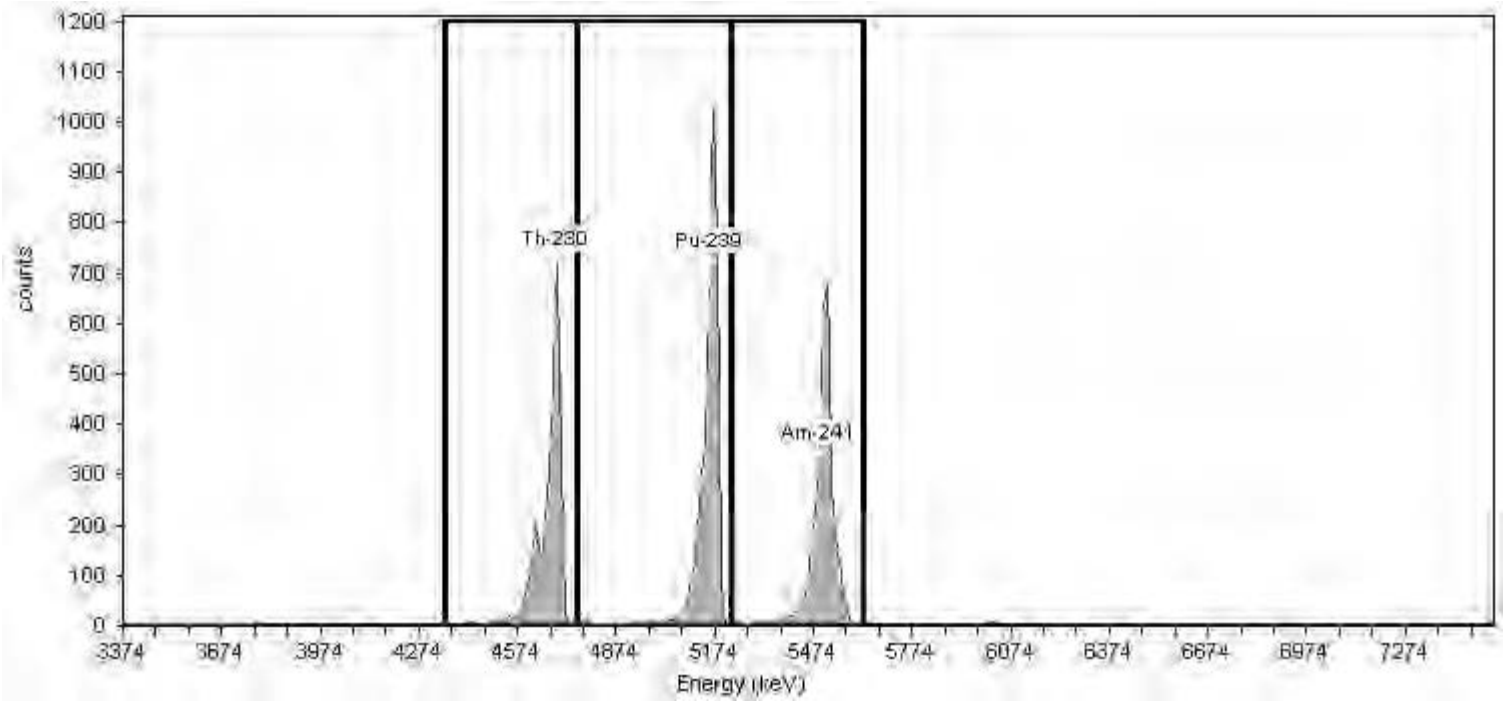
Certificate ID: 82233-334
Prepared by: Analytics

Certification Date: 6/3/2010 12:00:00PM
Description:

Acquisition

Detector: AV8 , SN: 41-137Q6
Acquisition Start Date: 5/18/2018 7:27:27PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 26.61% +/- 0.50% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	4,638.00	77.30
Pu-239	240	5.16	186	249	0.00	5,945.00	99.08
Am-241	284	5.49	249	303	0.00	4,809.00	80.15

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:48:07PM 11/16/2017

Calibration

Sample Name: ICV-8877;AV147-20171115
Description:
Detector: AV147

Analyst: 60040
Analysis Date: 11/15/2017 12:45:10PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82236-334
Prepared by: Analytics
Description:

Certification Date: 6/2/2010 12:00:00PM

Acquisition

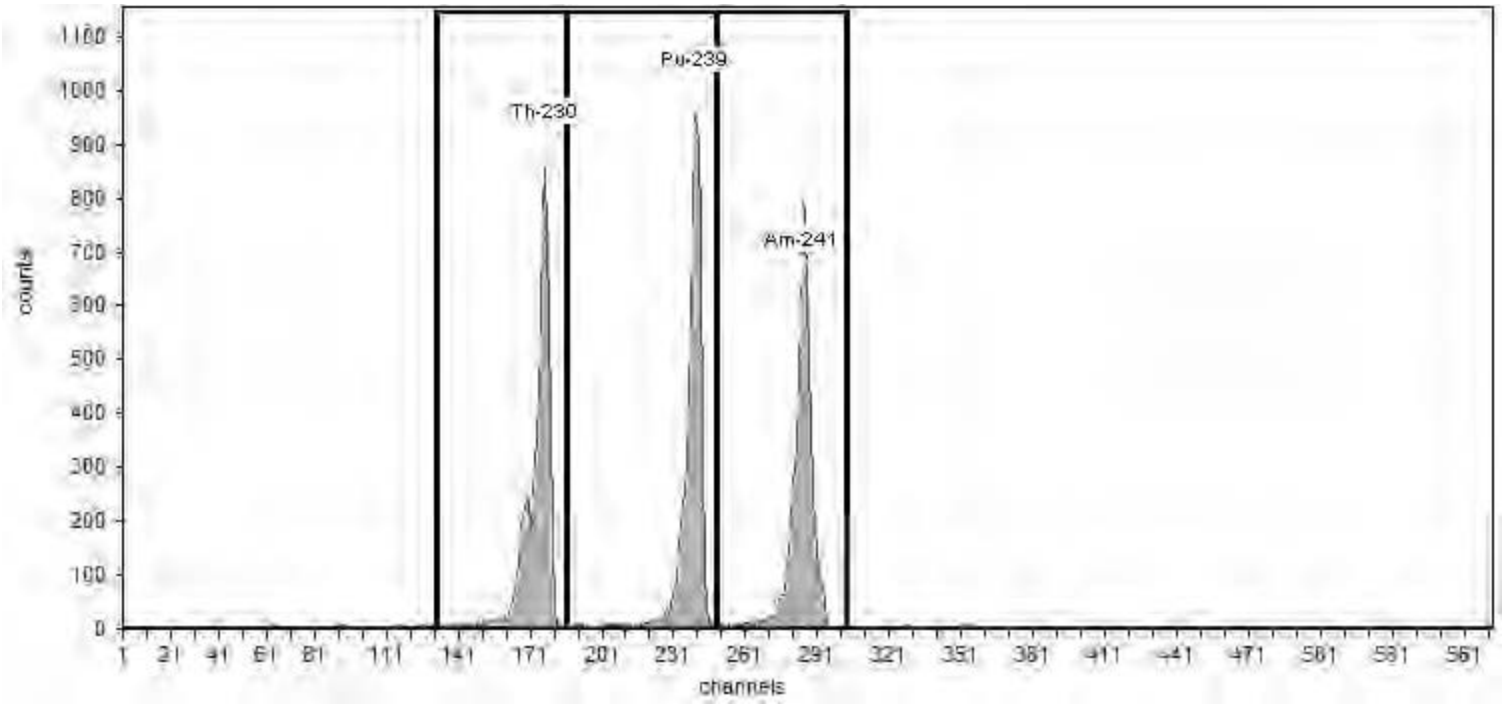
Detector: AV147 , SN: 50-05/R1
Acquisition Start Date: 11/15/2017 11:44:15AM

Live Time: 60.00 min.
Real Time: 60.01 min.

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²

Efficiency Calibration Name: ICV-8877;AV147-2017111

Efficiency: 24.27% +/- 0.40% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	35.83	6,055.00	100.92
Pu-239	240	5,155.40	186	249	38.72	6,089.00	101.48
Am-241	284	5,485.70	249	303	39.45	5,870.00	97.83

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:50:34PM 11/15/2017

Calibration

Sample Name: ICV-9795;AV148-20171115
Description:
Detector: AV148

Analyst: 60040
Analysis Date: 11/15/2017 12:50:32PM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82243-334
Prepared by: Analytics
Description:

Certification Date: 6/9/2010 12:00:00PM

Acquisition

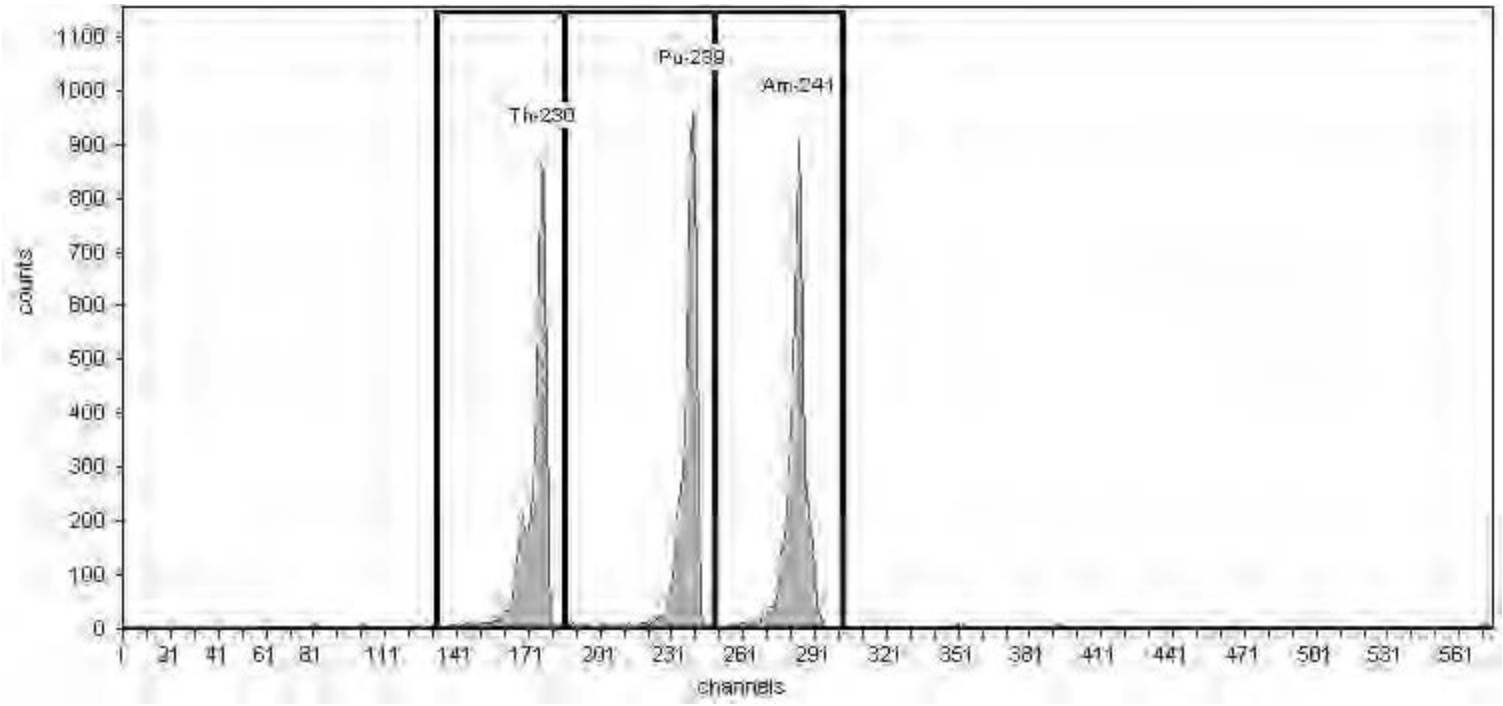
Detector: AV148 , SN: 50-05/R2
Acquisition Start Date: 11/15/2017 11:50:26AM

Live Time: 60.00 min.
Real Time: 60.00 min.

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²

Efficiency Calibration Name: ICV-9795;AV148-2017111

Efficiency: 25.73% +/- 0.45% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	30.81	5,339.00	88.98
Pu-239	240	5,155.40	186	249	33.04	5,548.00	92.47
Am-241	284	5,485.70	249	303	33.16	5,932.00	98.87

Monthly Calibration Verifications

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:52:45AM 7/11/2018

Calibration

Sample Name: CCV-8877;AV3-07102018
Description:
Detector: AV3

Calibration Date: 7/11/2018 10:52:42AM
Analyst: 60040

Source Info

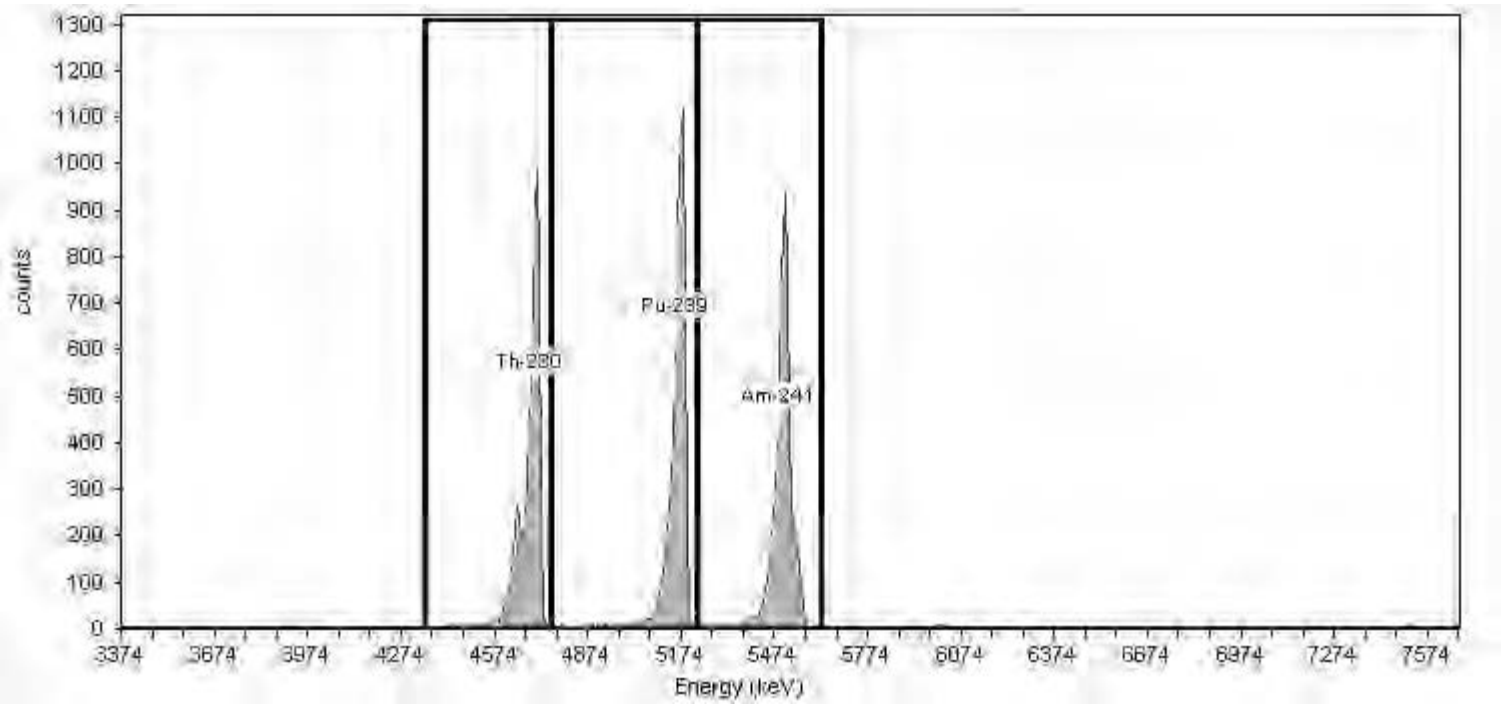
Certificate ID: 82236-334
Prepared by: Analytics

Certification Date: 6/2/2010 12:00:00PM
Description:

Acquisition

Detector: AV3 , SN: 49-202 FF7
Acquisition Start Date: 7/10/2018 4:55:46PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 24.69% +/- 0.41% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,049.00	100.82
Pu-239	240	5.16	186	249	0.00	6,325.00	105.42
Am-241	284	5.49	249	303	0.00	5,973.00	99.55

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:53:49AM 7/11/2018

Calibration

Sample Name: CCV-9520;AV4-07102018a
Description:
Detector: AV4

Calibration Date: 7/11/2018 10:53:46AM
Analyst: 60040

Source Info

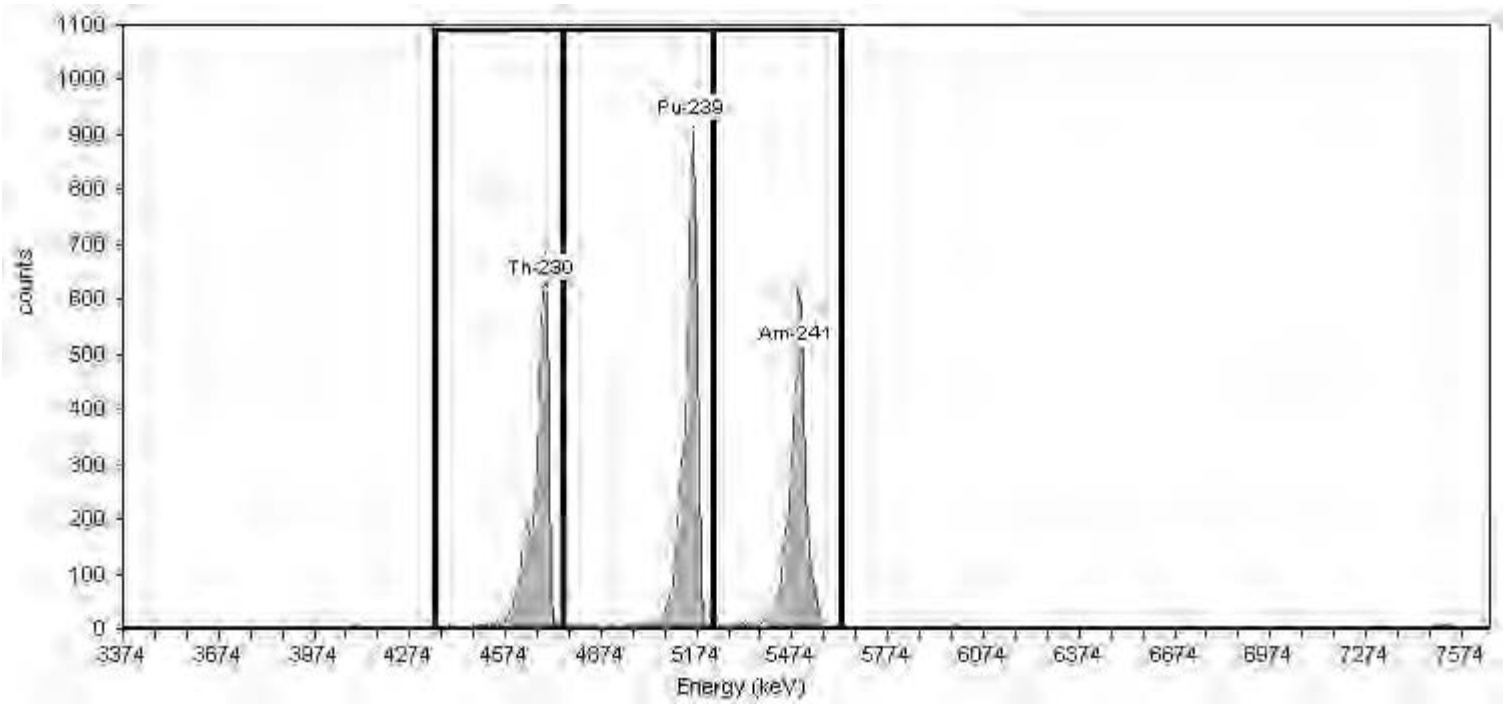
Certificate ID: 82237-334
Prepared by: Analytics

Certification Date: 6/1/2010 12:00:00PM
Description:

Acquisition

Detector: AV4 , SN: 46-033Q4
Acquisition Start Date: 7/10/2018 4:57:52PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 22.71% +/- 0.43% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	4,559.00	75.98
Pu-239	240	5.16	186	249	0.00	5,576.00	92.93
Am-241	284	5.49	249	303	0.00	4,457.00	74.28

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:52:56AM 7/11/2018

Calibration

Sample Name: CCV-9793;AV7-07102018
Description:
Detector: AV7

Calibration Date: 7/11/2018 10:52:53AM
Analyst: 60040

Source Info

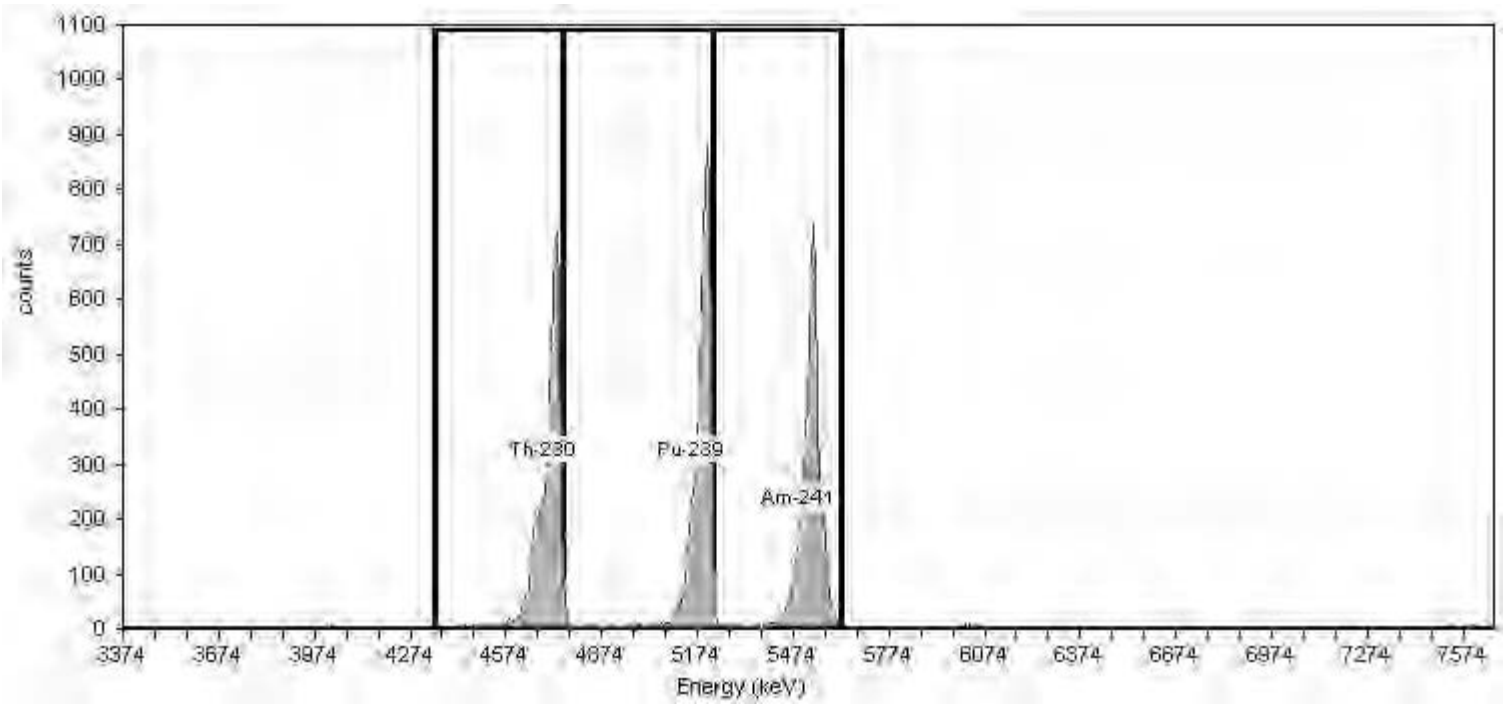
Certificate ID: 82241-334
Prepared by: Analytics

Certification Date: 6/8/2010 12:00:00PM
Description:

Acquisition

Detector: AV7 , SN: 48-158EE5
Acquisition Start Date: 7/10/2018 4:56:23PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 22.77% +/- 0.40% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,254.00	87.57
Pu-239	240	5.16	186	249	0.00	5,589.00	93.15
Am-241	284	5.49	249	303	0.00	5,551.00	92.52

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:53:07AM 7/11/2018

Calibration

Sample Name: CCV-9795;AV8-07102018
Description:
Detector: AV8

Calibration Date: 7/11/2018 10:53:03AM
Analyst: 60040

Source Info

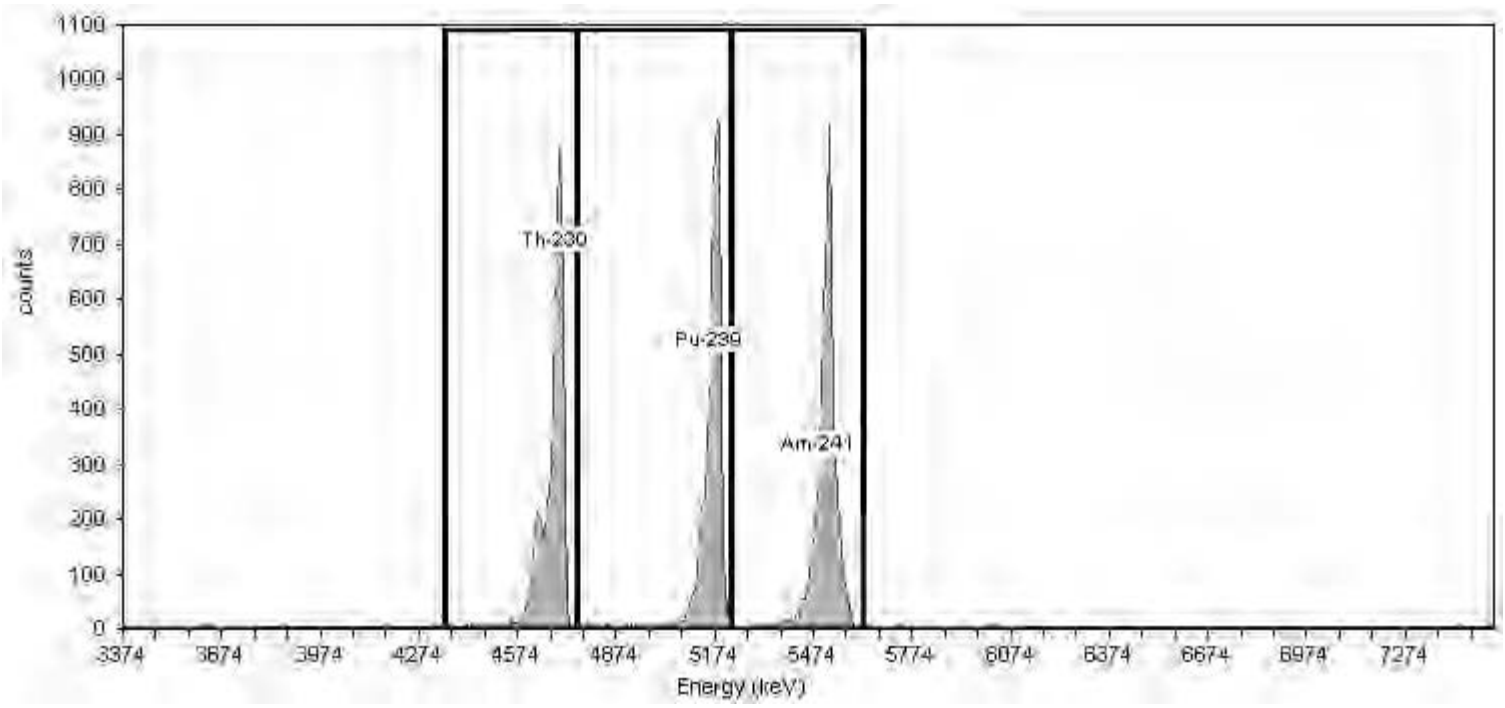
Certificate ID: 82243-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV8 , SN: 41-137Q6
Acquisition Start Date: 7/10/2018 4:56:46PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 25.76% +/- 0.45% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,396.00	89.93
Pu-239	240	5.16	186	249	0.00	5,633.00	93.88
Am-241	284	5.49	249	303	0.00	5,804.00	96.73

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:46:54AM 7/24/2018

Calibration

Sample Name: CCV-7107;AV147-20180724
Description:
Detector: AV147

Analyst: 60040
Analysis Date: 7/24/2018 11:46:50AM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82232-334
Prepared by: Analytics
Description:

Certification Date: 6/3/2010 12:00:00PM

Acquisition

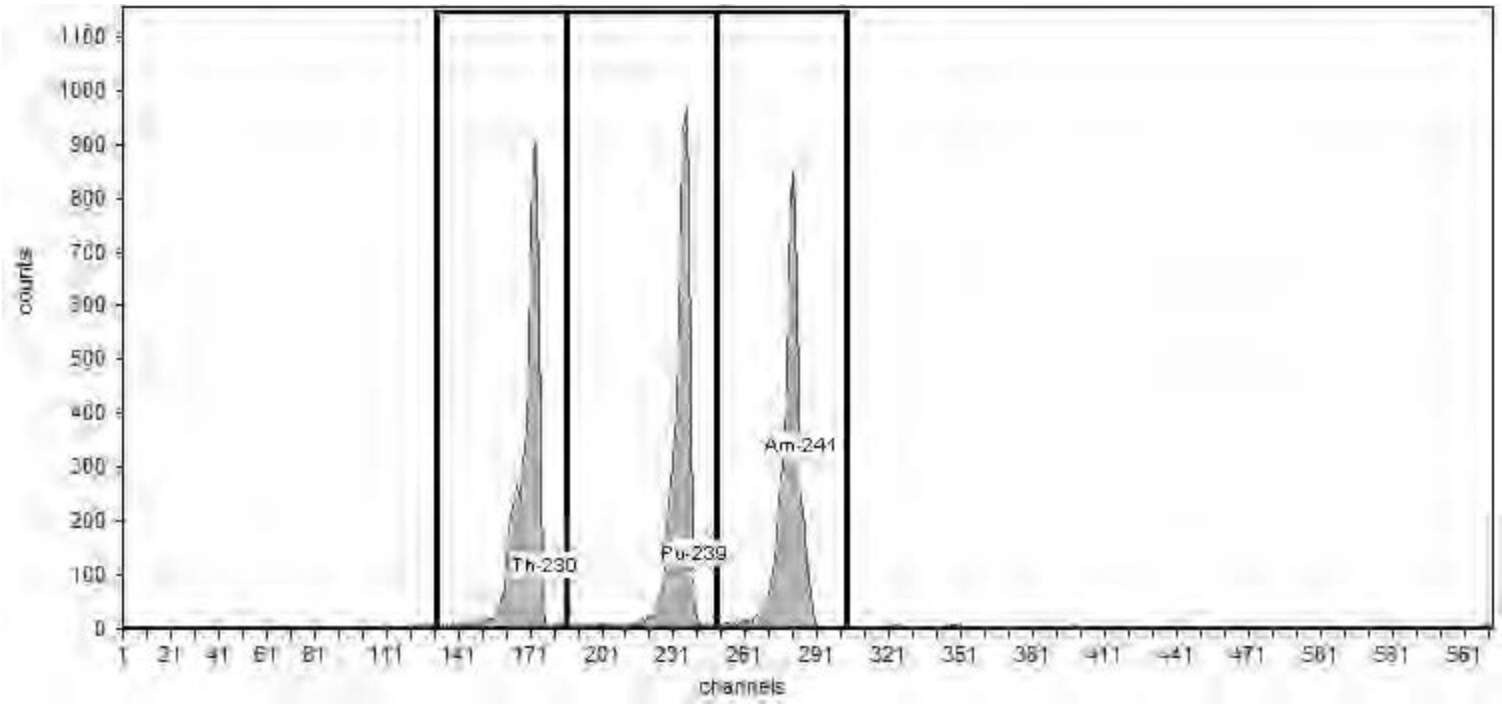
Detector: AV147 , SN: 50-05/R1
Acquisition Start Date: 7/24/2018 10:31:22AM

Live Time: 60.00 min.
Real Time: 60.00 min.

Efficiency Calibration Name: CCV-7107;AV147-201807

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.31% +/- 0.39% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	36.12	6,527.00	108.78
Pu-239	240	5,155.40	186	249	39.62	6,484.00	108.07
Am-241	284	5,485.70	249	303	37.60	6,223.00	103.72

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:47:03AM 7/24/2018

Calibration

Sample Name: CCV-8874;AV148-20180724
Description:
Detector: AV148

Analyst: 60040
Analysis Date: 7/24/2018 11:47:01AM
Calibration Type: Energy And Efficiency

Source Info

Certificate ID: 82233-334
Prepared by: Analytics
Description:

Certification Date: 6/3/2010 12:00:00PM

Acquisition

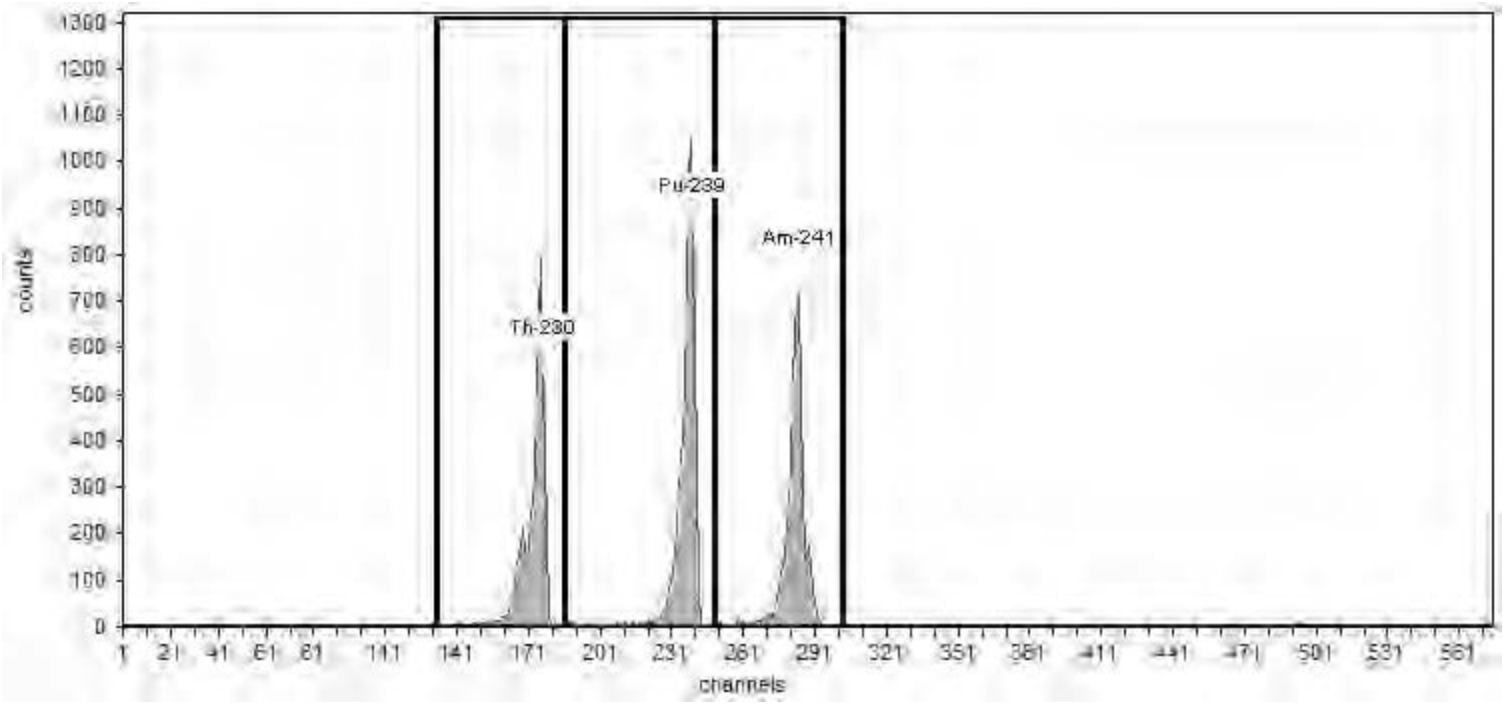
Detector: AV148 , SN: 50-05/R2
Acquisition Start Date: 7/24/2018 10:32:15AM

Live Time: 60.00 min.
Real Time: 60.01 min.

Efficiency Calibration Name: CCV-8874;AV148-201807

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 26.26% +/- 0.49% TPU(2 sigma)



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy keV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4,687.50	132	186	29.69	4,569.00	76.15
Pu-239	240	5,155.40	186	249	33.10	5,886.00	98.10
Am-241	284	5,485.70	249	303	33.63	4,729.00	78.82

Monthly Backgrounds

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
4:13:47AM 7/14/2018

Sample

Sample Name: ICB;AV3
Comment:

Spectrum #2 Analysis #1

Batch

Batch Name: July2018
Description:

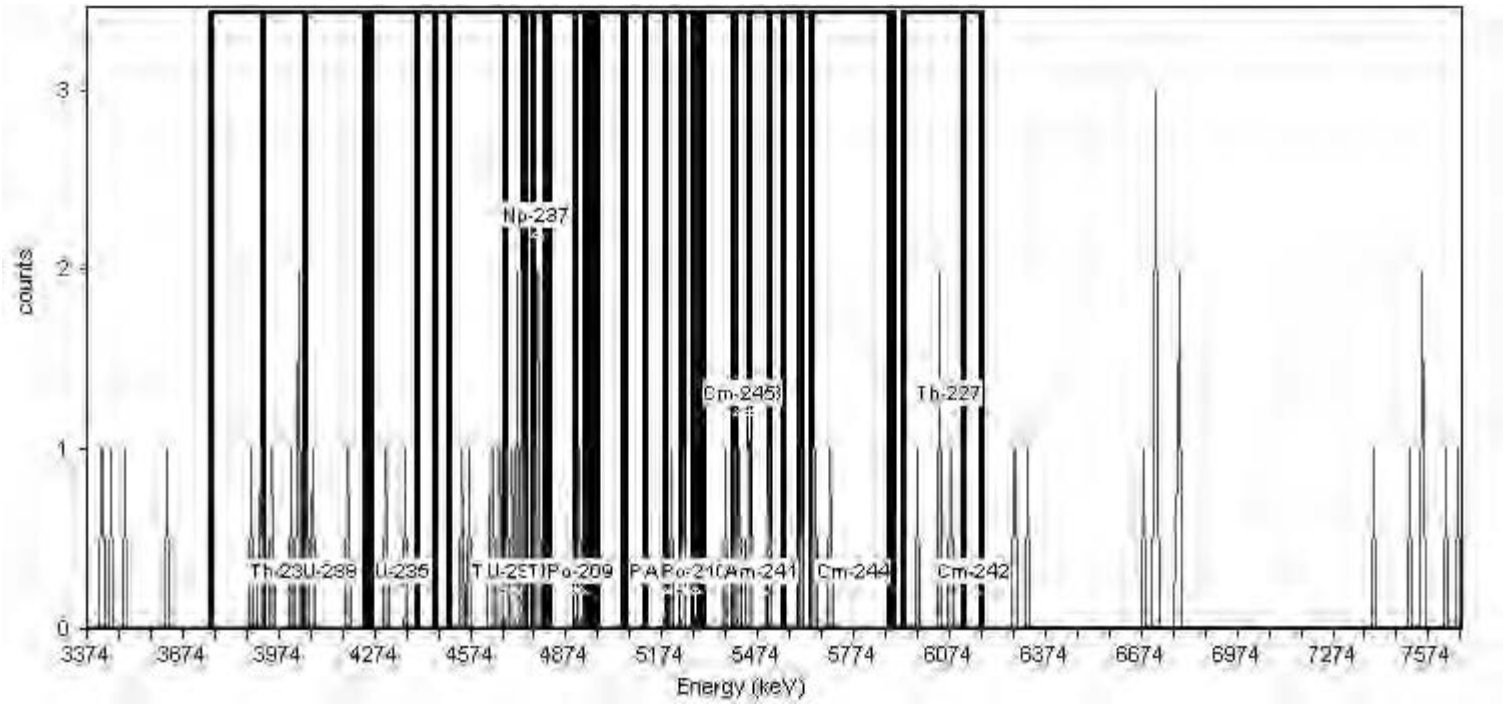
Analyst: 60040

Acquisition

Detector: AV3 , SN: 49-202 FF7
Acquisition Start Date: 7/13/2018 12:11:20PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-8877;AV3-05142018
Calibration Date: 5/14/2018 6:25:15PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.44% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 67.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	6.00	6.250E-003	2.756E-003
U-238	4.14	3.92	4.24	7.00	7.292E-003	2.946E-003
U-235	4.36	4.26	4.46	2.00	2.083E-003	1.804E-003
Th-230	4.68	4.40	4.75	12.00	1.250E-002	3.756E-003
U-234	4.71	4.51	4.82	14.00	1.458E-002	4.034E-003
Pu-242	4.90	4.68	4.95	9.00	9.375E-003	3.294E-003
Th-229	4.86	4.74	5.12	3.00	3.125E-003	2.083E-003
Np-237	4.78	4.77	4.81	2.00	2.083E-003	1.804E-003
Po-209	4.92	4.90	4.93	1.00	1.042E-003	1.473E-003
Pu-239	5.18	4.97	5.24	2.00	2.083E-003	1.804E-003
Am-243	5.23	5.05	5.31	2.00	2.083E-003	1.804E-003
U-232	5.25	5.06	5.40	4.00	4.167E-003	2.329E-003
Th-228	5.45	5.19	5.51	8.00	8.333E-003	3.125E-003
Po-210	5.28	5.23	5.29	1.00	1.042E-003	1.473E-003
Pu-238	5.47	5.27	5.55	6.00	6.250E-003	2.756E-003
Am-241	5.48	5.30	5.60	6.00	6.250E-003	2.756E-003
Cm-245	5.42	5.40	5.45	4.00	4.167E-003	2.329E-003
Pu-236	5.76	5.61	5.89	4.00	4.167E-003	2.329E-003
Cm-244	5.78	5.64	5.90	3.00	3.125E-003	2.083E-003
Th-227	6.07	5.93	6.18	5.00	5.208E-003	2.552E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:56:18AM 7/13/2018

Sample

Sample Name: ICB;AV4
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

Analyst: 60040

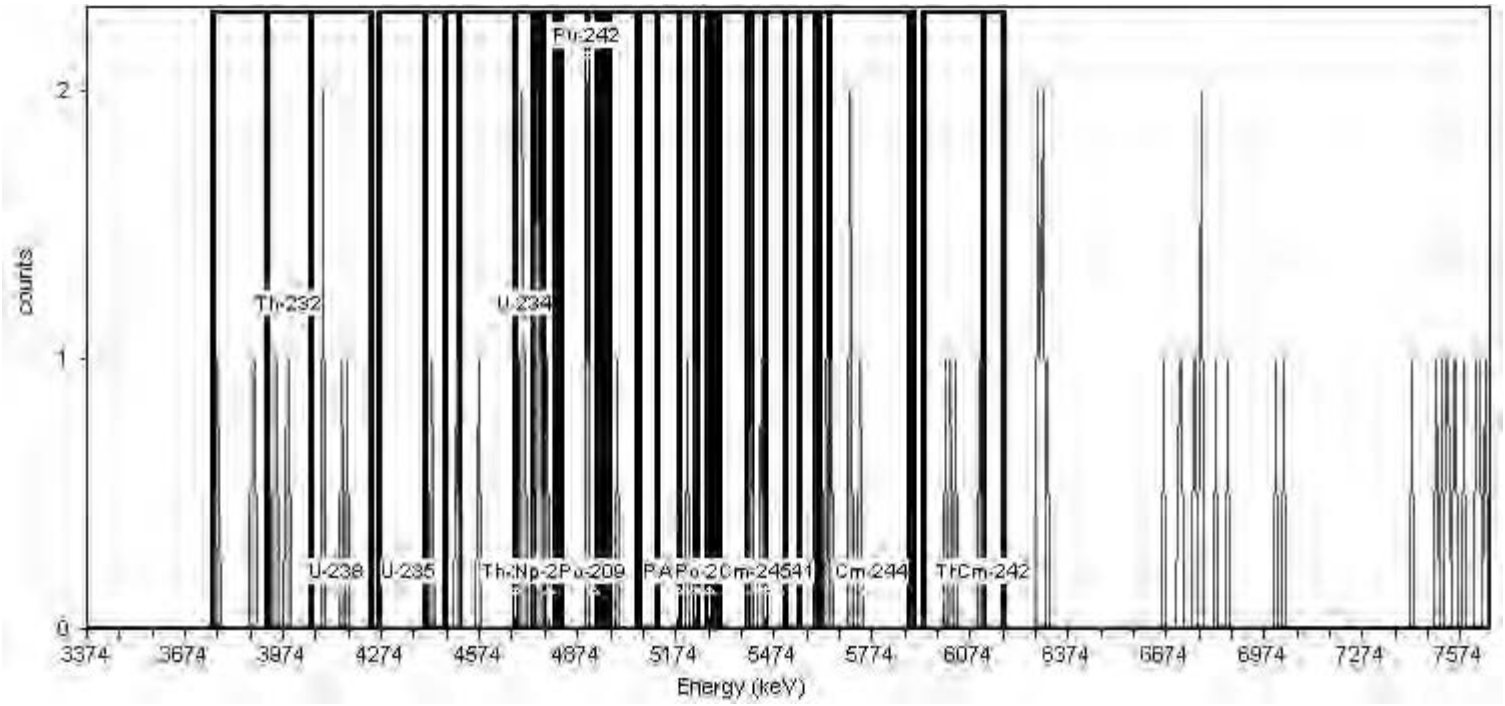
Acquisition

Detector: AV4 , SN: 46-033Q4
Acquisition Start Date: 7/12/2018 1:42:06PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Calibration Name: IC-9520;AV4-05142018
Calibration Date: 5/14/2018 6:25:34PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 22.79% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 66.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	7.00	7.292E-003	2.946E-003
U-238	4.14	3.92	4.24	8.00	8.333E-003	3.125E-003
U-235	4.36	4.26	4.46	1.00	1.042E-003	1.473E-003
Th-230	4.68	4.40	4.75	8.00	8.333E-003	3.125E-003
U-234	4.71	4.51	4.82	9.00	9.375E-003	3.294E-003
Pu-242	4.90	4.68	4.95	10.00	1.042E-002	3.455E-003
Th-229	4.86	4.74	5.12	8.00	8.333E-003	3.125E-003
Np-237	4.78	4.77	4.81	1.00	1.042E-003	1.473E-003
Po-209	4.92	4.90	4.93	2.00	2.083E-003	1.804E-003
Pu-239	5.18	4.97	5.24	2.00	2.083E-003	1.804E-003
Am-243	5.23	5.05	5.31	1.00	1.042E-003	1.473E-003
U-232	5.25	5.06	5.40	2.00	2.083E-003	1.804E-003
Th-228	5.45	5.19	5.51	3.00	3.125E-003	2.083E-003
Po-210	5.28	5.23	5.29	0.00	0.000E+000	1.473E-003
Pu-238	5.47	5.27	5.55	2.00	2.083E-003	1.804E-003
Am-241	5.48	5.30	5.60	2.00	2.083E-003	1.804E-003
Cm-245	5.42	5.40	5.45	2.00	2.083E-003	1.804E-003
Pu-236	5.76	5.61	5.89	5.00	5.208E-003	2.552E-003
Cm-244	5.78	5.64	5.90	4.00	4.167E-003	2.329E-003
Th-227	6.07	5.93	6.18	4.00	4.167E-003	2.329E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:56:36AM 7/13/2018

Sample

Sample Name: ICB;AV7
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

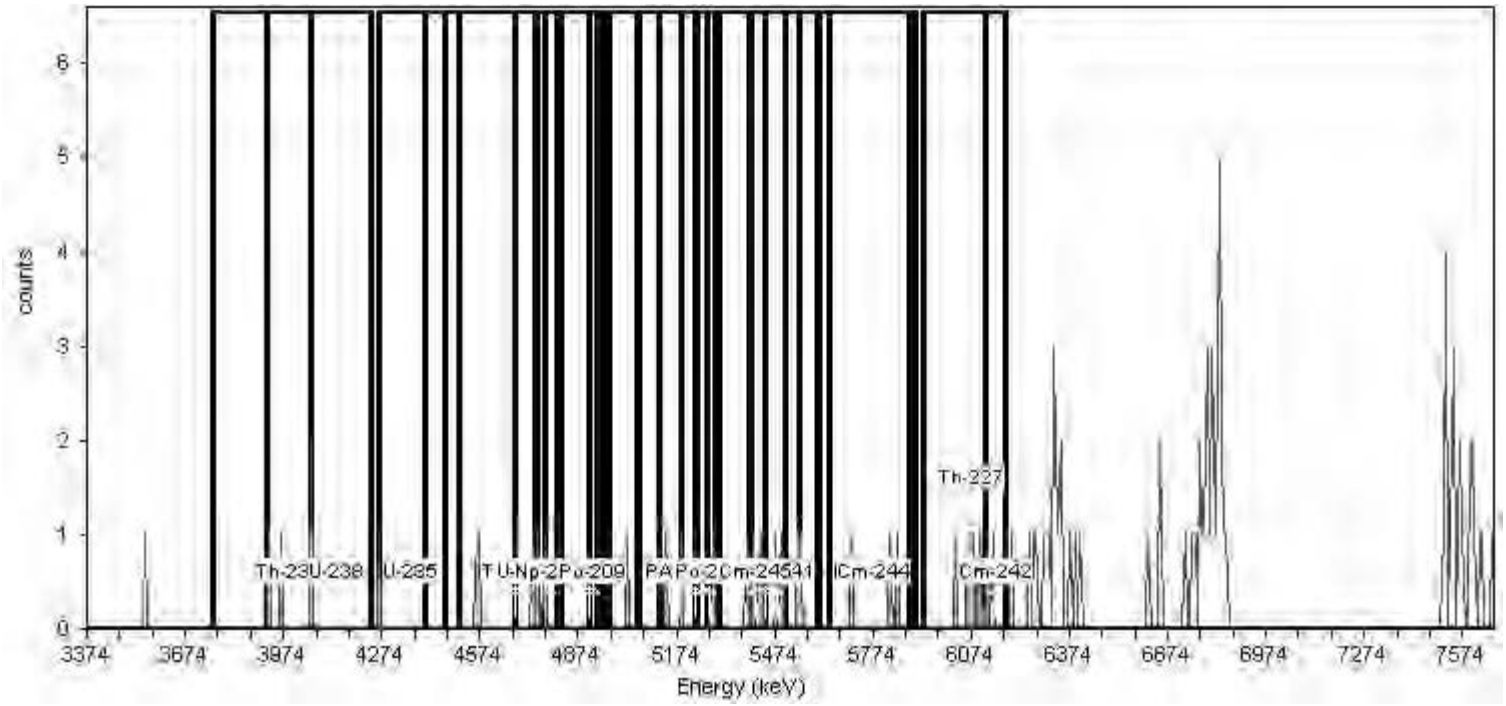
Analyst: 60040

Acquisition

Detector: AV7 , SN: 48-158EE5
Acquisition Start Date: 7/12/2018 1:39:27PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Calibration Name: IC-9793;AV7-05142018
Calibration Date: 5/14/2018 6:26:13PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 22.98% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 101.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	4.00	4.167E-003	2.329E-003
U-238	4.14	3.92	4.24	4.00	4.167E-003	2.329E-003
U-235	4.36	4.26	4.46	1.00	1.042E-003	1.473E-003
Th-230	4.68	4.40	4.75	4.00	4.167E-003	2.329E-003
U-234	4.71	4.51	4.82	5.00	5.208E-003	2.552E-003
Pu-242	4.90	4.68	4.95	3.00	3.125E-003	2.083E-003
Th-229	4.86	4.74	5.12	3.00	3.125E-003	2.083E-003
Np-237	4.78	4.77	4.81	1.00	1.042E-003	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	3.00	3.125E-003	2.083E-003
Am-243	5.23	5.05	5.31	3.00	3.125E-003	2.083E-003
U-232	5.25	5.06	5.40	4.00	4.167E-003	2.329E-003
Th-228	5.45	5.19	5.51	8.00	8.333E-003	3.125E-003
Po-210	5.28	5.23	5.29	1.00	1.042E-003	1.473E-003
Pu-238	5.47	5.27	5.55	9.00	9.375E-003	3.294E-003
Am-241	5.48	5.30	5.60	8.00	8.333E-003	3.125E-003
Cm-245	5.42	5.40	5.45	3.00	3.125E-003	2.083E-003
Pu-236	5.76	5.61	5.89	3.00	3.125E-003	2.083E-003
Cm-244	5.78	5.64	5.90	3.00	3.125E-003	2.083E-003
Th-227	6.07	5.93	6.18	7.00	7.292E-003	2.946E-003
Cm-242	6.15	6.12	6.18	2.00	2.083E-003	1.804E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:56:47AM 7/13/2018

Sample

Sample Name: ICB;AV8
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

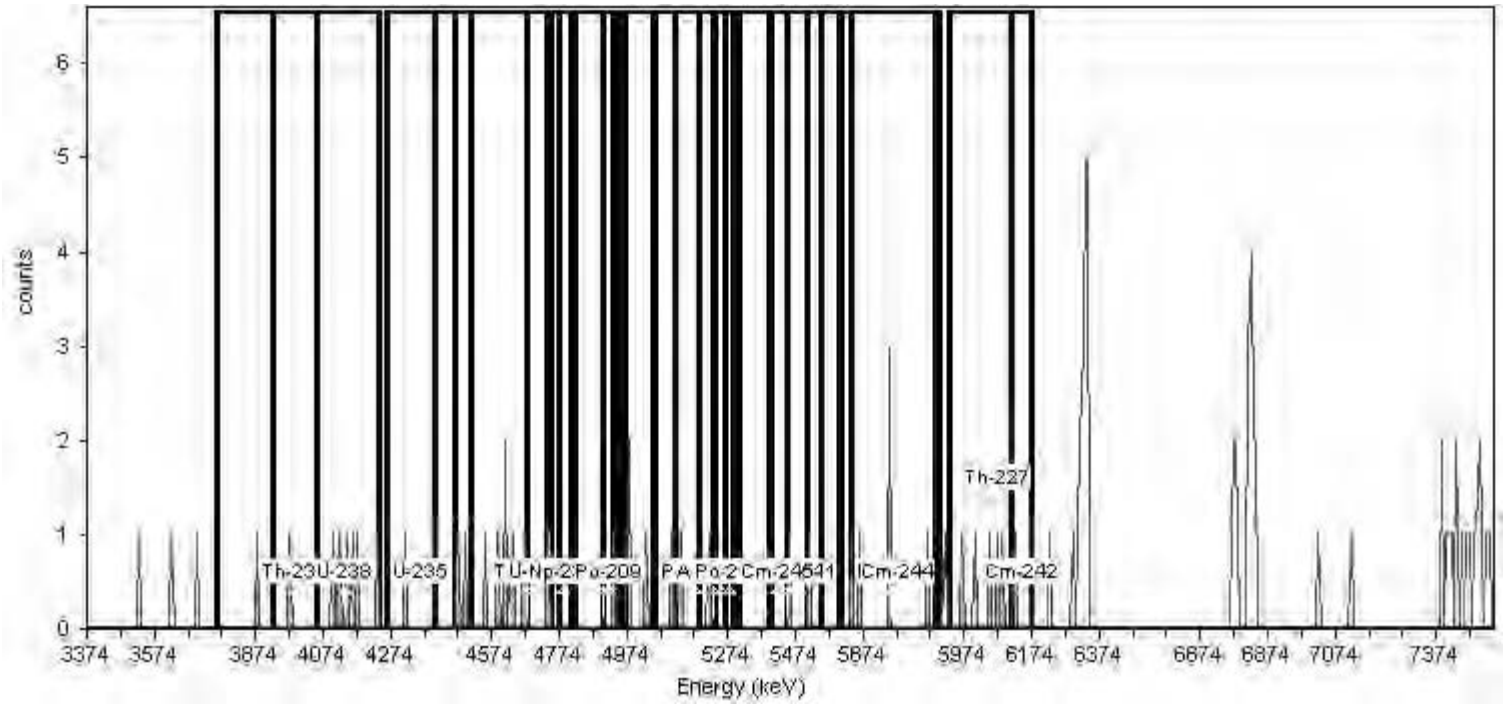
Analyst: 60040

Acquisition

Detector: AV8 , SN: 41-137Q6
Acquisition Start Date: 7/12/2018 1:39:28PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Calibration Name: IC-9795;AV8-05142018
Calibration Date: 5/14/2018 6:26:27PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 25.96% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 99.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-230	4.68	4.40	4.75	11.00	1.146E-002	3.608E-003
U-234	4.71	4.51	4.82	9.00	9.375E-003	3.294E-003
Pu-242	4.90	4.68	4.95	2.00	2.083E-003	1.804E-003
Th-229	4.86	4.74	5.12	6.00	6.250E-003	2.756E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	1.00	1.042E-003	1.473E-003
Pu-239	5.18	4.97	5.24	7.00	7.292E-003	2.946E-003
Am-243	5.23	5.05	5.31	4.00	4.167E-003	2.329E-003
U-232	5.25	5.06	5.40	4.00	4.167E-003	2.329E-003
Th-228	5.45	5.19	5.51	2.00	2.083E-003	1.804E-003
Po-210	5.28	5.23	5.29	0.00	0.000E+000	1.473E-003
Pu-238	5.47	5.27	5.55	2.00	2.083E-003	1.804E-003
Am-241	5.48	5.30	5.60	2.00	2.083E-003	1.804E-003
Cm-245	5.42	5.40	5.45	0.00	0.000E+000	1.473E-003
Pu-236	5.76	5.61	5.89	6.00	6.250E-003	2.756E-003
Cm-244	5.78	5.64	5.90	6.00	6.250E-003	2.756E-003
Th-227	6.07	5.93	6.18	6.00	6.250E-003	2.756E-003
Cm-242	6.15	6.12	6.18	1.00	1.042E-003	1.473E-003
Th-232	3.99	3.75	4.05	2.00	2.083E-003	1.804E-003
U-238	4.14	3.92	4.24	7.00	7.292E-003	2.946E-003
U-235	4.36	4.26	4.46	1.00	1.042E-003	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
1:40:39PM 7/22/2018

Sample

Sample Name: ICB;AV147
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

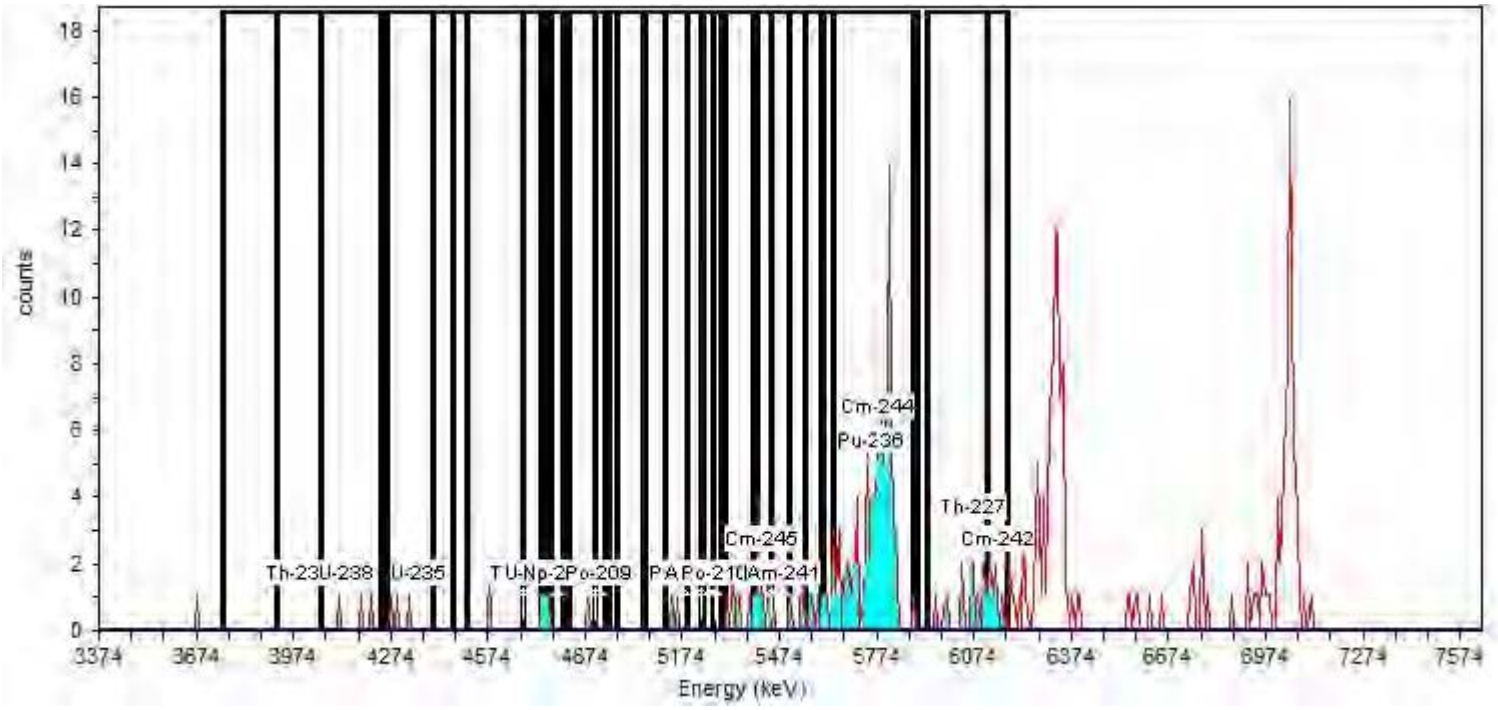
Batch

Batch Name: July2018b
Description:

Acquisition

Detector: AV147 , SN: 50-05/R1
Acquisition Start Date: 7/21/2018 9:28:12PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Calibration Name: IC-7107;AV147-20171113
Calibration Date: 11/13/2017 12:21:03PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 336.00

Nuclide Summary (ROI)

RegionName	Peak Energy (keV)	Start Energy (keV)	End Energy (keV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3,985.93	3,754.75	4,053.05	0.00	0.000E+000	1.473E-003
U-238	4,135.08	3,918.81	4,239.49	3.00	3.125E-003	2.083E-003
U-235	4,358.81	4,261.86	4,463.21	3.00	3.125E-003	2.083E-003
Th-230	4,679.48	4,403.55	4,746.60	4.00	4.167E-003	2.329E-003
U-234	4,709.31	4,507.96	4,821.17	6.00	6.250E-003	2.756E-003
Pu-242	4,903.21	4,679.48	4,947.95	5.00	5.208E-003	2.552E-003
Th-229	4,858.46	4,739.14	5,119.48	5.00	5.208E-003	2.552E-003
Np-237	4,783.89	4,768.97	4,806.26	0.00	0.000E+000	1.473E-003
Po-209	4,918.12	4,903.21	4,933.04	0.00	0.000E+000	1.473E-003
Pu-239	5,179.14	4,970.33	5,238.80	2.00	2.083E-003	1.804E-003
Am-243	5,231.34	5,052.36	5,305.92	2.00	2.083E-003	1.804E-003
U-232	5,253.71	5,059.82	5,402.86	10.00	1.042E-002	3.455E-003
Th-228	5,447.61	5,186.59	5,507.27	18.00	1.875E-002	4.541E-003
Po-210	5,276.09	5,231.34	5,291.00	0.00	0.000E+000	1.473E-003
Pu-238	5,469.98	5,268.63	5,552.01	20.00	2.083E-002	4.774E-003
Am-241	5,484.90	5,298.46	5,604.22	24.00	2.500E-002	5.208E-003
Cm-245	5,417.78	5,395.41	5,447.61	10.00	1.042E-002	3.455E-003
Pu-236	5,760.83	5,611.67	5,887.60	100.00	1.042E-001	1.047E-002
Cm-244	5,775.74	5,641.51	5,902.52	97.00	1.010E-001	1.031E-002
Th-227	6,074.04	5,932.35	6,178.45	22.00	2.292E-002	4.996E-003
Cm-242	6,148.62	6,118.79	6,178.45	8.00	8.333E-003	3.125E-003

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
1:41:50PM 7/22/2018

Sample

Sample Name: ICB;AV148
Comment:

Spectrum #1 Analysis #1
Analyst: 60040

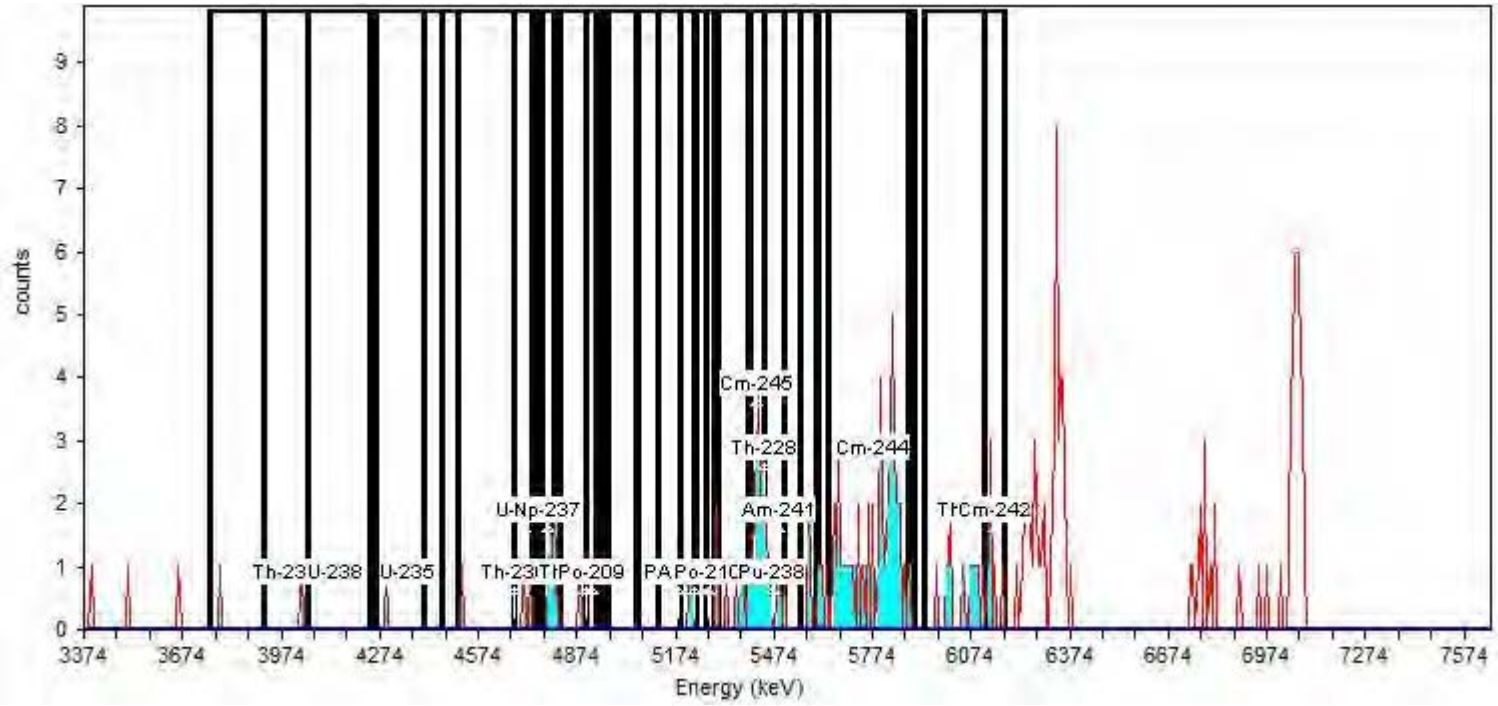
Batch

Batch Name: July2018b
Description:

Acquisition

Detector: AV148 , SN: 50-05/R2
Acquisition Start Date: 7/21/2018 9:28:13PM
Live Time: 960.00 min.
Real Time: 960.07 min.
Calibration Name: IC-8874;AV148-20171113a
Calibration Date: 11/13/2017 12:24:55PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 202.00

Nuclide Summary (ROI)

RegionName	Peak Energy (keV)	Start Energy (keV)	End Energy (keV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3,985.93	3,754.75	4,053.05	2.00	2.083E-003	1.804E-003
U-238	4,135.08	3,918.81	4,239.49	1.00	1.042E-003	1.473E-003
U-235	4,358.81	4,261.86	4,463.21	1.00	1.042E-003	1.473E-003
Th-230	4,679.48	4,403.55	4,746.60	3.00	3.125E-003	2.083E-003
U-234	4,709.31	4,507.96	4,821.17	9.00	9.375E-003	3.294E-003
Pu-242	4,903.21	4,679.48	4,947.95	9.00	9.375E-003	3.294E-003
Th-229	4,858.46	4,739.14	5,119.48	7.00	7.292E-003	2.946E-003
Np-237	4,783.89	4,768.97	4,806.26	6.00	6.250E-003	2.756E-003
Po-209	4,918.12	4,903.21	4,933.04	0.00	0.000E+000	1.473E-003
Pu-239	5,179.14	4,970.33	5,238.80	2.00	2.083E-003	1.804E-003
Am-243	5,231.34	5,052.36	5,305.92	4.00	4.167E-003	2.329E-003
U-232	5,253.71	5,059.82	5,402.86	10.00	1.042E-002	3.455E-003
Th-228	5,447.61	5,186.59	5,507.27	30.00	3.125E-002	5.800E-003
Po-210	5,276.09	5,231.34	5,291.00	0.00	0.000E+000	1.473E-003
Pu-238	5,469.98	5,268.63	5,552.01	28.00	2.917E-002	5.610E-003
Am-241	5,484.90	5,298.46	5,604.22	30.00	3.125E-002	5.800E-003
Cm-245	5,417.78	5,395.41	5,447.61	17.00	1.771E-002	4.419E-003
Pu-236	5,760.83	5,611.67	5,887.60	49.00	5.104E-002	7.366E-003
Cm-244	5,775.74	5,641.51	5,902.52	46.00	4.792E-002	7.141E-003
Th-227	6,074.04	5,932.35	6,178.45	17.00	1.771E-002	4.419E-003
Cm-242	6,148.62	6,118.79	6,178.45	6.00	6.250E-003	2.756E-003

Run Logs

Alpha Spectroscopy Run Log

Detector: AV3

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 15:46	140	IC 160-371847/1		371847			PS
05/18/18 19:25	60	ICV 160-371942/1		371942			PS
07/10/18 16:55	60	CCV 160-375343/1		375343			PS
07/13/18 12:11	960	ICB 160-375880/1		375880			PS
08/10/18 14:23	1	PULSER 160-381888/1		381888			RTM
08/10/18 18:48	180	MB 160-381166/1-A		381888	381166	A-01-R	RTM

Detector: AV4

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 15:46	140	IC 160-371848/1		371848			PS
05/18/18 19:26	60	ICV 160-371943/1		371943			PS
07/10/18 16:57	60	CCV 160-375344/1		375344			PS
07/12/18 13:42	960	ICB 160-375483/1		375483			PS
08/10/18 14:23	1	PULSER 160-381889/1		381889			RTM
08/10/18 18:48	180	LCS 160-381166/2-A		381889	381166	A-01-R	RTM

Detector: AV7

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 15:47	140	IC 160-371856/1		371856			PS
05/18/18 19:26	60	ICV 160-371945/1		371945			PS
07/10/18 16:56	60	CCV 160-375346/1		375346			PS
07/12/18 13:39	960	ICB 160-375509/1		375509			PS
08/10/18 14:23	1	PULSER 160-381909/1		381909			RTM
08/10/18 18:48	180	LCSD 160-381166/3-A		381909	381166	A-01-R	RTM

Detector: AV8

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 15:47	140	IC 160-371857/1		371857			PS
05/18/18 19:27	60	ICV 160-371946/1		371946			PS
07/10/18 16:56	60	CCV 160-375347/1		375347			PS
07/12/18 13:39	960	ICB 160-375520/1		375520			PS
08/10/18 14:23	1	PULSER 160-381919/1		381919			RTM
08/10/18 18:48	180	160-29476-1	CRC-MW-1	381919	381166	A-01-R	RTM

Detector: AV147

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
11/13/17 09:43	140	IC 160-337250/1		337250			PS
11/15/17 11:44	60	ICV 160-337582/1		337582			PS
07/21/18 21:28	960	ICB 160-378373/1		378373			PS
07/24/18 10:31	60	CCV 160-378429/1		378429			PS
08/03/18 12:32	1	PULSER 160-380260/1		380260			ALS
08/03/18 14:29	180	MB 160-377736/1-A		380260	377736	A-01-R	ALS
08/06/18 21:31	1	PULSER 160-380834/1		380834			ALS
08/06/18 22:38	720	160-29476-1	CRC-MW-1	380834	377736	A-01-R	ALS

Alpha Spectroscopy Run Log

Detector: AV148

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
11/13/17 10:03	140	IC 160-337251/1		337251			PS
11/15/17 11:50	60	ICV 160-337583/1		337583			PS
07/21/18 21:28	960	ICB 160-378374/1		378374			PS
07/24/18 10:32	60	CCV 160-378430/1		378430			PS
08/03/18 12:32	1	PULSER 160-380261/1		380261			ALS
08/03/18 14:29	180	LCS 160-377736/2-A		380261	377736	A-01-R	ALS
08/06/18 21:31	1	PULSER 160-380835/1		380835			ALS
08/06/18 22:38	720	160-29476-1 DU	CRC-MW-1 DU	380835	377736	A-01-R	ALS

GAS FLOW PROPORTIONAL COUNTER

Method 9315

Radium-226 (GFPC) by Method 9315

Prep Batch: 375564

Preparation, Precipitate Separation (21-Day In-Growth)

Gas Flow Proportional Counter Analysis Detail Report
Prep Batch: 375564

Lab ID: LCS 160-375564/1-A | Analyzed: 08/08/18 05:27 | Decay Corrected: No | Ts: 100
Client ID: | Detector: Orange4 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 2

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-226	10.46	0.552	1.09		pCi/L	1.00	0.0719	1444	40	14.440	0.040	0.18446	380986

Carrier	LCS Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03120				g		0.0339	92.0	40 - 110

Lab ID: LCSD 160-375564/2-A | Analyzed: 08/08/18 05:27 | Decay Corrected: No | Ts: 100
Client ID: | Detector: Orange5 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 2

Analyte	LCSD Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-226	10.60	0.537	1.10		pCi/L	1.00	0.101	1584	119	15.840	0.119	0.18330	380986

Carrier	LCSD Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03380				g		0.0339	99.7	40 - 110

Lab ID: 160-29476-1 | Analyzed: 08/08/18 05:29 | Decay Corrected: No | Ts: 100
Client ID: CRC-MW-1 | Detector: Orange19 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 2

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-226	0.356	0.105	0.109		pCi/L	1.00	0.0859	63	86	0.630	0.086	0.19526	380986

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0327				g		0.0339	96.5	40 - 110

Lab ID: MB 160-375564/15-A | Analyzed: 08/08/18 05:29 | Decay Corrected: No | Ts: 100
Client ID: | Detector: Orange22 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 2

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-226	0.1295	0.0706	0.0716		pCi/L	1.00	0.0869	30	96	0.300	0.096	0.19197	380986

Carrier	MB Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03430				g		0.0339	101	40 - 110

Gas Flow Proportional Counter Analysis Detail Report
Prep Batch: 375564

Quality Control Summary

Method Blank ID:	Analyte	Parent Result	Spike Added	MB Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
MB 160-375564/15-A	Radium-226			0.1295		pCi/L							3.617412 27

Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-375564/1-A	Radium-226		11.4	10.46		pCi/L	92	68 - 137	1				-1.117189 905

Lab Control Sample Duplicate	Analyte	Parent Result	Spike Added	LCSD Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCSD 160-375564/2-A	Radium-226		11.4	10.60		pCi/L	93	68 - 137	1	0.07	0.19	1	-.9371899 937

Glossary:

Ts = Count Duration, Sample
Tb = Count Duration, Background
Cs = Total Counts, Sample
Cb = Total Counts, Background
CPMs = Counts Per Minute, Sample
CPMb = Counts Per Minute, Background
Eff = Efficiency

GAS FLOW PROPORTIONAL COUNTER BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Batch Number: 375564 Batch Start Date: 07/13/18 13:31 Batch Analyst: Chapman, Jessica L

Batch Method: PrecSep-21 Batch End Date: 07/27/18 12:35

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	Ba_TareWt	Ba_GrossWt	Ba_Mass	IngDecDate1	IngDecDate2
LCS 160-375564/1		PrecSep-21, 9315		1000 mL	8.7765 g	8.8077 g	0.0339 g	07/18/2018 13:48	07/27/2018 08:20
LCSD 160-375564/2		PrecSep-21, 9315		1000 mL	8.8247 g	8.8585 g	0.0339 g	07/18/2018 13:48	07/27/2018 08:20
160-29476-F-1	CRC-MW-1	PrecSep-21, 9315	T	1000.16 mL	8.7417 g	8.7744 g	0.0339 g	07/18/2018 13:48	07/27/2018 08:20
MB 160-375564/15		PrecSep-21, 9315		1000 mL	8.8003 g	8.8346 g	0.0339 g	07/18/2018 13:48	07/27/2018 08:20

Lab Sample ID	Client Sample ID	Method Chain	Basis	IngDecDate3	NativeMassBa	Ba Carrier 00038	Ra-226 00027		
LCS 160-375564/1		PrecSep-21, 9315		08/08/2018	0 g	1 mL	1 mL		
LCSD 160-375564/2		PrecSep-21, 9315		08/08/2018	0 g	1 mL	1 mL		
160-29476-F-1	CRC-MW-1	PrecSep-21, 9315	T	08/08/2018	0 g	1 mL			
MB 160-375564/15		PrecSep-21, 9315		08/08/2018	0 g	1 mL			

Batch Notes	
Balance ID	1122021820, 1125330898
Batch Comment	In CPR, Out JTR
Pipette ID	RAD112, CR001
Analyst ID - Reagent Drop Witness	CPR per JLC
Analyst ID - Reagent Drop	JLC
SOP Number	ST-RC-0041, ST-RC-0002

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - A

Addr: 4

Sample ID LCS 160-375564/1-A

Repeat 1

Carrier No. 0

Batch ID 375564

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/8/2018 5:27:22 AM

Count Ended 8/8/2018 7:07:35 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.040	1,444	14.440	14.400
sd	0.006	38.000	0.380	0.380
Beta	0.351	2,724	27.240	26.889
sd	0.019	52.192	0.522	0.522

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - B

Addr: 5

Sample ID LCSD 160-375564/2-A

Repeat 1

Carrier No. 0

Batch ID 375564

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/8/2018 5:27:28 AM

Count Ended 8/8/2018 7:07:39 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.119	1,584	15.840	15.721
sd	0.011	39.799	0.398	0.398
Beta	0.362	2,808	28.080	27.718
sd	0.019	52.991	0.530	0.530

Alpha/Beta Count Results

Sample Activity Report

Orange 16-19 - D

Addr: 19

Sample ID 160-29476-F-1-A

Repeat 1

Carrier No. 0

Batch ID 375564

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/8/2018 5:29:05 AM

Count Ended 8/8/2018 7:09:17 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.086	63	0.630	0.544
sd	0.009	7.937	0.079	0.080
Beta	0.465	80	0.800	0.335
sd	0.022	8.944	0.089	0.092

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - C

Addr: 22

Sample ID MB 160-375564/15-A

Repeat 1

Carrier No. 0

Batch ID 375564

Count Method Gross Alpha Beta

Detector Volts 1515

Count Began 8/8/2018 5:29:26 AM

Count Ended 8/8/2018 7:11:03 AM

Sample Count Time 100.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.096	30	0.300	0.204
sd	0.010	5.477	0.055	0.056
Beta	0.386	45	0.450	0.064
sd	0.020	6.708	0.067	0.070

Method 9320

Radium-228 (GFPC) by Method 9320

Prep Batch: 375578

Preparation, Precipitate Separation

Gas Flow Proportional Counter Analysis Detail Report
Prep Batch: 375578

Lab ID: LCS 160-375578/1-A | Analyzed: 07/27/18 09:18 | Decay Corrected: No | Ts: 200
Client ID: | Detector: Protean0 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 1

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-228	11.46	0.782	1.31		pCi/L	1.00	0.513	1128	664	5.640	0.664	0.43619	378362

Carrier	LCS Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03120				g		0.0339	92.0	40 - 110
Y Carrier	0.02270				g		0.0268	84.9	40 - 110

Lab ID: LCSD 160-375578/2-A | Analyzed: 07/27/18 09:18 | Decay Corrected: No | Ts: 200
Client ID: | Detector: Protean1 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 1

Analyte	LCSD Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-228	10.96	0.732	1.25		pCi/L	1.00	0.404	1076	432	5.380	0.432	0.43795	378362

Carrier	LCSD Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03380				g		0.0339	99.7	40 - 110
Y Carrier	0.02170				g		0.0268	81.1	40 - 110

Lab ID: 160-29476-1 | Analyzed: 07/27/18 09:20 | Decay Corrected: No | Ts: 200
Client ID: CRC-MW-1 | Detector: Protean13 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 1

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-228	0.533	0.273	0.277		pCi/L	1.00	0.404	132	422	0.660	0.422	0.43897	378362

Carrier	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.0327				g		0.0339	96.5	40 - 110
Y Carrier	0.0222				g		0.0268	83.0	40 - 110

Lab ID: MB 160-375578/15-A | Analyzed: 07/27/18 09:20 | Decay Corrected: No | Ts: 200
Client ID: | Detector: Protean15 | Yield Truncated: No | Tb: 1000
Sigma: 2 | Dil Fac: 1 | Calibration Type: 1

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Cs	Cb	CPMs	CPMb	Eff	Anly Batch
Radium-228	0.3845	0.274	0.276	U	pCi/L	1.00	0.430	140	522	0.700	0.522	0.43189	378362

Carrier	MB Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Ba Carrier	0.03430				g		0.0339	101	40 - 110
Y Carrier	0.02230				g		0.0268	83.4	40 - 110

Gas Flow Proportional Counter Analysis Detail Report
Prep Batch: 375578

Quality Control Summary

Method Blank ID:	Analyte	Parent Result	Spike Added	MB Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
MB 160-375578/15-A	Radium-228			0.3845	U	pCi/L							2.78361485

Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-375578/1-A	Radium-228		11.2	11.46		pCi/L	102	56 - 140	4				.2980378917

Lab Control Sample Duplicate	Analyte	Parent Result	Spike Added	LCSD Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCSD 160-375578/2-A	Radium-228		11.2	10.96		pCi/L	98	56 - 140	4	0.19	0.55	1	-.252745236

Glossary:

Ts = Count Duration, Sample
Tb = Count Duration, Background
Cs = Total Counts, Sample
Cb = Total Counts, Background
CPMs = Counts Per Minute, Sample
CPMb = Counts Per Minute, Background
Eff = Efficiency

GAS FLOW PROPORTIONAL COUNTER BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Batch Number: 375578 Batch Start Date: 07/13/18 14:09 Batch Analyst: Chapman, Jessica L

Batch Method: PrecSep_0 Batch End Date: 07/27/18 08:40

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	Ba_TareWt	Ba_GrossWt	Ba_Mass	Y_TareWt	Y_GrossWt
LCS 160-375578/1		PrecSep_0, 9320		1000 mL	8.7765 g	8.8077 g	0.0339 g	8.7137 g	8.7364 g
LCSD 160-375578/2		PrecSep_0, 9320		1000 mL	8.8247 g	8.8585 g	0.0339 g	8.8450 g	8.8667 g
160-29476-F-1	CRC-MW-1	PrecSep_0, 9320	T	1000.16 mL	8.7417 g	8.7744 g	0.0339 g	8.7350 g	8.7572 g
MB 160-375578/15		PrecSep_0, 9320		1000 mL	8.8003 g	8.8346 g	0.0339 g	8.8056 g	8.8279 g

Lab Sample ID	Client Sample ID	Method Chain	Basis	Y_Mass	IngDecDate1	IngDecDate2	NativeMassBa	NativeMassY	Ba Carrier 00038
LCS 160-375578/1		PrecSep_0, 9320		0.02675 g	07/18/2018 13:48	07/27/2018 06:00	0 g	0 g	1 mL
LCSD 160-375578/2		PrecSep_0, 9320		0.02675 g	07/18/2018 13:48	07/27/2018 06:00	0 g	0 g	1 mL
160-29476-F-1	CRC-MW-1	PrecSep_0, 9320	T	0.02675 g	07/18/2018 13:48	07/27/2018 06:00	0 g	0 g	1 mL
MB 160-375578/15		PrecSep_0, 9320		0.02675 g	07/18/2018 13:48	07/27/2018 06:00	0 g	0 g	1 mL

Lab Sample ID	Client Sample ID	Method Chain	Basis	Ra22804A120 00001	Y Carrier 00032				
LCS 160-375578/1		PrecSep_0, 9320		0.3 mL	0.2 mL				
LCSD 160-375578/2		PrecSep_0, 9320		0.3 mL	0.2 mL				
160-29476-F-1	CRC-MW-1	PrecSep_0, 9320	T		0.2 mL				
MB 160-375578/15		PrecSep_0, 9320			0.2 mL				

Batch Notes	
Balance ID	1122021820, 1125330898
Batch Comment	In CPR, Out JTR
Pipette ID	RAD112, CR001, SEP005
Analyst ID - Reagent Drop Witness	CPR, JLC per CPR
Analyst ID - Reagent Drop	JLC per CPR, CPR
SOP Number	ST-RC-0041, ST-RC-0002

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GAS FLOW PROPORTIONAL COUNTER BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29476-1

SDG No.:

Batch Number: 375578 Batch Start Date: 07/13/18 14:09 Batch Analyst: Chapman, Jessica L

Batch Method: PrecSep_0 Batch End Date: 07/27/18 08:40

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Alpha/Beta Count Results

Sample Activity Report

Protean 0-3 - A

Addr: 0

Sample ID LCS 160-375578/1-A

Repeat 1

Carrier No. 0

Batch ID 375578

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 ***Sample*** **sd** 0 ***Sample***

Residual Wt 0 ***mg*** **sd** 0 ***mg***

Count Began 7/27/2018 9:18:23 AM

Count Ended 7/27/2018 12:38:36 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 200.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.066	49	0.245	0.179
sd	0.000			0.008	7.000	0.035	0.036
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.664	1,128	5.640	4.976
sd	0.000			0.026	33.586	0.168	0.170

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Protean 0-3 - B

Addr: 1

Sample ID LCSD 160-375578/2-A

Repeat 1

Carrier No. 0

Batch ID 375578

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/27/2018 9:18:29 AM

Count Ended 7/27/2018 12:38:41 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 200.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.074	36	0.180	0.106
sd	0.000			0.009	6.000	0.030	0.031
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.432	1,076	5.380	4.948
sd	0.000			0.021	32.802	0.164	0.165

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Protean 12-15 - B

Addr: 13

Sample ID 160-29476-F-1-B

Repeat 1

Carrier No. 0

Batch ID 375578

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/27/2018 9:20:00 AM

Count Ended 7/27/2018 12:40:14 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 200.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.137	46	0.230	0.093
sd	0.000			0.012	6.782	0.034	0.036
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.422	132	0.660	0.238
sd	0.000			0.021	11.489	0.057	0.061

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Protean 12-15 - D

Addr: 15

Sample ID MB 160-375578/15-A

Repeat 1

Carrier No. 0

Batch ID 375578

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***Sample***	**sd**	0 ***Sample***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 7/27/2018 9:20:12 AM

Count Ended 7/27/2018 12:40:26 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 200.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	54	0.270	0.121
sd	0.000			0.012	7.348	0.037	0.039
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.522	140	0.700	0.178
sd	0.000			0.023	11.832	0.059	0.063

	Net Activity dpm	LLD dpm	MDC DPM	MPC DPM	Net Concentration * DPM	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	0.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Currie

Error = .00 **x sd**

Daily Checks

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Wednesday, August 08, 2018

Instrument: ***Orange***

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
Detector 0											
12:08 AM	**Efficiency**						49200.94	49935.03	1498.05	-734.09	Pass
	Background										
	Crosstalk						46.535	655.525	273.412	-608.990	NA
12:15 AM	**Efficiency**	12508.33	12918.08	387.54	-409.74	**FAIL**					
	Background										
	Crosstalk	4288.000	4183.775	91.802	104.225	Pass					
1:16 AM	**Efficiency**	12441.29	12918.08	387.54	-476.79	**FAIL**					
	Background										
	Crosstalk	4215.000	4183.775	91.802	31.225	Pass					
4:38 AM	**Efficiency**										
	Background	0.185	0.097	0.037	0.088	Pass	0.575	0.500	0.099	0.076	Pass
	Crosstalk										
Detector 1											
12:07 AM	**Efficiency**						47484.96	48521.48	1455.64	-1036.52	Pass
	Background										
	Crosstalk						10.116	338.750	244.604	-328.634	NA
12:15 AM	**Efficiency**	13339.63	13693.68	410.81	-354.04	Pass					
	Background										
	Crosstalk	4640.000	4106.275	231.030	533.725	**WARNING**					
4:27 AM	**Efficiency**										
	Background	0.080	0.077	0.029	0.004	Pass	0.435	0.382	0.064	0.053	Pass
	Crosstalk										
Detector 2											
12:07 AM	**Efficiency**						48859.25	49918.95	1497.57	-1059.70	Pass
	Background										
	Crosstalk						8.093	611.900	348.104	-603.807	NA

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Wednesday, August 08, 2018

Instrument: Orange

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
12:15 AM	**Efficiency**	13702.88	14260.08	427.80	-557.20	**FAIL**					
	Background										
	Crosstalk	4656.500	4228.575	214.101	427.925	Pass					
1:16 AM	**Efficiency**	13689.37	14260.08	427.80	-570.71	**FAIL**					
	Background										
	Crosstalk	4471.500	4228.575	214.101	242.925	Pass					
4:38 AM	**Efficiency**										
	Background	0.185	0.091	0.032	0.095	Pass	0.595	0.408	0.053	0.187	**FAIL**
	Crosstalk										
8:35 AM	**Efficiency**										
	Background	0.115	0.091	0.032	0.025	Pass	0.475	0.408	0.053	0.067	Pass
	Crosstalk										
Detector 3											
12:08 AM	**Efficiency**						58674.75	59069.20	1772.08	-394.45	Pass
	Background										
	Crosstalk						9.105	545.400	417.832	-536.295	NA
12:15 AM	**Efficiency**	12779.74	13346.88	400.41	-567.14	**FAIL**					
	Background										
	Crosstalk	4392.000	4042.275	43.117	349.725	**DOEF**					
1:16 AM	**Efficiency**	12857.30	13346.88	400.41	-489.58	**FAIL**					
	Background										
	Crosstalk	4403.000	4042.275	43.117	360.725	**DOEF**					
4:38 AM	**Efficiency**										
	Background	0.245	0.104	0.021	0.141	**FAIL**	0.675	0.601	0.097	0.074	Pass
	Crosstalk										
Detector 4											
12:08 AM	**Efficiency**						56232.15	55962.22	1678.87	269.93	Pass
	Background										
	Crosstalk						0.000	0.320	0.284	-0.320	NA

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Instrument: ***Orange***

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
12:15 AM	**Efficiency**	15772.13	16076.75	482.30	-304.62	Pass					
	Background										
	Crosstalk	6198.500	6120.950	71.073	77.550	Pass					
4:27 AM	**Efficiency**										
	Background	0.100	0.104	0.030	-0.003	Pass	0.400	0.462	0.068	-0.062	Pass
	Crosstalk										
Detector 5											
12:08 AM	**Efficiency**						54221.95	54077.08	1622.31	144.87	Pass
	Background										
	Crosstalk						3.541	0.250	0.344	3.291	NA
12:15 AM	**Efficiency**	16171.95	16418.00	492.54	-246.05	Pass					
	Background										
	Crosstalk	6441.000	6233.125	41.144	207.875	**DOEF**					
4:27 AM	**Efficiency**										
	Background	0.110	0.076	0.014	0.034	Pass	0.505	0.444	0.110	0.061	Pass
	Crosstalk										
Detector 6											
12:08 AM	**Efficiency**						45417.34	49761.08	1492.83	-4343.73	**FAIL**
	Background										
	Crosstalk						1.513	0.175	0.294	1.338	NA
12:15 AM	**Efficiency**	11501.74	14588.50	437.66	-3086.76	**FAIL**					
	Background										
	Crosstalk	9168.500	6496.200	551.681	2672.300	**DOEF**					
4:27 AM	**Efficiency**										
	Background	0.080	0.100	0.035	-0.020	Pass	0.410	0.463	0.080	-0.053	Pass
	Crosstalk										
Detector 7											

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Instrument: Orange

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
12:02 AM	**Efficiency**						45834.24	45414.23	1362.43	420.02	Pass
	Background										
	Crosstalk						3.541	1.325	0.893	2.216	NA
12:08 AM	**Efficiency**						45889.49	45414.23	1362.43	475.26	Pass
	Background										
	Crosstalk						3.035	1.325	0.893	1.710	NA
12:15 AM	**Efficiency**	15329.28	15629.53	468.89	-300.25	Pass					
	Background										
	Crosstalk	5801.000	5742.775	47.803	58.225	Pass					
1:17 AM	**Efficiency**	15142.63	15629.53	468.89	-486.90	**FAIL**					
	Background										
	Crosstalk	5792.000	5742.775	47.803	49.225	Pass					
4:38 AM	**Efficiency**										
	Background	0.185	0.119	0.035	0.066	Pass	0.660	0.560	0.073	0.100	Pass
	Crosstalk										
Detector 8											
12:11 AM	**Efficiency**						49778.49	49452.15	1483.56	326.34	Pass
	Background										
	Crosstalk						9.647	2.575	1.340	7.072	NA
12:18 AM	**Efficiency**	12294.84	12479.00	374.37	-184.16	Pass					
	Background										
	Crosstalk	4417.000	4244.750	69.836	172.250	**WARNING**					
4:27 AM	**Efficiency**										
	Background	0.145	0.068	0.016	0.078	**FAIL**	0.520	0.420	0.072	0.100	Pass
	Crosstalk										
8:35 AM	**Efficiency**										
	Background	0.080	0.068	0.016	0.013	Pass	0.520	0.420	0.072	0.100	Pass
	Crosstalk										
Detector 9											

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Instrument: Orange

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
12:12 AM	**Efficiency**						49023.82	48747.90	1462.44	275.92	Pass
	Background										
	Crosstalk						10.662	2.700	0.992	7.962	NA
12:18 AM	**Efficiency**	13429.19	13598.65	407.96	-169.46	Pass					
	Background										
	Crosstalk	4775.500	4590.975	94.057	184.525	Pass					
4:27 AM	**Efficiency**										
	Background	0.105	0.112	0.033	-0.007	Pass	0.595	0.487	0.082	0.108	Pass
	Crosstalk										
Detector 10											
12:12 AM	**Efficiency**						50318.01	50054.68	1501.64	263.34	Pass
	Background										
	Crosstalk						3.046	0.125	0.222	2.921	NA
12:18 AM	**Efficiency**	11378.61	11708.33	351.25	-329.72	Pass					
	Background										
	Crosstalk	7388.000	7201.325	145.497	186.675	Pass					
4:27 AM	**Efficiency**										
	Background	0.095	0.125	0.033	-0.030	Pass	0.390	0.506	0.095	-0.116	Pass
	Crosstalk										
Detector 11											
12:12 AM	**Efficiency**						59412.28	59142.43	1774.27	269.86	Pass
	Background										
	Crosstalk						3.554	2.650	1.204	0.904	NA
12:18 AM	**Efficiency**	13273.63	13398.55	401.96	-124.92	Pass					
	Background										
	Crosstalk	4457.000	4216.575	69.064	240.425	**DOEF**					
4:27 AM	**Efficiency**										
	Background	0.125	0.116	0.031	0.009	Pass	0.715	0.719	0.097	-0.004	Pass
	Crosstalk										

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Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
Detector 12											
12:12 AM	**Efficiency**						57148.33	56886.15	1706.58	262.18	Pass
	Background										
	Crosstalk						3.046	2.475	1.082	0.571	NA
12:18 AM	**Efficiency**	16900.89	16917.10	507.51	-16.21	Pass					
	Background										
	Crosstalk	6014.000	5738.500	102.997	275.500	**WARNING**					
4:27 AM	**Efficiency**										
	Background	0.270	0.103	0.030	0.167	**FAIL**	0.730	0.618	0.100	0.112	Pass
	Crosstalk										
8:35 AM	**Efficiency**										
	Background	0.115	0.103	0.030	0.012	Pass	0.570	0.618	0.100	-0.048	Pass
	Crosstalk										
Detector 13											
12:12 AM	**Efficiency**						55704.96	55204.43	1656.13	500.53	Pass
	Background										
	Crosstalk						42.648	22.150	5.535	20.498	NA
12:20 AM	**Efficiency**	17161.60	17051.55	511.55	110.05	Pass					
	Background										
	Crosstalk	5472.500	5209.900	107.080	262.600	**WARNING**					
4:27 AM	**Efficiency**										
	Background	0.090	0.118	0.029	-0.028	Pass	0.635	0.615	0.084	0.020	Pass
	Crosstalk										
Detector 14											
12:12 AM	**Efficiency**						50931.05	51681.73	1550.45	-750.67	Pass
	Background										
	Crosstalk						64.535	51.775	17.970	12.760	NA

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Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
12:18 AM	**Efficiency**	15437.24	15537.73	466.13	-100.49	Pass					
	Background										
	Crosstalk	4840.500	4533.500	133.093	307.000	**WARNING**					
4:27 AM	**Efficiency**										
	Background	0.125	0.095	0.034	0.031	Pass	0.545	0.518	0.090	0.027	Pass
	Crosstalk										
Detector 15											
12:12 AM	**Efficiency**						44623.96	44769.68	1343.09	-145.71	Pass
	Background										
	Crosstalk						13.201	5.175	1.711	8.026	NA
12:18 AM	**Efficiency**	15148.01	15520.28	465.61	-372.27	Pass					
	Background										
	Crosstalk	5291.000	4871.600	159.105	419.400	**WARNING**					
4:28 AM	**Efficiency**										
	Background	0.120	0.138	0.024	-0.018	Pass	0.425	0.544	0.070	-0.119	Pass
	Crosstalk										
Detector 16											
12:15 AM	**Efficiency**						49433.61	49427.80	1482.83	5.81	Pass
	Background										
	Crosstalk						27.928	13.575	3.477	14.353	NA
12:22 AM	**Efficiency**	12413.97	12627.03	378.81	-213.05	Pass					
	Background										
	Crosstalk	4491.000	4414.550	41.621	76.450	Pass					
4:29 AM	**Efficiency**										
	Background	0.155	0.106	0.034	0.050	Pass	0.555	0.515	0.101	0.041	Pass
	Crosstalk										
Detector 17											

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Instrument: ***Orange***

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
12:15 AM	**Efficiency**						48252.32	48123.48	1443.70	128.84	Pass
	Background										
	Crosstalk						6.093	1.975	1.164	4.118	NA
12:22 AM	**Efficiency**	13207.59	13433.43	403.00	-225.83	Pass					
	Background										
	Crosstalk	4916.000	4784.025	106.709	131.975	Pass					
4:29 AM	**Efficiency**										
	Background	0.130	0.103	0.035	0.028	Pass	0.510	0.410	0.069	0.100	Pass
	Crosstalk										
Detector 18											
12:16 AM	**Efficiency**						50631.99	50092.13	1502.76	539.87	Pass
	Background										
	Crosstalk						16.757	12.050	3.734	4.707	NA
12:23 AM	**Efficiency**	13940.66	14158.50	424.76	-217.84	Pass					
	Background										
	Crosstalk	4969.500	4572.700	56.751	396.800	**DOEF**					
4:29 AM	**Efficiency**										
	Background	0.140	0.097	0.018	0.043	Pass	0.475	0.455	0.055	0.021	Pass
	Crosstalk										
Detector 19											
12:16 AM	**Efficiency**						60297.22	60133.55	1804.01	163.67	Pass
	Background										
	Crosstalk						20.309	17.325	4.190	2.984	NA
12:22 AM	**Efficiency**	13150.53	13501.28	405.04	-350.75	Pass					
	Background										
	Crosstalk	4606.500	4504.475	54.298	102.025	Pass					
4:29 AM	**Efficiency**										
	Background	0.155	0.110	0.034	0.045	Pass	0.405	2.596	9.515	-2.191	Pass
	Crosstalk										

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Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
Detector 20											
12:16 AM	**Efficiency**						56026.73	56390.63	1691.72	-363.90	Pass
	Background										
	Crosstalk						10.663	5.350	1.920	5.313	NA
12:23 AM	**Efficiency**	16638.67	16878.00	506.34	-239.33	Pass					
	Background										
	Crosstalk	5837.000	5700.475	42.878	136.525	**DOEF**					
4:29 AM	**Efficiency**										
	Background	0.145	0.098	0.026	0.048	Pass	0.385	0.409	0.085	-0.024	Pass
	Crosstalk										
Detector 21											
12:16 AM	**Efficiency**						55122.30	55234.63	1657.04	-112.32	Pass
	Background										
	Crosstalk						12.187	8.525	2.489	3.662	NA
12:23 AM	**Efficiency**	16760.33	17014.40	510.43	-254.07	Pass					
	Background										
	Crosstalk	5773.000	5708.100	49.208	64.900	Pass					
4:29 AM	**Efficiency**										
	Background	0.130	0.106	0.036	0.024	Pass	0.340	0.414	0.068	-0.074	Pass
	Crosstalk										
Detector 22											
12:16 AM	**Efficiency**						52221.76	52617.68	1578.53	-395.91	Pass
	Background										
	Crosstalk						8.631	3.950	2.070	4.681	NA
12:23 AM	**Efficiency**	15159.56	15510.45	465.31	-350.89	Pass					
	Background										
	Crosstalk	5624.500	5610.125	63.217	14.375	Pass					

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Instrument: ***Orange***

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
4:29 AM	**Efficiency**										
	Background	0.125	0.104	0.030	0.021	Pass	0.410	0.407	0.060	0.004	Pass
	Crosstalk										
Detector 23											
12:16 AM	**Efficiency**						45496.95	45356.30	1360.69	140.65	Pass
	Background										
	Crosstalk						11.179	2.450	1.307	8.729	NA
12:23 AM	**Efficiency**	15076.99	15430.00	462.90	-353.01	Pass					
	Background										
	Crosstalk	5511.000	5503.275	61.421	7.725	Pass					
4:29 AM	**Efficiency**										
	Background	0.105	0.105	0.033	0.000	Pass	0.355	0.439	0.107	-0.084	Pass
	Crosstalk										

The Alpha and Beta +/- limit are based upon initial 20-point population.

The Alpha and Beta +/- limit for Efficiency is stated at 3%. Flags are "FAIL" > 3%.

The Alpha and Beta +/- limit for Background is stated at 1 StDev. Flags are "FAIL" > 3 StDev.

The Alpha +/- limit for Crosstalk is stated at 1 StDev. Flags are "Warning > 2 StDev and "DOEF" > 3 StDev. Beta is negligible, for trend only ("NA").

Times shown reflect the end of the count duration.

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Instrument: Protean

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
Detector 0											
12:36 AM	**Efficiency**	12191.88	12598.25	377.95	-406.37	**FAIL**					
	Background										
	Crosstalk	4102.000	4210.200	44.960	-108.200	**WARNING**					
12:40 AM	**Efficiency**						49679.12	48583.18	1457.50	1095.94	Pass
	Background										
	Crosstalk						30.946	23.225	5.043	7.721	NA
12:58 AM	**Efficiency**	12249.93	12598.25	377.95	-348.32	Pass					
	Background										
	Crosstalk	4191.500	4210.200	44.960	-18.700	Pass					
4:18 AM	**Efficiency**										
	Background	0.200	0.096	0.037	0.104	Pass	0.780	0.716	0.094	0.064	Pass
	Crosstalk										
Detector 1											
12:36 AM	**Efficiency**	13172.64	13515.73	405.47	-343.09	Pass					
	Background										
	Crosstalk	4642.000	4578.400	63.081	63.600	Pass					
12:40 AM	**Efficiency**						48788.30	47659.85	1429.80	1128.45	Pass
	Background										
	Crosstalk						9.639	10.950	2.549	-1.311	NA
4:17 AM	**Efficiency**										
	Background	0.245	0.111	0.029	0.134	**FAIL**	0.745	0.498	0.078	0.248	**FAIL**
	Crosstalk										
9:04 AM	**Efficiency**										
	Background	0.110	0.111	0.029	-0.001	Pass	0.375	0.498	0.078	-0.123	Pass
	Crosstalk										
Detector 2											

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Instrument: Protean

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
12:36 AM	**Efficiency**	13608.47	14068.05	422.04	-459.58	**FAIL**					
	Background										
	Crosstalk	4837.000	4802.250	75.574	34.750	Pass					
12:40 AM	**Efficiency**						49940.80	49887.83	1496.63	52.98	Pass
	Background										
	Crosstalk						8.117	5.375	1.806	2.742	NA
12:58 AM	**Efficiency**	13523.91	14068.05	422.04	-544.14	**FAIL**					
	Background										
	Crosstalk	4829.000	4802.250	75.574	26.750	Pass					
4:18 AM	**Efficiency**										
	Background	1.200	0.088	0.031	1.112	**FAIL**	3.520	0.541	0.087	2.979	**FAIL**
	Crosstalk										
9:04 AM	**Efficiency**										
	Background	0.230	0.088	0.031	0.142	**FAIL**	0.670	0.541	0.087	0.129	Pass
	Crosstalk										
Detector 3											
12:36 AM	**Efficiency**	12984.99	13271.53	398.15	-286.53	Pass					
	Background										
	Crosstalk	4457.500	4349.025	65.645	108.475	Pass					
12:40 AM	**Efficiency**						59142.08	59018.83	1770.56	123.26	Pass
	Background										
	Crosstalk						10.654	10.375	2.724	0.279	NA
4:17 AM	**Efficiency**										
	Background	0.290	0.085	0.023	0.205	**FAIL**	0.975	0.682	0.093	0.293	**FAIL**
	Crosstalk										
9:04 AM	**Efficiency**										
	Background	0.135	0.085	0.023	0.050	Pass	0.730	0.682	0.093	0.048	Pass
	Crosstalk										
Detector 4											

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Instrument: ***Protean***

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
12:37 AM	**Efficiency**	16188.96	16556.85	496.71	-367.89	Pass					
	Background										
	Crosstalk	6387.000	6135.800	62.856	251.200	**DOEF**					
12:40 AM	**Efficiency**						56287.17	56572.13	1697.16	-284.95	Pass
	Background										
	Crosstalk						3.044	0.850	0.651	2.194	NA
4:17 AM	**Efficiency**										
	Background	0.205	0.073	0.013	0.133	**FAIL**	0.615	0.435	0.045	0.180	**FAIL**
	Crosstalk										
9:04 AM	**Efficiency**										
	Background	0.200	0.073	0.013	0.128	**FAIL**	0.435	0.435	0.045	0.000	Pass
	Crosstalk										
Detector 5											
12:37 AM	**Efficiency**	15761.13	15673.68	470.21	87.45	Pass					
	Background										
	Crosstalk	6591.000	6104.975	888.403	486.025	Pass					
12:40 AM	**Efficiency**						53807.36	53786.35	1613.59	21.01	Pass
	Background										
	Crosstalk						3.551	0.325	0.373	3.226	NA
4:17 AM	**Efficiency**										
	Background	0.245	0.074	0.018	0.172	**FAIL**	0.810	0.418	0.056	0.392	**FAIL**
	Crosstalk										
9:04 AM	**Efficiency**										
	Background	0.165	0.074	0.018	0.092	**FAIL**	0.450	0.418	0.056	0.032	Pass
	Crosstalk										
Detector 6											
12:37 AM	**Efficiency**	14658.78	14736.55	442.10	-77.77	Pass					
	Background										
	Crosstalk	5899.000	5498.275	745.701	400.725	Pass					

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Instrument: Protean

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
12:40 AM	**Efficiency**						51213.16	51221.45	1536.64	-8.29	Pass
	Background										
	Crosstalk						3.046	0.700	0.410	2.346	NA
4:17 AM	**Efficiency**										
	Background	0.410	0.114	0.035	0.296	**FAIL**	1.120	0.418	0.055	0.702	**FAIL**
	Crosstalk										
9:05 AM	**Efficiency**										
	Background	0.285	0.114	0.035	0.171	**FAIL**	0.485	0.418	0.055	0.067	Pass
	Crosstalk										
Detector 7											
12:37 AM	**Efficiency**	15074.10	15385.65	461.57	-311.55	Pass					
	Background										
	Crosstalk	5846.000	5760.050	798.954	85.950	Pass					
12:40 AM	**Efficiency**						44988.27	44749.03	1342.47	239.25	Pass
	Background										
	Crosstalk						4.566	1.425	0.922	3.141	NA
4:17 AM	**Efficiency**										
	Background	0.305	0.072	0.027	0.233	**FAIL**	0.815	0.523	0.066	0.292	**FAIL**
	Crosstalk										
9:05 AM	**Efficiency**										
	Background	0.175	0.072	0.027	0.103	**FAIL**	0.575	0.523	0.066	0.052	Pass
	Crosstalk										
Detector 8											
12:36 AM	**Efficiency**						46301.30	46135.45	1384.06	165.85	Pass
	Background										
	Crosstalk						4.566	0.725	0.638	3.841	NA
12:40 AM	**Efficiency**	11684.49	11620.55	348.62	63.94	Pass					
	Background										
	Crosstalk	4062.500	3784.000	489.685	278.500	Pass					

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Instrument: ***Protean***

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
4:17 AM	**Efficiency**										
	Background	0.335	0.097	0.034	0.239	**FAIL**	0.855	0.445	0.078	0.410	**FAIL**
	Crosstalk										
9:05 AM	**Efficiency**										
	Background	0.100	0.097	0.034	0.004	Pass	0.465	0.445	0.078	0.020	Pass
	Crosstalk										
Detector 9											
12:37 AM	**Efficiency**						47880.27	47841.35	1435.24	38.92	Pass
	Background										
	Crosstalk						7.102	10.350	2.705	-3.248	NA
12:40 AM	**Efficiency**	13335.76	13544.15	406.32	-208.39	Pass					
	Background										
	Crosstalk	4833.000	4627.500	61.771	205.500	**DOEF**					
4:17 AM	**Efficiency**										
	Background	0.305	0.115	0.033	0.190	**FAIL**	0.685	0.440	0.052	0.245	**FAIL**
	Crosstalk										
9:05 AM	**Efficiency**										
	Background	0.195	0.115	0.033	0.080	Pass	0.500	0.440	0.052	0.060	Pass
	Crosstalk										
Detector 10											
12:37 AM	**Efficiency**						49299.98	49376.35	1481.29	-76.37	Pass
	Background										
	Crosstalk						12.683	28.625	5.591	-15.942	NA
12:40 AM	**Efficiency**	13358.78	13960.33	418.81	-601.55	**FAIL**					
	Background										
	Crosstalk	4850.000	4854.775	66.791	-4.775	Pass					
1:00 AM	**Efficiency**	13532.41	13960.33	418.81	-427.92	**FAIL**					
	Background										
	Crosstalk	4919.500	4854.775	66.791	64.725	Pass					

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, July 27, 2018

Instrument: Protean

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
4:20 AM	**Efficiency**										
	Background	0.240	0.105	0.038	0.135	**FAIL**	0.500	0.420	0.089	0.080	Pass
	Crosstalk										
9:05 AM	**Efficiency**										
	Background	0.190	0.105	0.038	0.085	Pass	0.425	0.420	0.089	0.005	Pass
	Crosstalk										
Detector 11											
12:37 AM	**Efficiency**						59109.23	59256.13	1777.68	-146.89	Pass
	Background										
	Crosstalk						28.410	33.400	4.406	-4.990	NA
12:41 AM	**Efficiency**	13065.55	13382.03	401.46	-316.48	Pass					
	Background										
	Crosstalk	4701.000	4646.925	43.882	54.075	Pass					
4:17 AM	**Efficiency**										
	Background	0.525	0.096	0.029	0.429	**FAIL**	0.990	0.470	0.063	0.521	**FAIL**
	Crosstalk										
9:05 AM	**Efficiency**										
	Background	0.205	0.096	0.029	0.109	**FAIL**	0.455	0.470	0.063	-0.014	Pass
	Crosstalk										
Detector 12											
12:37 AM	**Efficiency**						0.00	57255.23	1717.66	-57255.23	**FAIL**
	Background										
	Crosstalk						0.000	22.750	5.663	-22.750	NA
12:41 AM	**Efficiency**	0.00	16555.28	496.66	-16555.28	**FAIL**					
	Background										
	Crosstalk	9.500	5593.325	888.555	-5583.825	**DOEF**					
4:17 AM	**Efficiency**										
	Background	0.000	0.073	0.021	-0.073	**FAIL**	0.000	0.483	0.059	-0.483	**FAIL**
	Crosstalk										

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, July 27, 2018

Instrument: Protean

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
Detector 13											
12:37 AM	**Efficiency**						54807.68	55313.48	1659.40	-505.79	Pass
	Background										
	Crosstalk						5.580	8.025	2.603	-2.445	NA
12:41 AM	**Efficiency**	16564.74	16489.13	494.67	75.62	Pass					
	Background										
	Crosstalk	6060.000	5831.525	819.117	228.475	Pass					
4:17 AM	**Efficiency**										
	Background	0.475	0.141	0.019	0.334	**FAIL**	1.175	0.480	0.068	0.695	**FAIL**
	Crosstalk										
9:05 AM	**Efficiency**										
	Background	0.185	0.141	0.019	0.044	Pass	0.325	0.480	0.068	-0.155	Pass
	Crosstalk										
Detector 14											
12:37 AM	**Efficiency**						51390.25	51515.98	1545.48	-125.73	Pass
	Background										
	Crosstalk						5.073	0.950	0.742	4.123	NA
12:41 AM	**Efficiency**	14847.92	15209.15	456.27	-361.23	Pass					
	Background										
	Crosstalk	5680.000	5770.450	63.706	-90.450	Pass					
4:17 AM	**Efficiency**										
	Background	0.230	0.106	0.036	0.124	**FAIL**	0.560	0.434	0.070	0.126	Pass
	Crosstalk										
9:05 AM	**Efficiency**										
	Background	0.215	0.106	0.036	0.109	**FAIL**	0.505	0.434	0.070	0.071	Pass
	Crosstalk										
Detector 15											

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Gas Proportional Counter Daily Quality Control Checks

Friday, July 27, 2018

Instrument: ***Protean***

Detector ID	Check Type	Alpha CPM	Alpha Mean	Alpha +/- limit	Alpha Deviation	Alpha Flag	Beta CPM	Beta Mean	Beta +/- limit	Beta Deviation	Beta Flag
12:37 AM	**Efficiency**						44795.01	45036.85	1351.11	-241.84	Pass
	Background										
	Crosstalk						6.595	2.575	1.417	4.020	NA
12:41 AM	**Efficiency**	15031.56	14890.68	446.72	140.89	Pass					
	Background										
	Crosstalk	5587.000	5361.500	749.037	225.500	Pass					
4:17 AM	**Efficiency**										
	Background	0.275	0.133	0.018	0.143	**FAIL**	0.650	0.553	0.100	0.097	Pass
	Crosstalk										
9:05 AM	**Efficiency**										
	Background	0.220	0.133	0.018	0.088	**FAIL**	0.500	0.553	0.100	-0.053	Pass
	Crosstalk										

The Alpha and Beta +/- limit are based upon initial 20-point population.

The Alpha and Beta +/- limit for Efficiency is stated at 3%. Flags are "FAIL" > 3%.

The Alpha and Beta +/- limit for Background is stated at 1 StDev. Flags are "FAIL" > 3 StDev.

The Alpha +/- limit for Crosstalk is stated at 1 StDev. Flags are "Warning > 2 StDev and "DOEF" > 3 StDev. Beta is negligible, for trend only ("NA").

Times shown reflect the end of the count duration.

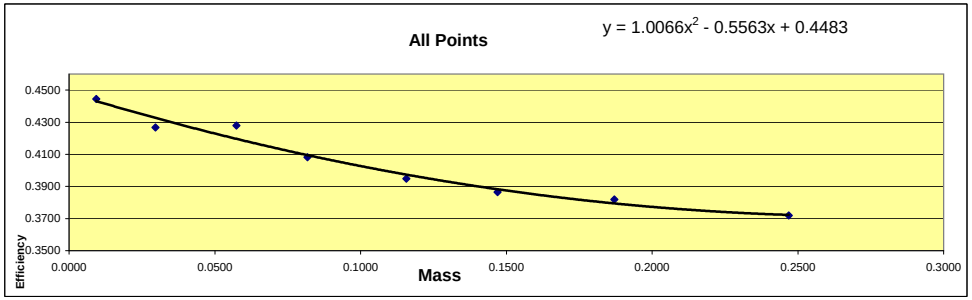
Alpha Beta Calibrations

Curve is for Gross Beta
Strontium 90
and
Total Strontium

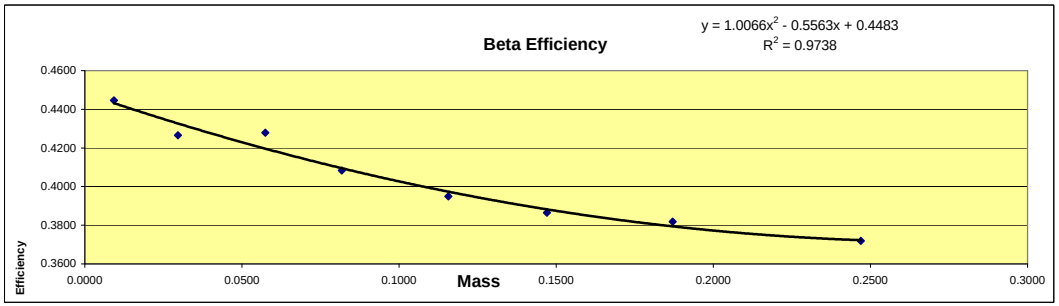
Protean 0

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41414.371 CPM	Sr-90 Eff	Standard Aliquot
0	B1	3/27/2013 12:24:34 AM	0.0093	1.01	18594	18409.901	0.4445	1mL
0	B2	3/27/2013 9:20:47 AM	0.0296	1.01	17845	17668.317	0.4266	1mL
0	B3	3/27/2013 8:55:13 AM	0.0574	1.01	17895	17717.822	0.4278	1mL
0	B4	3/27/2013 8:50:39 AM	0.0818	1.01	17078	16908.911	0.4083	1mL
0	B5	3/27/2013 2:15:46 AM	0.1157	1.01	16518	16354.455	0.3949	1mL
0	B6	3/27/2013 1:06:53 AM	0.1470	1.01	16166	16005.941	0.3865	1mL
0	B7	3/27/2013 12:52:20 AM	0.1871	1.01	15970	15811.881	0.3818	1mL
0	B8	3/27/2013 12:33:51 AM	0.2469	1.01	15554	15400.000	0.3719	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4445	0.4432	0.30%
0.0296	0.4266	0.4327	-1.41%
0.0574	0.4278	0.4197	1.94%
0.0818	0.4083	0.4095	-0.30%
0.1157	0.3949	0.3974	-0.63%
0.1470	0.3865	0.3883	-0.46%
0.1871	0.3818	0.3795	0.62%
0.2469	0.3719	0.3723	-0.12%



Mass	Efficiency
0.0093	0.4445
0.0296	0.4266
0.0574	0.4278
0.0818	0.4083
0.1157	0.3949
0.1470	0.3865
0.1871	0.3818
0.2469	0.3719



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

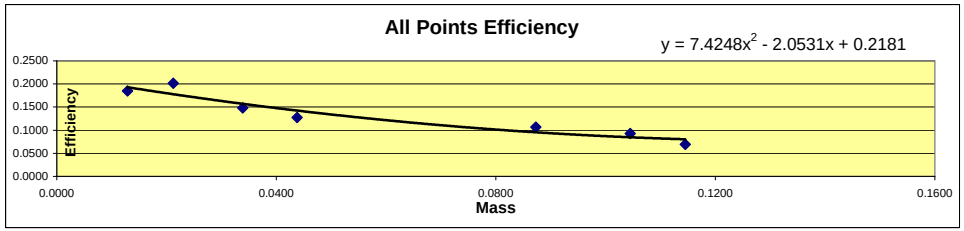
Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	3/27/2013
Elapsed Time:	1287.000 days
Half Life:	10409.625 days
Exponential Term:	0.91787171
Corrected Activity:	20707.1857 dpm/mL
Decay Activity (Sr/Y-90)	41414.3714 dpm

Curve is for Gross Alpha

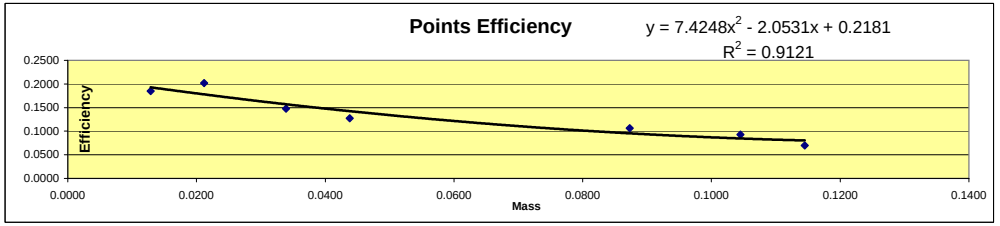
Protean 0

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
0	ICABT-51465;A1	11/13/2015 1:18:49 PM	50	21949	438.980	2374.5	0.1849	1mL	0.0129
0	ICABT-51465;A2	11/15/2015 6:17:57 PM	20.89	10003	478.842	2374.5	0.2017	1mL	0.0212
0	ICABT-51465;A3	11/15/2015 2:39:37 PM	28.46	10002	351.441	2374.5	0.1480	1mL	0.0339
0	ICABT-51465;A4	11/15/2015 1:38:18 PM	33.02	10000	302.847	2374.5	0.1275	1mL	0.0438
0	ICABT-51465;A6	11/15/2015 11:16:21 PM	19.82	10007	504.894	4749.0	0.1063	2mL	0.0873
0	ICABT-51465;A7	11/15/2015 10:33:57 PM	22.71	10004	440.511	4749.0	0.0928	2mL	0.1045
0	ICABT-51465;A8	11/15/2015 9:23:24 PM	30.28	10000	330.251	4749.0	0.0695	2mL	0.1145

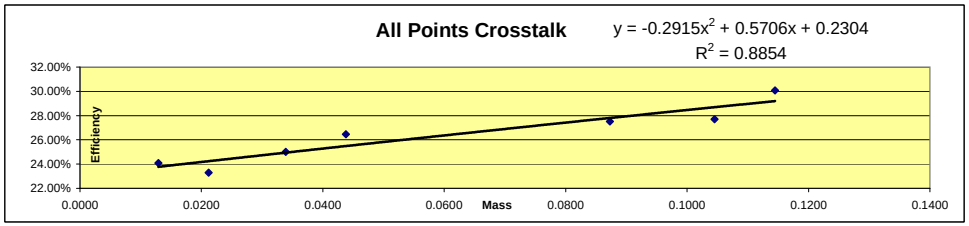
Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0129	0.1849	0.1929	-4.14%
0.0212	0.2017	0.1779	13.35%
0.0339	0.1480	0.1570	-5.75%
0.0438	0.1275	0.1424	-10.45%
0.0873	0.1063	0.0955	11.38%
0.1045	0.0928	0.0846	9.60%
0.1145	0.0695	0.0804	-13.46%



Mass	Efficiency
0.0129	0.1849
0.0212	0.2017
0.0339	0.1480
0.0438	0.1275
0.0873	0.1063
0.1045	0.0928
0.1145	0.0695



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
0	ICABT-51465;A1	0.0129	50	21949	6967	438.98	139.34	24.09%	Min
0	ICABT-51465;A2	0.0212	20.89	10003	3037	478.84	145.3805649	23.29%	23.29%
0	ICABT-51465;A3	0.0339	28.46	10002	3336	351.44	117.2171469	25.01%	
0	ICABT-51465;A4	0.0438	33.02	10000	3599	302.85	108.9945488	26.47%	Max
0	ICABT-51465;A6	0.0873	19.82	10007	3797	504.89	191.5741675	27.51%	30.07%
0	ICABT-51465;A7	0.1045	22.71	10004	3832	440.51	168.7362395	27.70%	
0	ICABT-51465;A8	0.1145	30.28	10000	4301	330.25	142.0409511	30.07%	Mean 26.31%



Standard ID
Thorium-230
Th-230_00016 #51465
Cert # 92523 Ref. date 11/29/2012
Activity 2374.5 dpm/mL

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-6322;B1*** **Repeat** ***1***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:23 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	7	6.931	6.895
sd	0.000			0.006	2.646	2.620	2.620
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	18,594	18,409.901	18,409.342
sd	0.000			0.024	136.360	135.010	135.010

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-6322;B8*** **Repeat** ***2***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:32 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	6	5.941	5.905
sd	0.000			0.006	2.449	2.425	2.425
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	15,554	15,400.000	15,399.441
sd	0.000			0.024	124.716	123.481	123.481

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-6322;B7*** **Repeat** ***3***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:51 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	14	13.861	13.825
sd	0.000			0.006	3.742	3.705	3.705
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	15,970	15,811.881	15,811.322
sd	0.000			0.024	126.372	125.121	125.121

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-6322;B6*** **Repeat** ***4***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 01:05 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	11	10.891	10.855
sd	0.000			0.006	3.317	3.284	3.284
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	16,166	16,005.941	16,005.382
sd	0.000			0.024	127.146	125.887	125.887

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-6322;B5*** **Repeat** ***6***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 02:14 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	9	8.911	8.875
sd	0.000			0.006	3.000	2.970	2.970
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	16,518	16,354.455	16,353.896
sd	0.000			0.024	128.522	127.250	127.250

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-6322;B4*** **Repeat** ***7***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 08:49 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	6	5.941	5.905
sd	0.000			0.006	2.449	2.425	2.425
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	17,078	16,908.911	16,908.352
sd	0.000			0.024	130.683	129.389	129.389

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-6322;B3*** **Repeat** ***8***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 08:54 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	10	9.901	9.865
sd	0.000			0.006	3.162	3.131	3.131
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	17,895	17,717.822	17,717.263
sd	0.000			0.024	133.772	132.448	132.448

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-6322;B2*** **Repeat** ***9***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:19 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	14	13.861	13.825
sd	0.000			0.006	3.742	3.705	3.705
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	17,845	17,668.317	17,667.758
sd	0.000			0.024	133.585	132.263	132.263

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-51465;A1*** **Repeat** ***39***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/13/201! 12:28 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	21,949	438.980	438.909
sd	0.000			0.008	148.152	2.963	2.963
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	6,967	139.340	138.719
sd	0.000			0.025	83.469	1.669	1.670

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-51465;A4*** **Repeat** ***40***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 13:05 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 33.02 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,000	302.847	302.776
sd	0.000			0.008	100.000	3.028	3.028
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	3,599	108.995	108.374
sd	0.000			0.025	59.992	1.817	1.817

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-51465;A3*** **Repeat** ***41***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 14:11 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 28.46 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,002	351.441	351.370
sd	0.000			0.008	100.010	3.514	3.514
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	3,336	117.217	116.596
sd	0.000			0.025	57.758	2.029	2.030

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-51465;A2*** **Repeat** ***42***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 17:57 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 20.89 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,003	478.842	478.771
sd	0.000			0.008	100.015	4.788	4.788
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	3,037	145.381	144.760
sd	0.000			0.025	55.109	2.638	2.638

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-51465;A8*** **Repeat** ***40***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 20:53 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.28 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,000	330.251	330.180
sd	0.000			0.008	100.000	3.303	3.303
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	4,301	142.041	141.420
sd	0.000			0.025	65.582	2.166	2.166

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-51465;A7*** **Repeat** ***41***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 22:11 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 22.71 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,004	440.511	440.440
sd	0.000			0.008	100.020	4.404	4.404
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	3,832	168.736	168.115
sd	0.000			0.025	61.903	2.726	2.726

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICABT-51465;A6*** **Repeat** ***42***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 22:56 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 19.82 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	10,007	504.894	504.823
sd	0.000			0.008	100.035	5.047	5.047
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	3,797	191.574	190.953
sd	0.000			0.025	61.620	3.109	3.109

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

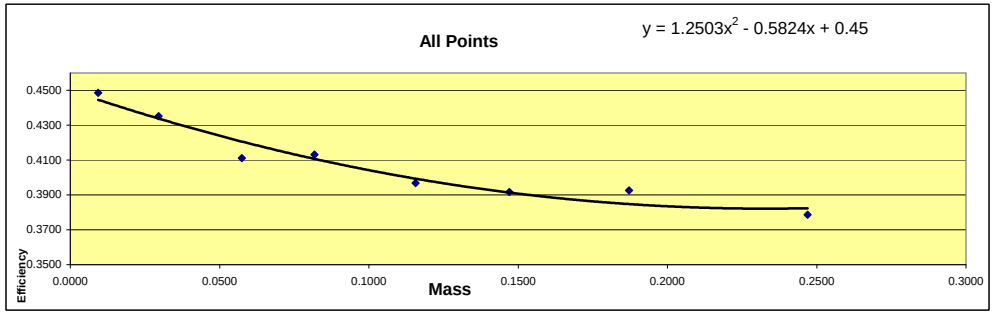
*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Curve is for Gross Beta
Strontium 90
and
Total Strontium

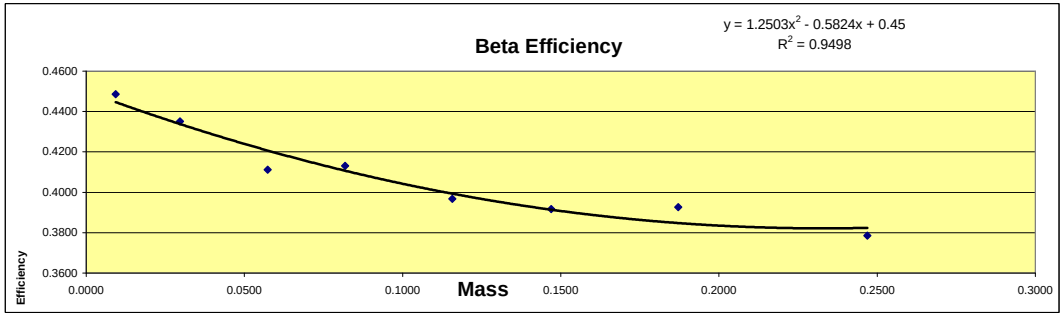
Protean 1

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41414.371 CPM	Sr-90 Eff	Standard Aliquot
1	B1	3/27/2013 12:33:56 AM	0.0093	1.01	18766	18580.198	0.4486	1mL
1	B2	3/27/2013 12:24:46 AM	0.0296	1.01	18203	18022.772	0.4352	1mL
1	B3	3/27/2013 9:20:52 AM	0.0574	1.01	17197	17026.733	0.4111	1mL
1	B4	3/27/2013 8:55:22 AM	0.0818	1.01	17282	17110.891	0.4132	1mL
1	B5	3/27/2013 8:50:46 AM	0.1157	1.01	16596	16431.683	0.3968	1mL
1	B6	3/27/2013 2:15:52 AM	0.1470	1.01	16384	16221.782	0.3917	1mL
1	B7	3/27/2013 1:10:03 AM	0.1871	1.01	16421	16258.416	0.3926	1mL
1	B8	3/27/2013 12:52:33 AM	0.2469	1.01	15836	15679.208	0.3786	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4486	0.4447	0.89%
0.0296	0.4352	0.4339	0.31%
0.0574	0.4111	0.4207	-2.27%
0.0818	0.4132	0.4107	0.59%
0.1157	0.3968	0.3994	-0.65%
0.1470	0.3917	0.3914	0.07%
0.1871	0.3926	0.3848	2.02%
0.2469	0.3786	0.3824	-1.00%



Mass	Efficiency
0.0093	0.4486
0.0296	0.4352
0.0574	0.4111
0.0818	0.4132
0.1157	0.3968
0.1470	0.3917
0.1871	0.3926
0.2469	0.3786



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

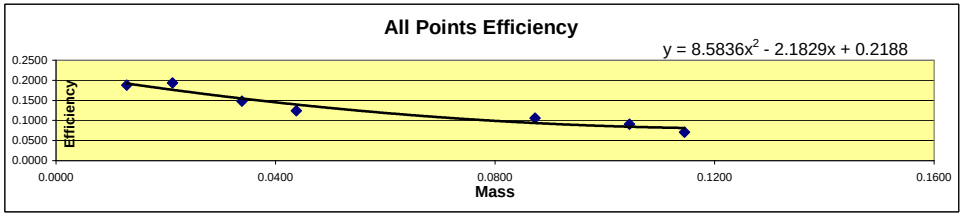
Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	3/27/2013
Elapsed Time:	1287.000 days
Half Life:	10409.625 days
Exponential Term:	0.917871706
Corrected Activity:	20707.18568 dpm/mL
Decay Activity (Sr/Y-90)	41414.37137 dpm

Curve is for Gross Alpha

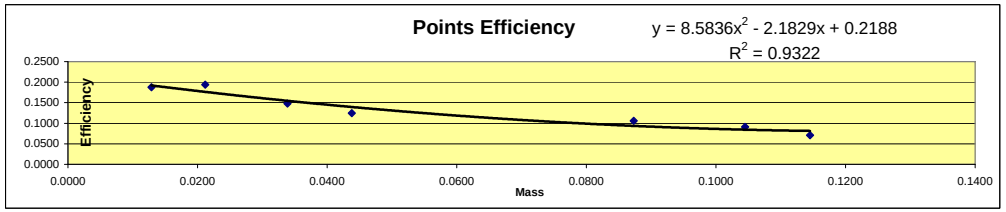
Protean 1

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
1	ICABT-51465I;A1	11/15/2015 1:27:50 PM	22.43	10004	446.010	2374.5	0.1878	1mL	0.0129
1	ICABT-51465I;A2	11/13/2015 1:18:58 PM	50	23017	460.340	2374.5	0.1939	1mL	0.0212
1	ICABT-51465;A3	11/15/2015 6:25:34 PM	28.44	10002	351.688	2374.5	0.1481	1mL	0.0339
1	ICABT-51465;A4	11/15/2015 2:45:06 PM	33.88	10002	295.218	2374.5	0.1243	1mL	0.0438
1	ICABT-51465I;A6	11/14/2015 9:57:48 PM	50	25132	502.640	4749.0	0.1058	2mL	0.0873
1	ICABT-51465I;A7	11/15/2015 11:19:41 PM	23.12	10004	432.699	4749.0	0.0911	2mL	0.1045
1	ICABT-51465I;A8	11/15/2015 10:41:00 PM	29.7	10003	336.801	4749.0	0.0709	2mL	0.1145

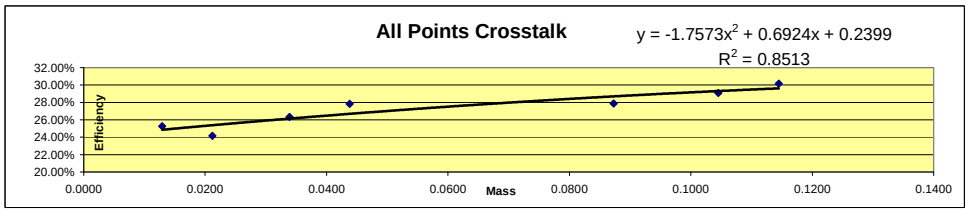
Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0129	0.1878	0.1921	-2.21%
0.0212	0.1939	0.1764	9.91%
0.0339	0.1481	0.1547	-4.24%
0.0438	0.1243	0.1397	-10.98%
0.0873	0.1058	0.0937	13.02%
0.1045	0.0911	0.0844	7.93%
0.1145	0.0709	0.0814	-12.86%



Mass	Efficiency
0.0129	0.1878
0.0212	0.1939
0.0339	0.1481
0.0438	0.1243
0.0873	0.1058
0.1045	0.0911
0.1145	0.0709



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
1	ICABT-51465I;A1	0.0129	22.43	10004	3383	446.01	150.8247882	25.27%	Min
1	ICABT-51465I;A2	0.0212	50	23017	7336	460.34	146.72	24.17%	24.17%
1	ICABT-51465;A3	0.0339	28.44	10002	3575	351.69	125.7032349	26.33%	
1	ICABT-51465;A4	0.0438	33.88	10002	3856	295.22	113.8134593	27.83%	Max
1	ICABT-51465I;A6	0.0873	50	25132	9717	502.64	194.34	27.88%	30.14%
1	ICABT-51465I;A7	0.1045	23.12	10004	4101	432.70	177.3788927	29.07%	
1	ICABT-51465I;A8	0.1145	29.7	10003	4316	336.80	145.3198653	30.14%	Mean
									27.24%



Standard ID
Thorium-230
Th-230_00016 #51465
Cert # 92523 Ref. date 11/29/2012
Activity 2374.5 dpm/mL

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** ***1***

Sample ID ***ICABT-6322;B2*** **Repeat** ***1***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:23 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	38	37.624	37.583
sd	0.000			0.006	6.164	6.103	6.103
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	18,203	18,022.772	18,022.305
sd	0.000			0.022	134.918	133.583	133.583

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-6322;B1*** **Repeat** *2*

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:32 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	50	49.505	49.464
sd	0.000			0.006	7.071	7.001	7.001
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	18,766	18,580.198	18,579.731
sd	0.000			0.022	136.989	135.633	135.633

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** ***1***

Sample ID ***ICABT-6322;B8*** **Repeat** ***3***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 00:51 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	27	26.733	26.692
sd	0.000			0.006	5.196	5.145	5.145
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	15,836	15,679.208	15,678.741
sd	0.000			0.022	125.841	124.595	124.595

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-6322;B7*** **Repeat** *5*

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 01:09 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	26	25.743	25.702
sd	0.000			0.006	5.099	5.049	5.049
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	16,421	16,258.416	16,257.949
sd	0.000			0.022	128.144	126.876	126.876

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-6322;B6*** **Repeat** *6*

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 02:14 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	31	30.693	30.652
sd	0.000			0.006	5.568	5.513	5.513
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	16,384	16,221.782	16,221.315
sd	0.000			0.022	128.000	126.733	126.733

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID *ICABT-6322;B5* **Repeat** *7*

Batch ID *122627*

Count Routine *Gross Alpha Beta* **Detector Volts** *1,515.0*

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 *mg* **sd** 0.000 *mg*

Count Date 3/27/2013 08:49 **Collection Date 1** **Half Life** 0.00 *days*
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	18	17.822	17.781
sd	0.000			0.006	4.243	4.201	4.201
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	16,596	16,431.683	16,431.216
sd	0.000			0.022	128.825	127.550	127.550

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** ***1***

Sample ID ***ICABT-6322;B4*** **Repeat** ***8***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 08:54 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	36	35.644	35.603
sd	0.000			0.006	6.000	5.941	5.941
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	17,282	17,110.891	17,110.424
sd	0.000			0.022	131.461	130.159	130.159

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-6322;B3*** **Repeat** *9*

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:19 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	27	26.733	26.692
sd	0.000			0.006	5.196	5.145	5.145
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	17,197	17,026.733	17,026.266
sd	0.000			0.022	131.137	129.839	129.839

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-51465;A2*** **Repeat** ***39***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/13/201! 12:28 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	23,017	460.340	460.260
sd	0.000			0.009	151.714	3.034	3.034
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	7,336	146.720	146.226
sd	0.000			0.022	85.650	1.713	1.713

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-51465;A6*** **Repeat** ***39***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/14/201! 21:07 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	25,132	502.640	502.560
sd	0.000			0.009	158.531	3.171	3.171
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	9,717	194.340	193.846
sd	0.000			0.022	98.575	1.971	1.972

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-51465;A1*** **Repeat** ***40***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 13:05 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 22.43 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	10,004	446.010	445.930
sd	0.000			0.009	100.020	4.459	4.459
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	3,383	150.825	150.331
sd	0.000			0.022	58.164	2.593	2.593

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-51465;A4*** **Repeat** ***41***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 14:11 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 33.88 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	10,002	295.218	295.138
sd	0.000			0.009	100.010	2.952	2.952
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	3,856	113.813	113.319
sd	0.000			0.022	62.097	1.833	1.833

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-51465;A3*** **Repeat** ***42***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 17:57 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 28.44 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	10,002	351.688	351.608
sd	0.000			0.009	100.010	3.517	3.517
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	3,575	125.703	125.209
sd	0.000			0.022	59.791	2.102	2.102

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-51465;A8*** **Repeat** ***41***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 22:11 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 29.70 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	10,003	336.801	336.721
sd	0.000			0.009	100.015	3.368	3.368
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	4,316	145.320	144.826
sd	0.000			0.022	65.696	2.212	2.212

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICABT-51465;A7*** **Repeat** ***42***

Batch ID ***m153000***

Count Routine ***Sample Count*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/15/201! 22:56 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 23.12 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	10,004	432.699	432.619
sd	0.000			0.009	100.020	4.326	4.326
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	4,101	177.379	176.885
sd	0.000			0.022	64.039	2.770	2.770

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

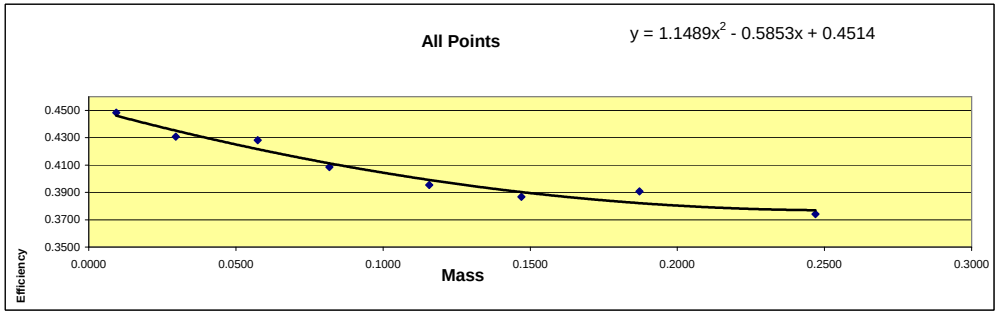
*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Curve is for Gross Beta
Strontium 90
and
Total Strontium

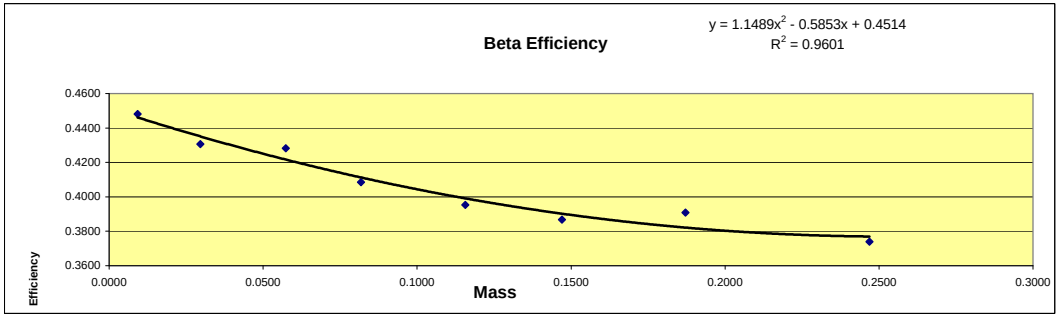
Protean 13

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41414.371 CPM 18561.386	Sr-90 Eff	Standard Aliquot
13	B1	3/27/2013 10:14:19 AM	0.0093	1.01	18747		0.4482	1mL
13	B2	3/27/2013 10:06:06 AM	0.0296	1.01	18015	17836.634	0.4307	1mL
13	B3	3/27/2013 9:57:08 AM	0.0574	1.01	17908	17730.693	0.4281	1mL
13	B4	3/27/2013 9:49:28 AM	0.0818	1.01	17087	16917.822	0.4085	1mL
13	B5	3/27/2013 9:36:05 AM	0.1157	1.01	16537	16373.267	0.3954	1mL
13	B6	3/27/2013 9:27:49 AM	0.1470	1.01	16181	16020.792	0.3868	1mL
13	B7	3/27/2013 10:28:32 AM	0.1871	1.01	16347	16185.149	0.3908	1mL
13	B8	3/27/2013 10:21:43 AM	0.2469	1.01	15645	15490.099	0.3740	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4482	0.4461	0.48%
0.0296	0.4307	0.4351	-1.01%
0.0574	0.4281	0.4216	1.55%
0.0818	0.4085	0.4112	-0.66%
0.1157	0.3954	0.3991	-0.93%
0.1470	0.3868	0.3902	-0.86%
0.1871	0.3908	0.3821	2.28%
0.2469	0.3740	0.3769	-0.77%



Mass	Efficiency
0.0093	0.4482
0.0296	0.4307
0.0574	0.4281
0.0818	0.4085
0.1157	0.3954
0.1470	0.3868
0.1871	0.3908
0.2469	0.3740



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

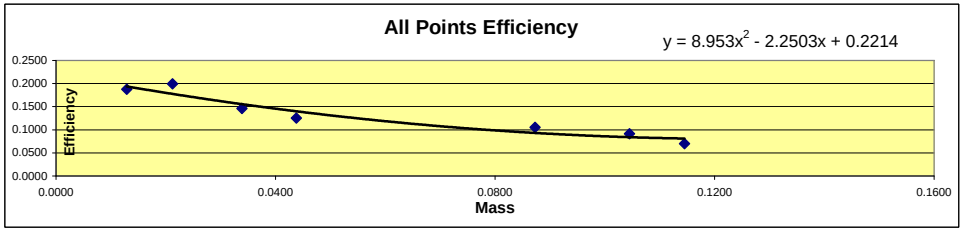
Initial Activity:	22560 dpm/mL
Reference Date:	9/17/2009
Count Date:	3/27/2013
Elapsed Time:	1287.000 days
Half Life:	10409.625 days
Exponential Term:	0.917871706
Corrected Activity:	20707.18568 dpm/mL
Decay Activity (Sr/Y-90)	41414.37137 dpm

Curve is for Gross Alpha

Protean 13

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
13	ICABT-51465;A1	11/29/2015 4:23:27 PM	50	22264	445.280	2374.5	0.1875	1mL	0.0129
13	ICABT-51465;A2	11/27/2015 9:40:57 AM	50	23693	473.860	2374.5	0.1996	1mL	0.0212
13	ICABT-51465;A3	11/27/2015 8:38:31 AM	50	17349	346.980	2374.5	0.1461	1mL	0.0339
13	ICABT-51465;A4	11/26/2015 12:35:38 AM	50	14844	296.880	2374.5	0.1250	1mL	0.0438
13	ICABT-51465;A6	11/25/2015 7:09:06 PM	50	25031	500.620	4749.0	0.1054	2mL	0.0873
13	ICABT-51465;A7	11/27/2015 1:36:42 PM	50	21665	433.300	4749.0	0.0912	2mL	0.1045
13	ICABT-51465;A8	11/27/2015 12:40:03 PM	50	16687	333.740	4749.0	0.0703	2mL	0.1145

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0129	0.1875	0.1939	-3.27%
0.0212	0.1996	0.1777	12.29%
0.0339	0.1461	0.1554	-5.97%
0.0438	0.1250	0.1400	-10.70%
0.0873	0.1054	0.0932	13.13%
0.1045	0.0912	0.0840	8.60%
0.1145	0.0703	0.0811	-13.36%



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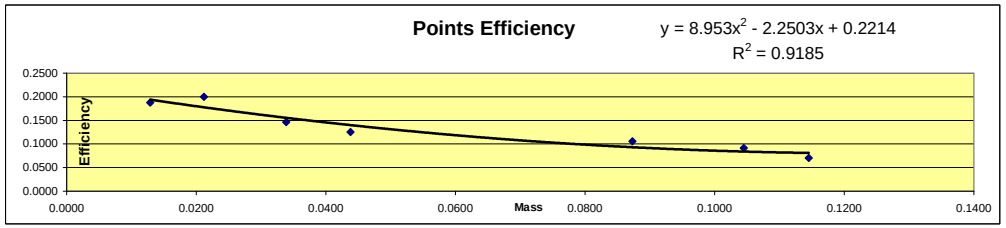
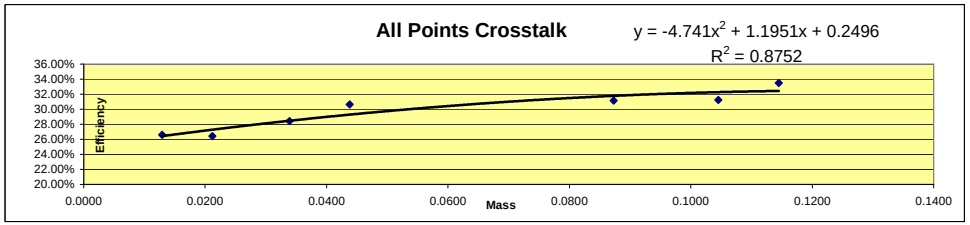
Mass	Efficiency
0.0129	0.1875
0.0212	0.1996
0.0339	0.1461
0.0438	0.1250
0.0873	0.1054
0.1045	0.0912
0.1145	0.0703



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
13	ICABT-51465;A1	0.0129	50	22264	8058	445.28	161.16	26.57%	Min
13	ICABT-51465;A2	0.0212	50	23693	8503	473.86	170.06	26.41%	26.41%
13	ICABT-51465;A3	0.0339	50	17349	6894	346.98	137.88	28.44%	
13	ICABT-51465;A4	0.0438	50	14844	6559	296.88	131.18	30.65%	Max
13	ICABT-51465;A6	0.0873	50	25031	11318	500.62	226.36	31.14%	33.49%
13	ICABT-51465;A7	0.1045	50	21665	9845	433.30	196.90	31.24%	
13	ICABT-51465;A8	0.1145	50	16687	8403	333.74	168.06	33.49%	Mean
									29.71%



Standard ID
Thorium-230
Th-230_00016 #51465
Cert # 92523 Ref. date 11/29/2012
Activity 2374.5 dpm/mL

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-6322;B6*** **Repeat** ***10***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:26 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	5	4.950	4.903
sd	0.000			0.007	2.236	2.214	2.214
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	16,181	16,020.792	16,020.363
sd	0.000			0.021	127.205	125.945	125.945

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-6322;B5*** **Repeat** ***11***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:35 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	4	3.960	3.913
sd	0.000			0.007	2.000	1.980	1.980
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	16,537	16,373.267	16,372.838
sd	0.000			0.021	128.596	127.323	127.323

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-6322;B4*** **Repeat** ***12***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:48 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	1	0.990	0.943
sd	0.000			0.007	1.000	0.990	0.990
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	17,087	16,917.822	16,917.393
sd	0.000			0.021	130.717	129.423	129.423

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-6322;B3*** **Repeat** ***13***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:55 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	3	2.970	2.923
sd	0.000			0.007	1.732	1.715	1.715
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	17,908	17,730.693	17,730.264
sd	0.000			0.021	133.821	132.496	132.496

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-6322;B2*** **Repeat** ***14***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 10:05 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	4	3.960	3.913
sd	0.000			0.007	2.000	1.980	1.980
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	18,015	17,836.634	17,836.205
sd	0.000			0.021	134.220	132.891	132.891

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-6322;B1*** **Repeat** ***15***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 10:13 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	9	8.911	8.864
sd	0.000			0.007	3.000	2.970	2.970
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	18,747	18,561.386	18,560.957
sd	0.000			0.021	136.920	135.564	135.564

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-6322;B8*** **Repeat** ***16***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 10:20 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	3	2.970	2.923
sd	0.000			0.007	1.732	1.715	1.715
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	15,645	15,490.099	15,489.670
sd	0.000			0.021	125.080	123.842	123.842

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-6322;B7*** **Repeat** ***17***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 10:27 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	4	3.960	3.913
sd	0.000			0.007	2.000	1.980	1.980
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	16,347	16,185.149	16,184.720
sd	0.000			0.021	127.855	126.589	126.589

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-51465;A6*** **Repeat** ***47***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/25/201! 18:18 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	25,031	500.620	500.471
sd	0.000			0.012	158.212	3.164	3.164
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	11,318	226.360	225.868
sd	0.000			0.022	106.386	2.128	2.128

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-51465;A4*** **Repeat** ***49***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/25/201! 23:45 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	14,844	296.880	296.731
sd	0.000			0.012	121.836	2.437	2.437
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	6,559	131.180	130.688
sd	0.000			0.022	80.988	1.620	1.620

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-51465;A3*** **Repeat** ***50***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/27/201! 07:48 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	17,349	346.980	346.831
sd	0.000			0.012	131.716	2.634	2.634
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	6,894	137.880	137.388
sd	0.000			0.022	83.030	1.661	1.661

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-51465;A2*** **Repeat** ***51***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/27/201! 08:50 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	23,693	473.860	473.711
sd	0.000			0.012	153.925	3.079	3.079
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	8,503	170.060	169.568
sd	0.000			0.022	92.212	1.844	1.844

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-51465;A8*** **Repeat** ***52***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/27/201! 11:48 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	16,687	333.740	333.591
sd	0.000			0.012	129.178	2.584	2.584
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	8,403	168.060	167.568
sd	0.000			0.022	91.668	1.833	1.833

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-51465;A7*** **Repeat** ***53***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/27/201! 12:46 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	21,665	433.300	433.151
sd	0.000			0.012	147.190	2.944	2.944
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	9,845	196.900	196.408
sd	0.000			0.022	99.222	1.984	1.985

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICABT-51465;A1*** **Repeat** ***54***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/29/201! 15:32 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	22,264	445.280	445.131
sd	0.000			0.012	149.211	2.984	2.984
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	8,058	161.160	160.668
sd	0.000			0.022	89.766	1.795	1.795

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

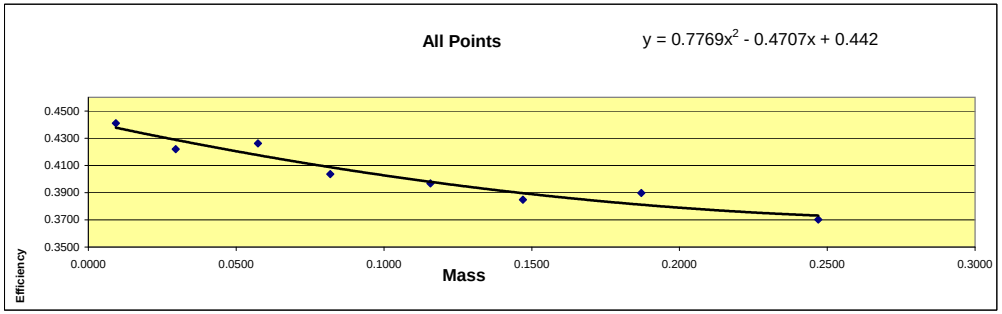
*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Curve is for Gross Beta
Strontium 90
and
Total Strontium

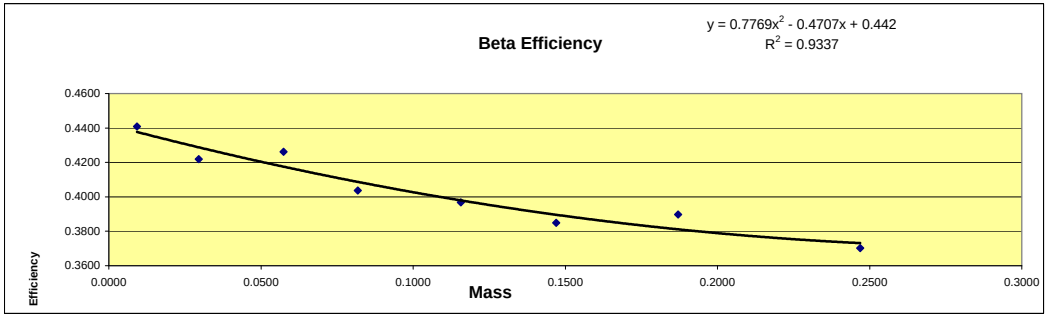
Protean 15

Detector ID	Std ID	Count Date	Sample Wt	Count Time	Beta Counts	DPM 41414.371 CPM	Sr-90 Eff	Standard Aliquot
15	B1	3/27/2013 10:28:44 AM	0.0093	1.01	18443	18260.396	0.4409	1mL
15	B2	3/27/2013 10:22:04 AM	0.0296	1.01	17651	17476.238	0.4220	1mL
15	B3	3/27/2013 10:14:38 AM	0.0574	1.01	17823	17646.535	0.4261	1mL
15	B4	3/27/2013 10:06:16 AM	0.0818	1.01	16883	16715.842	0.4036	1mL
15	B5	3/27/2013 9:57:09 AM	0.1157	1.01	16601	16436.634	0.3969	1mL
15	B6	3/27/2013 9:49:29 AM	0.1470	1.01	16099	15939.604	0.3849	1mL
15	B7	3/27/2013 9:36:15 AM	0.1871	1.01	16302	16140.594	0.3897	1mL
15	B8	3/27/2013 9:28:01 AM	0.2469	1.01	15488	15334.653	0.3703	1mL

Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0093	0.4409	0.4377	0.74%
0.0296	0.4220	0.4287	-1.58%
0.0574	0.4261	0.4175	2.05%
0.0818	0.4036	0.4087	-1.24%
0.1157	0.3969	0.3979	-0.27%
0.1470	0.3849	0.3896	-1.21%
0.1871	0.3897	0.3811	2.26%
0.2469	0.3703	0.3731	-0.77%



Mass	Efficiency
0.0093	0.4409
0.0296	0.4220
0.0574	0.4261
0.0818	0.4036
0.1157	0.3969
0.1470	0.3849
0.1871	0.3897
0.2469	0.3703



Standard ID
Strontium 90
Sr-90_00004 #6322
Cert# 80573-334 Ref. date 9/172009

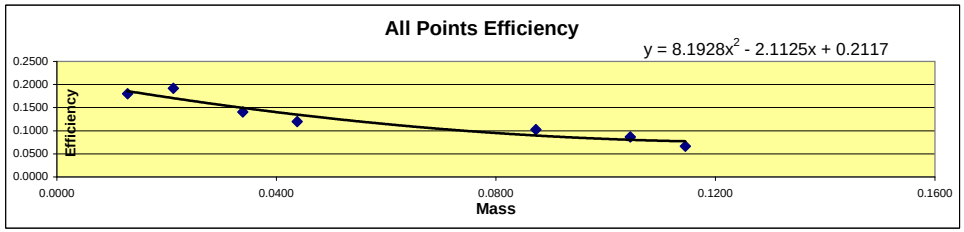
Initial Activity:	22560	dpm/mL
Reference Date:	9/17/2009	
Count Date:	3/27/2013	
Elapsed Time:	1287.000	days
Half Life:	10409.625	days
Exponential Term:	0.917871706	
Corrected Activity:	20707.18568	dpm/mL
Decay Activity (Sr/Y-90)	41414.37137	dpm

Curve is for Gross Alpha

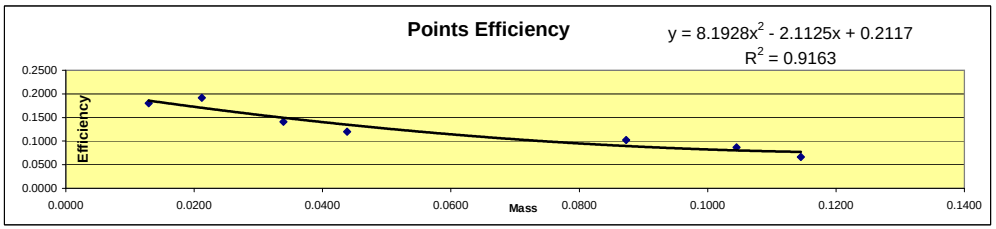
Protean 15

Detector ID	Sample ID	Count Date	Count Time	Alpha Counts	Net CPM	DPM	Th-230 Efficiency	Standard Aliquot	Mass
15	ICABT-51465;A1	11/27/2015 1:36:43 PM	50	21370	427.400	2374.5	0.1800	1mL	0.0129
15	ICABT-51465;A2	11/27/2015 12:40:08 PM	50	22735	454.700	2374.5	0.1915	1mL	0.0212
15	ICABT-51465;A3	11/29/2015 4:24:28 PM	50	16706	334.120	2374.5	0.1407	1mL	0.0339
15	ICABT-51465;A4	11/27/2015 9:41:09 AM	50	14210	284.200	2374.5	0.1197	1mL	0.0438
15	ICABT-51465;A6	11/26/2015 12:35:40 AM	50	24317	486.340	4749.0	0.1024	2mL	0.0873
15	ICABT-51465;A7	11/25/2015 11:38:49 PM	50	20630	412.600	4749.0	0.0869	2mL	0.1045
15	ICABT-51465;A8	11/25/2015 7:09:17 PM	50	15839	316.780	4749.0	0.0667	2mL	0.1145

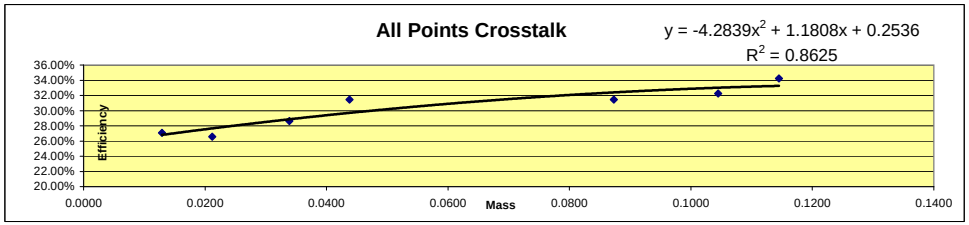
Mass	Measured Efficiency	Theoretical Efficiency	Percent Δ Efficiency
0.0129	0.1800	0.1858	-3.13%
0.0212	0.1915	0.1706	12.25%
0.0339	0.1407	0.1495	-5.88%
0.0438	0.1197	0.1349	-11.27%
0.0873	0.1024	0.0897	14.14%
0.1045	0.0869	0.0804	8.05%
0.1145	0.0667	0.0772	-13.63%



Mass	Efficiency
0.0129	0.1800
0.0212	0.1915
0.0339	0.1407
0.0438	0.1197
0.0873	0.1024
0.1045	0.0869
0.1145	0.0667



Detector ID	Sample ID	Mass	Count Time	Alpha Counts	Beta Counts	Alpha CPM	Beta CPM	% α into β	
15	ICABT-51465;A1	0.0129	50	21370	7940	427.40	158.80	27.09%	Min
15	ICABT-51465;A2	0.0212	50	22735	8232	454.70	164.64	26.58%	26.58%
15	ICABT-51465;A3	0.0339	50	16706	6709	334.12	134.18	28.65%	
15	ICABT-51465;A4	0.0438	50	14210	6516	284.20	130.32	31.44%	Max
15	ICABT-51465;A6	0.0873	50	24317	11164	486.34	223.28	31.46%	34.23%
15	ICABT-51465;A7	0.1045	50	20630	9823	412.60	196.46	32.26%	
15	ICABT-51465;A8	0.1145	50	15839	8245	316.78	164.90	34.23%	Mean
									30.25%



Standard ID
Thorium-230
Th-230_00016 #51465
Cert # 92523 Ref. date 11/29/2012
Activity 2374.5 dpm/mL

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICABT-6322;B8*** **Repeat** ***10***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:26 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	2	1.980	1.933
sd	0.000			0.007	1.414	1.400	1.400
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.480	15,488	15,334.653	15,334.173
sd	0.000			0.022	124.451	123.219	123.219

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICABT-6322;B7*** **Repeat** ***11***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:35 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	0	0.000	-0.047
sd	0.000			0.007	0.000	0.000	0.305
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.480	16,302	16,140.594	16,140.114
sd	0.000			0.022	127.679	126.415	126.415

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICABT-6322;B6*** **Repeat** ***12***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:48 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	1	0.990	0.943
sd	0.000			0.007	1.000	0.990	0.990
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.480	16,099	15,939.604	15,939.124
sd	0.000			0.022	126.882	125.626	125.626

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICABT-6322;B5*** **Repeat** ***13***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 09:55 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	1	0.990	0.943
sd	0.000			0.007	1.000	0.990	0.990
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.480	16,601	16,436.634	16,436.154
sd	0.000			0.022	128.845	127.569	127.569

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICABT-6322;B4*** **Repeat** ***14***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 10:05 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	0	0.000	-0.047
sd	0.000			0.007	0.000	0.000	0.305
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.480	16,883	16,715.842	16,715.362
sd	0.000			0.022	129.935	128.648	128.648

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICABT-6322;B3*** **Repeat** ***15***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 10:13 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	1	0.990	0.943
sd	0.000			0.007	1.000	0.990	0.990
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.480	17,823	17,646.535	17,646.055
sd	0.000			0.022	133.503	132.181	132.181

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICABT-6322;B2*** **Repeat** ***16***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 10:20 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	2	1.980	1.933
sd	0.000			0.007	1.414	1.400	1.400
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.480	17,651	17,476.238	17,475.758
sd	0.000			0.022	132.857	131.542	131.542

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICABT-6322;B1*** **Repeat** ***17***

Batch ID ***122627***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/27/2013 10:27 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 1.01 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	0	0.000	-0.047
sd	0.000			0.007	0.000	0.000	0.305
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.480	18,443	18,260.396	18,259.916
sd	0.000			0.022	135.805	134.460	134.460

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICABT-51465;A8*** **Repeat** ***47***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/25/201! 18:19 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	15,839	316.780	316.649
sd	0.000			0.011	125.853	2.517	2.517
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.483	8,245	164.900	164.417
sd	0.000			0.022	90.802	1.816	1.816

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICABT-51465;A7*** **Repeat** ***48***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/25/201! 22:48 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	20,630	412.600	412.469
sd	0.000			0.011	143.631	2.873	2.873
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.483	9,823	196.460	195.977
sd	0.000			0.022	99.111	1.982	1.982

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICABT-51465;A6*** **Repeat** ***49***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/25/201! 23:45 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	24,317	486.340	486.209
sd	0.000			0.011	155.939	3.119	3.119
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.483	11,164	223.280	222.797
sd	0.000			0.022	105.660	2.113	2.113

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICABT-51465;A4*** **Repeat** ***51***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/27/201! 08:50 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	14,210	284.200	284.069
sd	0.000			0.011	119.206	2.384	2.384
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.483	6,516	130.320	129.837
sd	0.000			0.022	80.722	1.614	1.615

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICABT-51465;A2*** **Repeat** ***52***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/27/201! 11:48 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	22,735	454.700	454.569
sd	0.000			0.011	150.781	3.016	3.016
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.483	8,232	164.640	164.157
sd	0.000			0.022	90.730	1.815	1.815

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICABT-51465;A1*** **Repeat** ***53***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/27/201! 12:46 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	21,370	427.400	427.269
sd	0.000			0.011	146.185	2.924	2.924
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.483	7,940	158.800	158.317
sd	0.000			0.022	89.107	1.782	1.782

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICABT-51465;A3*** **Repeat** ***54***

Batch ID ***m153000***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/29/201! 15:33 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 50.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	16,706	334.120	333.989
sd	0.000			0.011	129.252	2.585	2.585
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.483	6,709	134.180	133.697
sd	0.000			0.022	81.908	1.638	1.638

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

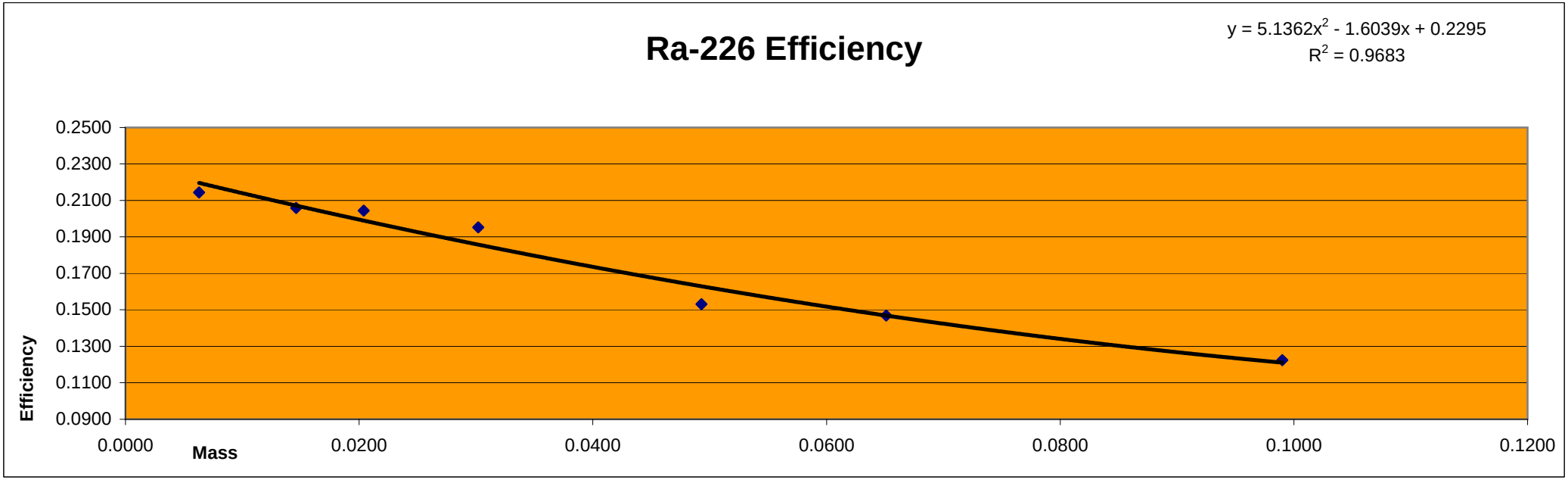
*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Ra-226 Calibrations

Ra-226 Calibration 2017

Orange 4

Std #	Mass	Count Time	Sample Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
R2	0.0063	15.00	2/14/2017 21:44	17922	1194.8000	2/13/2017 13:30	1.6484	0.4487	1615.3043	7534.6	0.2144
R3	0.0146	15.00	2/14/2017 21:26	26502	1766.8000	2/13/2017 13:30	1.6431	0.6933	1551.0727	7534.6	0.2059
R4	0.0204	15.00	2/14/2017 21:09	27485	1832.3333	2/13/2017 13:30	1.6380	0.7265	1539.7503	7534.6	0.2044
R5	0.0302	15.00	2/14/2017 20:52	31007	2067.1333	2/13/2017 13:30	1.6328	0.8604	1471.4068	7534.6	0.1953
R6	0.0493	15.00	2/14/2017 20:32	26373	1758.2000	2/13/2017 13:30	1.6269	0.9364	1154.1603	7534.6	0.1532
R7	0.0651	15.00	2/14/2017 22:47	25671	1711.4000	2/13/2017 13:30	1.6669	0.9274	1107.1113	7534.6	0.1469
R8	0.0990	15.00	2/14/2017 22:27	21603	1440.2000	2/13/2017 13:30	1.6610	0.9402	922.2723	7534.6	0.1224



Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - A

Addr: 4

Sample ID ICRa6-986404;6-A

Repeat 1

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/14/2017 8:32:11 PM

Count Ended 2/14/2017 8:47:17 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.128	26,373	1,758.200	1,758.072
sd	0.000			0.011	162.398	10.827	10.827
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.367	22,745	1,516.333	1,515.966
sd	0.000			0.019	150.814	10.054	10.054

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - A

Addr: 4

Sample ID ICRa6-986404;-5-A

Repeat 2

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/14/2017 8:52:04 PM

Count Ended 2/14/2017 9:07:12 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.128	31,007	2,067.133	2,067.005
sd	0.000			0.011	176.088	11.739	11.739
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.367	21,653	1,443.533	1,443.166
sd	0.000			0.019	147.150	9.810	9.810

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - A

Addr: 4

Sample ID ICRa6-986404;-4-A

Repeat 3

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/14/2017 9:09:34 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 2/14/2017 9:24:41 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.128	27,485	1,832.333	1,832.205
sd	0.000			0.011	165.786	11.052	11.052
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.367	18,897	1,259.800	1,259.433
sd	0.000			0.019	137.466	9.164	9.164

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - A

Addr: 4

Sample ID ICRa6-986404;-3-A

Repeat 4

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/14/2017 9:26:37 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 2/14/2017 9:41:43 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.128	26,502	1,766.800	1,766.672
sd	0.000			0.011	162.794	10.853	10.853
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.367	17,805	1,187.000	1,186.633
sd	0.000			0.019	133.435	8.896	8.896

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - A

Addr: 4

Sample ID ICRa6-986404;-2-A

Repeat 5

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/14/2017 9:44:36 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 2/14/2017 9:59:42 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.128	17,922	1,194.800	1,194.672
sd	0.000			0.011	133.873	8.925	8.925
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.367	11,660	777.333	776.966
sd	0.000			0.019	107.981	7.199	7.199

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - A

Addr: 4

Sample ID ICRa6-986404;8-A

Repeat 7

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/14/2017 10:27:05 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 2/14/2017 10:42:14 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.128	21,603	1,440.200	1,440.072
sd	0.000			0.011	146.980	9.799	9.799
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.367	22,807	1,520.467	1,520.100
sd	0.000			0.019	151.020	10.068	10.068

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - A

Addr: 4

Sample ID ICRa6-986404;-7-A

Repeat 8

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/14/2017 10:47:24 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 2/14/2017 11:02:30 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.128	25,671	1,711.400	1,711.272
sd	0.000			0.011	160.222	10.681	10.681
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.367	22,652	1,510.133	1,509.766
sd	0.000			0.019	150.506	10.034	10.034

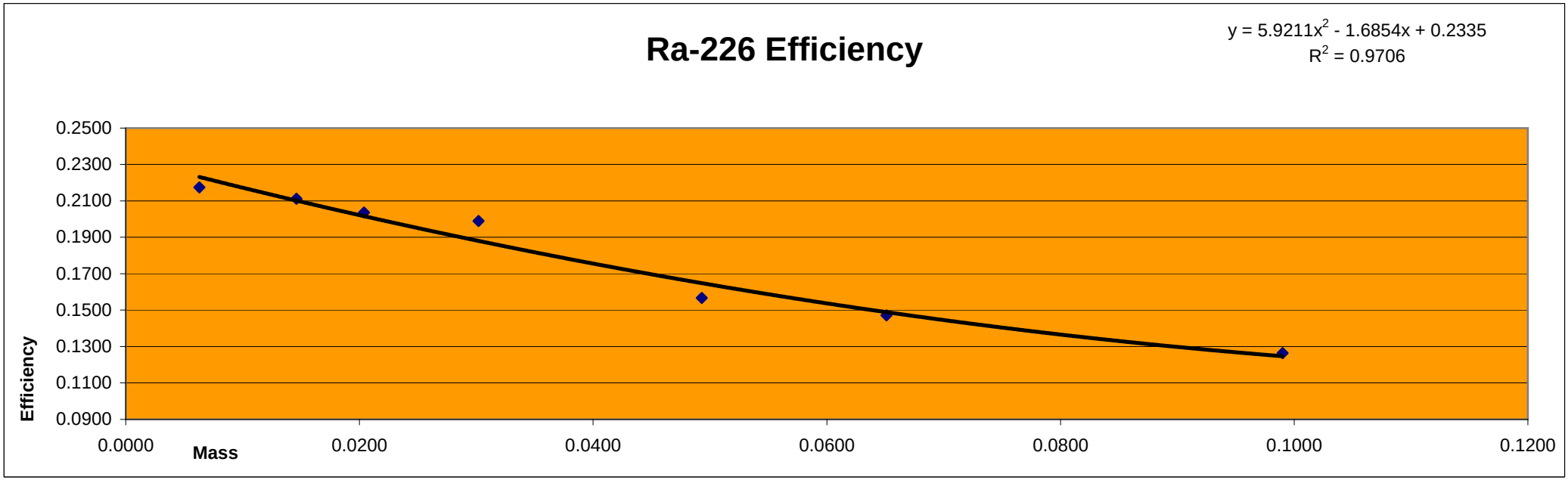
	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Ra-226 Calibration 2017

Orange 5

Std #	Mass	Count Time	Sample Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
R2	0.0063	15.00	2/14/2017 22:09	18255	1217.0000	2/13/2017 13:30	1.6557	0.4487	1638.1216	7534.6	0.2174
R3	0.0146	15.00	2/14/2017 21:44	27282	1818.8000	2/13/2017 13:30	1.6484	0.6933	1591.5470	7534.6	0.2112
R4	0.0204	15.00	2/14/2017 21:26	27467	1831.1333	2/13/2017 13:30	1.6431	0.7265	1533.9904	7534.6	0.2036
R5	0.0302	15.00	2/14/2017 21:09	31689	2112.6000	2/13/2017 13:30	1.6380	0.8604	1498.9885	7534.6	0.1989
R6	0.0493	15.00	2/14/2017 20:52	27076	1805.0667	2/13/2017 13:30	1.6328	0.9364	1180.6100	7534.6	0.1567
R7	0.0651	15.00	2/14/2017 20:32	25092	1672.8000	2/13/2017 13:30	1.6269	0.9274	1108.7706	7534.6	0.1472
R8	0.0990	15.00	2/14/2017 22:47	22386	1492.4000	2/13/2017 13:30	1.6669	0.9402	952.2664	7534.6	0.1264



Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - B

Addr: 5

Sample ID ICRa6-986404;-7-A

Repeat 1

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/14/2017 8:32:14 PM

Count Ended 2/14/2017 8:47:21 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.072	25,092	1,672.800	1,672.728
sd	0.000			0.008	158.405	10.560	10.560
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.362	21,123	1,408.200	1,407.838
sd	0.000			0.019	145.338	9.689	9.689

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - B

Addr: 5

Sample ID ICRa6-986404;-6-A

Repeat 2

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/14/2017 8:52:07 PM

Count Ended 2/14/2017 9:07:14 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.072	27,076	1,805.067	1,804.995
sd	0.000			0.008	164.548	10.970	10.970
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.362	22,431	1,495.400	1,495.038
sd	0.000			0.019	149.770	9.985	9.985

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - B

Addr: 5

Sample ID ICRa6-986404;5-A

Repeat 3

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/14/2017 9:09:34 PM

Count Ended 2/14/2017 9:24:41 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.072	31,689	2,112.600	2,112.528
sd	0.000			0.008	178.014	11.868	11.868
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.362	21,401	1,426.733	1,426.371
sd	0.000			0.019	146.291	9.753	9.753

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - B

Addr: 5

Sample ID ICRa6-986404;-4-A

Repeat 4

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/14/2017 9:26:39 PM

Count Ended 2/14/2017 9:41:45 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.072	27,467	1,831.133	1,831.061
sd	0.000			0.008	165.732	11.049	11.049
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.362	18,920	1,261.333	1,260.971
sd	0.000			0.019	137.550	9.170	9.170

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - B

Addr: 5

Sample ID ICRa6-986404;-3-A

Repeat 5

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/14/2017 9:44:39 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 2/14/2017 9:59:44 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.072	27,282	1,818.800	1,818.728
sd	0.000			0.008	165.173	11.012	11.012
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.362	17,926	1,195.067	1,194.705
sd	0.000			0.019	133.888	8.926	8.926

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - B

Addr: 5

Sample ID ICRa6-986404;-2-A

Repeat 6

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/14/2017 10:09:06 PM

Count Ended 2/14/2017 10:24:11 PM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.072	18,255	1,217.000	1,216.928
sd	0.000			0.008	135.111	9.007	9.007
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.362	11,518	767.867	767.505
sd	0.000			0.019	107.322	7.155	7.155

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - B

Addr: 5

Sample ID ICRa6-986404;-8-A

Repeat 8

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/14/2017 10:47:27 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 2/14/2017 11:02:33 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.072	22,386	1,492.400	1,492.328
sd	0.000			0.008	149.620	9.975	9.975
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.362	22,984	1,532.267	1,531.905
sd	0.000			0.019	151.605	10.107	10.107

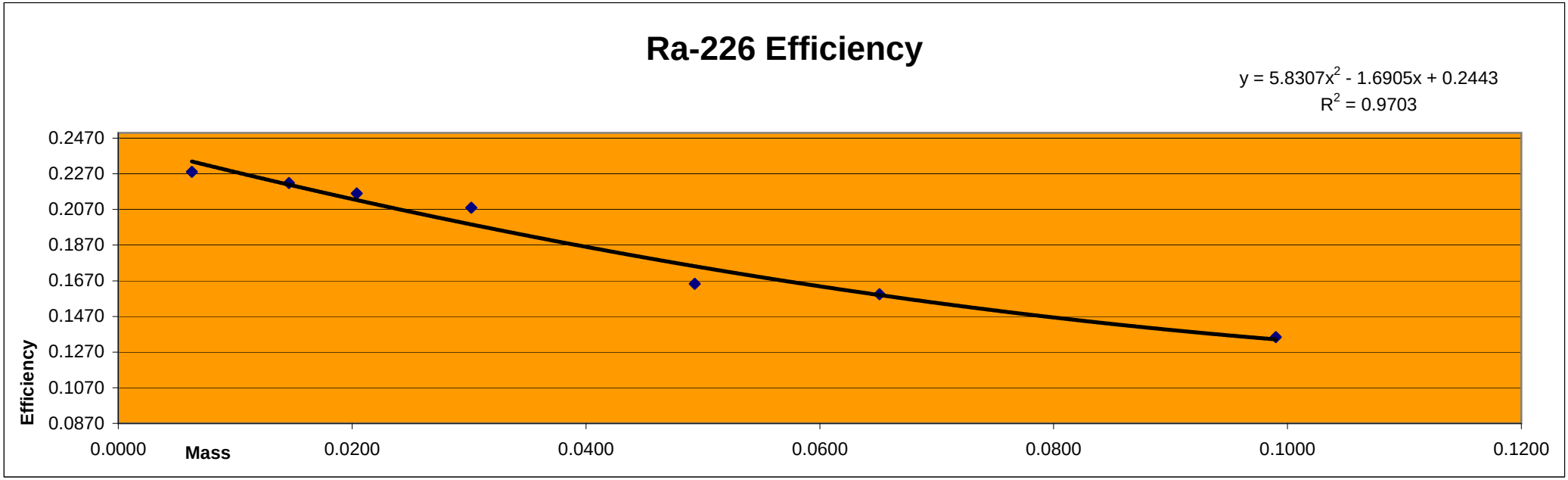
	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Ra-226 Calibration 2017

Orange 19

Std #	Mass	Count Time	Sample Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
R2	0.0063	15.00	2/15/2017 8:09	21124	1408.2667	2/13/2017 13:30	1.8264	0.4487	1718.3451	7534.6	0.2281
R3	0.0146	15.00	2/15/2017 7:50	31654	2110.2667	2/13/2017 13:30	1.8212	0.6933	1671.4126	7534.6	0.2218
R4	0.0204	15.00	2/15/2017 7:24	32173	2144.8667	2/13/2017 13:30	1.8140	0.7265	1627.5304	7534.6	0.2160
R5	0.0302	15.00	2/15/2017 7:04	36589	2439.2667	2/13/2017 13:30	1.8086	0.8604	1567.5618	7534.6	0.2080
R6	0.0493	15.00	2/15/2017 10:11	32525	2168.3333	2/13/2017 13:30	1.8593	0.9364	1245.4399	7534.6	0.1653
R7	0.0651	15.00	2/15/2017 9:18	30826	2055.0667	2/13/2017 13:30	1.8451	0.9274	1201.0376	7534.6	0.1594
R8	0.0990	15.00	2/15/2017 8:58	26462	1764.1333	2/13/2017 13:30	1.8397	0.9402	1019.9621	7534.6	0.1354



Alpha/Beta Count Results

Sample Activity Report

Orange 16-19 - D

Addr: 19

Sample ID ICRa6-986404;-5-A

Repeat 17

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/15/2017 7:04:57 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 2/15/2017 7:20:05 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.113	36,589	2,439.267	2,439.154
sd	0.000			0.011	191.283	12.752	12.752
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.442	25,241	1,682.733	1,682.291
sd	0.000			0.021	158.874	10.592	10.592

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 16-19 - D

Addr: 19

Sample ID ICRa6-986404;-4-A

Repeat 18

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/15/2017 7:24:39 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 2/15/2017 7:39:47 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.113	32,173	2,144.867	2,144.754
sd	0.000			0.011	179.368	11.958	11.958
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.442	22,516	1,501.067	1,500.625
sd	0.000			0.021	150.053	10.004	10.004

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 16-19 - D

Addr: 19

Sample ID ICRa6-986404;-3-A

Repeat 19

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/15/2017 7:50:53 AM

Collection Date 1 1/1/1900

Half Life 0.00 ***days***

Count Ended 2/15/2017 8:06:00 AM

Collection Date 2 1/1/1900

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.113	31,654	2,110.267	2,110.154
sd	0.000			0.011	177.916	11.861	11.861
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.442	21,324	1,421.600	1,421.158
sd	0.000			0.021	146.027	9.735	9.735

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 16-19 - D

Addr: 19

Sample ID ICRa6-986404;2-A

Repeat 20

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/15/2017 8:09:55 AM

Collection Date 1 1/1/1900

Half Life 0.00 ***days***

Count Ended 2/15/2017 8:25:01 AM

Collection Date 2 1/1/1900

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.113	21,124	1,408.267	1,408.154
sd	0.000			0.011	145.341	9.689	9.689
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.442	13,765	917.667	917.225
sd	0.000			0.021	117.324	7.822	7.822

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 16-19 - D

Addr: 19

Sample ID ICRa6-986404;-8-A

Repeat 22

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/15/2017 8:58:32 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 2/15/2017 9:13:38 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.113	26,462	1,764.133	1,764.020
sd	0.000			0.011	162.671	10.845	10.845
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.442	27,220	1,814.667	1,814.225
sd	0.000			0.021	164.985	10.999	10.999

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 16-19 - D

Addr: 19

Sample ID ICRa6-986404;-7-A

Repeat 23

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/15/2017 9:18:36 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 2/15/2017 9:33:43 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.113	30,826	2,055.067	2,054.954
sd	0.000			0.011	175.573	11.705	11.705
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.442	27,096	1,806.400	1,805.958
sd	0.000			0.021	164.609	10.974	10.974

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 16-19 - D

Addr: 19

Sample ID ICRa6-986404;-6-A

Repeat 24

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/15/2017 10:11:08 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 2/15/2017 10:26:22 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.113	32,525	2,168.333	2,168.220
sd	0.000			0.011	180.347	12.023	12.023
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.442	28,455	1,897.000	1,896.558
sd	0.000			0.021	168.686	11.246	11.246

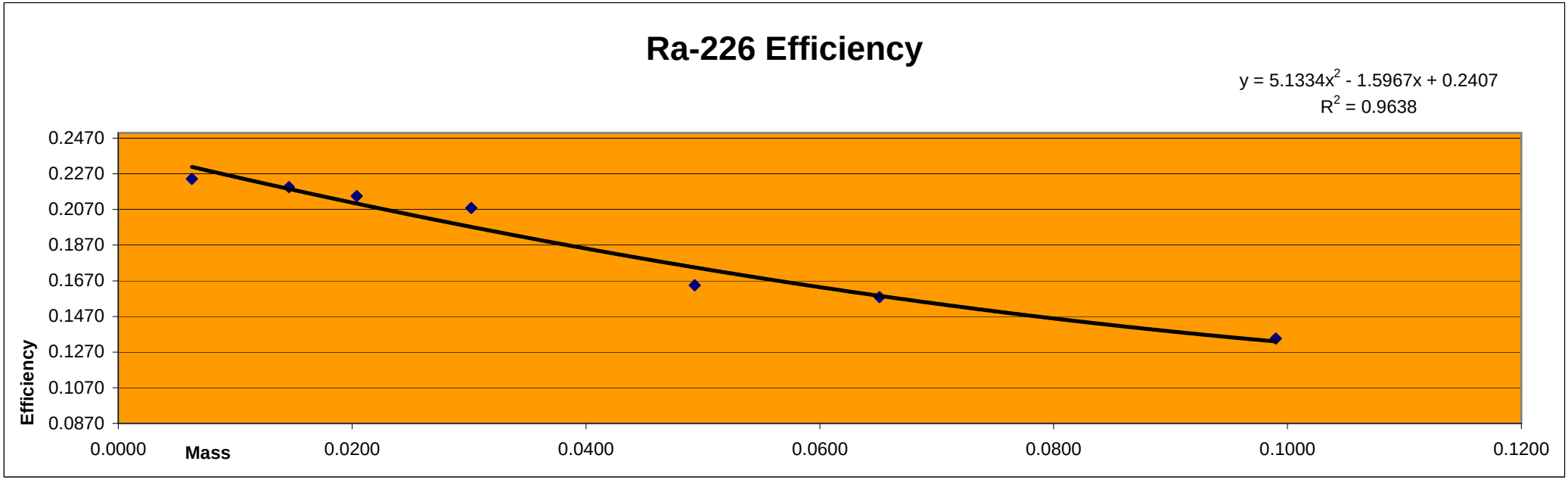
	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Ra-226 Calibration 2017

Orange 22

Std #	Mass	Count Time	Sample Time	Alpha Counts	CPM	Sep Time	Ingrowth	Recovery	Adj CPM	DPM	Efficiency
R2	0.0063	15.00	2/15/2017 9:18	20977	1398.4667	2/13/2017 13:30	1.8450	0.4487	1689.1949	7534.6	0.2242
R3	0.0146	15.00	2/15/2017 8:58	31638	2109.2000	2/13/2017 13:30	1.8396	0.6933	1653.8766	7534.6	0.2195
R4	0.0204	15.00	2/15/2017 8:29	32265	2151.0000	2/13/2017 13:30	1.8318	0.7265	1616.2805	7534.6	0.2145
R5	0.0302	15.00	2/15/2017 8:09	36903	2460.2000	2/13/2017 13:30	1.8262	0.8604	1565.7520	7534.6	0.2078
R6	0.0493	15.00	2/15/2017 7:51	31713	2114.2000	2/13/2017 13:30	1.8213	0.9364	1239.7075	7534.6	0.1645
R7	0.0651	15.00	2/15/2017 7:24	30008	2000.5333	2/13/2017 13:30	1.8141	0.9274	1189.1928	7534.6	0.1578
R8	0.0990	15.00	2/15/2017 7:05	25871	1724.7333	2/13/2017 13:30	1.8086	0.9402	1014.2936	7534.6	0.1346



Ra226 ICV

Orange Ra226 ICV 2017				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
22	87.77%	95.74%	89.38%	90.97%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity 3788.19152 pCi/mL

Prep Batch: 291970

Detector	Beta 1	Activity	Units
22	Low Mass	3.325E+03	pCi/mL

Beta 2	Activity	Units
Medium Mass	3.627E+03	pCi/mL

Beta 3	Activity	Units
High Mass	3.386E+03	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - C

Addr: 22

Sample ID ICRa6-986404;-8-A

Repeat 17

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/15/2017 7:05:13 AM

Collection Date 1 1/1/1900

Half Life 0.00 ***days***

Count Ended 2/15/2017 7:20:30 AM

Collection Date 2 1/1/1900

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.110	25,871	1,724.733	1,724.623
sd	0.000			0.010	160.845	10.723	10.723
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	26,865	1,791.000	1,790.611
sd	0.000			0.020	163.905	10.927	10.927

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - C

Addr: 22

Sample ID ICRa6-986404;-7-A

Repeat 18

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/15/2017 7:24:52 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 2/15/2017 7:39:59 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 15.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.110	30,008	2,000.533	2,000.423
sd	0.000			0.010	173.228	11.549	11.549
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	26,786	1,785.733	1,785.344
sd	0.000			0.020	163.664	10.911	10.911

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - C

Addr: 22

Sample ID ICRa6-986404;-6-A

Repeat 19

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/15/2017 7:51:13 AM

Count Ended 2/15/2017 8:06:20 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.110	31,713	2,114.200	2,114.090
sd	0.000			0.010	178.081	11.872	11.872
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	27,758	1,850.533	1,850.144
sd	0.000			0.020	166.607	11.107	11.107

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - C

Addr: 22

Sample ID ICRa6-986404;-5-A

Repeat 20

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/15/2017 8:09:07 AM

Count Ended 2/15/2017 8:24:16 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.110	36,903	2,460.200	2,460.090
sd	0.000			0.010	192.102	12.807	12.807
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	26,960	1,797.333	1,796.944
sd	0.000			0.020	164.195	10.946	10.946

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - C

Addr: 22

Sample ID ICRa6-986404;-4-A

Repeat 21

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/15/2017 8:29:47 AM

Count Ended 2/15/2017 8:44:54 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.110	32,265	2,151.000	2,150.890
sd	0.000			0.010	179.625	11.975	11.975
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	23,393	1,559.533	1,559.144
sd	0.000			0.020	152.948	10.197	10.197

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - C

Addr: 22

Sample ID ICRa6-986404;3-A

Repeat 22

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/15/2017 8:58:11 AM

Count Ended 2/15/2017 9:13:18 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.110	31,638	2,109.200	2,109.090
sd	0.000			0.010	177.871	11.858	11.858
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	22,292	1,486.133	1,485.744
sd	0.000			0.020	149.305	9.954	9.954

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - C

Addr: 22

Sample ID ICRa6-986404;2-A

Repeat 23

Carrier No. 0

Batch ID 291968

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/15/2017 9:18:09 AM

Count Ended 2/15/2017 9:33:14 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 15.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.110	20,977	1,398.467	1,398.357
sd	0.000			0.010	144.834	9.656	9.656
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	14,377	958.467	958.078
sd	0.000			0.020	119.904	7.994	7.994

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha Beta Calibration Verifications

ICV is for Gross Alpha

Protean Alpha ICV - 2015				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
0	101.29%	85.46%	85.48%	90.74%

Standard ID

Thorium-230

Th-230_00019 #181198

Cert # 92776 Ref. date 08/08/2013

Activity 5.0185 pCi/mL

Prep Batch: M153001

	Low Mass	Medium Mass	High Mass
	0.142g	0.0512g	0.0747g
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
0	5.083	4.289	4.29

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Protean Beta ICV - 2013				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
0	98.05%	97.20%	98.50%	97.92%

Beta Activity 2000.929 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Count Date:	3/28/2013		(or date at which you wish to determine activity)
Elapsed Time:	119.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.992107441		
Corrected Activity:	2221.030929	dpm	
Decay Activity (Sr/Y-90)	4442.061857	dpm	2000.929 pCi

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICVABT-51512;Beta 1*** **Repeat** ***5***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 10:21 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	6	1.200	1.164
sd	0.000			0.006	2.449	0.490	0.490
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	9,201	1,840.200	1,839.641
sd	0.000			0.024	95.922	19.184	19.184

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICVABT-51512;Beta 3*** **Repeat** ***10***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 13:22 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	5	1.000	0.964
sd	0.000			0.006	2.236	0.447	0.447
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	8,327	1,665.400	1,664.841
sd	0.000			0.024	91.252	18.250	18.250

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICVABT-51512;Beta 2*** **Repeat** ***11***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 13:39 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.036	7	1.400	1.364
sd	0.000			0.006	2.646	0.529	0.529
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.559	8,614	1,722.800	1,722.241
sd	0.000			0.024	92.812	18.562	18.562

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICVABT-181198;A1*** **Repeat** ***1***

Batch ID ***m153001***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/20/201! 13:53 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	12,896	429.867	429.796
sd	0.000			0.008	113.561	3.785	3.785
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	4,088	136.267	135.646
sd	0.000			0.025	63.937	2.131	2.131

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICVABT-181198;A3*** **Repeat** ***3***

Batch ID ***m153001***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/20/201! 18:43 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	6,068	202.267	202.196
sd	0.000			0.008	77.897	2.597	2.597
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	2,274	75.800	75.179
sd	0.000			0.025	47.686	1.590	1.590

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - A **Address:** ***0***

Sample ID ***ICVABT-181198;A2*** **Repeat** ***4***

Batch ID ***m153001***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/20/201! 19:40 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.071	7,568	252.267	252.196
sd	0.000			0.008	86.994	2.900	2.900
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.621	2,634	87.800	87.179
sd	0.000			0.025	51.323	1.711	1.711

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

ICV is for Gross Alpha

Protean Alpha ICV - 2015				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
1	100.63%	88.77%	87.70%	92.36%

Standard ID

Thorium-230

Th-230_00019 #181198

Cert # 92776 Ref. date 08/08/2013

Activity 5.0185 pCi/mL

Prep Batch: M153001

	Low Mass	Medium Mass	High Mass
	0.142g	0.0512g	0.0747g
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
1	5.05	4.455	4.401

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Protean Beta ICV - 2013				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
1	100.10%	97.30%	99.70%	99.04%

Beta Activity 2000.929 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	3/28/2013		(or date at which you wish to determine activity)
Elapsed Time:	119.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.992107441		
Corrected Activity:	2221.030929	dpm	
Decay Activity (Sr/Y-90)	4442.061857	dpm	2000.929 pCi

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICVABT-51512;Beta 2*** **Repeat** *5*

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 10:21 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	13	2.600	2.559
sd	0.000			0.006	3.606	0.721	0.721
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	8,660	1,732.000	1,731.533
sd	0.000			0.022	93.059	18.612	18.612

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** ***1***

Sample ID ***ICVABT-51512;Beta 3*** **Repeat** ***11***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 13:39 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	15	3.000	2.959
sd	0.000			0.006	3.873	0.775	0.775
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	8,539	1,707.800	1,707.333
sd	0.000			0.022	92.407	18.481	18.481

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** ***1***

Sample ID ***ICVABT-51512;Beta 1*** **Repeat** ***20***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 4/2/2013 21:11 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.041	23	4.600	4.559
sd	0.000			0.006	4.796	0.959	0.959
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.467	9,415	1,883.000	1,882.533
sd	0.000			0.022	97.031	19.406	19.406

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICVABT-181198;A2*** **Repeat** *1*

Batch ID ***m153001***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/20/201! 13:53 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	7,689	256.300	256.220
sd	0.000			0.009	87.687	2.923	2.923
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	2,743	91.433	90.939
sd	0.000			0.022	52.374	1.746	1.746

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICVABT-181198;A1*** **Repeat** *2*

Batch ID ***m153001***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/20/201! 14:28 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	12,752	425.067	424.987
sd	0.000			0.009	112.925	3.764	3.764
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	4,155	138.500	138.006
sd	0.000			0.022	64.459	2.149	2.149

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 0-3 - B **Address:** *1*

Sample ID ***ICVABT-181198;A3*** **Repeat** *4*

Batch ID ***m153001***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.200 ***l*** **sd** 0.000 ***l***

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 11/20/201! 19:40 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.080	6,077	202.567	202.487
sd	0.000			0.009	77.955	2.599	2.599
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.494	2,442	81.400	80.906
sd	0.000			0.022	49.417	1.647	1.647

	Net Activity dpm	LLD dpm	Net Concentration * pCi/l	MDC pCi/l	Limits pCi/l	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

ICV is for Gross Alpha

Protean Alpha ICV - 2015				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
13	101.68%	103.98%	103.02%	102.89%

Standard ID

Thorium-230

Th-230_00019 #181198

Cert # 92776 Ref. date 08/08/2013

Activity 5.0185 pCi/mL

Prep Batch: M153007

	Low Mass	Medium Mass	High Mass
	0.161g	0.0552g	0.0777g
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
13	5.103	5.218	5.17

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Protean Beta ICV - 2013				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
13	99.70%	99.45%	97.35%	98.84%

Beta Activity 2000.929 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	3/28/2013		(or date at which you wish to determine activity)
Elapsed Time:	119.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.992107441		
Corrected Activity:	2221.030929	dpm	
Decay Activity (Sr/Y-90)	4442.061857	dpm	2000.929 pCi

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICVABT-51512;Beta 3*** **Repeat** ***15***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 23:41 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	3	0.600	0.553
sd	0.000			0.007	1.732	0.346	0.346
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	8,285	1,657.000	1,656.571
sd	0.000			0.021	91.022	18.204	18.204

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICVABT-51512;Beta 2*** **Repeat** ***16***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 23:47 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	5	1.000	0.953
sd	0.000			0.007	2.236	0.447	0.447
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	8,847	1,769.400	1,768.971
sd	0.000			0.021	94.058	18.812	18.812

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICVABT-51512;Beta 1*** **Repeat** ***17***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 23:53 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	2	0.400	0.353
sd	0.000			0.007	1.414	0.283	0.283
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.429	9,399	1,879.800	1,879.371
sd	0.000			0.021	96.948	19.390	19.390

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICVABT-181198; A3*** **Repeat** ***99***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 08:30 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	8,655	288.500	288.351
sd	0.000			0.012	93.032	3.101	3.101
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	3,265	108.833	108.341
sd	0.000			0.022	57.140	1.905	1.905

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICVABT-181198; A2*** **Repeat** ***100***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 10:24 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	12,748	424.933	424.784
sd	0.000			0.012	112.907	3.764	3.764
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	4,325	144.167	143.675
sd	0.000			0.022	65.765	2.192	2.192

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - B **Address:** ***13***

Sample ID ***ICVABT-181198; A1*** **Repeat** ***21***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 12:21 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.149	6,933	231.100	230.951
sd	0.000			0.012	83.265	2.775	2.776
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.492	2,877	95.900	95.408
sd	0.000			0.022	53.638	1.788	1.788

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

ICV is for Gross Alpha

Protean Alpha ICV - 2015				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
15	104.97%	104.41%	104.39%	104.59%

Standard ID

Thorium-230

Th-230_00019 #181198

Cert # 92776 Ref. date 08/08/2013

Activity 5.0185 pCi/mL

Prep Batch: M153007

	Low Mass	Medium Mass	High Mass
	0.161g	0.0552g	0.0777g
Detector	Activity (pCi/mL)	Activity (pCi/mL)	Activity (pCi/mL)
15	5.27E+00	5.24E+00	5.24E+00

ICV is for Gross Beta
Strontium 90
and
Total Strontium

Protean Beta ICV - 2013				
Detector	Low Mass Recovery	Medium Mass Recovery	High Mass Recovery	Mean Recovery
15	97.91%	97.45%	99.00%	98.12%

Beta Activity 2000.929 pCi

Beta Activity 2000.796 pCi

Standard ID

Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	3/28/2013		(or date at which you wish to determine activity)
Elapsed Time:	119.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.992107441		
Corrected Activity:	2221.030929	dpm	
Decay Activity (Sr/Y-90)	4442.061857	dpm	2000.929 pCi

Initial Activity:	2238.7	dpm	
Reference Date:	11/29/2012		
Current Date:	3/29/2013		(or date at which you wish to determine activity)
Elapsed Time:	120.000	days	
Half Life:	10409.625	days	
Exponential Term:	0.992041382		
Corrected Activity:	2220.883041	dpm	
Decay Activity (Sr/Y-90)	4441.766083	dpm	2000.796 pCi

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICVABT-51512;Beta 3*** **Repeat** ***17***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 23:53 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	0	0.000	-0.047
sd	0.000			0.007	0.000	0.000	0.137
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.480	8,408	1,681.600	1,681.120
sd	0.000			0.022	91.695	18.339	18.339

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICVABT-51512;Beta 2*** **Repeat** ***18***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/28/2013 23:59 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	5	1.000	0.953
sd	0.000			0.007	2.236	0.447	0.447
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.480	8,642	1,728.400	1,727.920
sd	0.000			0.022	92.962	18.592	18.592

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICVABT-51512;Beta 1*** **Repeat** ***19***

Batch ID ***122640***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 3/29/2013 00:05 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.047	2	0.400	0.353
sd	0.000			0.007	1.414	0.283	0.283
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.480	9,131	1,826.200	1,825.720
sd	0.000			0.022	95.556	19.111	19.111

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICVABT-181198; A1*** **Repeat** ***18***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 10:24 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	6,775	225.833	225.702
sd	0.000			0.011	82.310	2.744	2.744
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.483	2,817	93.900	93.417
sd	0.000			0.022	53.075	1.769	1.769

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICVABT-181198; A3*** **Repeat** ***102***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 11:38 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	8,383	279.433	279.302
sd	0.000			0.011	91.559	3.052	3.052
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.483	3,245	108.167	107.684
sd	0.000			0.022	56.965	1.899	1.899

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Low Level Alpha/Beta Count Results
Sample Activity Report

Protean 12-15 - D **Address:** ***15***

Sample ID ***ICVABT-181198; A2*** **Repeat** ***103***

Batch ID ***m153007***

Count Routine ***Gross Alpha Beta*** **Detector Volts** ***1,515.0***

Sample Qty 0.000 **sd** 0.000

Residual Wt 0.000 ***mg*** **sd** 0.000 ***mg***

Count Date 12/3/2015 12:22 **Collection Date 1** **Half Life** 0.00 ***days***
Collection Date 2 **Decay Factor** 1.000

Sample Count Time 30.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.131	12,621	420.700	420.569
sd	0.000			0.011	112.343	3.745	3.745
Alpha to Beta	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.483	4,278	142.600	142.117
sd	0.000			0.022	65.406	2.180	2.180

	Net Activity dpm	LLD dpm	Net Concentration *	MDC	Limits	% of Limits
Alpha	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			
Beta	0.000	0.000	0.000 ± 0.000	0.000	1.000	0.000
sd	0.000		0.000			

*** Note: Decay Corrected MDC Method -** **Tb = Ts < 10**
Error = 0.00 **x sd**

Ra-226 Calibration Verifications

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Total Alpha-Emitting Radium

Batch: 291970 **Operator:**

SampID / Analyte	WRKNO	Ts	Aliquot Tb	Cs	Ba Mass Cb	Ba Yield CPMs	Trunc Yield CPMb	Ingrowth	Ba Precip Time	InstrID	Eff	Cal Type	Cnt Date Time	Sigma
								Activity	UncCount	UncTotal	MDA	DLC	MQO	
160-21018-A-1-A	160-21018-A-1-A		1.0000mL		0.0133	63.15%	False	1.8468	2/13/17 13:30	Orange4	0.2091	2	2/15/17 9:21	1.00
Total Alpha Emitting		5.00	1000.00	9123	128	1824.60	0.13	3.371E+003pCi/mL	3.529E+001	1.557E+002	2.083E+000	4.875E-001	155.7301	
160-21018-A-2-A	160-21018-A-2-A		1.0000mL		0.0276	78.63%	False	1.8442	2/13/17 13:30	Orange4	0.1891	2	2/15/17 9:12	1.00
Total Alpha Emitting		5.00	1000.00	11128	128	2225.60	0.13	3.655E+003pCi/mL	3.465E+001	1.681E+002	1.852E+000	4.334E-001	168.0884	
160-21018-A-3-A	160-21018-A-3-A		1.0000mL		0.0487	92.50%	False	1.8396	2/13/17 13:30	Orange4	0.1636	2	2/15/17 8:55	1.00
Total Alpha Emitting		5.00	1000.00	10262	128	2052.40	0.13	3.322E+003pCi/mL	3.279E+001	1.530E+002	1.825E+000	4.271E-001	153.0306	

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

SampID	SampDupID	Analyte	Activity	DupActivity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	WRKNO	Analyte	Activity	MSActivity	StdAdded	Recovery	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal

Ra226 ICV

Orange Ra226 ICV 2017				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
4	88.99%	96.48%	87.69%	91.05%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity 3788.19152 pCi/mL

Prep Batch: 291970

Detector	1	Activity	Units
4	Low Mass (0.0133g)	3.371E+03	pCi/mL

2	Activity	Units
Medium Mass (0.0276g)	3.655E+03	pCi/mL

3	Activity	Units
High Mass (0.0487g)	3.322E+03	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - A

Addr: 4

Sample ID ICVRa6-1063071;3-A

Repeat 3

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/15/2017 8:55:34 AM

Count Ended 2/15/2017 9:00:38 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 *days*

Decay Factor 1.000

Sample Count Time 5.00 *mins*

Background Count Time 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.128	10,262	2,052.400	2,052.272
sd	0.000			0.011	101.302	20.260	20.260
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.367	10,305	2,061.000	2,060.633
sd	0.000			0.019	101.514	20.303	20.303

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - A

Addr: 4

Sample ID ICVRa6-1063071;2-A

Repeat 4

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/15/2017 9:12:37 AM

Count Ended 2/15/2017 9:17:39 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.128	11,128	2,225.600	2,225.472
sd	0.000			0.011	105.489	21.098	21.098
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.367	9,097	1,819.400	1,819.033
sd	0.000			0.019	95.378	19.076	19.076

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - A

Addr: 4

Sample ID ICVRa6-1063071;-1-A

Repeat 5

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/15/2017 9:21:58 AM

Count Ended 2/15/2017 9:27:01 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.128	9,123	1,824.600	1,824.472
sd	0.000			0.011	95.514	19.103	19.103
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.367	7,481	1,496.200	1,495.833
sd	0.000			0.019	86.493	17.299	17.299

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

TestAmerica

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Analysis Report for Total Alpha-Emitting Radium

Batch: 291970 **Operator:**

SampID / Analyte	WRKNO	Ts	Aliquot Tb	Cs	Ba Mass Cb	Ba Yield CPMs	Trunc Yield CPMb	Ingrowth	Ba Precip Time	InstrID	Eff	Cal Type	Cnt Date Time	Sigma
								Activity	UncCount	UncTotal	MDA	DLC	MQO	
160-21018-A-1-A	160-21018-A-1-A		1.0000mL		0.0133	63.15%	False	1.8609	2/13/17 13:30	Orange5	0.2121	2	2/15/17 10:14	1.00
Total Alpha Emitting		5.00	1000.00	9151	72	1830.20	0.07	3.307E+003pCi/mL	3.457E+001	1.528E+002	1.799E+000	3.576E-001	152.7846	
160-21018-A-2-A	160-21018-A-2-A		1.0000mL		0.0276	78.63%	False	1.8468	2/13/17 13:30	Orange5	0.1915	2	2/15/17 9:22	1.00
Total Alpha Emitting		5.00	1000.00	11328	72	2265.60	0.07	3.670E+003pCi/mL	3.448E+001	1.687E+002	1.613E+000	3.206E-001	168.7176	
160-21018-A-3-A	160-21018-A-3-A		1.0000mL		0.0487	92.50%	False	1.8443	2/13/17 13:30	Orange5	0.1655	2	2/15/17 9:12	1.00
Total Alpha Emitting		5.00	1000.00	10704	72	2140.80	0.07	3.417E+003pCi/mL	3.302E+001	1.573E+002	1.589E+000	3.158E-001	157.2518	

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

SampID	SampDupID	Analyte	Activity	DupActivity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	WRKNO	Analyte	Activity	MSActivity	StdAdded	Recovery	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal

Ra226 ICV

Orange Ra226 ICV 2017				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
5	87.30%	96.88%	90.20%	91.46%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity 3788.19152 pCi/mL

Prep Batch: 291970

Detector	1	Activity	Units
5	Low Mass (0.0133g)	3.307E+03	pCi/mL

2	Activity	Units
Medium Mass (0.0276g)	3.670E+03	pCi/mL

3	Activity	Units
High Mass (0.0487g)	3.417E+03	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - B

Addr: 5

Sample ID ICVRa6-1063071;3-A

Repeat 4

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/15/2017 9:12:45 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 2/15/2017 9:18:00 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.072	10,704	2,140.800	2,140.728
sd	0.000			0.008	103.460	20.692	20.692
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.362	10,222	2,044.400	2,044.038
sd	0.000			0.019	101.104	20.221	20.221

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - B

Addr: 5

Sample ID ICVRa6-1063071;-2-A

Repeat 5

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/15/2017 9:22:03 AM

Count Ended 2/15/2017 9:27:07 AM

Collection Date 1 1/1/1900

Collection Date 2 1/1/1900

Half Life 0.00 ***days***

Decay Factor 1.000

Sample Count Time 5.00 ***mins***

Background Count Time 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.072	11,328	2,265.600	2,265.528
sd	0.000			0.008	106.433	21.287	21.287
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.362	8,966	1,793.200	1,792.838
sd	0.000			0.019	94.689	18.938	18.938

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected**

MDC Method Tb = Ts < 10

Error = .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 4-7 - B

Addr: 5

Sample ID ICVRa6-1063071;1-A

Repeat 6

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/15/2017 10:14:09 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 2/15/2017 10:19:12 AM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.072	9,151	1,830.200	1,830.128
sd	0.000			0.008	95.661	19.132	19.132
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.362	7,218	1,443.600	1,443.238
sd	0.000			0.019	84.959	16.992	16.992

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Total Alpha-Emitting Radium

Batch: 291970 **Operator:**

SampID / Analyte	WRKNO	Ts	Aliquot Tb	Cs	Ba Mass Cb	CPMs	Ba Yield CPMb	Trunc Yield	Ingrowth Activity	Ba Precip Time UncCount	InstrID UncTotal	Eff MDA	Cal Type DLC	Cnt Date Time MQO	Sigma
160-21018-A-1-A	160-21018-A-1-A		1.0000mL		0.0133		63.15%	False	1.8922	2/13/17 13:30	Orange19	0.2228	2	2/15/17 12:11	1.00
Total Alpha Emitting		5.00	1000.00	9857	113	1971.40	0.11		3.335E+003pCi/mL	3.359E+001	1.538E+002	1.854E+000	4.194E-001	153.7746	
160-21018-A-2-A	160-21018-A-2-A		1.0000mL		0.0276		78.63%	False	1.8904	2/13/17 13:30	Orange19	0.2021	2	2/15/17 12:04	1.00
Total Alpha Emitting		5.00	1000.00	12142	113	2428.40	0.11		3.642E+003pCi/mL	3.305E+001	1.672E+002	1.643E+000	3.718E-001	167.1709	
160-21018-A-3-A	160-21018-A-3-A		1.0000mL		0.0487		92.50%	False	1.8882	2/13/17 13:30	Orange19	0.1758	2	2/15/17 11:56	1.00
Total Alpha Emitting		5.00	1000.00	11514	113	2302.80	0.11		3.378E+003pCi/mL	3.149E+001	1.553E+002	1.608E+000	3.637E-001	155.2554	

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

SampID	SampDupID	Analyte	Activity	DupActivity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	WRKNO	Analyte	Activity	MSActivity	StdAdded	Recovery	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal

Ra226 ICV

Orange Ra226 ICV 2017				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
19	88.04%	96.14%	89.17%	91.12%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity 3788.19152 pCi/mL

Prep Batch: 291970

Detector	1	Activity	Units
19	Low Mass (0.0133g)	3.335E+03	pCi/mL

2	Activity	Units
Medium Mass (0.0276g)	3.642E+03	pCi/mL

3	Activity	Units
High Mass (0.0487g)	3.378E+03	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Orange 16-19 - D

Addr: 19

Sample ID ICVRa6-1063071;3-A

Repeat 18

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/15/2017 11:56:24 AM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 2/15/2017 12:01:44 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.113	11,514	2,302.800	2,302.687
sd	0.000			0.011	107.303	21.461	21.461
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.442	10,224	2,044.800	2,044.358
sd	0.000			0.021	101.114	20.223	20.223

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 16-19 - D

Addr: 19

Sample ID ICVRa6-1063071;-2-A

Repeat 19

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/15/2017 12:04:43 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 2/15/2017 12:09:51 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.113	12,142	2,428.400	2,428.287
sd	0.000			0.011	110.191	22.038	22.038
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.442	8,886	1,777.200	1,776.758
sd	0.000			0.021	94.266	18.853	18.853

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 16-19 - D

Addr: 19

Sample ID ICVRa6-1063071;-1-A

Repeat 20

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/15/2017 12:11:33 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 2/15/2017 12:16:35 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.113	9,857	1,971.400	1,971.287
sd	0.000			0.011	99.282	19.856	19.856
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.442	7,434	1,486.800	1,486.358
sd	0.000			0.021	86.221	17.244	17.244

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Total Alpha-Emitting Radium

Batch: 291970 **Operator:**

SampID / Analyte	WRKNO	Ts	Aliquot Tb	Cs	Ba Mass Cb	Ba Yield CPMs	Trunc Yield CPMb	Ingrowth	Ba Precip Time	InstrID	Eff	Cal Type	Cnt Date Time	Sigma
								Activity	UncCount	UncTotal	MDA	DLC	MQO	
160-21018-A-1-A	160-21018-A-1-A		1.0000mL		0.0133	63.15%	False	1.8975	2/13/17 13:30	Orange22	0.2204	2	2/15/17 12:31	1.00
Total Alpha Emitting		5.00	1000.00	9746	110	1949.20	0.11	3.325E+003pCi/mL	3.368E+001	1.534E+002	1.858E+000	4.173E-001	153.3688	
160-21018-A-2-A	160-21018-A-2-A		1.0000mL		0.0276	78.63%	False	1.8957	2/13/17 13:30	Orange22	0.2005	2	2/15/17 12:24	1.00
Total Alpha Emitting		5.00	1000.00	12034	110	2406.80	0.11	3.627E+003pCi/mL	3.306E+001	1.665E+002	1.641E+000	3.686E-001	166.5230	
160-21018-A-3-A	160-21018-A-3-A		1.0000mL		0.0487	92.50%	False	1.8941	2/13/17 13:30	Orange22	0.1751	2	2/15/17 12:18	1.00
Total Alpha Emitting		5.00	1000.00	11532	110	2306.40	0.11	3.386E+003pCi/mL	3.154E+001	1.556E+002	1.599E+000	3.592E-001	155.6165	

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

SampID	SampDupID	Analyte	Activity	DupActivity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	WRKNO	Analyte	Activity	MSActivity	StdAdded	Recovery	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal

Ra226 ICV

Orange Ra226 ICV 2017				
	Low	Medium	High	Mean
	Mass	Mass	Mass	Recovery
Detector	Recovery	Recovery	Recovery	
22	87.77%	95.74%	89.38%	90.97%

Standard ID

Ra-226
Ra-226_00025 #1063071
Cert # 104858
Added: 1mL
Activity 3788.19152 pCi/mL

Prep Batch: 291970

Detector	1	Activity	Units
22	Low Mass (0.0133g)	3.325E+03	pCi/mL

2	Activity	Units
Medium Mass (0.0276g)	3.627E+03	pCi/mL

3	Activity	Units
High Mass (0.0487g)	3.386E+03	pCi/mL

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - C

Addr: 22

Sample ID ICVRa6-1063071;-3-A

Repeat 21

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/15/2017 12:18:36 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 2/15/2017 12:23:52 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.110	11,532	2,306.400	2,306.290
sd	0.000			0.010	107.387	21.477	21.477
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	10,410	2,082.000	2,081.611
sd	0.000			0.020	102.029	20.406	20.406

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - C

Addr: 22

Sample ID ICVRa6-1063071;-2-A

Repeat 22

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty 0 *l* **sd** 0 *l*

Residual Wt 0 *mg* **sd** 0 *mg*

Count Began 2/15/2017 12:24:36 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 *days*

Count Ended 2/15/2017 12:29:38 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 *mins* **Background Count Time** 1,000.00 *mins*

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.110	12,034	2,406.800	2,406.690
sd	0.000			0.010	109.700	21.940	21.940
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	9,242	1,848.400	1,848.011
sd	0.000			0.020	96.135	19.227	19.227

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Alpha/Beta Count Results

Sample Activity Report

Orange 20-23 - C

Addr: 22

Sample ID ICVRa6-1063071;-1-A

Repeat 23

Carrier No. 0

Batch ID 291970

Count Method Gross Alpha Beta

Detector Volts 1515

Sample Qty	0 ***l***	**sd**	0 ***l***
Residual Wt	0 ***mg***	**sd**	0 ***mg***

Count Began 2/15/2017 12:31:18 PM **Collection Date 1** 1/1/1900 **Half Life** 0.00 ***days***

Count Ended 2/15/2017 12:36:23 PM **Collection Date 2** 1/1/1900 **Decay Factor** 1.000

Sample Count Time 5.00 ***mins*** **Background Count Time** 1,000.00 ***mins***

	Efficiency %	Attenuation Factor	Activity Divisor	Background cpm	Gross counts	Gross cpm	Net cpm
Alpha	0.000	1.000	1.000	0.110	9,746	1,949.200	1,949.090
sd	0.000			0.010	98.722	19.744	19.744
A to B	0.000	1.000				0.000	
sd	0.000					0.000	
Beta	0.000	1.000	1.000	0.389	7,533	1,506.600	1,506.211
sd	0.000			0.020	86.793	17.359	17.359

	Net Activity dpm	LLD dpm	MDC pCi/l	MPC pCi/l	Net Concentration * pCi/l	Conc / MPC Ratio
Alpha	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	
Beta	0.000	0.000	0.000	1.000	0.000 ± 0.000	0.000
sd	0.000				0.000	

*** Note: Decay Corrected** **MDC Method** Tb = Ts < 10 **Error =** .00 **x sd**

Monthly Backgrounds

Alpha/Beta Count Results

Source Count Report

Orange 4-7 - A

Addr: 4

Sample ID ICB
ICB;Monthly Background Check

Repeat 2014

Carrier No. 0

Batch ID ICB;Monthly Background

Detector Volts 1515

Residual Wt 0 ***mg***

Half Life 0.00 ***Years***

Count Began 7/27/2018 2:16:02 PM

Calibration Date 8/4/2012 9:20:16 AM

Decay Factor 1.000

Count Ended 7/28/2018 6:57:32 AM

Backgrounds From

Sample Count Time 1,000.00 ***mins***

Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	40	0.040	0.000	0.040
sd	6.325	0.006	0.000	0.006
Beta	351	0.351	0.000	0.351
sd	18.735	0.019	0.000	0.019

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Orange 4-7 - B

Addr: 5

Sample ID ICB
ICB;Monthly Background Check

Repeat 2024

Carrier No. 0

Batch ID ICB;Monthly Background

Detector Volts 1515

Residual Wt 0 ***mg***

Half Life 0.00 ***Years***

Count Began 7/27/2018 2:16:04 PM

Calibration Date 8/4/2012 9:20:16 AM

Decay Factor 1.000

Count Ended 7/28/2018 6:57:40 AM

Backgrounds From

Sample Count Time 1,000.00 ***mins***

Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	119	0.119	0.000	0.119
sd	10.909	0.011	0.000	0.011
Beta	362	0.362	0.000	0.362
sd	19.026	0.019	0.000	0.019

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Orange 16-19 - D

Addr: 19

Sample ID ICB
ICB;Monthly Background Check

Repeat 2029

Carrier No. 0

Batch ID ICB;Monthly Background

Detector Volts 1515

Residual Wt 0 ***mg***

Half Life 0.00 ***Years***

Count Began 7/27/2018 2:16:55 PM

Calibration Date 8/4/2012 9:20:16 AM

Decay Factor 1.000

Count Ended 7/28/2018 6:57:58 AM

Backgrounds From

Sample Count Time 1,000.00 ***mins***

Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	86	0.086	0.000	0.086
sd	9.274	0.009	0.000	0.009
Beta	465	0.465	0.000	0.465
sd	21.564	0.022	0.000	0.022

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Orange 20-23 - C

Addr: 22

Sample ID ICB
ICB;Monthly Background Check

Repeat 2032

Carrier No. 0

Batch ID ICB;Monthly Background

Detector Volts 1515

Residual Wt 0 ***mg***

Half Life 0.00 ***Years***

Count Began 7/27/2018 2:17:04 PM

Calibration Date 8/4/2012 9:20:16 AM

Decay Factor 1.000

Count Ended 7/28/2018 6:58:06 AM

Backgrounds From

Sample Count Time 1,000.00 ***mins***

Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	96	0.096	0.000	0.096
sd	9.798	0.010	0.000	0.010
Beta	386	0.386	0.000	0.386
sd	19.647	0.020	0.000	0.020

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Protean 0-3 - A

Addr: 0

Sample ID ICB
ICB; Monthly Backgrounds

Batch ID ICB;Monthly Backgrounds

Repeat 511
Carrier No. 0
Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 6/29/2018 10:24:56 AM
Count Ended 6/30/2018 3:05:48 AM
Sample Count Time 1,000.00 ***mins***

Calibration Date 2/15/2016 5:20:09 PM
Backgrounds From
Background Count Time 0.00

Half Life 0.00 ***Years***
Decay Factor 1.000

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	66	0.066	0.000	0.066
sd	8.124	0.008	0.000	0.008
Beta	664	0.664	0.000	0.664
sd	25.768	0.026	0.000	0.026

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Protean 0-3 - B

Addr: 1

Sample ID ICB
ICB; Monthly Backgrounds

Batch ID ICB;Monthly Backgrounds

Repeat 512
Carrier No. 0
Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 6/29/2018 10:33:50 AM
Count Ended 6/30/2018 3:14:42 AM
Sample Count Time 1,000.00 ***mins***

Calibration Date 2/15/2016 5:20:09 PM
Backgrounds From
Background Count Time 0.00

Half Life 0.00 ***Years***
Decay Factor 1.000

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	74	0.074	0.000	0.074
sd	8.602	0.009	0.000	0.009
Beta	432	0.432	0.000	0.432
sd	20.785	0.021	0.000	0.021

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Protean 12-15 - B

Addr: 13

Sample ID ICB
ICB; Monthly Backgrounds

Batch ID ICB;Monthly Backgrounds

Repeat 515
Carrier No. 0
Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 6/29/2018 11:05:32 AM
Count Ended 6/30/2018 3:46:29 AM
Sample Count Time 1,000.00 ***mins***

Calibration Date 2/15/2016 5:20:09 PM
Backgrounds From
Background Count Time 0.00

Half Life 0.00 ***Years***
Decay Factor 1.000

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	137	0.137	0.000	0.137
sd	11.705	0.012	0.000	0.012
Beta	422	0.422	0.000	0.422
sd	20.543	0.021	0.000	0.021

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Alpha/Beta Count Results

Source Count Report

Protean 12-15 - D

Addr: 15

Sample ID ICB
ICB; Monthly Backgrounds

Batch ID ICB;Monthly Backgrounds

Repeat 516
Carrier No. 0

Detector Volts 1515

Residual Wt 0 ***mg***
Count Began 6/29/2018 11:13:12 AM
Count Ended 6/30/2018 3:54:08 AM

Calibration Date 2/15/2016 5:20:09 PM
Backgrounds From

Half Life 0.00 ***Years***
Decay Factor 1.000

Sample Count Time 1,000.00 ***mins***
Background Count Time 0.00

	Gross counts	Gross cpm	Background cpm	Net cpm
Alpha	149	0.149	0.000	0.149
sd	12.207	0.012	0.000	0.012
Beta	522	0.522	0.000	0.522
sd	22.847	0.023	0.000	0.023

	Uncorrected DPM	Corrected DPM	Corrected dpm	Efficiency %
Alpha	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000
Alpha to Beta				0.000
sd				0.000
Beta	0.000	0.000	0.000	0.000
sd	0.000	0.000	0.000	0.000

Run Logs

Gas Flow Proportional Counter Run Log

Detector: Orange4

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
02/14/17 20:32	15	ICRA6 160-292932/1		292932			PS
02/14/17 20:52	15	ICRA6 160-292932/2		292932			PS
02/14/17 21:09	15	ICRA6 160-292932/3		292932			PS
02/14/17 21:26	15	ICRA6 160-292932/4		292932			PS
02/14/17 21:44	15	ICRA6 160-292932/5		292932			PS
02/14/17 22:27	15	ICRA6 160-292932/6		292932			PS
02/14/17 22:47	15	ICRA6 160-292932/7		292932			PS
02/15/17 08:55	5	ICVRA6 160-292932/8		292932			PS
02/15/17 09:12	5	ICVRA6 160-292932/9		292932			PS
02/15/17 09:21	5	ICVRA6 160-292932/10		292932			PS
07/27/18 14:16	1000	ICB 160-378546/5		378546			PS
08/08/18 00:05	2	CCVB 160-380986/3		380986			RTM
08/08/18 00:11	2	CCVA 160-380986/27		380986			RTM
08/08/18 01:07	200	CCB 160-380986/48		380986			RTM
08/08/18 05:27	100	LCS 160-375564/1-A		380986	375564	9315	RTM
08/08/18 08:52	60	ZZZZZ		380986			
08/08/18 10:18	60	ZZZZZ		380986			
08/08/18 11:45	60	ZZZZZ		380986			
08/08/18 13:10	200	ZZZZZ		380986			
08/08/18 18:18	60	ZZZZZ		380986			

Detector: Orange5

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
02/14/17 20:32	15	ICRA6 160-292933/1		292933			PS
02/14/17 20:52	15	ICRA6 160-292933/2		292933			PS
02/14/17 21:09	15	ICRA6 160-292933/3		292933			PS
02/14/17 21:26	15	ICRA6 160-292933/4		292933			PS
02/14/17 21:44	15	ICRA6 160-292933/5		292933			PS
02/14/17 22:09	15	ICRA6 160-292933/6		292933			PS
02/14/17 22:47	15	ICRA6 160-292933/7		292933			PS
02/15/17 09:12	5	ICVRA6 160-292933/8		292933			PS
02/15/17 09:22	5	ICVRA6 160-292933/9		292933			PS
02/15/17 10:14	5	ICVRA6 160-292933/10		292933			PS
07/27/18 14:16	1000	ICB 160-378546/6		378546			PS
08/08/18 00:05	2	CCVB 160-380986/10		380986			RTM
08/08/18 00:11	2	CCVA 160-380986/28		380986			RTM
08/08/18 01:07	200	CCB 160-380986/49		380986			RTM
08/08/18 05:27	100	LCSD 160-375564/2-A		380986	375564	9315	RTM
08/08/18 13:11	200	ZZZZZ		380986			
08/08/18 18:20	200	ZZZZZ		380986			

Detector: Orange19

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
02/15/17 07:04	15	ICRA6 160-292948/1		292948			PS
02/15/17 07:24	15	ICRA6 160-292948/2		292948			PS
02/15/17 07:50	15	ICRA6 160-292948/3		292948			PS
02/15/17 08:09	15	ICRA6 160-292948/4		292948			PS
02/15/17 08:58	15	ICRA6 160-292948/5		292948			PS
02/15/17 09:18	15	ICRA6 160-292948/6		292948			PS
02/15/17 10:11	15	ICRA6 160-292948/7		292948			PS
02/15/17 11:56	5	ICVRA6 160-292948/8		292948			PS

Gas Flow Proportional Counter Run Log

Detector: Orange19 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
02/15/17 12:04	5	ICVRA6 160-292948/9		292948			PS
02/15/17 12:11	5	ICVRA6 160-292948/10		292948			PS
07/27/18 14:16	1000	ICB 160-378546/20		378546			PS
08/08/18 00:05	2	CCVB 160-380986/5		380986			RTM
08/08/18 00:19	2	CCVA 160-380986/42		380986			RTM
08/08/18 01:07	200	CCB 160-380986/62		380986			RTM
08/08/18 05:29	100	160-29476-1	CRC-MW-1	380986	375564	9315	RTM
08/08/18 08:53	60	ZZZZZ		380986			
08/08/18 10:19	60	ZZZZZ		380986			
08/08/18 11:45	60	ZZZZZ		380986			
08/08/18 13:12	200	ZZZZZ		380986			
08/08/18 18:21	200	ZZZZZ		380986			

Detector: Orange22

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
02/15/17 07:05	15	ICRA6 160-292951/1		292951			PS
02/15/17 07:24	15	ICRA6 160-292951/2		292951			PS
02/15/17 07:51	15	ICRA6 160-292951/3		292951			PS
02/15/17 08:09	15	ICRA6 160-292951/4		292951			PS
02/15/17 08:29	15	ICRA6 160-292951/5		292951			PS
02/15/17 08:58	15	ICRA6 160-292951/6		292951			PS
02/15/17 09:18	15	ICRA6 160-292951/7		292951			PS
02/15/17 12:18	5	ICVRA6 160-292951/8		292951			PS
02/15/17 12:24	5	ICVRA6 160-292951/9		292951			PS
02/15/17 12:31	5	ICVRA6 160-292951/10		292951			PS
07/27/18 14:17	1000	ICB 160-378546/23		378546			PS
08/08/18 00:05	2	CCVB 160-380986/14		380986			RTM
08/08/18 00:19	2	CCVA 160-380986/45		380986			RTM
08/08/18 01:07	200	CCB 160-380986/63		380986			RTM
08/08/18 05:29	100	MB 160-375564/15-A		380986	375564	9315	RTM
08/08/18 08:53	60	ZZZZZ		380986			
08/08/18 10:20	60	ZZZZZ		380986			
08/08/18 11:45	60	ZZZZZ		380986			
08/08/18 13:12	200	ZZZZZ		380986			
08/08/18 18:21	200	ZZZZZ		380986			

Detector: Protean0

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/13 00:23	1.01	ICABT 160-224068/1		224068			JLW
03/27/13 00:32	1.01	ICABT 160-224068/2		224068			JLW
03/27/13 00:51	1.01	ICABT 160-224068/3		224068			JLW
03/27/13 01:05	1.01	ICABT 160-224068/4		224068			JLW
03/27/13 01:08	1.01	ZZZZZ		224068			
03/27/13 02:14	1.01	ICABT 160-224068/6		224068			JLW
03/27/13 08:49	1.01	ICABT 160-224068/7		224068			JLW
03/27/13 08:54	1.01	ICABT 160-224068/8		224068			JLW
03/27/13 09:19	1.01	ICABT 160-224068/9		224068			JLW
03/28/13 10:21	5	ICVABT 160-224068/10		224068			JLW
03/28/13 13:22	5	ICVABT 160-224068/11		224068			JLW
03/28/13 13:39	5	ICVABT 160-224068/12		224068			JLW
11/13/15 12:28	50	ICABT 160-224068/22		224068			JLW

Gas Flow Proportional Counter Run Log

Detector: Protean0 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
11/14/15 21:07	50	ZZZZZ		224068			
11/15/15 13:05	33	ICABT 160-224068/13		224068			JLW
11/15/15 14:11	28	ICABT 160-224068/14		224068			JLW
11/15/15 17:57	21	ICABT 160-224068/15		224068			JLW
11/15/15 20:53	30	ICABT 160-224068/16		224068			JLW
11/15/15 22:11	23	ICABT 160-224068/17		224068			JLW
11/15/15 22:56	20	ICABT 160-224068/18		224068			JLW
11/20/15 13:53	30	ICVABT 160-224068/19		224068			JLW
11/20/15 18:43	30	ICVABT 160-224068/20		224068			JLW
11/20/15 19:40	30	ICVABT 160-224068/21		224068			JLW
06/29/18 10:24	1000	ICB 160-373454/11		373454			PS
07/27/18 00:05	2	CCVA 160-378362/9		378362			
07/27/18 00:38	2	CCVB 160-378362/17		378362			RTM
07/27/18 00:55	2	CCVA 160-378362/33		378362			RTM
07/27/18 00:58	200	CCB 160-378362/49		378362			RTM
07/27/18 09:18	200	LCS 160-375578/1-A		378362	375578	9320	RTM

Detector: Protean1

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/13 00:23	1.01	ICABT 160-224047/10		224047			JLW
03/27/13 00:32	1.01	ICABT 160-224047/11		224047			JLW
03/27/13 00:51	1.01	ICABT 160-224047/12		224047			JLW
03/27/13 01:05	1.01	ZZZZZ		224047			
03/27/13 01:09	1.01	ICABT 160-224047/14		224047			JLW
03/27/13 02:14	1.01	ICABT 160-224047/15		224047			JLW
03/27/13 08:49	1.01	ICABT 160-224047/16		224047			JLW
03/27/13 08:54	1.01	ICABT 160-224047/17		224047			JLW
03/27/13 09:19	1.01	ICABT 160-224047/18		224047			JLW
03/28/13 10:21	5	ICVABT 160-224047/19		224047			JLW
03/28/13 13:39	5	ICVABT 160-224047/20		224047			JLW
04/02/13 21:11	5	ICVABT 160-224047/21		224047			JLW
11/13/15 12:28	50	ICABT 160-224047/22		224047			JLW
11/14/15 21:07	50	ICABT 160-224047/23		224047			JLW
11/15/15 13:05	22	ICABT 160-224047/1		224047			JLW
11/15/15 14:11	34	ICABT 160-224047/2		224047			JLW
11/15/15 17:57	28	ICABT 160-224047/3		224047			JLW
11/15/15 20:52	24	ZZZZZ		224047			
11/15/15 22:11	30	ICABT 160-224047/5		224047			JLW
11/15/15 22:56	23	ICABT 160-224047/6		224047			JLW
11/20/15 13:53	30	ICVABT 160-224047/7		224047			JLW
11/20/15 14:28	30	ICVABT 160-224047/8		224047			JLW
11/20/15 19:40	30	ZZZZZ		224047			
11/20/15 19:40	30	ICVABT 160-224047/24		224047			JLW
06/29/18 10:33	1000	ICB 160-373454/12		373454			PS
07/27/18 00:05	2	CCVA 160-378362/6		378362			RTM
07/27/18 00:38	2	CCVB 160-378362/18		378362			RTM
07/27/18 00:57	200	CCB 160-378362/36		378362			
07/27/18 05:44	200	CCB 160-378362/51		378362			RTM
07/27/18 09:18	200	LCSD 160-375578/2-A		378362	375578	9320	RTM

Gas Flow Proportional Counter Run Log

Detector: Protean13

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/13 09:26	1.01	ICABT 160-224911/9		224911			JLW
03/27/13 09:35	1.01	ICABT 160-224911/10		224911			JLW
03/27/13 09:48	1.01	ICABT 160-224911/11		224911			JLW
03/27/13 09:55	1.01	ICABT 160-224911/12		224911			JLW
03/27/13 10:05	1.01	ICABT 160-224911/13		224911			JLW
03/27/13 10:13	1.01	ICABT 160-224911/14		224911			JLW
03/27/13 10:20	1.01	ICABT 160-224911/15		224911			JLW
03/27/13 10:27	1.01	ICABT 160-224911/16		224911			JLW
03/28/13 23:41	5	ICVABT 160-224911/17		224911			JLW
03/28/13 23:47	5	ICVABT 160-224911/18		224911			JLW
03/28/13 23:53	5	ICVABT 160-224911/19		224911			JLW
11/25/15 18:18	50	ICABT 160-224911/1		224911			JLW
11/25/15 22:48	50	ZZZZZ		224911			
11/25/15 23:45	50	ICABT 160-224911/3		224911			JLW
11/27/15 07:48	50	ICABT 160-224911/4		224911			JLW
11/27/15 08:50	50	ICABT 160-224911/5		224911			JLW
11/27/15 11:48	50	ICABT 160-224911/6		224911			JLW
11/27/15 12:46	50	ICABT 160-224911/7		224911			JLW
11/29/15 15:32	50	ICABT 160-224911/8		224911			JLW
12/03/15 08:30	30	ICVABT 160-224911/20		224911			JLW
12/03/15 10:24	30	ICVABT 160-224911/21		224911			JLW
12/03/15 12:21	30	ICVABT 160-224911/22		224911			JLW
06/29/18 11:05	1000	ICB 160-373454/15		373454			PS
07/27/18 00:05	2	CCVB 160-378362/1		378362			RTM
07/27/18 00:39	2	CCVA 160-378362/30		378362			RTM
07/27/18 00:57	200	CCB 160-378362/45		378362			
07/27/18 05:45	200	CCB 160-378362/62		378362			RTM
07/27/18 09:20	200	160-29476-1	CRC-MW-1	378362	375578	9320	RTM

Detector: Protean15

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/27/13 09:26	1.01	ICABT 160-224913/9		224913			JLW
03/27/13 09:35	1.01	ICABT 160-224913/10		224913			JLW
03/27/13 09:48	1.01	ICABT 160-224913/11		224913			JLW
03/27/13 09:55	1.01	ICABT 160-224913/12		224913			JLW
03/27/13 10:05	1.01	ICABT 160-224913/13		224913			JLW
03/27/13 10:13	1.01	ICABT 160-224913/14		224913			JLW
03/27/13 10:20	1.01	ICABT 160-224913/15		224913			JLW
03/27/13 10:27	1.01	ICABT 160-224913/16		224913			JLW
03/28/13 23:53	5	ICVABT 160-224913/17		224913			JLW
03/28/13 23:59	5	ICVABT 160-224913/18		224913			JLW
03/29/13 00:05	5	ICVABT 160-224913/19		224913			JLW
11/25/15 18:19	50	ICABT 160-224913/1		224913			JLW
11/25/15 22:48	50	ICABT 160-224913/2		224913			JLW
11/25/15 23:45	50	ICABT 160-224913/3		224913			JLW
11/27/15 07:48	50	ZZZZZ		224913			
11/27/15 08:50	50	ICABT 160-224913/5		224913			JLW
11/27/15 11:48	50	ICABT 160-224913/6		224913			JLW
11/27/15 12:46	50	ICABT 160-224913/7		224913			JLW
11/29/15 15:33	50	ICABT 160-224913/8		224913			JLW
12/03/15 10:24	30	ICVABT 160-224913/20		224913			JLW
12/03/15 11:38	30	ICVABT 160-224913/21		224913			JLW

Gas Flow Proportional Counter Run Log

Detector: Protean15 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
12/03/15 12:22	30	ICVABT 160-224913/22		224913			JLW
06/29/18 11:13	1000	ICB 160-373454/16		373454			PS
07/27/18 00:05	2	CCVB 160-378362/3		378362			RTM
07/27/18 00:39	2	CCVA 160-378362/32		378362			RTM
07/27/18 00:57	200	CCB 160-378362/47		378362			
07/27/18 05:45	200	CCB 160-378362/64		378362			RTM
07/27/18 09:20	200	MB 160-375578/15-A		378362	375578	9320	RTM

Shipping and Receiving Documents

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Phone: 314.298.8566 Fax: 314.298.8757

Chain of Custody Record 215033

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TestAmerica Laboratories, Inc.
TAL-8210 (0713)

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Kris Schnoes	Site Contact: Kris Schnoes	Date: 7/11/18	COC No:
Company Name: Tetra Tech	Tel/Fax: 773 759 8058	Lab Contact:	Carrier: Fed Ex	____ of ____ COCs
Address: 1 S. Wacker ste 3300	Analysis Turnaround Time			Sampler:
City/State/Zip: Chicago, IL 60606	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
Phone: 773 759-8058	TAT if different from Below ____			Walk-in Client:
Fax:	☒ 2 weeks			Lab Sampling:
Project Name: Carnotite Reduction Co	☐ 1 week			
Site: Chicago, IL	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	Ra-226 + 228	Isotopic Ur	Th-230	TSS	Diss. Sulfide	Phenol	Cyanide	BOD	Cr+6	Metals + Hg	Fluoride	Sample Specific Notes:
CRC-MW-1	7/11/18	1355	G	W				X	X	X	X	X	X	X	X	X	X	X	

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160-29476 Chain of Custody

Preservation Used: 1= Ice, 2= HCl, 3= H2SO4; 4=HNO3, 5=NaOH; 6= Other ____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for____ Months

Special Instructions/QC Requirements & Comments:
Rad samples in separate cooler. Dose rate not above bkgnd for all samples

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd:____ Corr'd:____ Therm ID No.:____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Kristine Schnoes	Tetra Tech	7/11/18 1530	C McIS	TA STL	071218 0930
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

COOLER RECEIPT FORM

160-29476 Chain of Custody

Cooler Received/Opened On 7/13/2018 @ 10:10

Time Samples Removed From Cooler_____ Time Samples Placed In Storage_____ (2 Hour Window)

1. Tracking # 3379 (last 4 digits, FedEx) Courier: FedEx

IR Gun ID 17960353 pH Strip Lot NA Chlorine Strip Lot NA

2. Temperature of rep. sample or temp blank when opened: 0.1 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...(NA)

4. Were custody seals on outside of cooler? (YES)...NO...NA

If yes, how many and where: 1 Front

5. Were the seals intact, signed, and dated correctly? (YES)...NO...NA

6. Were custody papers inside cooler? (YES)...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) KCF

7. Were custody seals on containers: YES (NO) and Intact YES...NO...(NA)

Were these signed and dated correctly? YES...NO...(NA)

8. Packing mat'l used? (Bubblewrap) (Plastic bag) Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: (Ice) Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? (YES)...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? (YES)...NO...NA

12. Did all container labels and tags agree with custody papers? (YES)...NO...NA

13a. Were VOA vials received? YES...NO...(NA)

b. Was there any observable headspace present in any VOA vial? YES...NO...(NA)

● ⬅ Larger than this.

14. Was there a Trip Blank in this cooler? YES...(NO)...NA If multiple coolers, sequence #_____

I certify that I unloaded the cooler and answered questions 7-14 (intial) _____

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...(NA)

b. Did the bottle labels indicate that the correct preservatives were used (YES)...NO...NA

16. Was residual chlorine present? YES...NO...(NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) _____

17. Were custody papers properly filled out (ink, signed, etc)? (YES)...NO...NA

18. Did you sign the custody papers in the appropriate place? (YES)...NO...NA

19. Were correct containers used for the analysis requested? (YES)...NO...NA

20. Was sufficient amount of sample sent in each container? (YES)...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) _____

I certify that I attached a label with the unique LIMS number to each container (intial) _____

21. Were there Non-Conformance issues at login? YES...(NO) Was a NCM generated? YES...(NO)...#_____

BIS = Broken in shipment

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Phone (314) 298-8566 Fax (314) 298-8757

Chain of Custody Record

Loc: 160 29476 | oc: 160 29476

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lambert-Sykes, Chenise Y	COC No: 60-144479.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: chenise.lambert-sykes@testamericainc.com	State: Illinois	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc		Accreditations Required (See note): NELAP - Louisiana	Job #: 160-29476-1
Address: 2960 Foster Creighton Drive, ,	Due Date Requested: 8/6/2018		
City: Nashville	TAT Requested (days):		
State, Zip: TN, 37204			
Phone: 615-726-0177(Tel) 615-726-3404(Fax)	PO #:		
Email:	WO #:		
Project Name: Former Carnotite Site - Non-Rad Analysis	Project #: 16007488		
Site:	SSOW#:		

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SM5210B_BODCalc/ Biochemical Oxygen Demand (BOD 5-Day)	9012B/9012B_Prep Total Cyanide	9066/Distill_Phenol Total Phenols	1664B/1664B_SPE (MOD) Local Method	2540D/ Total Suspended Solids	Total Number of containers	Special Instructions/Note:
			Preservation Code:										
CRC-MW-1 (160-29476-1)	7/11/18	13:55 Central		Water			X	X	X	X	X	9	, RAD SCREEENS REQUIRED PRIOR TO SHIPPING!

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to TestAmerica Laboratories, Inc.

Possible Hazard Identification *Unconfirmed*	***Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)*** ☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 4	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time: 071218 1800	Company TA STL	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time: 7-13-18 1010	Company TA-MS

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 0-1

Ver: 09/20/2016

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

COOLER RECEIPT FORM

160-29476 Chain of Custody

Cooler Received/Opened On 7/13/2018 @ 10:10

Time Samples Removed From Cooler _____ Time Samples Placed In Storage _____ (2 Hour Window)

1. Tracking # 3379 (last 4 digits, FedEx) Courier: FedEx

IR Gun ID 17960353 pH Strip Lot NA Chlorine Strip Lot NA

2. Temperature of rep. sample or temp blank when opened: 0.1 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...(NA)

4. Were custody seals on outside of cooler? (YES)...NO...NA

If yes, how many and where: 1 Front

5. Were the seals intact, signed, and dated correctly? (YES)...NO...NA

6. Were custody papers inside cooler? (YES)...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) VCF

7. Were custody seals on containers: YES (NO) and Intact YES...NO...(NA)

Were these signed and dated correctly? YES...NO...(NA)

8. Packing mat'l used? (Bubblewrap) (Plastic bag) Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: (Ice) Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? (YES)...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? (YES)...NO...NA

12. Did all container labels and tags agree with custody papers? (YES)...NO...NA

13a. Were VOA vials received? YES...NO...(NA)

b. Was there any observable headspace present in any VOA vial? YES...NO...(NA)

● ⬅ Larger than this.

14. Was there a Trip Blank in this cooler? YES...(NO)...NA If multiple coolers, sequence # _____

I certify that I unloaded the cooler and answered questions 7-14 (intial) _____

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...(NA)

b. Did the bottle labels indicate that the correct preservatives were used (YES)...NO...NA

16. Was residual chlorine present? YES...NO...(NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) _____

17. Were custody papers properly filled out (ink, signed, etc)? (YES)...NO...NA

18. Did you sign the custody papers in the appropriate place? (YES)...NO...NA

19. Were correct containers used for the analysis requested? (YES)...NO...NA

20. Was sufficient amount of sample sent in each container? (YES)...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) _____

I certify that I attached a label with the unique LIMS number to each container (intial) _____

21. Were there Non-Conformance issues at login? YES...(NO) Was a NCM generated? YES...(NO)...# _____

BIS = Broken in shipment
Cooler Receipt Form.doc

LF-1
End of Form

Revised 8/23/17

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Phone (314) 298-8566 Fax (314) 298-8757

Chain of Custody Record

Loc: 160
29476

Loc: 160
29476

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lambert-Sykes, Chenise Y	COC No: 60-144479.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: chenise.lambert-sykes@testamericainc.com	State of Origin: Illinois	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc		Accreditations Required (See note): NELAP - Louisiana	Job #: 160-29476-1
Address: 2960 Foster Creighton Drive, ,	Due Date Requested: 8/6/2018		
City: Nashville	TAT Requested (days):		
State, Zip: TN, 37204			
Phone: 615-726-0177(Tel) 615-726-3404(Fax)	PO #:		
Email:	WO #:		
Project Name: Former Carnotite Site - Non-Rad Analysis	Project #: 16007488		
Site:	SSOW#:		

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SM5210B_BODCalc/ Biochemical Oxygen Demand (BOD 5-Day)	9012B/9012B_Prep Total Cyanide	9066/Distill_Phenol Total Phenols	1664B/1664B_SPE (MOD) Local Method	2540D/ Total Suspended Solids	Total Number of containers	Special Instructions/Note:
			Preservation Code:										
CRC-MW-1 (160-29476-1)	7/11/18	13:55 Central		Water			X	X	X	X	X	9	, RAD SCREEENS REQUIRED PRIOR TO SHIPPING!

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to TestAmerica Laboratories, Inc.

Possible Hazard Identification *Unconfirmed*	***Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)*** ☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*
Deliverable Requested: I, II, III, IV, Other (specify) — Primary Deliverable Rank: 4	Special Instructions/QC Requirements:

Empty Kit Relinquished by:		Date:		Time:		Method of Shipment:
Relinquished by:	Date/Time: 071218 1800	Company TA STL	Received by:	Date/Time:	Company	
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company	
Relinquished by:	Date/Time:	Company	Received by:	Date/Time: 7-13-18 1010	Company TA-STL	
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks: 0-1			

Ver: 09/20/2016

Login Sample Receipt Checklist

Client: Tetra Tech, Inc.

Job Number: 160-29476-1

Login Number: 29476
List Number: 1
Creator: McKinney, Gerrod E

List Source: TestAmerica St. Louis

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	20.0, 20.0, 2.6
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

Job Number: 160-29479-1

Job Description: Former Carnotite Site - Non-Rad Analysis

For:
Tetra Tech, Inc.
1 South Wacker Dr.
Suite 3700
Chicago, IL 60606

Attention: Ms. Kristine Schnoes

Approved for release.
Chenise Y Lambert-Sykes
Project Manager I
8/22/2018 12:25 PM

Chenise Y Lambert-Sykes, Project Manager I
13715 Rider Trail North, Earth City, MO, 63045
(314)298-8566
chenise.lambert-sykes@testamericainc.com
08/22/2018

The test results in this report meet NELAP requirements for parameters for which accreditation is required or available. Any exceptions to the NELAP requirements are noted. Results pertain only to samples listed in this report. Pursuant to NELAP, this report shall not be reproduced, except in full, without the written approval of the laboratory. This report is confidential and is intended for the sole use of TestAmerica and its client. All questions regarding this report should be directed to the TestAmerica Project Manager.

Louisiana Lab Certification ID (Non-Potable, Solid/Haz. Material): 106151
Florida Lab Certification ID (Drinking Water): E87689.

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Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

CASE NARRATIVE

Client: Tetra Tech, Inc.

Project: Former Carnotite Site - Rad Analysis

Report Number: 160-29479-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 07/12/2018; the samples arrived in good condition, properly preserved and on ice. The temperatures of the 3 coolers at receipt time were 2.6º C, 20.0º C and 20.0º C.

Centrifugation was requested, but the water volume produced was insufficient for analysis. Samples were analyzed as soils.

PERCENT SOLIDS

Samples CRC-B1-0002 (160-29479-1), CRC-B1-1820 (160-29479-2), CRC-B1-1214 (160-29479-3), CRC-B7-1416 (160-29479-4), CRC-B7-2224 (160-29479-5), CRC-B7-2628 (160-29479-6), CRC-B20-1214 (160-29479-7), CRC-B20-1820 (160-29479-8) and CRC-B20-2628 (160-29479-9) were analyzed for percent solids in accordance with EPA Method 160.3 MOD. The samples were analyzed on 07/17/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples CRC-B1-0002 (160-29479-1), CRC-B1-1820 (160-29479-2), CRC-B1-1214 (160-29479-3), CRC-B7-1416 (160-29479-4), CRC-B7-2224 (160-29479-5), CRC-B7-2628 (160-29479-6), CRC-B20-1214 (160-29479-7), CRC-B20-1820 (160-29479-8) and CRC-B20-2628 (160-29479-9) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA 901.1. The samples were dried on 07/18/2018, prepared on 07/19/2018 and analyzed on 08/09/2018.

Prep Batch: 376740

Insufficient sample was provided for the following sample to fill a tuna can geometry calibrated for radium-226 analysis by gamma

spectroscopy: CRC-B1-0002 (160-29479-1). The use of a 100 mL d=1 geometry could potentially bias the results low due to the loss of radon into the headspace of the container.

The following sample, analyzed by gamma spectroscopy, has lead-210 as a requested analyte. Lead-210, energy 46.54 keV, is out of calibration range for water and Density-equals-one geometries. The results are estimated. The data have been reported with this narrative. CRC-B1-0002 (160-29479-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Samples CRC-B1-0002 (160-29479-1), CRC-B1-1820 (160-29479-2), CRC-B1-1214 (160-29479-3), CRC-B7-1416 (160-29479-4), CRC-B7-2224 (160-29479-5), CRC-B7-2628 (160-29479-6), CRC-B20-1214 (160-29479-7), CRC-B20-1820 (160-29479-8) and CRC-B20-2628 (160-29479-9) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with DOE A01R_Th. The samples were dried on 07/18/2018, prepared on 07/24/2018 and analyzed on 08/04/2018.

Prep Batch: 160-377729

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: CRC-B1-0002 (160-29479-1), CRC-B1-1820 (160-29479-2), CRC-B1-1214 (160-29479-3), CRC-B7-1416 (160-29479-4), CRC-B7-2224 (160-29479-5), CRC-B7-2628 (160-29479-6), CRC-B20-1214 (160-29479-7), CRC-B20-1820 (160-29479-8) and CRC-B20-2628 (160-29479-9). Samples from job 490-155782 contain rocks. Samples from jobs 160-29479 and 160-29521 contain sand and rocks.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: CRC-B1-0002 (160-29479-1), CRC-B1-1820 (160-29479-2), CRC-B1-1214 (160-29479-3), CRC-B7-1416 (160-29479-4), CRC-B7-2224 (160-29479-5), CRC-B7-2628 (160-29479-6), CRC-B20-1214 (160-29479-7), CRC-B20-1820 (160-29479-8) and CRC-B20-2628 (160-29479-9). Samples from job 490-155782 contain rocks. Samples from jobs 160-29479 and 160-29521 contain rocks and sand.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples CRC-B1-0002 (160-29479-1), CRC-B1-1820 (160-29479-2), CRC-B1-1214 (160-29479-3), CRC-B7-1416 (160-29479-4), CRC-B7-2224 (160-29479-5), CRC-B7-2628 (160-29479-6), CRC-B20-1214 (160-29479-7), CRC-B20-1820 (160-29479-8) and CRC-B20-2628 (160-29479-9) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 07/18/2018, prepared on 07/24/2018 and analyzed on 08/04/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Client Sample ID: CRC-B1-0002 — Lab Sample ID: 160-29479-1

Date Collected: 07/10/18 10:00 — **Matrix: Solid**
Date Received: 07/12/18 09:30

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**9.4**		0.1	0.1	%			07/17/18 22:33	1
Percent Solids	**90.6**		0.1	0.1	%			07/17/18 22:33	1

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.576	U	0.614	0.618		1.01	pCi/g	07/19/18 15:00	08/09/18 01:23	1
Actinium-228	0.341	U	0.578	0.579		0.660	pCi/g	07/19/18 15:00	08/09/18 01:23	1
Bismuth-212	-0.644	U	2.12	2.12		3.60	pCi/g	07/19/18 15:00	08/09/18 01:23	1
Bismuth-214	**11.3**		0.671	1.29		0.296	pCi/g	07/19/18 15:00	08/09/18 01:23	1
Lead-210	**9.31**		1.52	1.94		2.05	pCi/g	07/19/18 15:00	08/09/18 01:23	1
Lead-212	**0.763**		0.181	0.198		0.244	pCi/g	07/19/18 15:00	08/09/18 01:23	1
Lead-214	**11.8**		0.608	1.29		0.333	pCi/g	07/19/18 15:00	08/09/18 01:23	1
Potassium-40	**14.0**		2.33	2.69		1.45	pCi/g	07/19/18 15:00	08/09/18 01:23	1
Protactinium-231	0.000	U	1.44	1.44		15.7	pCi/g	07/19/18 15:00	08/09/18 01:23	1
Radium-226	**11.3**		0.671	1.29	1.00	0.296	pCi/g	07/19/18 15:00	08/09/18 01:23	1
Radium-228	0.341	U	0.578	0.579		0.660	pCi/g	07/19/18 15:00	08/09/18 01:23	1
Thallium-208	**0.343**		0.147	0.151		0.151	pCi/g	07/19/18 15:00	08/09/18 01:23	1
Thorium-232	0.341	U	0.578	0.579		0.660	pCi/g	07/19/18 15:00	08/09/18 01:23	1
Thorium-234	**4.27**		0.995	1.08		2.63	pCi/g	07/19/18 15:00	08/09/18 01:23	1
Uranium-235	**1.27**		0.697	0.708		0.832	pCi/g	07/19/18 15:00	08/09/18 01:23	1
Uranium-238	**4.27**		0.995	1.08		2.63	pCi/g	07/19/18 15:00	08/09/18 01:23	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	**36.3**		1.33	3.32	1.00	0.153	pCi/g	07/24/18 17:17	08/04/18 14:30	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*75.0*		*30 - 110*	*07/24/18 17:17*	*08/04/18 14:30*	*1*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	**5.07**		0.446	0.617	1.00	0.0696	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-235	**0.241**		0.109	0.111	1.00	0.0554	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-238	**5.38**		0.459	0.644	1.00	0.0445	pCi/g	07/24/18 18:48	08/04/18 14:34	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*109*		*30 - 110*	*07/24/18 18:48*	*08/04/18 14:34*	*1*

Client Sample ID: CRC-B1-1820 — Lab Sample ID: 160-29479-2

Date Collected: 07/10/18 10:40 — **Matrix: Solid**
Date Received: 07/12/18 09:30

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**20.2**		0.1	0.1	%			07/17/18 22:33	1

Client Sample ID: CRC-B1-1820 — Lab Sample ID: 160-29479-2

Date Collected: 07/10/18 10:40 — **Matrix: Solid**
Date Received: 07/12/18 09:30

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**79.8**		0.1	0.1	%			07/17/18 22:33	1

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.325	U	0.721	0.722		1.03	pCi/g	07/19/18 15:00	08/09/18 18:44	1
Actinium-228	0.272	U	0.265	0.267		0.305	pCi/g	07/19/18 15:00	08/09/18 18:44	1
Bismuth-212	0.341	U	0.601	0.602		1.02	pCi/g	07/19/18 15:00	08/09/18 18:44	1
Bismuth-214	**0.329**		0.133	0.138		0.143	pCi/g	07/19/18 15:00	08/09/18 18:44	1
Lead-210	0.349	U	1.34	1.34		2.00	pCi/g	07/19/18 15:00	08/09/18 18:44	1
Lead-212	**0.212**		0.0797	0.0842		0.107	pCi/g	07/19/18 15:00	08/09/18 18:44	1
Lead-214	**0.371**		0.105	0.112		0.101	pCi/g	07/19/18 15:00	08/09/18 18:44	1
Potassium-40	**13.1**		1.65	2.12		0.779	pCi/g	07/19/18 15:00	08/09/18 18:44	1
Protactinium-231	-0.0000000405	U	2.32	2.32		3.97	pCi/g	07/19/18 15:00	08/09/18 18:44	1
Radium-226	**0.329**		0.133	0.138	1.00	0.143	pCi/g	07/19/18 15:00	08/09/18 18:44	1
Radium-228	0.272	U	0.265	0.267		0.305	pCi/g	07/19/18 15:00	08/09/18 18:44	1
Thallium-208	**0.0719**		0.0558	0.0563		0.0691	pCi/g	07/19/18 15:00	08/09/18 18:44	1
Thorium-232	0.272	U	0.265	0.267		0.305	pCi/g	07/19/18 15:00	08/09/18 18:44	1
Thorium-234	0.667	U	0.504	0.509		1.43	pCi/g	07/19/18 15:00	08/09/18 18:44	1
Uranium-235	-0.0465	U	0.316	0.316		0.623	pCi/g	07/19/18 15:00	08/09/18 18:44	1
Uranium-238	0.667	U	0.504	0.509		1.43	pCi/g	07/19/18 15:00	08/09/18 18:44	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	**0.343**		0.155	0.158	1.00	0.145	pCi/g	07/24/18 17:17	08/04/18 14:30	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*84.7*		*30 - 110*	*07/24/18 17:17*	*08/04/18 14:30*	*1*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	**0.229**		0.104	0.106	1.00	0.0689	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-235	0.0228	U	0.0404	0.0405	1.00	0.0730	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-238	**0.413**		0.137	0.141	1.00	0.0585	pCi/g	07/24/18 18:48	08/04/18 14:34	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*87.1*		*30 - 110*	*07/24/18 18:48*	*08/04/18 14:34*	*1*

Client Sample ID: CRC-B1-1214 — Lab Sample ID: 160-29479-3

Date Collected: 07/10/18 10:45 — **Matrix: Solid**
Date Received: 07/12/18 09:30

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**16.1**		0.1	0.1	%			07/17/18 22:33	1

Client Sample ID: CRC-B1-1214 — Lab Sample ID: 160-29479-3

Date Collected: 07/10/18 10:45 — **Matrix: Solid**
Date Received: 07/12/18 09:30

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**83.9**		0.1	0.1	%			07/17/18 22:33	1

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.160	U	0.637	0.637		0.927	pCi/g	07/19/18 15:00	08/09/18 01:27	1
Actinium-228	**0.442**		0.155	0.162		0.135	pCi/g	07/19/18 15:00	08/09/18 01:27	1
Bismuth-212	0.211	U	0.812	0.812		1.42	pCi/g	07/19/18 15:00	08/09/18 01:27	1
Bismuth-214	**0.338**		0.121	0.126		0.125	pCi/g	07/19/18 15:00	08/09/18 01:27	1
Lead-210	1.69	U	1.27	1.28		1.72	pCi/g	07/19/18 15:00	08/09/18 01:27	1
Lead-212	**0.157**		0.0767	0.0793		0.109	pCi/g	07/19/18 15:00	08/09/18 01:27	1
Lead-214	**0.490**		0.112	0.123		0.111	pCi/g	07/19/18 15:00	08/09/18 01:27	1
Potassium-40	**13.8**		1.73	2.24		0.811	pCi/g	07/19/18 15:00	08/09/18 01:27	1
Protactinium-231	-0.149	U	0.544	0.544		4.24	pCi/g	07/19/18 15:00	08/09/18 01:27	1
Radium-226	**0.338**		0.121	0.126	1.00	0.125	pCi/g	07/19/18 15:00	08/09/18 01:27	1
Radium-228	**0.442**		0.155	0.162		0.135	pCi/g	07/19/18 15:00	08/09/18 01:27	1
Thallium-208	**0.129**		0.0470	0.0489		0.0447	pCi/g	07/19/18 15:00	08/09/18 01:27	1
Thorium-232	**0.442**		0.155	0.162		0.135	pCi/g	07/19/18 15:00	08/09/18 01:27	1
Thorium-234	0.617	U	1.02	1.02		1.49	pCi/g	07/19/18 15:00	08/09/18 01:27	1
Uranium-235	0.0596	U	0.137	0.137		0.622	pCi/g	07/19/18 15:00	08/09/18 01:27	1
Uranium-238	0.617	U	1.02	1.02		1.49	pCi/g	07/19/18 15:00	08/09/18 01:27	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	**0.320**		0.158	0.160	1.00	0.152	pCi/g	07/24/18 17:17	08/04/18 14:30	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*75.9*		*30 - 110*	*07/24/18 17:17*	*08/04/18 14:30*	*1*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	**0.322**		0.121	0.124	1.00	0.0770	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-235	0.0522	U	0.0615	0.0617	1.00	0.0917	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-238	**0.438**		0.141	0.145	1.00	0.0799	pCi/g	07/24/18 18:48	08/04/18 14:34	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*103*		*30 - 110*	*07/24/18 18:48*	*08/04/18 14:34*	*1*

Client Sample ID: CRC-B7-1416 — Lab Sample ID: 160-29479-4

Date Collected: 07/11/18 11:55 — **Matrix: Solid**
Date Received: 07/12/18 09:30

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**13.9**		0.1	0.1	%			07/17/18 22:33	1
Percent Solids	**86.1**		0.1	0.1	%			07/17/18 22:33	1

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.146	U	0.849	0.849		1.45	pCi/g	07/19/18 15:00	08/09/18 02:03	1
Actinium-228	**0.335**		0.150	0.154		0.123	pCi/g	07/19/18 15:00	08/09/18 02:03	1
Bismuth-212	-0.392	U	0.939	0.940		1.62	pCi/g	07/19/18 15:00	08/09/18 02:03	1
Bismuth-214	**0.422**		0.163	0.168		0.157	pCi/g	07/19/18 15:00	08/09/18 02:03	1
Lead-210	-0.993	U	1.28	1.29		2.86	pCi/g	07/19/18 15:00	08/09/18 02:03	1
Lead-212	**0.133**		0.0766	0.0785		0.0955	pCi/g	07/19/18 15:00	08/09/18 02:03	1
Lead-214	**0.290**		0.126	0.129		0.181	pCi/g	07/19/18 15:00	08/09/18 02:03	1
Potassium-40	**11.9**		1.93	2.29		0.995	pCi/g	07/19/18 15:00	08/09/18 02:03	1
Protactinium-231	0.397	U	1.47	1.47		4.79	pCi/g	07/19/18 15:00	08/09/18 02:03	1
Radium-226	**0.422**		0.163	0.168	1.00	0.157	pCi/g	07/19/18 15:00	08/09/18 02:03	1
Radium-228	**0.335**		0.150	0.154		0.123	pCi/g	07/19/18 15:00	08/09/18 02:03	1
Thallium-208	0.0464	U	0.0826	0.0827		0.0963	pCi/g	07/19/18 15:00	08/09/18 02:03	1
Thorium-232	**0.335**		0.150	0.154		0.123	pCi/g	07/19/18 15:00	08/09/18 02:03	1
Thorium-234	0.295	U	1.62	1.62		2.74	pCi/g	07/19/18 15:00	08/09/18 02:03	1
Uranium-235	0.0778	U	0.198	0.198		0.938	pCi/g	07/19/18 15:00	08/09/18 02:03	1
Uranium-238	0.295	U	1.62	1.62		2.74	pCi/g	07/19/18 15:00	08/09/18 02:03	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	**0.385**		0.169	0.172	1.00	0.154	pCi/g	07/24/18 17:17	08/04/18 14:30	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*76.7*		*30 - 110*	*07/24/18 17:17*	*08/04/18 14:30*	*1*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	**0.315**		0.120	0.123	1.00	0.0743	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-235	0.0221	U	0.0391	0.0391	1.00	0.0706	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-238	**0.312**		0.117	0.120	1.00	0.0566	pCi/g	07/24/18 18:48	08/04/18 14:34	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*96.3*		*30 - 110*	*07/24/18 18:48*	*08/04/18 14:34*	*1*

Client Sample ID: CRC-B7-2224 — Lab Sample ID: 160-29479-5

Date Collected: 07/11/18 12:00 — **Matrix: Solid**
Date Received: 07/12/18 09:30

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**19.1**		0.1	0.1	%			07/17/18 22:33	1
Percent Solids	**80.9**		0.1	0.1	%			07/17/18 22:33	1

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.372	U	0.368	0.370		1.63	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Actinium-228	0.160	U	0.286	0.286		0.326	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Bismuth-212	0.266	U	0.813	0.814		1.42	pCi/g	07/19/18 15:00	08/09/18 06:36	1

Client Sample ID: CRC-B7-2224 — Lab Sample ID: 160-29479-5

Date Collected: 07/11/18 12:00 — **Matrix: Solid**
Date Received: 07/12/18 09:30

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Bismuth-214	**0.671**		0.176	0.189		0.159	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Lead-210	0.942	U	1.63	1.63		2.47	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Lead-212	**0.395**		0.0970	0.105		0.102	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Lead-214	**0.551**		0.146	0.156		0.191	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Potassium-40	**13.6**		1.96	2.39		0.861	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Protactinium-231	0.000	U	0.557	0.557		5.39	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Radium-226	**0.671**		0.176	0.189	1.00	0.159	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Radium-228	0.160	U	0.286	0.286		0.326	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Thallium-208	**0.126**		0.0971	0.0979		0.0952	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Thorium-232	0.160	U	0.286	0.286		0.326	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Thorium-234	0.586	U	0.707	0.710		1.98	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Uranium-235	0.133	U	0.604	0.604		1.02	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Uranium-238	0.586	U	0.707	0.710		1.98	pCi/g	07/19/18 15:00	08/09/18 06:36	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	**0.491**		0.170	0.175	1.00	0.138	pCi/g	07/24/18 17:17	08/04/18 14:30	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*99.4*		*30 - 110*	*07/24/18 17:17*	*08/04/18 14:30*	*1*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	**0.582**		0.153	0.161	1.00	0.0638	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-235	0.000	U	0.00460	0.00460	1.00	0.0368	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-238	**0.604**		0.155	0.163	1.00	0.0560	pCi/g	07/24/18 18:48	08/04/18 14:34	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*90.4*		*30 - 110*	*07/24/18 18:48*	*08/04/18 14:34*	*1*

Client Sample ID: CRC-B7-2628 — Lab Sample ID: 160-29479-6

Date Collected: 07/11/18 12:30 — **Matrix: Solid**
Date Received: 07/12/18 09:30

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**14.4**		0.1	0.1	%			07/17/18 22:33	1
Percent Solids	**85.6**		0.1	0.1	%			07/17/18 22:33	1

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.359	U	0.716	0.717		1.16	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Actinium-228	**0.657**		0.203	0.214		0.115	pCi/g	07/19/18 15:00	08/09/18 06:36	1

Client Sample ID: CRC-B7-2628 — Lab Sample ID: 160-29479-6

Date Collected: 07/11/18 12:30 **Matrix: Solid**
Date Received: 07/12/18 09:30

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Bismuth-212	-0.0626	U	0.624	0.624		1.44	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Bismuth-214	**0.470**		0.145	0.153		0.134	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Lead-210	0.732	U	1.51	1.51		2.22	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Lead-212	**0.382**		0.0977	0.109		0.113	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Lead-214	**0.539**		0.131	0.142		0.113	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Potassium-40	**12.1**		1.78	2.17		0.722	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Protactinium-231	0.246	U	1.44	1.44		3.31	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Radium-226	**0.470**		0.145	0.153	1.00	0.134	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Radium-228	**0.657**		0.203	0.214		0.115	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Thallium-208	**0.141**		0.0503	0.0524		0.0422	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Thorium-232	**0.657**		0.203	0.214		0.115	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Thorium-234	1.09	U	0.665	0.675		1.84	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Uranium-235	0.219	U	0.186	0.187		0.236	pCi/g	07/19/18 15:00	08/09/18 06:36	1
Uranium-238	1.09	U	0.665	0.675		1.84	pCi/g	07/19/18 15:00	08/09/18 06:36	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	**0.340**		0.163	0.165	1.00	0.158	pCi/g	07/24/18 17:17	08/04/18 14:30	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*87.4*		*30 - 110*	*07/24/18 17:17*	*08/04/18 14:30*	*1*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	**1.14**		0.216	0.236	1.00	0.0529	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-235	**0.0507**		0.0507	0.0509	1.00	0.0380	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-238	**1.42**		0.241	0.269	1.00	0.0528	pCi/g	07/24/18 18:48	08/04/18 14:34	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*86.5*		*30 - 110*	*07/24/18 18:48*	*08/04/18 14:34*	*1*

Client Sample ID: CRC-B20-1214 — Lab Sample ID: 160-29479-7

Date Collected: 07/11/18 13:40 **Matrix: Solid**
Date Received: 07/12/18 09:30

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**17.9**		0.1	0.1	%			07/17/18 22:33	1
Percent Solids	**82.1**		0.1	0.1	%			07/17/18 22:33	1

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.144	U	0.948	0.948		1.62	pCi/g	07/19/18 15:00	08/09/18 06:37	1

Client Sample ID: CRC-B20-1214 — Lab Sample ID: 160-29479-7

Date Collected: 07/11/18 13:40 **Matrix: Solid**
Date Received: 07/12/18 09:30

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-228	**0.366**		0.234	0.237		0.229	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Bismuth-212	0.359	U	0.761	0.762		1.31	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Bismuth-214	**0.305**		0.141	0.145		0.157	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Lead-210	**2.75**		1.56	1.59		1.83	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Lead-212	**0.181**		0.0811	0.0844		0.109	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Lead-214	**0.490**		0.124	0.134		0.134	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Potassium-40	**14.0**		2.03	2.48		0.723	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Protactinium-231	-0.923	U	3.19	3.19		5.37	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Radium-226	**0.305**		0.141	0.145	1.00	0.157	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Radium-228	**0.366**		0.234	0.237		0.229	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Thallium-208	**0.140**		0.0479	0.0500		0.0303	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Thorium-232	**0.366**		0.234	0.237		0.229	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Thorium-234	1.51	U	0.659	0.677		1.75	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Uranium-235	-0.0174	U	0.406	0.406		0.840	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Uranium-238	1.51	U	0.659	0.677		1.75	pCi/g	07/19/18 15:00	08/09/18 06:37	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	**0.621**		0.200	0.207	1.00	0.154	pCi/g	07/24/18 17:17	08/04/18 14:30	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*92.2*		*30 - 110*	*07/24/18 17:17*	*08/04/18 14:30*	*1*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	**1.22**		0.224	0.246	1.00	0.0661	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-235	0.0587	U	0.0572	0.0574	1.00	0.0660	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-238	**1.11**		0.214	0.233	1.00	0.0622	pCi/g	07/24/18 18:48	08/04/18 14:34	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*91.4*		*30 - 110*	*07/24/18 18:48*	*08/04/18 14:34*	*1*

Client Sample ID: CRC-B20-1820 — Lab Sample ID: 160-29479-8

Date Collected: 07/11/18 14:30 **Matrix: Solid**
Date Received: 07/12/18 09:30

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**21.7**		0.1	0.1	%			07/17/18 22:33	1
Percent Solids	**78.3**		0.1	0.1	%			07/17/18 22:33	1

Client Sample ID: CRC-B20-1820 — Lab Sample ID: 160-29479-8

Date Collected: 07/11/18 14:30 — **Matrix: Solid**
Date Received: 07/12/18 09:30

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.287	U	0.439	0.441		1.01	pCi/g	07/19/18 15:00	08/09/18 06:42	1
Actinium-228	**0.386**		0.131	0.137		0.378	pCi/g	07/19/18 15:00	08/09/18 06:42	1
Bismuth-212	0.247	U	0.841	0.841		1.47	pCi/g	07/19/18 15:00	08/09/18 06:42	1
Bismuth-214	**0.357**		0.146	0.151		0.154	pCi/g	07/19/18 15:00	08/09/18 06:42	1
Lead-210	0.651	U	1.33	1.33		2.02	pCi/g	07/19/18 15:00	08/09/18 06:42	1
Lead-212	**0.273**		0.0836	0.0907		0.0989	pCi/g	07/19/18 15:00	08/09/18 06:42	1
Lead-214	**0.494**		0.135	0.145		0.132	pCi/g	07/19/18 15:00	08/09/18 06:42	1
Potassium-40	**14.6**		1.86	2.39		0.884	pCi/g	07/19/18 15:00	08/09/18 06:42	1
Protactinium-231	0.0000000230	U	2.67	2.67		4.58	pCi/g	07/19/18 15:00	08/09/18 06:42	1
Radium-226	**0.357**		0.146	0.151	1.00	0.154	pCi/g	07/19/18 15:00	08/09/18 06:42	1
Radium-228	**0.386**		0.131	0.137		0.378	pCi/g	07/19/18 15:00	08/09/18 06:42	1
Thallium-208	**0.0890**		0.0783	0.0789		0.0858	pCi/g	07/19/18 15:00	08/09/18 06:42	1
Thorium-232	**0.386**		0.131	0.137		0.378	pCi/g	07/19/18 15:00	08/09/18 06:42	1
Thorium-234	1.55	U	1.20	1.21		1.70	pCi/g	07/19/18 15:00	08/09/18 06:42	1
Uranium-235	-0.0112	U	0.0297	0.0297		0.730	pCi/g	07/19/18 15:00	08/09/18 06:42	1
Uranium-238	1.55	U	1.20	1.21		1.70	pCi/g	07/19/18 15:00	08/09/18 06:42	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	**0.679**		0.205	0.213	1.00	0.154	pCi/g	07/24/18 17:17	08/04/18 14:30	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*90.5*		*30 - 110*	*07/24/18 17:17*	*08/04/18 14:30*	*1*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	**0.749**		0.174	0.185	1.00	0.0522	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-235	0.0226	U	0.0356	0.0357	1.00	0.0569	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-238	**0.948**		0.195	0.211	1.00	0.0520	pCi/g	07/24/18 18:48	08/04/18 14:34	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*88.6*		*30 - 110*	*07/24/18 18:48*	*08/04/18 14:34*	*1*

Client Sample ID: CRC-B20-2628 — Lab Sample ID: 160-29479-9

Date Collected: 07/11/18 15:05 — **Matrix: Solid**
Date Received: 07/12/18 09:30

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**17.5**		0.1	0.1	%			07/17/18 22:33	1
Percent Solids	**82.5**		0.1	0.1	%			07/17/18 22:33	1

Client Sample ID: CRC-B20-2628 **Lab Sample ID: 160-29479-9**
Date Collected: 07/11/18 15:05 **Matrix: Solid**
Date Received: 07/12/18 09:30

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.264	U	1.22	1.22		2.06	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Actinium-228	**0.554**		0.198	0.206		0.235	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Bismuth-212	0.000	U	0.840	0.840		1.90	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Bismuth-214	**0.650**		0.199	0.210		0.175	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Lead-210	1.61	U	2.12	2.13		2.86	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Lead-212	**0.352**		0.111	0.117		0.139	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Lead-214	**0.670**		0.137	0.153		0.0750	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Potassium-40	**12.3**		2.07	2.42		1.35	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Protactinium-231	0.888	U	2.58	2.58		5.86	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Radium-226	**0.650**		0.199	0.210	1.00	0.175	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Radium-228	**0.554**		0.198	0.206		0.235	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Thallium-208	**0.187**		0.144	0.145		0.108	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Thorium-232	**0.554**		0.198	0.206		0.235	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Thorium-234	**4.16**		1.04	1.14		2.38	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Uranium-235	**0.556**		0.305	0.310		0.422	pCi/g	07/19/18 15:00	08/09/18 06:37	1
Uranium-238	**4.16**		1.04	1.14		2.38	pCi/g	07/19/18 15:00	08/09/18 06:37	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	**0.383**		0.163	0.166	1.00	0.146	pCi/g	07/24/18 17:17	08/04/18 14:31	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*89.8*		*30 - 110*	*07/24/18 17:17*	*08/04/18 14:31*	*1*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	**3.88**		0.412	0.526	1.00	0.0933	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-235	**0.247**		0.118	0.120	1.00	0.0825	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-238	**3.89**		0.411	0.525	1.00	0.0661	pCi/g	07/24/18 18:48	08/04/18 14:34	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*85.6*		*30 - 110*	*07/24/18 18:48*	*08/04/18 14:34*	*1*

Default Detection Limits

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29479-1

General Chemistry

Analyte	RL	MDL	Units	Method
Percent Moisture	0.1	0.1	%	Moisture
Percent Solids	0.1	0.1	%	Moisture

Tracer/Carrier Summary

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29479-1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	horium-22 (30-110)
160-29479-1	CRC-B1-0002	75.0
160-29479-2	CRC-B1-1820	84.7
160-29479-3	CRC-B1-1214	75.9
160-29479-4	CRC-B7-1416	76.7
160-29479-5	CRC-B7-2224	99.4
160-29479-6	CRC-B7-2628	87.4
160-29479-7	CRC-B20-1214	92.2
160-29479-8	CRC-B20-1820	90.5
160-29479-9	CRC-B20-2628	89.8
490-155782-F-2-F DU	Duplicate	70.5
LCS 160-377729/2-A	Lab Control Sample	93.5
MB 160-377729/1-A	Method Blank	100

Tracer/Carrier Legend

Thorium-229 = Thorium-229

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	ranium-23 (30-110)
160-29479-1	CRC-B1-0002	109
160-29479-2	CRC-B1-1820	87.1
160-29479-3	CRC-B1-1214	103
160-29479-4	CRC-B7-1416	96.3
160-29479-5	CRC-B7-2224	90.4
160-29479-6	CRC-B7-2628	86.5
160-29479-7	CRC-B20-1214	91.4
160-29479-8	CRC-B20-1820	88.6
160-29479-9	CRC-B20-2628	85.6
490-155782-F-2-H DU	Duplicate	88.8
LCS 160-377742/2-A	Lab Control Sample	82.1
MB 160-377742/1-A	Method Blank	90.9

Tracer/Carrier Legend

Uranium-232 = Uranium-232

Method: Moisture - Percent Moisture

Lab Sample ID: 160-29479-2 DU **Client Sample ID: CRC-B1-1820**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 376375

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Percent Moisture	20.2		22.1		%		9	30
Percent Solids	79.8		77.9		%		2	30

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-376740/1-A **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 381202 **Prep Batch: 376740**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.1402	U	0.289	0.289		1.43	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Actinium-228	-0.01752	U	0.246	0.246		0.306	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Bismuth-212	-0.4385	U	1.02	1.02		1.75	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Bismuth-214	-0.1323	U	0.149	0.149		0.490	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Lead-210	0.9041	U	1.49	1.49		2.30	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Lead-212	-0.05787	U	0.0648	0.0651		0.179	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Lead-214	0.009031	U	0.128	0.128		0.186	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Potassium-40	0.5436		0.384	0.388		0.501	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Protactinium-231	0.3578	U	1.36	1.36		4.55	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Radium-226	-0.1323	U	0.149	0.149	1.00	0.490	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Radium-228	-0.01752	U	0.246	0.246		0.306	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Thallium-208	-0.004696	U	0.00383	0.00386		0.131	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Thorium-232	-0.01752	U	0.246	0.246		0.306	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Thorium-234	0.5011	U	0.905	0.907		1.38	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Uranium-235	0.07006	U	0.107	0.107		0.669	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Uranium-238	0.5011	U	0.905	0.907		1.38	pCi/g	07/19/18 15:00	08/09/18 01:24	1

Lab Sample ID: LCS 160-376740/2-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 381207 **Prep Batch: 376740**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Americium-241	96.8	99.26		11.7		1.22	pCi/g	103	87 - 116
Cesium-137	28.2	31.67		3.34		0.273	pCi/g	112	87 - 120
Cobalt-60	12.9	13.89		1.45		0.137	pCi/g	108	87 - 115

Lab Sample ID: 160-29479-2 DU **Client Sample ID: CRC-B1-1820**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 381204 **Prep Batch: 376740**

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Actinium-227	-0.325	U	0.0000	U	0.338		1.08	pCi/g	0.31	1
Actinium-228	0.272	U	0.1903		0.166		0.176	pCi/g	0.19	1
Bismuth-212	0.341	U	0.1810	U	0.390		0.678	pCi/g	0.16	1
Bismuth-214	0.329		0.2690		0.103		0.111	pCi/g	0.25	1

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-29479-2 DU **Client Sample ID: CRC-B1-1820**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 381204 **Prep Batch: 376740**

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Lead-210	0.349	U		-0.4156	U	1.31		2.22	pCi/g			0.29	1
Lead-212	0.212			0.1927		0.0649		0.0731	pCi/g			0.13	1
Lead-214	0.371			0.4207		0.108		0.0790	pCi/g			0.22	1
Potassium-40	13.1			13.23		2.01		0.611	pCi/g			0.04	1
Protactinium-231	-0.0000000405	U		0.5503	U	1.97		3.33	pCi/g			0.13	1
Radium-226	0.329			0.2690		0.103	1.00	0.111	pCi/g			0.25	1
Radium-228	0.272	U		0.1903		0.166		0.176	pCi/g			0.19	1
Thallium-208	0.0719			0.07889		0.0737		0.0607	pCi/g			0.05	1
Thorium-232	0.272	U		0.1903		0.166		0.176	pCi/g			0.19	1
Thorium-234	0.667	U		0.4880	U	1.07		1.79	pCi/g			0.11	1
Uranium-235	-0.0465	U		-0.1655	U	0.282		0.893	pCi/g			0.20	1
Uranium-238	0.667	U		0.4880	U	1.07		1.79	pCi/g			0.11	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-377729/1-A **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 380567 **Prep Batch: 377729**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	-0.01242	U	0.0892	0.0893	1.00	0.141	pCi/g	07/24/18 17:17	08/04/18 14:31	1

Tracer	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*100*		*30 - 110*	*07/24/18 17:17*	*08/04/18 14:31*	*1*

Lab Sample ID: LCS 160-377729/2-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 380576 **Prep Batch: 377729**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Thorium-230			24.5	22.98		2.38	1.00	0.240	pCi/g	94	81 - 118		

Tracer	*LCS %Yield*	*LCS Qualifier*	*Limits*
Thorium-229	*93.5*		*30 - 110*

Lab Sample ID: 490-155782-F-2-F DU **Client Sample ID: Duplicate**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 380507 **Prep Batch: 377729**

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Thorium-230	0.719			1.147		0.303	1.00	0.184	pCi/g			0.78	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) (Continued)

Lab Sample ID: 490-155782-F-2-F DU **Client Sample ID: Duplicate**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 380507 **Prep Batch: 377729**

Tracer	DU %Yield	DU Qualifier	Limits
Thorium-229	70.5		30 - 110

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-377742/1-A **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 380552 **Prep Batch: 377742**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	0.02041	U	0.0289	0.0289	1.00	0.0306	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-235	0.0000	U	0.00476	0.00476	1.00	0.0381	pCi/g	07/24/18 18:48	08/04/18 14:34	1
Uranium-238	-0.003820	U	0.00540	0.00541	1.00	0.0529	pCi/g	07/24/18 18:48	08/04/18 14:34	1

Tracer	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Uranium-232	90.9		30 - 110	07/24/18 18:48	08/04/18 14:34	1

Lab Sample ID: LCS 160-377742/2-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 380553 **Prep Batch: 377742**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Uranium-234			6.37	6.552		0.774	1.00	0.0642	pCi/g	103	84 - 120		
Uranium-238			6.51	7.127		0.824	1.00	0.0585	pCi/g	109	82 - 122		

Tracer	LCS %Yield	LCS Qualifier	Limits
Uranium-232	82.1		30 - 110

Lab Sample ID: 490-155782-F-2-H DU **Client Sample ID: Duplicate**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 380555 **Prep Batch: 377742**

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Uranium-234	0.786			0.9606		0.229	1.00	0.0944	pCi/g			0.40	1
Uranium-235	0.0719			0.01171	U	0.0293	1.00	0.0656	pCi/g			0.62	1
Uranium-238	0.830			1.122		0.248	1.00	0.0748	pCi/g			0.64	1

Tracer	DU %Yield	DU Qualifier	Limits
Uranium-232	88.8		30 - 110

General Chemistry

Analysis Batch: 376375

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29479-1	CRC-B1-0002	Total/NA	Solid	Moisture	
160-29479-2	CRC-B1-1820	Total/NA	Solid	Moisture	
160-29479-3	CRC-B1-1214	Total/NA	Solid	Moisture	
160-29479-4	CRC-B7-1416	Total/NA	Solid	Moisture	
160-29479-5	CRC-B7-2224	Total/NA	Solid	Moisture	
160-29479-6	CRC-B7-2628	Total/NA	Solid	Moisture	
160-29479-7	CRC-B20-1214	Total/NA	Solid	Moisture	
160-29479-8	CRC-B20-1820	Total/NA	Solid	Moisture	
160-29479-9	CRC-B20-2628	Total/NA	Solid	Moisture	
160-29479-2 DU	CRC-B1-1820	Total/NA	Solid	Moisture	

Rad

Leach Batch: 376403

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29479-1	CRC-B1-0002	Total/NA	Solid	Dry and Grind	
160-29479-2	CRC-B1-1820	Total/NA	Solid	Dry and Grind	
160-29479-3	CRC-B1-1214	Total/NA	Solid	Dry and Grind	
160-29479-4	CRC-B7-1416	Total/NA	Solid	Dry and Grind	
160-29479-5	CRC-B7-2224	Total/NA	Solid	Dry and Grind	
160-29479-6	CRC-B7-2628	Total/NA	Solid	Dry and Grind	
160-29479-7	CRC-B20-1214	Total/NA	Solid	Dry and Grind	
160-29479-8	CRC-B20-1820	Total/NA	Solid	Dry and Grind	
160-29479-9	CRC-B20-2628	Total/NA	Solid	Dry and Grind	
160-29479-2 DU	CRC-B1-1820	Total/NA	Solid	Dry and Grind	

Leach Batch: 376723

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-155782-F-2-F DU	Duplicate	Total/NA	Solid	Dry and Grind	
490-155782-F-2-H DU	Duplicate	Total/NA	Solid	Dry and Grind	

Prep Batch: 376740

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29479-1	CRC-B1-0002	Total/NA	Solid	Fill_Geo-21	376403
160-29479-2	CRC-B1-1820	Total/NA	Solid	Fill_Geo-21	376403
160-29479-3	CRC-B1-1214	Total/NA	Solid	Fill_Geo-21	376403
160-29479-4	CRC-B7-1416	Total/NA	Solid	Fill_Geo-21	376403
160-29479-5	CRC-B7-2224	Total/NA	Solid	Fill_Geo-21	376403
160-29479-6	CRC-B7-2628	Total/NA	Solid	Fill_Geo-21	376403
160-29479-7	CRC-B20-1214	Total/NA	Solid	Fill_Geo-21	376403
160-29479-8	CRC-B20-1820	Total/NA	Solid	Fill_Geo-21	376403
160-29479-9	CRC-B20-2628	Total/NA	Solid	Fill_Geo-21	376403
MB 160-376740/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-376740/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-29479-2 DU	CRC-B1-1820	Total/NA	Solid	Fill_Geo-21	376403

Prep Batch: 377729

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29479-1	CRC-B1-0002	Total/NA	Solid	ExtChrom	376403
160-29479-2	CRC-B1-1820	Total/NA	Solid	ExtChrom	376403

Rad (Continued)

Prep Batch: 377729 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29479-3	CRC-B1-1214	Total/NA	Solid	ExtChrom	376403
160-29479-4	CRC-B7-1416	Total/NA	Solid	ExtChrom	376403
160-29479-5	CRC-B7-2224	Total/NA	Solid	ExtChrom	376403
160-29479-6	CRC-B7-2628	Total/NA	Solid	ExtChrom	376403
160-29479-7	CRC-B20-1214	Total/NA	Solid	ExtChrom	376403
160-29479-8	CRC-B20-1820	Total/NA	Solid	ExtChrom	376403
160-29479-9	CRC-B20-2628	Total/NA	Solid	ExtChrom	376403
MB 160-377729/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-377729/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
490-155782-F-2-F DU	Duplicate	Total/NA	Solid	ExtChrom	376723

Prep Batch: 377742

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29479-1	CRC-B1-0002	Total/NA	Solid	ExtChrom	376403
160-29479-2	CRC-B1-1820	Total/NA	Solid	ExtChrom	376403
160-29479-3	CRC-B1-1214	Total/NA	Solid	ExtChrom	376403
160-29479-4	CRC-B7-1416	Total/NA	Solid	ExtChrom	376403
160-29479-5	CRC-B7-2224	Total/NA	Solid	ExtChrom	376403
160-29479-6	CRC-B7-2628	Total/NA	Solid	ExtChrom	376403
160-29479-7	CRC-B20-1214	Total/NA	Solid	ExtChrom	376403
160-29479-8	CRC-B20-1820	Total/NA	Solid	ExtChrom	376403
160-29479-9	CRC-B20-2628	Total/NA	Solid	ExtChrom	376403
MB 160-377742/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-377742/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
490-155782-F-2-H DU	Duplicate	Total/NA	Solid	ExtChrom	376723

Lab Chronicle

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29479-1

Client Sample ID: CRC-B1-0002

Date Collected: 07/10/18 10:00
Date Received: 07/12/18 09:30

Lab Sample ID: 160-29479-1

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	376375	07/17/18 22:33	SDB	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			376740	07/19/18 15:00	SJS	TAL SL
Total/NA	Analysis	901.1		1	381210	08/09/18 01:23	CDR	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377729	07/24/18 17:17	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380519	08/04/18 14:30	ALS	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377742	07/24/18 18:48	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380557	08/04/18 14:34	ALS	TAL SL

Client Sample ID: CRC-B1-1820

Date Collected: 07/10/18 10:40
Date Received: 07/12/18 09:30

Lab Sample ID: 160-29479-2

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	376375	07/17/18 22:33	SDB	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			376740	07/19/18 15:00	SJS	TAL SL
Total/NA	Analysis	901.1		1	381206	08/09/18 18:44	CDR	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377729	07/24/18 17:17	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380538	08/04/18 14:30	ALS	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377742	07/24/18 18:48	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380558	08/04/18 14:34	ALS	TAL SL

Client Sample ID: CRC-B1-1214

Date Collected: 07/10/18 10:45
Date Received: 07/12/18 09:30

Lab Sample ID: 160-29479-3

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	376375	07/17/18 22:33	SDB	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			376740	07/19/18 15:00	SJS	TAL SL
Total/NA	Analysis	901.1		1	381206	08/09/18 01:27	CDR	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377729	07/24/18 17:17	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380539	08/04/18 14:30	ALS	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377742	07/24/18 18:48	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380559	08/04/18 14:34	ALS	TAL SL

Lab Chronicle

Client: Tetra Tech, Inc. TestAmerica Job ID: 160-29479-1
Project/Site: Former Carnotite Site - Non-Rad Analysis

Client Sample ID: CRC-B7-1416 Lab Sample ID: 160-29479-4

Date Collected: 07/11/18 11:55 **Matrix: Solid**
Date Received: 07/12/18 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	376375	07/17/18 22:33	SDB	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			376740	07/19/18 15:00	SJS	TAL SL
Total/NA	Analysis	901.1		1	381205	08/09/18 02:03	CDR	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377729	07/24/18 17:17	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380540	08/04/18 14:30	ALS	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377742	07/24/18 18:48	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380560	08/04/18 14:34	ALS	TAL SL

Client Sample ID: CRC-B7-2224 Lab Sample ID: 160-29479-5

Date Collected: 07/11/18 12:00 **Matrix: Solid**
Date Received: 07/12/18 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	376375	07/17/18 22:33	SDB	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			376740	07/19/18 15:00	SJS	TAL SL
Total/NA	Analysis	901.1		1	381202	08/09/18 06:36	CDR	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377729	07/24/18 17:17	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380541	08/04/18 14:30	ALS	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377742	07/24/18 18:48	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380561	08/04/18 14:34	ALS	TAL SL

Client Sample ID: CRC-B7-2628 Lab Sample ID: 160-29479-6

Date Collected: 07/11/18 12:30 **Matrix: Solid**
Date Received: 07/12/18 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	376375	07/17/18 22:33	SDB	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			376740	07/19/18 15:00	SJS	TAL SL
Total/NA	Analysis	901.1		1	381203	08/09/18 06:36	KLS	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377729	07/24/18 17:17	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380542	08/04/18 14:30	ALS	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377742	07/24/18 18:48	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380562	08/04/18 14:34	ALS	TAL SL

Client Sample ID: CRC-B20-1214 Lab Sample ID: 160-29479-7

Date Collected: 07/11/18 13:40 **Matrix: Solid**
Date Received: 07/12/18 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	376375	07/17/18 22:33	SDB	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			376740	07/19/18 15:00	SJS	TAL SL
Total/NA	Analysis	901.1		1	381205	08/09/18 06:37	CDR	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377729	07/24/18 17:17	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380543	08/04/18 14:30	ALS	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377742	07/24/18 18:48	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380563	08/04/18 14:34	ALS	TAL SL

Client Sample ID: CRC-B20-1820 Lab Sample ID: 160-29479-8

Date Collected: 07/11/18 14:30 **Matrix: Solid**
Date Received: 07/12/18 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	376375	07/17/18 22:33	SDB	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			376740	07/19/18 15:00	SJS	TAL SL
Total/NA	Analysis	901.1		1	381206	08/09/18 06:42	CDR	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377729	07/24/18 17:17	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380544	08/04/18 14:30	ALS	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377742	07/24/18 18:48	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380564	08/04/18 14:34	ALS	TAL SL

Client Sample ID: CRC-B20-2628 Lab Sample ID: 160-29479-9

Date Collected: 07/11/18 15:05 **Matrix: Solid**
Date Received: 07/12/18 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	376375	07/17/18 22:33	SDB	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			376740	07/19/18 15:00	SJS	TAL SL
Total/NA	Analysis	901.1		1	381207	08/09/18 06:37	CDR	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377729	07/24/18 17:17	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380545	08/04/18 14:31	ALS	TAL SL
Total/NA	Leach	Dry and Grind			376403	07/18/18 09:27	DRO	TAL SL
Total/NA	Prep	ExtChrom			377742	07/24/18 18:48	TAT	TAL SL
Total/NA	Analysis	A-01-R		1	380565	08/04/18 14:34	ALS	TAL SL

Lab Chronicle

Client: Tetra Tech, Inc. TestAmerica Job ID: 160-29479-1
Project/Site: Former Carnotite Site - Non-Rad Analysis

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: Tetra Tech, Inc. TestAmerica Job ID: 160-29479-1
Project/Site: Former Carnotite Site - Non-Rad Analysis

Laboratory: TestAmerica St. Louis

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Louisiana	NELAP	6	04080	06-30-19

The following analytes are included in this report, but accreditation/certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
901.1	Fill_Geo-21	Solid	Actinium-227
901.1	Fill_Geo-21	Solid	Actinium-228
901.1	Fill_Geo-21	Solid	Bismuth-212
901.1	Fill_Geo-21	Solid	Bismuth-214
901.1	Fill_Geo-21	Solid	Lead-210
901.1	Fill_Geo-21	Solid	Lead-212
901.1	Fill_Geo-21	Solid	Lead-214
901.1	Fill_Geo-21	Solid	Potassium-40
901.1	Fill_Geo-21	Solid	Protactinium-231
901.1	Fill_Geo-21	Solid	Radium-226
901.1	Fill_Geo-21	Solid	Radium-228
901.1	Fill_Geo-21	Solid	Thallium-208
901.1	Fill_Geo-21	Solid	Thorium-232
901.1	Fill_Geo-21	Solid	Thorium-234
901.1	Fill_Geo-21	Solid	Uranium-235
901.1	Fill_Geo-21	Solid	Uranium-238
A-01-R	ExtChrom	Solid	Uranium-235
Moisture		Solid	Percent Moisture
Moisture		Solid	Percent Solids

Method Summary

Client: Tetra Tech, Inc. TestAmerica Job ID: 160-29479-1
Project/Site: Former Carnotite Site - Non-Rad Analysis

Method	Method Description	Protocol	Laboratory
Moisture	Percent Moisture	EPA	TAL SL
901.1	Radium-226 & Other Gamma Emitters (GS)	EPA	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
EPA = US Environmental Protection Agency
None = None

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29479-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-29479-1	CRC-B1-0002	Solid	07/10/18 10:00	07/12/18 09:30
160-29479-2	CRC-B1-1820	Solid	07/10/18 10:40	07/12/18 09:30
160-29479-3	CRC-B1-1214	Solid	07/10/18 10:45	07/12/18 09:30
160-29479-4	CRC-B7-1416	Solid	07/11/18 11:55	07/12/18 09:30
160-29479-5	CRC-B7-2224	Solid	07/11/18 12:00	07/12/18 09:30
160-29479-6	CRC-B7-2628	Solid	07/11/18 12:30	07/12/18 09:30
160-29479-7	CRC-B20-1214	Solid	07/11/18 13:40	07/12/18 09:30
160-29479-8	CRC-B20-1820	Solid	07/11/18 14:30	07/12/18 09:30
160-29479-9	CRC-B20-2628	Solid	07/11/18 15:05	07/12/18 09:30

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29479-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
100mLD=1_00003	07/01/61	Eckert & Zeigler, Lot 85520-334			(Purchased Reagent)		Americium-241	1326.1 Bq
							Cd-109	18716.1 Bq
							Ce-139	628.4 Bq
							Cesium-137	529.5 Bq
							Co-57	421.7 Bq
							Cobalt-60	833.7 Bq
							Hg-203	1360.8 Bq
							Sn-113	1089.3 Bq
							Y-88	1805.7 Bq
100mLD=1_00004	02/25/61	Eckert & Zeigler, Lot 81593-334			(Purchased Reagent)		Americium-241	1370.8 Bq
							Cesium-137	547.5 Bq
							Cobalt-60	874 Bq
108001_00001	12/06/67	Eckert and Ziegler, Lot 108001			(Purchased Reagent)		Americium-241	7.286 Bq
							Pu-239	6.646 Bq
							Thorium-230	6.01 Bq
108002_00001	12/07/67	Eckert and Ziegler, Lot 108002			(Purchased Reagent)		Americium-241	8.089 Bq
							Pu-239	8.515 Bq
							Thorium-230	9.349 Bq
108345_00001	01/22/68	Eckert & Ziegler, Lot 108345			(Purchased Reagent)		Americium-241	7.916 Bq
							Pu-239	7.695 Bq
							Thorium-230	7.314 Bq
108346_00001	01/22/68	Eckert & Ziegler, Lot 108346			(Purchased Reagent)		Americium-241	8.008 Bq
							Pu-239	7.835 Bq
							Thorium-230	7.57 Bq
108347_00001	01/23/68	Eckert & Ziegler, Lot 108347			(Purchased Reagent)		Americium-241	8.643 Bq
							Pu-239	8.035 Bq
							Thorium-230	8.101 Bq
108348_00001	01/23/68	Eckert & Ziegler, Lot 108348			(Purchased Reagent)		Americium-241	7.497 Bq
							Pu-239	7.067 Bq
							Thorium-230	6.956 Bq
82232-334_00001	06/03/60	Eckert & Ziegler, Lot 82232-334			(Purchased Reagent)		Americium-241	7.281 Bq
							Pu-239	7.137 Bq
							Thorium-230	7.63 Bq
82233-334_00001	06/03/60	Eckert & Zigler, Lot 82233-334			(Purchased Reagent)		Americium-241	5.114 Bq
							Pu-239	6.064 Bq
							Thorium-230	4.95 Bq
82236-334_00001	06/02/60	Eckert & Ziegler, Lot 82236-334			(Purchased Reagent)		Americium-241	6.891 Bq
							Pu-239	6.664 Bq
							Thorium-230	7.107 Bq
82237-334_00003	06/01/60	Eckert & Ziegler, Lot 82237-334			(Purchased Reagent)		Americium-241	5.608 Bq
							Pu-239	6.424 Bq
							Thorium-230	5.856 Bq
82240-334_00001	06/08/60	Eckert & Ziegler, Lot 82240-334			(Purchased Reagent)		Americium-241	8.298 Bq

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29479-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Pu-239	7.163 Bq
							Thorium-230	6.304 Bq
82241-334_00001	06/08/60	Eckert & Ziegler, Lot 82241-334			(Purchased Reagent)		Americium-241	6.638 Bq
							Pu-239	6.797 Bq
							Thorium-230	6.629 Bq
82243-334_00001	06/09/60	Eckert & Ziegler, Lot 82243-334			(Purchased Reagent)		Americium-241	6.39 Bq
							Pu-239	5.979 Bq
							Thorium-230	5.856 Bq
82244-334_00001	06/09/60	Eckert & Zigler, Lot 82244-334			(Purchased Reagent)		Americium-241	6.897 Bq
							Pu-239	6.717 Bq
							Thorium-230	7.352 Bq
82246-334_00001	06/09/60	Eckert & Ziegler, Lot 82246-334			(Purchased Reagent)		Americium-241	6.002 Bq
							Pu-239	5.353 Bq
							Thorium-230	5.57 Bq
Marn Soil_00002	03/01/16	Eckert & Ziegler, Lot 83814-334			(Purchased Reagent)		Americium-241	2870 Bq
							Cd-109	39231 Bq
							Ce-139	1302 Bq
							Cesium-137	1087 Bq
							Co-57	849 Bq
							Cobalt-60	1788 Bq
							Hg-203	2820 Bq
							Lead-210	35040 Bq
							Sn-113	2306 Bq
							Y-88	3762 Bq
MarnSolid_00002	02/09/17	Eckert & Ziegler, Lot 90099			(Purchased Reagent)		Americium-241	2797 Bq
							Cd-109	39337 Bq
							Ce-139	1320 Bq
							Cesium-137	1122 Bq
							Co-57	870 Bq
							Hg-203	2814 Bq
							Lead-210	35883 Bq
							Sn-113	2322 Bq
							Y-88	3821 Bq
Source D_00001	04/01/59	02/23/11	water, Lot 79670-334	0.9781 g	Gamma Ampuole_00001	0.9781 g	Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
.Gamma Ampuole_00001	04/07/59	Analytics, Lot 79670-334			(Purchased Reagent)		Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29479-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
Source E_00001	04/01/59	02/23/11	water, Lot 79670-334	1.0205 g	Gamma Ampuole_00001	1.0205 g	Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
.Gamma Ampuole_00001	04/07/59		Analytics, Lot 79670-334		(Purchased Reagent)		Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
Source F_00001	01/01/61	02/23/11	water, Lot 83725-334	10 mL	Gamma Ampuole_00003	2.0327 mL	Americium-241	1846.42 Bq
							Cd-109	26819.3 Bq
							Ce-139	890.424 Bq
							Cesium-137	743.562 Bq
							Co-57	580.6 Bq
							Cobalt-60	1222.38 Bq
							Hg-203	1926.02 Bq
							Sn-113	1576.93 Bq
							Y-88	2572.87 Bq
.Gamma Ampuole_00003	01/19/61		Analytics, Lot 83725-334		(Purchased Reagent)		Americium-241	9083.6 Bq
							Cd-109	131939 Bq
							Ce-139	4380.5 Bq
							Cesium-137	3658 Bq
							Co-57	2856.3 Bq
							Cobalt-60	6013.6 Bq
							Hg-203	9475.2 Bq
							Sn-113	7757.8 Bq
							Y-88	12657.4 Bq
Source H_00002	01/01/51	01/01/12	wataer, Lot 83725-334	10 mL	Gamma Ampuole_00003	2.1184 g	Americium-241	1924.27 Bq
							Cd-109	27950 Bq
							Ce-139	927.965 Bq
							Cesium-137	774.911 Bq

Lab Name: TestAmerica St. Louis Job No.: 160-29479-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Co-57	605.079 Bq
							Cobalt-60	1273.92 Bq
							Hg-203	2007.23 Bq
							Sn-113	1643.41 Bq
							Y-88	2681.34 Bq
.Gamma Ampuole_00003	01/19/61		Analytics, Lot 83725-334		(Purchased Reagent)		Americium-241	9083.6 Bq
							Cd-109	131939 Bq
							Ce-139	4380.5 Bq
							Cesium-137	3658 Bq
							Co-57	2856.3 Bq
							Cobalt-60	6013.6 Bq
							Hg-203	9475.2 Bq
							Sn-113	7757.8 Bq
							Y-88	12657.4 Bq
Th-229_00023	12/20/18	12/15/17	0.1M HNO3, Lot n/a	500 mL	Th-229_00017	15 mL	At-217	67.2296 dpm/mL
							Thorium-229	67.2296 dpm/mL
.Th-229_00017	12/20/18	08/20/14	0.1M HNO3, Lot n/a	100 mL	Th-229_00016	5.0464 g	At-217	2240.99 dpm/mL
							Thorium-229	2240.99 dpm/mL
..Th-229_00016	08/06/64		Analytics, Lot 97790		(Purchased Reagent)		At-217	740.127 Bq/g
							Thorium-229	740.127 Bq/g
TRM-2_00002	03/20/50		DOE, Lot TRM-2		(Purchased Reagent)		Lead-210	22.1 pCi/g
							Radium-226	25.4 pCi/g
							Thorium-230	24.5 pCi/g
							Uranium-234	6.2 pCi/g
							Uranium-238	6 pCi/g
Tuna Can LCS_00006	09/29/17		Analytics, Lot 74139-334		(Purchased Reagent)		Americium-241	219 dpm/g
							Cesium-137	82.3 dpm/g
							Cobalt-60	136 dpm/g
Tuna Can LCS_00007	09/21/18		Analytics, Lot 74139-334		(Purchased Reagent)		Americium-241	219 dpm/g
							Cesium-137	82.3 dpm/g
							Cobalt-60	136 dpm/g
Tuna Can_00002	02/03/15		Eckert & Ziegler, Lot 81427-334		(Purchased Reagent)		Americium-241	1164 Bq
							Cd-109	16063 Bq
							Ce-139	546 Bq
							Cesium-137	465 Bq
							Co-57	357 Bq
							Cobalt-60	742 Bq
							Hg-203	1208 Bq
							Lead-210	15186 Bq
							Sn-113	943 Bq
							Y-88	1571 Bq
Tuna Can_00003	02/09/17		Eckert & Ziegler, Lot 90099		(Purchased Reagent)		Americium-241	1164 Bq

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29479-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Cd-109	16373 Bq
							Ce-139	549 Bq
							Cesium-137	467 Bq
							Co-57	362 Bq
							Cobalt-60	735 Bq
							Hg-203	1171 Bq
							Lead-210	14936 Bq
							Sn-113	967 Bq
							Y-88	1590 Bq
Tuna Can_00006	03/01/16	Eckert & Ziegler, Lot 83814-334			(Purchased Reagent)		Americium-241	1195 Bq
							Cd-109	16353 Bq
							Ce-139	543 Bq
							Cesium-137	453 Bq
							Co-57	354 Bq
							Cobalt-60	745 Bq
							Hg-203	1175 Bq
							Lead-210	14606 Bq
							Sn-113	961 Bq
							Y-88	1568 Bq
U-232_00040	12/20/18	12/18/17	DI Water, Lot n/a	500 mL	U-232_00009	4 mL	Uranium-232	82.2457 dpm/mL
.U-232_00009	12/20/18	08/29/11	1M HNO3, Lot 0	100 mL	U-232_00003	5.1609 g	Uranium-232	10280.7 dpm/mL
..U-232_00003	08/25/61	Eckert & Ziegler, Lot 85539-334			(Purchased Reagent)		Uranium-232	3320.07 Bq/g
UNAT_00014	11/28/18	12/21/17	1M HNO3, Lot n/a	200 mL	UNAT Parent_00001	20 mL	Uranium-234	70.6912 dpm/mL
							Uranium-235	3.37064 dpm/mL
							Uranium-238	72.265 dpm/mL
.UNAT Parent_00001	11/28/18	05/03/13	1M HNO3, Lot n/a	200 mL	UNAT Ampoule_00001	19.2509 g	Uranium-234	706.912 dpm/mL
							Uranium-235	33.7064 dpm/mL
							Uranium-238	722.65 dpm/mL
..UNAT Ampoule_00001	03/30/58	New Brunswick Lab, Lot CRM 145			(Purchased Reagent)		Uranium-234	7344.2 dpm/g
							Uranium-235	350.18 dpm/g
							Uranium-238	7507.7 dpm/g

Reagent

100mLD=1_00003

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

85520-334

5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis
P.O. No.: 2434437, Item 1
Reference Date: 01-Jul-2011 12:00 PM EST **Grams of Master Source:** 0.029166

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	1.580E+05	———	3.368E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	4.626E+02	1.639E+05	4.780E+03	0.5	1.7	3.5	HPGe
Co-57	122.1	2.718E+02	8.758E+04	2.554E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	1.376E+02	1.218E+05	3.552E+03	0.5	1.1	2.4	HPGe
Hg-203	279.2	4.661E+01	2.692E+05	7.851E+03	0.4	1.1	2.3	HPGe
Sn-113	391.7	1.151E+02	1.691E+05	4.932E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	1.098E+04	1.093E+05	3.188E+03	0.6	1.2	2.7	HPGe
Y-88	898.0	1.066E+02	4.105E+05	1.197E+04	0.4	1.1	2.3	HPGe
Co-60	1173.2	1.925E+03	2.022E+05	5.897E+03	0.5	1.1	2.4	HPGe
Co-60	1332.5	1.925E+03	2.022E+05	5.897E+03	0.5	1.1	2.4	HPGe
Y-88	1836.1	1.066E+02	4.346E+05	1.268E+04	0.5	1.1	2.4	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Comments:
5.32298 g 4M HCl solution with approximately 30 μg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the reference date.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 8/18/11
J. D. McCorvey, QA Manager Alternate

Reagent

100mLD=1_00004

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

81593-334

5 mL Liquid in Flame Sealed Vial

Customer: Test America/Earth City, MO
P.O. No.: 2344874, Item 2
Reference Date: 01-Jan-2010 12:00 PM EST **Grams of Master Source:** 0.030007

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty , % Type u_A	u_B	U	Calibration Method
Am-241	59.5	1.580E+05	———	3.474E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	4.626E+02	1.606E+05	4.819E+03	0.4	1.7	3.5	HPGe
Co-57	122.1	2.718E+02	8.471E+04	2.542E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	1.376E+02	1.209E+05	3.628E+03	0.4	1.1	2.4	HPGe
Hg-203	279.2	4.661E+01	2.726E+05	8.180E+03	0.4	1.1	2.3	HPGe
Sn-113	391.7	1.151E+02	1.672E+05	5.017E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	1.098E+04	1.096E+05	3.289E+03	0.6	1.2	2.7	HPGe
Y-88	898.0	1.066E+02	4.077E+05	1.223E+04	0.4	1.1	2.4	HPGe
Co-60	1173.2	1.925E+03	2.055E+05	6.166E+03	0.5	1.1	2.4	HPGe
Co-60	1332.5	1.925E+03	2.056E+05	6.169E+03	0.7	1.1	2.6	HPGe
Y-88	1836.1	1.066E+02	4.308E+05	1.293E+04	0.5	1.1	2.4	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

70016
ID: 0.5L Marn LCS_000
Exp:01/01/50 Prpd:JW Opn:03/
Gamma 05L Marn LCS

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Comments:
5.31128 grams 4M HCl solution with approximately 30 microg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y.
This standard will expire one year after the reference date.

Source Prepared by: _____
W. Mao, Radiochemist

QA Approved: _____ for _____ Date: 2-22-10
J. D. McCorvey, QA Manager Alternate

Reagent

108001_00001

Eckert & Ziegler
Analytics

1368446
ID: 108001_00001
Exp:12/06/67 Prpd:JLW Opn:01/29/18
Alpha Calibration source

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 108001
Source Description: 24.1 mm Diameter x 0.77 mm Thick Stainless Steel Disk
Product Code: MIX-EAB-FOIL
Customer: TestAmerica Laboratories - St. Louis
P.O. Number: 2698841, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities (if detected) were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectrometry. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 06-December-2017 12:00 PM EST

Isotope	Activity, Bq	Energy Range, keV	Half-Life, d	Uncertainty u_A, %	u_B, %	U, %*
Pu-239	6.646E+00	4950-5240	8.806E+06	1.2	1.5	3.9
Am-241	7.286E+00	5280-5600	1.580E+05	1.1	1.5	3.8
Th-230	6.010E+00	4470-4760	2.753E+07	1.2	1.5	3.9
Total Activity	1.997E+01	3000-8000		0.7	1.5	3.4

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

SRS Number: 108001

Comments:

Diameter of active area: 19 mm

Mounted on customer supplied 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION:

Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Calibrated by: _____

A. Chen, Spectroscopist

QC Approved by: _____ Date: 19-DEC-17

J. Lahr, Spectroscopist

Reagent

108002_00001

Eckert & Ziegler
Analytics

1368447
ID: 108002_00001
Exp:12/07/67 Prpd:JLW Opn:01/25/18
Alpha Calibration source

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 108002
Source Description: 24.1 mm Diameter x 0.77 mm Thick Stainless Steel Disk
Product Code: MIX-EAB-FOIL
Customer: TestAmerica Laboratories - St. Louis
P.O. Number: 2698841, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities (if detected) were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectrometry. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 07-December-2017 12:00 PM EST

Isotope	Activity, Bq	Energy Range, keV	Half-Life, d	Uncertainty u_A, %	u_B, %	U, %*
Pu-239	8.515E+00	4950-5240	8.806E+06	1.0	1.5	3.7
Am-241	8.089E+00	5280-5600	1.580E+05	1.0	1.5	3.7
Th-230	9.349E+00	4470-4760	2.753E+07	1.0	1.5	3.6
Total Activity	2.599E+01	3000-8000		0.6	1.5	3.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

SRS Number: 108002

Comments:

Diameter of active area: 19 mm

Mounted on customer supplied 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION:

Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Calibrated by: _____

A. Chen, Spectroscopist

QC Approved by: _____ Date: 19-DEC-17

J. Lahr, Spectroscopist

Reagent

108345_00001

Eckert & Ziegler
Analytics

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Tel 404·352·8677
Fax 404·352·2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 108345
Source Description: 24.1 mm Diameter x 0.77 mm Thick Stainless Steel Disk
Product Code: MIX-EAB-FOIL
Customer: TestAmerica Laboratories - St. Louis
P.O. Number: 2695542, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities (if detected) were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectrometry. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 22-January-2018 12:00 PM EST

Isotope	Activity, Bq	Energy Range, keV	Half-Life, d	Uncertainty u_A, %	u_B, %	U, %*
Pu-239	7.695E+00	4950-5240	8.806E+06	1.1	1.5	3.7
Am-241	7.916E+00	5280-5600	1.580E+05	1.1	1.5	3.7
Th-230	7.314E+00	4470-4760	2.753E+07	1.1	1.5	3.7
Total Activity	2.294E+01	3000-8000		0.7	1.5	3.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

SRS Number: 108345

Comments:

Diameter of active area: 19 mm

Mounted on customer supplied 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION:

Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Calibrated by: _____

A. Chen, Spectroscopist

QC Approved by: _____ Date: 29-JAN-18

J. Lahr, Spectroscopist

Reagent

108346_00001

Eckert & Ziegler
Analytics

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Tel 404·352·8677
Fax 404·352·2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 108346
Source Description: 24.1 mm Diameter x 0.77 mm Thick Stainless Steel Disk
Product Code: MIX-EAB-FOIL
Customer: TestAmerica Laboratories - St. Louis
P.O. Number: 2695542, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities (if detected) were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectrometry. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 22-January-2018 12:00 PM EST

Isotope	Activity, Bq	Energy Range, keV	Half-Life, d	Uncertainty u_A, %	u_B, %	U, %*
Pu-239	7.835E+00	4950-5240	8.806E+06	1.2	1.5	3.8
Am-241	8.008E+00	5280-5600	1.580E+05	1.2	1.5	3.8
Th-230	7.570E+00	4470-4760	2.753E+07	1.2	1.5	3.8
Total Activity	2.343E+01	3000-8000		0.9	1.5	3.5

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

SRS Number: 108346

Comments:

Diameter of active area: 19 mm

Mounted on customer supplied 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION:

Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Calibrated by: _____

A. Chen, Spectroscopist

QC Approved by: _____ Date: 29-JAN-18

J. Lahr, Spectroscopist

Reagent

108347_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 108347
Source Description: 24.1 mm Diameter x 0.77 mm Thick Stainless Steel Disk
Product Code: MIX-EAB-FOIL
Customer: TestAmerica Laboratories - St. Louis
P.O. Number: 2702184, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities (if detected) were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectrometry. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 23-January-2018 12:00 PM EST

Isotope	Activity, Bq	Energy Range, keV	Half-Life, d	Uncertainty u_A, %	u_B, %	U, %*
Pu-239	8.035E+00	4950-5240	8.806E+06	1.0	1.5	3.6
Am-241	8.643E+00	5280-5600	1.580E+05	1.0	1.5	3.6
Th-230	8.101E+00	4470-4760	2.753E+07	1.0	1.5	3.6
Total Activity	2.480E+01	3000-8000		0.5	1.5	3.2

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

SRS Number: 108347

Comments:

Diameter of active area: 19 mm

Mounted on customer supplied 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION:

Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Calibrated by: _____

A. Chen, Spectroscopist

QC Approved by: _____ Date: 29-JAN-18

J. Lahr, Spectroscopist

Reagent

108348_00001

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Analytics

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Fax 404-352-2837
www.ezag.com

CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 108348
Source Description: 24.1 mm Diameter x 0.77 mm Thick Stainless Steel Disk
Product Code: MIX-EAB-FOIL
Customer: TestAmerica Laboratories - St. Louis
P.O. Number: 2702184, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities (if detected) were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectrometry. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 23-January-2018 12:00 PM EST

Isotope	Activity, Bq	Energy Range, keV	Half-Life, d	Uncertainty u_A, %	u_B, %	U, %*
Pu-239	7.067E+00	4950-5240	8.806E+06	1.1	1.5	3.7
Am-241	7.497E+00	5280-5600	1.580E+05	1.1	1.5	3.7
Th-230	6.956E+00	4470-4760	2.753E+07	1.1	1.5	3.7
Total Activity	2.154E+01	3000-8000		0.7	1.5	3.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

SRS Number: 108348

Comments:

Diameter of active area: 19 mm

Mounted on customer supplied 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION:

Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Calibrated by: _____

A. Chen, Spectroscopist

QC Approved by: _____ Date: 29-JAN-18

J. Lahr, Spectroscopist

Reagent

82232-334_00001

Eckert & Ziegler
Analytics

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Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82232-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 3-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	7.630E+00	4420-4800	7.540E+04	0.7	1.1	2.6
Pu-239	7.137E+00	4950-5240	2.410E+04	0.7	1.1	2.6
Am-241	7.281E+00	5280-5600	4.326E+02	0.7	1.1	2.6
Total Activity	2.210E+01	3000-8000		0.4	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82233-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82233-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 3-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	4.950E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	6.064E+00	4950-5240	2.410E+04	0.7	1.1	2.6
Am-241	5.114E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	1.616E+01	3000-8000		0.1	1.1	2.2

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82236-334_00001

Eckert & Ziegler
Analytics

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Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82236-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 2-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	7.107E+00	4420-4800	7.540E+04	0.7	1.1	2.6
Pu-239	6.664E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	6.891E+00	5280-5600	4.326E+02	0.7	1.1	2.6
Total Activity	2.071E+01	3000-8000		0.4	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.46 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82237-334_00003

Eckert & Ziegler
Analytics

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Atlanta, Georgia 30318
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Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82237-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 1-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	5.856E+00	4420-4800	7.540E+04	1.0	1.1	3.0
Pu-239	6.424E+00	4950-5240	2.410E+04	0.9	1.1	2.8
Am-241	5.608E+00	5280-5600	4.326E+02	1.0	1.1	3.0
Total Activity	1.793E+01	3000-8000		0.6	1.1	2.5

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82240-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82240-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 8-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	6.304E+00	4420-4800	7.540E+04	0.9	1.1	2.8
Pu-239	7.163E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	8.298E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	2.182E+01	3000-8000		0.5	1.1	2.4

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82241-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82241-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 8-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	6.629E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	6.797E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	6.638E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	2.011E+01	3000-8000		0.4	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82243-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82243-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 9-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	5.856E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	5.979E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	6.390E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	1.827E+01	3000-8000		0.3	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1966

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82244-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82244-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 9-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	7.352E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	6.717E+00	4950-5240	2.410E+04	0.9	1.1	2.8
Am-241	6.897E+00	5280-5600	4.326E+02	0.9	1.1	2.8
Total Activity	2.101E+01	3000-8000		0.6	1.1	2.5

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82246-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82246-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 9-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	5.570E+00	4420-4800	7.540E+04	1.0	1.1	3.0
Pu-239	5.353E+00	4950-5240	2.410E+04	1.0	1.1	3.0
Am-241	6.002E+00	5280-5600	4.326E+02	1.0	1.1	3.0
Total Activity	1.696E+01	3000-8000		0.7	1.1	2.6

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06.24.2010
E. A. Taskaev, QA Manager Alternate

Reagent

Gamma Ampuole_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

79670-334

5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2303925, Item 1
Calibration Date: 01-Apr-2009 12:00 EST **Grams of Master Source:** 0.028371

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	157860	———	3.390E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	462.60	1.691E+05	4.798E+03	0.4	1.7	3.5	HPGe
Co-57	122.1	271.79	8.904E+04	2.526E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	137.6	1.256E+05	3.563E+03	0.4	1.1	2.3	HPGe
Hg-203	279.2	46.61	2.788E+05	7.910E+03	0.3	1.1	2.3	HPGe
Sn-113	391.7	115.1	1.725E+05	4.894E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	10983	1.120E+05	3.178E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.205E+05	1.193E+04	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.184E+05	6.196E+03	0.7	1.1	2.6	HPGe
Co-60	1332.5	1925.4	2.185E+05	6.199E+03	0.7	1.1	2.6	HPGe
Y-88	1836.1	106.6	4.444E+05	1.261E+04	0.7	1.1	2.6	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
5.31740 grams 4M HCl solution with approximately 30 microg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the calibration date.

Source Prepared by: for
W. Mao, Radiochemist

QA Approved: Date: 5-13-09
D. M. Montgomery, QA Manager

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Gamma Ampuole_00003

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

83725-334

5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis/Earth City, MO
P.O. No.: 2397508, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.028066

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	1.580E+05	———	3.261E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	4.763E+03	0.8	1.7	3.8	HPGe
Co-57	122.1	2.718E+02	8.711E+04	2.445E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	3.500E+03	0.5	1.1	2.4	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	7.727E+03	0.4	1.1	2.3	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	4.965E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	3.113E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	1.066E+02	4.224E+05	1.186E+04	0.5	1.1	2.4	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	6.012E+03	0.6	1.1	2.5	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	6.015E+03	0.6	1.1	2.5	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	1.255E+04	0.5	1.1	2.4	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY — HEALTH PHYSICS SOCIETY — FOUNDED 1956

Comments:
5.30203 grams 4M HCl solution with approximately 30 µg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the reference date.

Source Prepared by: M I Taskaeva
M. I. Taskaeva, Radiochemist

QA Approved: _____ Date: 13 JAN 11
J. D. McCorvey, QA Manager Alternate

Reagent

Marn Soil_00002

Eckert & Ziegler
Analytics

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Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

83814-334

1.0 Liter Sand in 1 Liter Wide Mouth HDPE Silgan Jar

Customer: Test America St. Louis
P.O. No.: 2395112, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.016927

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Pb-210	46.5	8.120E+03	———	3.021E+03	0.1	2.1	4.1	4π LS
Am-241	59.5	1.580E+05	———	2.090E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	2.873E+03	0.8	2.3	4.9	HPGe
Co-57	122.1	2.718E+02	8.711E+04	1.475E+03	0.5	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	2.111E+03	0.5	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	4.660E+03	0.4	1.9	3.9	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	2.994E+03	0.5	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	1.877E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.224E+05	7.150E+03	0.5	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	3.626E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	3.627E+03	0.6	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	7.570E+03	0.5	1.9	3.9	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Corporate Office
Laboratory

Comments:
1550 grams of sand. Homogeneous down to 10 gram aliquot.
This standard will expire one year after the reference date.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 2/11/11
J. D. McCorvey, QA Manager Alternate

Reagent

MarnSolid_00002

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

90099

1.0 Liter Sand in 1 Liter Wide Mouth HDPE Silgan Jar

Customer: TestAmerica St. Louis / Earth City, MO
P.O. No.: 2454150, Item 1
Reference Date: 01-Jan-2012 12:00 PM EST **Grams of Master Source:** 0.017180

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Additional radionuclides were added gravimetrically from solutions calibrated by gamma-ray spectrometry, ionization chamber, or liquid scintillation counting. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty* , % Type u_A	u_B	U	Calibration Method*
Pb-210	46.5	8.109E+03	———	3.094E+03	0.1	2.1	4.1	4π LS
Am-241	59.5	1.580E+05	———	2.037E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.677E+05	2.881E+03	0.5	2.3	4.7	HPGe
Co-57	122.1	2.718E+02	8.795E+04	1.511E+03	0.4	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.245E+05	2.139E+03	0.4	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.707E+05	4.651E+03	0.3	1.9	3.8	HPGe
Sn-113	391.7	1.151E+02	1.755E+05	3.015E+03	0.4	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.128E+05	1.938E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.228E+05	7.264E+03	0.5	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.084E+05	3.580E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.084E+05	3.581E+03	0.7	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.476E+05	7.690E+03	0.7	1.9	4.0	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Comments:
1550 grams of sand. Homogenous down to 10 grams aliquot.
This standard will expire one year after the reference date.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 30 JAN 12
J.D. McCorvey, Counting Room Manager

Reagent

Source D_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

79670-334

5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2303925, Item 1
Calibration Date: 01-Apr-2009 12:00 EST **Grams of Master Source:** 0.028371

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	157860	———	3.390E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	462.60	1.691E+05	4.798E+03	0.4	1.7	3.5	HPGe
Co-57	122.1	271.79	8.904E+04	2.526E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	137.6	1.256E+05	3.563E+03	0.4	1.1	2.3	HPGe
Hg-203	279.2	46.61	2.788E+05	7.910E+03	0.3	1.1	2.3	HPGe
Sn-113	391.7	115.1	1.725E+05	4.894E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	10983	1.120E+05	3.178E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.205E+05	1.193E+04	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.184E+05	6.196E+03	0.7	1.1	2.6	HPGe
Co-60	1332.5	1925.4	2.185E+05	6.199E+03	0.7	1.1	2.6	HPGe
Y-88	1836.1	106.6	4.444E+05	1.261E+04	0.7	1.1	2.6	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
5.31740 grams 4M HCl solution with approximately 30 microg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the calibration date.

Source Prepared by: _____ for
W. Mao, Radiochemist

QA Approved: _____ Date: 5-13-09
D. M. Montgomery, QA Manager

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Source E_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

79670-334

5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2303925, Item 1
Calibration Date: 01-Apr-2009 12:00 EST **Grams of Master Source:** 0.028371

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	157860	———	3.390E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	462.60	1.691E+05	4.798E+03	0.4	1.7	3.5	HPGe
Co-57	122.1	271.79	8.904E+04	2.526E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	137.6	1.256E+05	3.563E+03	0.4	1.1	2.3	HPGe
Hg-203	279.2	46.61	2.788E+05	7.910E+03	0.3	1.1	2.3	HPGe
Sn-113	391.7	115.1	1.725E+05	4.894E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	10983	1.120E+05	3.178E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.205E+05	1.193E+04	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.184E+05	6.196E+03	0.7	1.1	2.6	HPGe
Co-60	1332.5	1925.4	2.185E+05	6.199E+03	0.7	1.1	2.6	HPGe
Y-88	1836.1	106.6	4.444E+05	1.261E+04	0.7	1.1	2.6	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
5.31740 grams 4M HCl solution with approximately 30 microg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the calibration date.

Source Prepared by: for
W. Mao, Radiochemist

QA Approved: Date: 5-13-09
D. M. Montgomery, QA Manager

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Source F_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

83725-334

5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis/Earth City, MO
P.O. No.: 2397508, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.028066

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	1.580E+05	———	3.261E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	4.763E+03	0.8	1.7	3.8	HPGe
Co-57	122.1	2.718E+02	8.711E+04	2.445E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	3.500E+03	0.5	1.1	2.4	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	7.727E+03	0.4	1.1	2.3	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	4.965E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	3.113E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	1.066E+02	4.224E+05	1.186E+04	0.5	1.1	2.4	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	6.012E+03	0.6	1.1	2.5	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	6.015E+03	0.6	1.1	2.5	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	1.255E+04	0.5	1.1	2.4	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Comments:
5.30203 grams 4M HCl solution with approximately 30 µg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the reference date.

Source Prepared by: M I Taskaeva
M. I. Taskaeva, Radiochemist

QA Approved: _____ Date: 13 JAN 11
J. D. McCorvey, QA Manager Alternate

Reagent

Source H_00002

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

83725-334

5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis/Earth City, MO
P.O. No.: 2397508, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.028066

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	1.580E+05	———	3.261E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	4.763E+03	0.8	1.7	3.8	HPGe
Co-57	122.1	2.718E+02	8.711E+04	2.445E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	3.500E+03	0.5	1.1	2.4	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	7.727E+03	0.4	1.1	2.3	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	4.965E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	3.113E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	1.066E+02	4.224E+05	1.186E+04	0.5	1.1	2.4	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	6.012E+03	0.6	1.1	2.5	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	6.015E+03	0.6	1.1	2.5	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	1.255E+04	0.5	1.1	2.4	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Comments:
5.30203 grams 4M HCl solution with approximately 30 µg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the reference date.

Source Prepared by: MTaskaeva
M. I. Taskaeva, Radiochemist

QA Approved: _____ Date: 13 JAN 11
J. D. McCorvey, QA Manager Alternate

Reagent

Th-229_00016

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

97790
Th-229 5 mL Liquid in Flame Sealed Vial

430569
ID: Th-229_00016
Exp:08/06/64 Prpd:SCB Opn:08/20/14
Th-229 Ampoule

Customer: TestAmerica - St. Louis
P.O. No.: 2573570, Item 1 Product Code: 8229

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Th-229	2.681E+06	3.761E+03	0.5	1.5	3.1	08/06/2014

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: α-impurities: Th-228 2.83E-01 Bq, Th-230 2.33E+01 Bq, Th-232 1.51E0 Bq; γ-impurities (other than decay products)<0.1%.
5.08156 g 0.5M HNO3 solution. Carrier free.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QC Approved: _____ Date: 06 AUG 14
A. Chen, Spectroscopist

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

ANA Form005 Rev. —

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

U.S. DEPARTMENT OF COMMERCE
National Institute of Standards & Technology
Gaithersburg, MD 20899

Certificate of Participation

Eckert & Ziegler Analytics
Atlanta, Georgia

is a participant for the period January 1, 2014, through December 31, 2014, in a radioactivity measurements assurance program conducted by the National Institute of Standards and Technology, in cooperation with NRMAP Incorporated. Continued participation is evidenced by dated Reports of Traceability issued for particular radionuclides, which indicate the deviation of the participant's reported value from that measured by the National Institute of Standards and Technology. The significance of these Reports is addressed below.*

For the Director,

Michael P. Unterweger, Leader
Radioactivity Group
Physical Measurement Laboratory

*As guidance for the proper use of Reports of Traceability, it should be emphasized that the National Institute of Standards and Technology is concerned only with fostering good measurements capability and consistency with the national measurements system. The assurance of the proper application of that capability to the ultimate consumer products is the responsibility of each manufacturer of these products and of the Federal regulatory agencies.

A continuing traceability program in radioactivity demonstrates, to the degree established by the periodic assays of calibrated radioactivity samples, a continuing competence to maintain the methods and standards necessary for accurate measurement. Such a program cannot, however, endorse each and every measurement nor the final product, any more than a spot check can vouch for every unchecked item. Care should be taken, therefore, not to imply such endorsement. The proper use of this Report is governed by section 200.114 of Title 15 of the Code of Federal Regulations. These regulations may be met if Reports are quoted only in their entirety. Excerpts out of context may be misleading.

1380 Seaboard Industrial Boulevard
Atlanta, Georgia 30318 USA
Phone (404) 352-8677 • Fax (404) 352-2837
Email: analytics@ezag.com (Tax EIN: 58-1406082)

Eckert & Ziegler
Analytics

Recommended Procedure for Opening the Flame Sealed Vial

1) If the solution is to be diluted, it is recommended that the diluting solution have a composition comparable to that of the standard.

2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood.

3) Shake the vial to wet the entire inside surface of the vial. Return the vial to the upright position.

4) Check that all of the liquid has drained out of the neck of the vial. If necessary, gently tap the neck to speed the process.

5) The Wheaton vials we use are pre-scored.

6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.

7) Hold the vial upright and wrap with soft tissue, such as Chem Wipes, around the tip of the vial and secure with tape (see picture). Snap off the top of the vial by pressing the pre-scored part of the neck away towards you while pulling the tip of the vial away from you.

8) Transfer the solution from the vial using a pycnometer or pipet with a dispenser handle. NEVER PIPETTE BY MOUTH.

9) Seal any unused solution in a flame sealed glass vial, if possible, to minimize the evaporation loss.

Reagent

Th-229_00023

Standard ID Number: Th-229_00023 (Coppt)
True Value = 67.21 dpm/mL
Date Analyzed: 12/20/2017

Radionuclide: Th-229

Replicates		
#1	69.18	dpm/mL
#2	67.64	dpm/mL
#3	64.07	dpm/mL

Mean = 66.9633333

1 sigma = 2.6213419

1.96 sigma = 5.13783

True Value minus 5% = 63.8495 (True Value - 5%)
True Value plus 5% = 70.5705 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: ALD 12/21/17

2nd Reviewed By/Date: RM 12.21.17

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	8/6/2014 0:00		
Decayto Date/Time (t):	12/20/17 0:00		
Initial Activity (A_0):	67.23 dpm		
Initial Aliquot:	1 mL		
Initial Conc:	67.22958 dpm/mL		
***Soln. Density:**	1 g/mL		
Nuclide:	Th-229		
Half-Life (days):	2897163	decay days	fraction
****Decay Factor:**	0.9997	1232.00	0.00043
Decay Corr Activity:	6.7210E+01 dpm		
Decay Corr Conc:	6.7210E+01 dpm/mL		

Conversion/Calculations

Final Activity Unit:	dpm
Activity Unit Factor:	1.00000
Final Volume Unit:	mL
Volume Unit Factor:	1.000
Final Concentration:	6.7210E+01 dpm/mL
Aliquot Volume:	1.0000E+00 mL
Final Activity (A):	6.7210E+01 dpm

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:43:30AM 12/21/2017

Sample

Sample Name: Ver1 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th 229 tracer
AnalysisResultsID: 206417
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

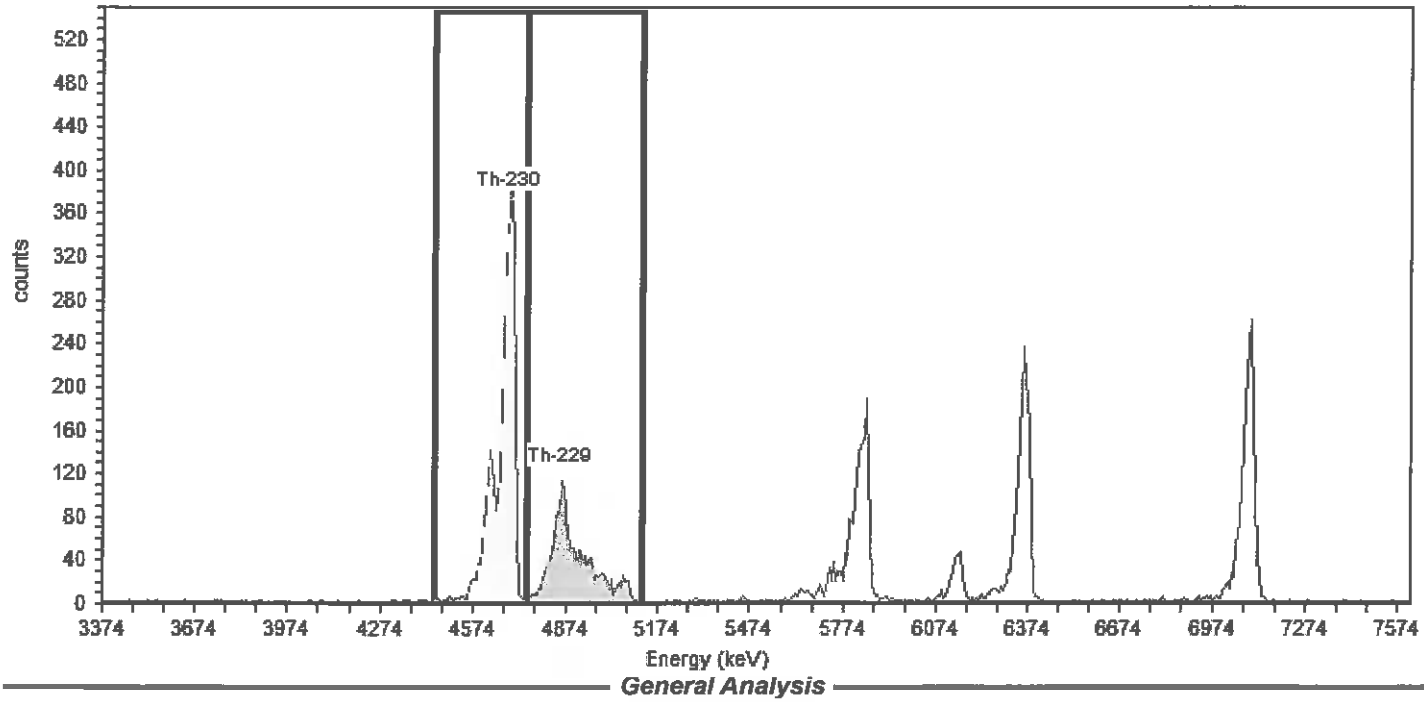
Tracer Name: Th-230_00036
Tracer Activity: 44.56 DPM / mL x (Vol.) 0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 11:41:20AM

Tracer Nuclide: Th-230
Tracer Recovery: 92.23%

Acquisition

Detector: AV210 SN: 50-119AA1
Acquisition Start Date: 12/20/2017 7:15:48PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/17/2017 3:28:10PM
Bkgd Info: Sample: ICB;AV210; Det: AV210; Spectrum #1; 11/17/2017 3:28:10 PM

Energy Calibration: IC-9795;AV210-20171114
Efficiency Calibration:IC-9795;AV210-20171114
Calibration Date: 11/14/2017 12:00:23PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 25.40% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: Absolute Interactive ROI Analysis
Decay Correction:12/20/2017 7:14:50PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-230	4688.0	4,687.5	0.5	4448.3	4746.6	50.8	99.7	3004	6.0000	2998.00	1.233E+002	DPM/mL
Th-229	4848.0	4,845.3	2.7	4746.6	5119.5	69.5	99.8	1554	1.0000	1553.00	6.918E+001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:44:04AM 12/21/2017

Sample

Sample Name: Ver2 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th 229 tracer
AnalysisResultsID: 206418
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

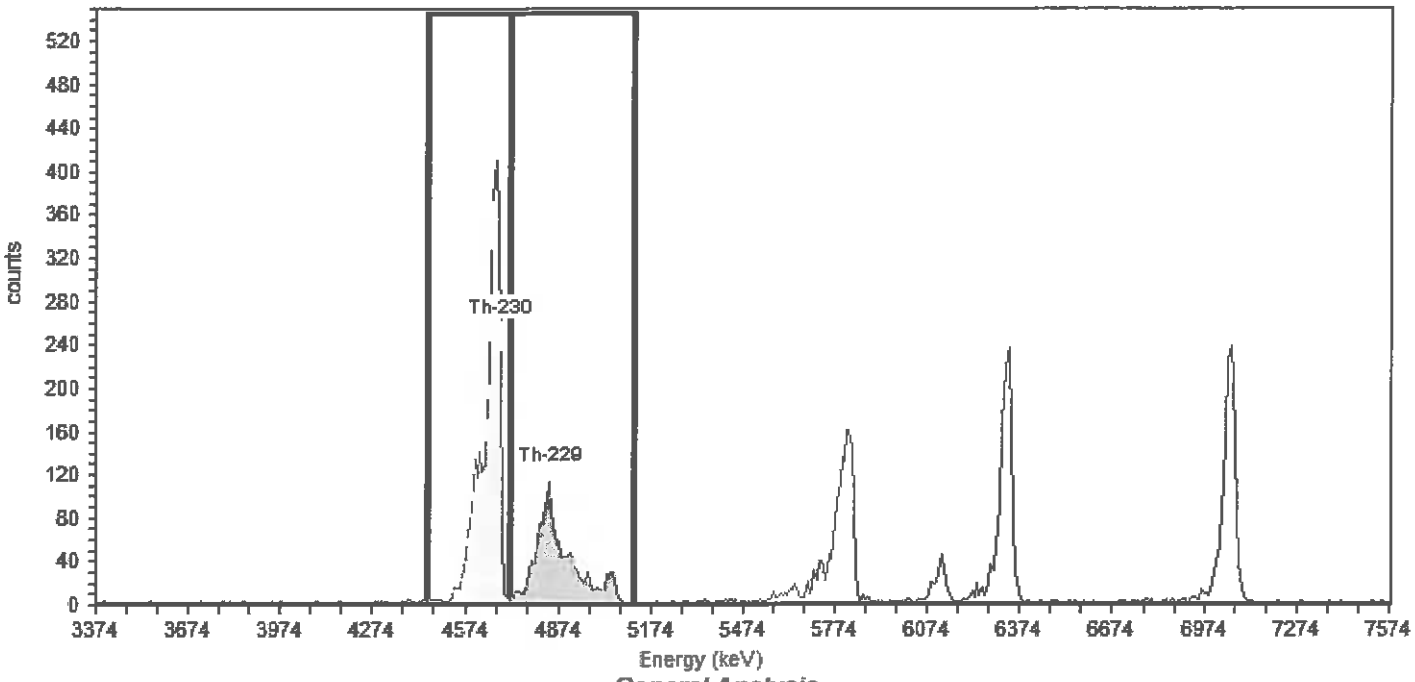
Tracer Name: Th-230_00036
Tracer Activity: 44.56 DPM / mL x (Vol.) 0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 11:41:20AM

Tracer Nuclide: Th-230
Tracer Recovery: 108.60%

Acquisition

Detector: AV211 SN: 50-117Z4
Acquisition Start Date: 12/20/2017 7:15:48PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/17/2017 3:28:10PM
Bkgd Info: Sample: ICB;AV211; Det: AV211; Spectrum #1; 11/17/2017 3:28:10 PM

Energy Calibration: IC-9817;AV211-20171114a
Efficiency Calibration:IC-9817;AV211-20171114a
Calibration Date: 11/14/2017 12:01:51PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.81% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th229_ROI_2010
Decay Correction:12/20/2017 7:14:50PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	22.9	99.7	3182	13.0310	3169.46	1.452E+002	DPM/mL
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	79.0	99.8	1615	10.0310	1605.15	6.764E+001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:45:14AM 12/21/2017

Sample

Sample Name: Ver3 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: Th 229 tracer
AnalysisResultsID: 206420
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

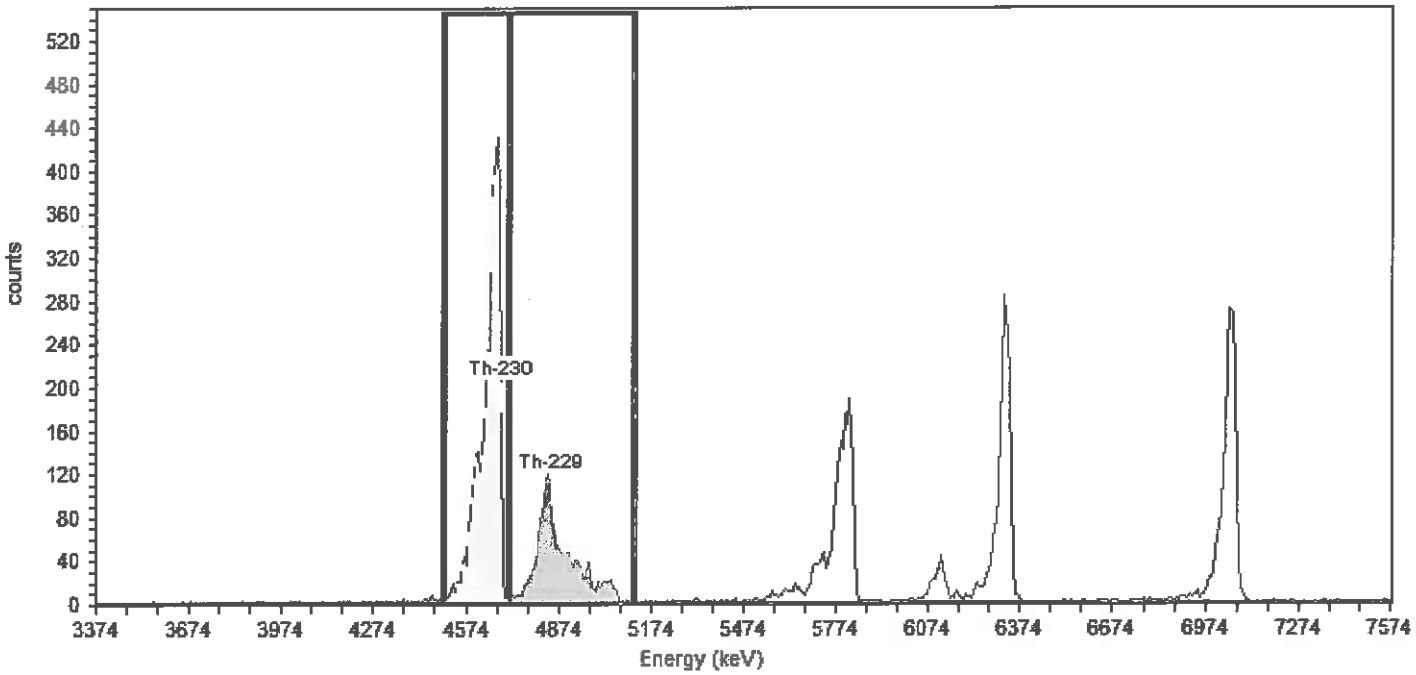
Tracer Name: Th-230_00036
Tracer Activity: 44.56 DPM / mL x (Vol.) 0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 11:41:20AM

Tracer Nuclide: Th-230
Tracer Recovery: 121.11%

Acquisition

Detector: AV212 SN: 49-155m5
Acquisition Start Date: 12/20/2017 7:15:48PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/17/2017 3:28:10PM
Bkgd Info: Sample: ICB;AV212; Det: AV212; Spectrum #1; 11/17/2017 3:28:10 PM

Energy Calibration: IC-9884;AV212-20171114
Efficiency Calibration:IC-9884;AV212-20171114
Calibration Date: 11/14/2017 12:01:41PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.41% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: Absolute Interactive ROI Analysis
Decay Correction:12/20/2017 7:14:50PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-230	4688.0	4,687.5	0.5	4500.5	4709.3	42.7	99.7	3475	2.0000	3473.00	1.619E+002	DPM/mL
Th-229	4848.0	4,845.3	2.7	4709.3	5119.5	67.0	99.8	1667	1.0000	1666.00	6.407E+001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Th-229 Tracer Verification (coppt.)

Standard Verification

Batch No. : _____

Balance ID : _____

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	VER. 1	0.1	210	
2	2	1	211	
3	3	1	212	
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A

Initials / Date

Isotope : Th-230
Std Sol'n No. : Th-230.00036
Vol (mL) : 0.3
Ref Activity (dpm/mL) : 44.5646
Act Ref Date : 08-08-13

Samples Spiked and Traced By:
SUB 12/19/17
Initials / Date

Verification Signature & Date:
RM 12/19/17
Initials / Date

LCS Standard ☐ N/A

Initials / Date

Isotope : Th-229
Std Sol'n ID. : Th-229.00023
Vol (mL) : 0.1
Ref Activity (dpm/mL) : 67.22958
Act Ref Date : 08-06-14

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐ ST-RC-0003 Rev.	☐ ST-RC-0040 Rev.	☐ ST-RC-0110 Rev.
☐ ST-RC-0004 Rev.	☐ ST-RC-0041 Rev.	☐ ST-RC-0120 Rev.
☐ ST-RC-0014 Rev.	☐ ST-RC-0050 Rev.	☐ ST-RC-0232 Rev.
☐ ST-RC-0020 Rev.	☐ ST-RC-0090 Rev.	☐ ST-RC-0238 Rev.
☐ ST-RC-0021 Rev.	☐ ST-RC-0100 Rev.	☐ ST-RC-0240 Rev.
		☐ ST-RC-0241 Rev.
		☐ ST-RC-0242 Rev.
		☐ ST-RC-5016 Rev.
		☐
		☐

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____
Date : _____

Reviewed by: _____
Date: _____

Th-229 Tracer ONLY VER.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Standard Verification (Copprt)

Batch No. : _____

Balance ID : _____

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	VER. 1 RC² = 1570	0.1	205	RC: 147
2	2 = 1649	6	207	RC: 149
3	3 = 1569	4	209	RC: 152
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A (Initials / Date)

Isotope : Th-229
Std Sol'n No. : Th-229.00023
Vol (mL) : 0.1
Ref Activity (dpm/mL) : 67.22958
Act Ref Date : 08-06-14

Samples Spiked and Traced By: SUB 12/19/17 (Initials / Date)

Verification Signature & Date: JDM 12/19/17 (Initials / Date)

LCS Standard ☐ N/A (Initials / Date)

Isotope : I
Std Sol'n ID. :
Vol (mL) :
Ref Activity (dpm/mL) :
Act Ref Date :

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐ ST-RC-0003 Rev.	☐ ST-RC-0040 Rev.	☐ ST-RC-0110 Rev.
☐ ST-RC-0004 Rev.	☐ ST-RC-0041 Rev.	☐ ST-RC-0120 Rev.
☐ ST-RC-0014 Rev.	☐ ST-RC-0050 Rev.	☐ ST-RC-0232 Rev.
☐ ST-RC-0020 Rev.	☐ ST-RC-0090 Rev.	☐ ST-RC-0238 Rev.
☐ ST-RC-0021 Rev.	☐ ST-RC-0100 Rev.	☐ ST-RC-0240 Rev.
		☐ ST-RC-0241 Rev.
		☐ ST-RC-0242 Rev.
		☐ ST-RC-5016 Rev.
		☐
		☐

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____
Date : _____

Reviewed by: _____
Date: _____

\\Slsvr01\RAD\MasterForms\RAD-0045 Rev(3)

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:01:20AM 1/15/2018

Sample

Sample Name: Ver. 1
SampleType: Sample

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Sample Collection Date:

Batch

Batch Name: Th-229 Tracer Only
AnalysisID: 719841

Analyst: 60040

Tracer

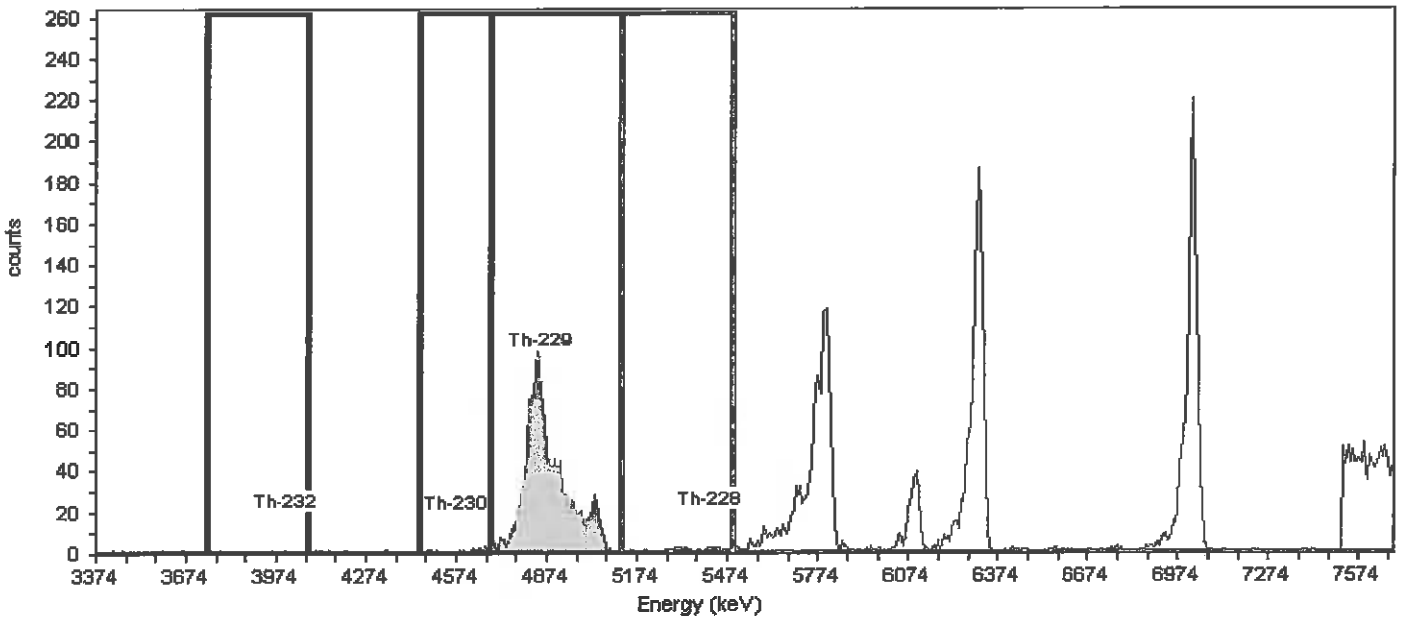
Tracer Name: Undefined
Tracer Activity:
Tracer Ref. Date:

Tracer Nuclide: External Recovery
Tracer Recovery: 100.00%

Acquisition

Detector: AV97
Serial Number: 76-03393
Acquisition Start Date: 1/12/2018 5:11:28PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 12/19/2017 12:16:50PM
Background Info: Sample: ICB;AV97; Det: AV97; Spectrum #1; Dec-19-2017 12:16

Calibration Name: IC-9886;AV97-20170802
Calibration Date: 8/2/2017 11:02:54AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.33% +/- 0.31% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 1/12/2018 5:08:17PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	11.9	100.2	3	1.0000	2.43	0.113	DPM/mL
Th-230	4567.6	4,687.5	-119.9	4448.3	4686.9	29.6	99.7	18	0.0000	18.00	0.842	DPM/mL
Th-229	4848.0	4,845.3	2.7	4686.9	5119.5	82.2	99.8	1538	1.0000	1537.00	71.851	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	140.5	99.8	37	17.9134	19.17	0.897	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:01:54AM 1/15/2018

Sample

Sample Name: Ver 2
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: Th-229 Tracer Only
AnalysisID: 719839

Analyst: 60040

Tracer

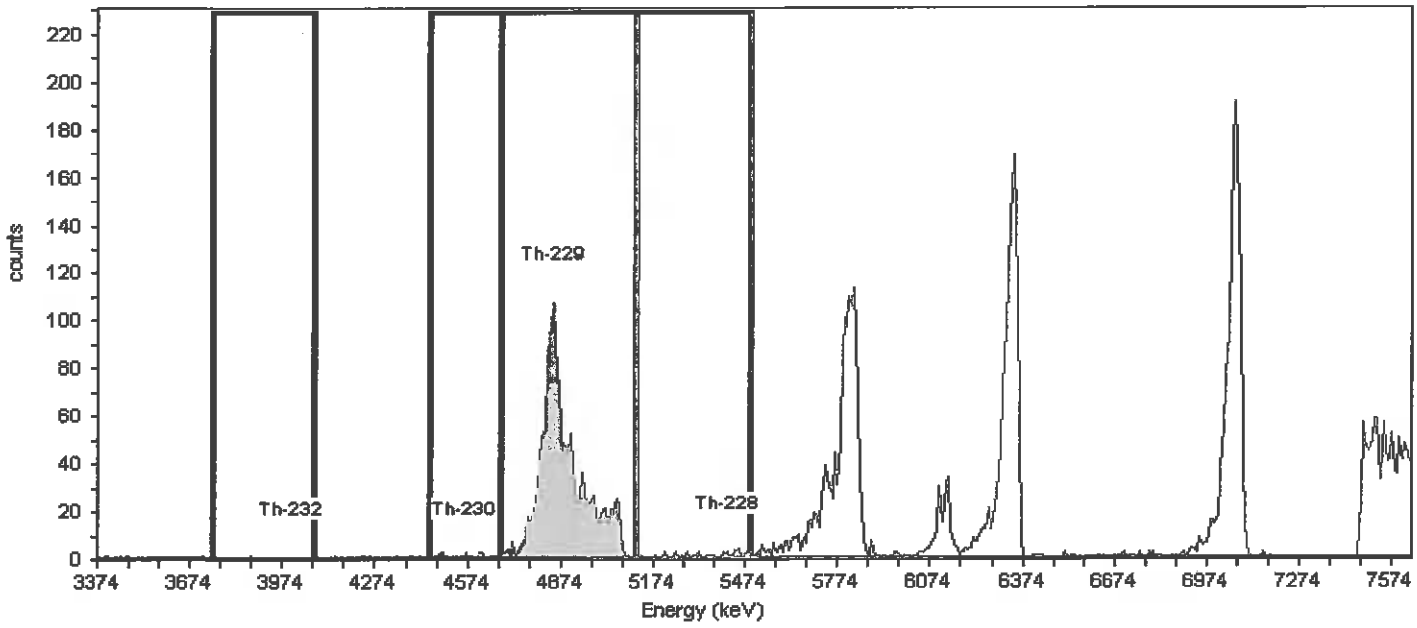
Tracer Name: Undefined
Tracer Activity:
Tracer Ref. Date:

Tracer Nuclide: External Recovery
Tracer Recovery: 100.00%

Acquisition

Detector: AV96
Serial Number: 46-033P1
Acquisition Start Date: 1/12/2018 5:11:26PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 12/19/2017 12:16:48PM
Background Info: Sample: ICB;AV96; Det: AV96; Spectrum #1; Dec-19-2017 12:16

Calibration Name: IC-9885;AV96-20170802
Calibration Date: 8/2/2017 11:02:35AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.24% +/- 0.36% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 1/12/2018 5:08:17PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	44.5	100.2	1	1.0000	0.00	0.000	DPM/mL
Th-230	4563.9	4,687.5	-123.6	4448.3	4679.5	196.1	99.7	23	0.0000	23.00	0.992	DPM/mL
Th-229	4848.0	4,845.3	2.7	4679.5	5119.5	76.5	99.8	1561	2.0000	1559.00	67.142	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	15.1	99.8	39	14.0000	25.00	1.077	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
9:02:07AM 1/15/2018

Sample

Sample Name: Ver 3
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: Th-229 Tracer Only
AnalysisID: 719837

Analyst: 60040

Tracer

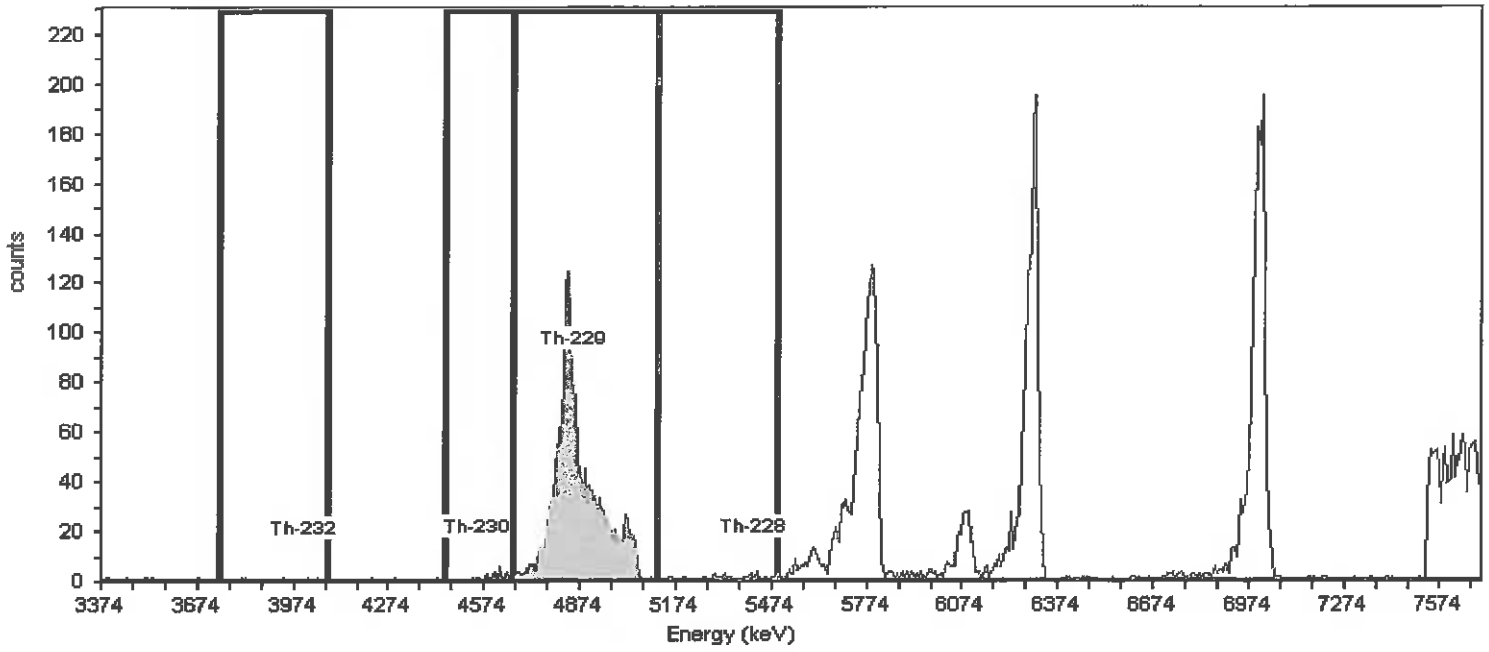
Tracer Name: Undefined
Tracer Activity:
Tracer Ref. Date:

Tracer Nuclide: External Recovery
Tracer Recovery: 100.00%

Acquisition

Detector: AV94
Serial Number: 49-203ff5
Acquisition Start Date: 1/12/2018 5:11:25PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 12/20/2017 2:53:21PM
Background Info: Sample: ICB;AV94; Det: AV94; Spectrum #1; Dec-20-2017 14:53

Calibration Name: IC-9817;AV94-20170802
Calibration Date: 8/2/2017 11:02:05AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 23.29% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 1/12/2018 5:08:17PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	10.8	100.2	6	1.0000	4.57	0.204	DPM/mL
Th-230	4556.4	4,687.5	-131.1	4448.3	4664.6	52.6	99.7	22	0.0000	22.00	0.987	DPM/mL
Th-229	4848.0	4,845.3	2.7	4664.6	5119.5	68.6	99.8	1596	3.0000	1593.00	71.396	DPM/mL
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	181.0	99.8	27	14.0000	12.91	0.579	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Reagent ID: Th-229_00023

Description:	Th-229 Tracer	Expiration Date:	12/20/2018
No. of Bottles:	1	Laboratory:	TestAmerica St. Louis
Storage Location:	RAD Actinide STDs	Prepared By:	Bernsen, Sarah C
Reagent Volume:	500.000 mL	Solvent:	0.1M HNO3
Creation Date:	12/15/2017	Solvent Lot:	n/a
Open Date:			
Container(s):	1347365		
Comment:			

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
At-217	Th-229_00017	03/26/2018	2240.98600	dpm/mL	67.22958	dpm/mL
Th-229	Th-229_00017	03/26/2018	2240.98600	dpm/mL	67.22958	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Th-229_00017	Th-229 Parent		03/26/18				15.00000	mL

Reagent

TRM-2_00002

Perry, Doug E

From: Salmi, Douglas R
Sent: March 20, 2000 10:48 AM
To: Perry, Doug E; Puissant, Pamela M
Subject: FW: SRMs for radiochemistry LCSs

Pam, Doug
FYI

-----Original Message-----
From: Minteer@aol.com [mailto:Minteer@aol.com]
Sent: March 20, 2000 10:36 AM
To: drsalmi@sandia.gov
Cc: dbourne@doeal.gov; GLDechant@aol.com; crandallb@quanterra.com
Subject: SRMs for radiochemistry LCSs

Doug:

As we discussed by telephone, please send approximately 500 grams each of PEM-1, TRM-2, and NBHD to STL St. Louis. These are to be used by STL as laboratory control samples. As with our other laboratories, STL will be asked to provide summaries of the data obtained in quarterly progress reports. This is not to assess their proficiency, but rather to help us develop interlaboratory acceptance criteria. The known values (given below) for PEM and TRM are good because the samples are well characterized. The known values for NBHD result from a single analysis and hence should be taken as estimates. All the values below are in pCi/g.

PEM-1:

Parameter	Result	Std. Dev.
Pu-238	8.03	0.37
Pu-239	41.0	3.0
Am-241	32.5	1.1
Cs-137	73.5	0.9
U-234	5.99	0.2
U-235	0.27	0.04
U-238	18.1	0.5

TRM-2

Parameter	Result	Uncertainty
U-238	6.0	+/- 4.0
U-234	6.2	+/- 4.0
Th-230	24.5	+/- 0.6
Ra-226	25.4	+/- 0.9
Pb-210	22.1	+/- 1.2

NBHD

Parameter	Result	Uncertainty
Am-241	1.47	+/- 0.28
Ra-226	67.3	+/- 5.5
U-234	174	none available
U-235	8.7	"
U-238	212	"
Cs-137	52.1	+/- 4.6
Pb-210	78.3	+/- 2.4
Pu-239/40	4.7	+/- 0.63
Pu-238	0.3	+/- 0.11
Th-230	83.4	+/- 6.5

Reagent

Tuna Can LCS_00006

Rec'd : 12-26-06

ANALYTICS
An Isotope Products Laboratories Company

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

74139-334
1.0 Liter Sand in 1 Liter Wide Mouth HDPE "S" Bottle

Customer: Severn Trent Laboratories/Earth City, MO
P.O. No.: 2169577, Item 1
Calibration Date: 01-Oct-2006 12:00 EST **Grams of Master Source:** 0.01552

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Pb-210	46.5	8145.9	———	3079.8	0.33	1.46	2.99	4π LS
Am-241	59.5	157860	———	2034.3	0.33	1.46	2.99	4π LS
Cd-109	88.0	462.60	189000	2933.5	0.57	1.70	3.59	HPGe
Co-57	122.1	271.79	94570	1467.8	0.34	1.30	2.69	HPGe
Ce-139	165.9	137.6	133800	2076.7	0.35	1.10	2.31	HPGe
Hg-203	279.2	46.61	295300	4583	0.40	1.10	2.34	HPGe
Sn-113	391.7	115.1	185600	2880.7	0.42	1.10	2.35	HPGe
Cs-137	661.7	10983	116700	1811.3	0.70	1.20	2.78	HPGe
Y-88	898.0	106.60	455400	7068	0.50	1.10	2.42	HPGe
Co-60	1173.2	1925.4	226900	3522	0.60	1.10	2.51	HPGe
Co-60	1332.5	1925.4	227000	3523	0.90	1.10	2.84	HPGe
Y-88	1836.1	106.6	481200	7469	0.90	1.10	2.84	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
1550 grams of sand. NOTE: Homogeneity was checked by the addition of Tc-99 tracer to the solution used to spike the sand. Ten 10-gram aliquots were removed after mixing and counted to measure the Tc-99. The standard deviation for the 10 measurements was 1.3% with a range of 4.8%. This demonstrates reasonable homogeneity for this source material down to a 10-gram aliquot.
This standard will expire one year after the calibration date.

Source Prepared by: M. I. Taskaeva, Radiochemist

QA Approved: for D. M. Montgomery, QA Manager Date: 12-21-06

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

St. Louis Radiological Standard Reverification Form

Standard ID Number: Tuna Can LCS_00006 (1012459)
True Value = 97.08 pCi/g
Date Analyzed: 9/29/2016

Radionuclide: Gamma LCS Am-241

	Replicates	
#1	96.82	pCi/g
#2	96.69	pCi/g
#3	97.75	pCi/g

Mean = 97.08667

1 sigma = 0.578129

1.96 sigma = 1.133133

True Value minus 5% = 92.226 (True Value - 5%)
True Value plus 5% = 101.934 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 10/03/16

SOP Reference: STL-QA-0002, Current Revision

St. Louis Radiological Standard Reverification Form

Standard ID Number: Tuna Can LCS_00006 (112459)
True Value = 29.45 pCi/g
Date Analyzed: 9/29/2016

Radionuclide: Gamma LCS Cs-137

	Replicates	
#1	28.26	pCi/g
#2	28.64	pCi/g
#3	28.37	pCi/g

Mean = 28.42333

1 sigma = 0.195533

1.96 sigma = 0.383246

True Value minus 5% = 27.9775 (True Value - 5%)
True Value plus 5% = 30.9225 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 10/03/16

SOP Reference: STL-QA-0002, Current Revision

St. Louis Radiological Standard Reverification Form

Standard ID Number: Tuna Can LCS_00006 (1012459)
True Value = 16.46 pCi/g
Date Analyzed: 9/29/116

Radionuclide: Gamma LCS Co-60

	Replicates	
#1	16.04	pCi/g
#2	15.77	pCi/g
#3	16.14	pCi/g

Mean = 15.98333

1 sigma = 0.191398

1.96 sigma = 0.375141

True Value minus 5% = 15.637 (True Value - 5%)
True Value plus 5% = 17.283 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 10/3/16

SOP Reference: STL-QA-0002, Current Revision

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gamma Spectroscopy

Batch: 272277 **Operator:**

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-272277~2-	LCS	341.90g	1.00	GammaVision	GV15	9 / 29 / 16 13:06	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	-2.044E-001pCi/g	5.500E-001	5.499E-001	1.436E+000	6.946E-001	-0.14	0.5500
AG-108M	10982	-1.018E-001pCi/g	9.743E-002	9.729E-002	3.075E-001	1.497E-001	-0.33	0.0974
AG-110M	10973	5.076E-002pCi/g	4.575E-002	4.567E-002	7.684E-001	3.751E-001	0.07	0.0457
AM-241	10818	9.682E+001pCi/g	5.100E+000	8.709E-001	1.290E+000	6.388E-001	75.07	5.0999
BA-133	10469	-1.624E-001pCi/g	1.661E-001	1.659E-001	5.506E-001	2.703E-001	-0.29	0.1661
BA-140	10463	-1.425E-001pCi/g	1.058E-001	1.055E-001	1.079E+000	5.219E-001	-0.13	0.1058
BE-7	10435	1.275E-001pCi/g	1.233E+000	1.233E+000	4.134E+000	2.030E+000	0.03	1.2334
BI-207	10195	1.058E-001pCi/g	7.194E-002	7.173E-002	2.372E-001	1.139E-001	0.45	0.0719
BI-210M	10173	8.477E-002pCi/g	9.587E-002	9.574E-002	4.994E-001	2.447E-001	0.17	0.0959
BI-212	10160	1.553E+000pCi/g	1.216E+000	1.214E+000	4.030E+000	1.941E+000	0.39	1.2163
BI-214	10154	8.681E-002pCi/g	3.647E-002	3.619E-002	1.088E+000	5.336E-001	0.08	0.0365
CD-109	9254	0.000E+000pCi/g	3.288E+000	3.288E+000	1.089E+001	5.402E+000	0.00	3.2880
CD-113M	17462	-1.456E+003pCi/g	1.073E+003	1.069E+003	3.536E+003	1.727E+003	-0.41	1,072.9969
CE-139	9241	7.398E-002pCi/g	7.038E-002	7.003E-002	2.323E-001	1.140E-001	0.32	0.0704
CE-141	9235	1.679E-002pCi/g	1.287E-001	1.287E-001	3.270E-001	1.601E-001	0.05	0.1287
CE-144	9221	-5.823E-001pCi/g	1.611E+000	1.610E+000	2.809E+000	1.390E+000	-0.21	1.6107
CF-249	9215	-3.279E-002pCi/g	1.794E-001	1.794E-001	6.001E-001	2.950E-001	-0.05	0.1794
CF-251	13690	-4.067E-001pCi/g	3.994E-001	3.978E-001	1.002E+000	4.903E-001	-0.41	0.3994
CO-56	8704	1.139E-001pCi/g	1.826E-001	1.825E-001	3.036E-001	1.454E-001	0.38	0.1826
CO-57	13694	4.528E-001pCi/g	4.266E-001	4.260E-001	1.102E+000	5.361E-001	0.41	0.4266
CO-58	8698	-1.658E-001pCi/g	1.376E-001	1.373E-001	4.558E-001	2.217E-001	-0.36	0.1376
CO-60	8692	1.604E+001pCi/g	8.400E-001	2.396E-001	9.914E-002	4.016E-002	161.75	0.8400
CR-51	8604	-9.651E-001pCi/g	1.169E+000	1.168E+000	3.438E+000	1.690E+000	-0.28	1.1689
CS-134	8553	6.593E-002pCi/g	8.889E-002	8.882E-002	5.089E-001	2.495E-001	0.13	0.0889
CS-136	8546	1.258E-001pCi/g	1.227E-001	1.225E-001	4.083E-001	1.980E-001	0.31	0.1227
CS-137	8539	2.826E+001pCi/g	1.520E+000	3.844E-001	2.878E-001	1.379E-001	98.20	1.5198
EU-152	7145	5.245E-001pCi/g	5.014E-001	5.007E-001	1.782E+000	8.797E-001	0.29	0.5014
EU-154	7138	4.532E-001pCi/g	3.576E-001	3.568E-001	3.623E+000	1.758E+000	0.13	0.3576
EU-155	7131	3.186E-001pCi/g	4.804E-001	4.800E-001	1.590E+000	7.880E-001	0.20	0.4804
FE-59	7073	-4.662E-001pCi/g	2.724E-001	2.714E-001	8.335E-001	4.027E-001	-0.56	0.2724
GA-68	18005	-2.864E+000pCi/g	6.167E+000	6.165E+000	1.352E+001	6.483E+000	-0.21	6.1671
GD-153	6824	-2.389E-001pCi/g	3.642E-001	3.639E-001	1.205E+000	5.975E-001	-0.20	0.3642
HF-181	6495	2.232E-002pCi/g	9.381E-002	9.380E-002	5.455E-001	2.678E-001	0.04	0.0938
HG-203	6466	-1.176E-001pCi/g	9.784E-002	9.761E-002	3.233E-001	1.585E-001	-0.36	0.0978
I-131	6380	1.345E-001pCi/g	1.325E-001	1.323E-001	2.783E-001	1.352E-001	0.48	0.1325
IR-192	6303	1.051E-001pCi/g	1.544E-001	1.543E-001	5.121E-001	2.528E-001	0.21	0.1544
K-40	6148	-3.414E-001pCi/g	3.403E+000	3.403E+000	1.694E+000	7.511E-001	-0.20	3.4027
LA-140	6096	6.964E-002pCi/g	2.842E-002	2.818E-002	6.304E-002	1.993E-002	1.10	0.0284
MN-54	5382	9.032E-003pCi/g	1.343E-001	1.343E-001	3.074E-001	1.474E-001	0.03	0.1343
NA-22	5201	7.656E-002pCi/g	4.569E-002	4.553E-002	1.483E-001	6.510E-002	0.52	0.0457
NB-94	5160	-6.911E-003pCi/g	8.527E-002	8.527E-002	2.509E-001	1.199E-001	-0.03	0.0853
NB-95	5154	-1.314E-001pCi/g	1.080E-001	1.078E-001	3.580E-001	1.732E-001	-0.37	0.1080
ND-147	5083	2.116E-001pCi/g	7.933E-001	7.932E-001	1.870E+000	9.017E-001	0.11	0.7933
NP-237	4757	-5.339E-001pCi/g	9.394E-001	9.389E-001	3.110E+000	1.543E+000	-0.17	0.9394
NP-239	4751	2.951E-001pCi/g	4.471E-001	4.467E-001	1.480E+000	7.333E-001	0.20	0.4471
PA-231	4541	0.000E+000pCi/g	1.548E+000	1.548E+000	1.296E+001	6.385E+000	0.00	1.5484
PA-233	4535	2.505E-001pCi/g	3.660E-001	3.657E-001	1.214E+000	5.993E-001	0.21	0.3660
PA-234	4528	9.127E-002pCi/g	1.542E-001	1.541E-001	1.714E+000	8.480E-001	0.05	0.1542
PA-234M	19453	2.654E+001pCi/g	1.513E+001	1.507E+001	5.612E+001	2.718E+001	0.47	15.1341
PB-210	4467	8.473E+002pCi/g	5.040E+001	8.041E+000	1.484E+001	7.350E+000	57.08	50.3970

PB-212	4454	5.507E-001pCi/g	1.742E-001	1.705E-001	3.941E-001	1.917E-001	1.40	0.1742
PB-214	4448	4.656E-001pCi/g	1.811E-001	1.795E-001	4.906E-001	2.371E-001	0.95	0.1811
PM-144	19585	-9.279E-002pCi/g	8.379E-002	8.365E-002	2.603E-001	1.247E-001	-0.36	0.0838
PM-146	2464	3.553E-001pCi/g	2.541E-001	2.534E-001	6.570E-001	3.117E-001	0.54	0.2541
RH-106	1882	0.000E+000pCi/g	4.336E-001	4.336E-001	5.120E+000	2.511E+000	0.00	0.4336
RU-103	1828	-1.980E-002pCi/g	1.475E-001	1.475E-001	2.961E-001	1.436E-001	-0.07	0.1475
SB-124	1784	1.062E-001pCi/g	8.303E-002	8.285E-002	5.042E-001	2.473E-001	0.21	0.0830
SB-125	1777	4.580E-001pCi/g	3.330E-001	3.322E-001	8.845E-001	4.300E-001	0.52	0.3330
SC-46	1739	-2.124E-001pCi/g	1.825E-001	1.822E-001	6.042E-001	2.955E-001	-0.35	0.1825
SN-113	1570	1.126E-001pCi/g	1.827E-001	1.826E-001	6.081E-001	2.988E-001	0.19	0.1827
SN-126	17459	-1.643E+000pCi/g	3.686E+000	3.685E+000	1.217E+001	6.066E+000	-0.13	3.6865
TA-182	1301	4.928E-001pCi/g	2.524E-001	2.512E-001	1.407E+000	6.803E-001	0.35	0.2524
TC-99M	17412	-2.091E-002pCi/g	1.038E-001	1.038E-001	3.452E-001	1.707E-001	-0.06	0.1038
TH-227	1058	5.331E+000pCi/g	2.061E+000	2.040E+000	6.682E+000	3.307E+000	0.80	2.0609
TH-229	1046	-1.252E+000pCi/g	1.725E+000	1.722E+000	4.349E+000	2.130E+000	-0.29	1.7249
TH-234	1027	-4.940E+000pCi/g	6.015E+000	6.009E+000	3.121E+001	1.555E+001	-0.16	6.0150
TL-208	929	4.162E-001pCi/g	1.180E-001	1.160E-001	2.299E-001	1.095E-001	1.81	0.1180
U-235	281	4.038E-001pCi/g	3.951E-001	3.946E-001	2.769E+000	1.369E+000	0.15	0.3951
Y-88	74	5.514E-002pCi/g	1.992E-002	1.971E-002	3.695E-001	1.776E-001	0.15	0.0199
ZN-65	31	0.000E+000pCi/g	1.231E-001	1.231E-001	1.061E+000	5.145E-001	0.00	0.1231
ZR-95	7	7.816E-003pCi/g	2.150E-001	2.150E-001	4.933E-001	2.360E-001	0.02	0.2150

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-272277~2-A	LCS 160-272277~2-A	CS-137	2.826E+001	pCi/g	2.945E+001	95.99%	-0.5385
		CO-60	1.604E+001	pCi/g	1.646E+001	97.45%	-0.3492
		AM-241	9.682E+001	pCi/g	9.708E+001	99.74%	-0.0356

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gamma Spectroscopy

Batch: 272277 **Operator:**

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-272277~2-	LCS	341.90g	1.00	GammaVision	GV05	9 / 29 / 16 19:17	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	6.948E-001pCi/g	4.428E-001	4.413E-001	1.386E+000	6.661E-001	0.50	0.4428
AG-108M	10982	-4.815E-002pCi/g	1.360E-001	1.359E-001	3.314E-001	1.611E-001	-0.15	0.1360
AG-110M	10973	-6.551E-002pCi/g	5.828E-002	5.819E-002	7.502E-001	3.646E-001	-0.09	0.0583
AM-241	10818	9.669E+001pCi/g	5.084E+000	8.185E-001	1.163E+000	5.751E-001	83.11	5.0845
BA-133	10469	-1.677E-001pCi/g	1.639E-001	1.637E-001	5.438E-001	2.661E-001	-0.31	0.1639
BA-140	10463	7.654E-001pCi/g	4.133E-001	4.114E-001	9.742E-001	4.664E-001	0.79	0.4133
BE-7	10435	-5.190E-001pCi/g	1.221E+000	1.221E+000	3.698E+000	1.806E+000	-0.14	1.2210
BI-207	10195	1.327E-001pCi/g	2.286E-001	2.285E-001	5.028E-001	2.394E-001	0.26	0.2286
BI-210M	10173	1.105E-001pCi/g	1.761E-001	1.760E-001	4.963E-001	2.426E-001	0.22	0.1761
BI-212	10160	-8.056E-001pCi/g	1.326E+000	1.326E+000	4.824E+000	2.326E+000	-0.17	1.3264
BI-214	10154	-3.129E-001pCi/g	1.874E-001	1.867E-001	1.276E+000	6.260E-001	-0.25	0.1874
CD-109	9254	1.605E+000pCi/g	2.280E+000	2.278E+000	7.558E+000	3.734E+000	0.21	2.2797
CD-113M	17462	-1.293E+003pCi/g	1.131E+003	1.128E+003	3.745E+003	1.826E+003	-0.35	1,131.1129
CE-139	9241	-6.545E-002pCi/g	8.083E-002	8.059E-002	2.679E-001	1.316E-001	-0.24	0.0808
CE-141	9235	7.536E-003pCi/g	1.415E-001	1.415E-001	4.733E-001	2.330E-001	0.02	0.1415
CE-144	9221	1.609E-001pCi/g	5.660E-001	5.659E-001	1.890E+000	9.298E-001	0.09	0.5660
CF-249	9215	-5.097E-002pCi/g	4.175E-002	4.166E-002	6.544E-001	3.214E-001	-0.08	0.0417
CF-251	13690	2.258E-001pCi/g	3.420E-001	3.414E-001	9.101E-001	4.433E-001	0.25	0.3420
CO-56	8704	-2.777E-003pCi/g	1.256E-001	1.256E-001	3.392E-001	1.622E-001	-0.01	0.1256
CO-57	13694	0.000E+000pCi/g	3.371E-002	3.371E-002	2.220E-001	1.091E-001	0.00	0.0337
CO-58	8698	1.419E-001pCi/g	1.238E-001	1.236E-001	4.114E-001	1.985E-001	0.34	0.1238
CO-60	8692	1.577E+001pCi/g	8.296E-001	2.480E-001	5.871E-002	1.856E-002	268.60	0.8296
CR-51	8604	8.429E-001pCi/g	8.344E-001	8.332E-001	2.771E+000	1.352E+000	0.30	0.8344
CS-134	8553	-1.864E-002pCi/g	1.769E-002	1.766E-002	5.873E-001	2.880E-001	-0.03	0.0177
CS-136	8546	1.666E-002pCi/g	1.960E-002	1.958E-002	4.831E-001	2.344E-001	0.03	0.0196
CS-137	8539	2.864E+001pCi/g	1.546E+000	4.128E-001	3.089E-001	1.474E-001	92.72	1.5462
EU-152	7145	2.755E-001pCi/g	3.412E-001	3.409E-001	1.401E+000	6.875E-001	0.20	0.3412
EU-154	7138	1.747E-001pCi/g	1.106E-001	1.102E-001	3.597E+000	1.737E+000	0.05	0.1106
EU-155	7131	2.480E-001pCi/g	3.696E-001	3.694E-001	1.226E+000	6.054E-001	0.20	0.3696
FE-59	7073	1.492E-001pCi/g	1.439E-001	1.437E-001	7.280E-001	3.478E-001	0.20	0.1439
GA-68	18005	-6.353E+000pCi/g	7.244E+000	7.235E+000	1.575E+001	7.557E+000	-0.40	7.2435
GD-153	6824	5.593E-002pCi/g	1.741E-001	1.741E-001	5.826E-001	2.858E-001	0.10	0.1741
HF-181	6495	1.366E-001pCi/g	1.060E-001	1.057E-001	4.948E-001	2.417E-001	0.28	0.1060
HG-203	6466	2.250E-002pCi/g	1.022E-001	1.022E-001	2.611E-001	1.269E-001	0.09	0.1022
I-131	6380	2.210E-002pCi/g	1.184E-002	1.179E-002	2.971E-001	1.441E-001	0.07	0.0118
IR-192	6303	8.284E-002pCi/g	7.520E-002	7.504E-002	3.258E-001	1.592E-001	0.25	0.0752
K-40	6148	7.507E-001pCi/g	5.361E-001	5.347E-001	1.327E+000	5.540E-001	0.57	0.5361
LA-140	6096	8.699E-002pCi/g	7.949E-002	7.936E-002	1.364E-001	5.501E-002	0.64	0.0795
MN-54	5382	-1.165E-001pCi/g	1.521E-001	1.520E-001	3.439E-001	1.646E-001	-0.34	0.1521
NA-22	5201	-2.814E-002pCi/g	5.797E-002	5.795E-002	2.055E-001	9.236E-002	-0.14	0.0580
NB-94	5160	6.783E-002pCi/g	6.927E-002	6.918E-002	2.389E-001	1.130E-001	0.28	0.0693
NB-95	5154	-1.620E-001pCi/g	1.191E-001	1.188E-001	3.935E-001	1.900E-001	-0.41	0.1191
ND-147	5083	-6.514E-001pCi/g	8.776E-001	8.768E-001	2.138E+000	1.031E+000	-0.30	0.8776
NP-237	4757	-4.627E-001pCi/g	7.177E-001	7.172E-001	2.379E+000	1.176E+000	-0.19	0.7177
NP-239	4751	2.276E-001pCi/g	3.340E-001	3.337E-001	1.108E+000	5.467E-001	0.21	0.3340
PA-231	4541	0.000E+000pCi/g	1.373E+000	1.373E+000	1.362E+001	6.701E+000	0.00	1.3729
PA-233	4535	2.236E-001pCi/g	3.060E-001	3.057E-001	1.017E+000	4.997E-001	0.22	0.3060
PA-234	4528	2.928E-001pCi/g	4.437E-001	4.434E-001	1.312E+000	6.465E-001	0.22	0.4437
PA-234M	19453	2.108E+001pCi/g	1.857E+001	1.854E+001	6.416E+001	3.107E+001	0.33	18.5748
PB-210	4467	8.671E+002pCi/g	5.159E+001	8.329E+000	1.461E+001	7.229E+000	59.34	51.5925

PB-212	4454	7.463E-001pCi/g	1.602E-001	1.528E-001	3.656E-001	1.769E-001	2.04	0.1602
PB-214	4448	2.370E-001pCi/g	2.355E-001	2.351E-001	7.474E-001	3.643E-001	0.32	0.2355
PM-144	19585	7.285E-002pCi/g	5.436E-002	5.422E-002	2.571E-001	1.222E-001	0.28	0.0544
PM-146	2464	1.040E-001pCi/g	3.321E-001	3.321E-001	7.921E-001	3.765E-001	0.13	0.3321
RA-226	1950	-4.839E-001pCi/g	3.042E+000	3.042E+000	5.837E+000	2.855E+000	-0.08	3.0419
RH-106	1882	-3.016E-001pCi/g	9.937E-001	9.936E-001	3.367E+000	1.626E+000	-0.09	0.9937
RU-103	1828	-6.222E-002pCi/g	1.352E-001	1.352E-001	3.240E-001	1.568E-001	-0.19	0.1352
SB-124	1784	-4.848E-002pCi/g	4.616E-002	4.609E-002	5.906E-001	2.896E-001	-0.08	0.0462
SB-125	1777	3.726E-001pCi/g	5.015E-001	5.012E-001	9.624E-001	4.671E-001	0.39	0.5015
SC-46	1739	-1.934E-001pCi/g	1.709E-001	1.706E-001	5.668E-001	2.757E-001	-0.34	0.1709
SN-113	1570	-1.832E-001pCi/g	6.511E-002	6.443E-002	6.636E-001	3.257E-001	-0.28	0.0651
SN-126	17459	-3.558E-001pCi/g	8.245E-001	8.243E-001	2.749E+000	1.352E+000	-0.13	0.8245
TA-182	1301	6.142E-001pCi/g	5.525E-001	5.517E-001	1.835E+000	8.906E-001	0.33	0.5525
TC-99M	17412	-6.331E-002pCi/g	7.898E-002	7.890E-002	2.620E-001	1.290E-001	-0.24	0.0790
TH-227	1058	1.965E+000pCi/g	1.983E+000	1.980E+000	6.552E+000	3.239E+000	0.30	1.9825
TH-229	1046	3.332E-001pCi/g	3.014E-001	3.002E-001	4.053E+000	1.977E+000	0.08	0.3014
TH-234	1027	5.142E-001pCi/g	1.278E+000	1.278E+000	6.351E+000	3.118E+000	0.08	1.2779
TL-208	929	3.882E-001pCi/g	9.932E-002	9.725E-002	2.123E-001	9.976E-002	1.83	0.0993
U-235	281	-5.267E-001pCi/g	7.677E-001	7.672E-001	2.130E+000	1.049E+000	-0.25	0.7677
Y-88	74	1.200E-001pCi/g	1.531E-001	1.529E-001	3.472E-001	1.653E-001	0.35	0.1531
ZN-65	31	-4.722E-001pCi/g	4.068E-001	4.061E-001	1.349E+000	6.559E-001	-0.35	0.4068
ZR-95	7	4.516E-001pCi/g	1.936E-001	1.922E-001	4.383E-001	2.068E-001	1.03	0.1936

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-272277~2-A	LCS 160-272277~2-A	CS-137	2.864E+001	pCi/g	2.944E+001	97.28%	-0.3615
		CO-60	1.577E+001	pCi/g	1.646E+001	95.82%	-0.5732
		AM-241	9.669E+001	pCi/g	9.708E+001	99.60%	-0.0539

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

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Analysis Report for Gamma Spectroscopy

Batch: 272277 **Operator:**

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-272277~2-	LCS	341.90g	1.00	GammaVision	GV10	9 / 30 / 16 19:13	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	5.161E-001pCi/g	4.930E-001	4.923E-001	1.066E+000	5.139E-001	0.48	0.4930
AG-108M	10982	-1.283E-001pCi/g	3.696E-002	3.637E-002	2.872E-001	1.401E-001	-0.45	0.0370
AG-110M	10973	-2.436E-001pCi/g	2.130E-001	2.126E-001	7.050E-001	3.451E-001	-0.35	0.2130
AM-241	10818	9.775E+001pCi/g	5.141E+000	8.314E-001	1.213E+000	6.008E-001	80.58	5.1409
BA-133	10469	7.040E-002pCi/g	1.351E-001	1.350E-001	4.510E-001	2.211E-001	0.16	0.1351
BA-140	10463	1.818E-001pCi/g	1.964E-001	1.962E-001	8.653E-001	4.175E-001	0.21	0.1964
BE-7	10435	-6.992E-001pCi/g	1.118E+000	1.117E+000	3.720E+000	1.828E+000	-0.19	1.1175
BI-207	10195	8.667E-002pCi/g	7.816E-002	7.803E-002	2.212E-001	1.066E-001	0.39	0.0782
BI-210M	10173	6.373E-002pCi/g	1.358E-001	1.357E-001	3.452E-001	1.681E-001	0.18	0.1358
BI-212	10160	1.530E+000pCi/g	1.367E+000	1.365E+000	4.535E+000	2.206E+000	0.34	1.3671
BI-214	10154	5.778E-001pCi/g	1.375E-001	1.341E-001	3.590E-001	1.707E-001	1.61	0.1375
CD-109	9254	1.642E+000pCi/g	2.301E+000	2.299E+000	7.619E+000	3.770E+000	0.22	2.3006
CD-113M	17462	9.148E+000pCi/g	9.992E+002	9.992E+002	3.367E+003	1.646E+003	0.00	999.2489
CE-139	9241	-2.055E-002pCi/g	6.937E-002	6.934E-002	2.318E-001	1.139E-001	-0.09	0.0694
CE-141	9235	1.025E-001pCi/g	7.847E-002	7.830E-002	2.128E-001	1.033E-001	0.48	0.0785
CE-144	9221	-4.688E-001pCi/g	5.253E-001	5.247E-001	1.741E+000	8.573E-001	-0.27	0.5253
CF-249	9215	1.362E-001pCi/g	1.495E-001	1.494E-001	4.985E-001	2.448E-001	0.27	0.1495
CF-251	13690	-3.095E-001pCi/g	3.513E-001	3.502E-001	9.286E-001	4.543E-001	-0.33	0.3513
CO-56	8704	1.879E-002pCi/g	1.572E-002	1.569E-002	2.803E-001	1.350E-001	0.07	0.0157
CO-57	13694	9.703E-002pCi/g	5.787E-002	5.764E-002	1.624E-001	7.956E-002	0.60	0.0579
CO-58	8698	2.483E-003pCi/g	9.680E-002	9.680E-002	3.289E-001	1.594E-001	0.01	0.0968
CO-60	8692	1.614E+001pCi/g	8.382E-001	2.145E-001	1.235E-001	5.442E-002	130.66	0.8382
CR-51	8604	-3.859E-001pCi/g	8.135E-001	8.132E-001	2.716E+000	1.332E+000	-0.14	0.8135
CS-134	8553	1.234E-001pCi/g	1.022E-001	1.020E-001	4.481E-001	2.199E-001	0.28	0.1022
CS-136	8546	1.085E-001pCi/g	7.572E-002	7.546E-002	2.841E-001	1.370E-001	0.38	0.0757
CS-137	8539	2.837E+001pCi/g	1.515E+000	3.427E-001	2.201E-001	1.050E-001	128.88	1.5151
EU-152	7145	4.455E-001pCi/g	3.696E-001	3.689E-001	1.216E+000	5.980E-001	0.37	0.3696
EU-154	7138	-8.727E-001pCi/g	8.178E-001	8.165E-001	2.720E+000	1.317E+000	-0.32	0.8178
EU-155	7131	2.450E-001pCi/g	3.372E-001	3.369E-001	1.118E+000	5.521E-001	0.22	0.3372
FE-59	7073	2.567E-001pCi/g	2.385E-001	2.382E-001	5.017E-001	2.396E-001	0.51	0.2385
GA-68	18005	-3.762E+000pCi/g	5.213E+000	5.209E+000	1.136E+001	5.457E+000	-0.33	5.2128
GD-153	6824	-1.804E-001pCi/g	2.541E-001	2.539E-001	8.419E-001	4.162E-001	-0.21	0.2541
HF-181	6495	9.232E-002pCi/g	1.044E-001	1.043E-001	4.959E-001	2.437E-001	0.19	0.1044
HG-203	6466	9.088E-002pCi/g	8.062E-002	8.045E-002	2.668E-001	1.306E-001	0.34	0.0806
I-131	6380	1.416E-002pCi/g	1.182E-002	1.180E-002	2.746E-001	1.339E-001	0.05	0.0118
IR-192	6303	-3.206E-003pCi/g	3.257E-003	3.251E-003	5.126E-001	2.534E-001	-0.01	0.0033
K-40	6148	-6.666E-002pCi/g	7.052E-001	7.052E-001	1.635E+000	7.434E-001	-0.04	0.7052
LA-140	6096	2.337E-002pCi/g	2.000E-002	1.996E-002	2.006E-001	9.142E-002	0.12	0.0200
MN-54	5382	1.200E-001pCi/g	1.052E-001	1.050E-001	2.364E-001	1.131E-001	0.51	0.1052
NA-22	5201	4.984E-002pCi/g	3.571E-002	3.562E-002	1.182E-001	5.202E-002	0.42	0.0357
NB-94	5160	3.947E-002pCi/g	6.204E-002	6.201E-002	2.207E-001	1.058E-001	0.18	0.0620
NB-95	5154	-1.353E-001pCi/g	9.204E-002	9.177E-002	3.033E-001	1.468E-001	-0.45	0.0920
ND-147	5083	-8.055E-001pCi/g	7.738E-001	7.724E-001	1.795E+000	8.692E-001	-0.45	0.7738
NP-237	4757	-4.782E-001pCi/g	6.851E-001	6.846E-001	2.269E+000	1.123E+000	-0.21	0.6851
NP-239	4751	-2.392E-001pCi/g	3.314E-001	3.311E-001	1.098E+000	5.427E-001	-0.22	0.3314
PA-231	4541	-2.858E+000pCi/g	4.644E+000	4.642E+000	1.540E+001	7.616E+000	-0.19	4.6444
PA-233	4535	-3.087E-003pCi/g	1.223E-001	1.223E-001	1.280E+000	6.331E-001	0.00	0.1223
PA-234	4528	6.645E-001pCi/g	3.995E-001	3.981E-001	5.016E-001	2.427E-001	1.32	0.3995
PA-234M	19453	1.019E+001pCi/g	7.871E+000	7.854E+000	5.194E+001	2.527E+001	0.20	7.8710
PB-210	4467	8.424E+002pCi/g	5.010E+001	7.962E+000	1.486E+001	7.359E+000	56.69	50.1004

PB-212	4454	7.213E-001pCi/g	1.549E-001	1.477E-001	3.494E-001	1.699E-001	2.06	0.1549
PB-214	4448	3.560E-001pCi/g	1.635E-001	1.624E-001	4.269E-001	2.062E-001	0.83	0.1635
PM-144	19585	4.197E-002pCi/g	5.362E-002	5.358E-002	2.115E-001	1.012E-001	0.20	0.0536
PM-146	2464	1.534E-001pCi/g	1.432E-001	1.429E-001	6.480E-001	3.101E-001	0.24	0.1432
RA-226	1950	4.820E-001pCi/g	1.940E+000	1.940E+000	5.198E+000	2.545E+000	0.09	1.9401
RH-106	1882	-1.076E+000pCi/g	8.905E-001	8.888E-001	2.950E+000	1.433E+000	-0.36	0.8905
RU-103	1828	5.218E-002pCi/g	9.724E-002	9.721E-002	2.375E-001	1.149E-001	0.22	0.0972
SB-124	1784	6.289E-002pCi/g	1.316E-001	1.316E-001	4.394E-001	2.156E-001	0.14	0.1316
SB-125	1777	-4.060E-001pCi/g	2.384E-001	2.375E-001	9.120E-001	4.454E-001	-0.45	0.2384
SC-46	1739	-1.325E-001pCi/g	1.242E-001	1.241E-001	5.329E-001	2.611E-001	-0.25	0.1242
SN-113	1570	1.363E-001pCi/g	1.516E-001	1.514E-001	5.030E-001	2.469E-001	0.27	0.1516
SN-126	17459	7.980E-001pCi/g	7.805E-001	7.794E-001	2.583E+000	1.272E+000	0.31	0.7805
TA-182	1301	3.939E-001pCi/g	3.736E-001	3.730E-001	1.242E+000	6.027E-001	0.32	0.3736
TC-99M	17412	-6.172E-002pCi/g	7.271E-002	7.262E-002	2.410E-001	1.188E-001	-0.26	0.0727
TH-227	1058	1.284E+000pCi/g	1.960E+000	1.958E+000	6.493E+000	3.214E+000	0.20	1.9597
TH-229	1046	1.458E+000pCi/g	1.568E+000	1.564E+000	3.942E+000	1.930E+000	0.37	1.5684
TH-234	1027	-1.796E+000pCi/g	5.751E+000	5.750E+000	6.531E+000	3.215E+000	-0.27	5.7506
TL-208	929	1.957E-001pCi/g	1.575E-001	1.572E-001	2.636E-001	1.271E-001	0.74	0.1575
U-235	281	2.796E-001pCi/g	5.431E-001	5.429E-001	1.808E+000	8.902E-001	0.15	0.5431
Y-88	74	-2.025E-001pCi/g	1.338E-001	1.334E-001	3.814E-001	1.849E-001	-0.53	0.1338
ZN-65	31	2.825E-001pCi/g	2.450E-001	2.446E-001	8.132E-001	3.940E-001	0.35	0.2450
ZR-95	7	-1.550E-001pCi/g	1.946E-001	1.944E-001	4.389E-001	2.107E-001	-0.35	0.1946

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-272277~2-A	LCS 160-272277~2-A	CS-137	2.837E+001	pCi/g	2.944E+001	96.35%	-0.4918
		CO-60	1.614E+001	pCi/g	1.645E+001	98.11%	-0.2592
		AM-241	9.775E+001	pCi/g	9.708E+001	100.69%	0.0929

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

Reagent

Tuna Can LCS_00007

ANALYTICS
An Isotope Products Laboratories Company

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

74139-334
1.0 Liter Sand in 1 Liter Wide Mouth HDPE "S" Bottle

Customer: Severn Trent Laboratories/Earth City, MO
P.O. No.: 2169577, Item 1
Calibration Date: 01-Oct-2006 12:00 EST Grams of Master Source: 0.01552

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Pb-210	46.5	8145.9	———	3079.5	0.33	1.46	2.99	4π LS
Am-241	59.5	157860	———	2034.3	0.33	1.46	2.99	4π LS
Cd-109	88.0	462.60	189000	2933.5	0.57	1.70	3.59	HPGe
Co-57	122.1	271.79	94670	1467.8	0.34	1.30	2.69	HPGe
Ce-139	165.9	137.6	133800	2076.7	0.35	1.10	2.31	HPGe
Hg-203	279.2	46.61	295300	4583	0.40	1.10	2.34	HPGe
Sn-113	391.7	115.1	185600	2880.7	0.42	1.10	2.35	HPGe
Cs-137	661.7	10983	116700	1811.3	0.70	1.20	2.78	HPGe
Y-88	898.0	106.60	455400	7068	0.50	1.10	2.42	HPGe
Co-60	1173.2	1925.4	226900	3522	0.60	1.10	2.51	HPGe
Co-60	1332.5	1925.4	227000	3523	0.90	1.10	2.84	HPGe
Y-88	1836.1	106.6	481200	7469	0.90	1.10	2.84	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. Uncertainty: U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
1550 grams of sand. NOTE: Homogeneity was checked by the addition of Tc-99 tracer to the solution used to spike the sand. Ten 10-gram aliquots were removed after mixing and counted to measure the Tc-99. The standard deviation for the 10 measurements was 1.3% with a range of 4.8%. This demonstrates reasonable homogeneity for this source material down to a 10-gram aliquot.
This standard will expire one year after the calibration date.

Source Prepared by: M. I. Taskaeva
M. I. Taskaeva, Radiochemist

QA Approved: for
D. M. Montgomery, QA Manager

Date: 12-21-06

End of Certificate

St. Louis Radiological Standard Verification

Standard ID Number: Tuna Can LCS_00007 (1282974)
True Value = 28.79 pCi/g
Date Analyzed: 9/21/2017

Radionuclide: Cs-137

	Replicates	
#1	28.31	pCi/g
#2	28.6	pCi/g
#3	28.53	pCi/g

Mean = 28.48

1 sigma = 0.15132746

1.96 sigma = 0.296602

True Value minus 5% = 27.3505 (True Value - 5%)
True Value plus 5% = 30.2295 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: JW 9/26/17

2nd Reviewed By/Date: RM 9-27-17

Standard ID Number: Tuna Can LCS_00007 (1282974)
True Value = 14.47 pCi/g
Date Analyzed: 9/21/2017

Radionuclide: Co-60

	Replicates	
#1	14.46	pCi/g
#2	14.27	pCi/g
#3	14.39	pCi/g

Mean = 14.3733333

1 sigma = 0.09609024

1.96 sigma = 0.188337

True Value minus 5% = 13.7465 (True Value - 5%)
True Value plus 5% = 15.1935 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: JW 9/26/17

2nd Reviewed By/Date: lm 9.27.17

Standard ID Number: Tuna Can LCS_00007 (1282974)
True Value = 96.93 pCi/g
Date Analyzed: 9/21/2017

Radionuclide: Am-241

	Replicates	
#1	93.28	pCi/g
#2	93.97	pCi/g
#3	92.89	pCi/g

Mean = 93.38

1 sigma = 0.54690036

1.96 sigma = 1.071925

True Value minus 5% = 92.0835 (True Value - 5%)
True Value plus 5% = 101.7765 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: JW 9/26/17

2nd Reviewed By/Date: RM 9.27.17

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Reagent ID: Tuna Can LCS_00007

Type:	ASTD	Expiration Date:	09/21/2018
Description:	Mixed Gamma Tuna Can LCS	Laboratory:	TestAmerica St. Louis
No. of Bottles:	1	Prepared By:	Watson, Jody L
Storage Location:	Gamma Closet	Vendor:	Analytics
Reagent Volume:	341.900 g	Vendor Lot #:	74139-334
Creation Date:	10/01/2006	Vendor Cat #:	
Open Date:			
Container(s):	1282974		
Comment:			

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
Am-241					219.00000	dpm/g
Co-60					136.00000	dpm/g
Cs-137					82.30000	dpm/g

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gamma Spectroscopy

Batch: 325347 **Operator:**

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-325347~2-	LCS	341.90g	1.00	GammaVision	GV16	9 / 21 / 17 3:43	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	9.048E-001pCi/g	2.661E-001	2.621E-001	6.631E-001	3.146E-001	1.36	0.2661
AG-108M	10982	3.668E-002pCi/g	1.157E-001	1.157E-001	2.696E-001	1.317E-001	0.14	0.1157
AG-110M	10973	-2.316E-001pCi/g	1.957E-001	1.953E-001	6.472E-001	3.170E-001	-0.36	0.1957
AM-241	10818	9.328E+001pCi/g	4.901E+000	7.673E-001	1.120E+000	5.552E-001	83.26	4.9013
BA-133	10469	-1.453E-001pCi/g	1.365E-001	1.363E-001	4.518E-001	2.219E-001	-0.32	0.1365
BA-140	10463	6.864E-001pCi/g	3.618E-001	3.600E-001	7.634E-001	3.681E-001	0.90	0.3618
BE-7	10435	-1.077E+000pCi/g	1.079E+000	1.078E+000	3.575E+000	1.759E+000	-0.30	1.0795
BI-207	10195	8.400E-002pCi/g	7.160E-002	7.147E-002	2.093E-001	1.011E-001	0.40	0.0716
BI-210M	10173	1.437E-001pCi/g	1.414E-001	1.411E-001	3.403E-001	1.661E-001	0.42	0.1414
BI-212	10160	1.463E+000pCi/g	1.237E+000	1.234E+000	4.096E+000	1.993E+000	0.36	1.2367
BI-214	10154	5.551E-001pCi/g	1.698E-001	1.673E-001	3.340E-001	1.591E-001	1.66	0.1698
CD-109	9254	0.000E+000pCi/g	1.206E+000	1.206E+000	8.996E+000	4.463E+000	0.00	1.2058
CD-113M	17462	-2.036E+001pCi/g	1.066E+003	1.066E+003	3.577E+003	1.755E+003	-0.01	1,065.6537
CE-139	9241	-2.403E-002pCi/g	6.710E-002	6.706E-002	2.238E-001	1.101E-001	-0.11	0.0671
CE-141	9235	-2.619E-002pCi/g	1.673E-001	1.673E-001	5.562E-001	2.753E-001	-0.05	0.1673
CE-144	9221	4.653E-001pCi/g	6.901E-001	6.897E-001	2.286E+000	1.132E+000	0.20	0.6901
CF-249	9215	4.298E-002pCi/g	1.363E-001	1.363E-001	4.555E-001	2.238E-001	0.09	0.1363
CF-251	13690	6.063E-002pCi/g	3.338E-001	3.338E-001	8.475E-001	4.149E-001	0.07	0.3338
CO-56	8704	1.207E-001pCi/g	1.049E-001	1.047E-001	2.271E-001	1.089E-001	0.53	0.1049
CO-57	13694	4.884E-001pCi/g	7.303E-001	7.299E-001	2.419E+000	1.198E+000	0.20	0.7303
CO-58	8698	9.260E-002pCi/g	9.393E-002	9.381E-002	3.126E-001	1.518E-001	0.30	0.0939
CO-60	8692	1.446E+001pCi/g	7.501E-001	1.891E-001	7.878E-002	3.285E-002	183.54	0.7501
CR-51	8604	1.380E+000pCi/g	6.647E-001	6.606E-001	1.513E+000	7.337E-001	0.91	0.6647
CS-134	8553	1.602E-001pCi/g	1.266E-001	1.263E-001	4.088E-001	2.007E-001	0.39	0.1266
CS-136	8546	-4.685E-002pCi/g	1.111E-001	1.111E-001	2.430E-001	1.170E-001	-0.19	0.1111
CS-137	8539	2.831E+001pCi/g	1.508E+000	3.231E-001	2.024E-001	9.666E-002	139.88	1.5079
EU-152	7145	1.876E-001pCi/g	1.741E-001	1.738E-001	1.466E+000	7.240E-001	0.13	0.1741
EU-154	7138	4.033E-001pCi/g	4.069E-001	4.064E-001	2.449E+000	1.185E+000	0.16	0.4069
EU-155	7131	2.237E-001pCi/g	2.684E-001	2.681E-001	1.489E+000	7.387E-001	0.15	0.2684
FE-59	7073	3.201E-002pCi/g	2.488E-001	2.488E-001	5.291E-001	2.545E-001	0.06	0.2488
GA-68	18005	-4.863E-002pCi/g	4.659E+000	4.659E+000	9.945E+000	4.775E+000	0.00	4.6590
GD-153	6824	-9.950E-003pCi/g	1.058E-002	1.057E-002	9.331E-001	4.623E-001	-0.01	0.0106
HF-181	6495	1.083E-001pCi/g	1.229E-001	1.228E-001	4.796E-001	2.360E-001	0.23	0.1229
HG-203	6466	-3.624E-002pCi/g	7.772E-002	7.769E-002	2.596E-001	1.273E-001	-0.14	0.0777
I-131	6380	1.408E-002pCi/g	2.242E-002	2.240E-002	2.512E-001	1.225E-001	0.06	0.0224
IR-192	6303	1.702E-002pCi/g	1.564E-002	1.560E-002	2.984E-001	1.466E-001	0.06	0.0156
K-40	6148	6.025E-001pCi/g	4.185E-001	4.174E-001	1.106E+000	4.874E-001	0.54	0.4185
LA-140	6096	-8.046E-002pCi/g	5.037E-002	5.019E-002	1.685E-001	7.637E-002	-0.48	0.0504
MN-54	5382	6.604E-004pCi/g	1.070E-001	1.070E-001	2.363E-001	1.135E-001	0.00	0.1070
NA-22	5201	-1.279E-001pCi/g	6.593E-002	6.562E-002	2.133E-001	1.003E-001	-0.60	0.0659
NB-94	5160	-5.086E-002pCi/g	8.124E-002	8.120E-002	2.727E-001	1.322E-001	-0.19	0.0812
NB-95	5154	0.000E+000pCi/g	3.061E-002	3.061E-002	2.565E-001	1.239E-001	0.00	0.0306
ND-147	5083	1.060E-001pCi/g	6.941E-001	6.941E-001	1.632E+000	7.906E-001	0.06	0.6941
NP-237	4757	3.913E-001pCi/g	7.714E-001	7.711E-001	2.554E+000	1.267E+000	0.15	0.7714
NP-239	4751	-9.779E-002pCi/g	4.296E-001	4.296E-001	1.425E+000	7.070E-001	-0.07	0.4296
PA-231	4541	0.000E+000pCi/g	1.002E+000	1.002E+000	1.318E+001	6.513E+000	0.00	1.0016
PA-233	4535	-3.806E-003pCi/g	3.221E-001	3.221E-001	1.179E+000	5.834E-001	0.00	0.3221
PA-234	4528	1.113E+000pCi/g	4.538E-001	4.501E-001	1.387E+000	6.863E-001	0.80	0.4538
PA-234M	19453	6.869E+000pCi/g	6.140E+000	6.130E+000	4.528E+001	2.201E+001	0.15	6.1399
PB-210	4467	7.675E+002pCi/g	4.562E+001	7.069E+000	1.340E+001	6.641E+000	57.27	45.6164

PB-212	4454	1.236E-001pCi/g	1.686E-001	1.684E-001	5.593E-001	2.754E-001	0.22	0.1686
PB-214	4448	7.401E-001pCi/g	1.726E-001	1.683E-001	4.225E-001	2.048E-001	1.75	0.1726
PM-144	19585	-2.998E-002pCi/g	6.878E-002	6.877E-002	2.326E-001	1.122E-001	-0.13	0.0688
PM-146	2464	7.664E-002pCi/g	2.679E-001	2.679E-001	6.105E-001	2.928E-001	0.13	0.2679
RH-106	1882	-1.029E+000pCi/g	1.345E+000	1.344E+000	4.469E+000	2.197E+000	-0.23	1.3453
RU-103	1828	1.035E-001pCi/g	9.723E-002	9.709E-002	2.256E-001	1.094E-001	0.46	0.0972
SB-124	1784	6.493E-002pCi/g	8.596E-002	8.589E-002	3.647E-001	1.787E-001	0.18	0.0860
SB-125	1777	1.207E-001pCi/g	7.017E-002	6.990E-002	8.276E-001	4.043E-001	0.15	0.0702
SC-46	1739	1.233E-001pCi/g	9.496E-002	9.475E-002	4.767E-001	2.335E-001	0.26	0.0950
SN-113	1570	1.378E-001pCi/g	1.461E-001	1.459E-001	4.842E-001	2.380E-001	0.28	0.1461
SN-126	17459	-1.547E+000pCi/g	3.304E+000	3.303E+000	1.091E+001	5.436E+000	-0.14	3.3036
TA-182	1301	1.291E-001pCi/g	2.200E-001	2.200E-001	1.126E+000	5.468E-001	0.11	0.2200
TC-99M	17412	-6.321E-002pCi/g	9.084E-002	9.077E-002	3.009E-001	1.489E-001	-0.21	0.0908
TH-227	1058	3.015E+000pCi/g	5.085E+000	5.082E+000	1.678E+001	8.363E+000	0.18	5.0847
TH-229	1046	-1.547E+000pCi/g	1.476E+000	1.471E+000	3.702E+000	1.815E+000	-0.42	1.4764
TH-234	1027	-4.867E+000pCi/g	6.764E+000	6.759E+000	2.817E+001	1.404E+001	-0.17	6.7638
TL-208	929	8.356E-002pCi/g	9.786E-002	9.777E-002	2.303E-001	1.110E-001	0.36	0.0979
U-235	281	-2.825E-002pCi/g	3.082E-002	3.079E-002	2.375E+000	1.175E+000	-0.01	0.0308
Y-88	74	-8.803E-002pCi/g	1.370E-001	1.369E-001	2.980E-001	1.438E-001	-0.30	0.1370
ZN-65	31	2.702E-001pCi/g	2.035E-001	2.031E-001	6.732E-001	3.253E-001	0.40	0.2035
ZR-95	7	1.762E-001pCi/g	1.492E-001	1.490E-001	3.353E-001	1.598E-001	0.53	0.1492

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity	StdAdded	Recovery	ZFactor
LCS 160-325347~2-A	LCS 160-325347~2-A	CS-137	2.831E+001 pCi/g	2.879E+001	98.34%	-0.2223
		CO-60	1.446E+001 pCi/g	1.447E+001	99.89%	-0.0145
		AM-241	9.328E+001 pCi/g	9.693E+001	96.23%	-0.5168

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gamma Spectroscopy

Batch: 327342 **Operator:**

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-327342~2-	LCS	341.90g	1.00	GammaVision	GV16	9 / 21 / 17 4:42	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	8.500E-001pCi/g	4.315E-001	4.293E-001	9.173E-001	4.417E-001	0.93	0.4315
AG-108M	10982	9.481E-002pCi/g	4.196E-002	4.168E-002	1.710E-001	8.234E-002	0.55	0.0420
AG-110M	10973	2.660E-001pCi/g	1.258E-001	1.250E-001	5.898E-001	2.883E-001	0.45	0.1258
AM-241	10818	9.397E+001pCi/g	4.945E+000	8.199E-001	1.222E+000	6.061E-001	76.89	4.9452
BA-133	10469	-1.453E-001pCi/g	1.318E-001	1.315E-001	4.360E-001	2.140E-001	-0.33	0.1318
BA-140	10463	5.361E-002pCi/g	3.530E-001	3.530E-001	8.313E-001	4.020E-001	0.06	0.3530
BE-7	10435	-1.086E+000pCi/g	1.072E+000	1.071E+000	3.550E+000	1.746E+000	-0.31	1.0722
BI-207	10195	2.619E-002pCi/g	6.426E-002	6.425E-002	2.170E-001	1.050E-001	0.12	0.0643
BI-210M	10173	1.103E-001pCi/g	1.431E-001	1.430E-001	4.310E-001	2.115E-001	0.26	0.1431
BI-212	10160	1.101E+000pCi/g	8.695E-001	8.676E-001	2.882E+000	1.386E+000	0.38	0.8695
BI-214	10154	5.139E-001pCi/g	1.198E-001	1.168E-001	3.497E-001	1.670E-001	1.47	0.1198
CD-109	9254	6.280E-001pCi/g	2.773E+000	2.773E+000	9.198E+000	4.564E+000	0.07	2.7735
CD-113M	17462	-1.256E+003pCi/g	1.086E+003	1.083E+003	3.587E+003	1.760E+003	-0.35	1,085.7017
CE-139	9241	6.951E-002pCi/g	6.700E-002	6.668E-002	2.210E-001	1.087E-001	0.31	0.0670
CE-141	9235	9.782E-002pCi/g	1.627E-001	1.627E-001	5.395E-001	2.670E-001	0.18	0.1627
CE-144	9221	4.705E-001pCi/g	6.877E-001	6.873E-001	2.278E+000	1.128E+000	0.21	0.6877
CF-249	9215	1.320E-001pCi/g	1.307E-001	1.305E-001	4.332E-001	2.126E-001	0.30	0.1307
CF-251	13690	-3.563E-001pCi/g	3.086E-001	3.070E-001	1.017E+000	4.995E-001	-0.35	0.3086
CO-56	8704	1.030E-001pCi/g	4.239E-002	4.206E-002	2.271E-001	1.089E-001	0.45	0.0424
CO-57	13694	5.054E-002pCi/g	5.763E-002	5.757E-002	1.911E-001	9.406E-002	0.26	0.0576
CO-58	8698	-1.279E-001pCi/g	7.199E-002	7.168E-002	3.394E-001	1.652E-001	-0.38	0.0720
CO-60	8692	1.427E+001pCi/g	7.415E-001	1.906E-001	7.412E-002	3.052E-002	192.59	0.7415
CR-51	8604	-8.335E-001pCi/g	4.560E-001	4.538E-001	4.338E+000	2.146E+000	-0.19	0.4560
CS-134	8553	1.485E-001pCi/g	1.204E-001	1.201E-001	4.276E-001	2.101E-001	0.35	0.1204
CS-136	8546	9.370E-002pCi/g	2.502E-002	2.443E-002	2.556E-001	1.233E-001	0.37	0.0250
CS-137	8539	2.860E+001pCi/g	1.523E+000	3.276E-001	2.249E-001	1.079E-001	127.17	1.5234
EU-152	7145	-3.312E-001pCi/g	1.998E-001	1.991E-001	1.602E+000	7.919E-001	-0.21	0.1998
EU-154	7138	5.882E-001pCi/g	3.374E-001	3.360E-001	2.309E+000	1.116E+000	0.25	0.3374
EU-155	7131	9.622E-002pCi/g	4.703E-001	4.703E-001	1.560E+000	7.741E-001	0.06	0.4703
FE-59	7073	-2.265E-001pCi/g	2.692E-001	2.690E-001	5.651E-001	2.725E-001	-0.40	0.2692
GA-68	18005	1.605E+000pCi/g	4.810E+000	4.809E+000	1.020E+001	4.904E+000	0.16	4.8096
GD-153	6824	-9.427E-002pCi/g	2.781E-001	2.780E-001	9.227E-001	4.571E-001	-0.10	0.2781
HF-181	6495	-1.433E-001pCi/g	1.439E-001	1.437E-001	4.765E-001	2.344E-001	-0.30	0.1439
HG-203	6466	8.908E-002pCi/g	7.501E-002	7.484E-002	2.480E-001	1.214E-001	0.36	0.0750
I-131	6380	7.504E-002pCi/g	7.274E-002	7.264E-002	2.476E-001	1.207E-001	0.30	0.0727
IR-192	6303	6.064E-002pCi/g	1.383E-001	1.382E-001	4.593E-001	2.271E-001	0.13	0.1383
K-40	6148	2.839E-002pCi/g	5.578E-001	5.578E-001	1.382E+000	6.252E-001	0.02	0.5578
LA-140	6096	-1.272E-002pCi/g	6.694E-002	6.694E-002	1.343E-001	5.927E-002	-0.09	0.0669
MN-54	5382	-1.293E-002pCi/g	7.314E-002	7.314E-002	2.220E-001	1.064E-001	-0.06	0.0731
NA-22	5201	-9.911E-002pCi/g	5.513E-002	5.491E-002	1.791E-001	8.323E-002	-0.55	0.0551
NB-94	5160	7.171E-002pCi/g	8.219E-002	8.210E-002	2.744E-001	1.331E-001	0.26	0.0822
NB-95	5154	6.785E-002pCi/g	6.382E-002	6.373E-002	2.130E-001	1.022E-001	0.32	0.0638
ND-147	5083	-3.054E-001pCi/g	7.104E-001	7.102E-001	1.663E+000	8.061E-001	-0.18	0.7104
NP-237	4757	-5.319E-001pCi/g	1.657E+000	1.657E+000	2.693E+000	1.337E+000	-0.20	1.6574
NP-239	4751	2.641E-001pCi/g	4.419E-001	4.416E-001	1.462E+000	7.256E-001	0.18	0.4419
PA-231	4541	-9.132E-002pCi/g	9.741E-002	9.729E-002	1.310E+001	6.472E+000	-0.01	0.0974
PA-233	4535	3.446E-001pCi/g	3.778E-001	3.774E-001	1.090E+000	5.386E-001	0.32	0.3778
PA-234	4528	2.876E-001pCi/g	4.140E-001	4.137E-001	1.371E+000	6.786E-001	0.21	0.4140
PA-234M	19453	-2.098E+001pCi/g	1.502E+001	1.498E+001	5.286E+001	2.580E+001	-0.40	15.0219
PB-210	4467	8.153E+002pCi/g	4.866E+001	8.716E+000	1.491E+001	7.395E+000	54.69	48.6615

PB-212	4454	5.258E-001pCi/g	1.077E-001	1.021E-001	3.165E-001	1.540E-001	1.66	0.1077
PB-214	4448	6.432E-001pCi/g	1.307E-001	1.263E-001	3.806E-001	1.838E-001	1.69	0.1307
PM-144	19585	-6.996E-002pCi/g	8.109E-002	8.101E-002	2.708E-001	1.313E-001	-0.26	0.0811
PM-146	2464	2.538E-001pCi/g	2.166E-001	2.162E-001	4.878E-001	2.315E-001	0.52	0.2166
RH-106	1882	9.992E-001pCi/g	1.049E+000	1.048E+000	3.485E+000	1.705E+000	0.29	1.0495
RU-103	1828	-1.026E-002pCi/g	7.167E-002	7.167E-002	2.444E-001	1.187E-001	-0.04	0.0717
SB-124	1784	-1.032E-001pCi/g	1.298E-001	1.297E-001	4.310E-001	2.118E-001	-0.24	0.1298
SB-125	1777	-1.763E-001pCi/g	1.830E-001	1.828E-001	8.131E-001	3.971E-001	-0.22	0.1830
SC-46	1739	1.436E-001pCi/g	1.225E-001	1.223E-001	4.056E-001	1.980E-001	0.35	0.1225
SN-113	1570	-9.433E-002pCi/g	7.930E-002	7.915E-002	5.086E-001	2.502E-001	-0.19	0.0793
SN-126	17459	-1.523E+000pCi/g	3.319E+000	3.318E+000	1.096E+001	5.462E+000	-0.14	3.3190
TA-182	1301	2.064E-001pCi/g	3.682E-001	3.680E-001	1.234E+000	6.007E-001	0.17	0.3682
TC-99M	17412	0.000E+000pCi/g	3.379E-002	3.379E-002	3.005E-001	1.487E-001	0.00	0.0338
TH-227	1058	-3.064E+000pCi/g	5.199E+000	5.196E+000	1.716E+001	8.551E+000	-0.18	5.1990
TH-229	1046	-1.641E+000pCi/g	1.217E+000	1.210E+000	3.998E+000	1.963E+000	-0.41	1.2168
TH-234	1027	-4.774E+000pCi/g	7.226E+000	7.222E+000	2.799E+001	1.395E+001	-0.17	7.2259
TL-208	929	2.380E-001pCi/g	9.205E-002	9.122E-002	2.092E-001	1.004E-001	1.14	0.0920
U-235	281	0.000E+000pCi/g	2.223E-001	2.223E-001	2.402E+000	1.189E+000	0.00	0.2223
Y-88	74	-1.225E-001pCi/g	1.401E-001	1.399E-001	3.034E-001	1.465E-001	-0.40	0.1401
ZN-65	31	-1.401E-001pCi/g	2.510E-001	2.509E-001	8.418E-001	4.096E-001	-0.17	0.2510
ZR-95	7	-4.541E-003pCi/g	4.520E-003	4.514E-003	4.071E-001	1.957E-001	-0.01	0.0045

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-327342~2-A	LCS 160-327342~2-A	CS-137	2.860E+001	pCi/g	2.879E+001	99.33%	-0.0887
		CO-60	1.427E+001	pCi/g	1.447E+001	98.62%	-0.1892
		AM-241	9.397E+001	pCi/g	9.693E+001	96.95%	-0.4168

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gamma Spectroscopy

Batch: 327322 **Operator:**

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-327322~2-	LCS	341.90g	1.00	GammaVision	GV16	9 / 21 / 17 3:01	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	8.750E-002pCi/g	4.692E-001	4.692E-001	1.026E+000	4.960E-001	0.09	0.4692
AG-108M	10982	3.131E-002pCi/g	4.204E-002	4.201E-002	2.628E-001	1.283E-001	0.12	0.0420
AG-110M	10973	1.045E-001pCi/g	8.401E-002	8.384E-002	5.938E-001	2.903E-001	0.18	0.0840
AM-241	10818	9.289E+001pCi/g	4.865E+000	6.537E-001	9.745E-001	4.823E-001	95.32	4.8649
BA-133	10469	1.368E-001pCi/g	1.303E-001	1.301E-001	4.317E-001	2.119E-001	0.32	0.1303
BA-140	10463	2.647E-001pCi/g	3.485E-001	3.482E-001	8.135E-001	3.931E-001	0.33	0.3485
BE-7	10435	-1.104E+000pCi/g	1.063E+000	1.061E+000	3.519E+000	1.730E+000	-0.31	1.0630
BI-207	10195	1.758E-002pCi/g	2.874E-002	2.873E-002	2.146E-001	1.038E-001	0.08	0.0287
BI-210M	10173	-6.782E-002pCi/g	1.268E-001	1.267E-001	4.230E-001	2.075E-001	-0.16	0.1268
BI-212	10160	-9.206E-001pCi/g	1.301E+000	1.300E+000	3.534E+000	1.712E+000	-0.26	1.3012
BI-214	10154	6.724E-001pCi/g	2.010E-001	1.979E-001	3.908E-001	1.875E-001	1.72	0.2010
CD-109	9254	5.730E+000pCi/g	1.460E+000	1.425E+000	3.488E+000	1.709E+000	1.64	1.4600
CD-113M	17462	-2.443E+002pCi/g	1.040E+003	1.040E+003	3.484E+003	1.709E+003	-0.07	1,040.1179
CE-139	9241	-5.180E-002pCi/g	7.253E-002	7.237E-002	2.405E-001	1.184E-001	-0.22	0.0725
CE-141	9235	-1.095E-001pCi/g	1.695E-001	1.694E-001	5.616E-001	2.780E-001	-0.19	0.1695
CE-144	9221	-4.716E-001pCi/g	7.236E-001	7.231E-001	2.397E+000	1.187E+000	-0.20	0.7236
CF-249	9215	1.332E-001pCi/g	1.321E-001	1.319E-001	4.376E-001	2.149E-001	0.30	0.1321
CF-251	13690	2.555E-001pCi/g	3.216E-001	3.208E-001	8.102E-001	3.963E-001	0.32	0.3216
CO-56	8704	7.595E-002pCi/g	4.158E-002	4.139E-002	2.386E-001	1.146E-001	0.32	0.0416
CO-57	13694	6.304E-002pCi/g	5.399E-002	5.389E-002	1.784E-001	8.773E-002	0.35	0.0540
CO-58	8698	4.917E-002pCi/g	9.888E-002	9.885E-002	3.320E-001	1.615E-001	0.15	0.0989
CO-60	8692	1.439E+001pCi/g	7.463E-001	1.867E-001	7.056E-002	2.874E-002	203.99	0.7463
CR-51	8604	-1.736E-002pCi/g	5.160E-001	5.160E-001	2.376E+000	1.165E+000	-0.01	0.5160
CS-134	8553	2.089E-001pCi/g	1.678E-001	1.674E-001	4.023E-001	1.974E-001	0.52	0.1678
CS-136	8546	8.617E-002pCi/g	5.071E-002	5.047E-002	2.414E-001	1.162E-001	0.36	0.0507
CS-137	8539	2.853E+001pCi/g	1.519E+000	3.225E-001	1.931E-001	9.202E-002	147.72	1.5188
EU-152	7145	6.155E-001pCi/g	3.994E-001	3.981E-001	1.428E+000	7.051E-001	0.43	0.3994
EU-154	7138	7.701E-001pCi/g	4.669E-001	4.652E-001	2.363E+000	1.142E+000	0.33	0.4669
EU-155	7131	2.663E-001pCi/g	4.397E-001	4.395E-001	1.455E+000	7.218E-001	0.18	0.4397
FE-59	7073	-4.433E-002pCi/g	2.429E-001	2.429E-001	5.165E-001	2.483E-001	-0.09	0.2429
GA-68	18005	-2.186E+000pCi/g	5.044E+000	5.043E+000	1.068E+001	5.136E+000	-0.20	5.0442
GD-153	6824	7.494E-002pCi/g	3.280E-001	3.280E-001	1.088E+000	5.398E-001	0.07	0.3280
HF-181	6495	1.034E-001pCi/g	1.372E-001	1.371E-001	4.695E-001	2.310E-001	0.22	0.1372
HG-203	6466	-1.999E-002pCi/g	7.720E-002	7.719E-002	2.586E-001	1.268E-001	-0.08	0.0772
I-131	6380	1.331E-002pCi/g	1.020E-001	1.020E-001	2.485E-001	1.212E-001	0.05	0.1020
IR-192	6303	2.431E-002pCi/g	1.338E-001	1.338E-001	4.456E-001	2.202E-001	0.05	0.1338
K-40	6148	-8.047E-001pCi/g	2.674E+000	2.674E+000	1.708E+000	7.880E-001	-0.47	2.6744
LA-140	6096	8.073E-002pCi/g	7.575E-002	7.563E-002	1.128E-001	4.852E-002	0.72	0.0757
MN-54	5382	1.764E-002pCi/g	1.033E-001	1.033E-001	2.279E-001	1.093E-001	0.08	0.1033
NA-22	5201	3.114E-002pCi/g	4.610E-002	4.608E-002	1.592E-001	7.327E-002	0.20	0.0461
NB-94	5160	9.861E-002pCi/g	7.976E-002	7.960E-002	2.642E-001	1.280E-001	0.37	0.0798
NB-95	5154	0.000E+000pCi/g	4.536E-002	4.536E-002	2.484E-001	1.199E-001	0.00	0.0454
ND-147	5083	1.353E+000pCi/g	6.646E-001	6.601E-001	1.513E+000	7.312E-001	0.89	0.6646
NP-237	4757	-5.262E-001pCi/g	3.908E-001	3.897E-001	2.736E+000	1.358E+000	-0.19	0.3908
NP-239	4751	-2.565E-001pCi/g	4.286E-001	4.284E-001	1.418E+000	7.037E-001	-0.18	0.4286
PA-231	4541	-5.356E-008pCi/g	3.922E+000	3.922E+000	1.307E+001	6.461E+000	0.00	3.9218
PA-233	4535	-3.806E-003pCi/g	1.397E-001	1.397E-001	1.069E+000	5.284E-001	0.00	0.1397
PA-234	4528	3.080E-001pCi/g	2.599E-001	2.594E-001	5.782E-001	2.820E-001	0.53	0.2599
PA-234M	19453	1.595E+001pCi/g	1.353E+001	1.350E+001	4.482E+001	2.178E+001	0.36	13.5253
PB-210	4467	7.622E+002pCi/g	4.531E+001	7.090E+000	1.361E+001	6.748E+000	55.98	45.3109

PB-212	4454	7.513E-001pCi/g	1.780E-001	1.712E-001	3.711E-001	1.813E-001	2.02	0.1780
PB-214	4448	5.325E-001pCi/g	1.616E-001	1.592E-001	4.404E-001	2.137E-001	1.21	0.1616
PM-144	19585	3.767E-002pCi/g	5.127E-002	5.124E-002	2.457E-001	1.188E-001	0.15	0.0513
PM-146	2464	-3.219E-001pCi/g	2.884E-001	2.879E-001	6.460E-001	3.105E-001	-0.50	0.2884
RH-106	1882	1.934E+000pCi/g	1.280E+000	1.276E+000	4.067E+000	1.996E+000	0.48	1.2804
RU-103	1828	1.121E-001pCi/g	5.519E-002	5.488E-002	1.474E-001	7.024E-002	0.76	0.0552
SB-124	1784	1.132E-001pCi/g	1.399E-001	1.398E-001	3.919E-001	1.923E-001	0.29	0.1399
SB-125	1777	1.076E-001pCi/g	8.679E-002	8.662E-002	8.612E-001	4.211E-001	0.12	0.0868
SC-46	1739	0.000E+000pCi/g	6.229E-002	6.229E-002	4.333E-001	2.118E-001	0.00	0.0623
SN-113	1570	5.394E-002pCi/g	1.424E-001	1.424E-001	4.754E-001	2.336E-001	0.11	0.1424
SN-126	17459	-1.519E+000pCi/g	3.303E+000	3.302E+000	1.090E+001	5.435E+000	-0.14	3.3026
TA-182	1301	-4.896E-001pCi/g	3.452E-001	3.444E-001	1.139E+000	5.530E-001	-0.43	0.3452
TC-99M	17412	0.000E+000pCi/g	1.694E-002	1.694E-002	3.153E-001	1.561E-001	0.00	0.0169
TH-227	1058	7.587E-001pCi/g	1.843E+000	1.843E+000	6.115E+000	3.029E+000	0.12	1.8434
TH-229	1046	-1.629E+000pCi/g	1.554E+000	1.548E+000	3.893E+000	1.910E+000	-0.42	1.5535
TH-234	1027	-4.783E+000pCi/g	1.167E+000	1.140E+000	2.788E+001	1.390E+001	-0.17	1.1667
TL-208	929	3.622E-001pCi/g	9.634E-002	9.449E-002	1.952E-001	9.343E-002	1.86	0.0963
U-235	281	3.472E-001pCi/g	7.050E-001	7.048E-001	2.523E+000	1.250E+000	0.14	0.7050
Y-88	74	-9.672E-003pCi/g	1.010E-002	1.009E-002	2.867E-001	1.382E-001	-0.03	0.0101
ZN-65	31	0.000E+000pCi/g	1.100E-001	1.100E-001	7.843E-001	3.808E-001	0.00	0.1100
ZR-95	7	-5.796E-002pCi/g	1.604E-001	1.604E-001	3.658E-001	1.750E-001	-0.16	0.1604

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-327322~2-A	LCS 160-327322~2-A	CS-137	2.853E+001	pCi/g	2.879E+001	99.09%	-0.1216
		CO-60	1.439E+001	pCi/g	1.447E+001	99.44%	-0.0771
		AM-241	9.289E+001	pCi/g	9.693E+001	95.83%	-0.5747

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

Reagent

Tuna Can_00002

Rec'd 2/3/10

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

81427-334

1.0 Liter Sand in 1 Liter HDPE Silgan Jar

Customer: TestAmerica/St. Louis, MO
P.O. No.: 2339090, Item 1
Reference Date: 01-Jan-2010 12:00 PM EST **Grams of Master Source:** 0.017570

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Pb-210	46.5	8.120E+03	———	3.141E+03	0.1	2.1	4.1	4π LS
Am-241	59.5	1.580E+05	———	2.034E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.606E+05	2.822E+03	0.4	2.3	4.7	HPGe
Co-57	122.1	2.718E+02	8.471E+04	1.488E+03	0.5	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.209E+05	2.124E+03	0.4	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.726E+05	4.790E+03	0.4	1.9	3.9	HPGe
Sn-113	391.7	1.151E+02	1.672E+05	2.938E+03	0.5	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.096E+05	1.926E+03	0.6	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.077E+05	7.163E+03	0.4	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.055E+05	3.611E+03	0.5	1.9	3.9	HPGe
Co-60	1332.5	1.925E+03	2.056E+05	3.612E+03	0.7	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.308E+05	7.569E+03	0.5	1.9	3.9	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY — HEALTH PHYSICS SOCIETY — FOUNDED 1956

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd Atlanta, Georgia 30318

Comments:
1550 grams of sand.
This standard will expire one year after the reference date.

Source Prepared by: _____
W. Mao, Radiochemist

QA Approved: _____ Date: 2/1/10
J. D. McCorvey, QA Manager Alternate

Reagent

Tuna Can_00003

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

90099

1.0 Liter Sand in 1 Liter Wide Mouth HDPE Silgan Jar

Customer: TestAmerica St. Louis / Earth City, MO
P.O. No.: 2454150, Item 1
Reference Date: 01-Jan-2012 12:00 PM EST **Grams of Master Source:** 0.017180

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Additional radionuclides were added gravimetrically from solutions calibrated by gamma-ray spectrometry, ionization chamber, or liquid scintillation counting. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty* , % Type u_A	u_B	U	Calibration Method*
Pb-210	46.5	8.109E+03	———	3.094E+03	0.1	2.1	4.1	4π LS
Am-241	59.5	1.580E+05	———	2.037E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.677E+05	2.881E+03	0.5	2.3	4.7	HPGe
Co-57	122.1	2.718E+02	8.795E+04	1.511E+03	0.4	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.245E+05	2.139E+03	0.4	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.707E+05	4.651E+03	0.3	1.9	3.8	HPGe
Sn-113	391.7	1.151E+02	1.755E+05	3.015E+03	0.4	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.128E+05	1.938E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.228E+05	7.264E+03	0.5	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.084E+05	3.580E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.084E+05	3.581E+03	0.7	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.476E+05	7.690E+03	0.7	1.9	4.0	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Comments:
1550 grams of sand. Homogenous down to 10 grams aliquot.
This standard will expire one year after the reference date.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 30 JAN 12
J.D. McCorvey, Counting Room Manager

Reagent

Tuna Can_00006

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

83814-334

1.0 Liter Sand in 1 Liter Wide Mouth HDPE Silgan Jar

Customer: Test America St. Louis
P.O. No.: 2395112, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.016927

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Pb-210	46.5	8.120E+03	———	3.021E+03	0.1	2.1	4.1	4π LS
Am-241	59.5	1.580E+05	———	2.090E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	2.873E+03	0.8	2.3	4.9	HPGe
Co-57	122.1	2.718E+02	8.711E+04	1.475E+03	0.5	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	2.111E+03	0.5	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	4.660E+03	0.4	1.9	3.9	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	2.994E+03	0.5	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	1.877E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.224E+05	7.150E+03	0.5	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	3.626E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	3.627E+03	0.6	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	7.570E+03	0.5	1.9	3.9	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS FOUNDED 1956 SOCIETY

Corporate Office
Laboratory

Comments:
1550 grams of sand. Homogeneous down to 10 gram aliquot.
This standard will expire one year after the reference date.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 2/11/11
J. D. McCorvey, QA Manager Alternate

Reagent

U-232_00003

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

85539-334

5 mL Liquid in Flame Sealed Vial

Customer: Test America/Earth City, MO
P.O. No.: 2434448, Item 1

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry and liquid scintillation counting. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty*, % Type u_A	u_B	U	Reference Date (12:00 PM EST)
U-232	2.517E+04	1.725E+04	0.5	2.4	4.9	08/25/2011

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: U-232 daughters, γ-impurities (other than decay products) < 0.1 %.

Source Prepared by: M. I. Taskaeva
M. I. Taskaeva, Radiochemist

QA Approved:
J. D. McCorvey, QA Manager Alternate

Date: 8/25/11

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

U-232_00040

Standard ID Number:	U-232_00040 (Clean)		Radionuclide:
True Value =	77.177	dpm/mL	U-232
Date Analyzed:	12/20/2017		

	Replicates	
#1	83.23	dpm/mL
#2	76.85	dpm/mL
#3	78.14	dpm/mL

Mean = 79.4066667

1 sigma = 3.37334157 1.96 sigma = 6.611749

True Value minus 5% = 73.31815 (True Value - 5%)
True Value plus 5% = 81.03585 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: ALD 12/21/17

2nd Reviewed By/Date: [illegible] 12-21-17

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	8/25/2011 0:00		
Decayto Date/Time (t):	12/20/17 0:00		
Initial Activity (A_0):	82.25 dpm		
Initial Aliquot:	1 mL		
Initial Conc:	82.245 dpm/mL		
***Soln. Density:**	1 g/mL		
Nuclide:	U-232		
Half-Life (days):	25165.725	decay days	fraction
****Decay Factor:**	0.9384	2309.00	0.09175
Decay Corr Activity:	7.7177E+01 dpm		
Decay Corr Conc:	7.7177E+01 dpm/mL		

Conversion/Calculations

Final Activity Unit:	dpm
Activity Unit Factor:	1.00000
Final Volume Unit:	mL
Volume Unit Factor:	1.000
Final Concentration:	7.7177E+01 dpm/mL
Aliquot Volume:	1.0000E+00 mL
Final Activity (A):	7.7177E+01 dpm

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:50:32AM 12/21/2017

Sample

Sample Name: Ver1 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: U232 Clean
AnalysisResultsID: 206424
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

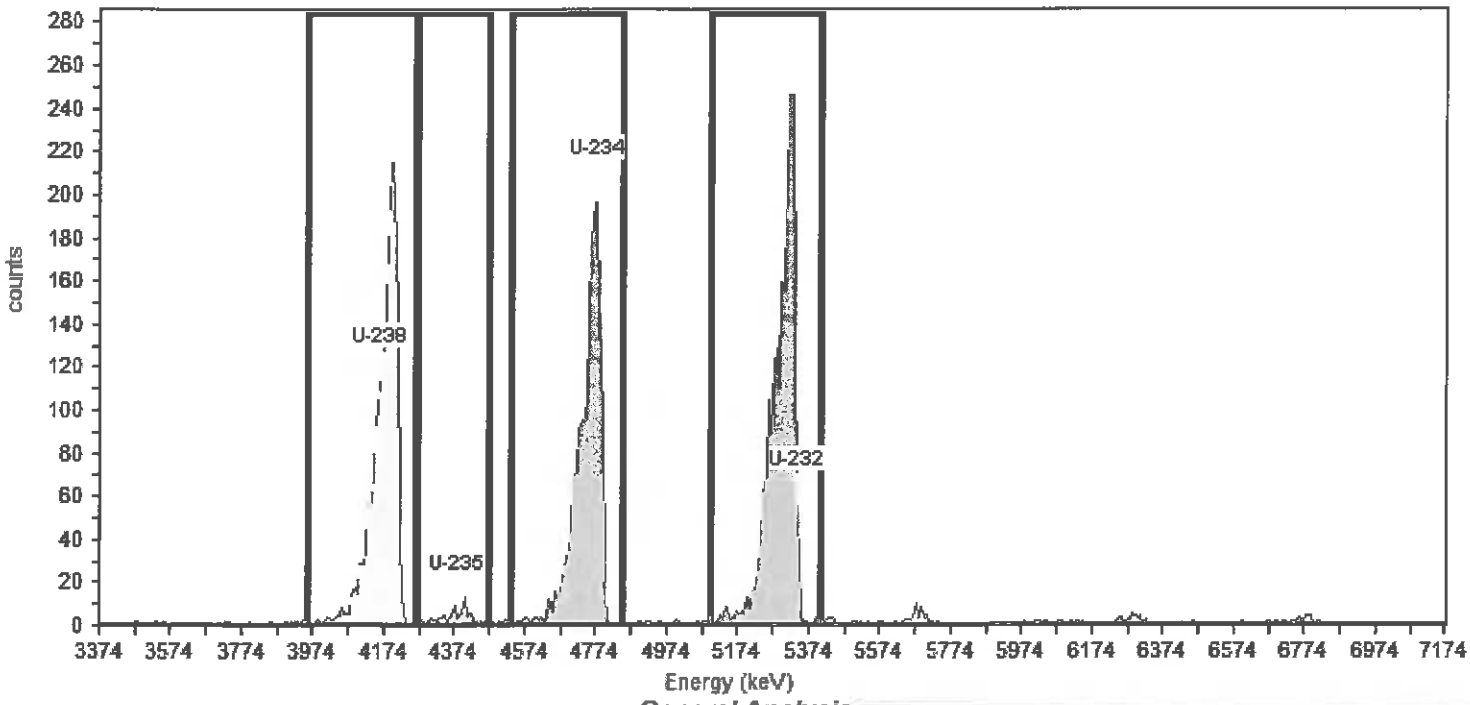
Tracer Name: UNAT_00013
Tracer Activity: 72.26 DPM / mL x (Vol.) 0.10 mL = 7.23 DPM
Tracer Ref. Date: 3/30/2008 11:48:31AM

Tracer Nuclide: U-238
Tracer Recovery: 114.55%

Acquisition

Detector: AV239 SN: 51-005EE1
Acquisition Start Date: 12/20/2017 7:23:04PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Background Date: 11/17/2017 3:28:16PM
Bkgd Info: Sample: ICB;AV239; Det: AV239; Spectrum #1; 11/17/2017 3:28:16 PM

Energy Calibration: IC-9794;AV239-20171114
Efficiency Calibration:IC-9794;AV239-20171114
Calibration Date: 11/15/2017 8:27:30AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.25% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI_U-232
Decay Correction:12/20/2017 7:22:15PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	62.0	100.0	1770	2.0000	1768.00	8.278E+001	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	52.3	80.2	83	4.0000	79.00	4.026E+000	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	62.5	99.8	1701	3.0000	1698.00	6.954E+001	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	72.6	100.1	2043	5.0000	2038.00	8.323E+001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:51:03AM 12/21/2017

Sample

Sample Name: Ver2 Type: Sample
Spectrum #1 Analysis #1
:
Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: U232 Clean
AnalysisResultsID: 206425
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

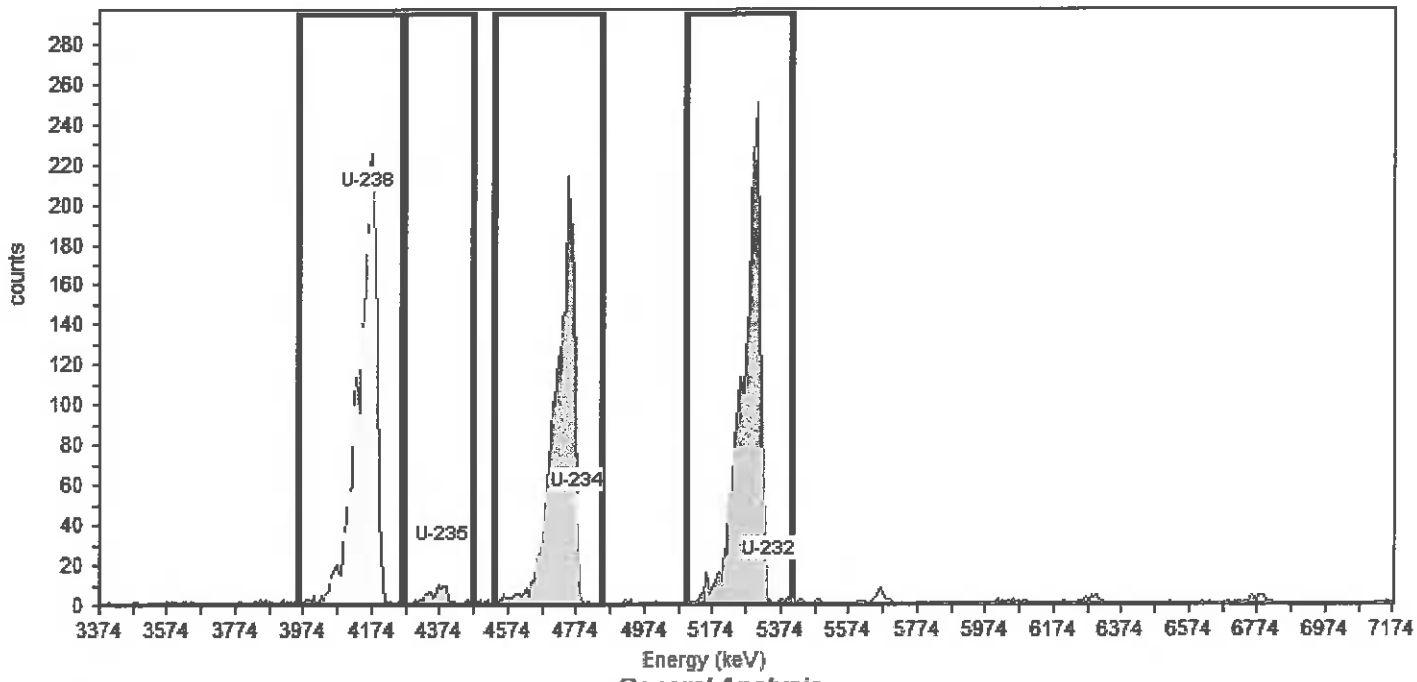
Tracer Name: UNAT_00013
Tracer Activity: 72.26 DPM / mL x (Vol.) 0.10 mL = 7.23 DPM
Tracer Ref. Date: 3/30/2008 11:48:31AM

Tracer Nuclide: U-238
Tracer Recovery: 103.73%

Acquisition

Detector: AV240 SN: 51-005Q1
Acquisition Start Date: 12/20/2017 7:23:05PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Background Date: 11/17/2017 3:28:16PM
Bkgd Info: Sample: ICB;AV240; Det: AV240; Spectrum #1; 11/17/2017 3:28:16 PM

Energy Calibration: IC-9795;AV240-20171114
Efficiency Calibration:IC-9795;AV240-20171114
Calibration Date: 11/15/2017 8:27:37AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.17% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI_U-232
Decay Correction:12/20/2017 7:22:15PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	63.1	100.0	1884	1.0000	1883.00	7.496E+001	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	63.7	80.2	74	1.0000	73.00	3.493E+000	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	71.3	99.8	1817	4.0000	1813.00	6.972E+001	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	67.7	100.1	2005	1.0000	2004.00	7.685E+001	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:51:36AM 12/21/2017

Sample

Sample Name: Ver3 Type: Sample
Spectrum #1 Analysis #1

Sample Collection Date:
Comment:

Sample Volume : 0.10 Sample Units: mL
First Stage Dilution: N/A
Aliquot: N/A Aliquot Fraction: N/A
Dilution 2: N/A
Lab Preparation:

Batch

Batch Name: U232 Clean
AnalysisResultsID: 206426
Description:

Client Name: Undefined
Client Contact:
Analyst: 60040

Tracer

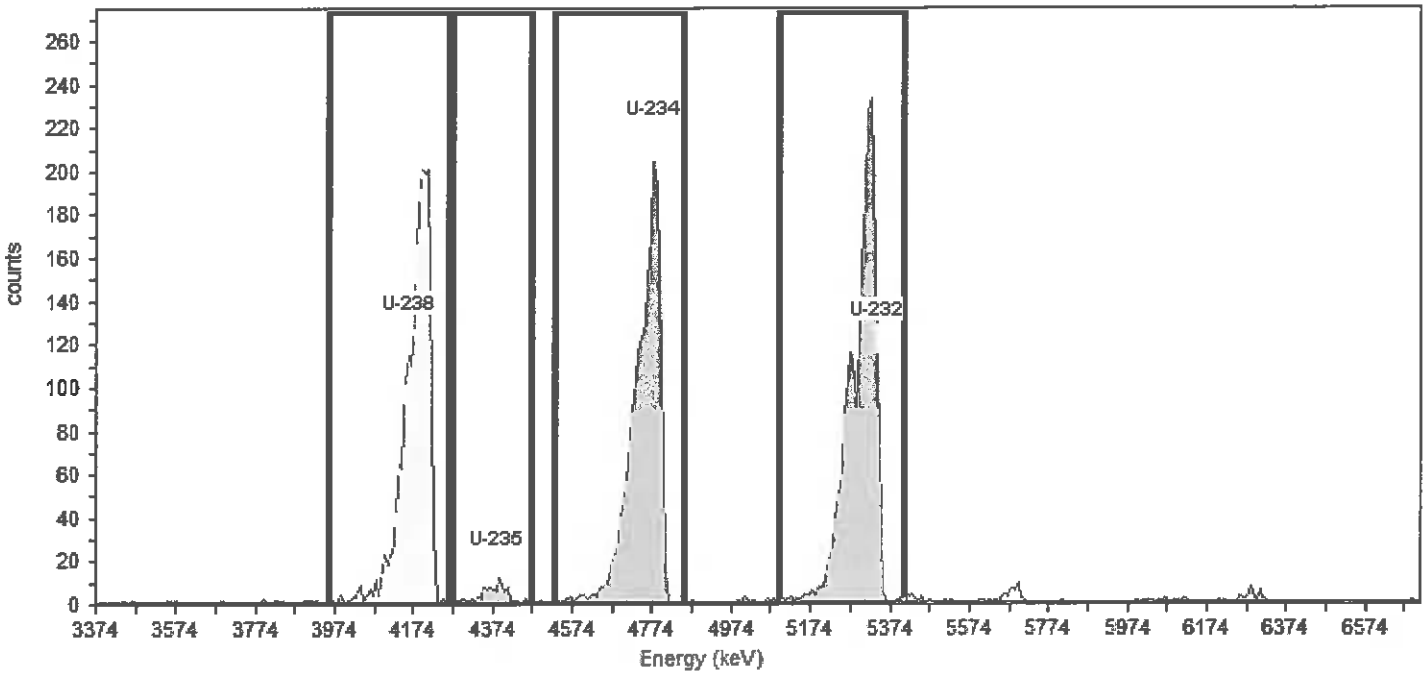
Tracer Name: UNAT_00013
Tracer Activity: 72.26 DPM / mL x (Vol.) 0.10 mL = 7.23 DPM
Tracer Ref. Date: 3/30/2008 11:48:31AM

Tracer Nuclide: U-238
Tracer Recovery: 122.50%

Acquisition

Detector: AV242 SN: 51-005P7
Acquisition Start Date: 12/20/2017 7:23:05PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/17/2017 3:28:17PM
Bkgd Info: Sample: ICB;AV242; Det: AV242; Spectrum #1; 11/17/2017 3:28:17 PM

Energy Calibration: IC-9884;AV242-20171114a
Efficiency Calibration:IC-9884;AV242-20171114a
Calibration Date: 11/15/2017 8:27:49AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.04% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI_U-232
Decay Correction:12/20/2017 7:22:15PM
MDA Constants: Kα = 1.64 , Kβ = 1.64

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	70.6	100.0	1873	0.0000	1873.00	8.853E+001	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	60.4	80.2	81	1.0000	80.00	3.849E+000	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	72.8	99.8	1864	4.0000	1860.00	7.191E+001	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	64.8	100.1	2039	12.0000	2027.00	7.814E+001	DPM/mL

U-232 Clean Tracer VER.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Standard Verification (coppt.)

Batch No. : _____

Balance ID : _____

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	VER. 1	0.1	239	
2	2	1	240	
3	3		242	
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. I.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A

Initials / Date

Isotope : UNAT
Std Sol'n No. : UNAT-00013
Vol (mL) : 0.1
Ref Activity (dpm/mL) : _____
Act Ref Date : _____

Samples Spiked and Traced By:
SLB 12/19/17
Initials / Date

Verification Signature & Date:
[signature] 12/19/17
Initials / Date

LCS Standard ☐ N/A

Initials / Date

Isotope : U-232 Clean
Std Sol'n ID. : U-232-00040
Vol (mL) : 0.1
Ref Activity (dpm/mL) : 82.245
Act Ref Date : 08-25-11

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐	ST-RC-0003 Rev.	☐	ST-RC-0040 Rev.	☐	ST-RC-0110 Rev.
☐	ST-RC-0004 Rev.	☐	ST-RC-0041 Rev.	☐	ST-RC-0120 Rev.
☐	ST-RC-0014 Rev.	☐	ST-RC-0050 Rev.	☐	ST-RC-0232 Rev.
☐	ST-RC-0020 Rev.	☐	ST-RC-0090 Rev.	☐	ST-RC-0238 Rev.
☐	ST-RC-0021 Rev.	☐	ST-RC-0100 Rev.	☐	ST-RC-0240 Rev.
				☐	ST-RC-0241 Rev.
				☐	ST-RC-0242 Rev.
				☐	ST-RC-5016 Rev.
				☐	
				☐	

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____
Date : _____

Reviewed by: _____
Date: _____

\\Slsvr01\RAD\MasterForms\RAD-0045 Rev(3)

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

U-232 Clean Tracer VER.

Standard Verification ONLY

Batch No. : _____

(COPPA) Balance ID : _____

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	VER. 1 LC²: 136	0.1	235	LC: 247
2	1 2 LC²: 137	1	237	LC: 248 5th,5T
3	1 3 LC²: 138	1	238	LC: 249
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. I.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A

Initials / Date

Clean

Isotope : U-232

Std Sol'n No. : U-232-000140

Vol (mL) : 0.1

Ref Activity (dpm/mL) : 82.245

Act Ref Date : 08-25-11

Samples Spiked and Traced By:

SNB 12/19/17
Initials / Date

Verification Signature & Date:

DAM 12/19/17
Initials / Date

LCS Standard ☐ N/A

Initials / Date

Isotope : _____ _____

Std Sol'n ID. : _____ _____

Vol (mL) : _____ _____

Ref Activity (dpm/mL) : _____ _____

Act Ref Date : _____ _____

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐ ST-RC-0003 Rev.	☐ ST-RC-0040 Rev.	☐ ST-RC-0110 Rev.
☐ ST-RC-0004 Rev.	☐ ST-RC-0041 Rev.	☐ ST-RC-0120 Rev.
☐ ST-RC-0014 Rev.	☐ ST-RC-0050 Rev.	☐ ST-RC-0232 Rev.
☐ ST-RC-0020 Rev.	☐ ST-RC-0090 Rev.	☐ ST-RC-0238 Rev.
☐ ST-RC-0021 Rev.	☐ ST-RC-0100 Rev.	☐ ST-RC-0240 Rev.
		☐ ST-RC-0241 Rev.
		☐ ST-RC-0242 Rev.
		☐ ST-RC-5016 Rev.
		☐
		☐

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____

Date : _____

Reviewed by: _____

Date: _____

\\Slsvr01\RAD\MasterForms\RAD-0045 Rev(3)

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:04:10AM 12/28/2017

Sample

Sample Name: Verification 1
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232 Clean Tracer Only
AnalysisID: 718500

Analyst: 60040

Tracer

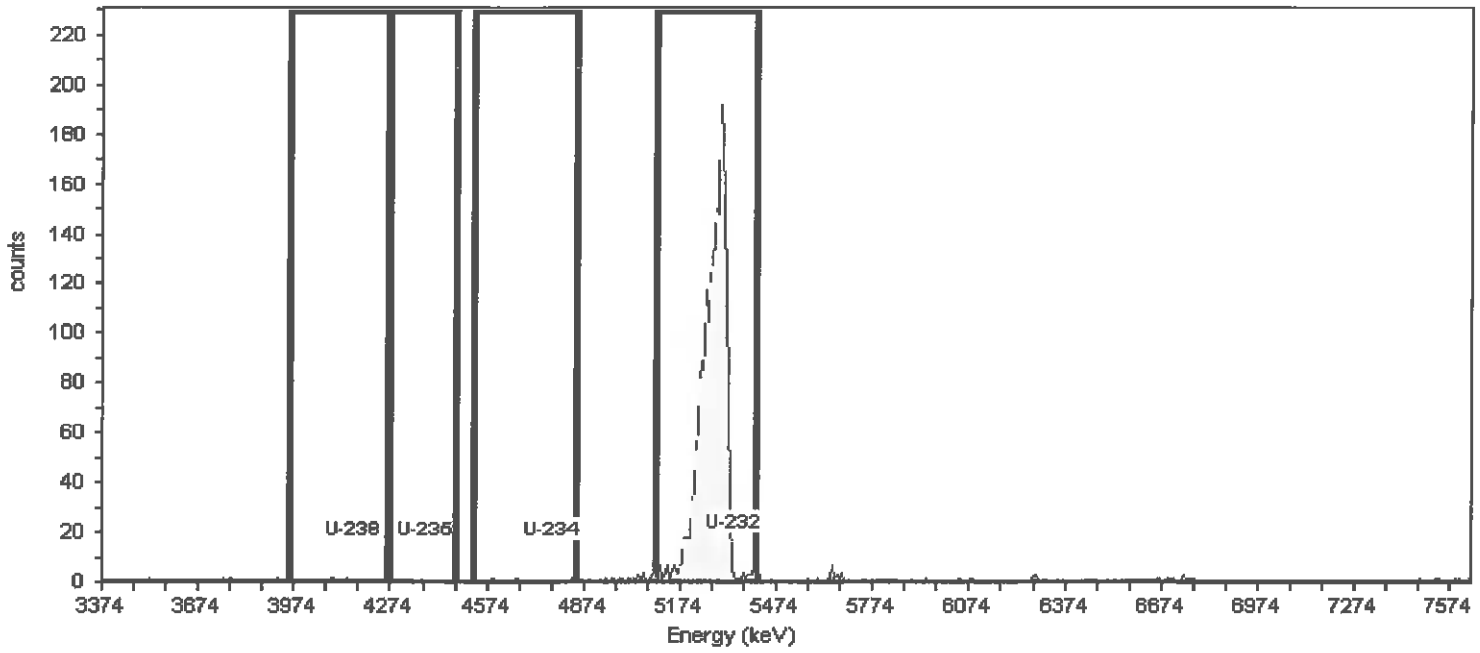
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.10 mL = 8.22 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 104.22%

Acquisition

Detector: AV136
Serial Number: 49-169O2
Acquisition Start Date: 12/27/2017 4:45:29PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 12/19/2017 12:17:35PM
Background Info: Sample: ICB;AV136; Det: AV136; Spectrum #1; Dec-19-2017 12:17

Calibration Name: IC-9885;AV136-20170802
Calibration Date: 8/2/2017 4:16:31PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.16% +/- 0.36% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 12/27/2017 4:44:20PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	88.1	100.0	2	1.0000	1.00	0.041	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	.0	80.2	0	0.0000	0.00	0.000	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	10.7	99.8	3	2.0000	1.00	0.041	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	80.0	100.1	1873	1.0000	1872.00	85.715	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:04:25AM 12/28/2017

Sample

Sample Name: Verification 2
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232 Clean Tracer Only
AnalysisID: 718499

Analyst: 60040

Tracer

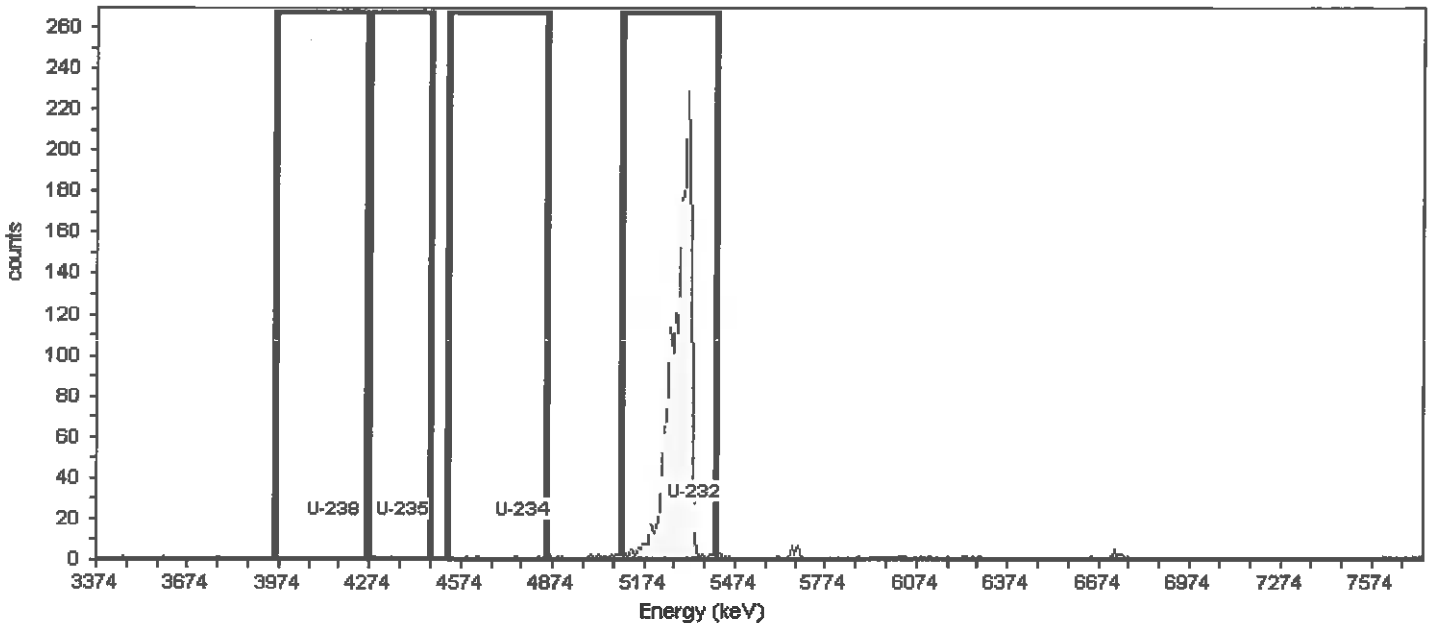
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.10 mL = 8.22 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 121.04%

Acquisition

Detector: AV137
Serial Number: 49-16904
Acquisition Start Date: 12/27/2017 4:45:26PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 12/19/2017 12:17:34PM
Background Info: Sample: ICB;AV137; Det: AV137; Spectrum #1; Dec-19-2017 12:17

Calibration Name: IC-9886;AV137-20170802
Calibration Date: 8/2/2017 4:17:12PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 21.93% +/- 0.31% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 12/27/2017 4:44:20PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	.0	100.0	0	0.0000	0.00	0.000	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	.3	80.2	3	0.0000	3.00	0.147	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	10.2	99.8	4	0.0000	4.00	0.157	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	71.3	100.1	1974	1.0000	1973.00	99.546	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:04:39AM 12/28/2017

Sample

Sample Name: Verification 3
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232 Clean Tracer Only
AnalysisID: 718501

Analyst: 60040

Tracer

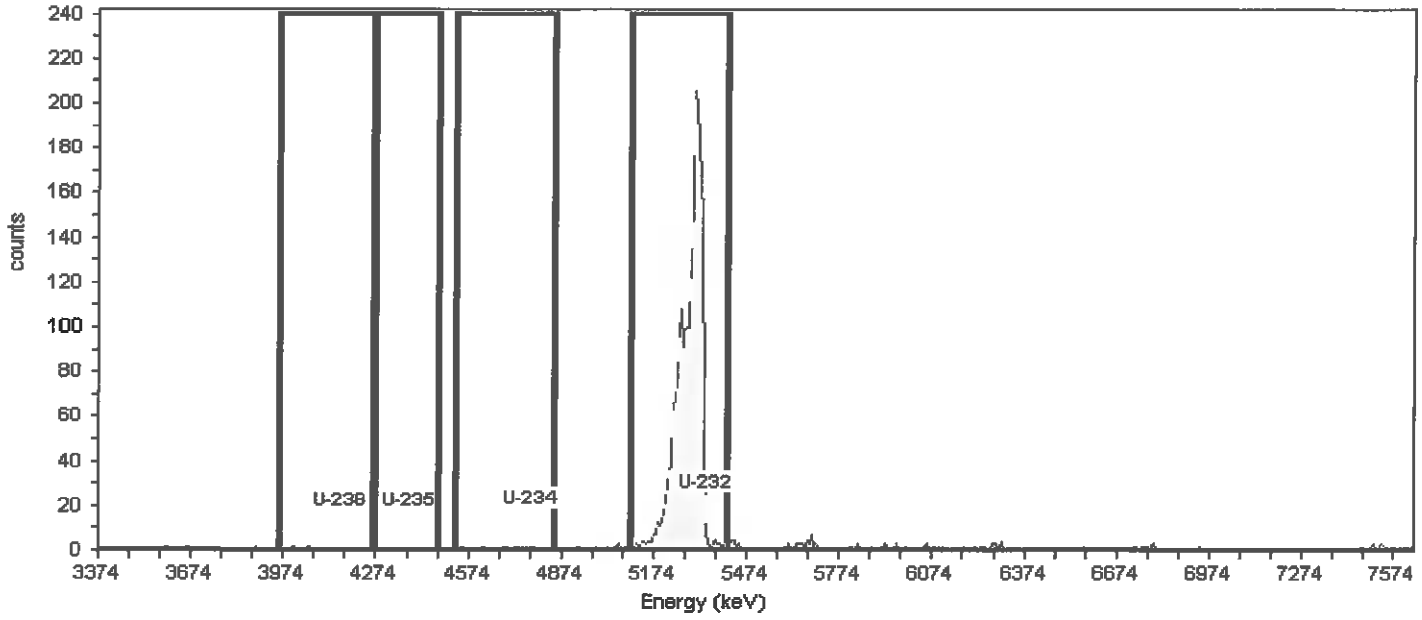
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.10 mL = 8.22 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 104.17%

Acquisition

Detector: AV138
Serial Number: 49-179B7
Acquisition Start Date: 12/27/2017 4:45:25PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 12/19/2017 12:17:36PM
Background Info: Sample: ICB;AV138; Det: AV138; Spectrum #1; Dec-19-2017 12:17

Calibration Name: IC-7107;AV138-20170802
Calibration Date: 8/3/2017 8:14:16AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 24.42% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 12/27/2017 4:44:20PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	91.2	100.0	2	0.0000	2.00	0.082	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	.0	80.2	0	1.0000	-1.00	-0.051	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	247.6	99.8	10	3.0000	7.00	0.287	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	75.8	100.1	1892	1.0000	1891.00	85.675	DPM/mL

Reagent

UNAT Ampoule_00001

New Brunswick Laboratory
U.S. Department of Energy

Certificate of Analysis
CRM 145
Uranyl (Normal) Nitrate Assay and Isotopic Solution

Uranium Mass Fraction: **0.0101356 g U/g solution ± 0.0000011 g U/g solution**
[10.1356 mg U/g solution ± 0.0011 mg U/g solution]

	$^{234}U/^{238}U$	$^{235}U/^{238}U$
Atom Ratio:	**0.000052841**	**0.0072543**
Atom Ratio Uncertainty:	**0.000000082**	**0.0000040**

	^{234}U	^{235}U	^{238}U
Atom Percent:	**0.0052458**	**0.72017**	**99.27458**
Atom Percent Uncertainty:	**0.0000081**	**0.00039**	**0.00039**
Weight Percent:	**0.0051579**	**0.71114**	**99.28370**
Weight Percent Uncertainty:	**0.0000080**	**0.00038**	**0.00038**

Relative Atomic Weight: **238.028918**
Relative Atomic Weight Uncertainty: **0.000012**

Note: ^{233}U and ^{236}U were not detected. The detection limit of uranium ratios for the technique used is 5×10^{-9}.

This Certified Reference Material (CRM) is a uranium concentration and isotopic solution standard intended for use in calibration of and/or quality control for uranium analysis methods. Each unit of CRM 145 consists of approximately 20-mL of uranyl nitrate solution in 1M nitric acid, contained in a sealed glass ampoule.

NOTE: The vial should be handled under proper radiologically-controlled conditions at all times.

The certified uranium content value is based on the mass of high-purity metal dissolved and diluted to a known solution mass. The stated uranium concentration was calculated as the prepared value and verified experimentally by the NBL-modified Davies and Gray titration. The certified uranium isotopic composition and atomic weight is based upon measurements performed on multiple samples by two different measurement techniques on a Thermal Ionization Mass Spectrometer (TIMS), calibrated using CRM U030-A as primary comparator and CRM 129-A as a quality control sample. The isotopic values are shared with CRM 112-A, uranium (normal) metal standard which was the source of uranium used to produce the solutions.

RAD13-0018
UNAT Spike
marrss
None
Prep/Opened: 5/3/2013
Exp(1): 5/10/2014
Exp(2): 5/10/2014

All uncertainties for the certified values are expressed as expanded uncertainties (U) where $U = k*u_c$, where u_c is the

September 30, 2010
Argonne, Illinois

www.nbl.doe.gov

Jon Neuhoff, Director
New Brunswick Laboratory

(Revision of Certificate dated March 30, 2008)

127971
ID: UNAT_00008
Exp: 05/10/14 Prpd: SB Crt: 05/03/13
UNAT spike

combined standard uncertainty and the coverage factor k = 2. Uncertainties were determined according to the JCGM 100:2008 *Guide to the Expression of Uncertainty in Measurement*. The coverage factor of 2 was chosen to provide an approximate 95% level of confidence. The input quantities associated with the uranium content included uncertainties due to weighing, CRM 112-A purity, and buoyancy factors. The input quantities associated with the uranium isotopic composition included uncertainties from the certified value for CRM U030-A, measurement precision, and background corrections associated with the analytical techniques.

The CRM was produced by dissolving uranium metal in a single batch and container, with extensive mixing of the resultant solution followed by dispensation into individual bottles. Subsequent measurements of a random sampling of the total lot produced did not indicate any inhomogeneity in uranium concentration or isotopic composition. The minimum sample sizes taken from packaged units and measured were 30 mg U by titration and 1 μg U by TIMS. The NBL makes no recommendation as to the minimum sample size to be used to ensure concentration or isotopic homogeneity.

Users are cautioned that once the vial is opened, the uranium concentration and/or isotopic composition of the material may be affected by evaporative losses or environmental contamination. User's should take appropriate precautions to safeguard the material before, during and after use to ensure valid certificate values.

Recommended Procedure for Ampoule Handling and Dispensing of Solution

1. The ampoule contains a strongly acidic solution of uranium. Appropriate precautions should be taken.

2. Before opening the ampoule, ensure that any dried uranium or condensed liquid in the neck or body of the ampoule is re-dissolved into solution. This can be accomplished by inverting the ampoule repeatedly.

3. The glass ampoules are scored at the neck for ease of opening. However, glass burrs and fragments pose a cut hazard to anyone opening the ampoules. Appropriate precautions should be taken.

4. Lightly moisten the scored line on the neck with distilled water to help ensure a clean break at the score.

5. Because of the narrow neck of the ampoule it may be difficult or impossible to pour the solution out. Here is one possible method:

    a. Obtain approximately 12-cm length of plastic capillary tubing (e.g. i.d. 0f 0.1", o.d. of 0.16").
    b. Insert one end of the capillary tubing fully into the ampoule
    c. Fold the remaining length of tubing along the outside of the ampoule, ensuring that the tube is not crimped and will allow the free flow of air through the tube and into the ampoule.
    d. Holding the ampoule and tubing in one hand, and a beaker or dispensing bottle in another, invert the ampoule over the container allowing the solution to drain into it.
    e. The capillary tubing allows air to flow into the ampoule, eliminating the "airlock" created by the narrow neck of the open ampoule.

6. The user should be wary of evaporative losses once the ampoule is opened, and prevent uranium contamination of the sample. It is recommended that the entire solution be accurately weighed and aliquanted as soon as possible after opening the sample. Precautions should be taken (clean glass/plastic ware, air filtration, etc) to prevent uranium contamination of the CRM with subsequent perturbation of the isotopic composition.

Reagent

UNAT_00014

Standard ID Number: UNAT_00013
True Value = 70.689 dpm/mL
Date Analyzed: 11/28/2017

Radionuclide: U-234

	Replicates	
#1	72.749	dpm/mL
#2	75.297	dpm/mL
#3	73.437	dpm/mL

Mean = 73.8276667

1 sigma = 1.31815831 1.96 sigma = 2.58359

True Value minus 5% = 67.15455 (True Value - 5%)
True Value plus 5% = 74.22345 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: Rm 12·21·17

2nd Reviewed By/Date: ALD 12/18/17

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	3/30/2008 0:00		
Decayto Date/Time (t):	11/28/17 0:00		
Initial Activity (A_0):	70.69	dpm	
Initial Aliquot:	1	mL	
Initial Conc:	70.69123	dpm/mL	
***Soln. Density:**	1	g/mL	
Nuclide:	U-234		
Half-Life (days):	89668875	decay days	fraction
****Decay Factor:**	1.0000	3530.00	0.00004
Decay Corr Activity:	7.0689E+01	dpm	
Decay Corr Conc:	7.0689E+01	dpm/mL	

Conversion/Calculations

Final Activity Unit:	dpm	
Activity Unit Factor:	1.00000	
Final Volume Unit:	mL	
Volume Unit Factor:	1.000	
Final Concentration:	7.0689E+01	dpm/mL
Aliquot Volume:	1.0000E+00	mL
Final Activity (A):	7.0689E+01	dpm

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:33:28PM 12/15/2017

Sample

Sample Name: Verification 1
SampleType: Sample

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Sample Collection Date:

Batch

Batch Name: U-232_00039
AnalysisID: 717874

Analyst: 60040

Tracer

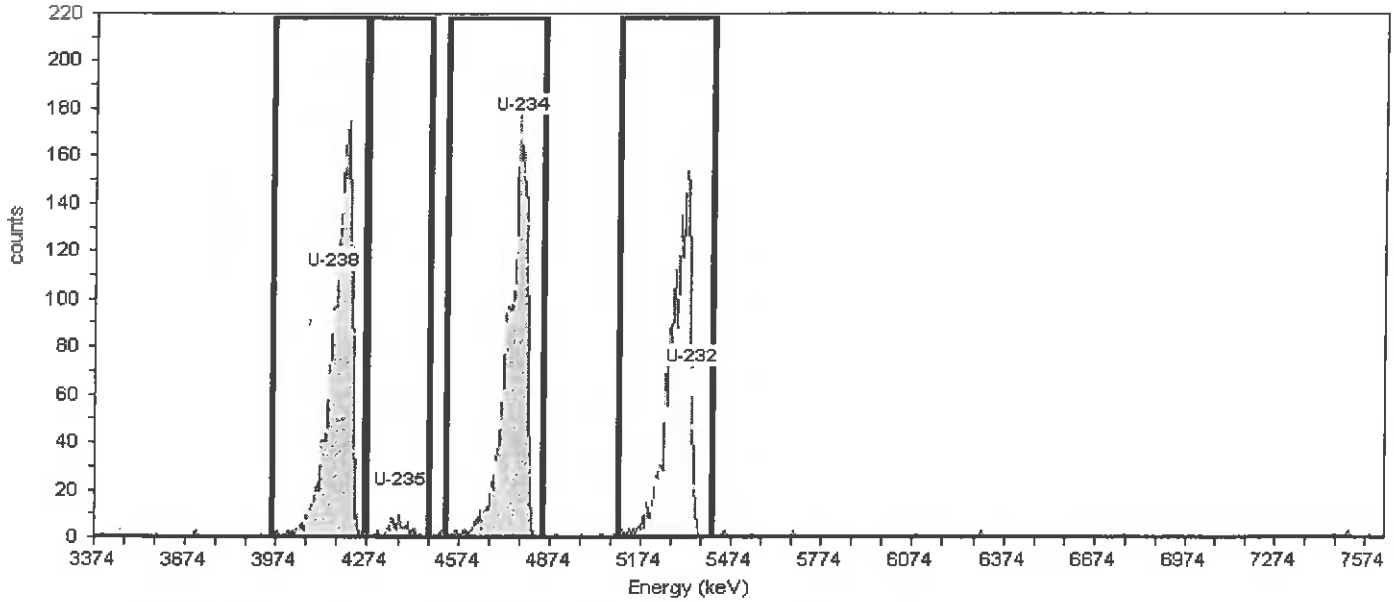
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 90.40%

Acquisition

Detector: AV118
Serial Number: 49-037F4
Acquisition Start Date: 11/28/2017 6:15:19PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:24PM
Background Info: Sample: ICB;AV118; Det: AV118; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9795;AV118-20170802
Calibration Date: 8/2/2017 1:38:49PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 26.06% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	78.5	100.0	1637	0.0000	1637.00	72.382	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	64.9	80.2	56	0.0000	56.00	3.087	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	75.3	99.8	1642	0.0000	1642.00	72.749	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	80.2	100.1	1524	1.0000	1523.00	70.035	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:33:58PM 12/15/2017

Sample

Sample Name: Verification 2
SampleType: Sample

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Sample Collection Date:

Batch

Batch Name: U-232_00039
AnalysisID: 717875

Analyst: 60040

Tracer

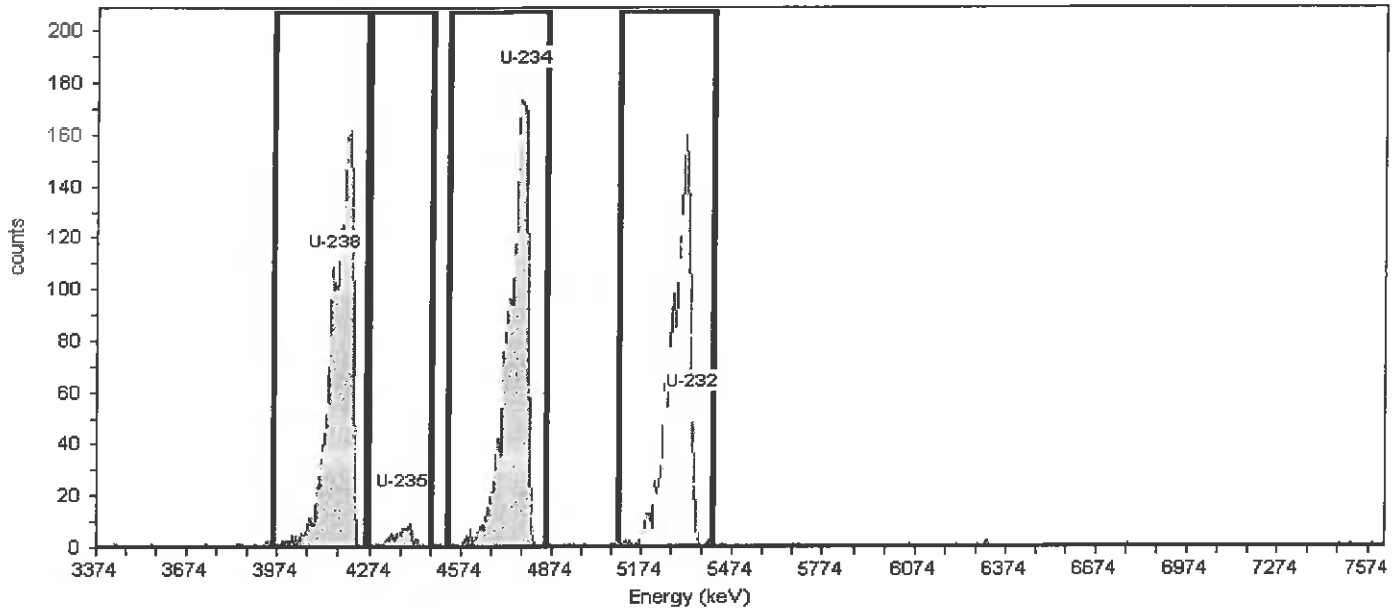
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 99.72%

Acquisition

Detector: AV119
Serial Number: 49-037G6
Acquisition Start Date: 11/28/2017 6:15:20PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:26PM
Background Info: Sample: ICB;AV119; Det: AV119; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9817;AV119-20170802
Calibration Date: 8/2/2017 1:39:16PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 23.42% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	84.0	100.0	1604	0.0000	1604.00	71.534	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	61.4	80.2	69	0.0000	69.00	3.837	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	71.1	99.8	1686	1.0000	1685.00	75.297	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	78.4	100.1	1513	3.0000	1510.00	77.261	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:34:11PM 12/15/2017

Sample

Sample Name: Verification 3
SampleType: Sample

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Sample Collection Date:

Batch

Batch Name: U-232_00039
AnalysisID: 717876

Analyst: 60040

Tracer

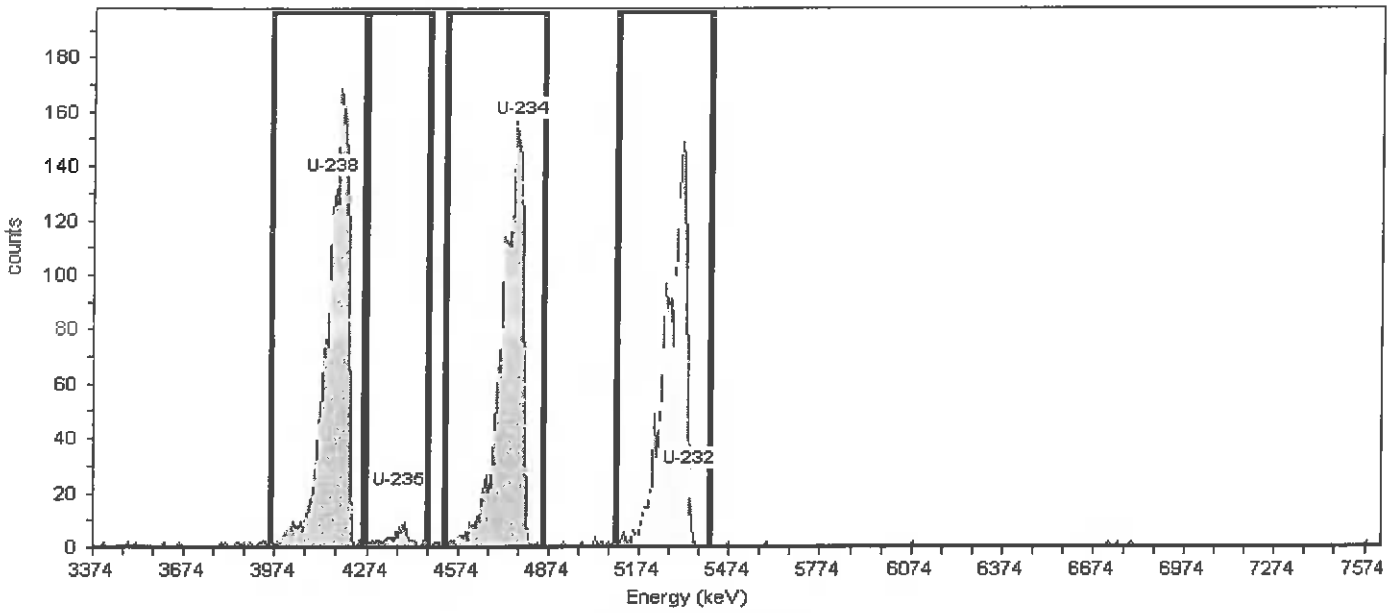
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 104.37%

Acquisition

Detector: AV120
Serial Number: 49-037W3
Acquisition Start Date: 11/28/2017 6:15:21PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:28PM
Background Info: Sample: ICB;AV120; Det: AV120; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9884;AV120-20170802
Calibration Date: 8/2/2017 1:39:29PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.48% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	72.0	100.0	1748	1.0000	1747.00	77.552	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	39.5	80.2	67	0.0000	67.00	3.708	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	80.4	99.8	1651	0.0000	1651.00	73.437	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	89.6	100.1	1519	2.0000	1517.00	80.860	DPM/mL

Ref. 3.30.2008

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

UNAT_00013

Reagent ID: UNAT_00013

Description:	UNAT spike	Expiration Date:	12/22/2017
No. of Bottles:	1	Laboratory:	TestAmerica St. Louis
Storage Location:	RAD Actinide STDs	Prepared By:	Bernsen, Sarah C
Reagent Volume:	200.000 mL	Solvent:	1M HNO3
Creation Date:	11/16/2016	Solvent Lot:	n/a
Open Date:			
Container(s):	1047854		
Comment:	only U-234 and U-238 are controlled as spike analytes, and therefore we have not verified the U-235		

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
U-234	UNAT Parent_00001	12/22/2017	706.91200	dpm/mL	70.69123	dpm/mL
U-235	UNAT Parent_00001	12/22/2017	33.70600	dpm/mL	3.37064	dpm/mL
U-238	UNAT Parent_00001	12/22/2017	722.65000	dpm/mL	72.26499	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
UNAT Parent_00001	UNAT Parent		12/22/17				20.00000	mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

U-232 Tracer Ver.

Aliquot Only

Batch No.:

Balance ID :

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	Ver 1	0.1	113	DC = 118
2	2	1	116	1 = 119
3	3	1	117	1 = 120
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A (Initials / Date)

Isotope : UNAT
Std Sol'n No. : UNAT-00013
Vol (mL) : 0.1
Ref Activity (dpm/mL) : 72.2650 (U-238)
Act Ref Date : 3-30-08
New Brunswick

Samples Spiked and Traced By: SMB 11/22/17 (Initials / Date)

Verification Signature & Date: amm 11/22/2017 (Initials / Date)

LCS Standard ☐ N/A (Initials / Date)

Isotope : U-232 Uncert
Std Sol'n ID. : U-232-00039
Vol (mL) : 0.1
Ref Activity (dpm/mL) : 77.476
Act Ref Date : 04-07-03

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐ ST-RC-0003 Rev.	☐ ST-RC-0040 Rev.	☐ ST-RC-0110 Rev.
☐ ST-RC-0004 Rev.	☐ ST-RC-0041 Rev.	☐ ST-RC-0120 Rev.
☐ ST-RC-0014 Rev.	☐ ST-RC-0050 Rev.	☐ ST-RC-0232 Rev.
☐ ST-RC-0020 Rev.	☐ ST-RC-0090 Rev.	☐ ST-RC-0238 Rev.
☐ ST-RC-0021 Rev.	☐ ST-RC-0100 Rev.	☐ ST-RC-0240 Rev.
		☐ ST-RC-0241 Rev.
		☐ ST-RC-0242 Rev.
		☐ ST-RC-5016 Rev.
		☐
		☐

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____
Date : _____

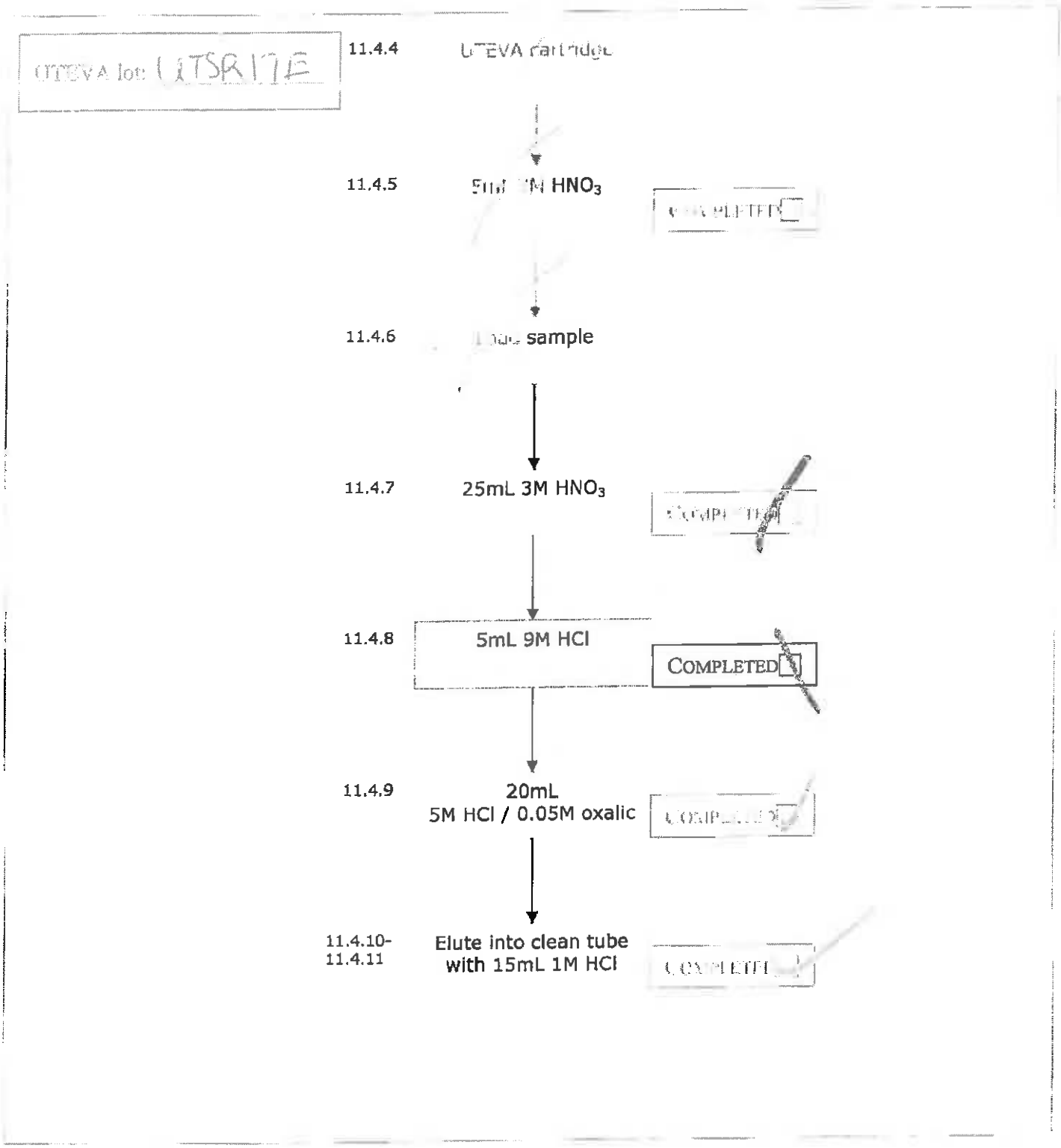
Reviewed by: _____
Date: _____

\\Slsvr01\RAD\MasterForms\RAD-0045 Rev(3)

Uranium only via UTEVA

Batch: ST-RC-0238

*All rinses should flow at 1 mL/minute unless 3M HNO_3 may be done at 3 mL/minute)



Form: RAD-0060, Revised 09/17/13

Standard ID Number: UNAT_00013
True Value = 72.265 dpm/mL
Date Analyzed: 11/28/2017

Radionuclide: U-238

	Replicates	
#1	72.382	dpm/mL
#2	71.534	dpm/mL
#3	77.552	dpm/mL

Mean = 73.8226667

1 sigma = 3.25741022 1.96 sigma = 6.384524

True Value minus 5% = 68.65175 (True Value - 5%)
True Value plus 5% = 75.87825 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: Rm 12·18·17

2nd Reviewed By/Date: ALD 12/18/17

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	3/30/2008 0:00		
Decayto Date/Time (t):	11/28/17 0:00		
Initial Activity (A_0):	72.26 dpm		
Initial Aliquot:	1 mL		
Initial Conc:	72.26499 dpm/mL		
***Soln. Density:**	1 g/mL		
Nuclide:	U-238		
Half-Life (days):	1.63194E+12	decay days	fraction
****Decay Factor:**	1.0000	3530.00	0.00000
Decay Corr Activity:	7.2265E+01 dpm		
Decay Corr Conc:	7.2265E+01 dpm/mL		

Conversion/Calculations

Final Activity Unit:	dpm
Activity Unit Factor:	1.00000
Final Volume Unit:	mL
Volume Unit Factor:	1.000
Final Concentration:	7.2265E+01 dpm/mL
Aliquot Volume:	1.0000E+00 mL
Final Activity (A):	7.2265E+01 dpm

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:33:28PM 12/15/2017

Sample

Sample Name: Verification 1
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232_00039
AnalysisID: 717874

Analyst: 60040

Tracer

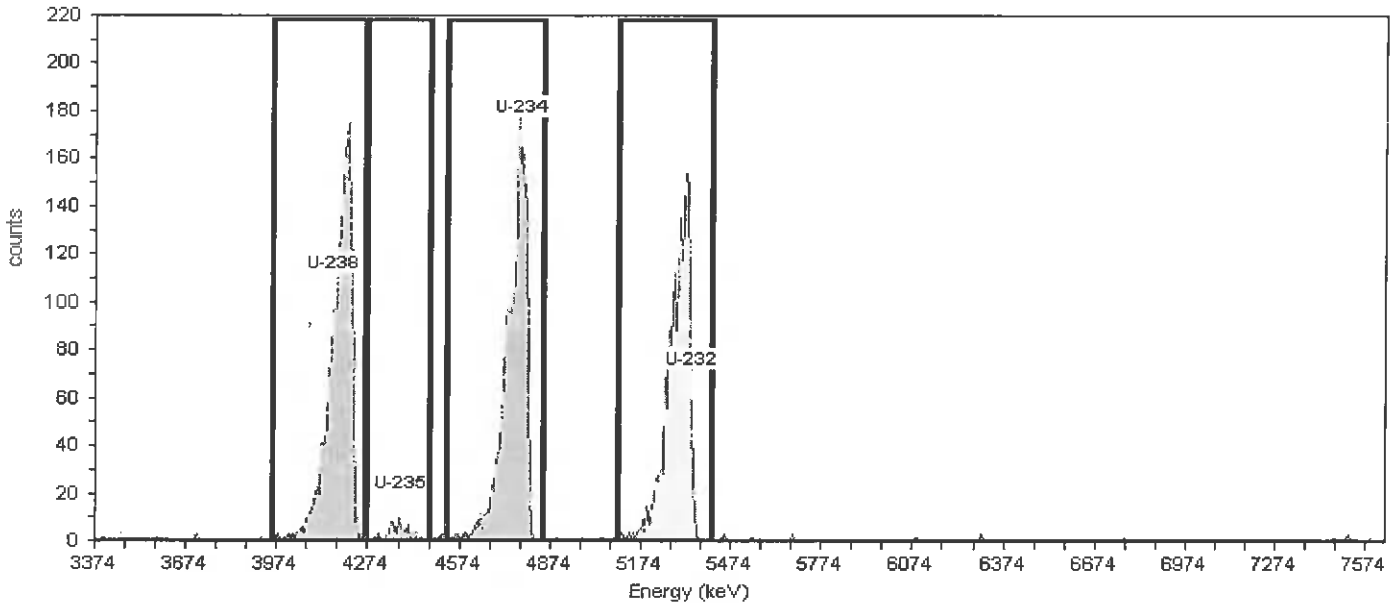
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 90.40%

Acquisition

Detector: AV118
Serial Number: 49-037F4
Acquisition Start Date: 11/28/2017 6:15:19PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:24PM
Background Info: Sample: ICB;AV118; Det: AV118; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9795;AV118-20170802
Calibration Date: 8/2/2017 1:38:49PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.06% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	78.5	100.0	1637	0.0000	1637.00	72.382	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	64.9	80.2	56	0.0000	56.00	3.087	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	75.3	99.8	1642	0.0000	1642.00	72.749	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	80.2	100.1	1524	1.0000	1523.00	70.035	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:33:58PM 12/15/2017

Sample

Sample Name: Verification 2
SampleType: Sample

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Sample Collection Date:

Batch

Batch Name: U-232_00039
AnalysisID: 717875

Analyst: 60040

Tracer

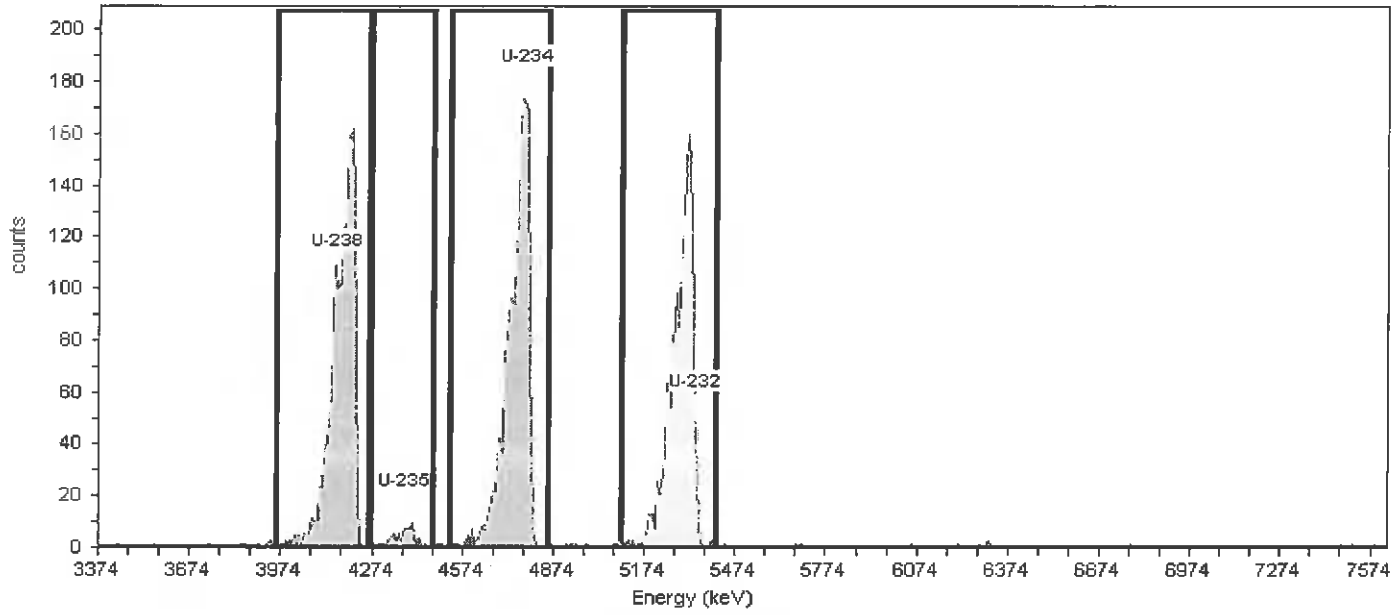
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 99.72%

Acquisition

Detector: AV119
Serial Number: 49-037G6
Acquisition Start Date: 11/28/2017 6:15:20PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:26PM
Background Info: Sample: ICB;AV119; Det: AV119; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9817;AV119-20170802
Calibration Date: 8/2/2017 1:39:16PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 23.42% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	84.0	100.0	1604	0.0000	1604.00	71.534	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	61.4	80.2	69	0.0000	69.00	3.837	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	71.1	99.8	1686	1.0000	1685.00	75.297	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	78.4	100.1	1513	3.0000	1510.00	77.261	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:34:11PM 12/15/2017

Sample

Sample Name: Verification 3
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232_00039
AnalysisID: 717876

Analyst: 60040

Tracer

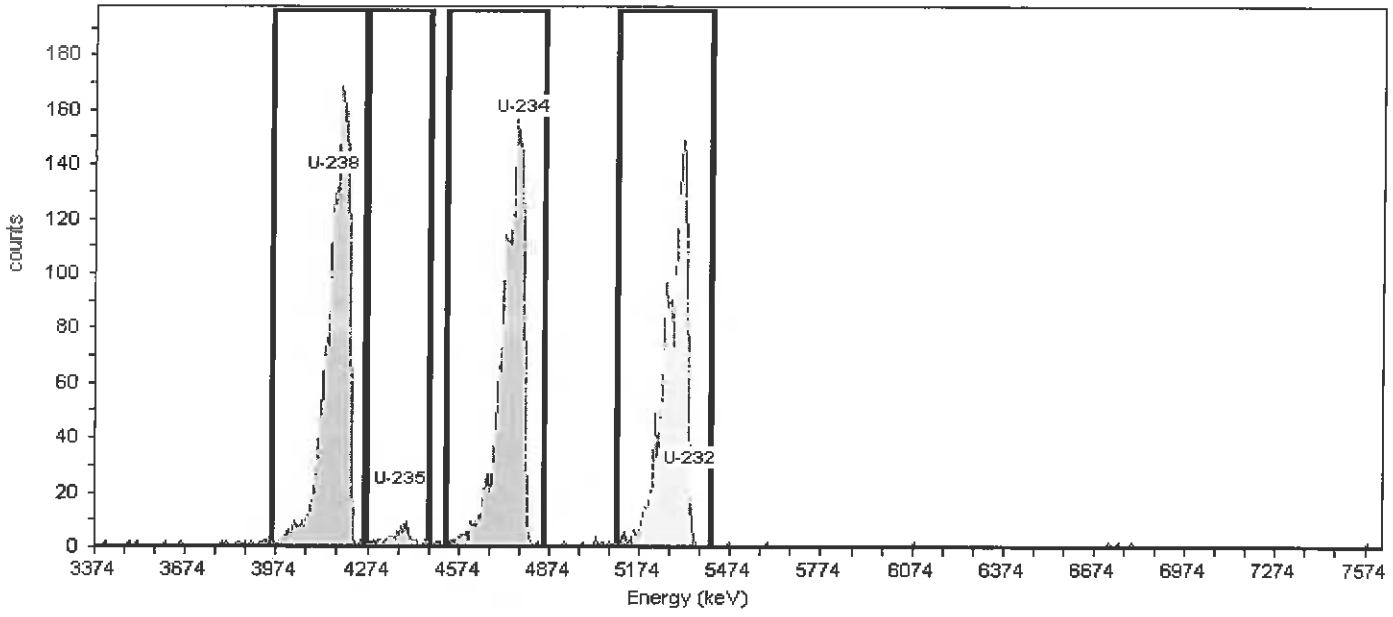
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 104.37%

Acquisition

Detector: AV120
Serial Number: 49-037W3
Acquisition Start Date: 11/28/2017 6:15:21PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:28PM
Background Info: Sample: ICB;AV120; Det: AV120; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9884;AV120-20170802
Calibration Date: 8/2/2017 1:39:29PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 22.48% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	72.0	100.0	1748	1.0000	1747.00	77.552	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	39.5	80.2	67	0.0000	67.00	3.708	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	80.4	99.8	1651	0.0000	1651.00	73.437	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	89.6	100.1	1519	2.0000	1517.00	80.860	DPM/mL

Ref. 3.30.2008

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

UNAT_00013

Reagent ID: UNAT_00013

Description:	UNAT spike	Expiration Date:	12/22/2017
No. of Bottles:	1	Laboratory:	TestAmerica St. Louis
Storage Location:	RAD Actinide STDs	Prepared By:	Bernsen, Sarah C
Reagent Volume:	200.000 mL	Solvent:	1M HNO3
Creation Date:	11/16/2016	Solvent Lot:	n/a
Open Date:			
Container(s):	1047854		
Comment:	only U-234 and U-238 are controlled as spike analytes, and therefore we have not verified the U-235		

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
U-234	UNAT Parent_00001	12/22/2017	706.91200	dpm/mL	70.69123	dpm/mL
U-235	UNAT Parent_00001	12/22/2017	33.70600	dpm/mL	3.37064	dpm/mL
U-238	UNAT Parent_00001	12/22/2017	722.65000	dpm/mL	72.26499	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
UNAT Parent_00001	UNAT Parent		12/22/17				20.00000	mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

U-232 Tracer Ver.

Aliquot Only

Batch No. :

960 mL

Balance ID :

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	Ver 1	0.1	113	QC = 118
2	2	1	116	[= 119
3	3	1	117	L = 120
4				
5				
6				
7				
8				
9				
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11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A

Initials / Date

Isotope : UNAT

Std Sol'n No. : UNAT-00013

Vol (mL) : 0.1

Ref Activity (dpm/mL) : 72.2650 (0.235)

Act Ref Date : 3-30-05

New Brunswick

Samples Spiked and Traced By: SAB 11/22/17 (Initials / Date)

Verification Signature & Date: amm 11/22/2017 (Initials / Date)

LCS Standard ☐ N/A

Initials / Date

Isotope : U-232 UNCRAN

Std Sol'n ID. : U-232-00039

Vol (mL) : 0.1

Ref Activity (dpm/mL) : 77.47 ± 4

Act Ref Date : 04-01-03

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐ ST-RC-0003 Rev.	☐ ST-RC-0040 Rev.	☐ ST-RC-0110 Rev.
☐ ST-RC-0004 Rev.	☐ ST-RC-0041 Rev.	☐ ST-RC-0120 Rev.
☐ ST-RC-0014 Rev.	☐ ST-RC-0050 Rev.	☐ ST-RC-0232 Rev.
☐ ST-RC-0020 Rev.	☐ ST-RC-0090 Rev.	☐ ST-RC-0238 Rev.
☐ ST-RC-0021 Rev.	☐ ST-RC-0100 Rev.	☐ ST-RC-0240 Rev.
		☐ ST-RC-0241 Rev.
		☐ ST-RC-0242 Rev.
		☐ ST-RC-5016 Rev.
		☐
		☐

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____

Date : _____

Reviewed by: _____

Date: _____

\\Slsvr01\RAD\MasterForms\RAD-0045 Rev(3)

Uranium only via UTEVA

ST-RC-0238

Batch:

*All stages should flow at 1 mL/minute (only 2M HNO3 may be done at 3 mL/minute)

UTEVA lot: UTSR17E

11.4.4 UTEVA cartridge

11.4.5 5mL 2M HNO_3 — COMPLETED

11.4.6 Load sample

11.4.7 25mL 3M HNO_3 — COMPLETED

11.4.8 5mL 9M HCl — COMPLETED

11.4.9 20mL 5M HCl / 0.05M oxalic — COMPLETED

11.4.10-11.4.11 Elute into clean tube with 15mL 1M HCl — COMPLETED

Form: RAD-0060, Revised 09/17/13

GENERAL CHEMISTRY

COVER PAGE
GENERAL CHEMISTRY

Lab Name: TestAmerica St. Louis Job Number: 160-29479-1

SDG No.:

Project: Former Carnotite Site - Non-Rad Analysis

Client Sample ID	Lab Sample ID
CRC-B1-0002	160-29479-1
CRC-B1-1820	160-29479-2
CRC-B1-1214	160-29479-3
CRC-B7-1416	160-29479-4
CRC-B7-2224	160-29479-5
CRC-B7-2628	160-29479-6
CRC-B20-1214	160-29479-7
CRC-B20-1820	160-29479-8
CRC-B20-2628	160-29479-9

Comments:

9-IN
DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica St. Louis Job Number: 160-29479-1

SDG Number:

Matrix: Solid Instrument ID: NOEQUIP

Method: Moisture RL Date: 01/28/2011 14:43

Analyte	Wavelength/ Mass	RL (%)	
Percent Moisture		0.1	
Percent Solids		0.1	

9-IN
CALIBRATION BLANK DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica St. Louis Job Number: 160-29479-1

SDG Number:

Matrix: Solid Instrument ID: NOEQUIP

Method: Moisture XRL Date: 01/28/2011 14:42

Analyte	Wavelength/ Mass	XRL (%)	
Percent Moisture		0.1	
Percent Solids		0.1	

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica St. Louis Job No.: 160-29479-1

SDG No.:

Instrument ID: NOEQUIP Analysis Method: Moisture

Start Date: 07/17/2018 22:33 End Date: 07/17/2018 22:33

Lab Sample Id	D/F	Type	Time	Analytes																									
				% Sol	Moist																								
160-29479-1	1	T	22:33	X	X																								
160-29479-2	1	T	22:33	X	X																								
160-29479-2 DU	1	T	22:33	X	X																								
160-29479-3	1	T	22:33	X	X																								
160-29479-4	1	T	22:33	X	X																								
160-29479-5	1	T	22:33	X	X																								
160-29479-6	1	T	22:33	X	X																								
160-29479-7	1	T	22:33	X	X																								
160-29479-8	1	T	22:33	X	X																								
160-29479-9	1	T	22:33	X	X																								
ZZZZZZ			22:33																										
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Prep Types:
T = Total/NA

FORM XIII-IN

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29479-1

SDG No.:

Batch Number: 376375 Batch Start Date: 07/17/18 23:15 Batch Analyst: Braatz, Steve D

Batch Method: Moisture Batch End Date: 07/18/18 18:13

Lab Sample ID	Client Sample ID	Method Chain	Basis	DISH#	DishWeight	SampleMassWet	SampleMassDry		
160-29479-A-1	CRC-B1-0002	Moisture	T	1	1.0391 g	11.3651 g	10.3919 g		
160-29479-A-2	CRC-B1-1820	Moisture	T	2	1.0616 g	18.2421 g	14.7710 g		
160-29479-A-2 DU	CRC-B1-1820	Moisture	T	3	1.0177 g	16.6025 g	13.1556 g		
160-29479-A-3	CRC-B1-1214	Moisture	T	4	1.0486 g	24.6185 g	20.8231 g		
160-29479-A-4	CRC-B7-1416	Moisture	T	5	1.0375 g	21.9496 g	19.0337 g		
160-29479-A-5	CRC-B7-2224	Moisture	T	6	1.0634 g	20.0457 g	16.4272 g		
160-29479-A-6	CRC-B7-2628	Moisture	T	7	1.0520 g	14.5969 g	12.6484 g		
160-29479-B-7	CRC-B20-1214	Moisture	T	8	1.0490 g	13.7869 g	11.5082 g		
160-29479-A-8	CRC-B20-1820	Moisture	T	9	1.0556 g	14.6149 g	11.6788 g		
160-29479-A-9	CRC-B20-2628	Moisture	T	10	1.0367 g	20.8312 g	17.3728 g		

Batch Notes	
Balance ID	0034150065
Batch Comment	TRAY A
Date samples were placed in the oven	07/17/2018
Oven Temp In	103.0 Degrees C
Time samples were place in the oven	23:15
Date samples were removed from oven	07/18/2018
Oven Temp Out	103.1 Degrees C
Time Samples were removed from oven	18:13
Oven ID	OA
Thermometer ID	A142186

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

ALPHA SPECTROSCOPY

Method A-01-R Th

Isotopic Thorium (Alpha Spectrometry) by Method A-01-R

Prep Batch: 377729

Preparation, Extraction Chromatography Resin Actinide Separation

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 377729

Lab ID: MB 160-377729/1-A
Client ID:
Sigma: 2
Analyzed: 08/04/18 14:31
Detector: AV7
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	-0.01242	0.0892	0.0893	U	pCi/g	1.00	0.141	380567

Tracer	MB Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	6.082	0.516	0.726		pCi/g	0.0667	6.05	100	30 - 110

Lab ID: LCS 160-377729/2-A
Client ID:
Sigma: 2
Analyzed: 08/04/18 14:30
Detector: AV8
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	22.98	1.39	2.38		pCi/g	1.00	0.240	380576

Tracer	LCS Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	11.33	0.938	1.34		pCi/g	0.132	12.1	93.5	30 - 110

Lab ID: 490-155782-F-2-F DU
Client ID:
Sigma: 2
Analyzed: 08/04/18 14:30
Detector: AV10
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	1.147	0.288	0.303		pCi/g	1.00	0.184	380507

Tracer	DU Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	4.290	0.430	0.561		pCi/g	0.0656	6.09	70.5	30 - 110

Lab ID: 160-29479-1
Client ID: CRC-B1-0002
Sigma: 2
Analyzed: 08/04/18 14:30
Detector: AV12
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	36.3	1.33	3.32		pCi/g	1.00	0.153	380519

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	4.56	0.407	0.559		pCi/g	0.0516	6.08	75.0	30 - 110

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 377729

Lab ID: 160-29479-2
Client ID: CRC-B1-1820
Sigma: 2
Analyzed: 08/04/18 14:30
Detector: AV14
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	0.343	0.155	0.158		pCi/g	1.00	0.145	380538

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	5.08	0.438	0.612		pCi/g	0.0575	6.00	84.7	30 - 110

Lab ID: 160-29479-3
Client ID: CRC-B1-1214
Sigma: 2
Analyzed: 08/04/18 14:30
Detector: AV15
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	0.320	0.158	0.160		pCi/g	1.00	0.152	380539

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	4.56	0.409	0.561		pCi/g	0.0677	6.01	75.9	30 - 110

Lab ID: 160-29479-4
Client ID: CRC-B7-1416
Sigma: 2
Analyzed: 08/04/18 14:30
Detector: AV16
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	0.385	0.169	0.172		pCi/g	1.00	0.154	380540

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	4.69	0.420	0.575		pCi/g	0.0428	6.11	76.7	30 - 110

Lab ID: 160-29479-5
Client ID: CRC-B7-2224
Sigma: 2
Analyzed: 08/04/18 14:30
Detector: AV17
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	0.491	0.170	0.175		pCi/g	1.00	0.138	380541

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	6.05	0.504	0.715		pCi/g	0.0596	6.08	99.4	30 - 110

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 377729

Lab ID: 160-29479-6
Client ID: CRC-B7-2628
Sigma: 2
Analyzed: 08/04/18 14:30
Detector: AV19
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	0.340	0.163	0.165		pCi/g	1.00	0.158	380542

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	5.29	0.474	0.650		pCi/g	0.0552	6.05	87.4	30 - 110

Lab ID: 160-29479-7
Client ID: CRC-B20-1214
Sigma: 2
Analyzed: 08/04/18 14:30
Detector: AV20
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	0.621	0.200	0.207		pCi/g	1.00	0.154	380543

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	5.57	0.503	0.687		pCi/g	0.0995	6.04	92.2	30 - 110

Lab ID: 160-29479-8
Client ID: CRC-B20-1820
Sigma: 2
Analyzed: 08/04/18 14:30
Detector: AV21
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	0.679	0.205	0.213		pCi/g	1.00	0.154	380544

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	5.52	0.488	0.673		pCi/g	0.0614	6.09	90.5	30 - 110

Lab ID: 160-29479-9
Client ID: CRC-B20-2628
Sigma: 2
Analyzed: 08/04/18 14:31
Detector: AV23
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thorium-230	0.383	0.163	0.166		pCi/g	1.00	0.146	380545

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Thorium-229	5.47	0.475	0.661		pCi/g	0.0532	6.08	89.8	30 - 110

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 377729

Quality Control Summary

Method Blank ID:	Analyte	Parent Result	Spike Added	MB Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
MB 160-377729/1-A	Thorium-230			-0.01242	U	pCi/g							-.2782733

Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-377729/2-A	Thorium-230		24.5	22.98		pCi/g	94	81 - 118					-.8710231191

Duplicate ID:	Analyte	Parent Result	Spike Added	DU Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
490-155782-F-2-F DU	Thorium-230	0.719		1.147		pCi/g			46	0.78	2.20	1	

Glossary:

Ts = Count Duration, Sample

ALPHA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29479-1

SDG No.:

Batch Number: 377729 Batch Start Date: 07/24/18 17:17 Batch Analyst: Turley, Taylor A

Batch Method: ExtChrom Batch End Date: 08/03/18 20:27

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	Th-229 00023	TRM-2 00002			
MB 160-377729/1		ExtChrom, A-01-R		1 g	0.2 mL				
LCS 160-377729/2		ExtChrom, A-01-R		0.4993 g	0.2 mL	0.4993 g			
490-155782-F-2-A DU		ExtChrom, A-01-R	T	0.9947 g	0.2 mL				
160-29479-A-1-B	CRC-B1-0002	ExtChrom, A-01-R	T	0.9961 g	0.2 mL				
160-29479-A-2-B	CRC-B1-1820	ExtChrom, A-01-R	T	1.0096 g	0.2 mL				
160-29479-A-3-B	CRC-B1-1214	ExtChrom, A-01-R	T	1.0066 g	0.2 mL				
160-29479-B-4-A	CRC-B7-1416	ExtChrom, A-01-R	T	0.9915 g	0.2 mL				
160-29479-A-5-B	CRC-B7-2224	ExtChrom, A-01-R	T	0.9955 g	0.2 mL				
160-29479-B-6-A	CRC-B7-2628	ExtChrom, A-01-R	T	1.0014 g	0.2 mL				
160-29479-A-7-A	CRC-B20-1214	ExtChrom, A-01-R	T	1.0029 g	0.2 mL				
160-29479-B-8-A	CRC-B20-1820	ExtChrom, A-01-R	T	0.9938 g	0.2 mL				
160-29479-B-9-A	CRC-B20-2628	ExtChrom, A-01-R	T	0.9951 g	0.2 mL				

Batch Notes	
Balance ID	1123433897
Analyst ID - Column	NMN per CMM
Column Date	08/01/2018
Analyst ID - CoPrecipitation	CMM
CoPrecipitation Date	08/03/2018
Pipette ID	RAD117
Analyst ID - Reagent Drop Witness	TAT per CMM
Analyst ID - Reagent Drop	CMM
SOP Number	ST-RC-0003, ST-RC-0004, ST-RC-0100, ST-RC-0242

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

ALPHA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29479-1

SDG No.:

Batch Number: 377729 Batch Start Date: 07/24/18 17:17 Batch Analyst: Turley, Taylor A

Batch Method: ExtChrom Batch End Date: 08/03/18 20:27

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:31:50PM 8/4/2018

Sample

Sample Name: MB 160-377729/1-A
SampleType: Blank
: MB 160-377729/1-A
Sample Collection Date: 8/3/2018 8:28:00PM

Spectrum #1 Analysis #1
Sample Weight : 1.0000g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377729
AnalysisID: 735901

Analyst: 60040

Tracer

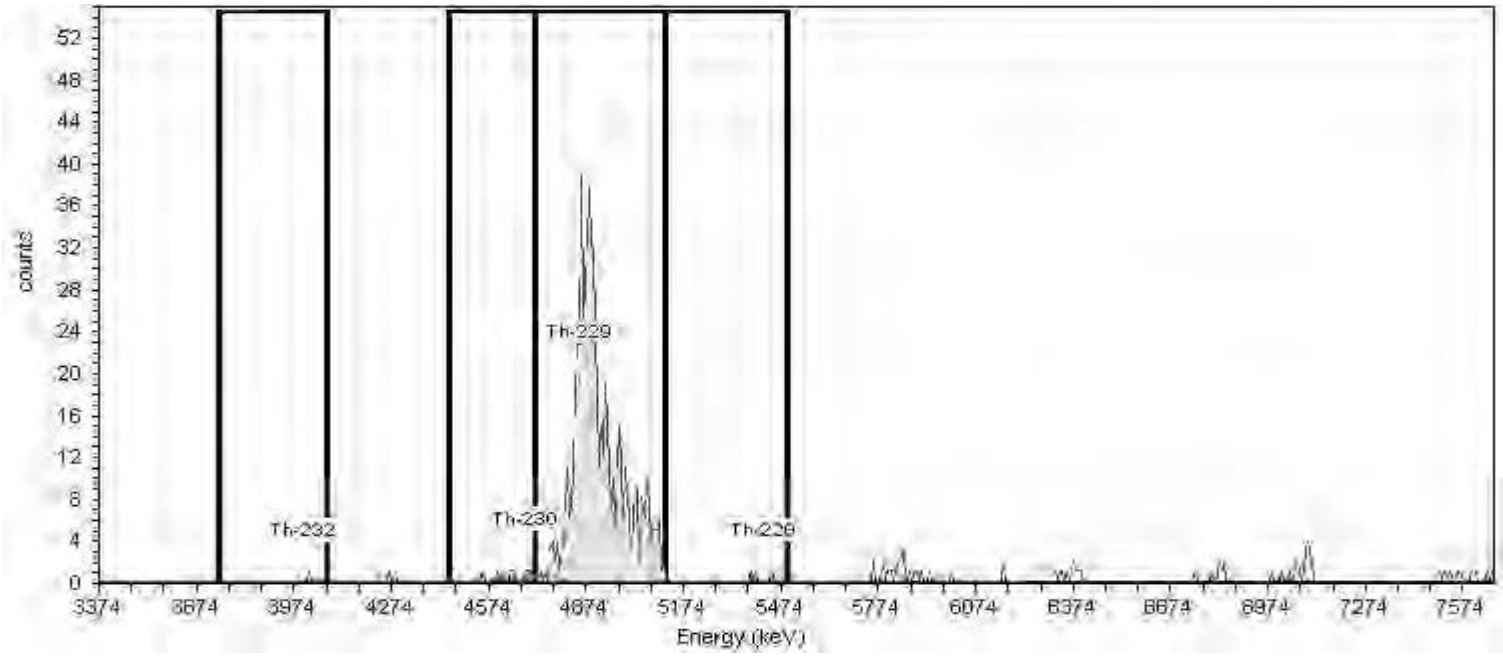
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 100.45%

Acquisition

Detector: AV7
Serial Number: 48-158EE5
Acquisition Start Date: 8/4/2018 2:31:14PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:27PM
Background Info: Sample: ICB;AV7; Det: AV7; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-9793;AV7-05142018
Calibration Date: 5/14/2018 6:26:13PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 22.98% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/4/2018 2:26:21PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	42.4	100.2	1	0.7500	0.25	0.003	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	22.9	99.7	8	0.3750	7.63	0.083	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	77.4	99.6	557	0.7500	556.44	6.084	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	.0	99.8	3	1.6713	1.52	0.017	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:32:08PM 8/4/2018

Sample

Sample Name: LCS 160-377729/2-A
SampleType: Control
: LCS 160-377729/2-A
Sample Collection Date: 8/3/2018 8:28:00PM

Spectrum #1 Analysis #1
Sample Weight : 0.4993g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377729
AnalysisID: 735903

Analyst: 60040

Tracer

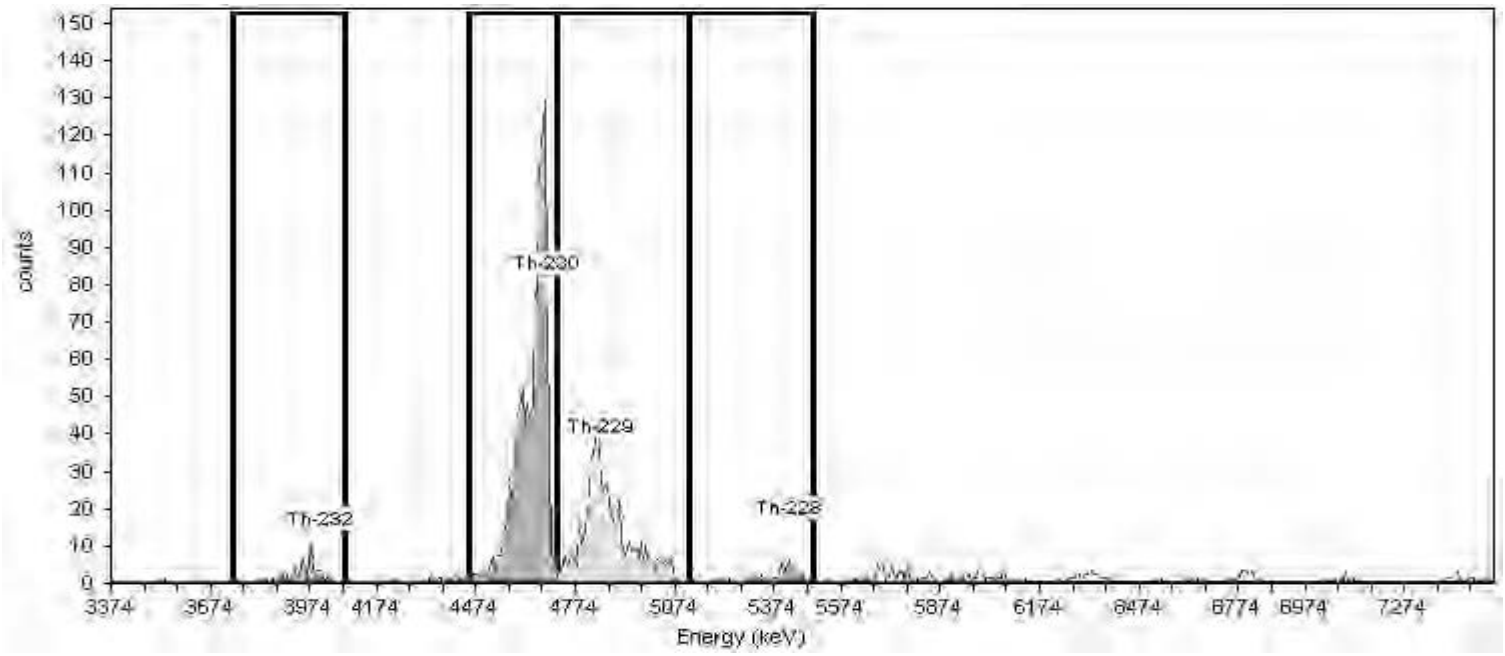
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 93.47%

Acquisition

Detector: AV8
Serial Number: 41-137Q6
Acquisition Start Date: 8/4/2018 2:30:44PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:28PM
Background Info: Sample: ICB;AV8; Det: AV8; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-9795;AV8-05142018
Calibration Date: 5/14/2018 6:26:27PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 25.96% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/4/2018 2:26:19PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Shifted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	63.6	100.2	55	0.3750	54.63	1.126	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	23.6	99.7	1116	1.8750	1113.91	23.078	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	89.8	99.6	586	1.1250	584.97	11.338	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	78.3	99.8	45	0.7500	44.25	0.916	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:32:44PM 8/4/2018

Sample

Sample Name: 490-155782-F-2-F DU
SampleType: Sample
: 490-155782-F-2-F DU
Sample Collection Date: 7/16/2018 9:55:00AM

Spectrum #1 Analysis #1
Sample Weight : 0.9947g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377729
AnalysisID: 735907

Analyst: 60040

Tracer

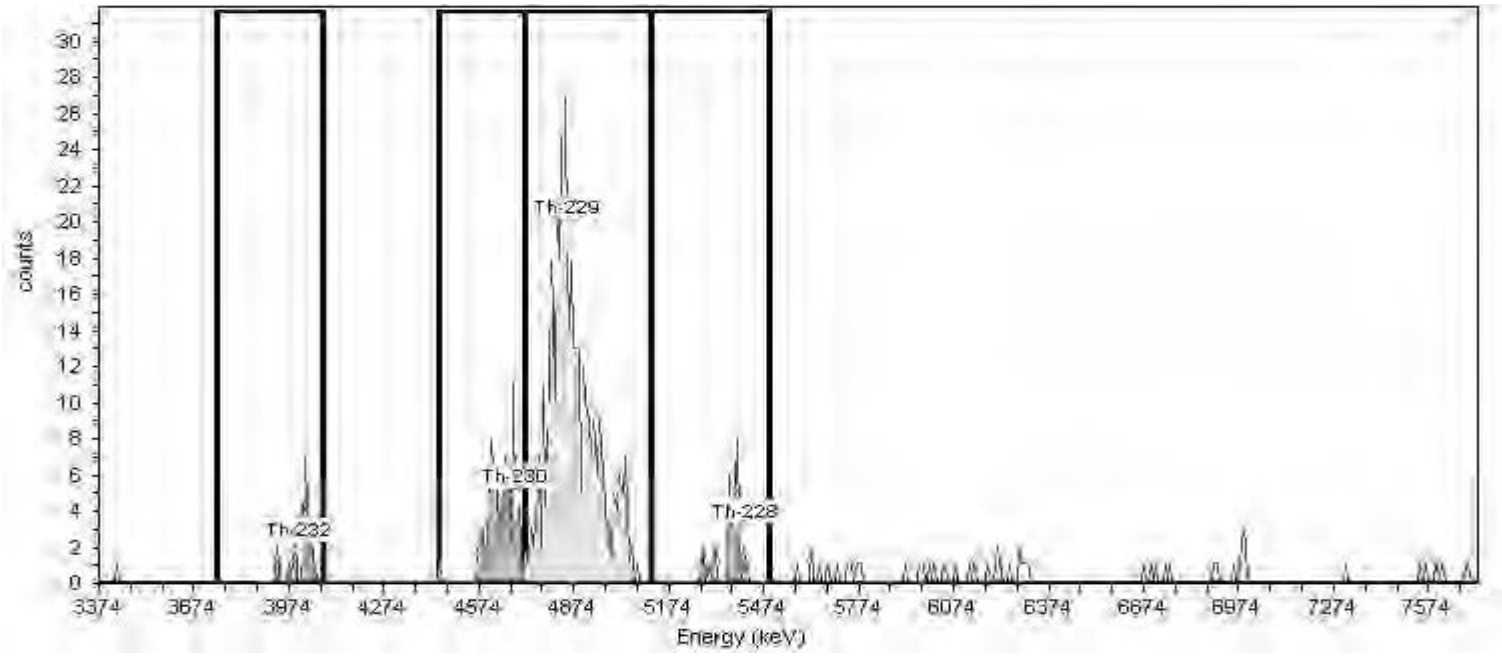
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 70.48%

Acquisition

Detector: AV10
Serial Number: 49-155N2
Acquisition Start Date: 8/4/2018 2:30:46PM
Live Time: 180.00 min.
Real Time: 180.01 min.
Background Date: 7/12/2018 1:39:32PM
Background Info: Sample: ICB;AV10; Det: AV10; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-9885;AV10-05142018
Calibration Date: 5/14/2018 6:26:57PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 23.49% +/- 0.35% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/4/2018 2:26:19PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	18.6	100.2	22	0.1875	21.81	0.331	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	14.6	99.7	83	1.1250	81.54	1.242	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	100.3	99.6	400	0.7500	399.22	4.292	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	44.6	99.8	34	1.5000	32.50	0.495	pCi/g

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Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:33:25PM 8/4/2018

Sample

Sample Name: 160-29479-A-1-D
SampleType: Sample
: 160-29479-A-1-D
Sample Collection Date: 7/10/2018 10:00:00AM

Spectrum #1 Analysis #1
Sample Weight : 0.9961g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377729
AnalysisID: 735911

Analyst: 60040

Tracer

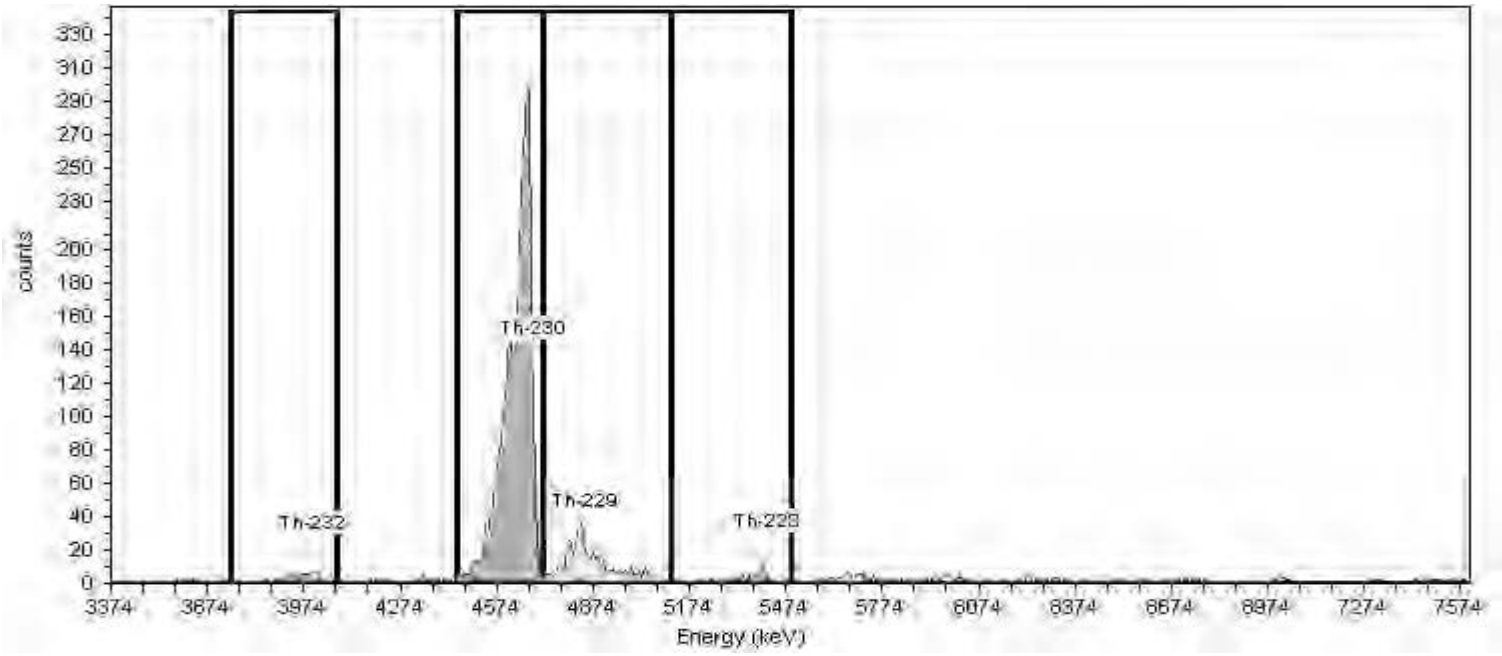
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 75.02%

Acquisition

Detector: AV12
Serial Number: 51-082B7
Acquisition Start Date: 8/4/2018 2:30:47PM
Live Time: 180.00 min.
Real Time: 180.01 min.
Background Date: 7/12/2018 1:39:36PM
Background Info: Sample: ICB;AV12; Det: AV12; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-1368447; AV12-05142018
Calibration Date: 5/14/2018 6:27:24PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 27.78% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/4/2018 2:26:19PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	102.1	100.2	62	0.8360	61.16	0.736	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	20.7	99.7	3008	0.5625	3007.10	36.361	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	78.3	99.6	503	0.5625	502.41	4.561	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	50.1	99.8	64	1.7037	62.30	0.753	pCi/g

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Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:33:43PM 8/4/2018

Sample

Sample Name: 160-29479-A-2-F
SampleType: Sample
: 160-29479-A-2-F
Sample Collection Date: 7/10/2018 10:40:00AM

Spectrum #1 Analysis #1
Sample Weight : 1.0096g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377729
AnalysisID: 735913

Analyst: 60040

Tracer

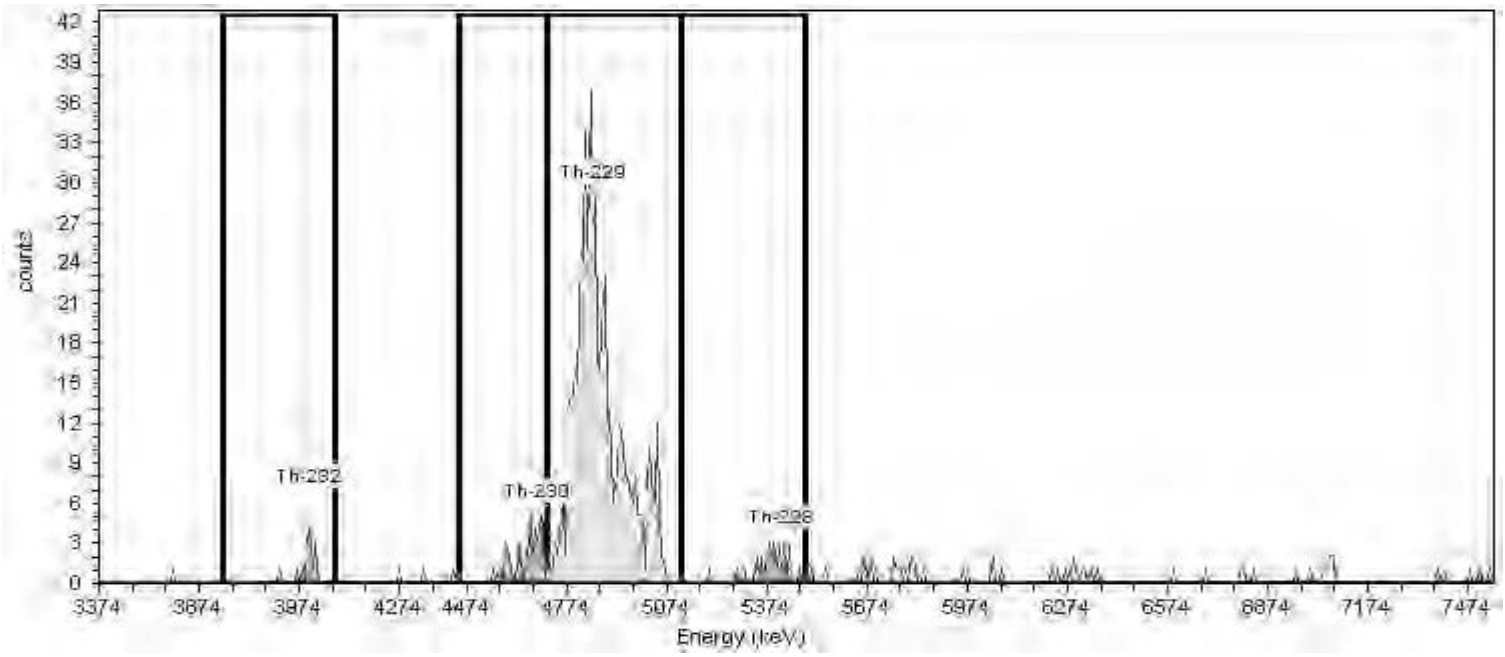
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 84.73%

Acquisition

Detector: AV14
Serial Number: 50-060W4
Acquisition Start Date: 8/4/2018 2:30:49PM
Live Time: 180.00 min.
Real Time: 180.01 min.
Background Date: 7/12/2018 1:39:27PM
Background Info: Sample: ICB;AV14; Det: AV14; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-1370622;AV14-05142018
Calibration Date: 5/14/2018 6:27:53PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 26.40% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/4/2018 2:26:19PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	45.9	100.2	15	0.0000	15.00	0.166	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	35.5	99.7	40	0.5625	39.44	0.438	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	94.7	99.6	540	0.7500	539.25	5.083	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	81.9	99.8	29	0.5625	28.44	0.316	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:33:52PM 8/4/2018

Sample

Sample Name: 160-29479-A-3-D
SampleType: Sample
: 160-29479-A-3-D
Sample Collection Date: 7/10/2018 10:45:00AM

Spectrum #1 Analysis #1
Sample Weight : 1.0066g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377729
AnalysisID: 735914

Analyst: 60040

Tracer

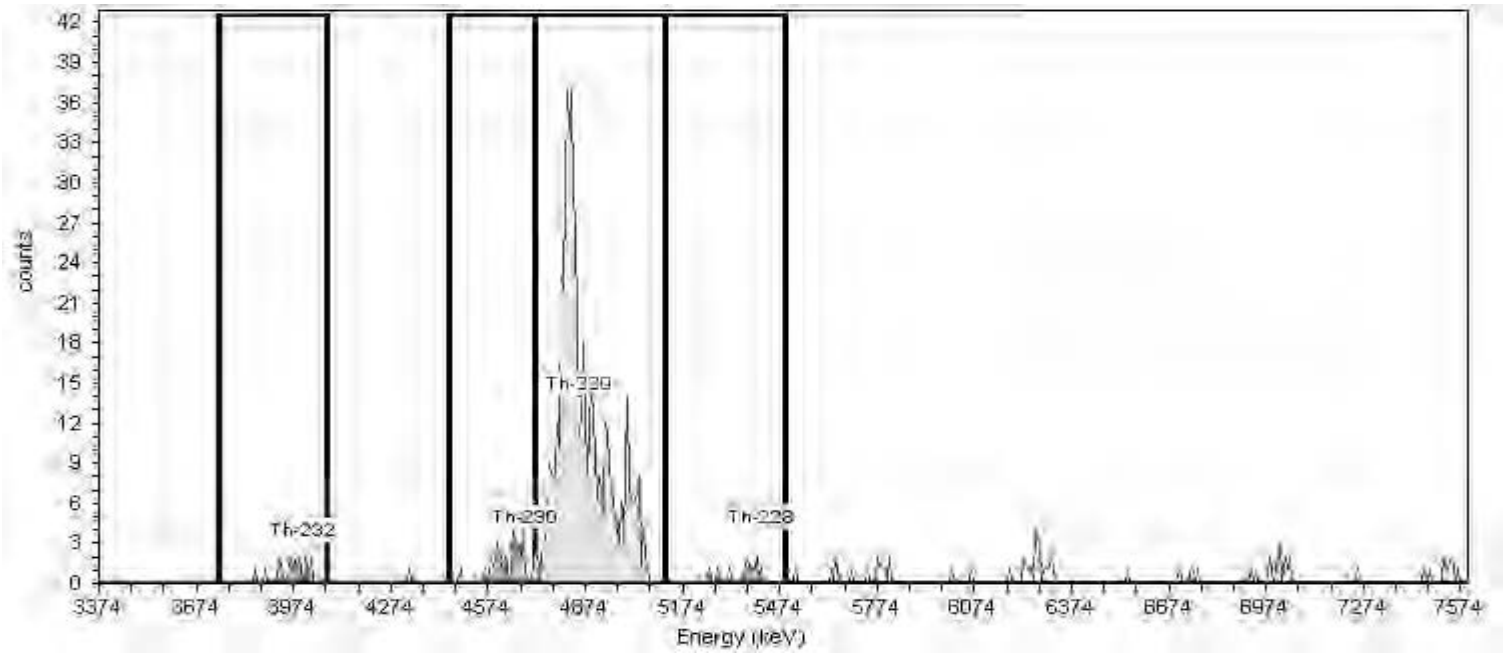
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 75.87%

Acquisition

Detector: AV15
Serial Number: 41-172C5
Acquisition Start Date: 8/4/2018 2:30:51PM
Live Time: 180.00 min.
Real Time: 180.01 min.
Background Date: 7/12/2018 1:39:30PM
Background Info: Sample: ICB;AV15; Det: AV15; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-1370619;AV15-05142018
Calibration Date: 5/14/2018 6:28:04PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 27.26% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/4/2018 2:26:19PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	67.9	100.2	18	0.2735	17.73	0.213	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	19.7	99.7	35	0.5625	34.47	0.416	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	63.2	99.6	500	1.5000	498.53	4.565	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	46.3	99.8	12	1.3125	10.69	0.129	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:34:47PM 8/4/2018

Sample

Sample Name: 160-29479-B-4-C
SampleType: Sample
: 160-29479-B-4-C
Sample Collection Date: 7/11/2018 11:55:00AM

Spectrum #1 Analysis #1
Sample Weight : 0.9915g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377729
AnalysisID: 735915

Analyst: 60040

Tracer

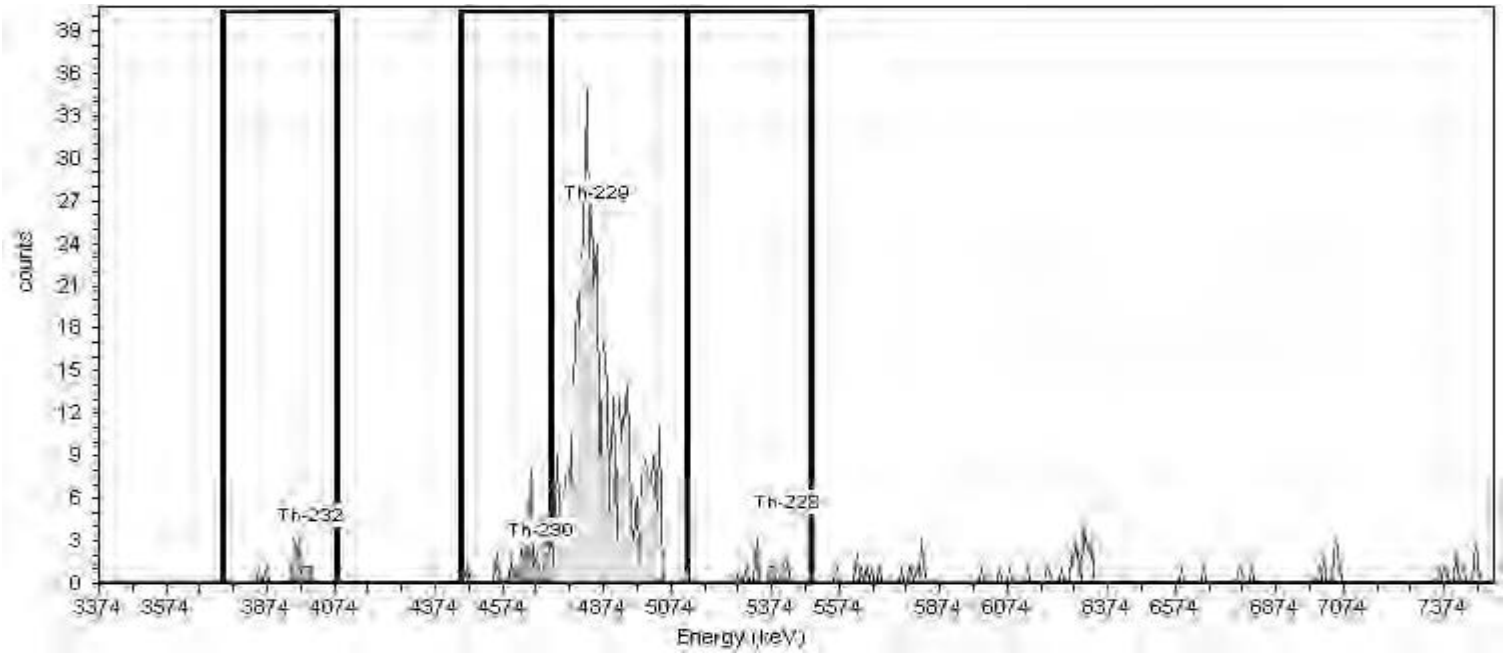
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 76.73%

Acquisition

Detector: AV16
Serial Number: 51-082B6
Acquisition Start Date: 8/4/2018 2:30:53PM
Live Time: 180.00 min.
Real Time: 180.01 min.
Background Date: 7/12/2018 1:39:32PM
Background Info: Sample: ICB;AV16; Det: AV16; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-137620;AV16-05142018
Calibration Date: 5/14/2018 6:28:17PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 26.96% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/4/2018 2:26:19PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	50.7	100.2	14	0.3750	13.63	0.166	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	74.4	99.7	40	0.6203	39.29	0.481	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	78.3	99.6	499	0.1875	498.66	4.687	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	314.9	99.8	13	0.1875	12.75	0.156	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:35:57PM 8/4/2018

Sample

Sample Name: 160-29479-A-5-D
SampleType: Sample
: 160-29479-A-5-D
Sample Collection Date: 7/11/2018 12:00:00PM

Spectrum #1 Analysis #1
Sample Weight : 0.9955g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377729
AnalysisID: 735916

Analyst: 60040

Tracer

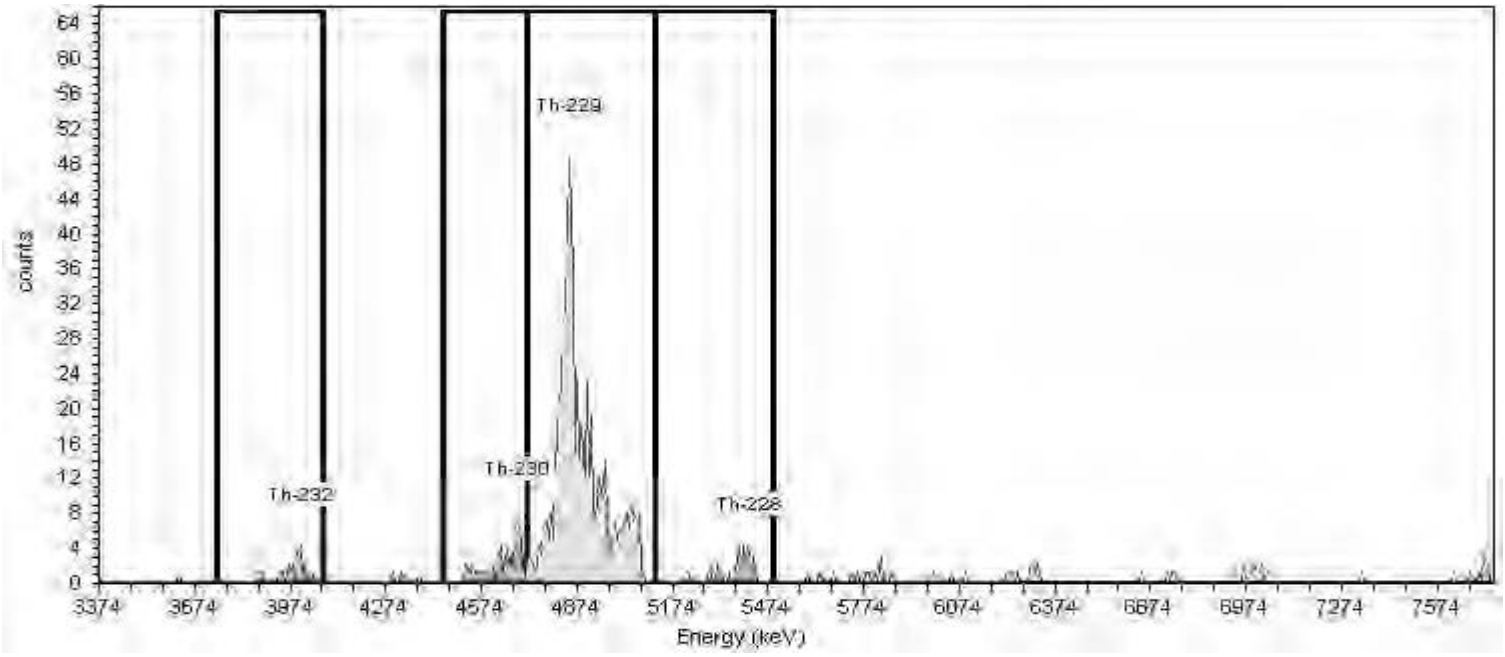
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 99.44%

Acquisition

Detector: AV17
Serial Number: 50-051C4
Acquisition Start Date: 8/4/2018 2:30:54PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/13/2018 12:11:23PM
Background Info: Sample: ICB;AV17; Det: AV17; Spectrum #2; Jul-13-2018 12:11

Calibration Name: IC-7107;AV17-05142018a
Calibration Date: 5/15/2018 12:29:12PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 24.09% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/4/2018 2:26:19PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	73.4	100.2	22	0.1875	21.81	0.228	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	26.8	99.7	56	0.3750	55.66	0.586	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	64.4	99.6	578	0.5625	577.47	6.050	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	53.9	99.8	32	2.8125	29.19	0.307	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:36:07PM 8/4/2018

Sample

Sample Name: 160-29479-B-6-C
SampleType: Sample
: 160-29479-B-6-C
Sample Collection Date: 7/11/2018 12:30:00PM

Spectrum #1 Analysis #1
Sample Weight : 1.0014g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377729
AnalysisID: 735917

Analyst: 60040

Tracer

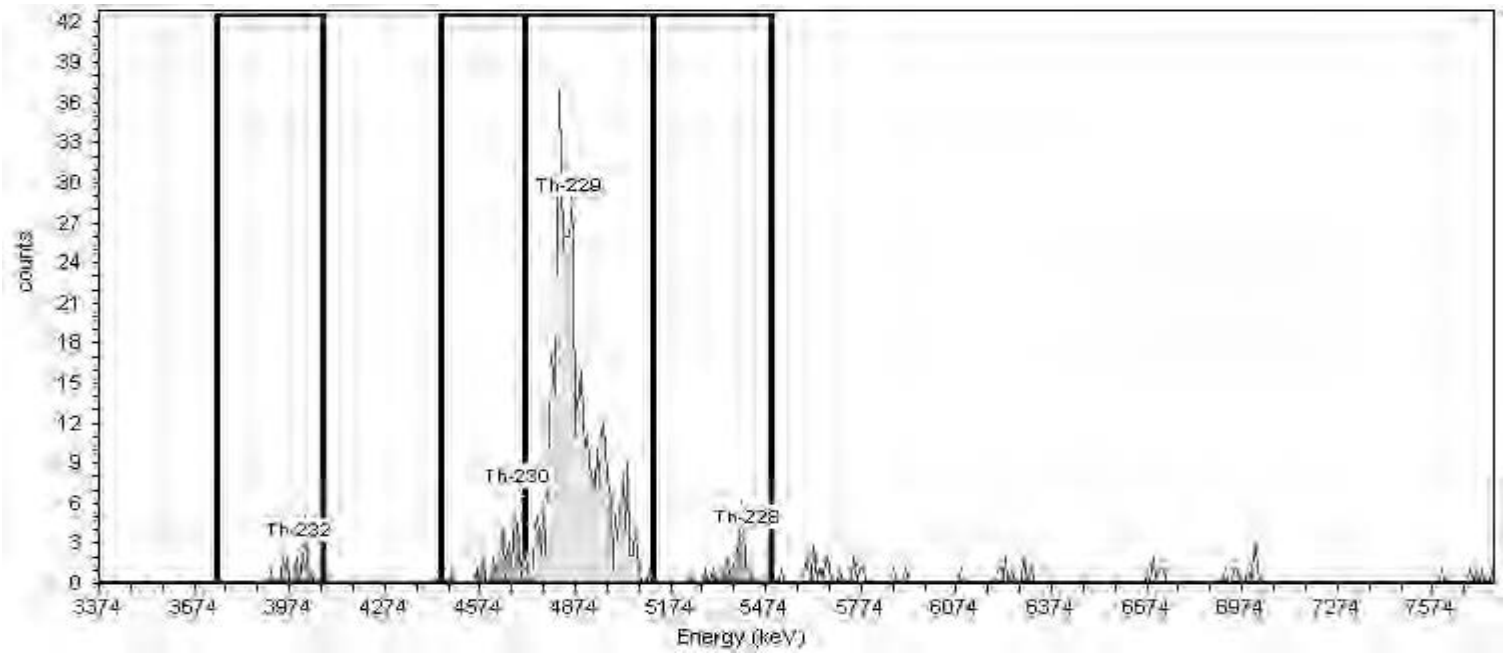
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 87.44%

Acquisition

Detector: AV19
Serial Number: 50-025FF5
Acquisition Start Date: 8/4/2018 2:30:56PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:36PM
Background Info: Sample: ICB;AV19; Det: AV19; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-8877;AV19-05142018
Calibration Date: 5/15/2018 12:27:55PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 23.60% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/4/2018 2:26:19PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	74.1	100.2	17	0.6422	16.36	0.198	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	24.4	99.7	37	1.1250	35.81	0.435	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	83.5	99.6	498	0.3750	497.56	5.289	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	47.7	99.8	28	1.5000	26.50	0.322	pCi/g

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:31:18PM 8/4/2018

Sample

Sample Name: 160-29479-A-7-C
SampleType: Sample
: 160-29479-A-7-C
Sample Collection Date: 7/11/2018 1:40:00PM

Spectrum #1 Analysis #1
Sample Weight : 1.0029g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377729
AnalysisID: 735900

Analyst: 60040

Tracer

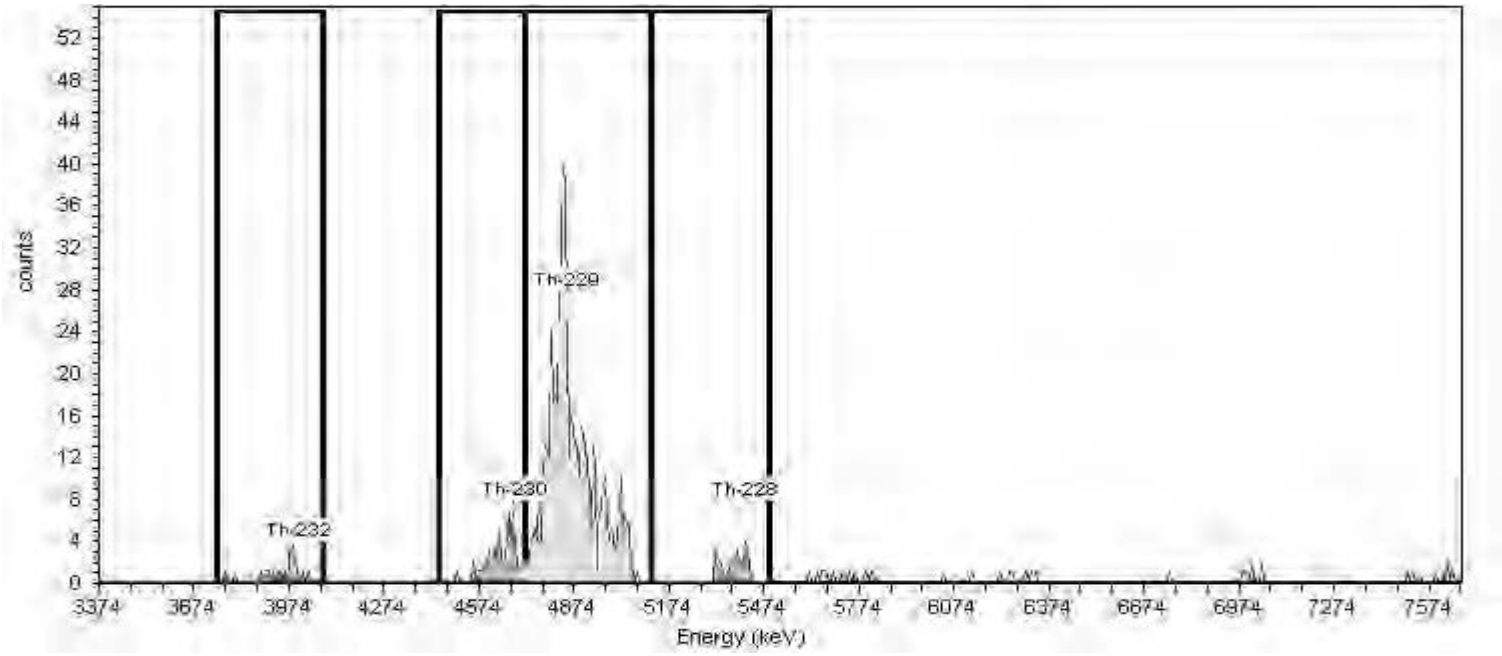
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 92.22%

Acquisition

Detector: AV20
Serial Number: 48-121A7
Acquisition Start Date: 8/4/2018 2:30:57PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:38PM
Background Info: Sample: ICB;AV20; Det: AV20; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-9520;AV20-05142018
Calibration Date: 5/15/2018 12:28:08PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 22.15% +/- 0.32% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/4/2018 2:26:19PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	51.7	100.2	20	0.3750	19.63	0.239	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	18.2	99.7	59	0.5683	58.43	0.716	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	82.0	99.6	495	2.6188	492.38	5.569	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	64.1	99.8	26	2.0505	23.95	0.293	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:31:59PM 8/4/2018

Sample

Sample Name: 160-29479-B-8-C
SampleType: Sample
: 160-29479-B-8-C
Sample Collection Date: 7/11/2018 2:30:00PM

Spectrum #1 Analysis #1
Sample Weight : 0.9938g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377729
AnalysisID: 735902

Analyst: 60040

Tracer

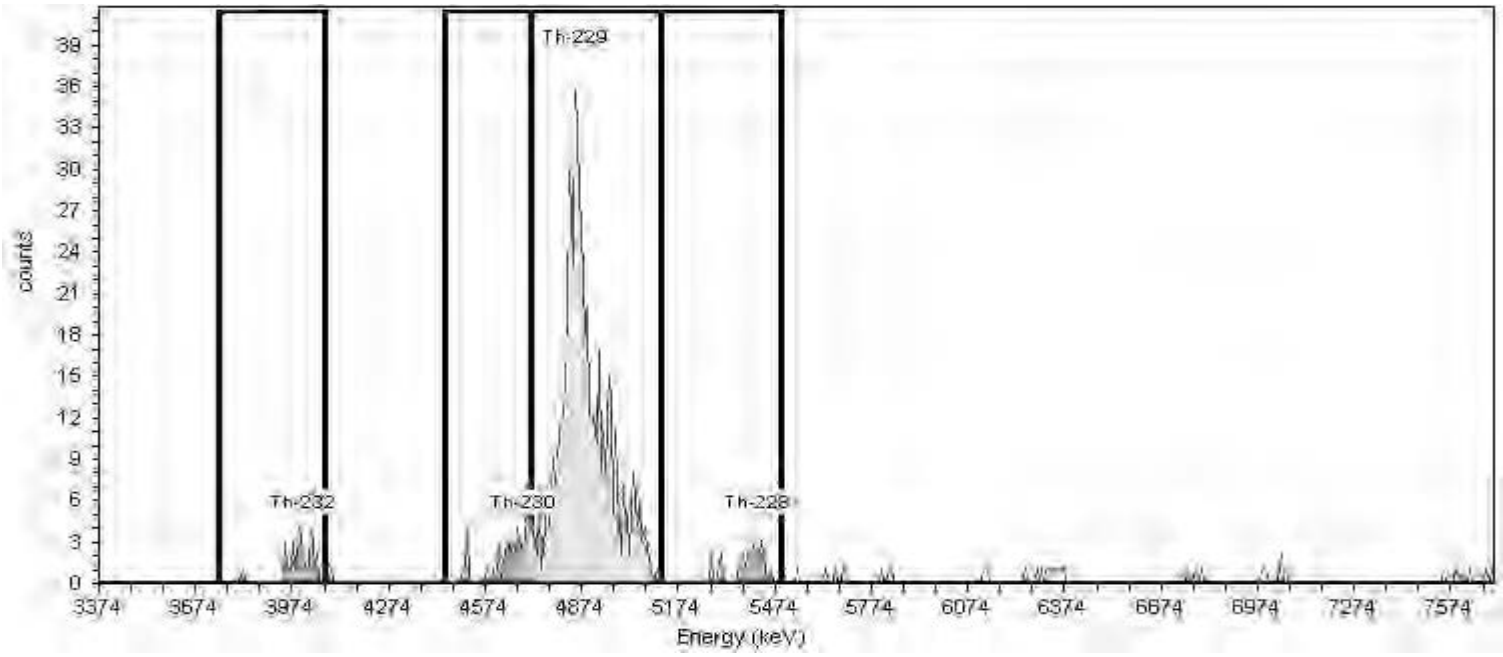
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 92.76%

Acquisition

Detector: AV21
Serial Number: 48-102BB6
Acquisition Start Date: 8/4/2018 2:30:59PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:41PM
Background Info: Sample: ICB;AV21; Det: AV21; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-9792;AV21-05142018
Calibration Date: 5/15/2018 12:28:21PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 23.43% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/4/2018 2:26:19PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	12.9	100.2	27	0.3750	26.63	0.308	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	54.0	99.7	52	0.5625	51.41	0.597	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	72.2	99.6	525	0.9375	524.03	5.653	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	71.6	99.8	29	1.1250	27.88	0.324	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:34:04PM 8/5/2018

Sample

Sample Name: 160-29479-B-8-C
SampleType: Sample
: 160-29479-B-8-C
Sample Collection Date: 7/11/2018 2:30:00PM

Spectrum #1 Analysis #1
Sample Weight : 0.9938g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377729
AnalysisID: 735945

Analyst: 60040

Tracer

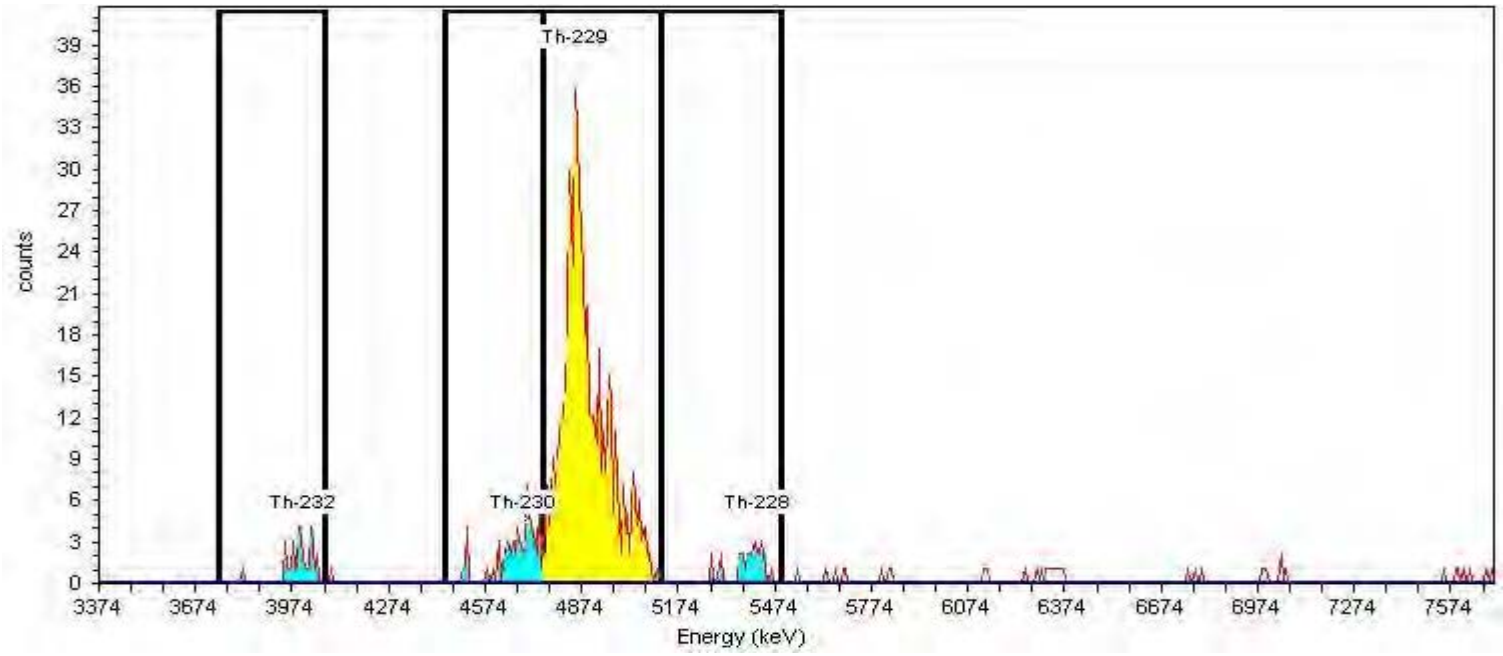
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 90.53%

Acquisition

Detector: AV21
Serial Number: 48-102BB6
Acquisition Start Date: 8/4/2018 2:30:59PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:41PM
Background Info: Sample: ICB;AV21; Det: AV21; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-9792;AV21-05142018
Calibration Date: 5/15/2018 12:28:21PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 23.43% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/4/2018 2:26:19PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	12.9	100.2	27	0.3750	26.63	0.315	pCi/g
Th-230	4688.0	4,687.5	0.5	4448.3	4754.1	35.7	99.7	66	0.9375	65.06	0.775	pCi/g
Th-229	4848.0	4,845.3	2.7	4754.1	5119.5	72.2	99.6	512	0.5625	511.44	5.518	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	71.6	99.8	29	1.1250	27.88	0.332	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:32:17PM 8/4/2018

Sample

Sample Name: 160-29479-B-9-C
SampleType: Sample
: 160-29479-B-9-C
Sample Collection Date: 7/11/2018 3:05:00PM

Spectrum #1 Analysis #1
Sample Weight : 0.9951g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377729
AnalysisID: 735904

Analyst: 60040

Tracer

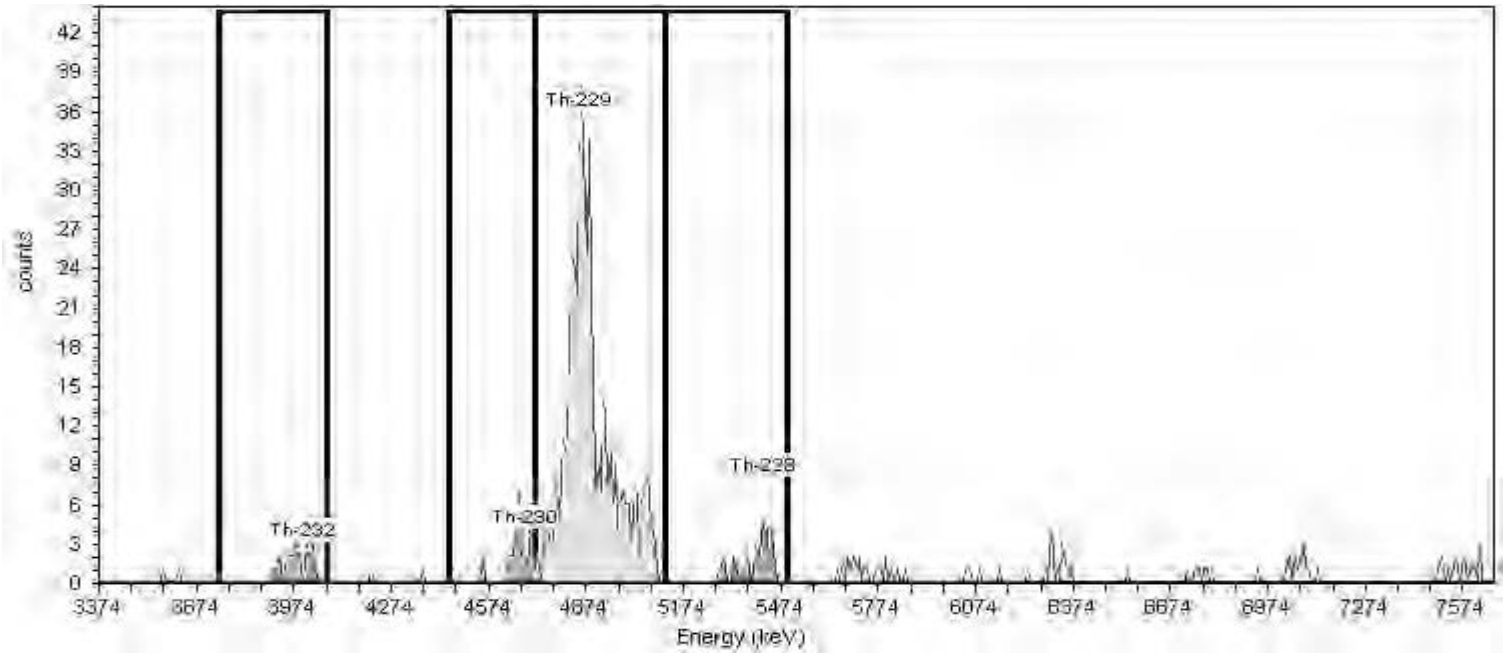
Tracer Name: Th-229_00023
Tracer Activity: 67.23 DPM/mL x (Vol.)0.20 mL = 13.45 DPM
Tracer Ref. Date: 8/6/2014 12:00:17PM

Tracer Nuclide: Th-229
Tracer Recovery: 89.83%

Acquisition

Detector: AV23
Serial Number: 48-158FF3
Acquisition Start Date: 8/4/2018 2:31:00PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:44PM
Background Info: Sample: ICB;AV23; Det: AV23; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-9795;AV23-05142018
Calibration Date: 5/15/2018 12:28:43PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 24.46% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/4/2018 2:26:19PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	13.8	100.2	32	0.7500	31.25	0.357	pCi/g
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	44.0	99.7	42	0.3750	41.66	0.478	pCi/g
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	73.6	99.6	530	0.3630	529.67	5.467	pCi/g
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	39.5	99.8	37	2.2380	34.76	0.399	pCi/g

Method A-01-R U

Isotopic Uranium (Alpha Spectrometry) by Method A-01-R

Prep Batch: 377742

Preparation, Extraction Chromatography Resin Actinide Separation

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 377742

Lab ID: MB 160-377742/1-A
Client ID:
Sigma: 2

Analyzed: 08/04/18 14:34
Detector: AV47
Dil Fac: 1

Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-234	0.02041	0.0289	0.0289	U	pCi/g	1.00	0.0306	380552
Uranium-235	0.0000	0.00476	0.00476	U	pCi/g	1.00	0.0381	380552
Uranium-238	-0.003820	0.00540	0.00541	U	pCi/g	1.00	0.0529	380552

Tracer	MB Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Uranium-232	6.301	0.484	0.717		pCi/g	0.0754	6.91	90.9	30 - 110

Lab ID: LCS 160-377742/2-A
Client ID:
Sigma: 2

Analyzed: 08/04/18 14:34
Detector: AV48
Dil Fac: 1

Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-234	6.552	0.544	0.774		pCi/g	1.00	0.0642	380553
Uranium-238	7.127	0.567	0.824		pCi/g	1.00	0.0585	380553

Tracer	LCS Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Uranium-232	5.690	0.459	0.663		pCi/g	0.0657	6.91	82.1	30 - 110

Lab ID: 490-155782-F-2-H DU
Client ID:
Sigma: 2

Analyzed: 08/04/18 14:34
Detector: AV52
Dil Fac: 1

Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-234	0.9606	0.214	0.229		pCi/g	1.00	0.0944	380555
Uranium-235	0.01171	0.0293	0.0293	U	pCi/g	1.00	0.0656	380555
Uranium-238	1.122	0.229	0.248		pCi/g	1.00	0.0748	380555

Tracer	DU Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Uranium-232	6.189	0.504	0.724		pCi/g	0.0626	6.95	88.8	30 - 110

Lab ID: 160-29479-1
Client ID: CRC-B1-0002
Sigma: 2

Analyzed: 08/04/18 14:34
Detector: AV54
Dil Fac: 1

Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-234	5.07	0.446	0.617		pCi/g	1.00	0.0696	380557
Uranium-235	0.241	0.109	0.111		pCi/g	1.00	0.0554	380557
Uranium-238	5.38	0.459	0.644		pCi/g	1.00	0.0445	380557

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 377742

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Uranium-232	7.58	0.568	0.853		pCi/g	0.0723	6.94	109	30 - 110

Lab ID: 160-29479-2
Client ID: CRC-B1-1820
Sigma: 2
Analyzed: 08/04/18 14:34
Detector: AV56
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-234	0.229	0.104	0.106		pCi/g	1.00	0.0689	380558
Uranium-235	0.0228	0.0404	0.0405	U	pCi/g	1.00	0.0730	380558
Uranium-238	0.413	0.137	0.141		pCi/g	1.00	0.0585	380558

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Uranium-232	5.98	0.485	0.698		pCi/g	0.0667	6.84	87.1	30 - 110

Lab ID: 160-29479-3
Client ID: CRC-B1-1214
Sigma: 2
Analyzed: 08/04/18 14:34
Detector: AV57
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-234	0.322	0.121	0.124		pCi/g	1.00	0.0770	380559
Uranium-235	0.0522	0.0615	0.0617	U	pCi/g	1.00	0.0917	380559
Uranium-238	0.438	0.141	0.145		pCi/g	1.00	0.0799	380559

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Uranium-232	7.07	0.561	0.817		pCi/g	0.0820	6.86	103	30 - 110

Lab ID: 160-29479-4
Client ID: CRC-B7-1416
Sigma: 2
Analyzed: 08/04/18 14:34
Detector: AV58
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-234	0.315	0.120	0.123		pCi/g	1.00	0.0743	380560
Uranium-235	0.0221	0.0391	0.0391	U	pCi/g	1.00	0.0706	380560
Uranium-238	0.312	0.117	0.120		pCi/g	1.00	0.0566	380560

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Uranium-232	6.73	0.532	0.777		pCi/g	0.0829	6.97	96.3	30 - 110

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 377742

Lab ID: 160-29479-5
Client ID: CRC-B7-2224
Sigma: 2
Analyzed: 08/04/18 14:34
Detector: AV60
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-234	0.582	0.153	0.161		pCi/g	1.00	0.0638	380561
Uranium-235	0.000	0.00460	0.00460	U	pCi/g	1.00	0.0368	380561
Uranium-238	0.604	0.155	0.163		pCi/g	1.00	0.0560	380561

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Uranium-232	6.29	0.473	0.709		pCi/g	0.0680	6.94	90.4	30 - 110

Lab ID: 160-29479-6
Client ID: CRC-B7-2628
Sigma: 2
Analyzed: 08/04/18 14:34
Detector: AV62
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-234	1.14	0.216	0.236		pCi/g	1.00	0.0529	380562
Uranium-235	0.0507	0.0507	0.0509		pCi/g	1.00	0.0380	380562
Uranium-238	1.42	0.241	0.269		pCi/g	1.00	0.0528	380562

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Uranium-232	5.99	0.459	0.681		pCi/g	0.0537	6.90	86.5	30 - 110

Lab ID: 160-29479-7
Client ID: CRC-B20-1214
Sigma: 2
Analyzed: 08/04/18 14:34
Detector: AV63
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-234	1.22	0.224	0.246		pCi/g	1.00	0.0661	380563
Uranium-235	0.0587	0.0572	0.0574	U	pCi/g	1.00	0.0660	380563
Uranium-238	1.11	0.214	0.233		pCi/g	1.00	0.0622	380563

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Uranium-232	6.32	0.486	0.719		pCi/g	0.0758	6.89	91.4	30 - 110

Lab ID: 160-29479-8
Client ID: CRC-B20-1820
Sigma: 2
Analyzed: 08/04/18 14:34
Detector: AV64
Dil Fac: 1
Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-234	0.749	0.174	0.185		pCi/g	1.00	0.0522	380564
Uranium-235	0.0226	0.0356	0.0357	U	pCi/g	1.00	0.0569	380564

Alpha Spectroscopy Analysis Detail Report
Prep Batch: 377742

Lab ID: 160-29479-8
Client ID: CRC-B20-1820
Sigma: 2

Analyzed: 08/04/18 14:34
Detector: AV64
Dil Fac: 1

Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-238	0.948	0.195	0.211		pCi/g	1.00	0.0520	380564

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Uranium-232	6.18	0.469	0.699		pCi/g	0.0630	6.95	88.6	30 - 110

Lab ID: 160-29479-9
Client ID: CRC-B20-2628
Sigma: 2

Analyzed: 08/04/18 14:34
Detector: AV66
Dil Fac: 1

Decay Corrected: No
Yield Truncated: No
Ts: 180

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-234	3.88	0.412	0.526		pCi/g	1.00	0.0933	380565
Uranium-235	0.247	0.118	0.120		pCi/g	1.00	0.0825	380565
Uranium-238	3.89	0.411	0.525		pCi/g	1.00	0.0661	380565

Tracer	Result	Count Unc	Total Unc	Qualifier	Unit	MDC	Spike Added	% Rec	% Rec Limits
Uranium-232	5.96	0.471	0.687		pCi/g	0.0710	6.94	85.6	30 - 110

Quality Control Summary

Method Blank ID:	Analyte	Parent Result	Spike Added	MB Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
MB 160-377742/1-A	Uranium-234			0.02041	U	pCi/g							1.41172547
MB 160-377742/1-A	Uranium-235			0.0000	U	pCi/g							.
MB 160-377742/1-A	Uranium-238			-0.003820	U	pCi/g							-1.41172547

Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-377742/2-A	Uranium-234		6.37	6.552		pCi/g	103	84 - 120					.3400118809
LCS 160-377742/2-A	Uranium-238		6.51	7.127		pCi/g	109	82 - 122					1.1038676679

Duplicate ID:	Analyte	Parent Result	Spike Added	DU Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
490-155782-F-2-H DU	Uranium-234	0.786		0.9606		pCi/g			20	0.40	1.14	1	
490-155782-F-2-H DU	Uranium-235	0.0719		0.01171	U	pCi/g			144	0.62	1.64	1	
490-155782-F-2-H DU	Uranium-238	0.830		1.122		pCi/g			30	0.64	1.79	1	

Glossary:
Ts = Count Duration, Sample

ALPHA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29479-1

SDG No.:

Batch Number: 377742 Batch Start Date: 07/24/18 18:48 Batch Analyst: Turley, Taylor A

Batch Method: ExtChrom Batch End Date: 08/03/18 20:29

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	U-232 00040	UNAT 00014			
MB 160-377742/1		ExtChrom, A-01-R		1 g	0.2 mL				
LCS 160-377742/2		ExtChrom, A-01-R		1 g	0.2 mL	0.2 mL			
490-155782-F-2-A DU		ExtChrom, A-01-R	T	0.9947 g	0.2 mL				
160-29479-A-1-B	CRC-B1-0002	ExtChrom, A-01-R	T	0.9961 g	0.2 mL				
160-29479-A-2-B	CRC-B1-1820	ExtChrom, A-01-R	T	1.0096 g	0.2 mL				
160-29479-A-3-B	CRC-B1-1214	ExtChrom, A-01-R	T	1.0066 g	0.2 mL				
160-29479-B-4-A	CRC-B7-1416	ExtChrom, A-01-R	T	0.9915 g	0.2 mL				
160-29479-A-5-B	CRC-B7-2224	ExtChrom, A-01-R	T	0.9955 g	0.2 mL				
160-29479-B-6-A	CRC-B7-2628	ExtChrom, A-01-R	T	1.0014 g	0.2 mL				
160-29479-A-7-A	CRC-B20-1214	ExtChrom, A-01-R	T	1.0029 g	0.2 mL				
160-29479-B-8-A	CRC-B20-1820	ExtChrom, A-01-R	T	0.9938 g	0.2 mL				
160-29479-B-9-A	CRC-B20-2628	ExtChrom, A-01-R	T	0.9951 g	0.2 mL				

Batch Notes	
Balance ID	1123433897
Analyst ID - Column	NMN per CMM
Column Date	08/01/2018
Analyst ID - CoPrecipitation	CMM
CoPrecipitation Date	08/03/2018
Pipette ID	RAD117
Analyst ID - Reagent Drop Witness	TAT per CMM
Analyst ID - Reagent Drop	CMM
SOP Number	ST-RC-0003, ST-RC-0004, ST-RC-0100, ST-RC-0242

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

ALPHA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29479-1

SDG No.:

Batch Number: 377742 Batch Start Date: 07/24/18 18:48 Batch Analyst: Turley, Taylor A

Batch Method: ExtChrom Batch End Date: 08/03/18 20:29

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:36:16PM 8/4/2018

Sample

Sample Name: MB 160-377742/1-A
SampleType: Blank
: MB 160-377742/1-A
Sample Collection Date: 8/3/2018 8:30:00PM

Spectrum #1 Analysis #1
Sample Weight : 1.0000g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377742
AnalysisID: 735918

Analyst: 60040

Tracer

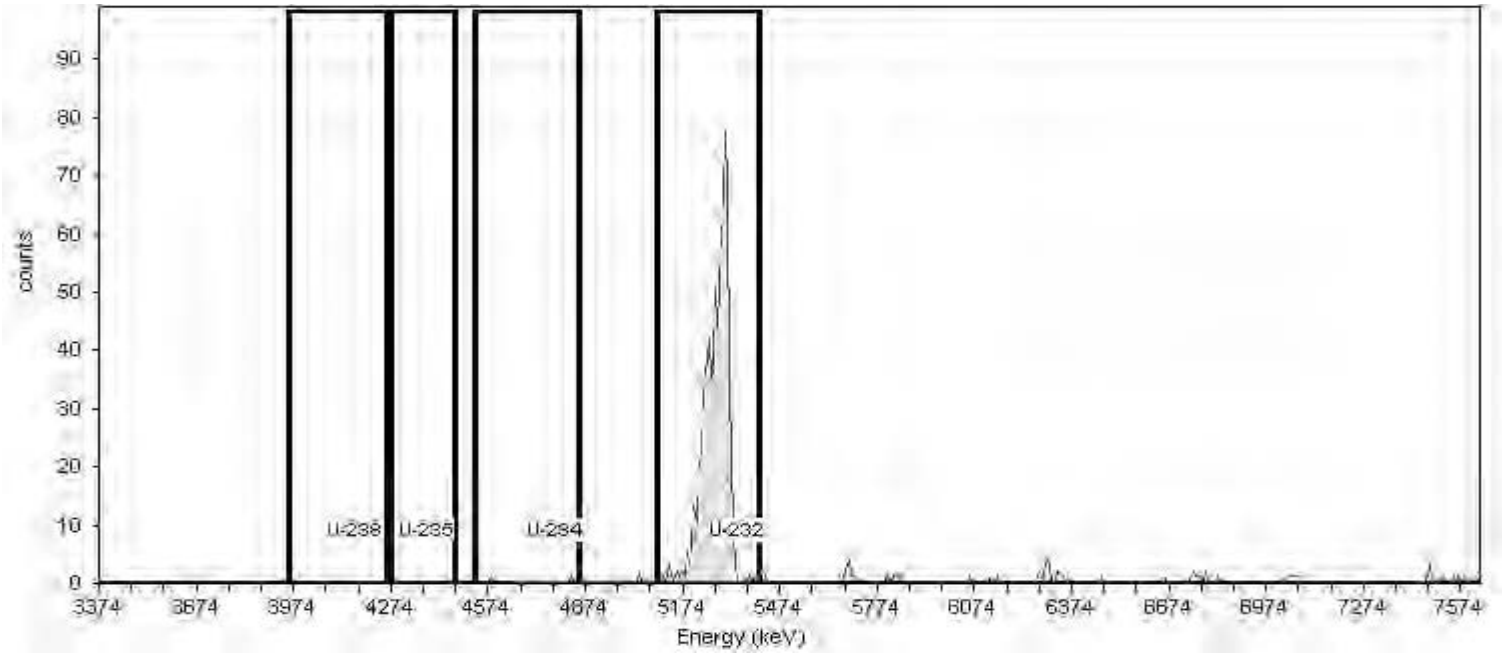
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.20 mL = 16.45 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 90.92%

Acquisition

Detector: AV47
Serial Number: 46-032336
Acquisition Start Date: 8/4/2018 2:34:15PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:57PM
Background Info: Sample: ICB;AV47; Det: AV47; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-1370622;AV47-05142018
Calibration Date: 5/15/2018 12:27:14PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 27.02% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 8/4/2018 2:31:19PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	.0	100.0	0	0.3750	-0.38	-0.004	pCi/g
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	.0	80.2	0	0.0000	0.00	0.000	pCi/g
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	10.2	99.8	2	0.0000	2.00	0.020	pCi/g
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	79.3	100.1	683	2.0625	680.94	6.737	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:36:25PM 8/4/2018

Sample

Sample Name: LCS 160-377742/2-A
SampleType: Control
: LCS 160-377742/2-A
Sample Collection Date: 8/3/2018 8:30:00PM

Spectrum #1 Analysis #1
Sample Weight : 1.0000g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377742
AnalysisID: 735919

Analyst: 60040

Tracer

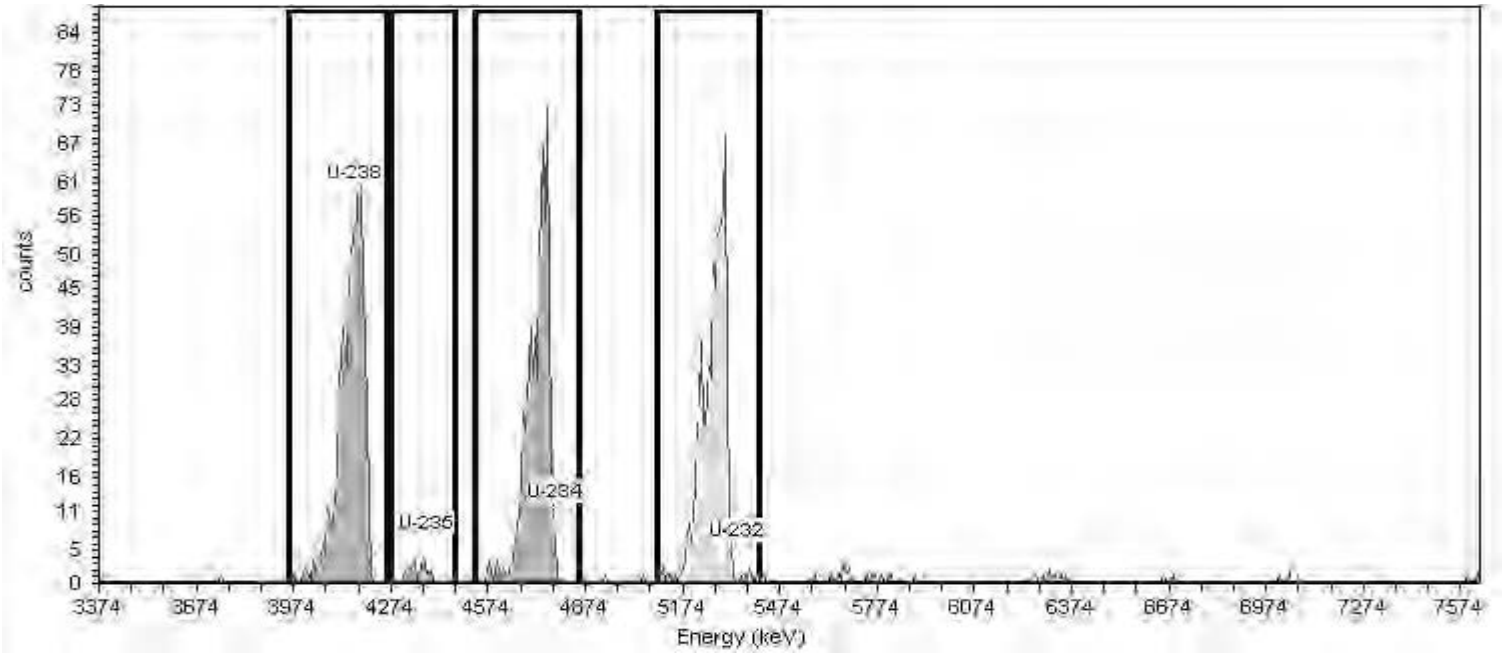
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.20 mL = 16.45 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 82.10%

Acquisition

Detector: AV48
Serial Number: 46-033P6
Acquisition Start Date: 8/4/2018 2:34:16PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:39:58PM
Background Info: Sample: ICB;AV48; Det: AV48; Spectrum #1; Jul-12-2018 13:39

Calibration Name: IC-1370619;AV48-05142018
Calibration Date: 5/15/2018 12:27:25PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 27.06% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 8/4/2018 2:31:18PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	74.8	100.0	633	0.3750	632.63	7.127	pCi/g
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	70.1	80.2	24	0.1875	23.81	0.334	pCi/g
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	72.7	99.8	581	0.5625	580.44	6.552	pCi/g
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	78.2	100.1	617	1.3125	615.69	6.083	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:36:43PM 8/4/2018

Sample

Sample Name: 490-155782-F-2-H DU
SampleType: Sample
: 490-155782-F-2-H DU
Sample Collection Date: 7/16/2018 9:55:00AM

Spectrum #1 Analysis #1
Sample Weight : 0.9947g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377742
AnalysisID: 735921

Analyst: 60040

Tracer

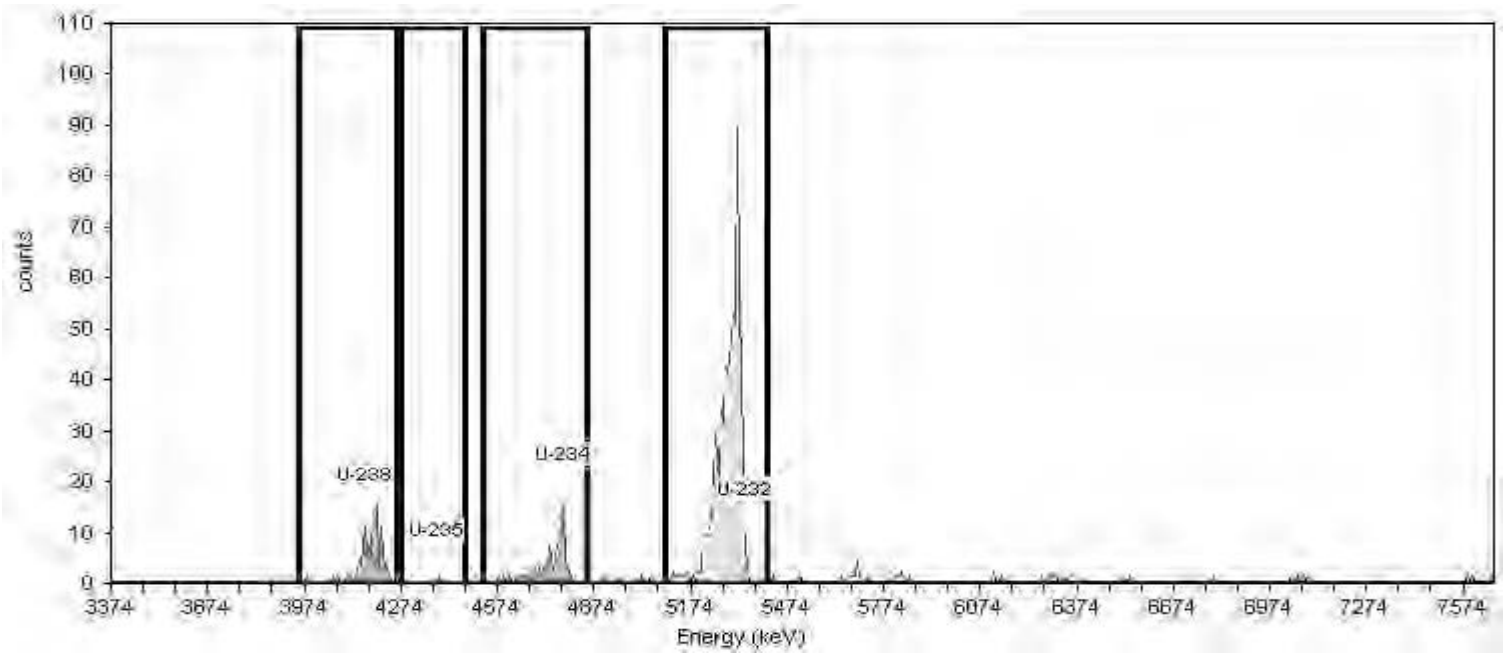
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.20 mL = 16.45 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 88.83%

Acquisition

Detector: AV52
Serial Number: 49-155N7
Acquisition Start Date: 8/4/2018 2:34:18PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:40:02PM
Background Info: Sample: ICB;AV52; Det: AV52; Spectrum #1; Jul-12-2018 13:40

Calibration Name: IC-8877;AV52-05152018
Calibration Date: 5/15/2018 3:36:50PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 24.50% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 8/4/2018 2:31:18PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	74.2	100.0	98	0.9375	97.06	1.122	pCi/g
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	18.3	80.2	1	0.1875	0.81	0.012	pCi/g
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	53.0	99.8	85	2.0625	82.94	0.961	pCi/g
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	70.0	100.1	604	0.7500	603.25	6.617	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:37:05PM 8/4/2018

Sample

Sample Name: 160-29479-A-1-E
SampleType: Sample
: 160-29479-A-1-E
Sample Collection Date: 7/10/2018 10:00:00AM

Spectrum #1 Analysis #1
Sample Weight : 0.9961g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377742
AnalysisID: 735923

Analyst: 60040

Tracer

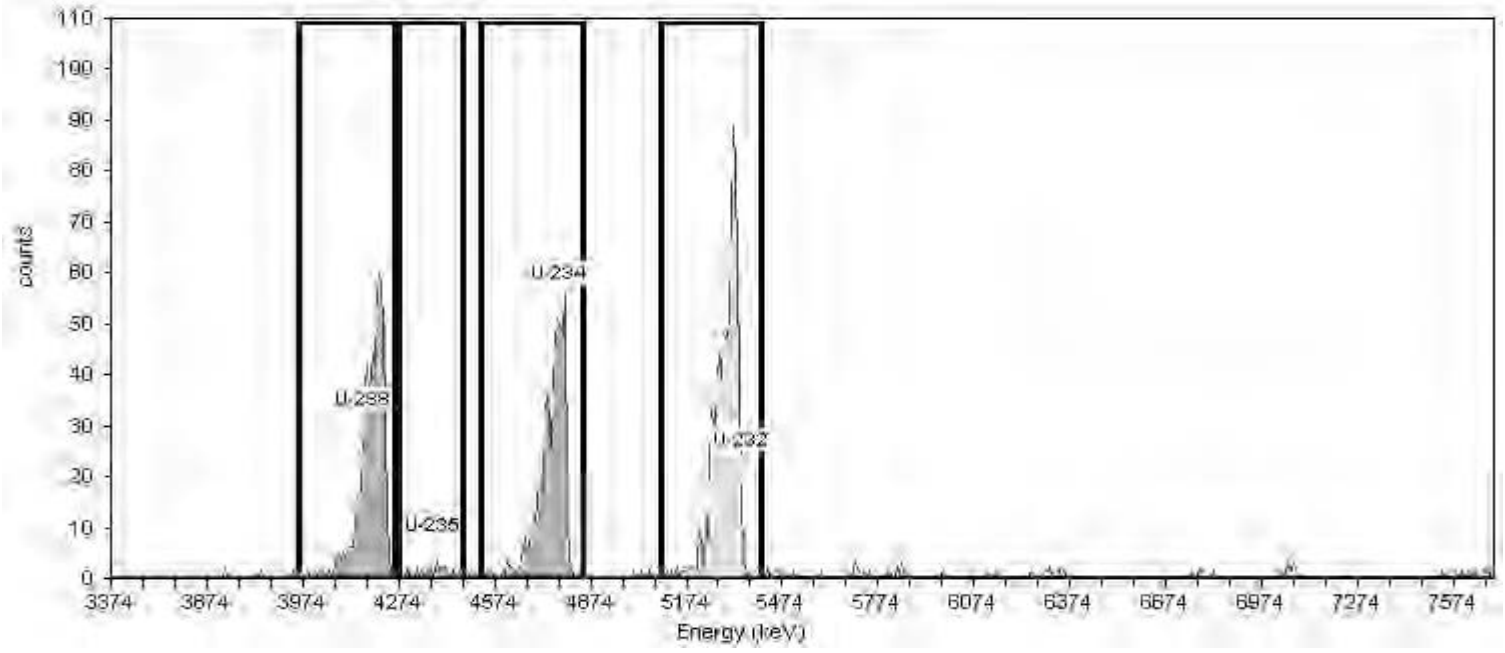
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.20 mL = 16.45 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 108.91%

Acquisition

Detector: AV54
Serial Number: 46-033P4
Acquisition Start Date: 8/4/2018 2:34:20PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:40:04PM
Background Info: Sample: ICB;AV54; Det: AV54; Spectrum #1; Jul-12-2018 13:40

Calibration Name: IC-9792;AV54-05152018
Calibration Date: 5/15/2018 3:37:57PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 23.62% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 8/4/2018 2:31:17PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	46.6	100.0	551	0.1875	550.81	5.380	pCi/g
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	57.9	80.2	20	0.1875	19.81	0.241	pCi/g
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	69.4	99.8	519	1.3125	517.69	5.067	pCi/g
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	77.1	100.1	714	1.1250	712.88	8.101	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:37:14PM 8/4/2018

Sample

Sample Name: 160-29479-A-2-G
SampleType: Sample
: 160-29479-A-2-G
Sample Collection Date: 7/10/2018 10:40:00AM

Spectrum #1 Analysis #1
Sample Weight : 1.0096g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377742
AnalysisID: 735924

Analyst: 60040

Tracer

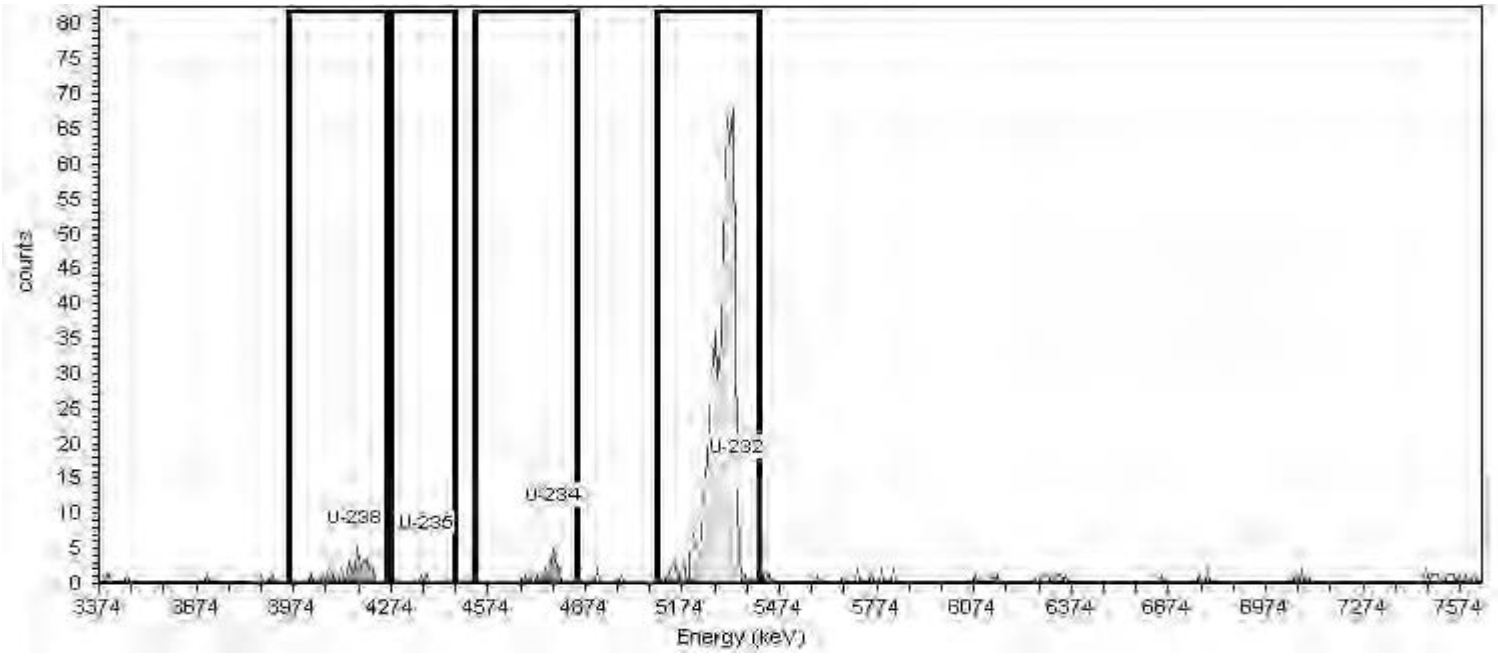
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.20 mL = 16.45 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 87.15%

Acquisition

Detector: AV56
Serial Number: 52-059EE5
Acquisition Start Date: 8/4/2018 2:34:21PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:40:09PM
Background Info: Sample: ICB;AV56; Det: AV56; Spectrum #1; Jul-12-2018 13:40

Calibration Name: IC-9795;AV56-05152018
Calibration Date: 5/15/2018 3:38:31PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 25.25% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 8/4/2018 2:31:17PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	76.3	100.0	37	0.3750	36.63	0.413	pCi/g
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	29.8	80.2	2	0.3750	1.63	0.023	pCi/g
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	48.8	99.8	21	0.7500	20.25	0.229	pCi/g
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	65.7	100.1	611	1.1250	609.88	6.396	pCi/g

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:37:23PM 8/4/2018

Sample

Sample Name: 160-29479-A-3-E
SampleType: Sample
: 160-29479-A-3-E
Sample Collection Date: 7/10/2018 10:45:00AM

Spectrum #1 Analysis #1
Sample Weight : 1.0066g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377742
AnalysisID: 735925

Analyst: 60040

Tracer

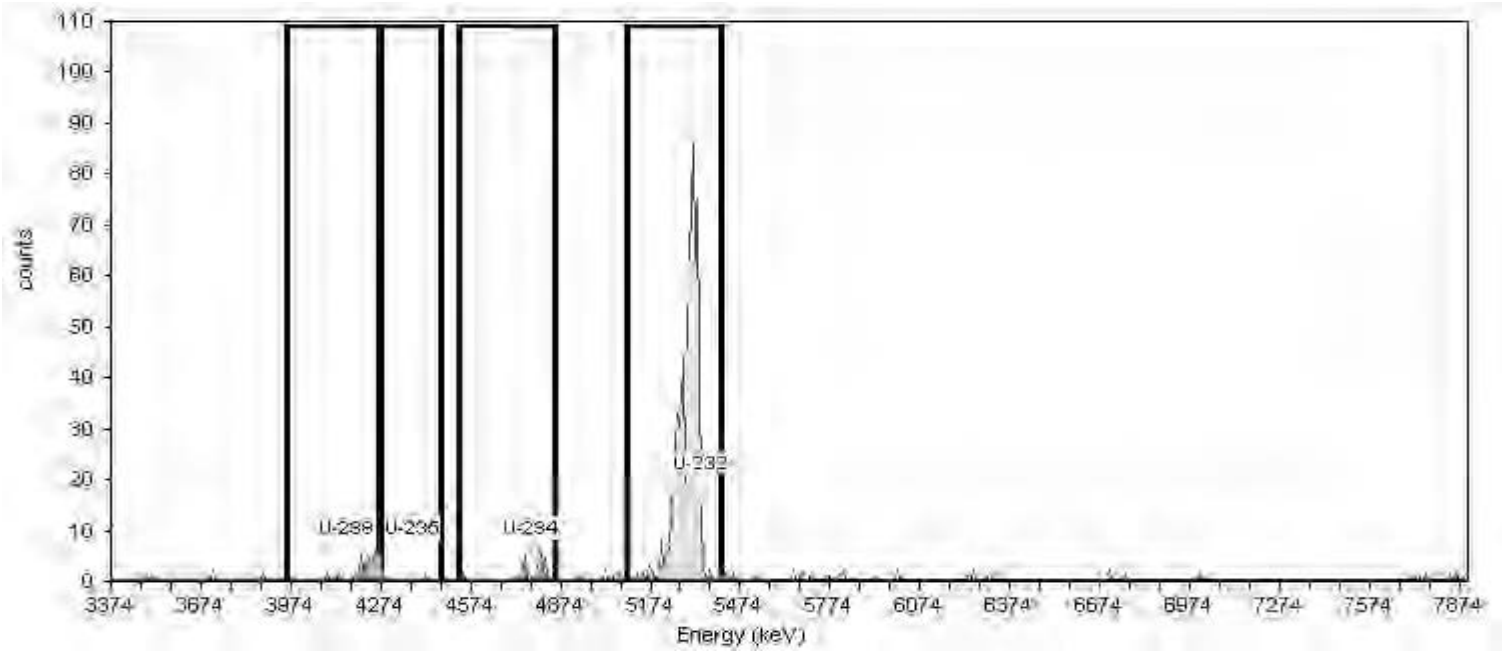
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.20 mL = 16.45 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 102.68%

Acquisition

Detector: AV57
Serial Number: 48-158EE3
Acquisition Start Date: 8/4/2018 2:34:22PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:40:11PM
Background Info: Sample: ICB;AV57; Det: AV57; Spectrum #1; Jul-12-2018 13:40

Calibration Name: IC-9817;AV57-05152018
Calibration Date: 5/15/2018 3:38:42PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 22.40% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 8/4/2018 2:31:17PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	29.2	100.0	42	1.5000	40.50	0.438	pCi/g
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	.0	80.2	5	1.1250	3.88	0.052	pCi/g
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	28.4	99.8	31	1.3125	29.69	0.322	pCi/g
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	61.3	100.1	639	1.5000	637.50	7.558	pCi/g

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Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:37:32PM 8/4/2018

Sample

Sample Name: 160-29479-B-4-D
SampleType: Sample
: 160-29479-B-4-D
Sample Collection Date: 7/11/2018 11:55:00AM

Spectrum #1 Analysis #1
Sample Weight : 0.9915g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377742
AnalysisID: 735926

Analyst: 60040

Tracer

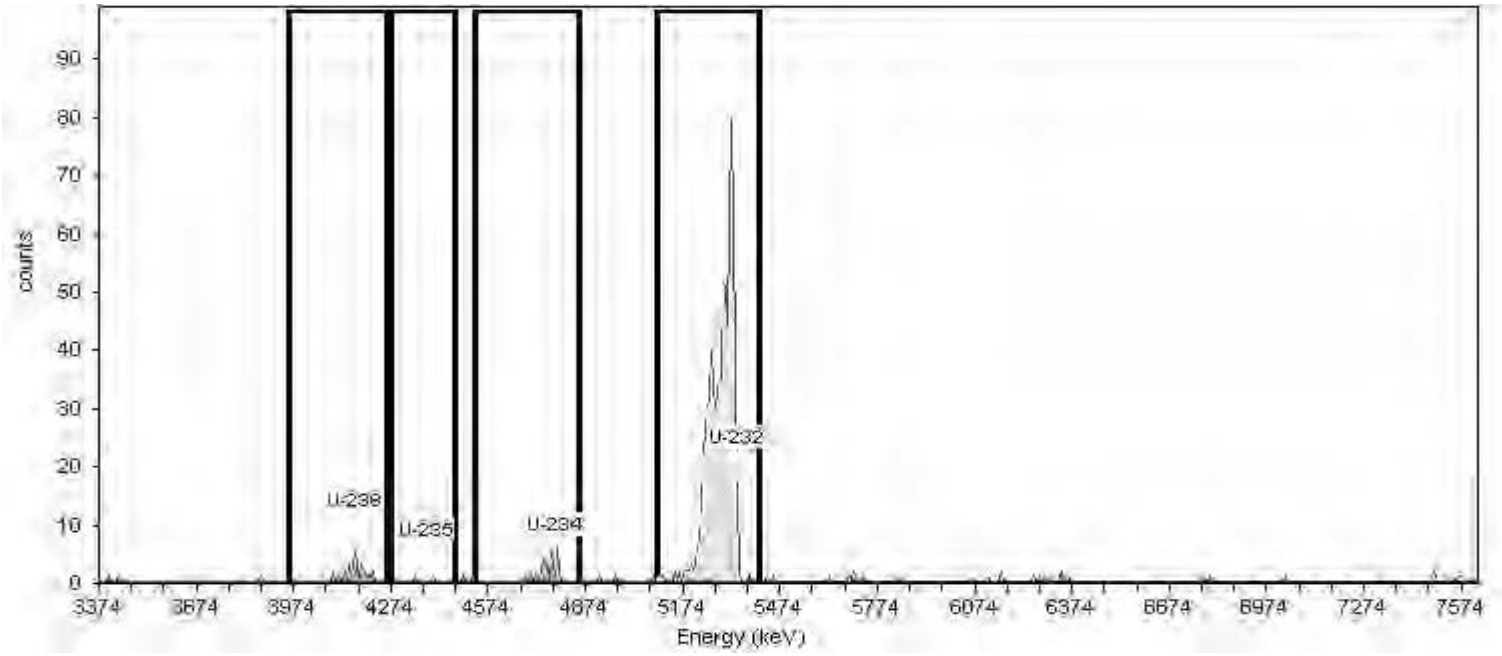
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.20 mL = 16.45 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 96.33%

Acquisition

Detector: AV58
Serial Number: 52-102 C5
Acquisition Start Date: 8/4/2018 2:34:22PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/13/2018 12:11:31PM
Background Info: Sample: ICB;AV58; Det: AV58; Spectrum #2; Jul-13-2018 12:11

Calibration Name: IC-9885;AV58-05152018
Calibration Date: 5/15/2018 3:38:55PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 24.05% +/- 0.36% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 8/4/2018 2:31:18PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	63.2	100.0	29	0.3750	28.63	0.312	pCi/g
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	18.3	80.2	2	0.3750	1.63	0.022	pCi/g
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	62.9	99.8	30	1.1250	28.88	0.315	pCi/g
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	90.0	100.1	644	1.8750	642.13	7.199	pCi/g

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Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:37:41PM 8/4/2018

Sample

Sample Name: 160-29479-A-5-E
SampleType: Sample
: 160-29479-A-5-E
Sample Collection Date: 7/11/2018 12:00:00PM

Spectrum #1 Analysis #1
Sample Weight : 0.9955g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377742
AnalysisID: 735927

Analyst: 60040

Tracer

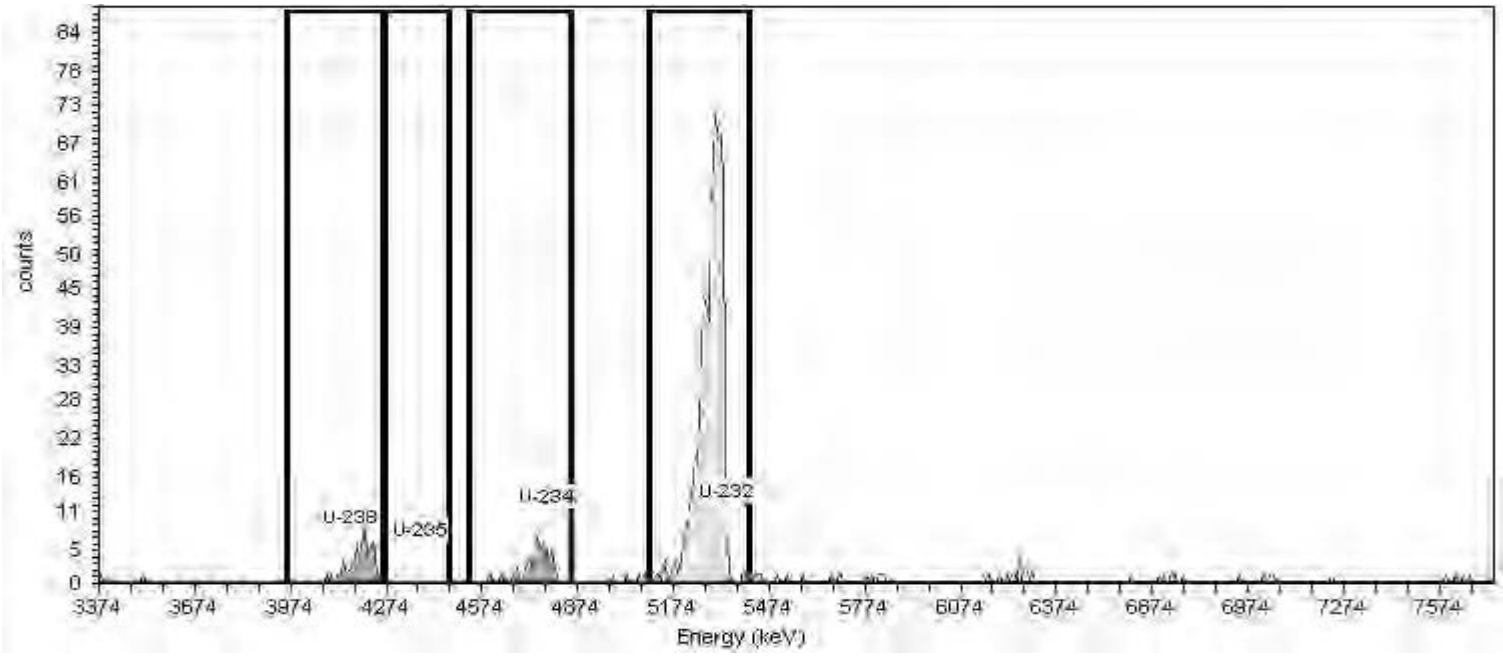
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.20 mL = 16.45 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 90.36%

Acquisition

Detector: AV60
Serial Number: 49-027117
Acquisition Start Date: 8/4/2018 2:34:23PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/13/2018 12:11:34PM
Background Info: Sample: ICB;AV60; Det: AV60; Spectrum #2; Jul-13-2018 12:11

Calibration Name: IC-1368446;AV60-05152018
Calibration Date: 5/15/2018 3:39:06PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 28.28% +/- 0.26% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 8/4/2018 2:31:18PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	39.5	100.0	62	0.5625	61.44	0.604	pCi/g
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	.0	80.2	0	0.0000	0.00	0.000	pCi/g
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	71.5	99.8	60	0.9375	59.06	0.582	pCi/g
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	69.2	100.1	710	1.6875	708.31	6.726	pCi/g

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Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:37:50PM 8/4/2018

Sample

Sample Name: 160-29479-B-6-D
SampleType: Sample
: 160-29479-B-6-D
Sample Collection Date: 7/11/2018 12:30:00PM

Spectrum #1 Analysis #1
Sample Weight : 1.0014g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377742
AnalysisID: 735928

Analyst: 60040

Tracer

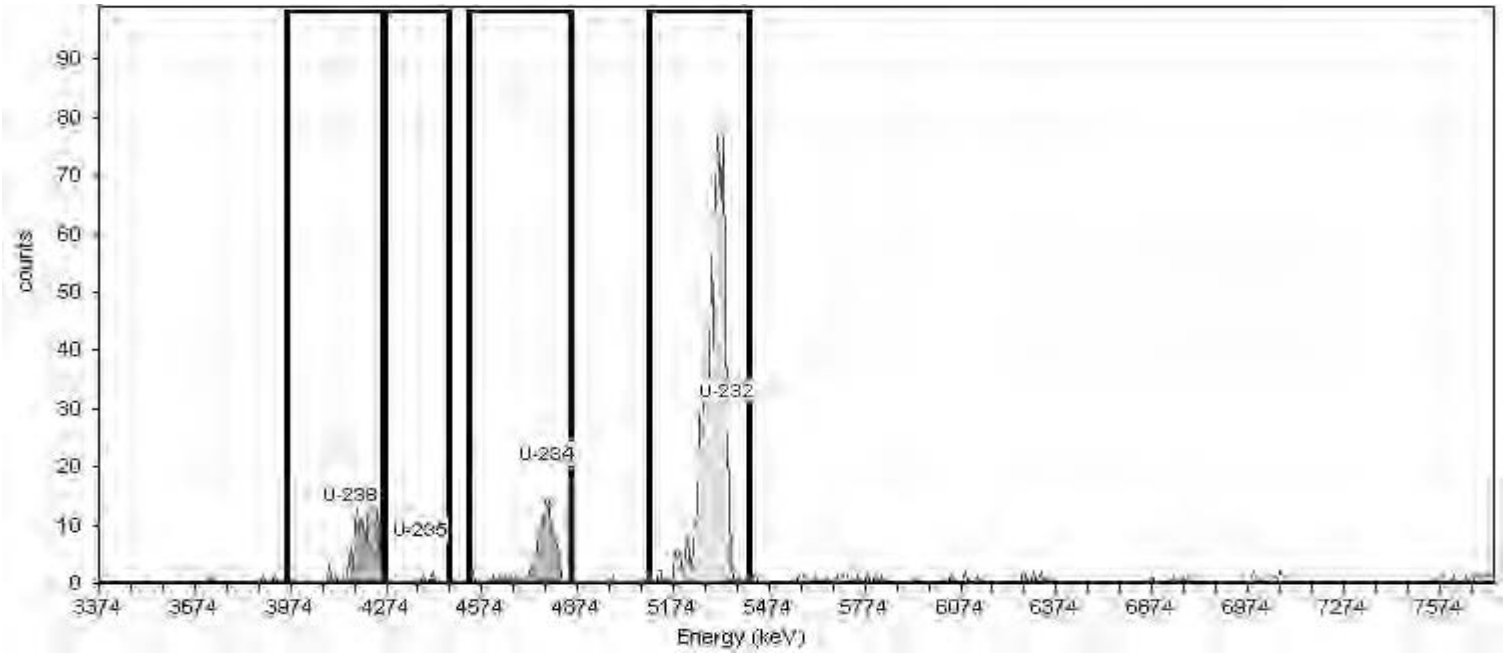
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.20 mL = 16.45 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 86.54%

Acquisition

Detector: AV62
Serial Number: 52-060FF2
Acquisition Start Date: 8/4/2018 2:34:24PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:40:16PM
Background Info: Sample: ICB;AV62; Det: AV62; Spectrum #1; Jul-12-2018 13:40

Calibration Name: IC-1368447;AV62-05152018
Calibration Date: 5/15/2018 3:39:22PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 28.40% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 8/4/2018 2:31:18PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	29.1	100.0	140	0.3750	139.63	1.420	pCi/g
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	17.1	80.2	4	0.0000	4.00	0.051	pCi/g
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	56.7	99.8	112	0.3750	111.63	1.137	pCi/g
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	65.9	100.1	682	0.7500	681.25	6.404	pCi/g

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Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:37:59PM 8/4/2018

Sample

Sample Name: 160-29479-A-7-D
SampleType: Sample
: 160-29479-A-7-D
Sample Collection Date: 7/11/2018 1:40:00PM

Spectrum #1 Analysis #1
Sample Weight : 1.0029g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377742
AnalysisID: 735929

Analyst: 60040

Tracer

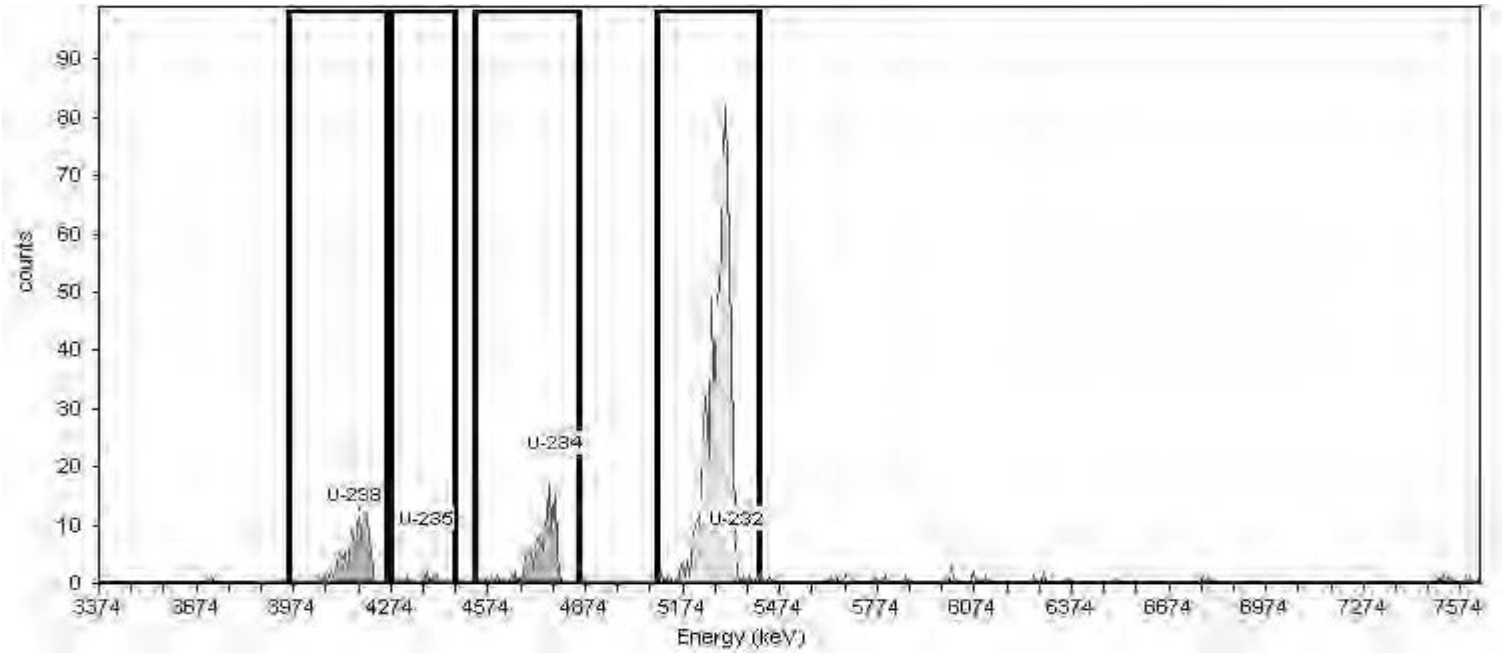
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.20 mL = 16.45 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 91.42%

Acquisition

Detector: AV63
Serial Number: 47-029ff2
Acquisition Start Date: 8/4/2018 2:34:25PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:40:17PM
Background Info: Sample: ICB;AV63; Det: AV63; Spectrum #1; Jul-12-2018 13:40

Calibration Name: IC-1370621;AV63-05152018
Calibration Date: 5/15/2018 3:39:32PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 26.80% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 8/4/2018 2:31:18PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	64.4	100.0	110	0.7500	109.25	1.113	pCi/g
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	17.7	80.2	5	0.3750	4.63	0.059	pCi/g
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	59.0	99.8	120	0.9375	119.06	1.215	pCi/g
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	66.2	100.1	681	2.0625	678.94	6.754	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:38:17PM 8/4/2018

Sample

Sample Name: 160-29479-B-8-D
SampleType: Sample
: 160-29479-B-8-D
Sample Collection Date: 7/11/2018 2:30:00PM

Spectrum #1 Analysis #1
Sample Weight : 0.9938g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377742
AnalysisID: 735930

Analyst: 60040

Tracer

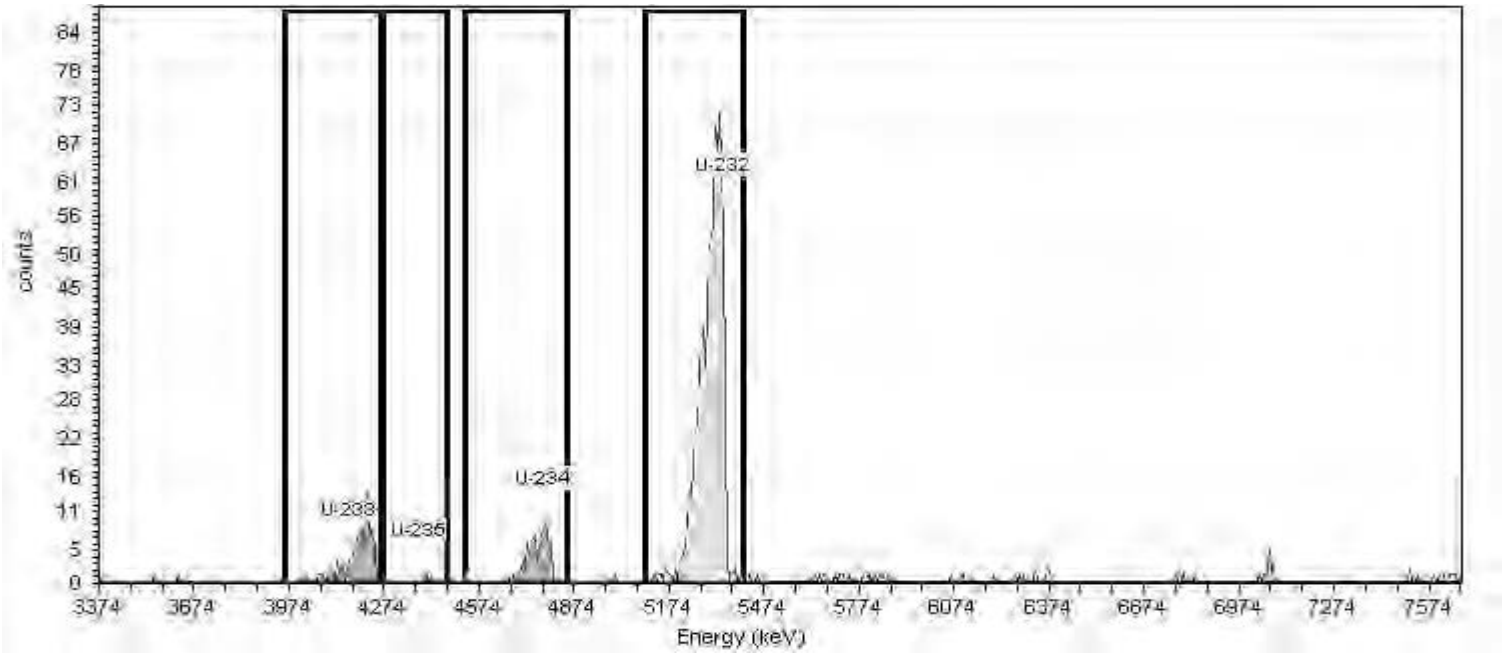
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.20 mL = 16.45 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 88.57%

Acquisition

Detector: AV64
Serial Number: 43-028v3
Acquisition Start Date: 8/4/2018 2:34:26PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:40:19PM
Background Info: Sample: ICB;AV64; Det: AV64; Spectrum #1; Jul-12-2018 13:40

Calibration Name: IC-1370622;AV64-05152018
Calibration Date: 5/15/2018 3:39:44PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 28.38% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 8/4/2018 2:31:18PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	46.7	100.0	95	0.3750	94.63	0.948	pCi/g
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	29.8	80.2	2	0.1875	1.81	0.023	pCi/g
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	85.4	99.8	75	0.3750	74.63	0.749	pCi/g
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	74.6	100.1	698	1.3125	696.69	6.604	pCi/g

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:38:26PM 8/4/2018

Sample

Sample Name: 160-29479-B-9-D
SampleType: Sample
: 160-29479-B-9-D
Sample Collection Date: 7/11/2018 3:05:00PM

Spectrum #1 Analysis #1
Sample Weight : 0.9951g
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 377742
AnalysisID: 735931

Analyst: 60040

Tracer

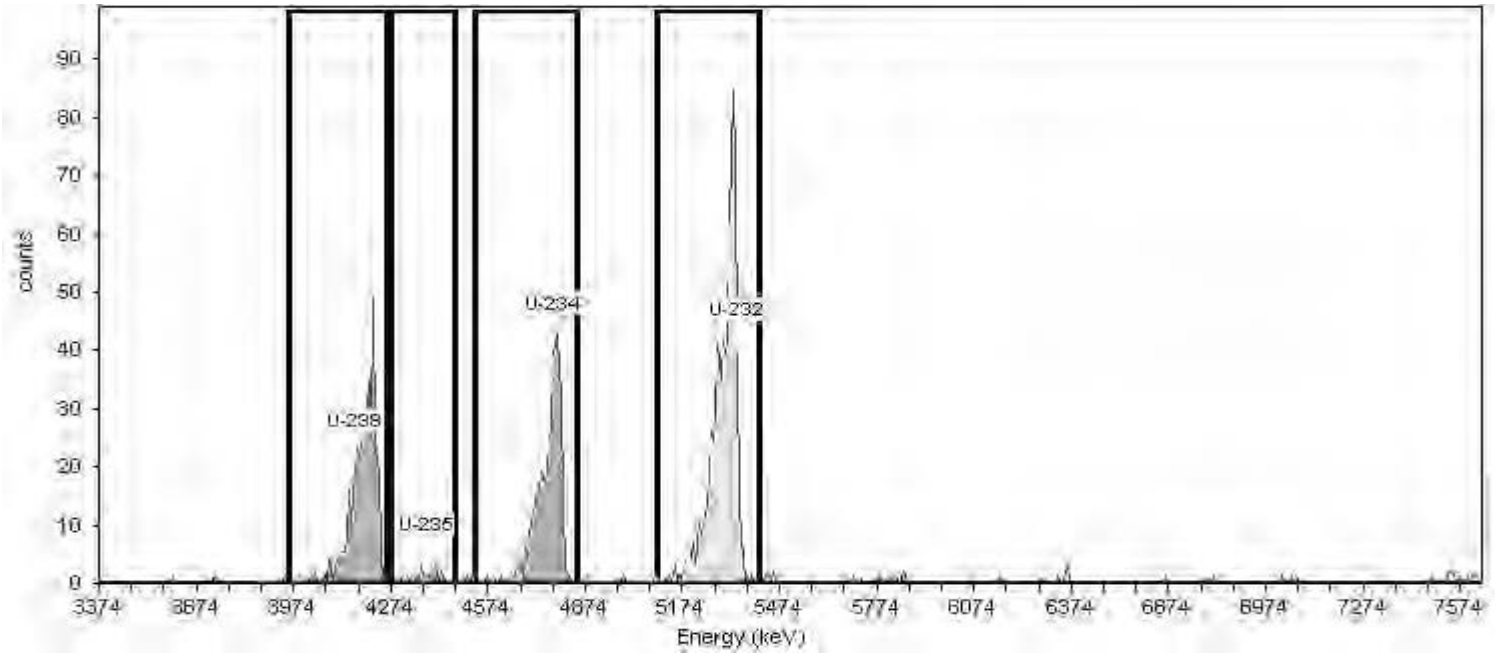
Tracer Name: U-232_00040
Tracer Activity: 82.25 DPM/mL x (Vol.)0.20 mL = 16.45 DPM
Tracer Ref. Date: 8/25/2011 12:00:28PM

Tracer Nuclide: U-232
Tracer Recovery: 85.59%

Acquisition

Detector: AV66
Serial Number: 48-158EE2
Acquisition Start Date: 8/4/2018 2:34:27PM
Live Time: 180.00 min.
Real Time: 180.00 min.
Background Date: 7/12/2018 1:40:22PM
Background Info: Sample: ICB;AV66; Det: AV66; Spectrum #1; Jul-12-2018 13:40

Calibration Name: IC-1370620;AV66-05152018
Calibration Date: 5/15/2018 3:40:08PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 27.12% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 8/4/2018 2:31:18PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diffted keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	54.5	100.0	360	0.7500	359.25	3.892	pCi/g
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	62.0	80.2	19	0.7500	18.25	0.247	pCi/g
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	61.0	99.8	360	2.4375	357.56	3.882	pCi/g
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	75.8	100.1	645	1.6875	643.31	6.373	pCi/g

Daily Checks

Alpha Spectroscopy Daily Pulser Check

Analysis Date: 08/04/18

		Gross Counts			FWHM (keV)			Pulser Center			Energy (keV)		
Detector	Analysis Date	Result	Criteria	P/F	Result	Criteria	P/F	Result	Criteria	P/F	Result	Criteria	P/F
AV7	08/04/18 11:00	7326	6979.5 - 7714.2	Pass	16.6	10 - 20	Pass	233.0	226.3 - 236.3	Pass	5104	5052.3 - 5132.3	Pass
AV8	08/04/18 11:00	7348	7015.5 - 7753.9	Pass	15.6	10 - 20	Pass	222.9	219.0 - 229.0	Pass	5029	4997.4 - 5077.4	Pass
AV10	08/04/18 11:00	7659	7183.9 - 7940.1	Pass	15.3	10 - 20	Pass	224.1	218.4 - 228.4	Pass	5038	4993.0 - 5073.0	Pass
AV12	08/04/18 11:00	7666	7310.5 - 8080.1	Pass	14.9	10 - 20	Pass	219.9	215.4 - 225.4	Pass	5007	4970.8 - 5050.8	Pass
AV14	08/04/18 11:00	7538	7116.4 - 7865.5	Pass	12.0	10 - 20	Pass	225.0	219.1 - 229.1	Pass	5045	4998.1 - 5078.1	Pass
AV15	08/04/18 11:00	7663	7303.8 - 8072.6	Pass	14.2	10 - 20	Pass	224.0	219.4 - 229.4	Pass	5037	5000.2 - 5080.2	Pass
AV16	08/04/18 11:00	7461	7062.1 - 7805.5	Pass	12.6	10 - 20	Pass	220.0	216.7 - 226.7	Pass	5008	4980.2 - 5060.2	Pass
AV17	08/04/18 11:00	7368	7222.1 - 7982.3	Pass	13.0	10 - 20	Pass	227.1	222.0 - 232.0	Pass	5060	5020.1 - 5100.1	Pass
AV19	08/04/18 11:00	7425	7146.1 - 7898.3	Pass	12.4	10 - 20	Pass	224.1	219.0 - 229.0	Pass	5038	4997.6 - 5077.6	Pass
AV20	08/04/18 11:01	7667	7319.9 - 8090.4	Pass	14.6	10 - 20	Pass	223.0	218.0 - 228.0	Pass	5030	4990.3 - 5070.3	Pass
AV21	08/04/18 11:01	7666	7320.7 - 8091.3	Pass	14.0	10 - 20	Pass	226.0	222.0 - 232.0	Pass	5053	5019.9 - 5099.9	Pass
AV23	08/04/18 11:01	7622	7289.1 - 8056.3	Pass	15.9	10 - 20	Pass	226.2	220.5 - 230.5	Pass	5054	5008.6 - 5088.6	Pass
AV47	08/04/18 11:01	7552	7271.8 - 8037.2	Pass	13.8	10 - 20	Pass	219.0	214.0 - 224.0	Pass	5000	4960.2 - 5040.2	Pass
AV48	08/04/18 11:01	7542	7259.1 - 8023.2	Pass	15.5	10 - 20	Pass	218.0	216.0 - 226.0	Pass	4993	4974.9 - 5054.9	Pass
AV52	08/04/18 11:01	7289	6954.9 - 7686.9	Pass	14.8	10 - 20	Pass	223.1	217.0 - 227.0	Pass	5030	4982.4 - 5062.4	Pass
AV54	08/04/18 11:01	7288	6952.1 - 7683.9	Pass	14.0	10 - 20	Pass	223.0	218.0 - 228.0	Pass	5030	4989.7 - 5069.7	Pass
AV56	08/04/18 11:01	7288	6947.0 - 7678.3	Pass	13.9	10 - 20	Pass	223.0	218.0 - 228.0	Pass	5030	4989.8 - 5069.8	Pass
AV57	08/04/18 11:01	7279	6628.0 - 7325.6	Pass	14.9	10 - 20	Pass	226.0	220.9 - 230.9	Pass	5053	5011.8 - 5091.8	Pass
AV58	08/04/18 11:01	6965	6730.3 - 7438.7	Pass	13.0	10 - 20	Pass	217.1	215.0 - 225.0	Pass	4986	4967.9 - 5047.9	Pass
AV60	08/04/18 11:01	7122	6808.2 - 7524.8	Pass	17.4	10 - 20	Pass	219.9	214.9 - 224.9	Pass	5007	4967.2 - 5047.2	Pass
AV62	08/04/18 11:01	7171	6804.7 - 7521.0	Pass	16.0	10 - 20	Pass	222.1	216.9 - 226.9	Pass	5023	4982.0 - 5062.0	Pass
AV63	08/04/18 11:01	7174	6821.0 - 7539.0	Pass	15.5	10 - 20	Pass	216.9	214.0 - 224.0	Pass	4984	4960.3 - 5040.3	Pass
AV64	08/04/18 11:01	7164	6826.0 - 7544.6	Pass	15.7	10 - 20	Pass	225.0	220.0 - 230.0	Pass	5045	5005.2 - 5085.2	Pass
AV66	08/04/18 11:01	7178	6829.7 - 7548.6	Pass	14.2	10 - 20	Pass	224.0	219.0 - 229.0	Pass	5037	4997.4 - 5077.4	Pass

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:10:49AM 8/4/2018

Sample

Sample Name: Pulser;AV7
Comment:

Spectrum #20 Analysis #1

Batch

Batch Name: July2018a
Description:

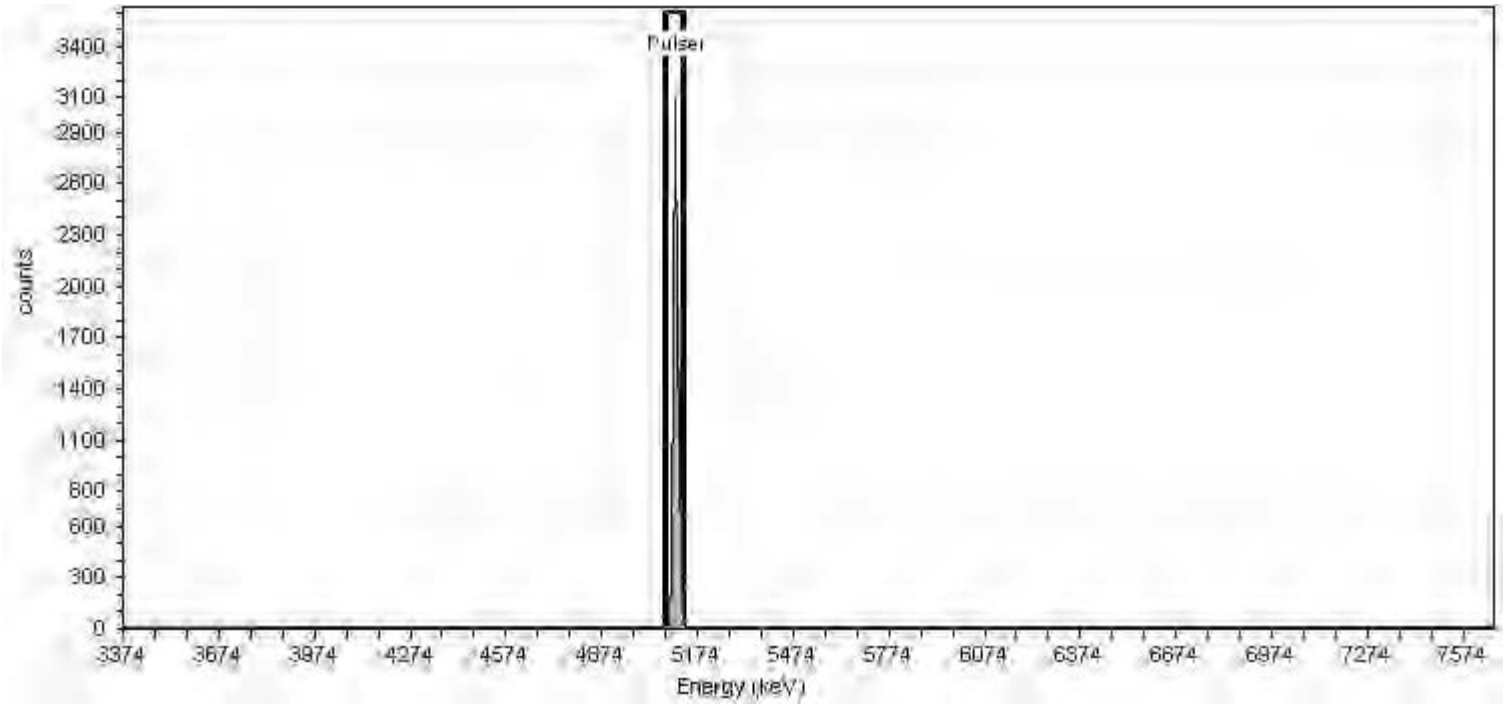
Analyst: 60040

Acquisition

Detector: AV7 , SN: 48-158EE5
Acquisition Start Date: 8/4/2018 11:00:43AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-9793;AV7-05142018
Calibration Date: 5/14/2018 6:26:13PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 22.98% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5104.499	5076.188	5132.811	16.63	7,390.46	7,326.21

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:10:58AM 8/4/2018

Sample

Sample Name: Pulser;AV8
Comment:

Spectrum #20 Analysis #1

Batch

Batch Name: July2018a
Description:

Analyst: 60040

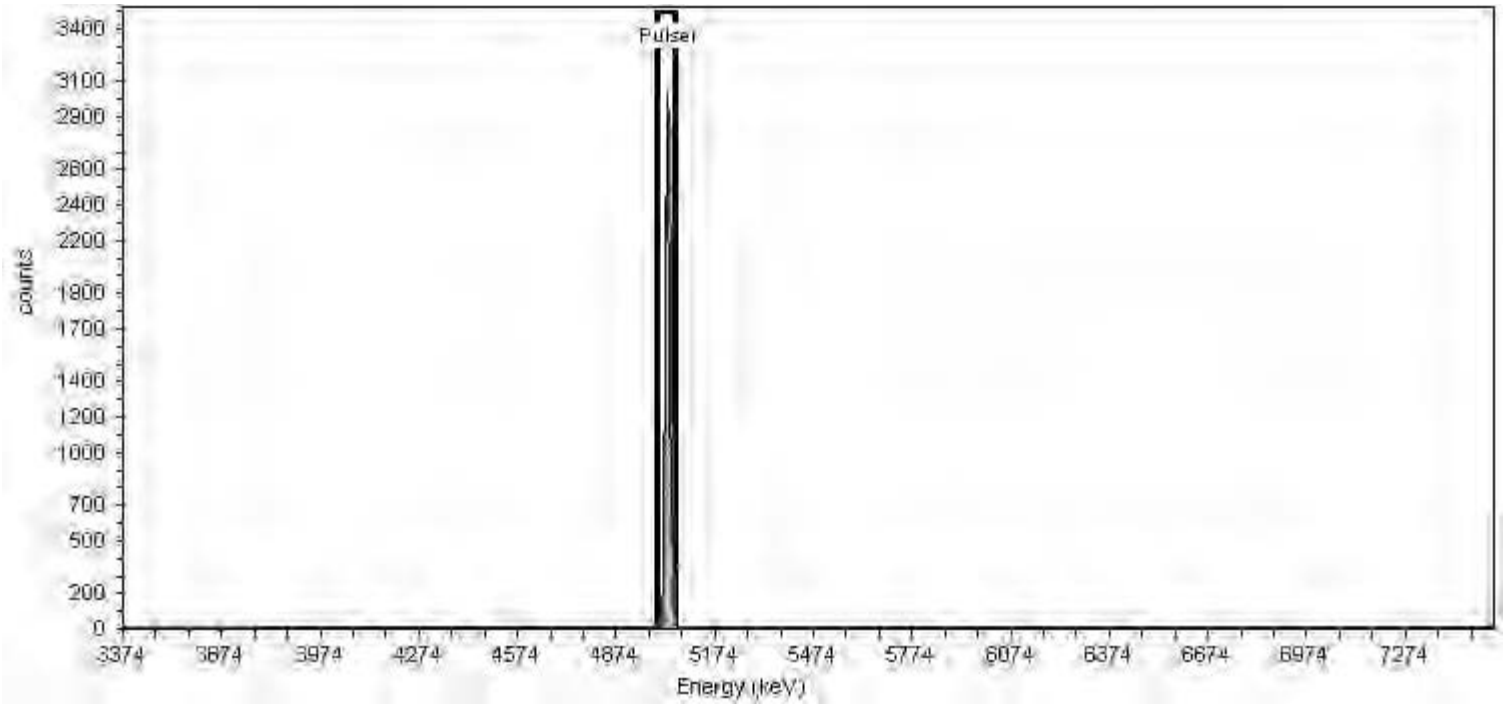
Acquisition

Detector: AV8 , SN: 41-137Q6
Acquisition Start Date: 8/4/2018 11:00:44AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-9795;AV8-05142018
Calibration Date: 5/14/2018 6:26:27PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 25.96% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5029.074	5002.491	5055.656	15.62	6,809.60	7,347.50

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:11:16AM 8/4/2018

Sample

Sample Name: Pulser;AV10
Comment:

Spectrum #21 Analysis #1

Batch

Batch Name: July2018a
Description:

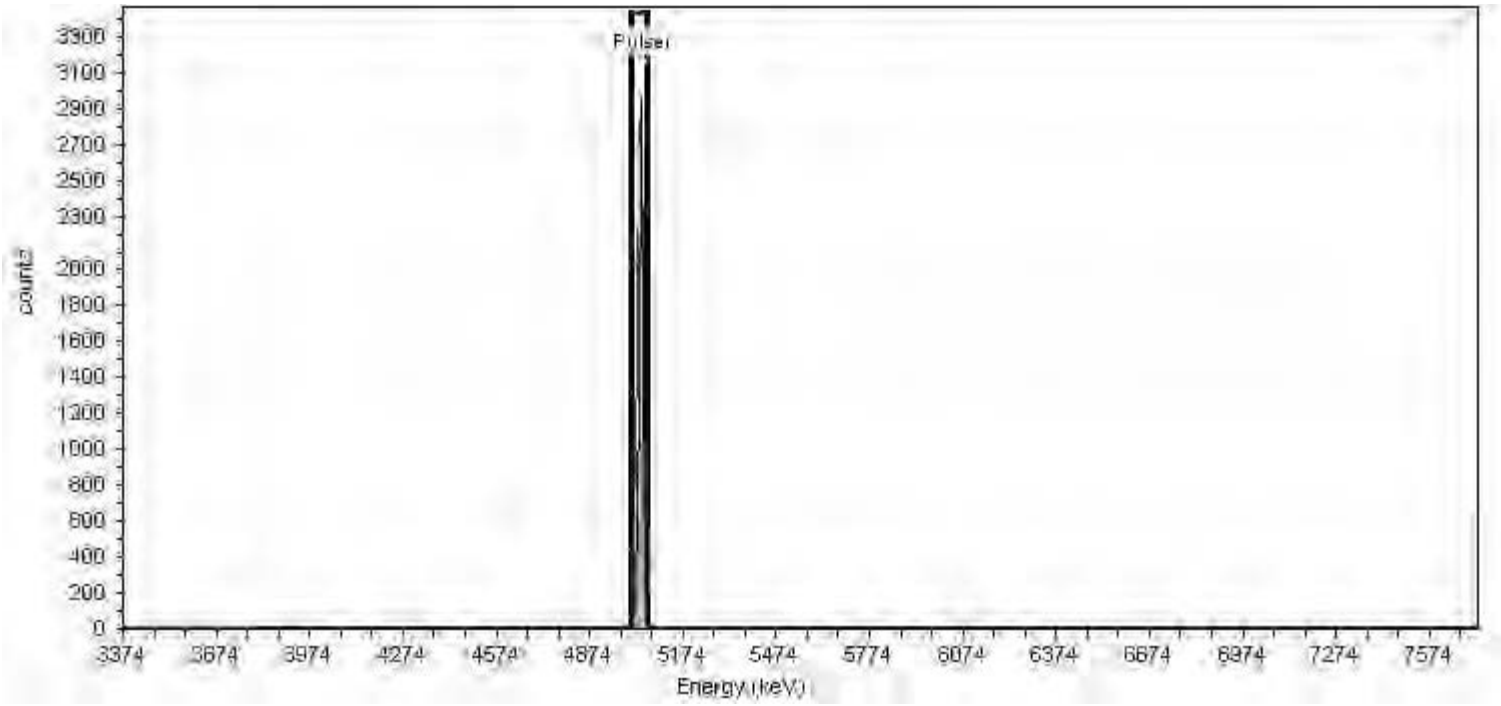
Analyst: 60040

Acquisition

Detector: AV10 , SN: 49-155N2
Acquisition Start Date: 8/4/2018 11:00:46AM
Live Time: 1.00 min.
Real Time: 1.02 min.
Calibration Name: IC-9885;AV10-05142018
Calibration Date: 5/14/2018 6:26:57PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 23.49% +/- 0.35% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5038.400	5012.400	5064.401	15.28	6,483.48	7,659.45

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:11:33AM 8/4/2018

Sample

Sample Name: Pulser;AV12
Comment:

Spectrum #20 Analysis #1

Batch

Batch Name: July2018a
Description:

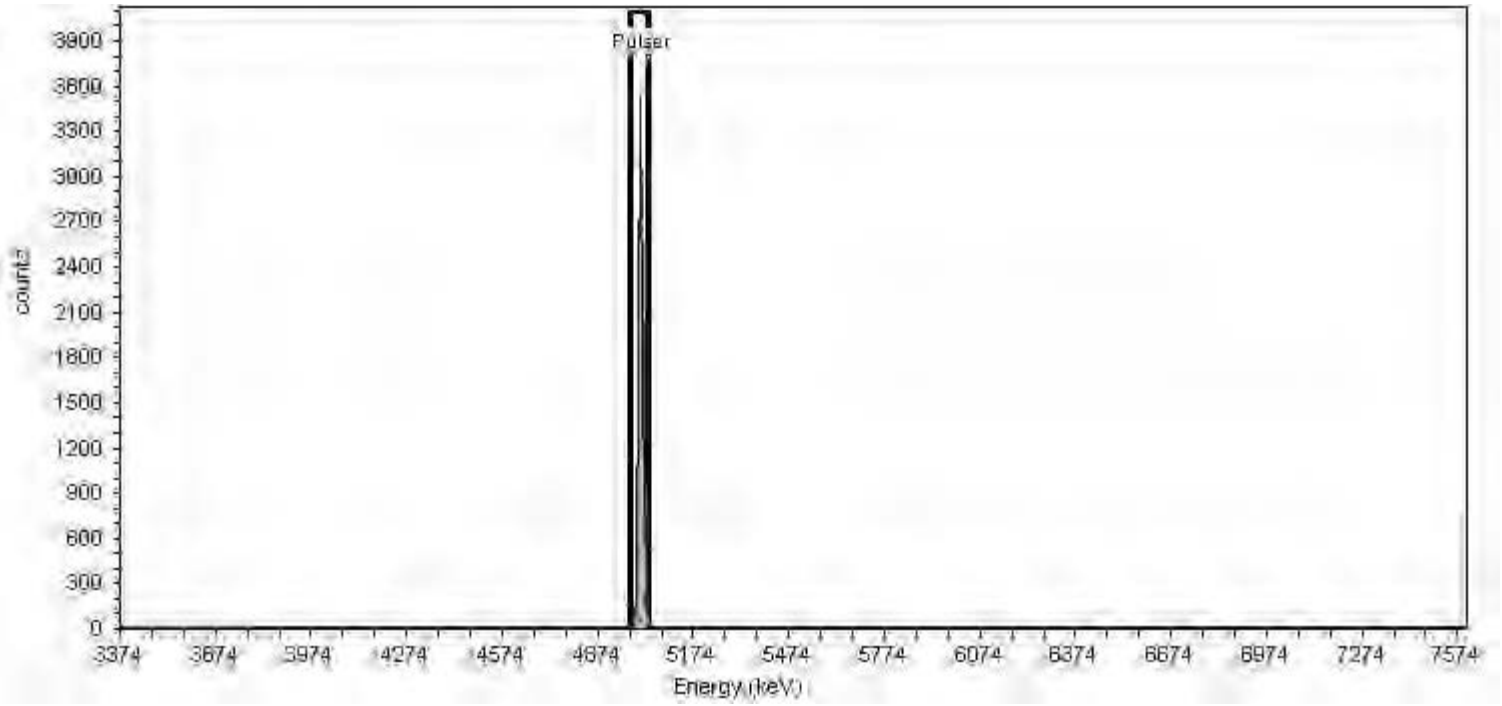
Analyst: 60040

Acquisition

Detector: AV12 , SN: 51-082B7
Acquisition Start Date: 8/4/2018 11:00:49AM
Live Time: 1.00 min.
Real Time: 1.02 min.
Calibration Name: IC-1368447; AV12-05142018
Calibration Date: 5/14/2018 6:27:24PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 27.78% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5007.189	4981.826	5032.552	14.90	7,539.27	7,666.04

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:11:46AM 8/4/2018

Sample

Sample Name: Pulser;AV14
Comment:

Spectrum #20 Analysis #1

Batch

Batch Name: July2018a
Description:

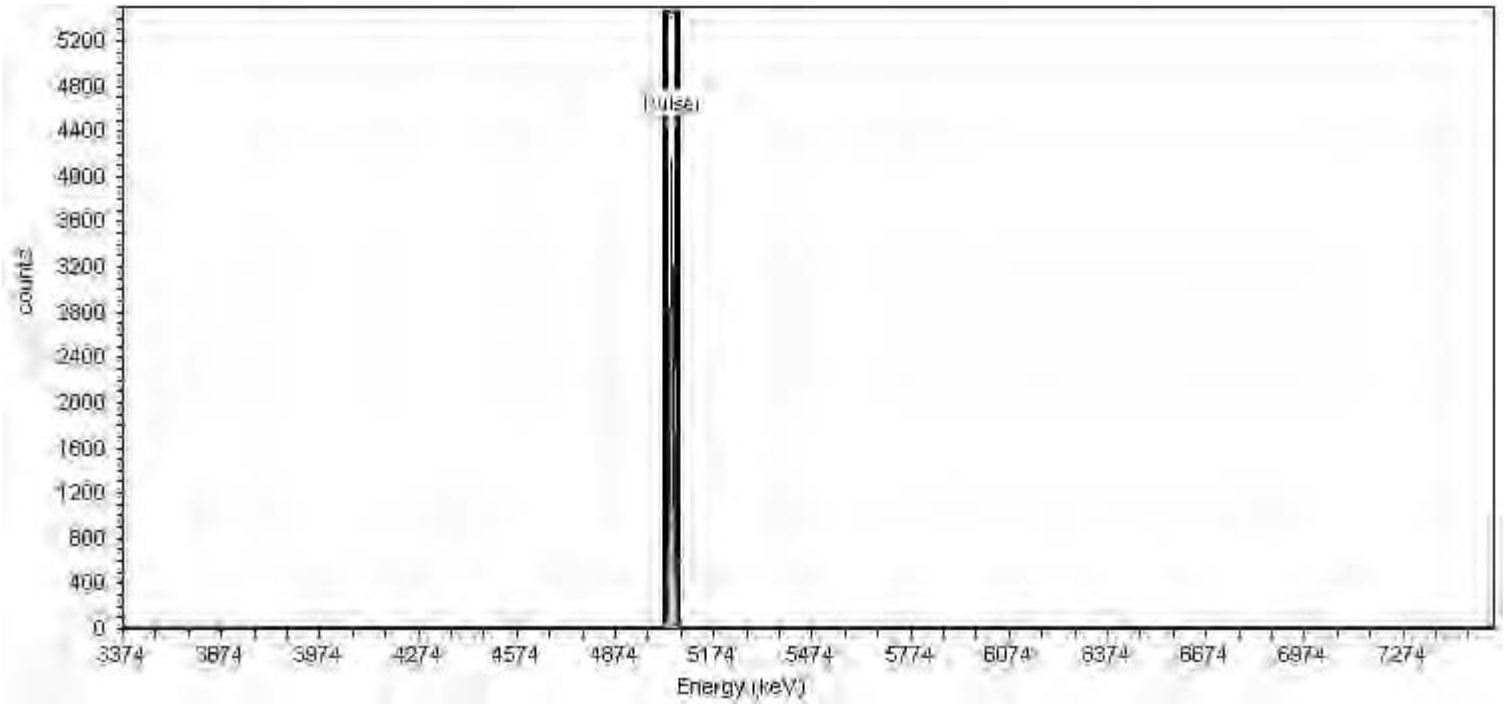
Analyst: 60040

Acquisition

Detector: AV14 , SN: 50-060W4
Acquisition Start Date: 8/4/2018 11:00:51AM
Live Time: 1.00 min.
Real Time: 1.02 min.
Calibration Name: IC-1370622;AV14-05142018
Calibration Date: 5/14/2018 6:27:53PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 26.40% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5044.713	5024.246	5065.181	12.02	7,175.87	7,538.50

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:11:56AM 8/4/2018

Sample

Sample Name: Pulser;AV15
Comment:

Spectrum #20 Analysis #1

Batch

Batch Name: July2018a
Description:

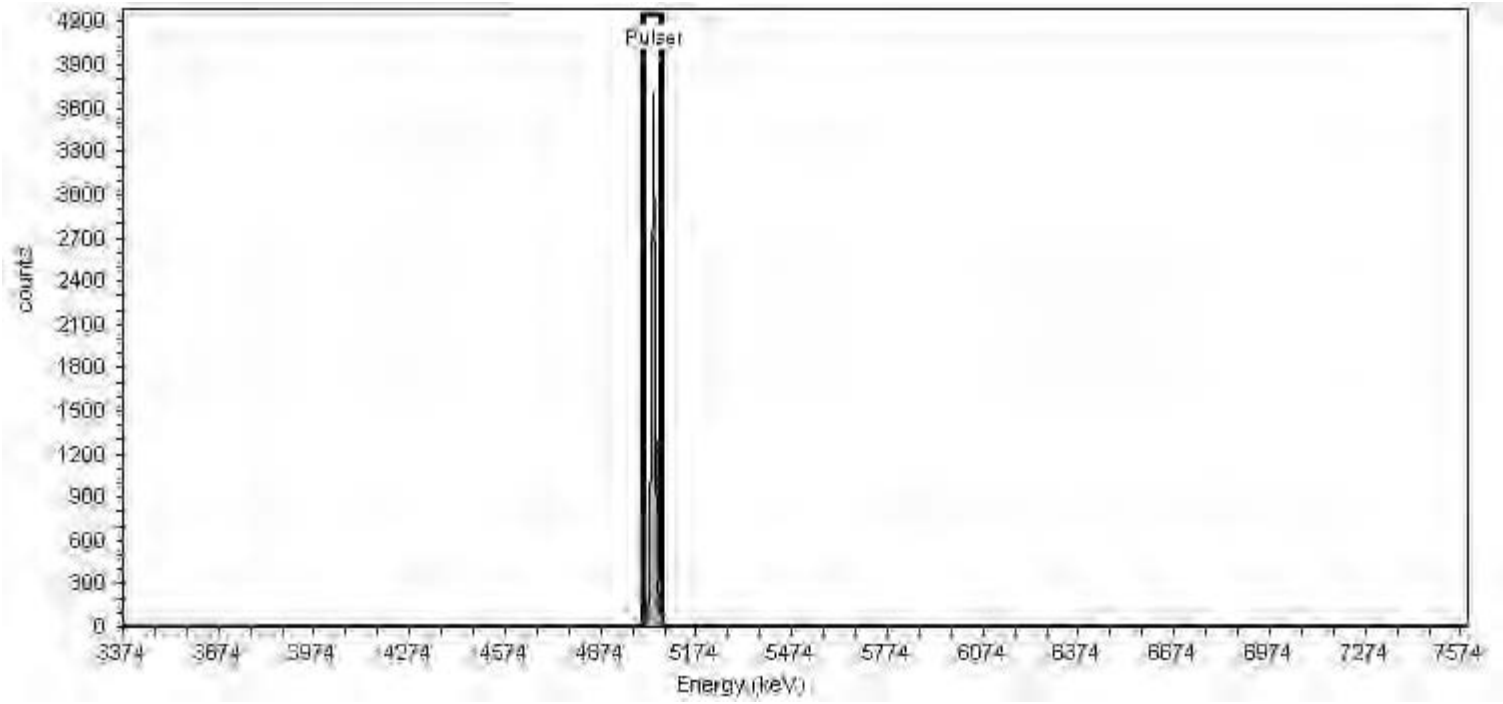
Analyst: 60040

Acquisition

Detector: AV15 , SN: 41-172C5
Acquisition Start Date: 8/4/2018 11:00:53AM
Live Time: 1.00 min.
Real Time: 1.02 min.
Calibration Name: IC-1370619;AV15-05142018
Calibration Date: 5/14/2018 6:28:04PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 27.26% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5037.227	5013.132	5061.321	14.16	7,518.49	7,663.38

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:12:05AM 8/4/2018

Sample

Sample Name: Pulser;AV16
Comment:

Spectrum #20 Analysis #1

Batch

Batch Name: July2018a
Description:

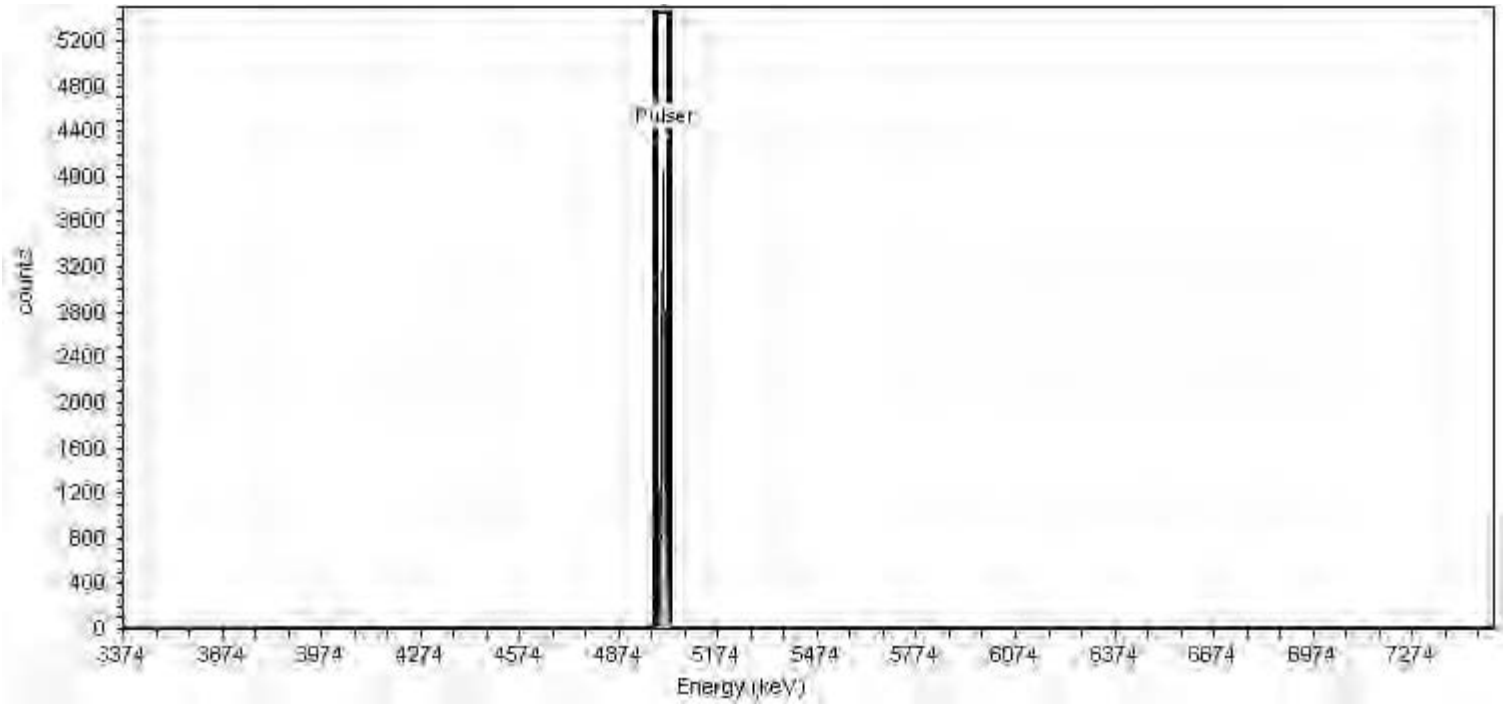
Analyst: 60040

Acquisition

Detector: AV16 , SN: 51-082B6
Acquisition Start Date: 8/4/2018 11:00:55AM
Live Time: 1.00 min.
Real Time: 1.02 min.
Calibration Name: IC-137620;AV16-05142018
Calibration Date: 5/14/2018 6:28:17PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 26.96% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5007.769	4986.405	5029.133	12.55	7,280.25	7,460.92

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:12:14AM 8/4/2018

Sample

Sample Name: Pulser;AV17
Comment:

Spectrum #20 Analysis #1

Batch

Batch Name: July2018a
Description:

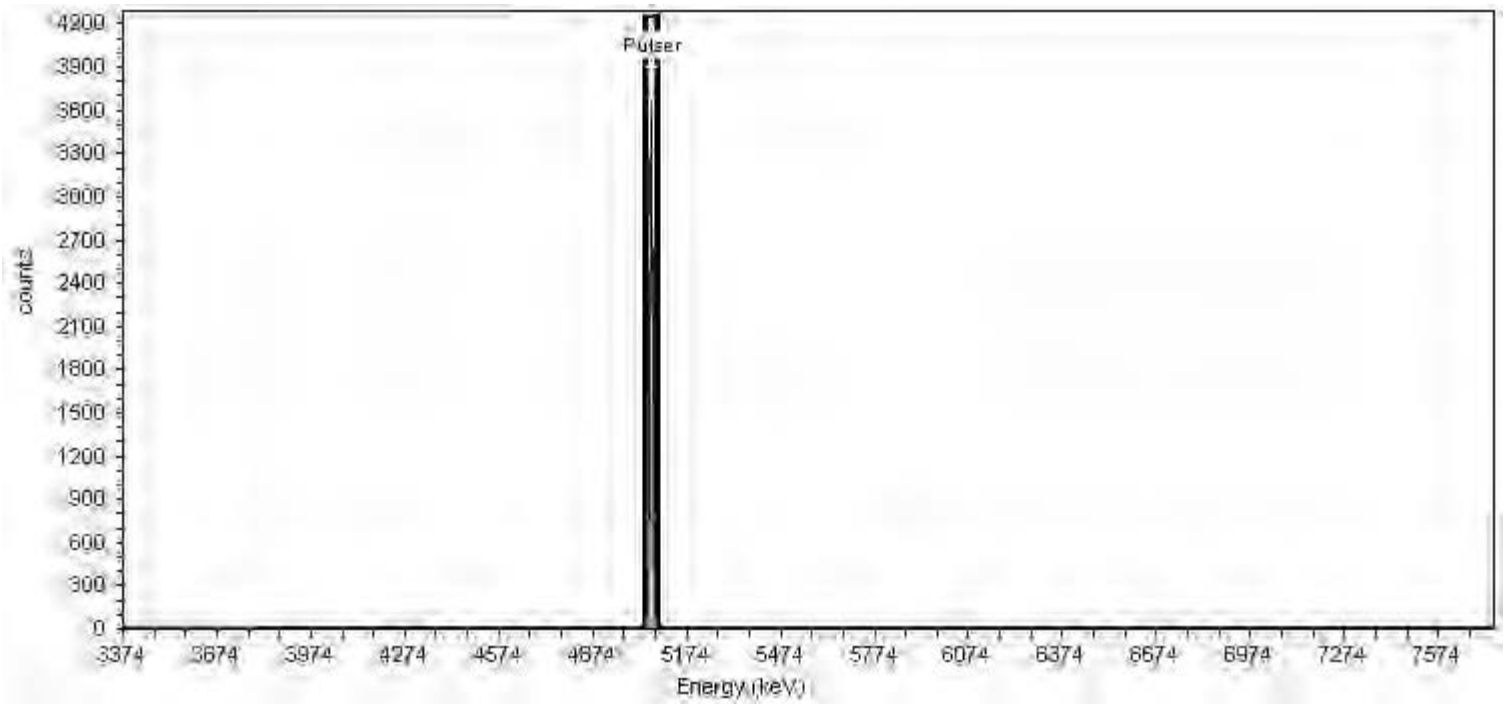
Analyst: 60040

Acquisition

Detector: AV17 , SN: 50-051C4
Acquisition Start Date: 8/4/2018 11:00:56AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-7107;AV17-05142018a
Calibration Date: 5/15/2018 12:29:12PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.09% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5060.258	5038.161	5082.354	12.98	6,830.03	7,367.72

TestAmerica
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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:12:22AM 8/4/2018

Sample

Sample Name: Pulser;AV19
Comment:

Spectrum #20 Analysis #1

Batch

Batch Name: July2018a
Description:

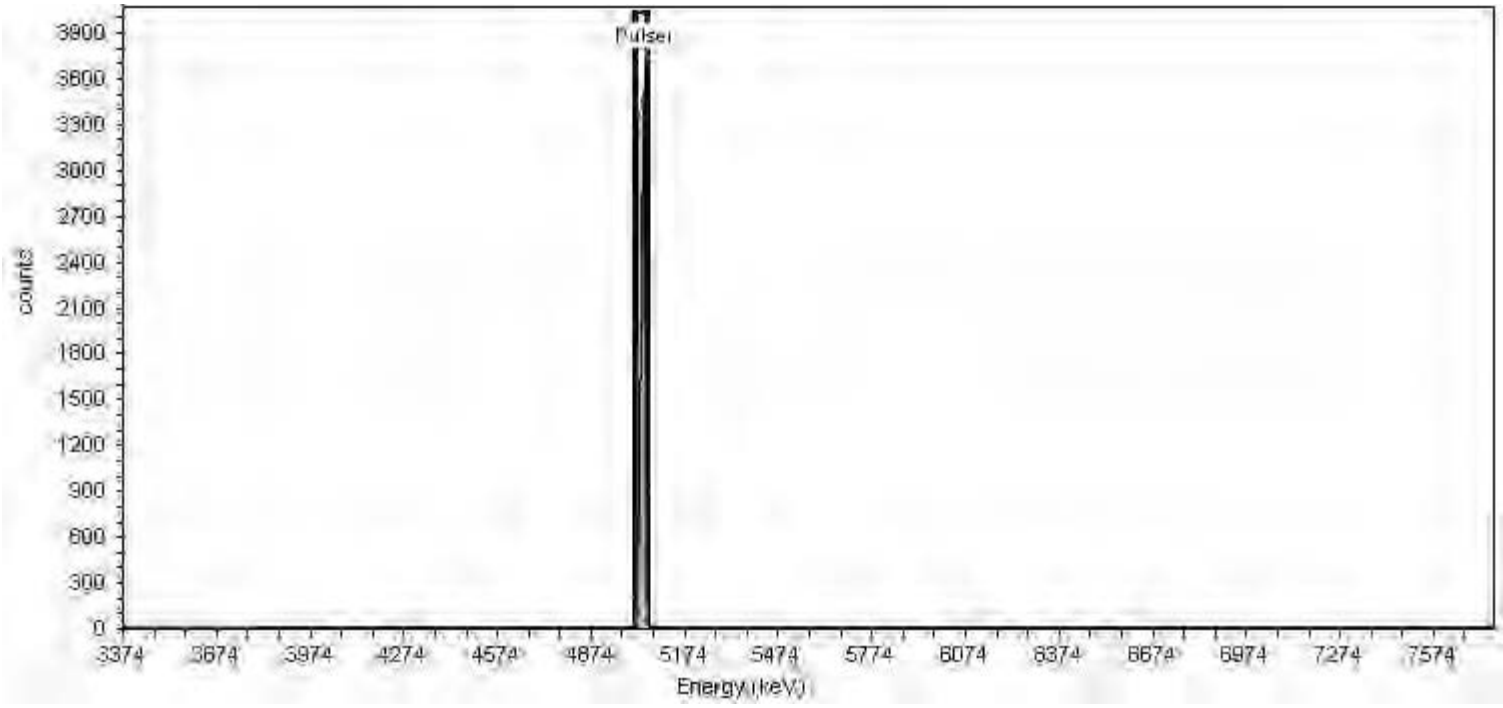
Analyst: 60040

Acquisition

Detector: AV19 , SN: 50-025FF5
Acquisition Start Date: 8/4/2018 11:00:59AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-8877;AV19-05142018
Calibration Date: 5/15/2018 12:27:55PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 23.60% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5038.326	5017.237	5059.416	12.39	6,243.94	7,425.34

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:12:31AM 8/4/2018

Sample

Sample Name: Pulser;AV20
Comment:

Spectrum #20 Analysis #1

Batch

Batch Name: July2018a
Description:

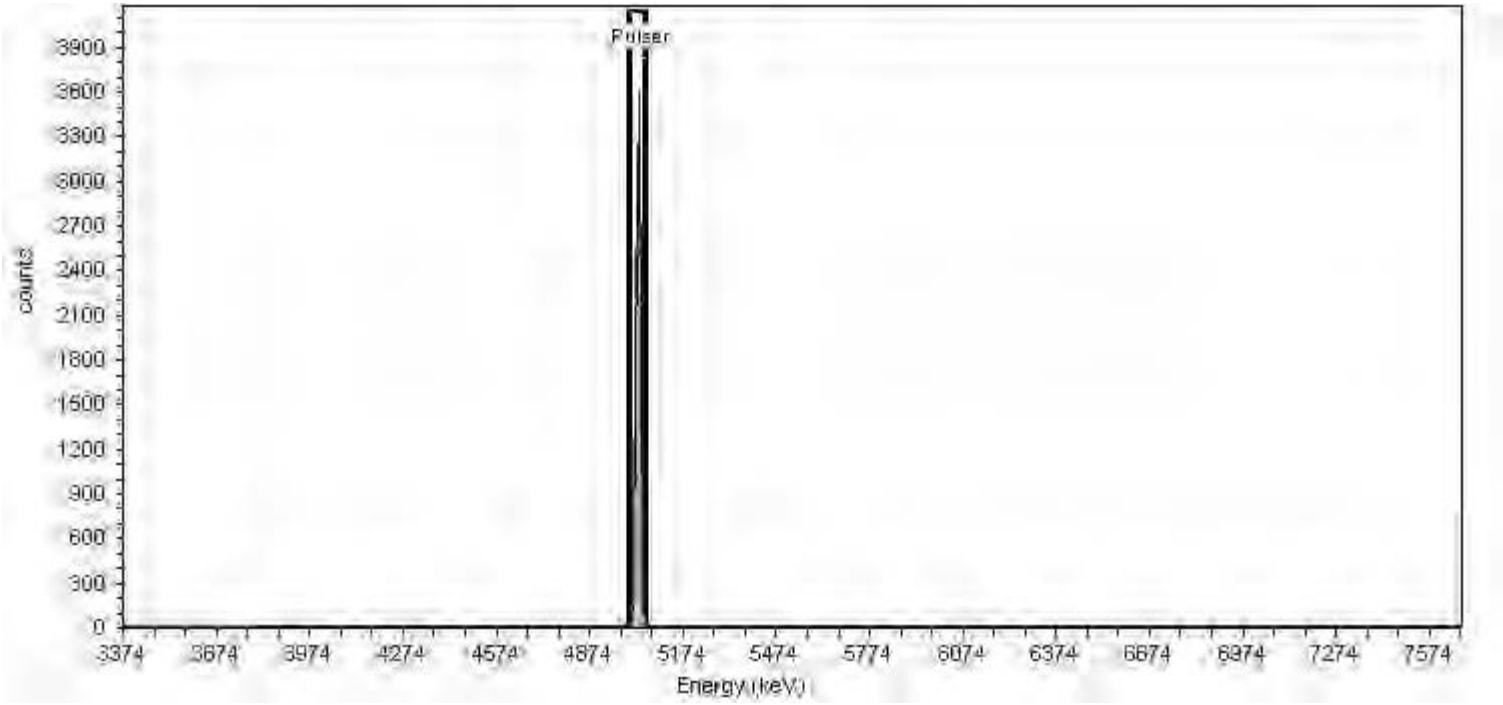
Analyst: 60040

Acquisition

Detector: AV20 , SN: 48-121A7
Acquisition Start Date: 8/4/2018 11:01:00AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-9520;AV20-05142018
Calibration Date: 5/15/2018 12:28:08PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 22.15% +/- 0.32% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5030.207	5005.276	5055.137	14.65	7,578.28	7,666.81

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:12:40AM 8/4/2018

Sample

Sample Name: Pulser;AV21
Comment:

Spectrum #20 Analysis #1

Batch

Batch Name: July2018a
Description:

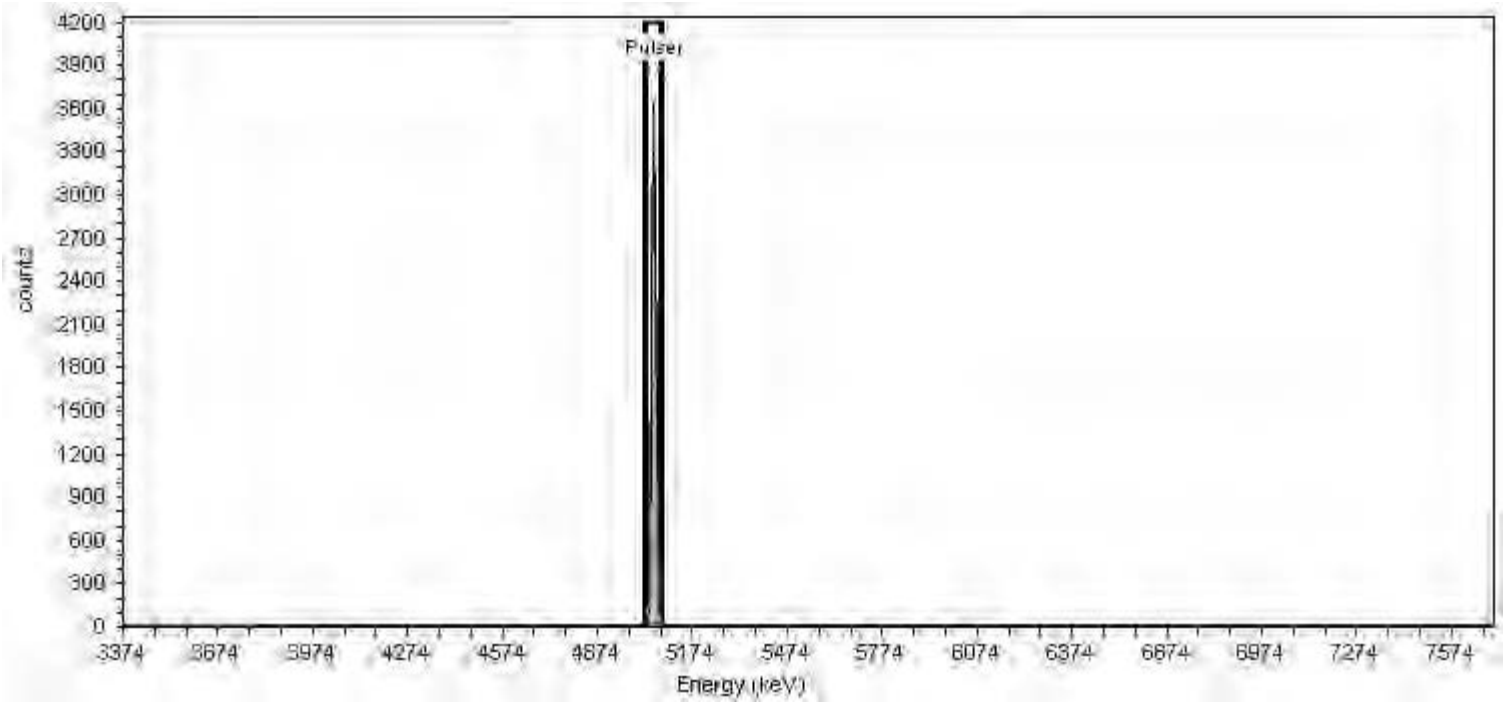
Analyst: 60040

Acquisition

Detector: AV21 , SN: 48-102BB6
Acquisition Start Date: 8/4/2018 11:01:02AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-9792;AV21-05142018
Calibration Date: 5/15/2018 12:28:21PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 23.43% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5052.688	5028.774	5076.603	14.05	7,337.61	7,665.55

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:12:58AM 8/4/2018

Sample

Sample Name: Pulser;AV23
Comment:

Spectrum #20 Analysis #1

Batch

Batch Name: July2018a
Description:

Analyst: 60040

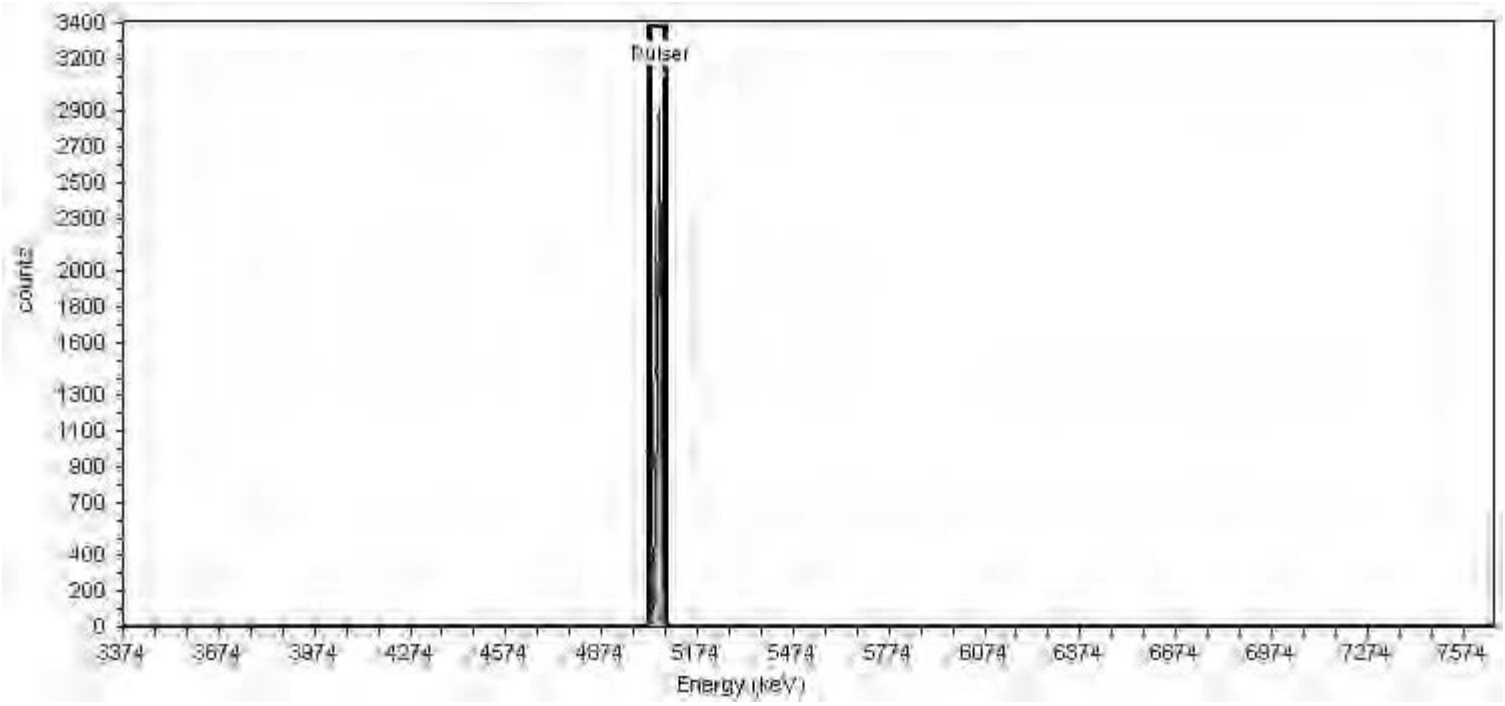
Acquisition

Detector: AV23 , SN: 48-158FF3
Acquisition Start Date: 8/4/2018 11:01:04AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-9795;AV23-05142018
Calibration Date: 5/15/2018 12:28:43PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.46% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5053.709	5026.713	5080.705	15.86	6,631.97	7,622.17

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:13:42AM 8/4/2018

Sample

Sample Name: Pulser;AV47
Comment:

Spectrum #19 Analysis #1

Batch

Batch Name: July2018b
Description:

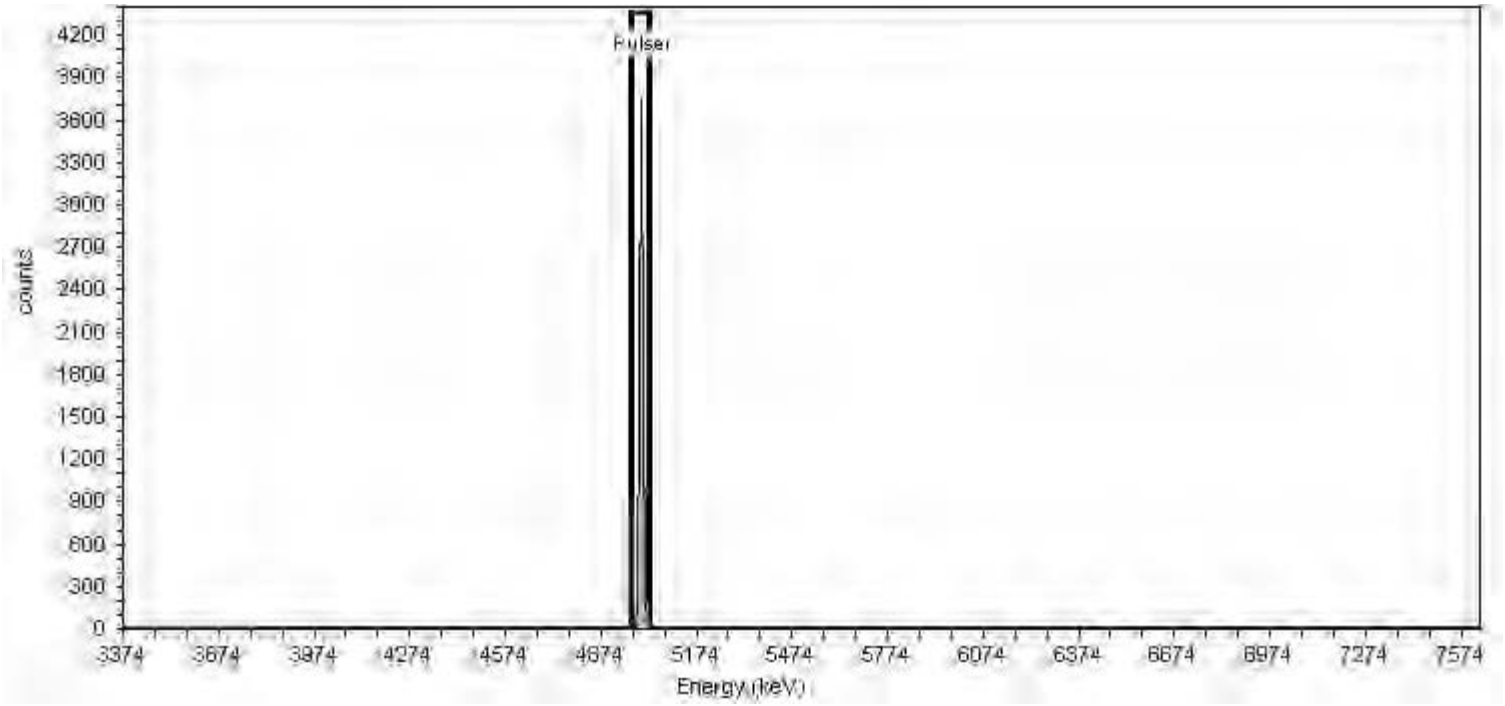
Analyst: 60040

Acquisition

Detector: AV47 , SN: 46-032336
Acquisition Start Date: 8/4/2018 11:01:11AM
Live Time: 1.00 min.
Real Time: 1.02 min.
Calibration Name: IC-1370622;AV47-05142018
Calibration Date: 5/15/2018 12:27:14PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 27.02% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5000.094	4976.560	5023.627	13.83	7,436.39	7,552.39

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:13:51AM 8/4/2018

Sample

Sample Name: Pulser;AV48
Comment:

Spectrum #19 Analysis #1

Batch

Batch Name: July2018b
Description:

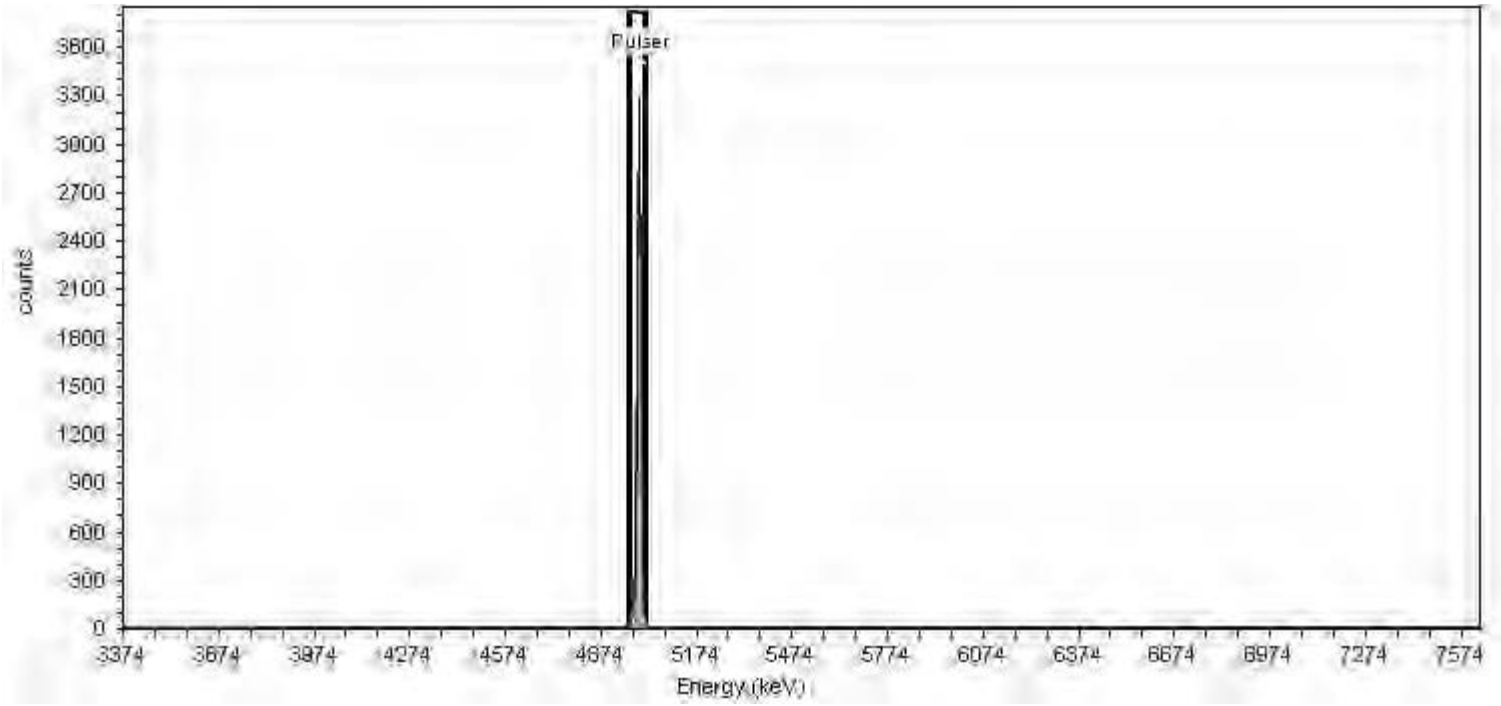
Analyst: 60040

Acquisition

Detector: AV48 , SN: 46-033P6
Acquisition Start Date: 8/4/2018 11:01:13AM
Live Time: 1.00 min.
Real Time: 1.02 min.
Calibration Name: IC-1370619;AV48-05142018
Calibration Date: 5/15/2018 12:27:25PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 27.06% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	4993.027	4966.563	5019.492	15.55	7,341.88	7,541.74

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:14:12AM 8/4/2018

Sample

Sample Name: Pulser;AV52
Comment:

Spectrum #19 Analysis #1

Batch

Batch Name: July2018b
Description:

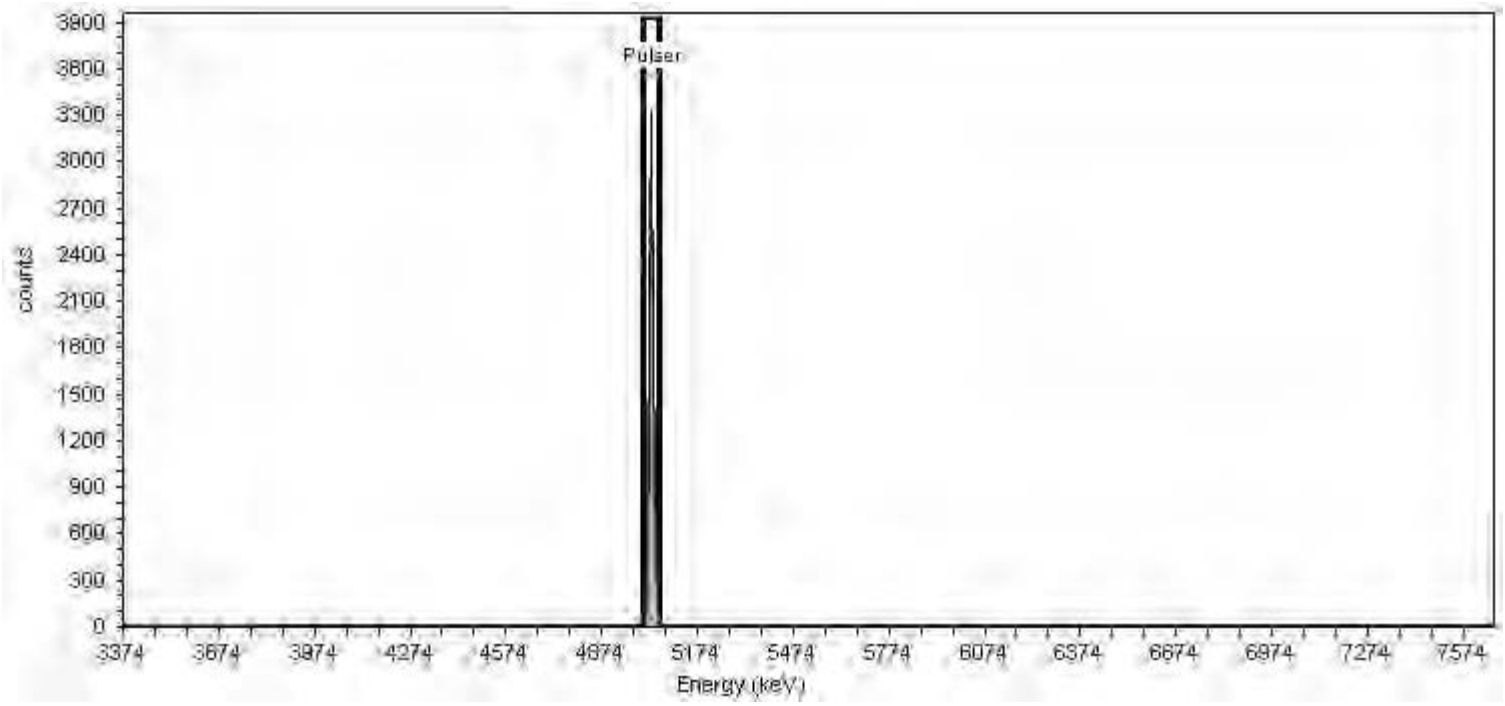
Analyst: 60040

Acquisition

Detector: AV52 , SN: 49-155N7
Acquisition Start Date: 8/4/2018 11:01:18AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-8877;AV52-05152018
Calibration Date: 5/15/2018 3:36:50PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.50% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5030.414	5005.178	5055.650	14.83	7,083.79	7,288.89

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:14:37AM 8/4/2018

Sample

Sample Name: Pulser;AV54
Comment:

Spectrum #19 Analysis #1

Batch

Batch Name: July2018b
Description:

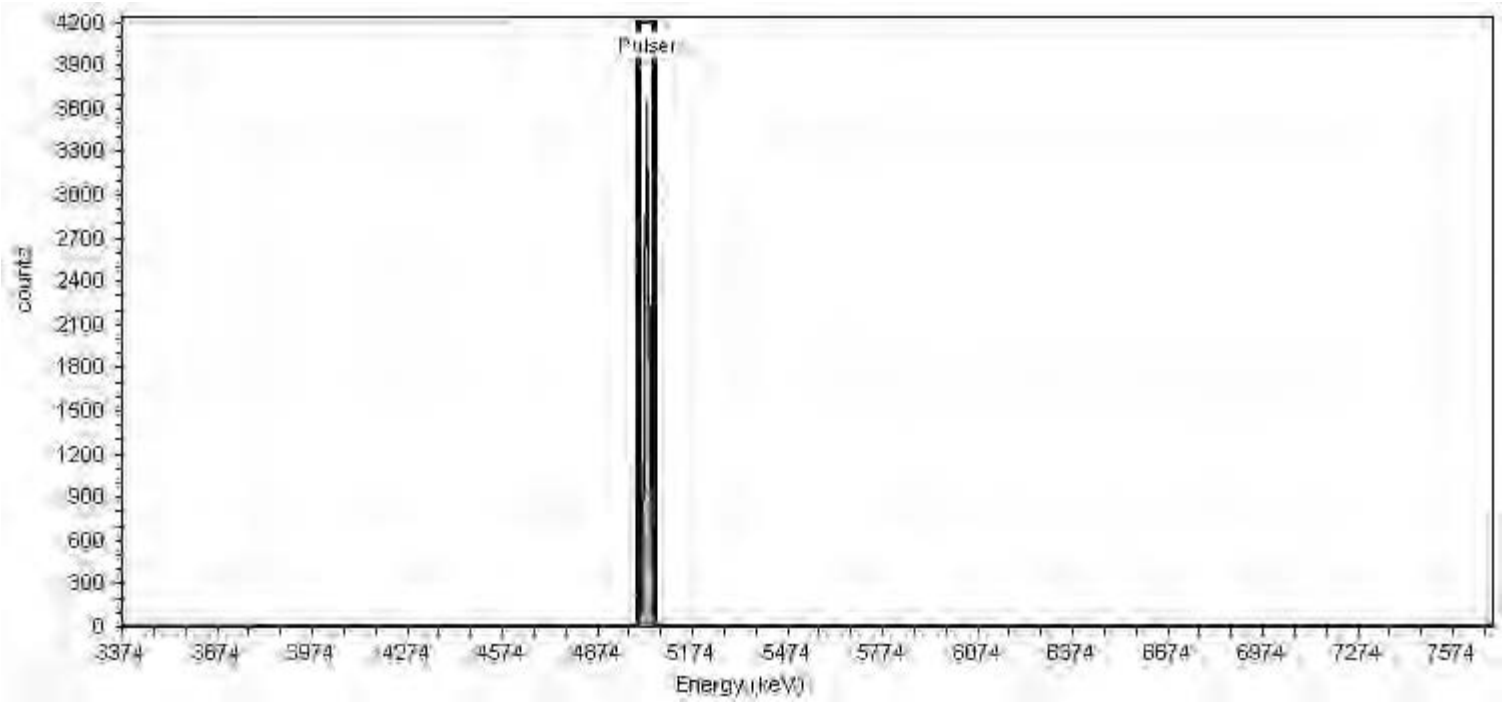
Analyst: 60040

Acquisition

Detector: AV54 , SN: 46-033P4
Acquisition Start Date: 8/4/2018 11:01:20AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-9792;AV54-05152018
Calibration Date: 5/15/2018 3:37:57PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 23.62% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5030.204	5006.359	5054.049	14.01	7,334.35	7,287.99

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:14:46AM 8/4/2018

Sample

Sample Name: Pulser;AV56
Comment:

Spectrum #19 Analysis #1

Batch

Batch Name: July2018b
Description:

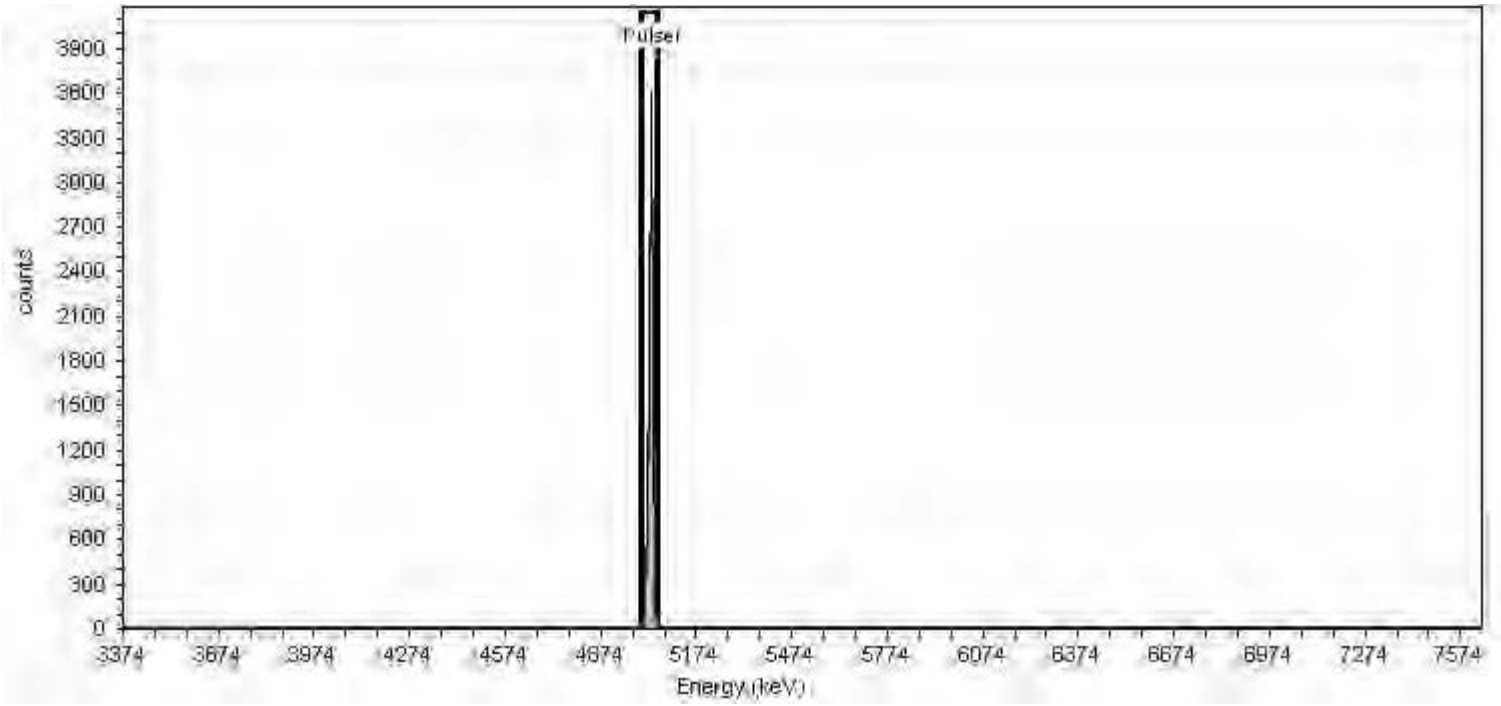
Analyst: 60040

Acquisition

Detector: AV56 , SN: 52-059EE5
Acquisition Start Date: 8/4/2018 11:01:22AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-9795;AV56-05152018
Calibration Date: 5/15/2018 3:38:31PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 25.25% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5029.742	5006.126	5053.358	13.87	7,182.60	7,287.60

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:14:54AM 8/4/2018

Sample

Sample Name: Pulser;AV57
Comment:

Spectrum #20 Analysis #1

Batch

Batch Name: July2018b
Description:

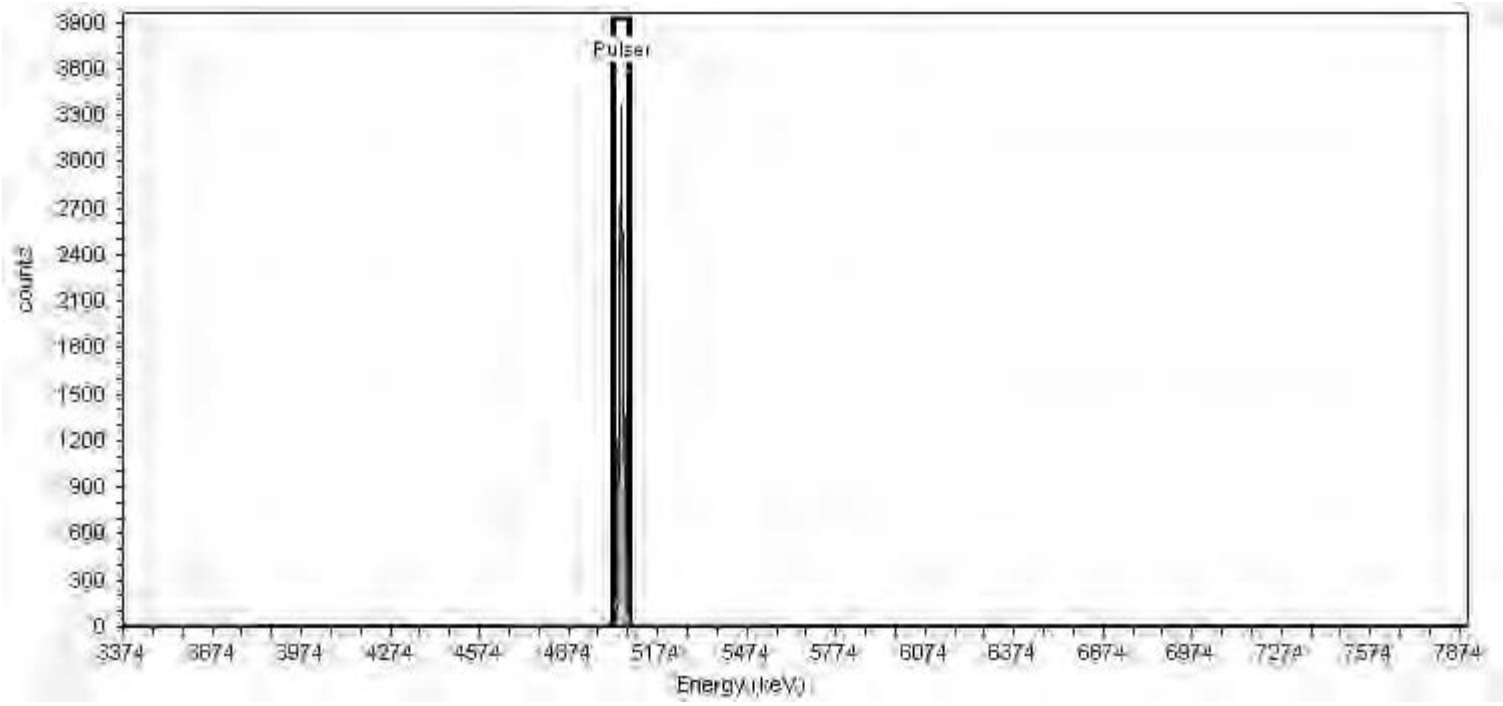
Analyst: 60040

Acquisition

Detector: AV57 , SN: 48-158EE3
Acquisition Start Date: 8/4/2018 11:01:23AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-9817;AV57-05152018
Calibration Date: 5/15/2018 3:38:42PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 22.40% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5052.515	5027.228	5077.802	14.86	7,185.19	7,279.09

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:15:13AM 8/4/2018

Sample

Sample Name: Pulser;AV58
Comment:

Spectrum #20 Analysis #1

Batch

Batch Name: July2018b
Description:

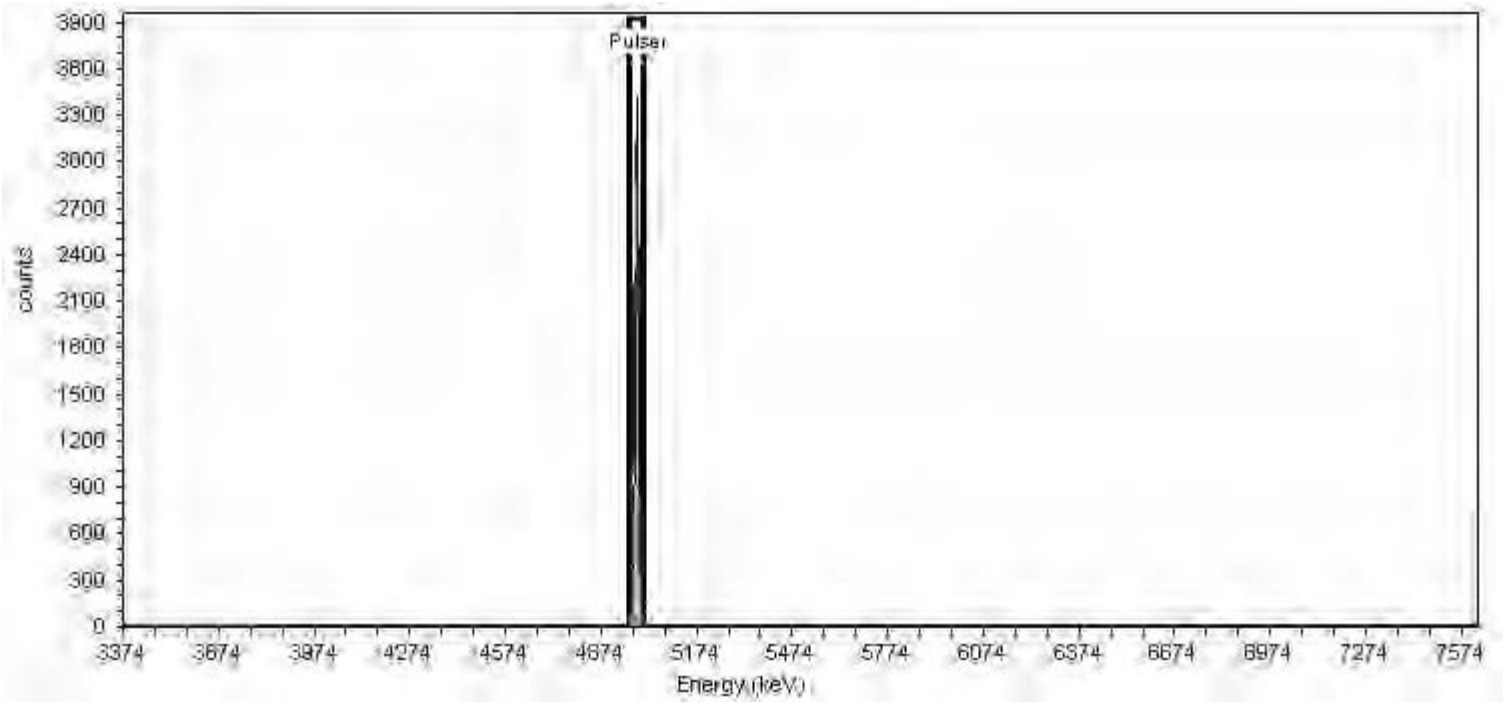
Analyst: 60040

Acquisition

Detector: AV58 , SN: 52-102 C5
Acquisition Start Date: 8/4/2018 11:01:25AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-9885;AV58-05152018
Calibration Date: 5/15/2018 3:38:55PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.05% +/- 0.36% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	4985.783	4963.683	5007.883	12.98	6,355.76	6,965.14

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:15:22AM 8/4/2018

Sample

Sample Name: Pulser;AV60
Comment:

Spectrum #19 Analysis #1

Batch

Batch Name: July2018b
Description:

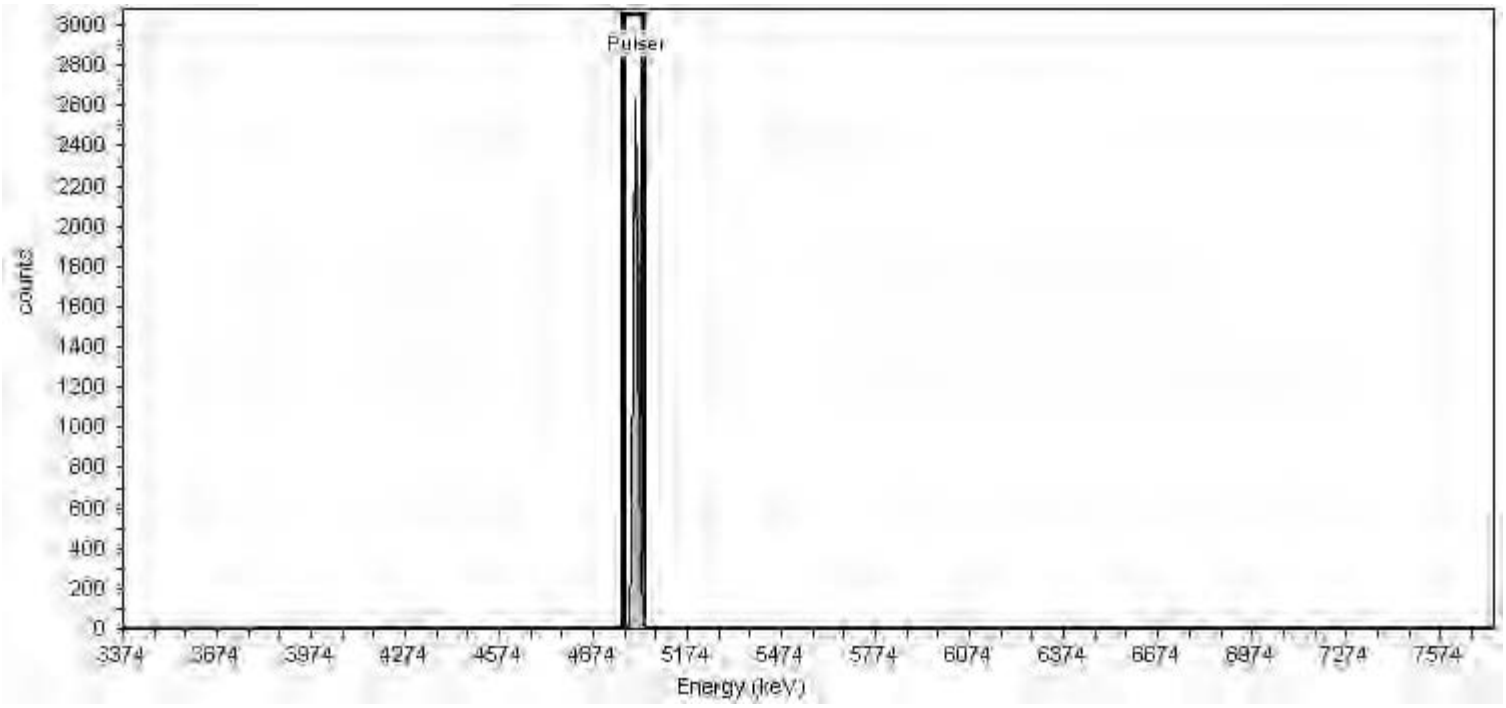
Analyst: 60040

Acquisition

Detector: AV60 , SN: 49-027117
Acquisition Start Date: 8/4/2018 11:01:27AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-1368446;AV60-05152018
Calibration Date: 5/15/2018 3:39:06PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 28.28% +/- 0.26% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5007.069	4977.396	5036.742	17.43	6,576.66	7,122.06

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:15:30AM 8/4/2018

Sample

Sample Name: Pulser;AV62
Comment:

Spectrum #20 Analysis #1

Batch

Batch Name: July2018b
Description:

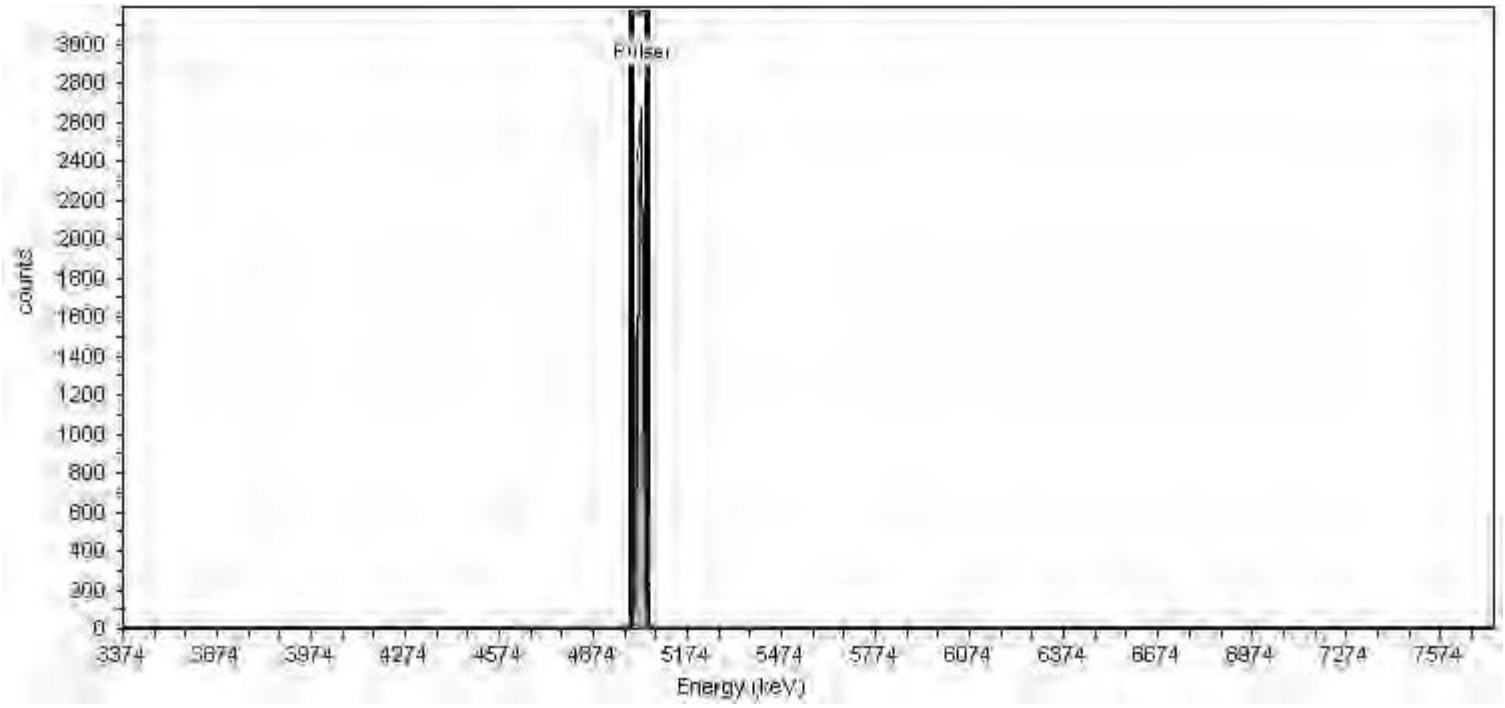
Analyst: 60040

Acquisition

Detector: AV62 , SN: 52-060FF2
Acquisition Start Date: 8/4/2018 11:01:28AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-1368447;AV62-05152018
Calibration Date: 5/15/2018 3:39:22PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 28.40% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5023.451	4996.239	5050.663	15.99	6,127.14	7,171.47

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:15:39AM 8/4/2018

Sample

Sample Name: Pulser;AV63
Comment:

Spectrum #21 Analysis #1

Batch

Batch Name: July2018b
Description:

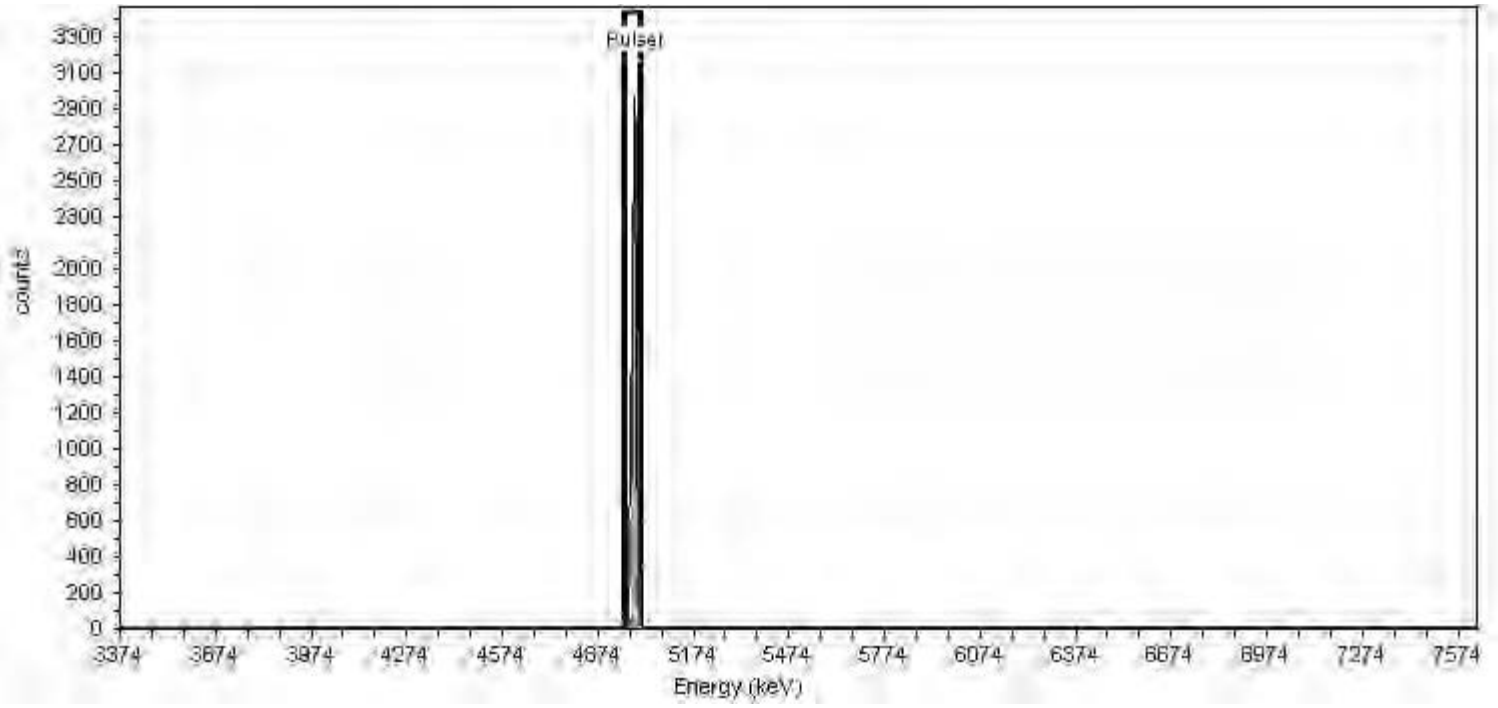
Analyst: 60040

Acquisition

Detector: AV63 , SN: 47-029ff2
Acquisition Start Date: 8/4/2018 11:01:30AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-1370621;AV63-05152018
Calibration Date: 5/15/2018 3:39:32PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 26.80% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	4984.461	4958.076	5010.846	15.50	6,610.53	7,174.30

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:15:48AM 8/4/2018

Sample

Sample Name: Pulser;AV64
Comment:

Spectrum #19 Analysis #1

Batch

Batch Name: July2018b
Description:

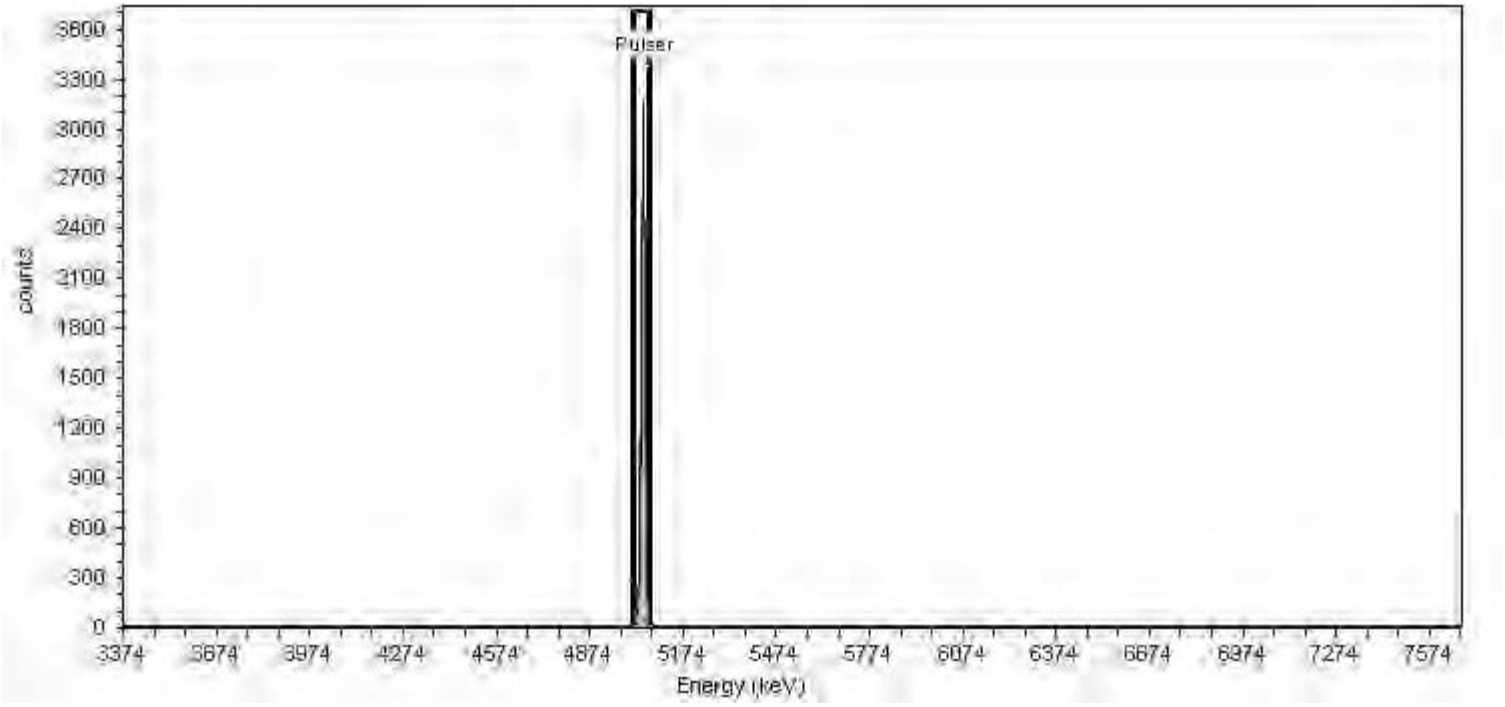
Analyst: 60040

Acquisition

Detector: AV64 , SN: 43-028v3
Acquisition Start Date: 8/4/2018 11:01:31AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-1370622;AV64-05152018
Calibration Date: 5/15/2018 3:39:44PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 28.38% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5045.047	5018.390	5071.704	15.66	7,117.56	7,163.85

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Alpha-Spectroscopy Pulser Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:15:57AM 8/4/2018

Sample

Sample Name: Pulser;AV66
Comment:

Spectrum #19 Analysis #1

Batch

Batch Name: July2018b
Description:

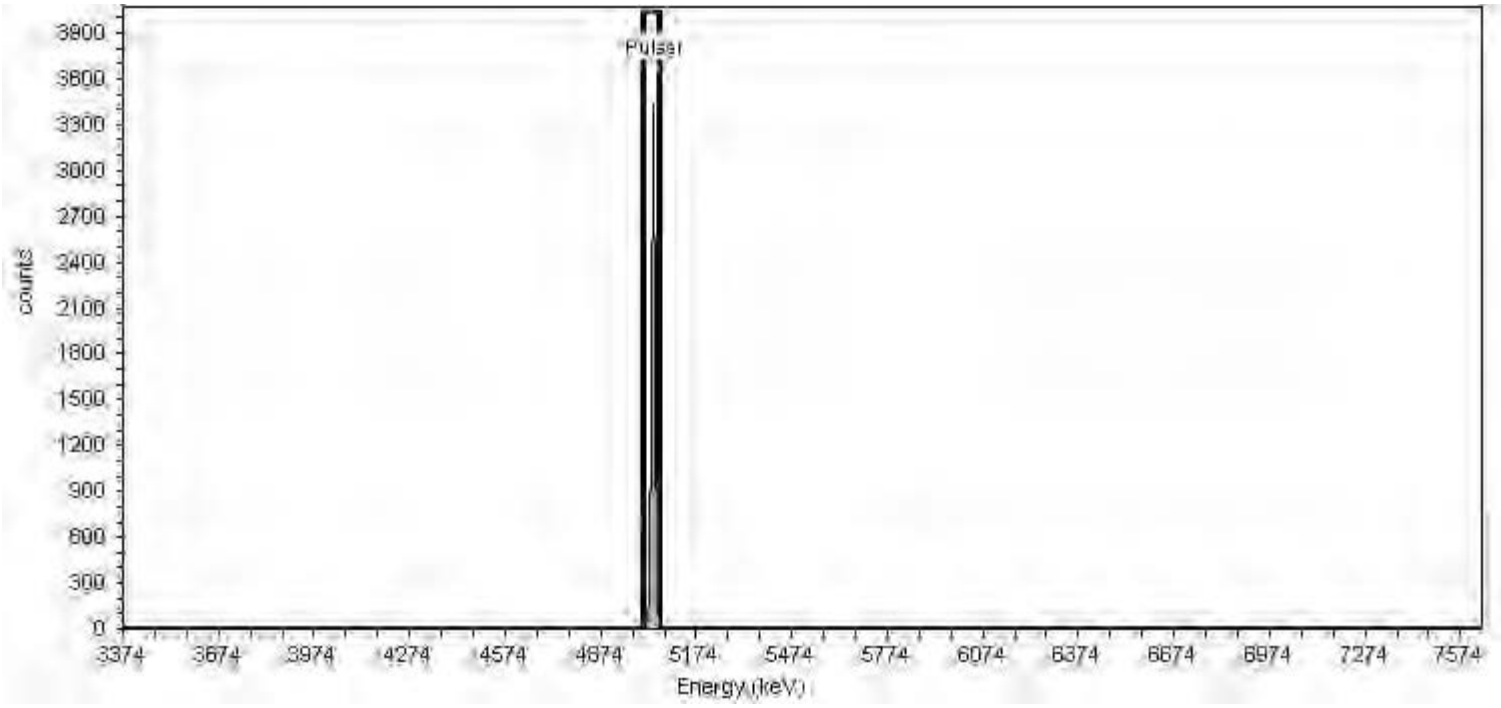
Analyst: 60040

Acquisition

Detector: AV66 , SN: 48-158EE2
Acquisition Start Date: 8/4/2018 11:01:33AM
Live Time: 1.00 min.
Real Time: 1.01 min.
Calibration Name: IC-1370620;AV66-05152018
Calibration Date: 5/15/2018 3:40:08PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 27.12% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: Peak Fit Analysis

Nuclide Summary (Peak Search)

Nuclide	Peak Energy keV	Start Energy keV	End Energy keV	FWHM keV	Fit Area	Gross Counts
Pulser	5037.492	5013.248	5061.737	14.24	7,029.59	7,178.01

Initial Calibrations

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Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:26:17PM 5/14/2018

Calibration

Sample Name: IC-9793;AV7-05142018
Description:
Detector: AV7

Calibration Date: 5/14/2018 6:26:13PM
Analyst: 60040

Source Info

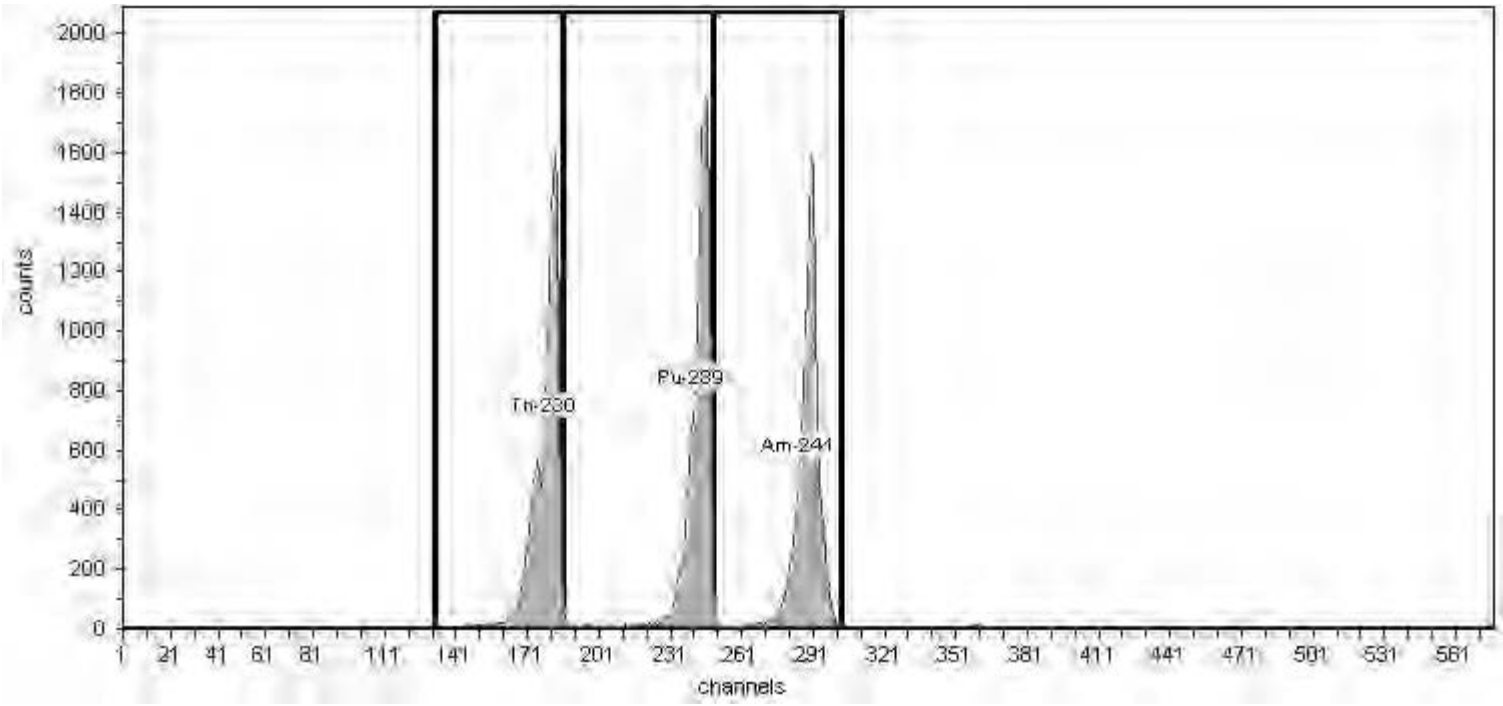
Certificate ID: 82241-334
Prepared by: Analytics

Certification Date: 6/8/2010 12:00:00PM
Description:

Acquisition

Detector: AV7 , SN: 48-158EE5
Acquisition Start Date: 5/14/2018 3:47:01PM
Live Time: 140.00 min.
Real Time: 140.09 min.
Efficiency: 22.98% +/- 0.29% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	12,677.00	90.55
Pu-239	240	5.16	186	249	0.00	13,298.00	94.99
Am-241	284	5.49	249	303	0.00	12,604.00	90.03

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Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:26:31PM 5/14/2018

Calibration

Sample Name: IC-9795;AV8-05142018
Description:
Detector: AV8

Calibration Date: 5/14/2018 6:26:27PM
Analyst: 60040

Source Info

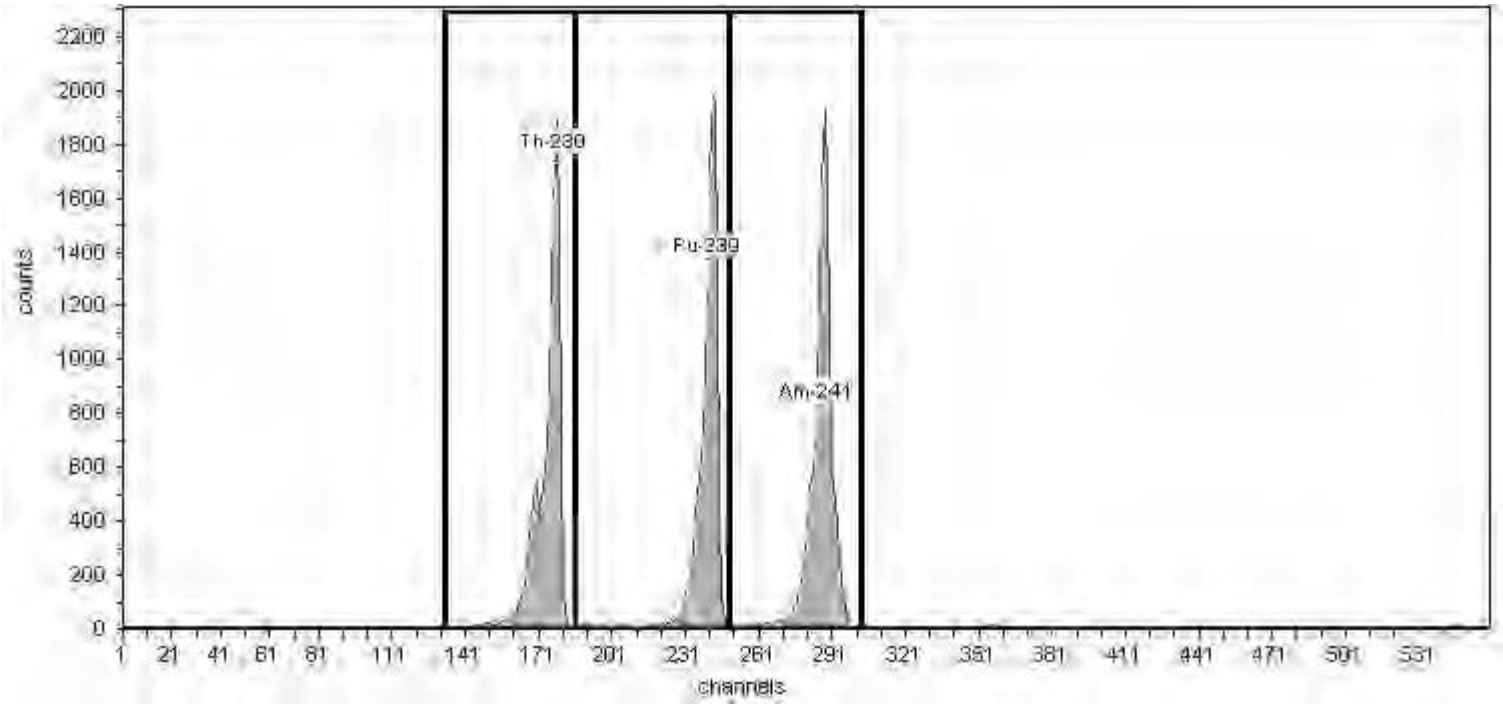
Certificate ID: 82243-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV8 , SN: 41-137Q6
Acquisition Start Date: 5/14/2018 3:47:39PM
Live Time: 140.00 min.
Real Time: 140.09 min.
Efficiency: 25.96% +/- 0.34% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	12,786.00	91.33
Pu-239	240	5.16	186	249	0.00	13,029.00	93.06
Am-241	284	5.49	249	303	0.00	13,761.00	98.29

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:27:02PM 5/14/2018

Calibration

Sample Name: IC-9885;AV10-05142018
Description:
Detector: AV10

Calibration Date: 5/14/2018 6:26:57PM
Analyst: 60040

Source Info

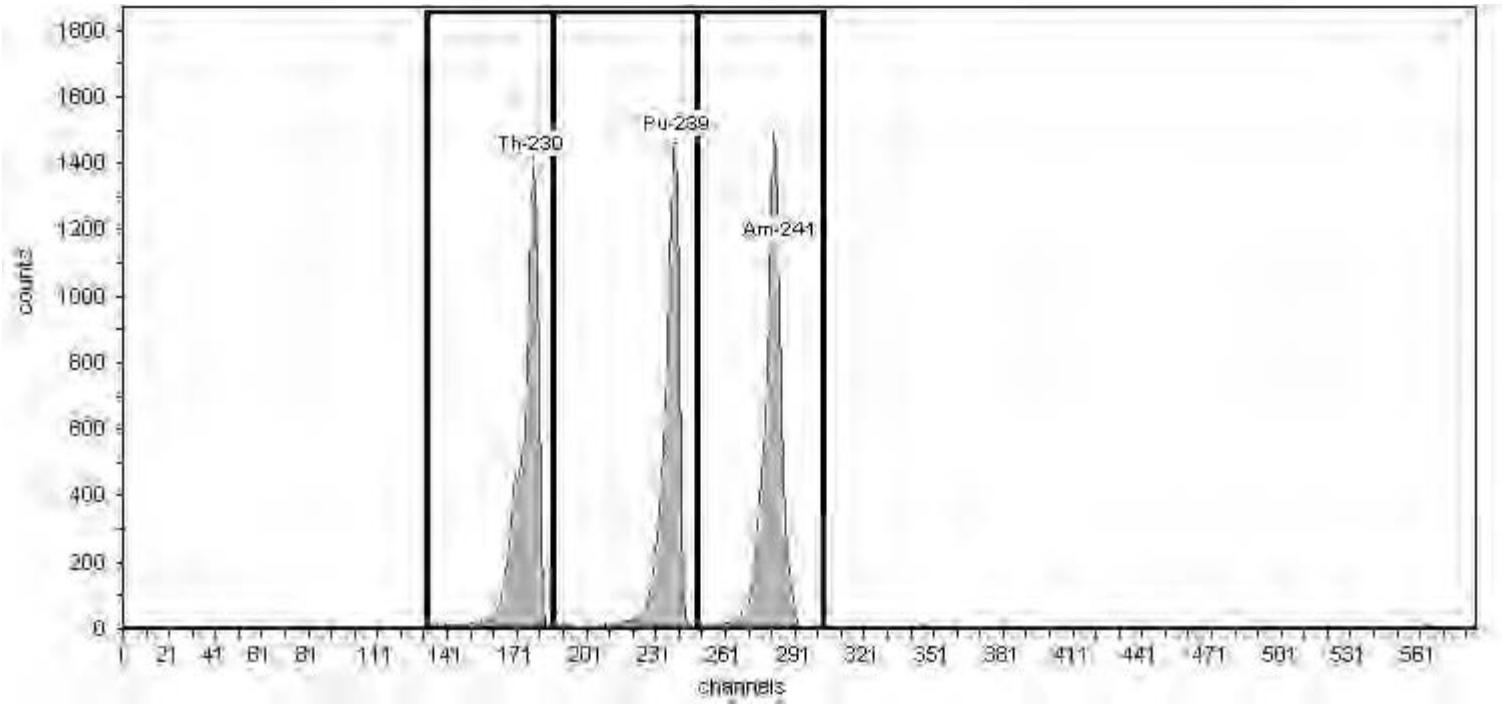
Certificate ID: 82246-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV10 , SN: 49-155N2
Acquisition Start Date: 5/14/2018 3:48:31PM
Live Time: 140.00 min.
Real Time: 140.12 min.
Efficiency: 23.49% +/- 0.35% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	11,054.00	78.96
Pu-239	240	5.16	186	249	0.00	10,563.00	75.45
Am-241	284	5.49	249	303	0.00	11,647.00	83.19

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Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:27:28PM 5/14/2018

Calibration

Sample Name: IC-1368447; AV12-05142018
Description:
Detector: AV12

Calibration Date: 5/14/2018 6:27:24PM
Analyst: 60040

Source Info

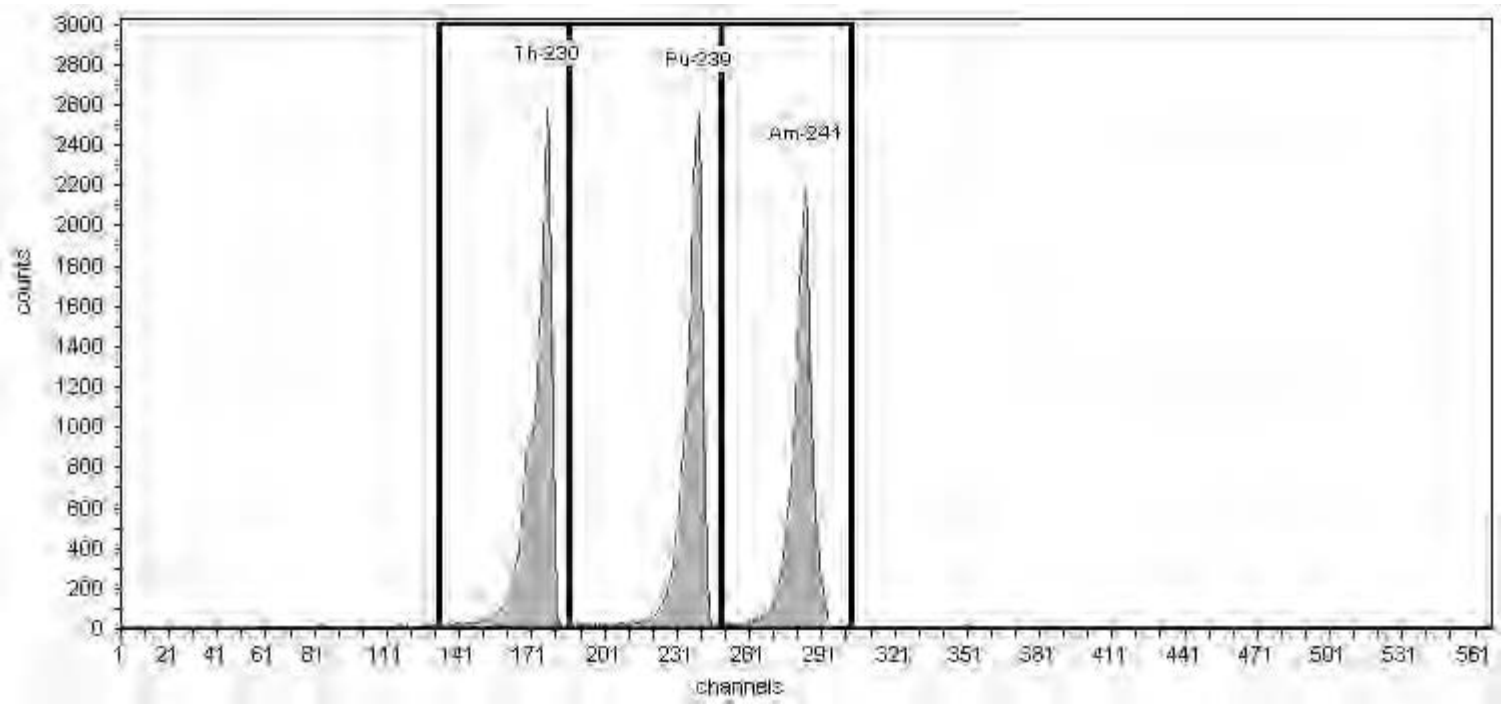
Certificate ID: 108002_00001
Prepared by: Eckert & Ziegler

Certification Date: 12/1/2017 11:00:00AM
Description:

Acquisition

Detector: AV12 , SN: 51-082B7
Acquisition Start Date: 5/14/2018 3:52:00PM
Live Time: 140.00 min.
Real Time: 140.12 min.
Efficiency: 27.78% +/- 0.23% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	21,819.00	155.85
Pu-239	240	5.16	186	249	0.00	20,129.00	143.78
Am-241	284	5.49	249	303	0.00	18,632.00	133.09

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:27:56PM 5/14/2018

Calibration

Sample Name: IC-1370622;AV14-05142018
Description:
Detector: AV14

Calibration Date: 5/14/2018 6:27:53PM
Analyst: 60040

Source Info

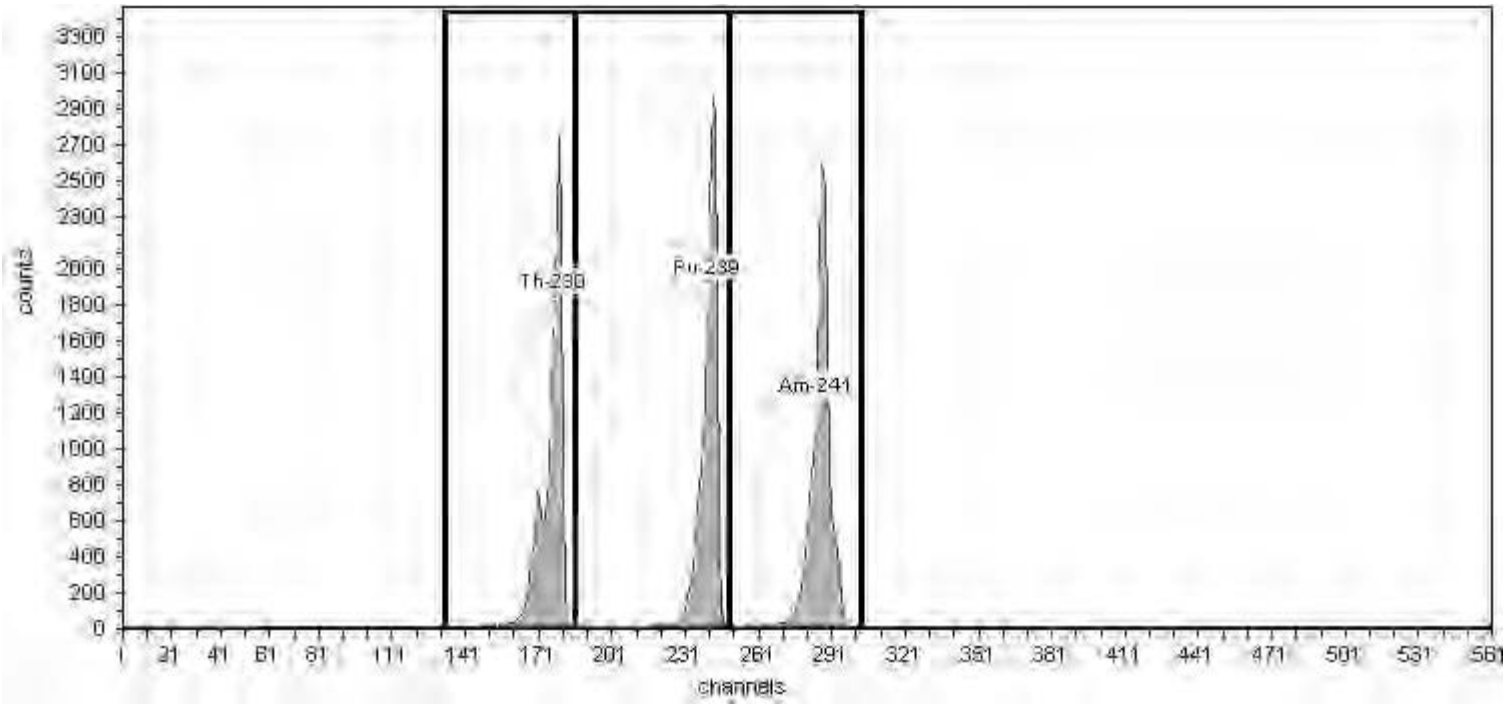
Certificate ID: 108346_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/22/2018 11:00:00AM
Description:

Acquisition

Detector: AV14 , SN: 50-060W4
Acquisition Start Date: 5/14/2018 3:54:06PM
Live Time: 140.00 min.
Real Time: 140.13 min.
Efficiency: 26.40% +/- 0.23% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	16,968.00	121.20
Pu-239	240	5.16	186	249	0.00	17,458.00	124.70
Am-241	284	5.49	249	303	0.00	17,506.00	125.04

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:28:08PM 5/14/2018

Calibration

Sample Name: IC-1370619;AV15-05142018
Description:
Detector: AV15

Calibration Date: 5/14/2018 6:28:04PM
Analyst: 60040

Source Info

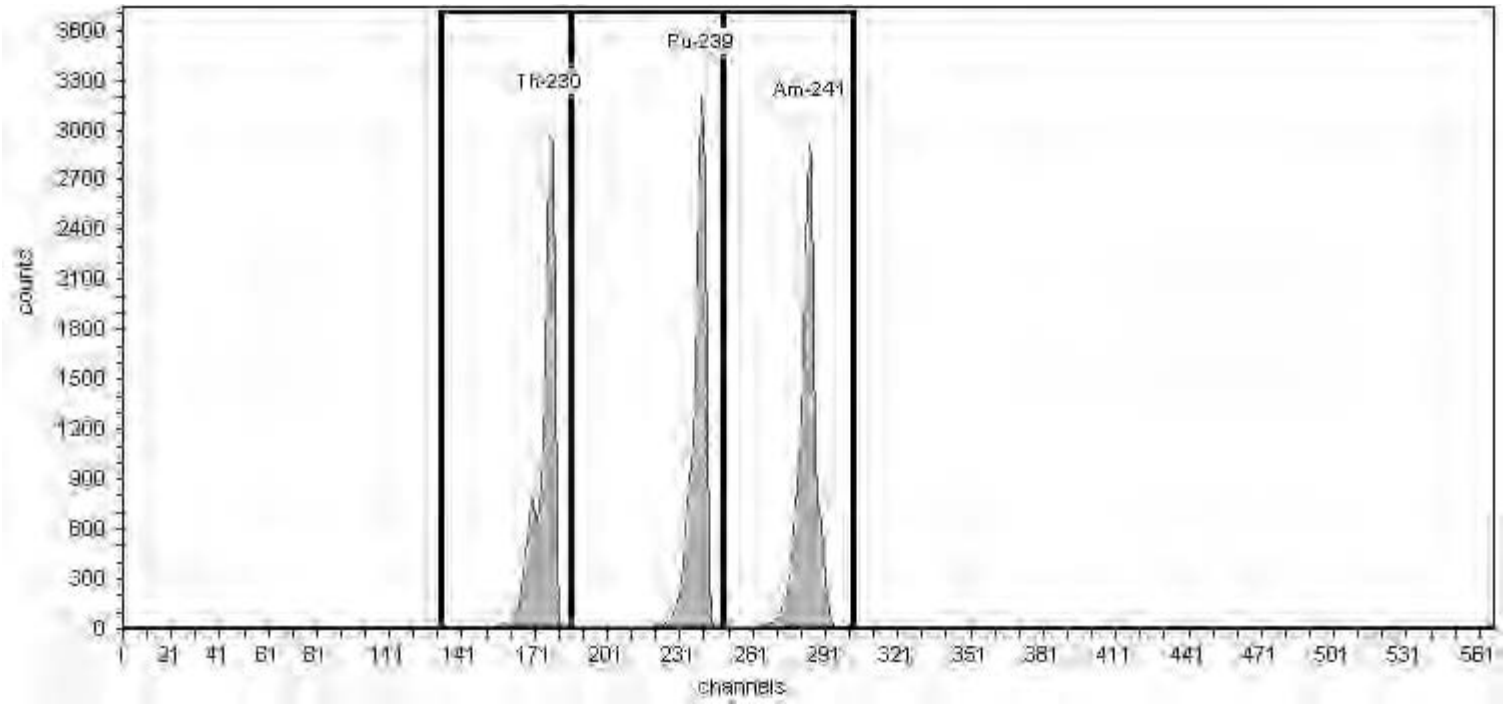
Certificate ID: 108347_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/23/2018 11:00:00AM
Description:

Acquisition

Detector: AV15 , SN: 41-172C5
Acquisition Start Date: 5/14/2018 3:57:06PM
Live Time: 140.00 min.
Real Time: 140.13 min.
Efficiency: 27.26% +/- 0.23% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	18,686.00	133.47
Pu-239	240	5.16	186	249	0.00	18,291.00	130.65
Am-241	284	5.49	249	303	0.00	19,767.00	141.19

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:28:21PM 5/14/2018

Calibration

Sample Name: IC-137620;AV16-05142018
Description:
Detector: AV16

Calibration Date: 5/14/2018 6:28:17PM
Analyst: 60040

Source Info

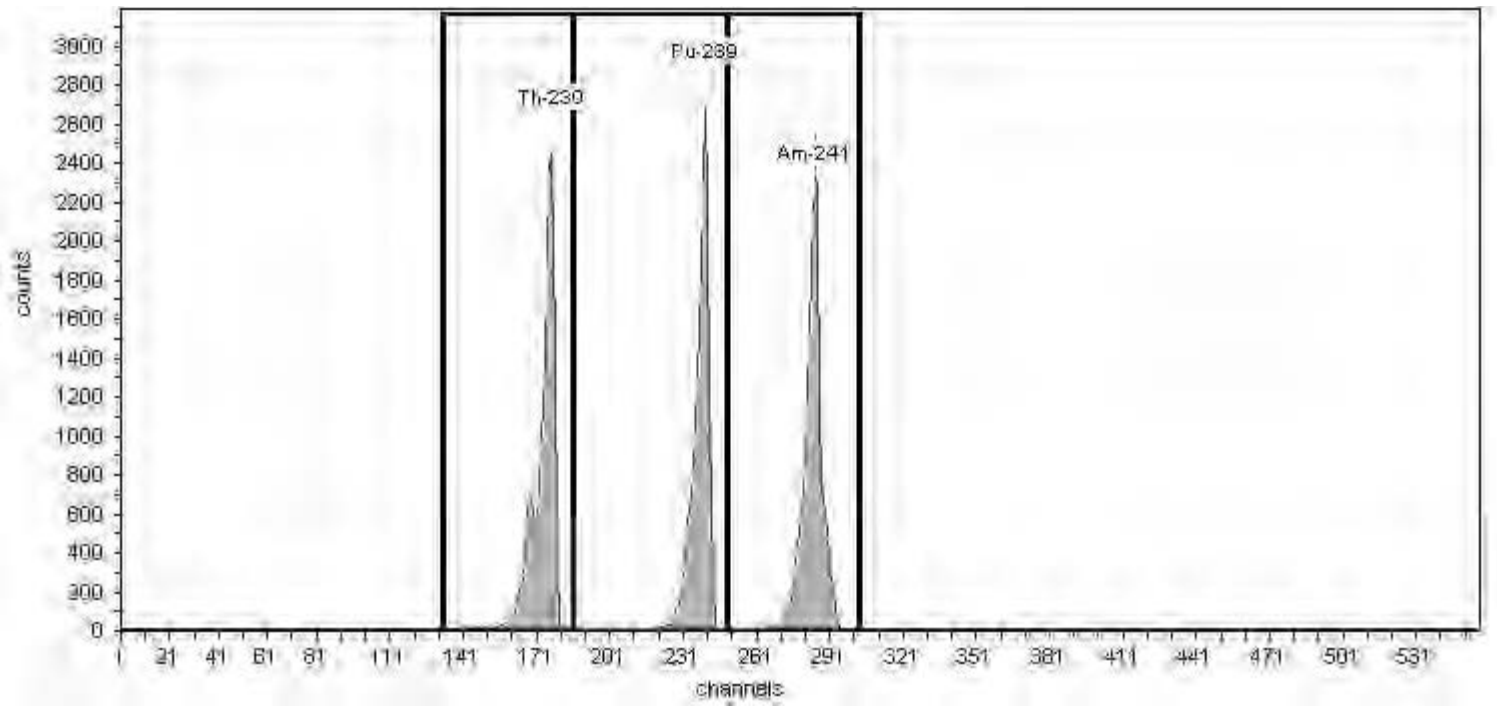
Certificate ID: 108348_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/23/2018 11:00:00PM
Description:

Acquisition

Detector: AV16 , SN: 51-082B6
Acquisition Start Date: 5/14/2018 3:59:51PM
Live Time: 140.00 min.
Real Time: 140.13 min.
Efficiency: 26.96% +/- 0.24% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	15,895.00	113.54
Pu-239	240	5.16	186	249	0.00	15,960.00	114.00
Am-241	284	5.49	249	303	0.00	16,886.00	120.61

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:29:16PM 5/15/2018

Calibration

Sample Name: IC-7107;AV17-05142018a
Description:
Detector: AV17

Calibration Date: 5/15/2018 12:29:12PM
Analyst: 60040

Source Info

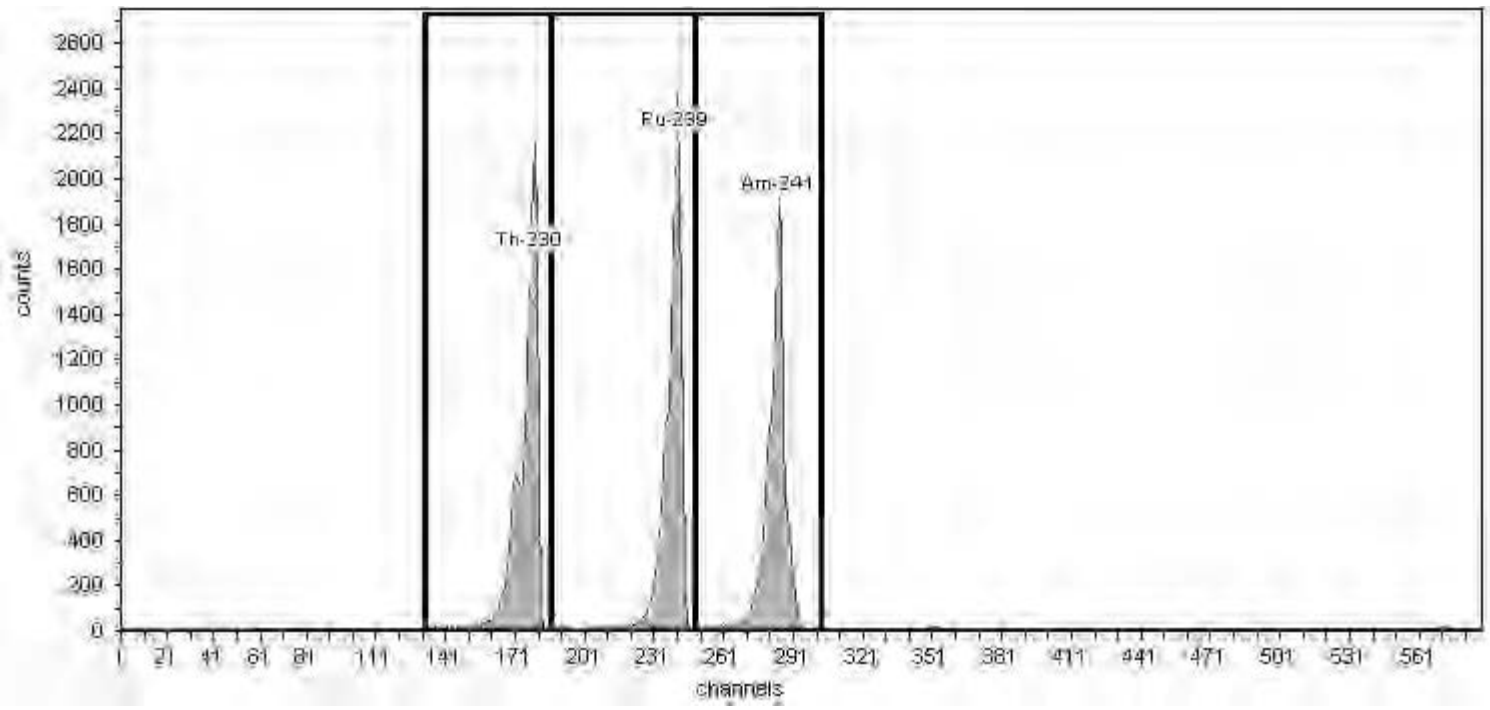
Certificate ID: 82232-334
Prepared by: Analytics

Certification Date: 6/3/2010 12:00:00PM
Description:

Acquisition

Detector: AV17 , SN: 50-051C4
Acquisition Start Date: 5/14/2018 6:47:26PM
Live Time: 140.00 min.
Real Time: 140.10 min.
Efficiency: 24.09% +/- 0.28% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	15,141.00	108.15
Pu-239	240	5.16	186	249	0.00	15,067.00	107.62
Am-241	284	5.49	249	303	0.00	14,291.00	102.08

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:28:01PM 5/15/2018

Calibration

Sample Name: IC-8877;AV19-05142018
Description:
Detector: AV19

Calibration Date: 5/15/2018 12:27:55PM
Analyst: 60040

Source Info

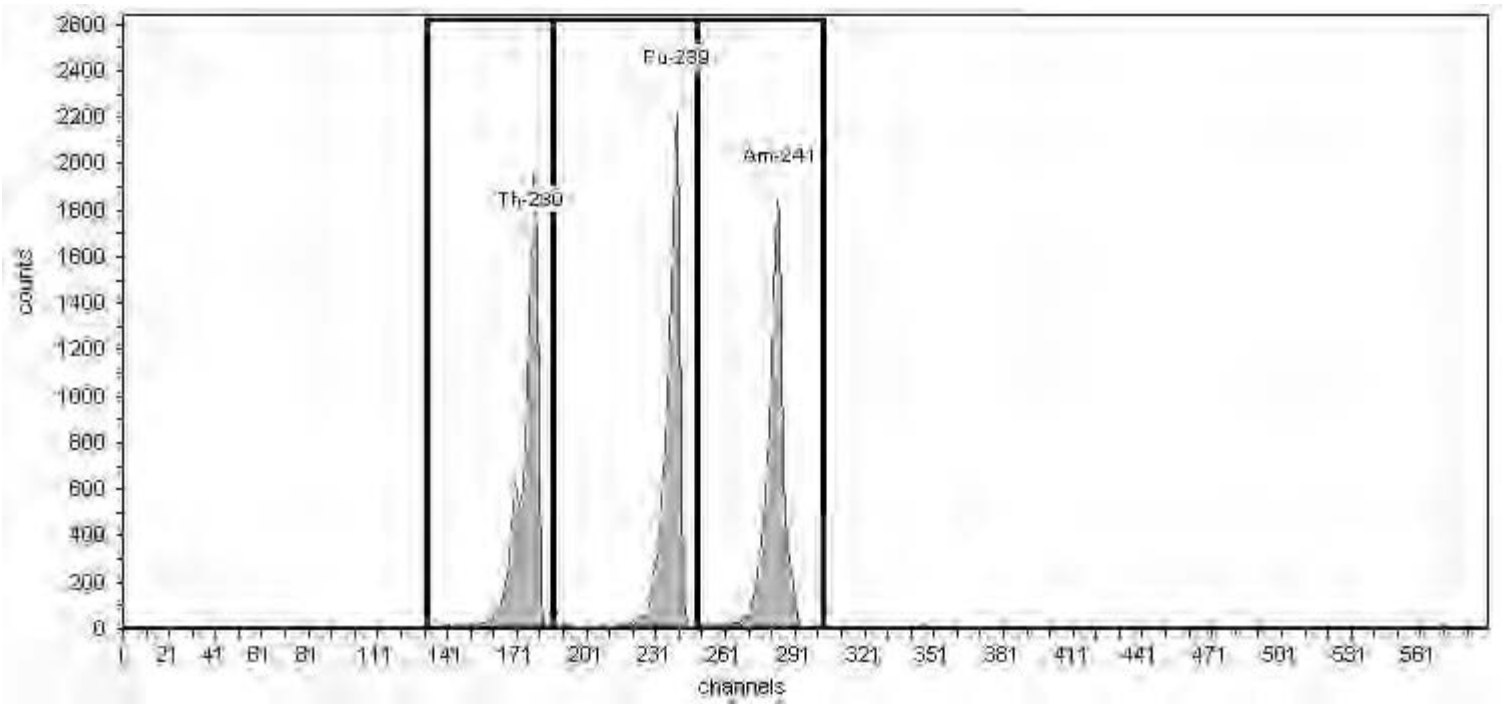
Certificate ID: 82236-334
Prepared by: Analytics

Certification Date: 6/2/2010 12:00:00PM
Description:

Acquisition

Detector: AV19 , SN: 50-025FF5
Acquisition Start Date: 5/14/2018 6:35:50PM
Live Time: 140.00 min.
Real Time: 140.11 min.
Efficiency: 23.60% +/- 0.29% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	13,623.00	97.31
Pu-239	240	5.16	186	249	0.00	13,975.00	99.82
Am-241	284	5.49	249	303	0.00	13,324.00	95.17

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:28:13PM 5/15/2018

Calibration

Sample Name: IC-9520;AV20-05142018
Description:
Detector: AV20

Calibration Date: 5/15/2018 12:28:08PM
Analyst: 60040

Source Info

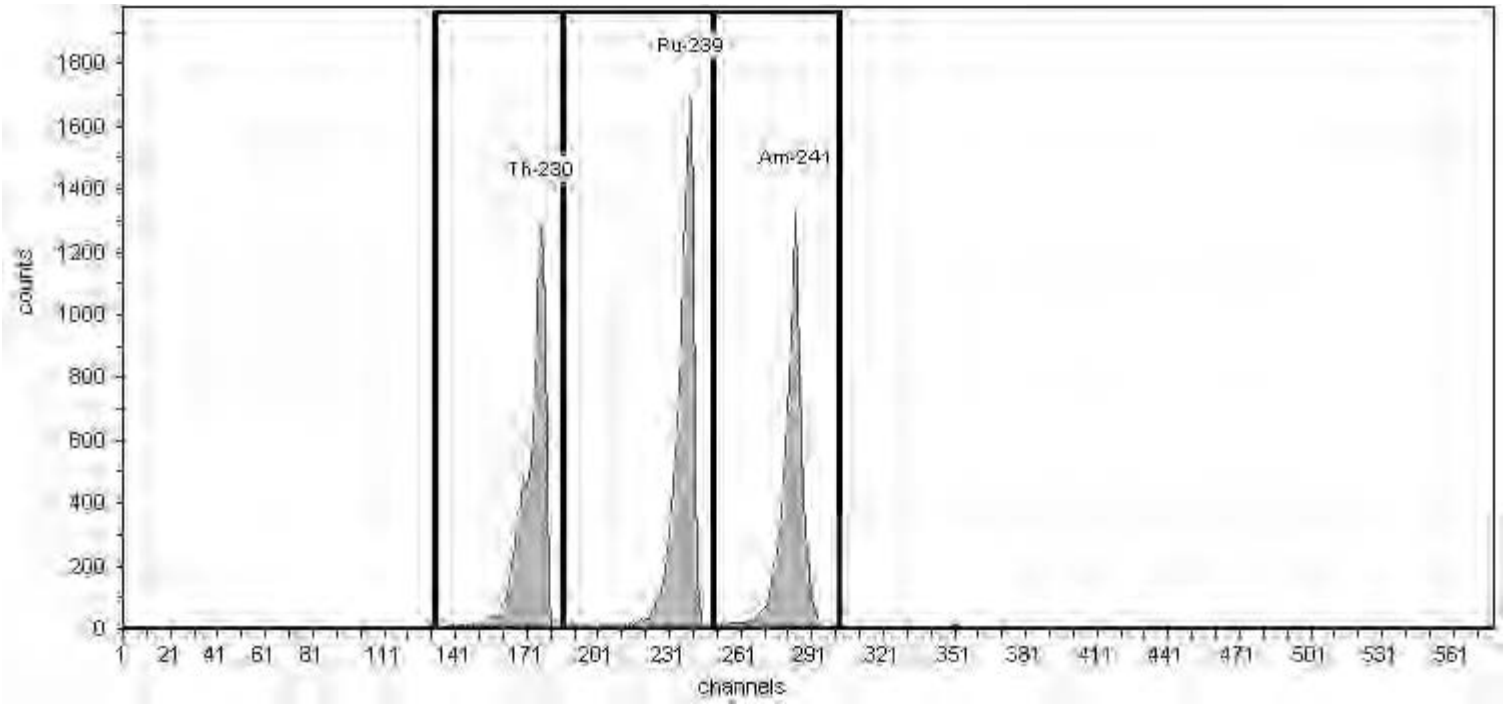
Certificate ID: 82237-334
Prepared by: Analytics

Certification Date: 6/1/2010 12:00:00PM
Description:

Acquisition

Detector: AV20 , SN: 48-121A7
Acquisition Start Date: 5/14/2018 6:36:08PM
Live Time: 140.00 min.
Real Time: 140.11 min.
Efficiency: 22.15% +/- 0.32% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	10,460.00	74.71
Pu-239	240	5.16	186	249	0.00	12,682.00	90.59
Am-241	284	5.49	249	303	0.00	10,037.00	71.69

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:28:24PM 5/15/2018

Calibration

Sample Name: IC-9792;AV21-05142018
Description:
Detector: AV21

Calibration Date: 5/15/2018 12:28:21PM
Analyst: 60040

Source Info

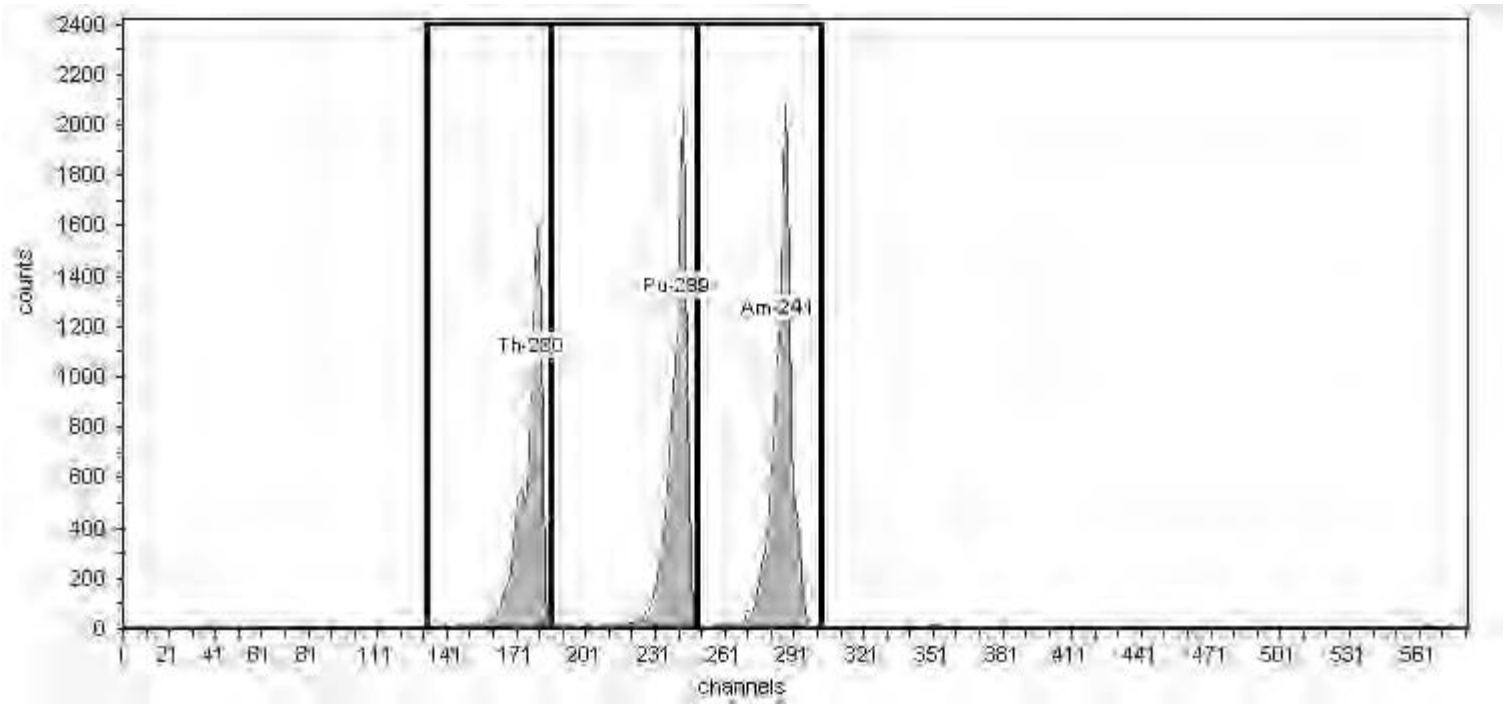
Certificate ID: 82240-334
Prepared by: Analytics

Certification Date: 6/8/2010 12:00:00PM
Description:

Acquisition

Detector: AV21 , SN: 48-102BB6
Acquisition Start Date: 5/14/2018 6:36:51PM
Live Time: 140.00 min.
Real Time: 140.11 min.
Efficiency: 23.43% +/- 0.28% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	12,248.00	87.49
Pu-239	240	5.16	186	249	0.00	14,254.00	101.81
Am-241	284	5.49	249	303	0.00	16,134.00	115.24

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:28:47PM 5/15/2018

Calibration

Sample Name: IC-9795;AV23-05142018
Description:
Detector: AV23

Calibration Date: 5/15/2018 12:28:43PM
Analyst: 60040

Source Info

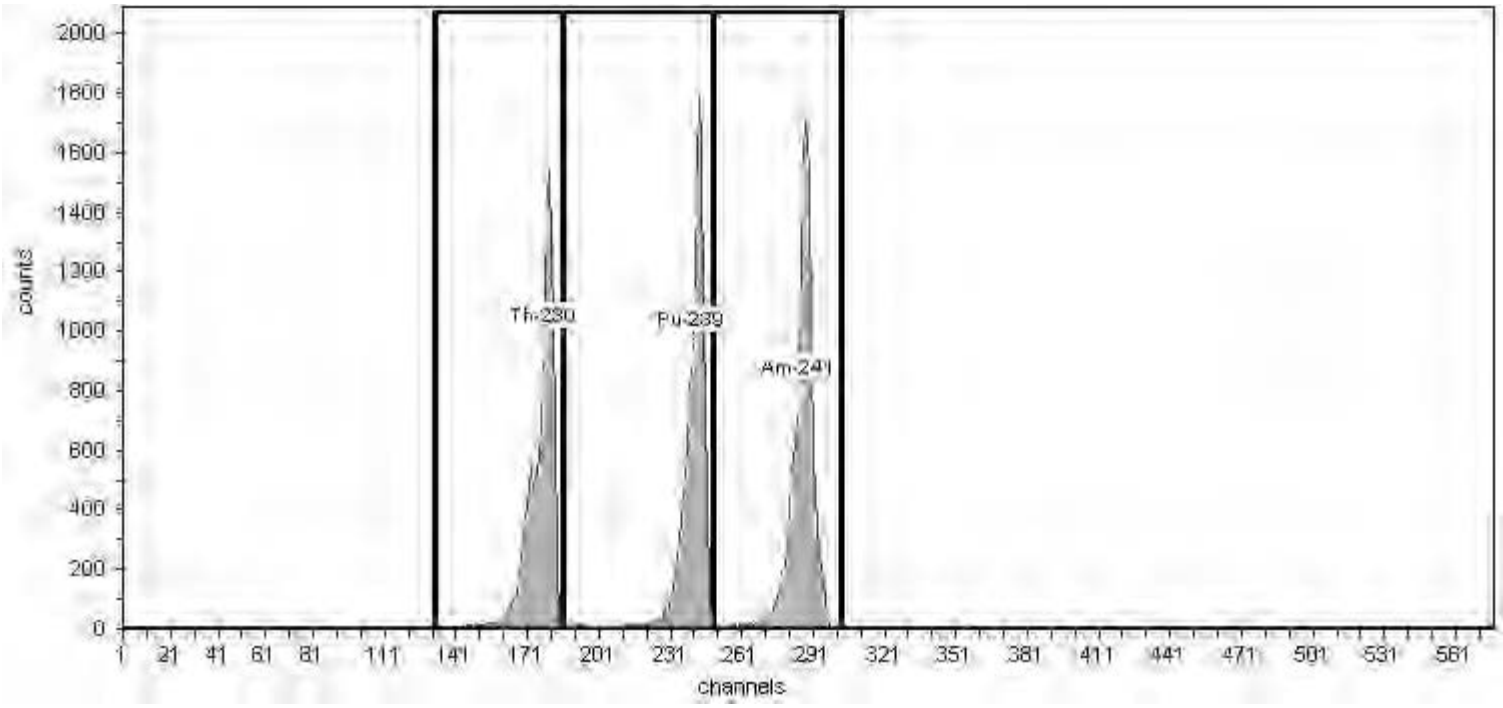
Certificate ID: 82243-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV23 , SN: 48-158FF3
Acquisition Start Date: 5/14/2018 6:37:31PM
Live Time: 140.00 min.
Real Time: 140.11 min.
Efficiency: 24.46% +/- 0.33% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	11,962.00	85.44
Pu-239	240	5.16	186	249	0.00	12,196.00	87.11
Am-241	284	5.49	249	303	0.00	13,128.00	93.77

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:27:18PM 5/15/2018

Calibration

Sample Name: IC-1370622;AV47-05142018
Description:
Detector: AV47

Calibration Date: 5/15/2018 12:27:14PM
Analyst: 60040

Source Info

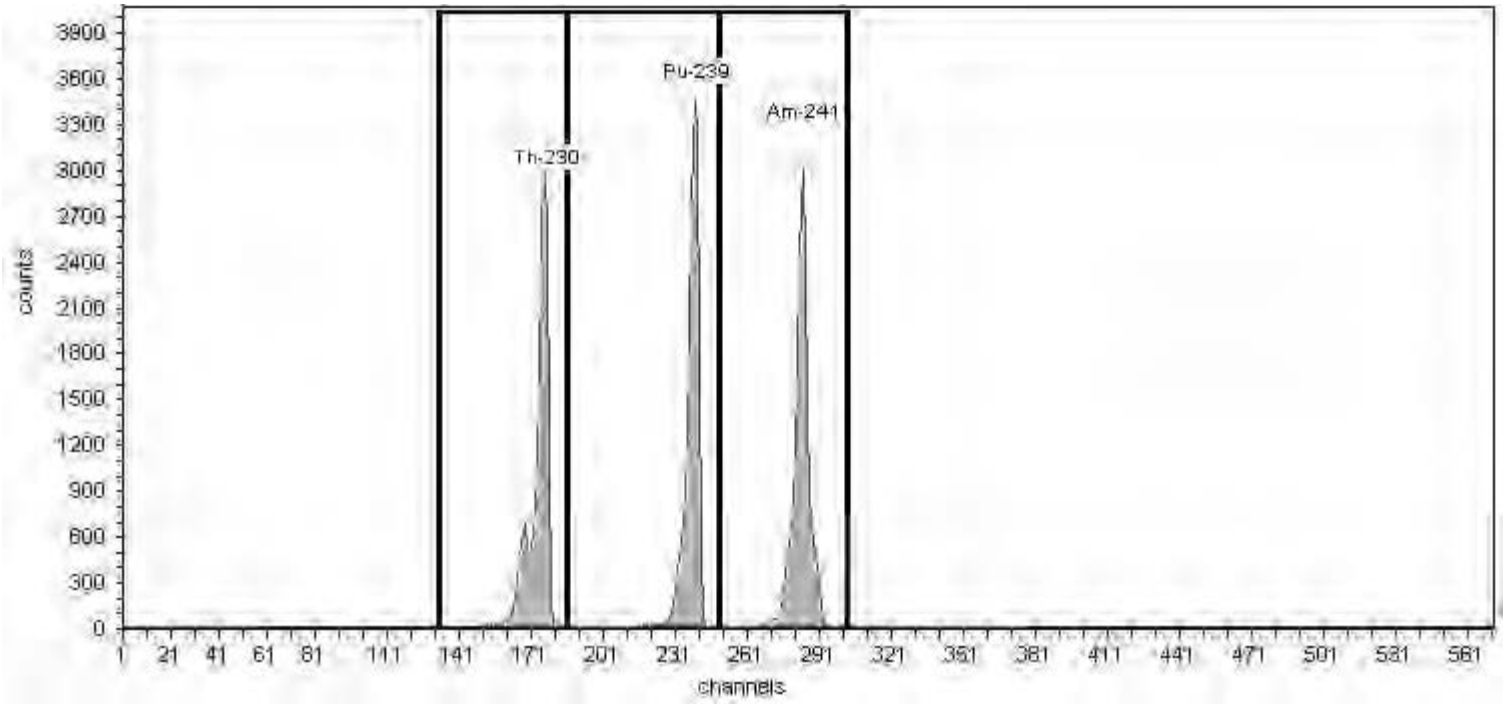
Certificate ID: 108346_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/22/2018 11:00:00AM
Description:

Acquisition

Detector: AV47 , SN: 46-032336
Acquisition Start Date: 5/14/2018 6:40:15PM
Live Time: 140.00 min.
Real Time: 140.11 min.
Efficiency: 27.02% +/- 0.23% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	17,177.00	122.69
Pu-239	240	5.16	186	249	0.00	17,986.00	128.47
Am-241	284	5.49	249	303	0.00	17,993.00	128.52

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:27:29PM 5/15/2018

Calibration

Sample Name: IC-1370619;AV48-05142018
Description:
Detector: AV48

Calibration Date: 5/15/2018 12:27:25PM
Analyst: 60040

Source Info

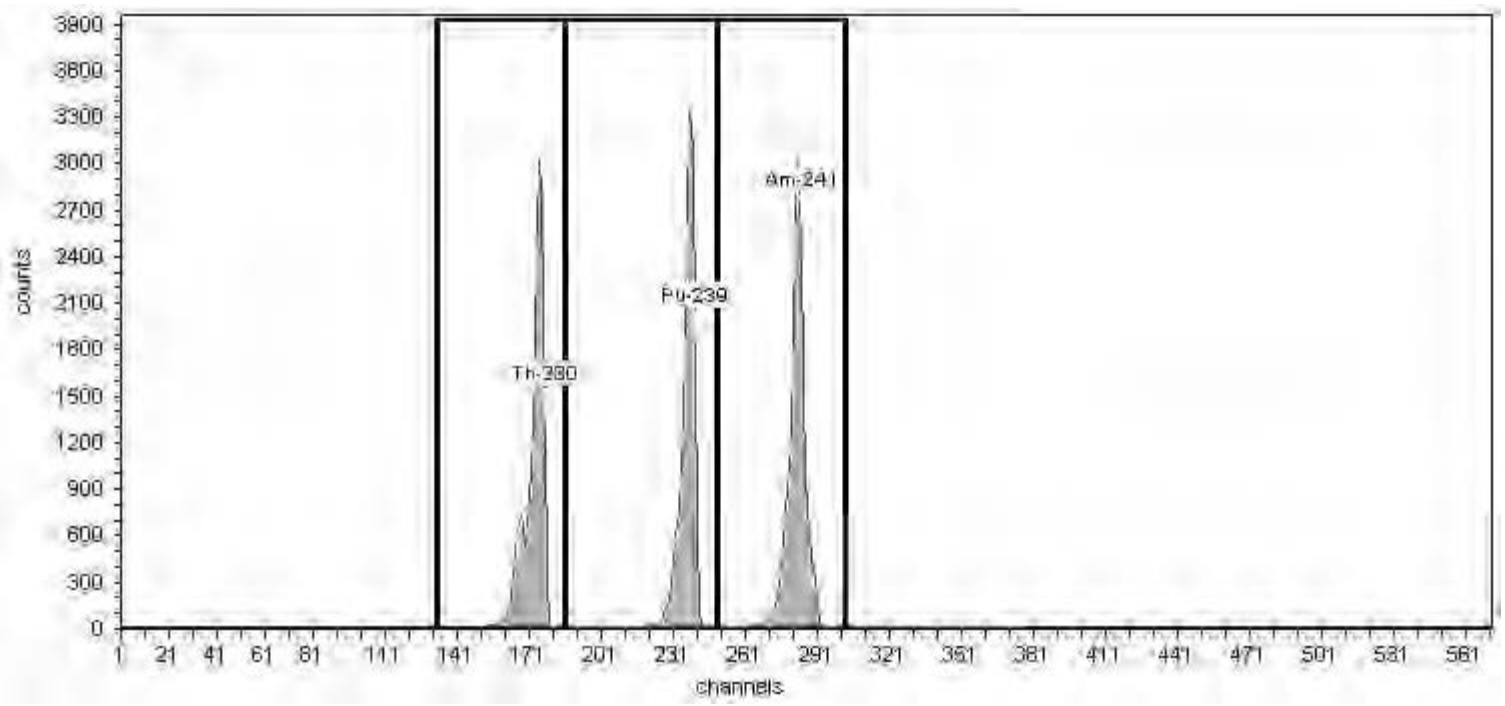
Certificate ID: 108347_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/23/2018 11:00:00AM
Description:

Acquisition

Detector: AV48 , SN: 46-033P6
Acquisition Start Date: 5/14/2018 6:40:17PM
Live Time: 140.00 min.
Real Time: 140.11 min.
Efficiency: 27.06% +/- 0.23% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	18,367.00	131.19
Pu-239	240	5.16	186	249	0.00	18,273.00	130.52
Am-241	284	5.49	249	303	0.00	19,691.00	140.65

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:36:55PM 5/15/2018

Calibration

Sample Name: IC-8877;AV52-05152018
Description:
Detector: AV52

Calibration Date: 5/15/2018 3:36:50PM
Analyst: 60040

Source Info

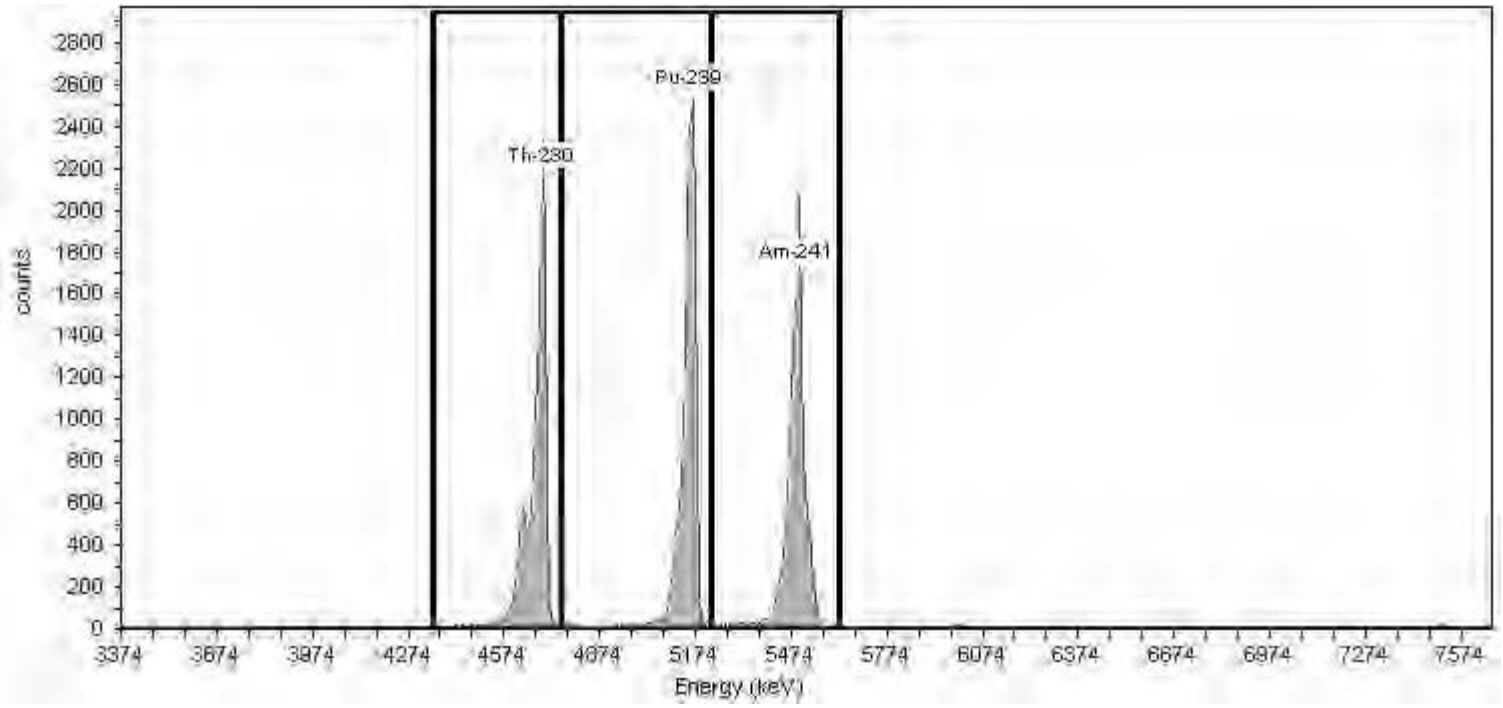
Certificate ID: 82236-334
Prepared by: Analytics

Certification Date: 6/2/2010 12:00:00PM
Description:

Acquisition

Detector: AV52 , SN: 49-155N7
Acquisition Start Date: 5/15/2018 12:36:54PM
Live Time: 140.00 min.
Real Time: 140.10 min.
Efficiency: 24.50% +/- 0.30% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	14,001.00	100.01
Pu-239	240	5.16	186	249	0.00	14,612.00	104.37
Am-241	284	5.49	249	303	0.00	13,904.00	99.31

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:38:02PM 5/15/2018

Calibration

Sample Name: IC-9792;AV54-05152018
Description:
Detector: AV54

Calibration Date: 5/15/2018 3:37:57PM
Analyst: 60040

Source Info

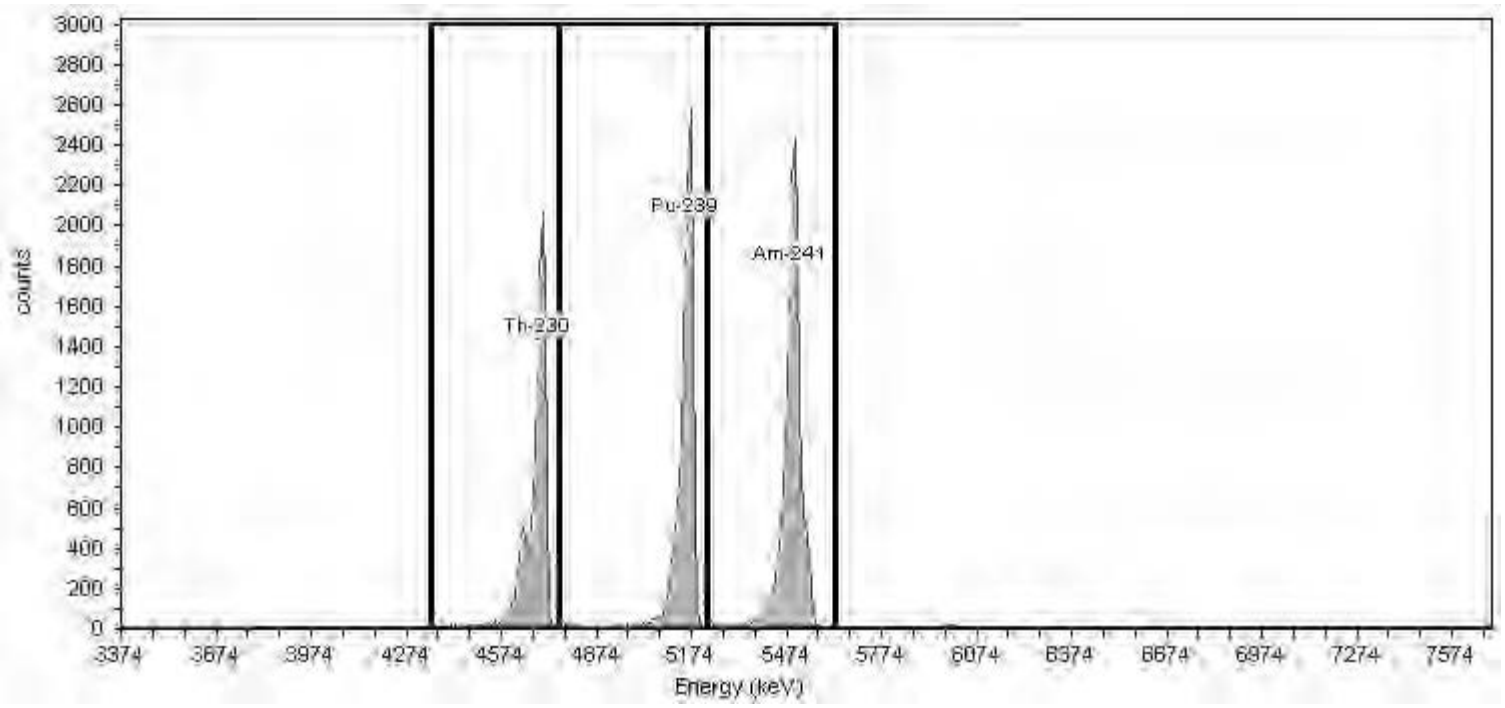
Certificate ID: 82240-334
Prepared by: Analytics

Certification Date: 6/8/2010 12:00:00PM
Description:

Acquisition

Detector: AV54 , SN: 46-033P4
Acquisition Start Date: 5/15/2018 12:37:33PM
Live Time: 140.00 min.
Real Time: 140.10 min.
Efficiency: 23.62% +/- 0.28% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	12,363.00	88.31
Pu-239	240	5.16	186	249	0.00	14,261.00	101.86
Am-241	284	5.49	249	303	0.00	16,341.00	116.72

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:38:34PM 5/15/2018

Calibration

Sample Name: IC-9795;AV56-05152018
Description:
Detector: AV56

Calibration Date: 5/15/2018 3:38:31PM
Analyst: 60040

Source Info

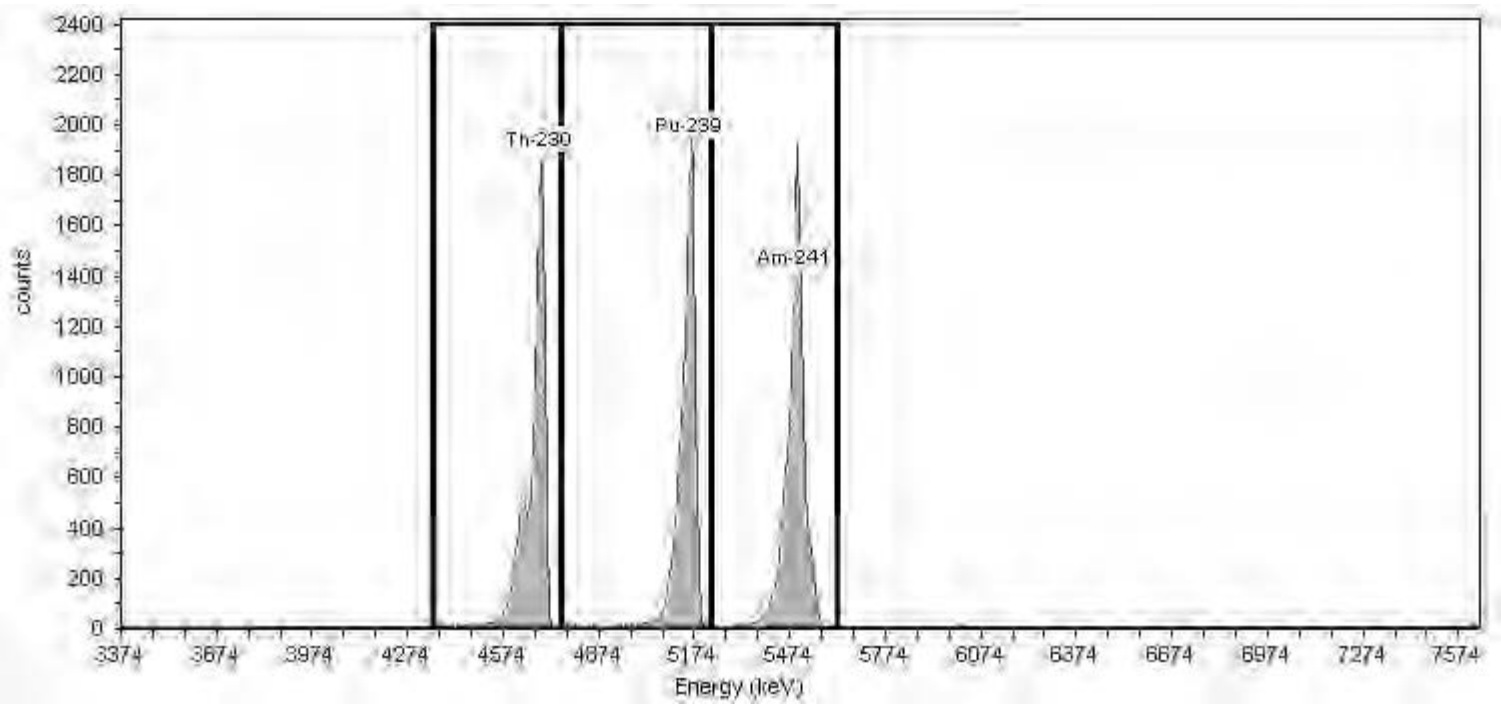
Certificate ID: 82243-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV56 , SN: 52-059EE5
Acquisition Start Date: 5/15/2018 12:38:26PM
Live Time: 140.00 min.
Real Time: 140.10 min.
Efficiency: 25.25% +/- 0.34% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	12,377.00	88.41
Pu-239	240	5.16	186	249	0.00	12,528.00	89.49
Am-241	284	5.49	249	303	0.00	13,590.00	97.07

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:38:46PM 5/15/2018

Calibration

Sample Name: IC-9817;AV57-05152018
Description:
Detector: AV57

Calibration Date: 5/15/2018 3:38:42PM
Analyst: 60040

Source Info

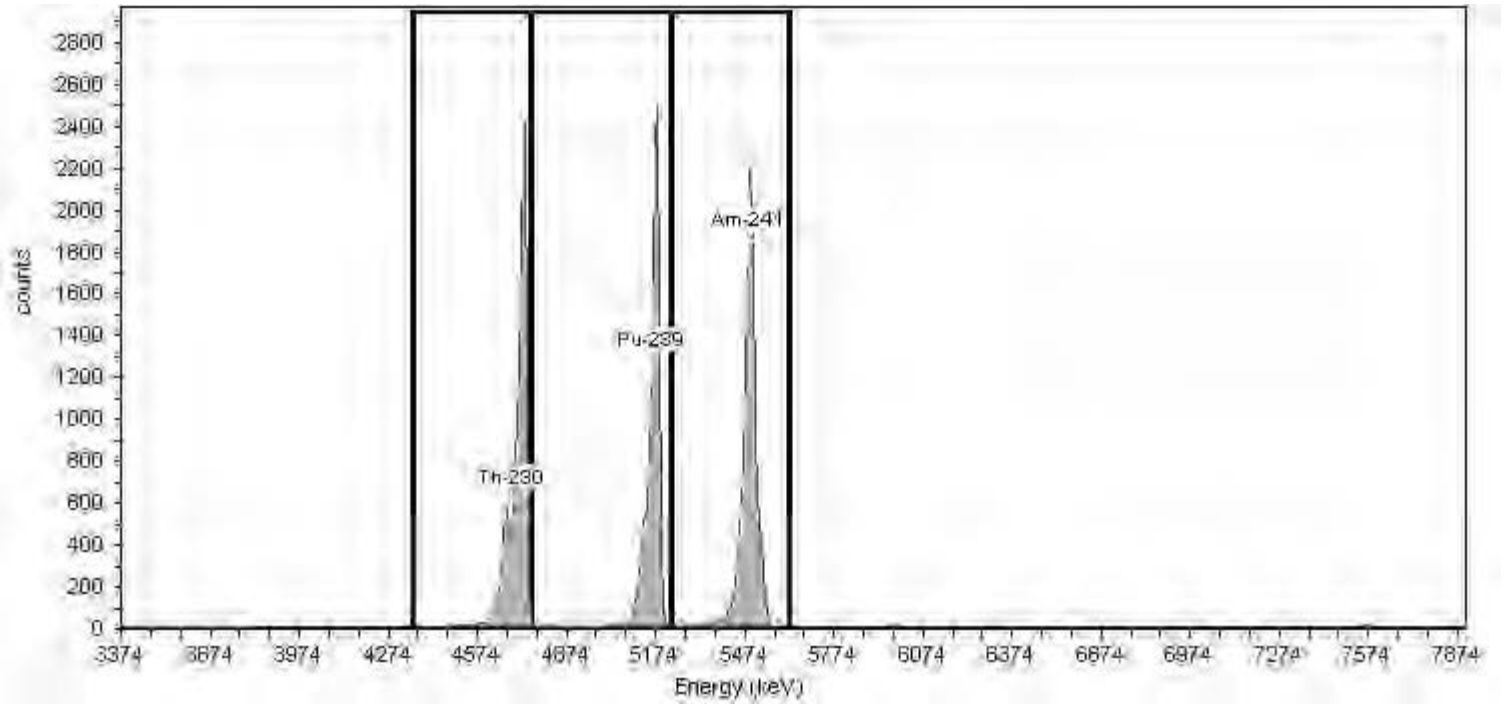
Certificate ID: 82244-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV57 , SN: 48-158EE3
Acquisition Start Date: 5/15/2018 12:38:54PM
Live Time: 140.00 min.
Real Time: 140.10 min.
Efficiency: 22.40% +/- 0.28% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	13,874.00	99.10
Pu-239	240	5.16	186	249	0.00	12,635.00	90.25
Am-241	284	5.49	249	303	0.00	12,789.00	91.35

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:38:59PM 5/15/2018

Calibration

Sample Name: IC-9885;AV58-05152018
Description:
Detector: AV58

Calibration Date: 5/15/2018 3:38:55PM
Analyst: 60040

Source Info

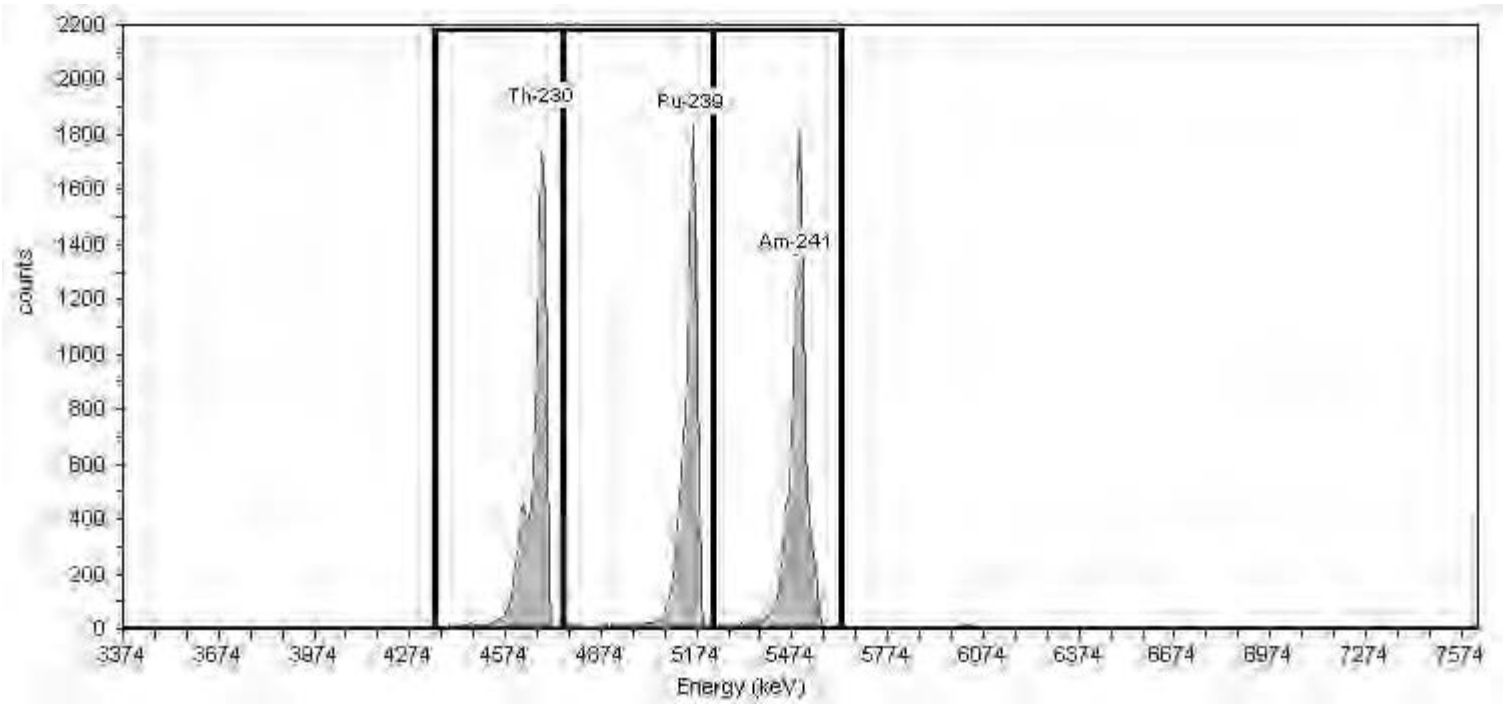
Certificate ID: 82246-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV58 , SN: 52-102 C5
Acquisition Start Date: 5/15/2018 12:39:21PM
Live Time: 140.00 min.
Real Time: 140.11 min.
Efficiency: 24.05% +/- 0.36% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	11,232.00	80.23
Pu-239	240	5.16	186	249	0.00	10,843.00	77.45
Am-241	284	5.49	249	303	0.00	11,976.00	85.54

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:39:10PM 5/15/2018

Calibration

Sample Name: IC-1368446;AV60-05152018
Description:
Detector: AV60

Calibration Date: 5/15/2018 3:39:06PM
Analyst: 60040

Source Info

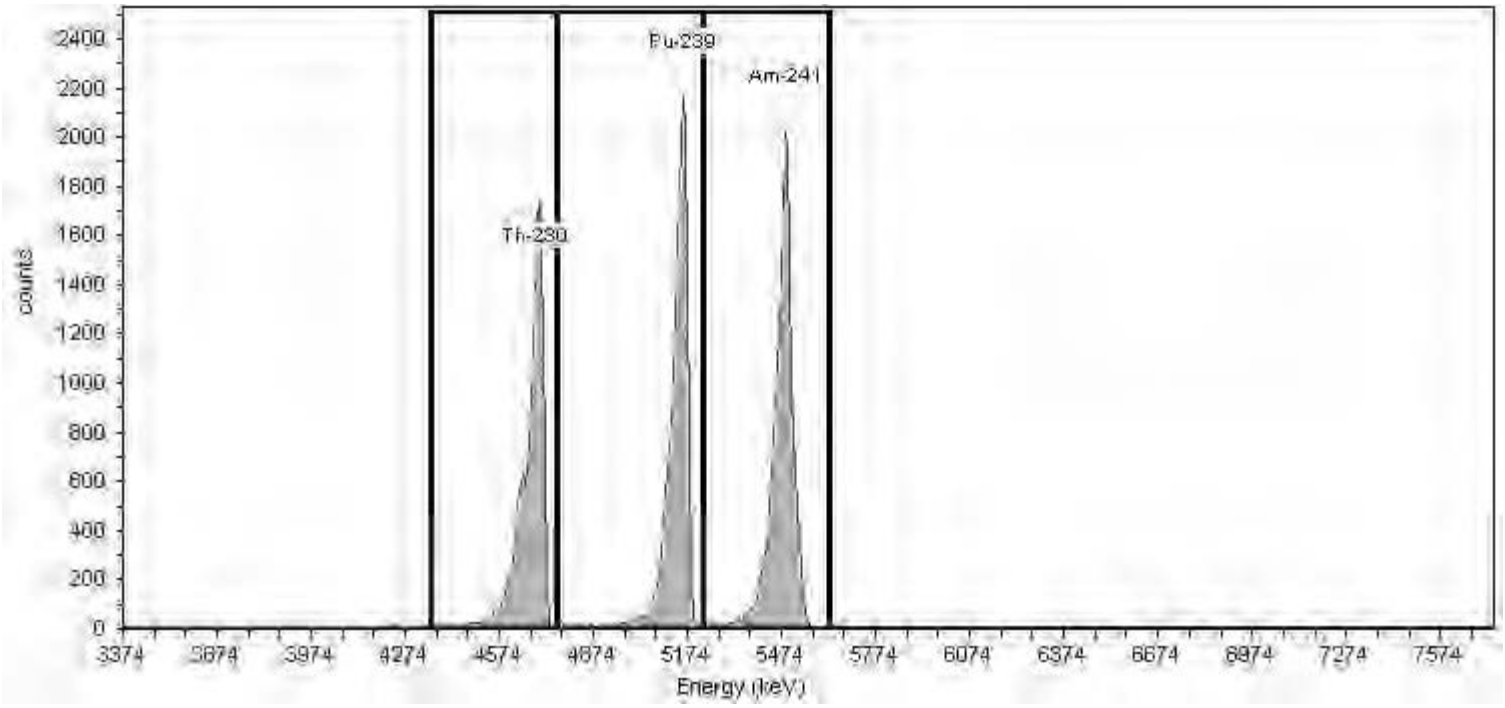
Certificate ID: 108001_00001
Prepared by: Eckert & Ziegler

Certification Date: 12/6/2017 11:00:00AM
Description:

Acquisition

Detector: AV60 , SN: 49-027117
Acquisition Start Date: 5/15/2018 12:39:39PM
Live Time: 140.00 min.
Real Time: 140.11 min.
Efficiency: 28.28% +/- 0.26% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	14,250.00	101.79
Pu-239	240	5.16	186	249	0.00	16,170.00	115.50
Am-241	284	5.49	249	303	0.00	16,975.00	121.25

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:39:25PM 5/15/2018

Calibration

Sample Name: IC-1368447;AV62-05152018
Description:
Detector: AV62

Calibration Date: 5/15/2018 3:39:22PM
Analyst: 60040

Source Info

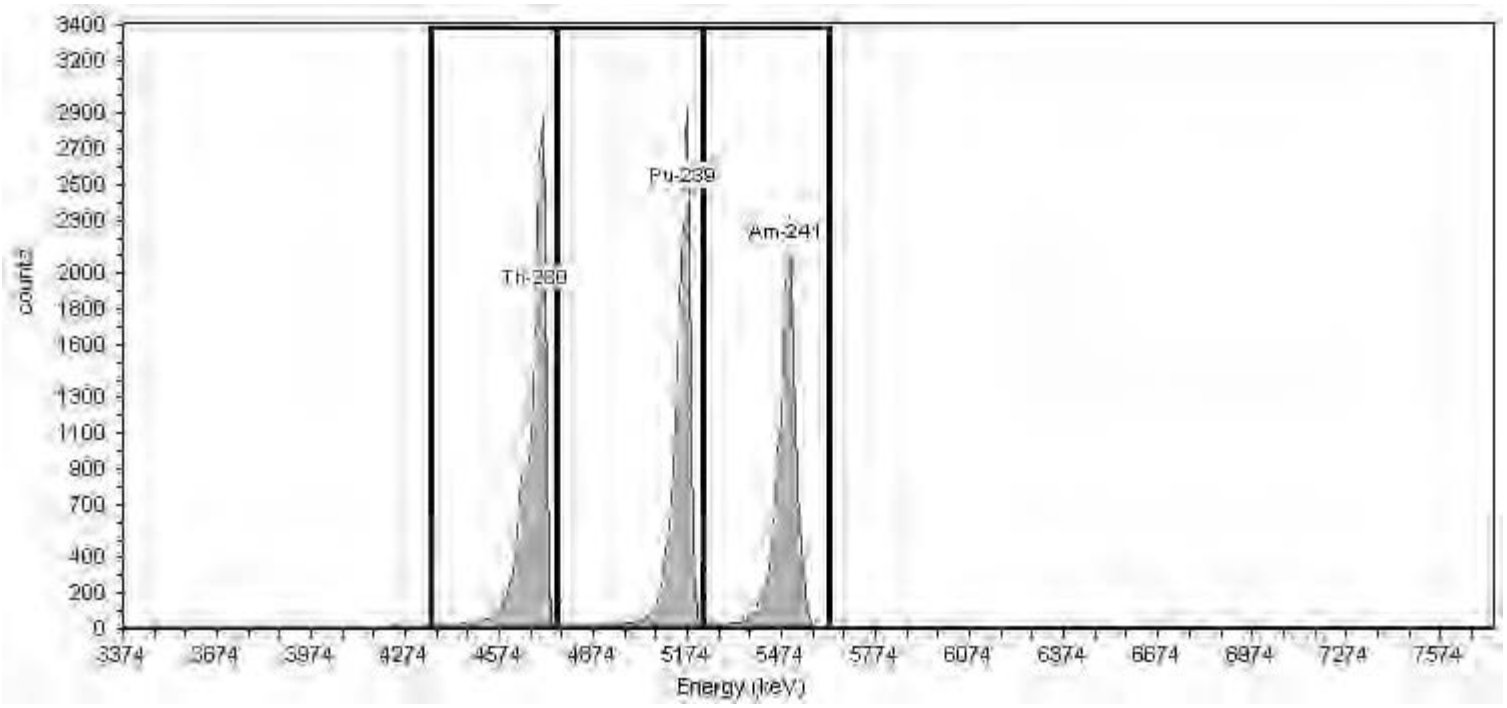
Certificate ID: 108002_00001
Prepared by: Eckert & Ziegler

Certification Date: 12/1/2017 11:00:00AM
Description:

Acquisition

Detector: AV62 , SN: 52-060FF2
Acquisition Start Date: 5/15/2018 12:40:11PM
Live Time: 140.00 min.
Real Time: 140.11 min.
Efficiency: 28.40% +/- 0.23% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	22,234.00	158.81
Pu-239	240	5.16	186	249	0.00	20,494.00	146.39
Am-241	284	5.49	249	303	0.00	19,202.00	137.16

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:39:36PM 5/15/2018

Calibration

Sample Name: IC-1370621;AV63-05152018
Description:
Detector: AV63

Calibration Date: 5/15/2018 3:39:32PM
Analyst: 60040

Source Info

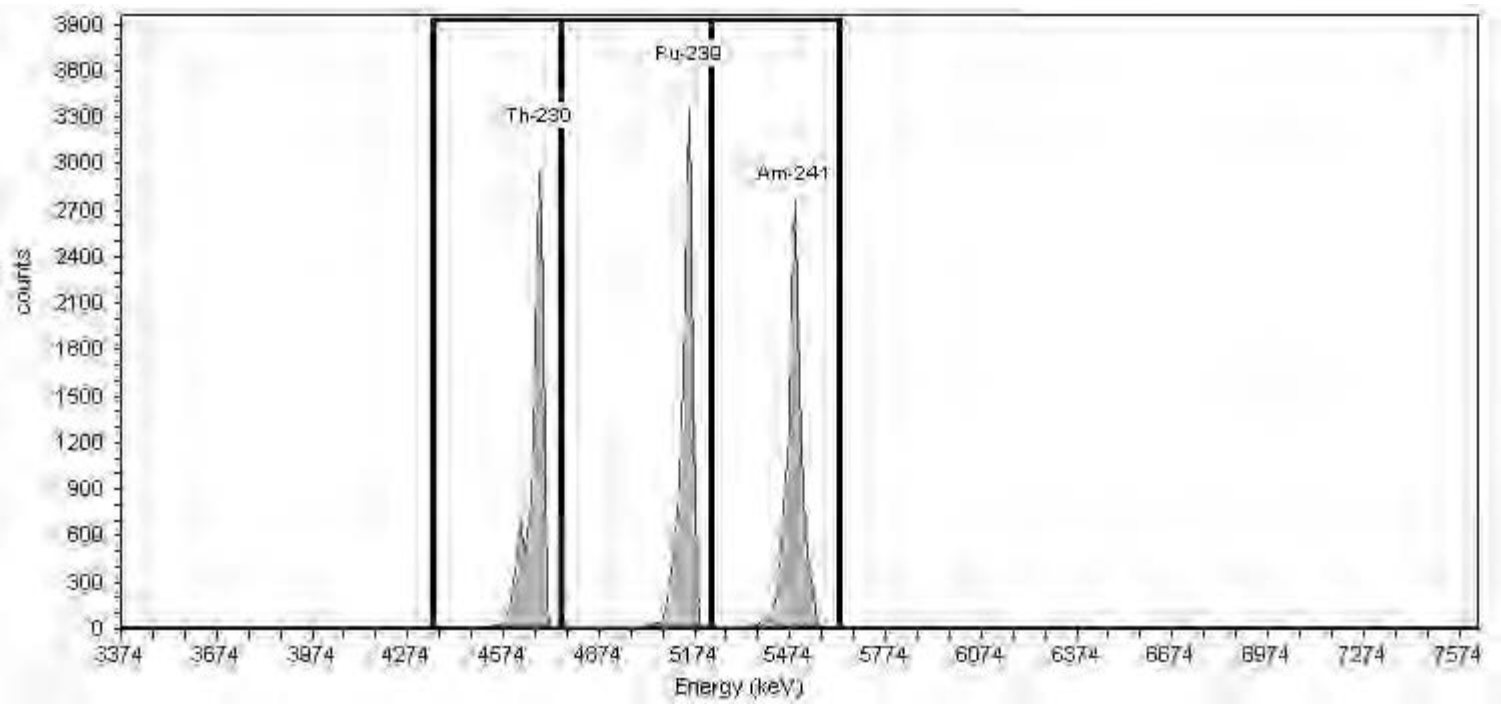
Certificate ID: 108345_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/22/2018 11:00:00AM
Description:

Acquisition

Detector: AV63 , SN: 47-029ff2
Acquisition Start Date: 5/15/2018 12:40:27PM
Live Time: 140.00 min.
Real Time: 140.11 min.
Efficiency: 26.80% +/- 0.24% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	16,368.00	116.91
Pu-239	240	5.16	186	249	0.00	17,390.00	124.21
Am-241	284	5.49	249	303	0.00	17,855.00	127.54

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:39:47PM 5/15/2018

Calibration

Sample Name: IC-1370622;AV64-05152018
Description:
Detector: AV64

Calibration Date: 5/15/2018 3:39:44PM
Analyst: 60040

Source Info

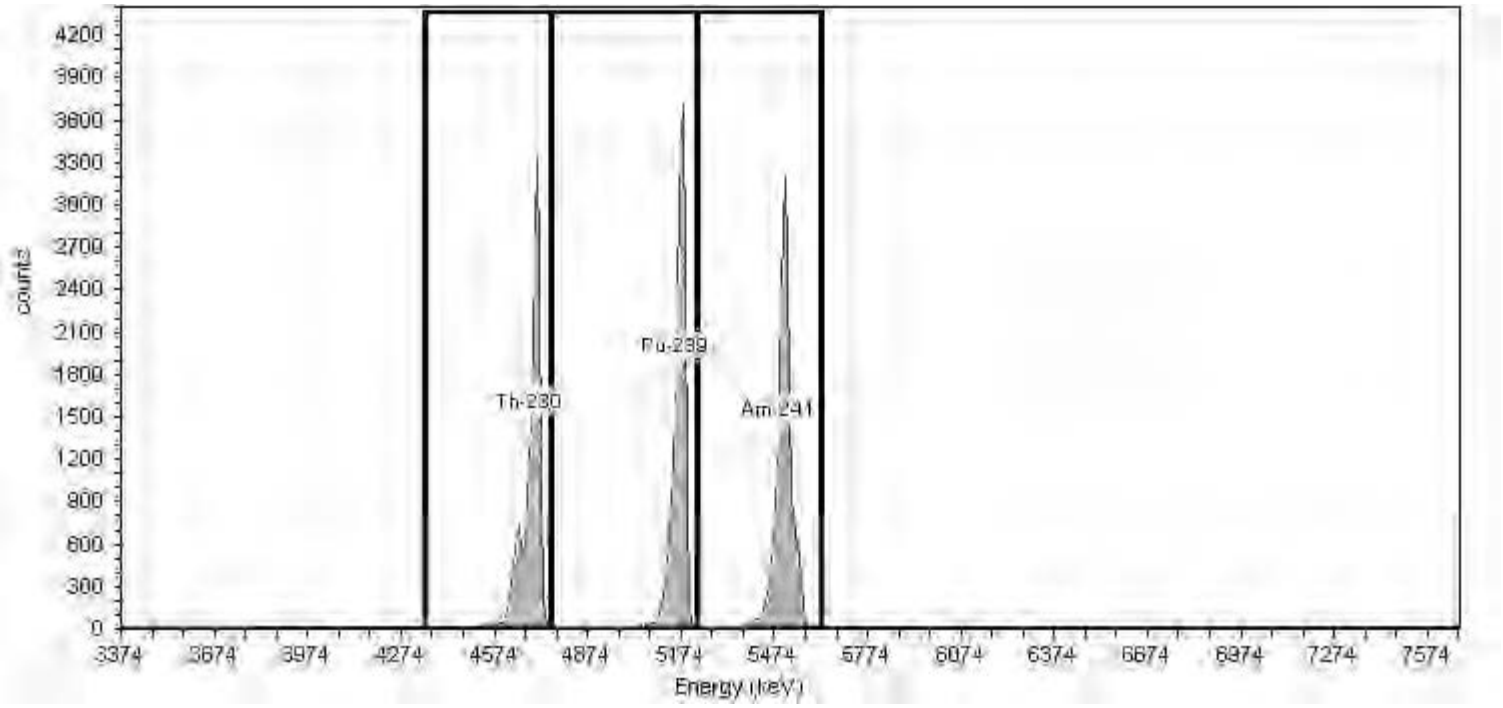
Certificate ID: 108346_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/22/2018 11:00:00AM
Description:

Acquisition

Detector: AV64 , SN: 43-028v3
Acquisition Start Date: 5/15/2018 12:40:47PM
Live Time: 140.00 min.
Real Time: 140.11 min.
Efficiency: 28.38% +/- 0.24% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	18,088.00	129.20
Pu-239	240	5.16	186	249	0.00	18,769.00	134.06
Am-241	284	5.49	249	303	0.00	18,968.00	135.49

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:40:11PM 5/15/2018

Calibration

Sample Name: IC-1370620;AV66-05152018
Description:
Detector: AV66

Calibration Date: 5/15/2018 3:40:08PM
Analyst: 60040

Source Info

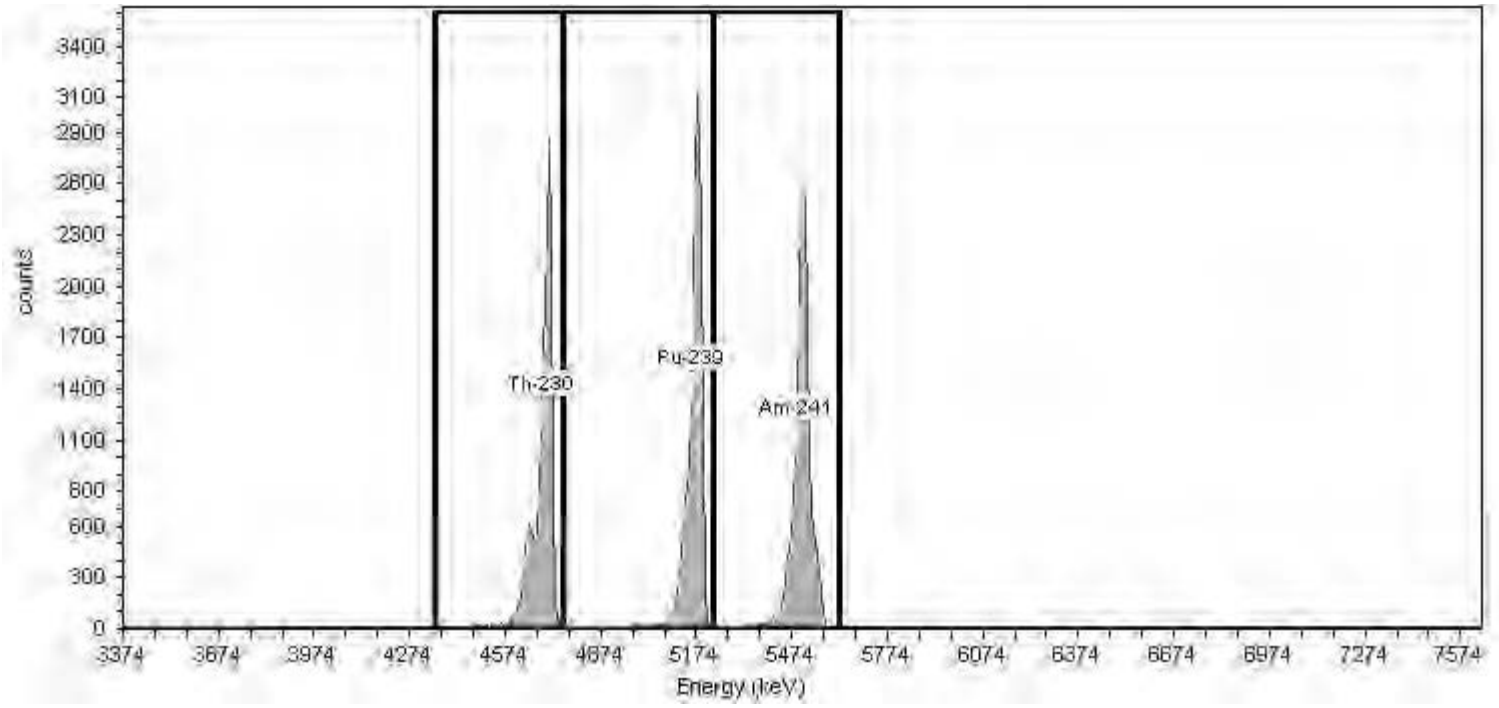
Certificate ID: 108348_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/23/2018 11:00:00PM
Description:

Acquisition

Detector: AV66 , SN: 48-158EE2
Acquisition Start Date: 5/15/2018 12:41:27PM
Live Time: 140.01 min.
Real Time: 140.11 min.
Efficiency: 27.12% +/- 0.24% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: Yes
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	15,839.00	113.13
Pu-239	240	5.16	186	249	0.00	16,360.00	116.85
Am-241	284	5.49	249	303	0.00	16,840.00	120.28

Initial Calibration Verifications

Alpha Spectroscopy Calibration Summary

Detector: AV7

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371856/1	05/14/18 15:47	82241-334_00001	0.2298	0.20-0.32		
ICV 160-371945/1	05/18/18 19:26	82237-334_00003	0.2253	0.20-0.32	98.1	95-105
CCV 160-375346/1	07/10/18 16:56	82241-334_00001	0.2277	0.20-0.32	99.1	95-105

Detector: AV8

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371857/1	05/14/18 15:47	82243-334_00001	0.2596	0.20-0.32		
ICV 160-371946/1	05/18/18 19:27	82233-334_00001	0.2661	0.20-0.32	102.5	95-105
CCV 160-375347/1	07/10/18 16:56	82243-334_00001	0.2576	0.20-0.32	99.2	95-105

Detector: AV10

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371831/1	05/14/18 15:48	82246-334_00001	0.2349	0.20-0.32		
ICV 160-371947/1	05/19/18 16:12	82240-334_00001	0.2344	0.20-0.32	99.8	95-105
CCV 160-375335/1	07/10/18 16:57	82246-334_00001	0.2379	0.20-0.32	101.2	95-105

Detector: AV12

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371833/1	05/14/18 15:52	108002_00001	0.2778	0.20-0.32		
ICV 160-371935/1	05/18/18 19:32	108001_00001	0.2790	0.20-0.32	100.4	95-105
CCV 160-375337/1	07/10/18 17:01	108002_00001	0.2791	0.20-0.32	100.5	95-105

Detector: AV14

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371835/1	05/14/18 15:54	108346_00001	0.2640	0.20-0.32		
ICV 160-371938/1	05/18/18 19:32	108345_00001	0.2666	0.20-0.32	101.0	95-105
CCV 160-375339/1	07/10/18 17:03	108346_00001	0.2723	0.20-0.32	103.1	95-105

Detector: AV15

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371836/1	05/14/18 15:57	108347_00001	0.2726	0.20-0.32		
ICV 160-371939/1	05/18/18 19:34	108348_00001	0.2659	0.20-0.32	97.5	95-105
CCV 160-375340/1	07/10/18 17:03	108347_00001	0.2713	0.20-0.32	99.5	95-105

Detector: AV16

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371837/1	05/14/18 15:59		0.2696	0.20-0.32		
ICV 160-371940/1	05/18/18 19:35	108347_00001	0.2723	0.20-0.32	101.0	95-105
CCV 160-375341/1	07/10/18 17:04	108348_00001	0.2702	0.20-0.32	100.3	95-105

Detector: AV17

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371838/1	05/14/18 18:47	82232-334_00001	0.2409	0.20-0.32		
ICV 160-371950/1	05/20/18 16:10	82236-334_00001	0.2361	0.20-0.32	98.0	95-105
CCV 160-375374/1	07/11/18 11:07	82232-334_00001	0.2416	0.20-0.32	100.3	95-105

Alpha Spectroscopy Calibration Summary

Detector: AV19

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371840/1	05/14/18 18:35	82236-334_00001	0.2360	0.20-0.32		
ICV 160-371952/1	05/20/18 16:11	82232-334_00001	0.2370	0.20-0.32	100.4	95-105
CCV 160-375375/1	07/11/18 11:08	82236-334_00001	0.2361	0.20-0.32	100.0	95-105

Detector: AV20

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371842/1	05/14/18 18:36	82237-334_00003	0.2215	0.20-0.32		
ICV 160-371953/1	05/20/18 16:11	82244-334_00001	0.2191	0.20-0.32	98.9	95-105
CCV 160-375376/1	07/11/18 11:08	82237-334_00003	0.2242	0.20-0.32	101.2	95-105

Detector: AV21

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371843/1	05/14/18 18:36	82240-334_00001	0.2343	0.20-0.32		
ICV 160-371954/1	05/20/18 16:11	82246-334_00001	0.2340	0.20-0.32	99.8	95-105
CCV 160-375377/1	07/11/18 11:08	82240-334_00001	0.2320	0.20-0.32	99.0	95-105

Detector: AV23

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371845/1	05/14/18 18:37	82243-334_00001	0.2446	0.20-0.32		
ICV 160-371956/1	05/20/18 16:12	82233-334_00001	0.2512	0.20-0.32	102.7	95-105
CCV 160-375379/1	07/11/18 11:09	82243-334_00001	0.2463	0.20-0.32	100.7	95-105

Detector: AV47

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371853/1	05/14/18 18:40	108346_00001	0.2702	0.20-0.32		
ICV 160-371962/1	05/20/18 16:15	108345_00001	0.2686	0.20-0.32	99.4	95-105
CCV 160-375385/1	07/11/18 11:10	108346_00001	0.2662	0.20-0.32	98.5	95-105

Detector: AV48

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371854/1	05/14/18 18:40	108347_00001	0.2706	0.20-0.32		
ICV 160-371963/1	05/20/18 16:15	108348_00001	0.2668	0.20-0.32	98.6	95-105
CCV 160-375386/1	07/11/18 12:36	108347_00001	0.2707	0.20-0.32	100.1	95-105

Detector: AV52

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371861/1	05/15/18 12:36	82236-334_00001	0.2450	0.20-0.32		
ICV 160-371998/1	05/23/18 11:26	82232-334_00001	0.2478	0.20-0.32	101.1	95-105
CCV 160-375390/1	07/11/18 12:40	82236-334_00001	0.2500	0.20-0.32	102.0	95-105

Detector: AV54

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371863/1	05/15/18 12:37	82240-334_00001	0.2362	0.20-0.32		
ICV 160-372000/1	05/23/18 11:27	82246-334_00001	0.2348	0.20-0.32	99.4	95-105
CCV 160-375392/1	07/11/18 12:38	82240-334_00001	0.2343	0.20-0.32	99.2	95-105

Alpha Spectroscopy Calibration Summary

Detector: AV56

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371865/1	05/15/18 12:38	82243-334_00001	0.2525	0.20-0.32		
ICV 160-372002/1	05/23/18 11:28	82233-334_00001	0.2610	0.20-0.32	103.4	95-105
CCV 160-375394/1	07/11/18 12:40	82243-334_00001	0.2521	0.20-0.32	99.8	95-105

Detector: AV57

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371866/1	05/15/18 12:38	82244-334_00001	0.2240	0.20-0.32		
ICV 160-372003/1	05/23/18 11:29	82241-334_00001	0.2283	0.20-0.32	101.9	95-105
CCV 160-375395/1	07/11/18 12:39	82244-334_00001	0.2256	0.20-0.32	100.7	95-105

Detector: AV58

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371867/1	05/15/18 12:39	82246-334_00001	0.2405	0.20-0.32		
ICV 160-372004/1	05/23/18 11:29	82240-334_00001	0.2410	0.20-0.32	100.2	95-105
CCV 160-375396/1	07/11/18 12:42	82246-334_00001	0.2406	0.20-0.32	100.0	95-105

Detector: AV60

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371868/1	05/15/18 12:39	108001_00001	0.2828	0.20-0.32		
ICV 160-371965/1	05/21/18 10:36	108002_00001	0.2815	0.20-0.32	99.5	95-105
CCV 160-375397/1	07/11/18 12:39	108001_00001	0.2827	0.20-0.32	100.0	95-105

Detector: AV62

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371869/1	05/15/18 12:40	108002_00001	0.2840	0.20-0.32		
ICV 160-371966/1	05/21/18 10:36	108001_00001	0.2808	0.20-0.32	98.9	95-105
CCV 160-375398/1	07/11/18 12:41	108002_00001	0.2859	0.20-0.32	100.7	95-105

Detector: AV63

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371870/1	05/15/18 12:40	108345_00001	0.2680	0.20-0.32		
ICV 160-371967/1	05/21/18 10:36	108346_00001	0.2687	0.20-0.32	100.3	95-105
CCV 160-375399/1	07/11/18 12:41	108345_00001	0.2673	0.20-0.32	99.8	95-105

Detector: AV64

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371871/1	05/15/18 12:40	108346_00001	0.2838	0.20-0.32		
ICV 160-371968/1	05/21/18 10:37	108345_00001	0.2842	0.20-0.32	100.1	95-105
CCV 160-375400/1	07/11/18 12:41	108346_00001	0.2844	0.20-0.32	100.2	95-105

Detector: AV66

Lab Sample ID	Analysis Date	Reagent ID	Efficiency	Efficiency Limits	Efficiency Recovery	Recovery Limits
IC 160-371873/1	05/15/18 12:41	108348_00001	0.2712	0.20-0.32		
ICV 160-371970/1	05/21/18 10:38	108347_00001	0.2733	0.20-0.32	100.8	95-105
CCV 160-375402/1	07/11/18 14:03	108348_00001	0.2667	0.20-0.32	98.3	95-105

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:59:12PM 5/19/2018

Calibration

Sample Name: ICV-9520;AV7-05182018
Description:
Detector: AV7

Calibration Date: 5/19/2018 3:59:09PM
Analyst: 60040

Source Info

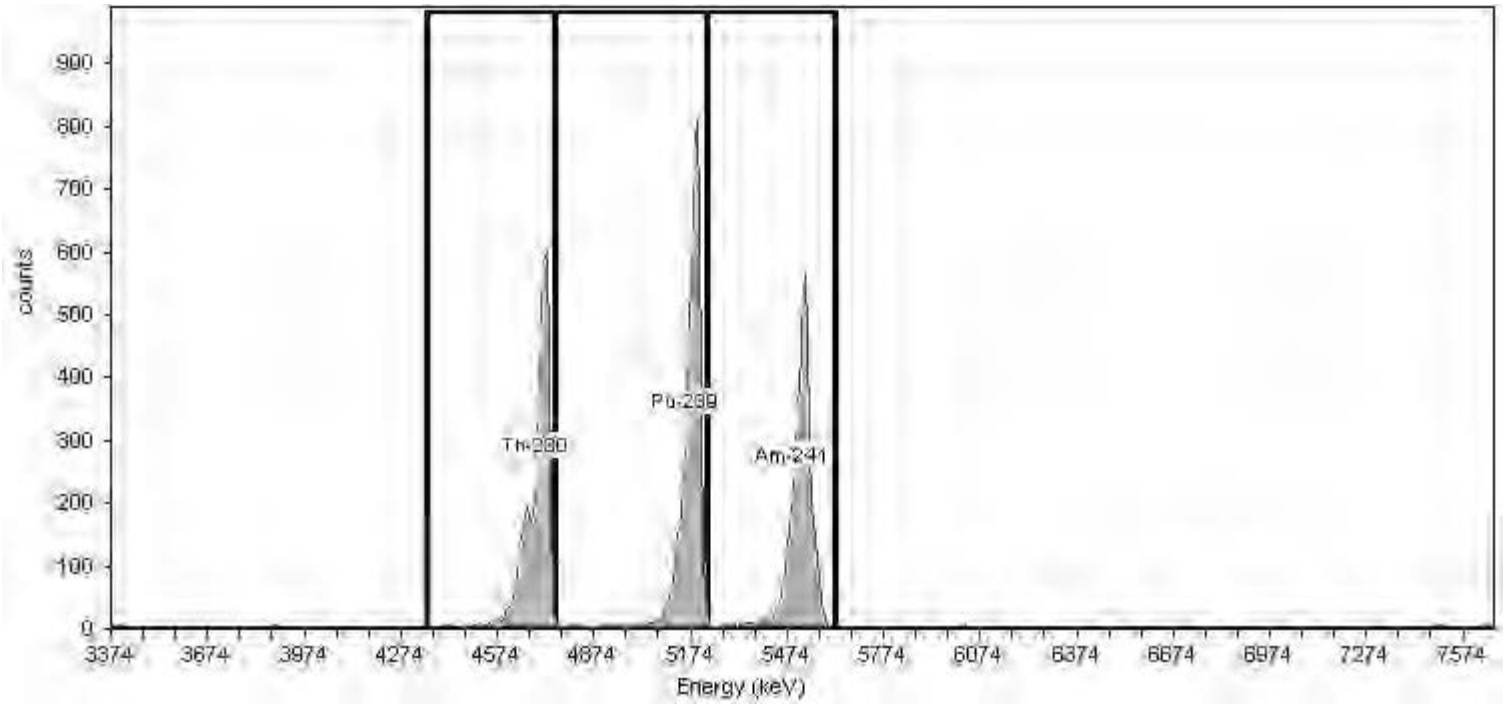
Certificate ID: 82237-334
Prepared by: Analytics

Certification Date: 6/1/2010 12:00:00PM
Description:

Acquisition

Detector: AV7 , SN: 48-158EE5
Acquisition Start Date: 5/18/2018 7:26:58PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 22.53% +/- 0.43% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	4,559.00	75.98
Pu-239	240	5.16	186	249	0.00	5,466.00	91.10
Am-241	284	5.49	249	303	0.00	4,443.00	74.05

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:59:31PM 5/19/2018

Calibration

Sample Name: ICV-8874;AV8-05182018
Description:
Detector: AV8

Calibration Date: 5/19/2018 3:59:26PM
Analyst: 60040

Source Info

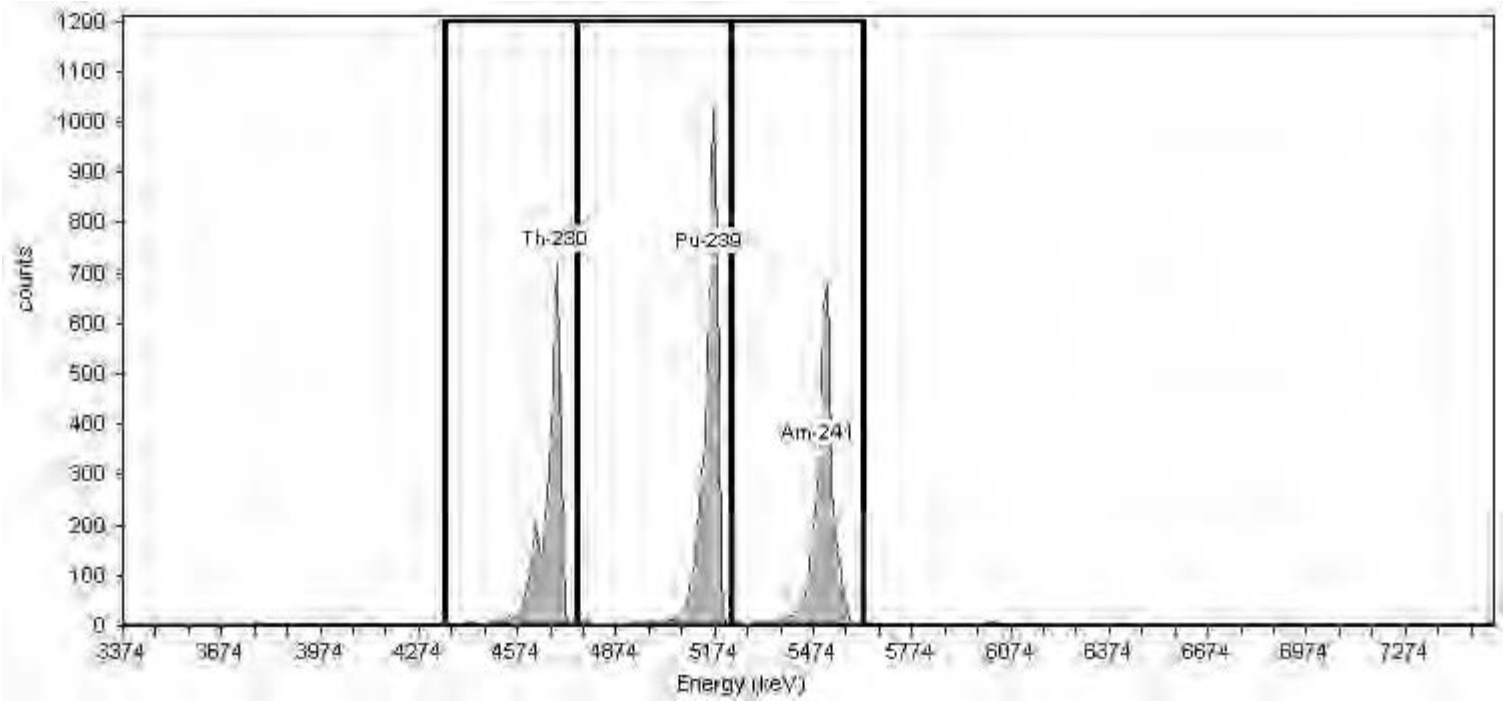
Certificate ID: 82233-334
Prepared by: Analytics

Certification Date: 6/3/2010 12:00:00PM
Description:

Acquisition

Detector: AV8 , SN: 41-137Q6
Acquisition Start Date: 5/18/2018 7:27:27PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 26.61% +/- 0.50% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	4,638.00	77.30
Pu-239	240	5.16	186	249	0.00	5,945.00	99.08
Am-241	284	5.49	249	303	0.00	4,809.00	80.15

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
11:34:51AM 5/20/2018

Calibration

Sample Name: ICV-9792;AV10-05192018
Description:
Detector: AV10

Calibration Date: 5/20/2018 11:34:48AM
Analyst: 60040

Source Info

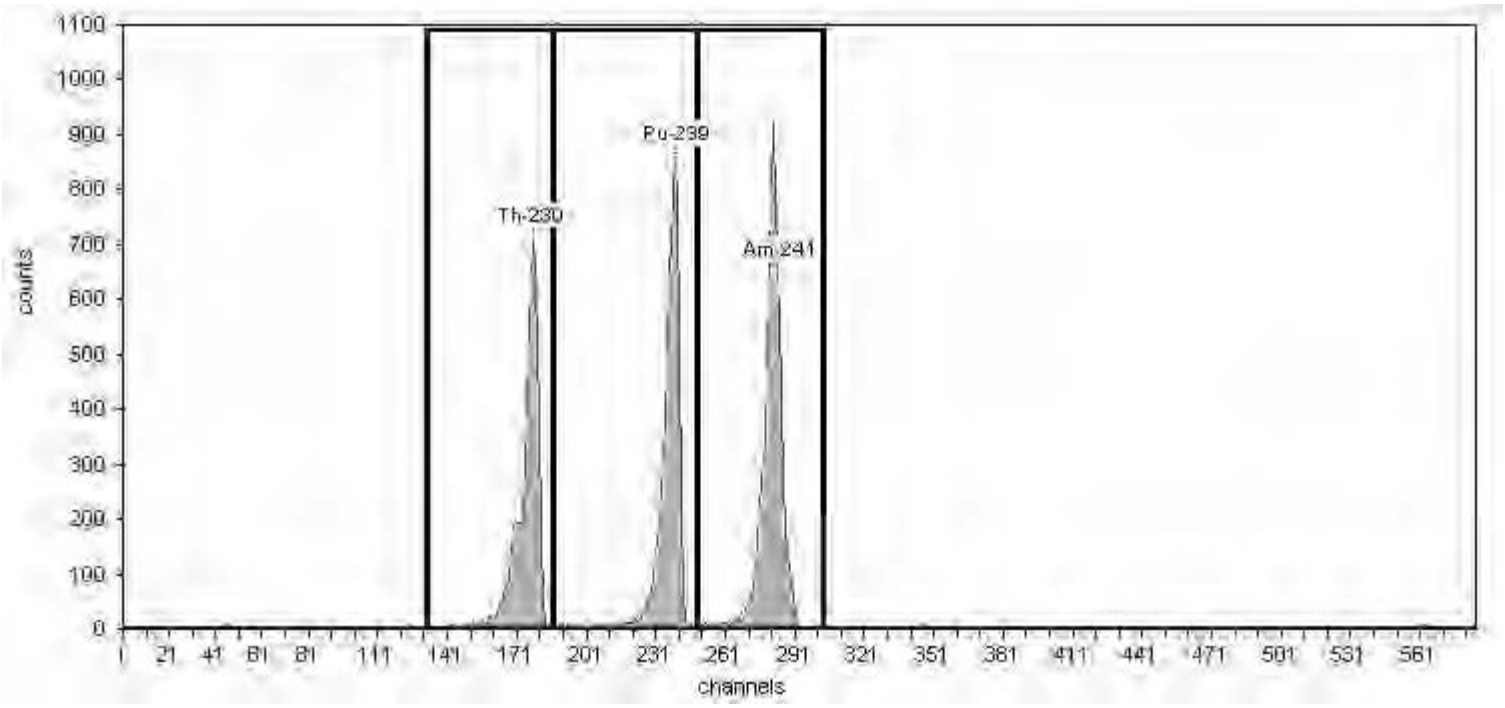
Certificate ID: 82240-334
Prepared by: Analytics

Certification Date: 6/8/2010 12:00:00PM
Description:

Acquisition

Detector: AV10 , SN: 49-155N2
Acquisition Start Date: 5/19/2018 4:12:06PM
Live Time: 60.00 min.
Real Time: 60.21 min.
Efficiency: 23.44% +/- 0.39% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,349.00	89.15
Pu-239	240	5.16	186	249	0.00	6,073.00	101.22
Am-241	284	5.49	249	303	0.00	6,863.00	114.38

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:59:57PM 5/19/2018

Calibration

Sample Name: ICV-1368446;AV12-05182018
Description:
Detector: AV12

Calibration Date: 5/19/2018 3:59:53PM
Analyst: 60040

Source Info

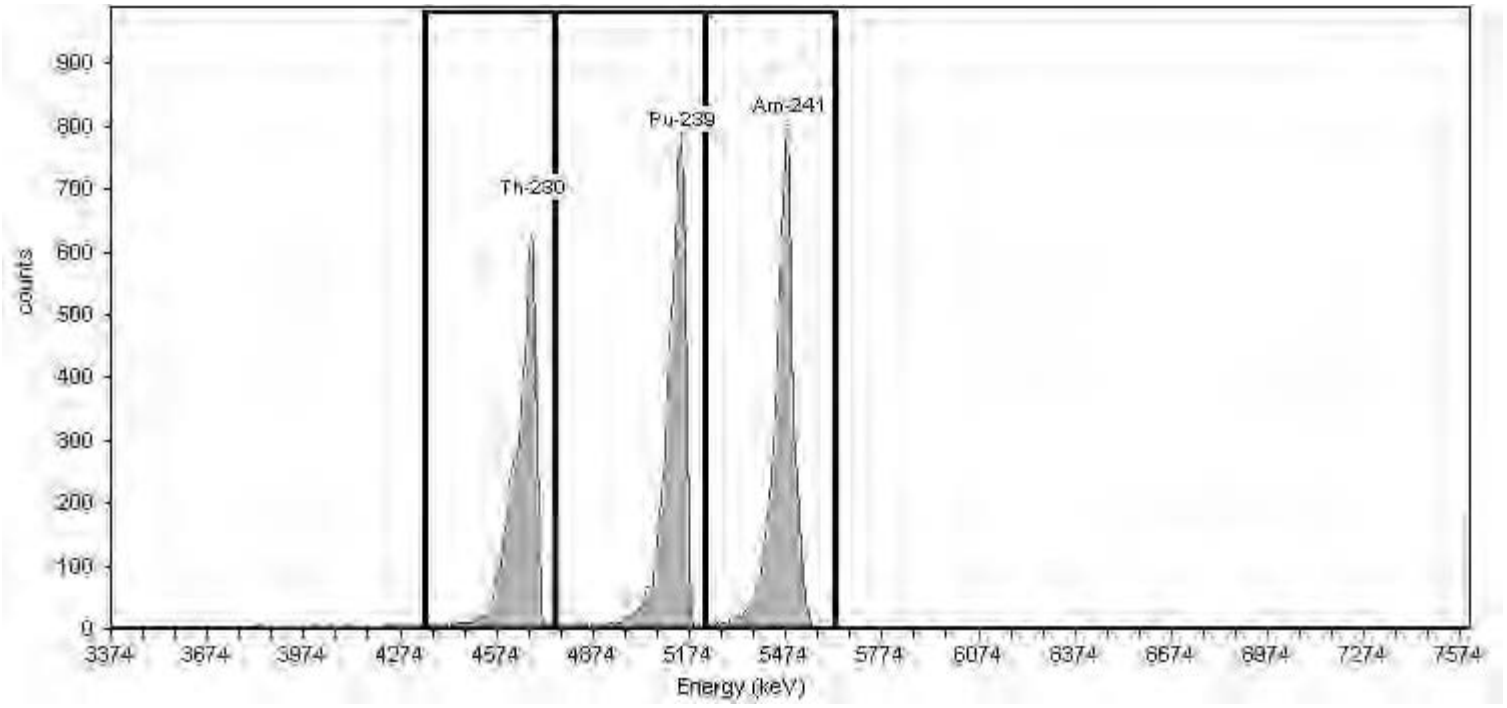
Certificate ID: 108001_00001
Prepared by: Eckert & Ziegler

Certification Date: 12/6/2017 11:00:00AM
Description:

Acquisition

Detector: AV12 , SN: 51-082B7
Acquisition Start Date: 5/18/2018 7:32:04PM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 27.90% +/- 0.39% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,971.00	99.52
Pu-239	240	5.16	186	249	0.00	6,903.00	115.05
Am-241	284	5.49	249	303	0.00	7,169.00	119.48

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
4:00:11PM 5/19/2018

Calibration

Sample Name: ICV-1370621;AV14-05182018
Description:
Detector: AV14

Calibration Date: 5/19/2018 4:00:07PM
Analyst: 60040

Source Info

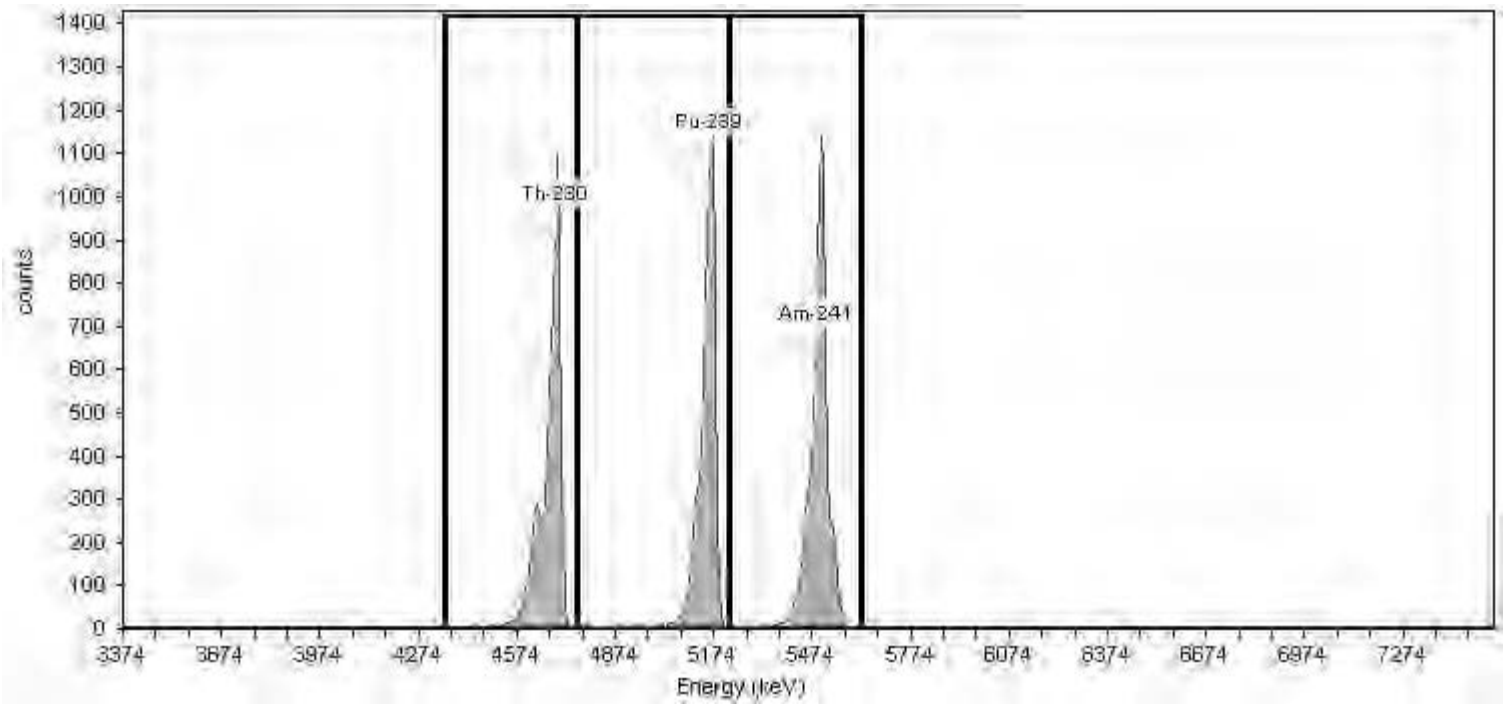
Certificate ID: 108345_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/22/2018 11:00:00AM
Description:

Acquisition

Detector: AV14 , SN: 50-060W4
Acquisition Start Date: 5/18/2018 7:32:50PM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 26.66% +/- 0.36% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,931.00	115.52
Pu-239	240	5.16	186	249	0.00	7,374.00	122.90
Am-241	284	5.49	249	303	0.00	7,706.00	128.43

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
4:00:35PM 5/19/2018

Calibration

Sample Name: ICV-1370620;AV15-05182018
Description:
Detector: AV15

Calibration Date: 5/19/2018 4:00:31PM
Analyst: 60040

Source Info

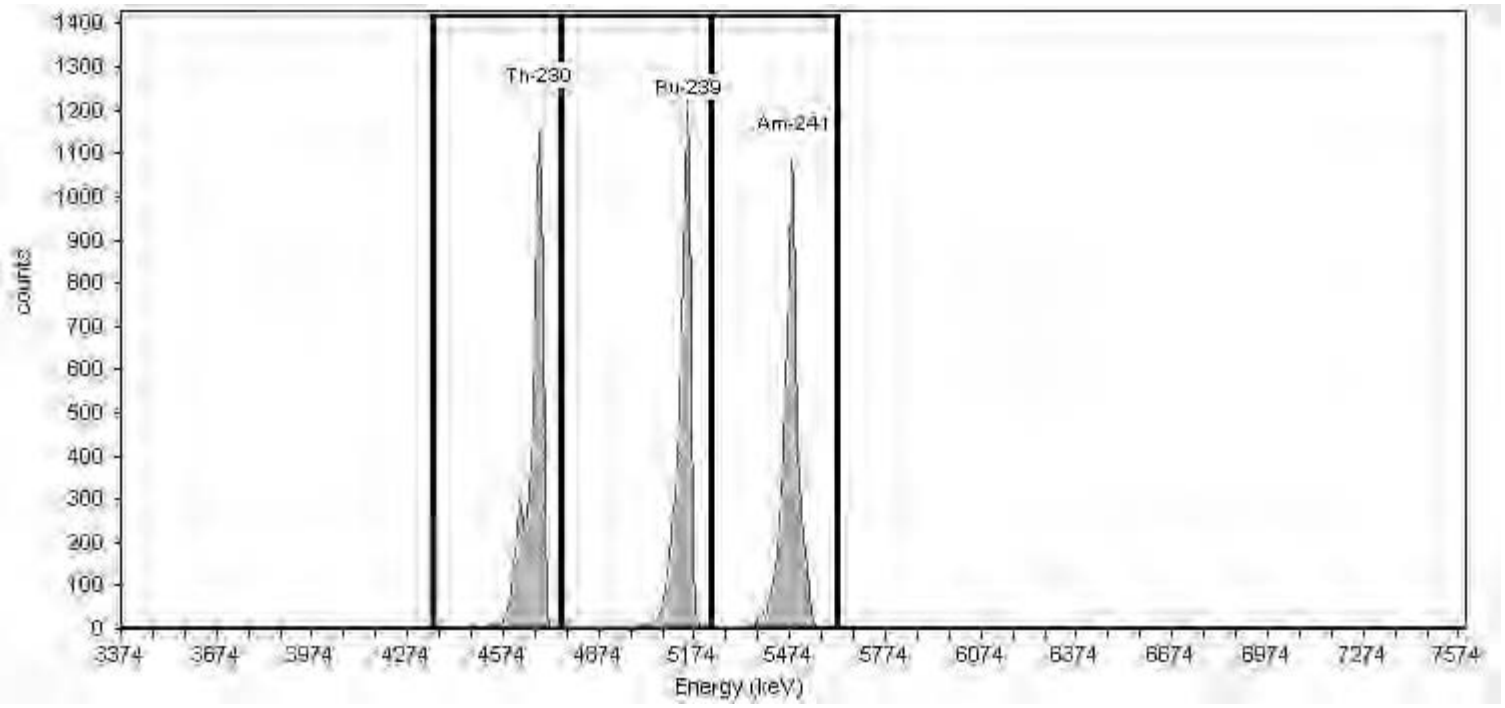
Certificate ID: 108348_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/23/2018 11:00:00PM
Description:

Acquisition

Detector: AV15 , SN: 41-172C5
Acquisition Start Date: 5/18/2018 7:34:31PM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 26.59% +/- 0.37% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,757.00	112.62
Pu-239	240	5.16	186	249	0.00	6,806.00	113.43
Am-241	284	5.49	249	303	0.00	7,041.00	117.35

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
4:01:38PM 5/19/2018

Calibration

Sample Name: ICV-1370619;AV16-05182018
Description:
Detector: AV16

Calibration Date: 5/19/2018 4:01:34PM
Analyst: 60040

Source Info

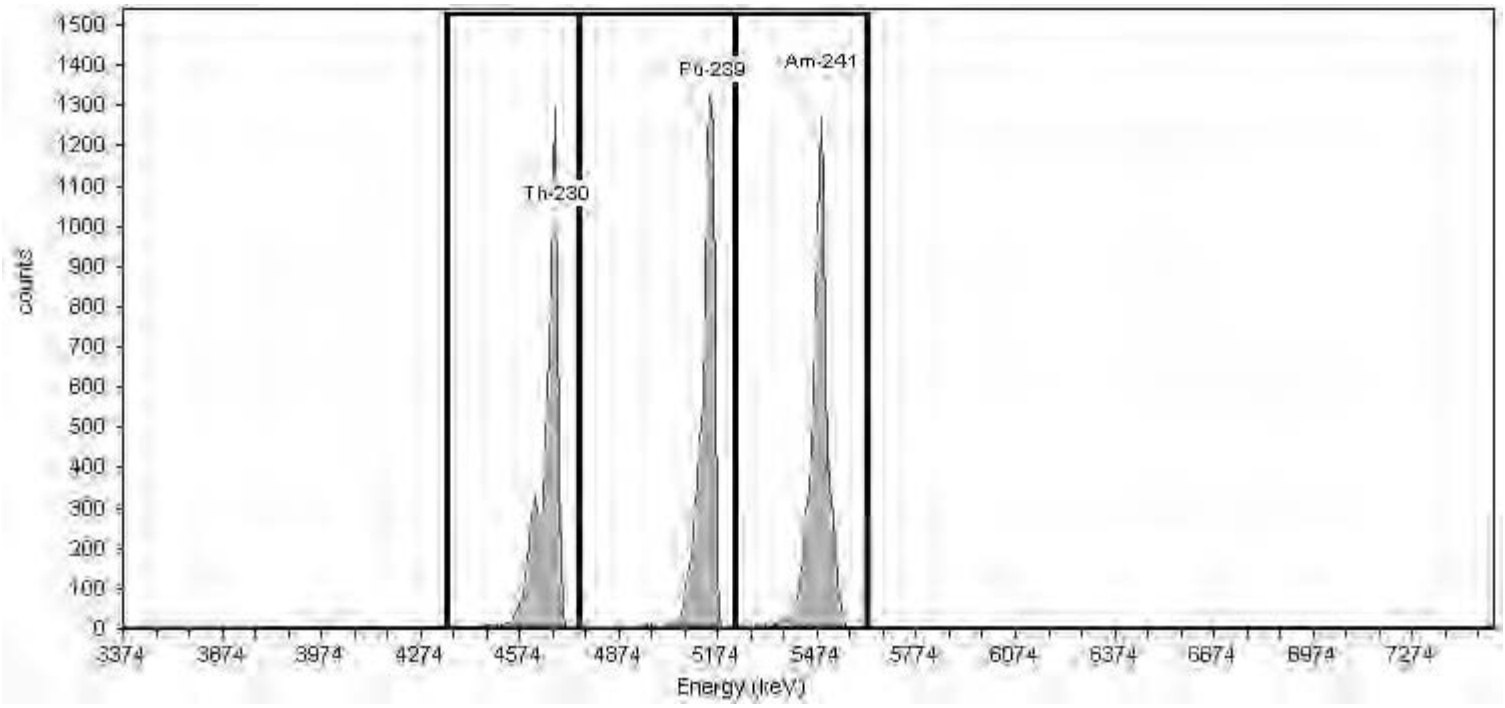
Certificate ID: 108347_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/23/2018 11:00:00AM
Description:

Acquisition

Detector: AV16 , SN: 51-082B6
Acquisition Start Date: 5/18/2018 7:35:32PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 27.23% +/- 0.35% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	7,922.00	132.03
Pu-239	240	5.16	186	249	0.00	7,874.00	131.23
Am-241	284	5.49	249	303	0.00	8,497.00	141.62

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:27:23AM 5/21/2018

Calibration

Sample Name: ICV-8877;AV17-05202018
Description:
Detector: AV17

Calibration Date: 5/21/2018 10:27:19AM
Analyst: 60040

Source Info

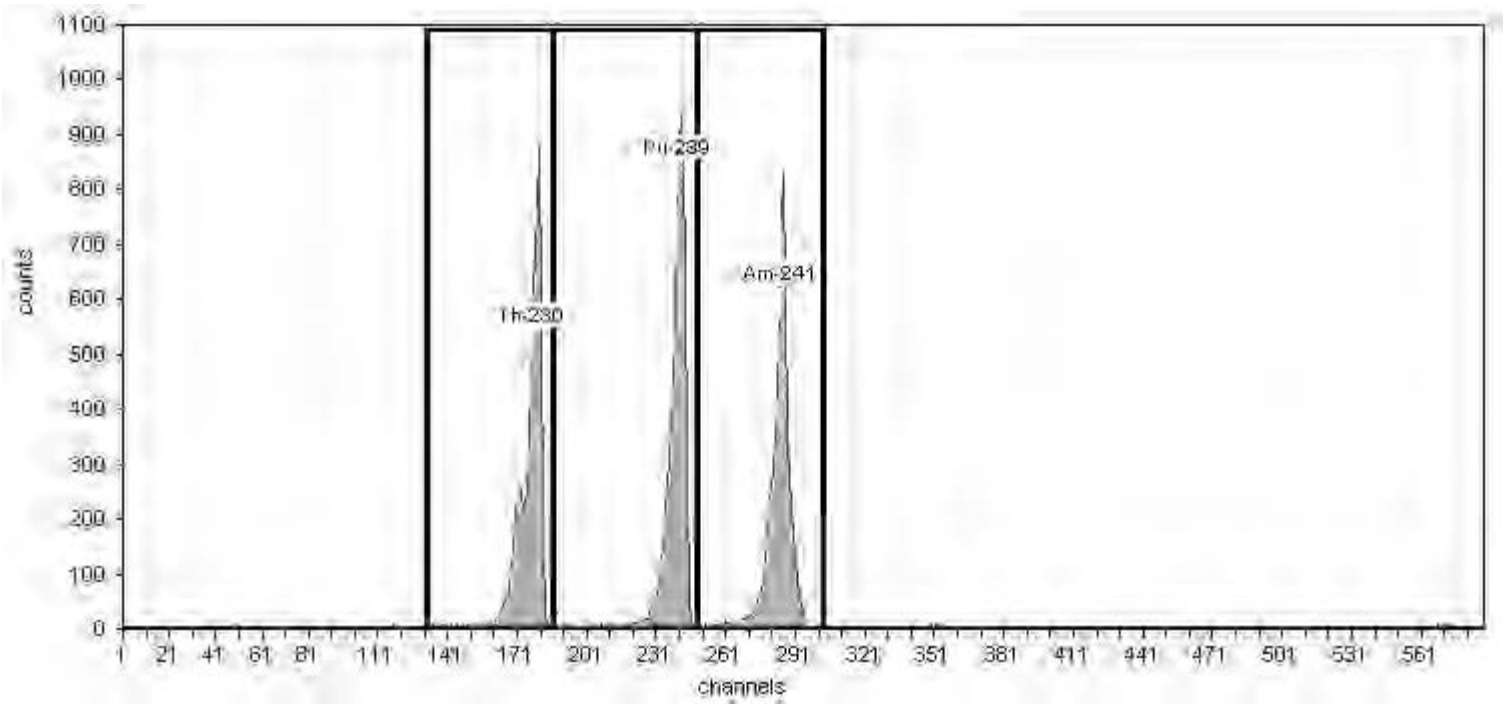
Certificate ID: 82236-334
Prepared by: Analytics

Certification Date: 6/2/2010 12:00:00PM
Description:

Acquisition

Detector: AV17 , SN: 50-051C4
Acquisition Start Date: 5/20/2018 4:10:39PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 23.61% +/- 0.40% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,761.00	96.02
Pu-239	240	5.16	186	249	0.00	6,066.00	101.10
Am-241	284	5.49	249	303	0.00	5,725.00	95.42

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:29:26AM 5/21/2018

Calibration

Sample Name: ICV-7107;AV19-05202018
Description:
Detector: AV19

Calibration Date: 5/21/2018 10:29:23AM
Analyst: 60040

Source Info

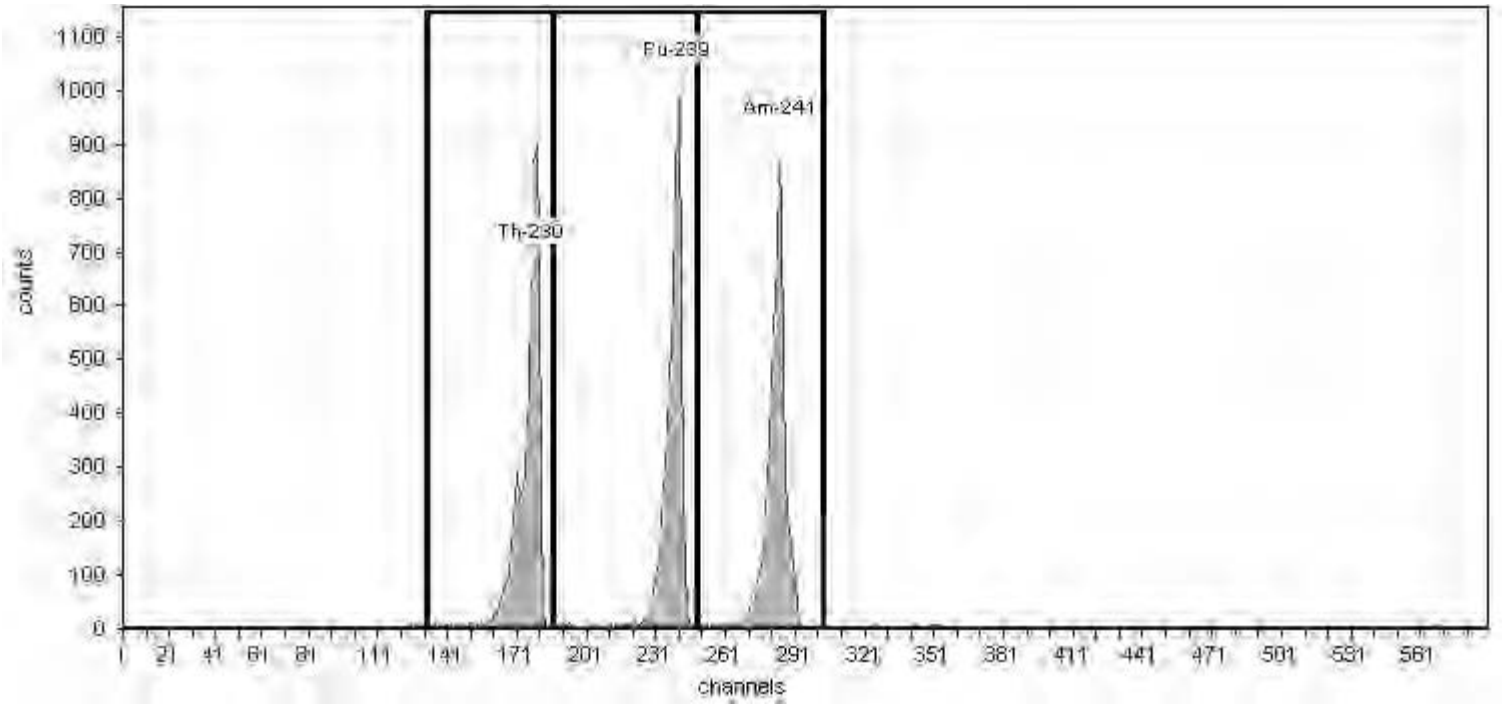
Certificate ID: 82232-334
Prepared by: Analytics

Certification Date: 6/3/2010 12:00:00PM
Description:

Acquisition

Detector: AV19 , SN: 50-025FF5
Acquisition Start Date: 5/20/2018 4:11:20PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 23.70% +/- 0.38% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,294.00	104.90
Pu-239	240	5.16	186	249	0.00	6,305.00	105.08
Am-241	284	5.49	249	303	0.00	6,161.00	102.68

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:29:50AM 5/21/2018

Calibration

Sample Name: ICV-9817;AV20-05202018
Description:
Detector: AV20

Calibration Date: 5/21/2018 10:29:46AM
Analyst: 60040

Source Info

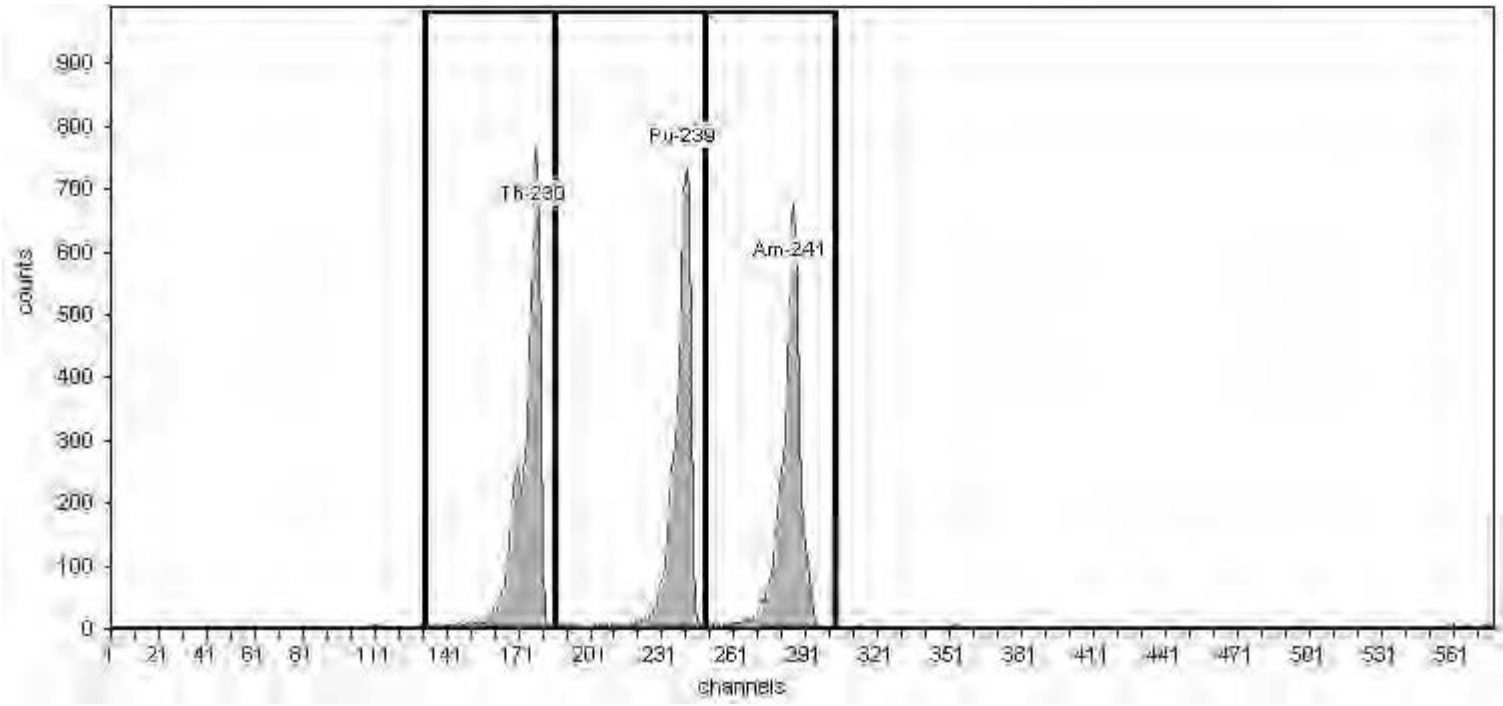
Certificate ID: 82244-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV20 , SN: 48-121A7
Acquisition Start Date: 5/20/2018 4:11:44PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 21.91% +/- 0.38% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,775.00	96.25
Pu-239	240	5.16	186	249	0.00	5,313.00	88.55
Am-241	284	5.49	249	303	0.00	5,386.00	89.77

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:30:02AM 5/21/2018

Calibration

Sample Name: ICV-9885;AV21-05202018
Description:
Detector: AV21

Calibration Date: 5/21/2018 10:29:58AM
Analyst: 60040

Source Info

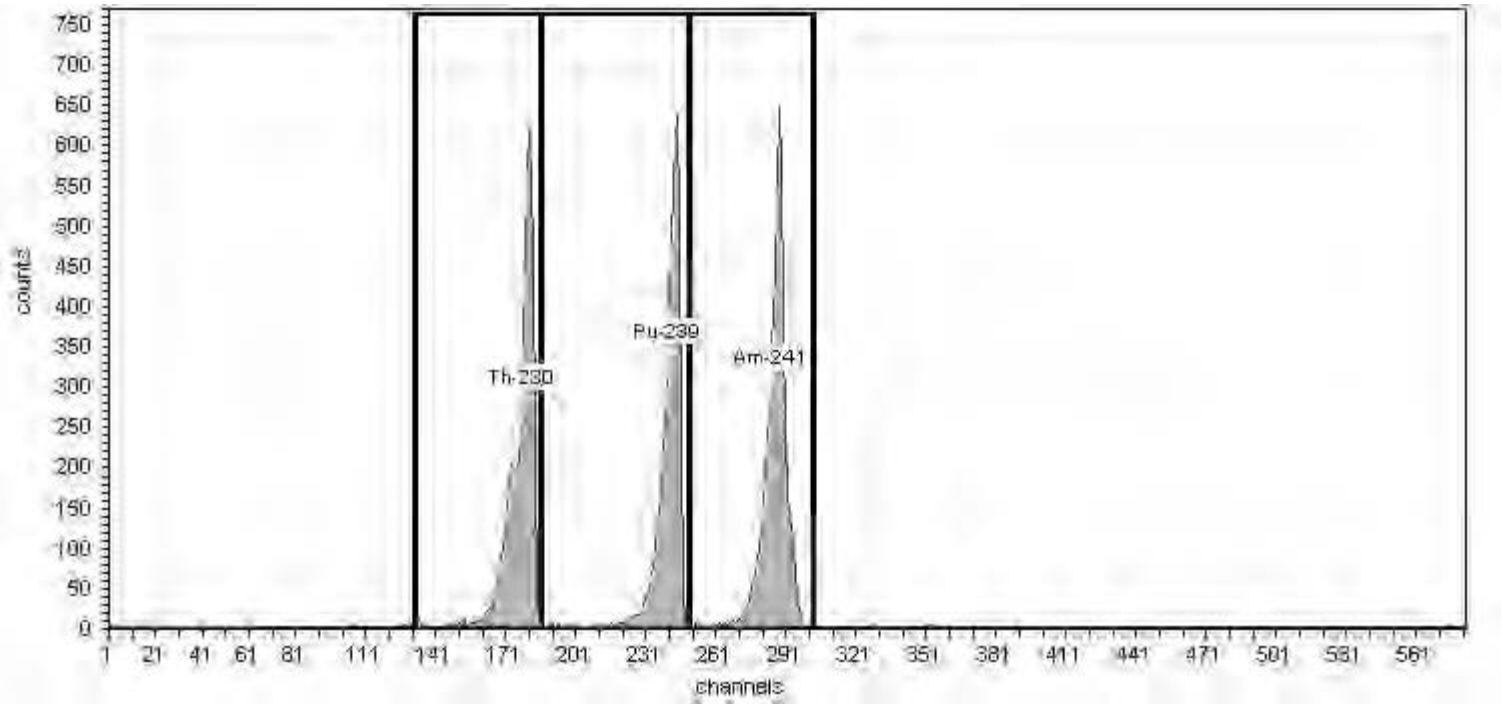
Certificate ID: 82246-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV21 , SN: 48-102BB6
Acquisition Start Date: 5/20/2018 4:11:59PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 23.40% +/- 0.46% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	4,645.00	77.42
Pu-239	240	5.16	186	249	0.00	4,501.00	75.02
Am-241	284	5.49	249	303	0.00	5,050.00	84.17

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:30:30AM 5/21/2018

Calibration

Sample Name: ICV-8874;AV23-05202018
Description:
Detector: AV23

Calibration Date: 5/21/2018 10:30:24AM
Analyst: 60040

Source Info

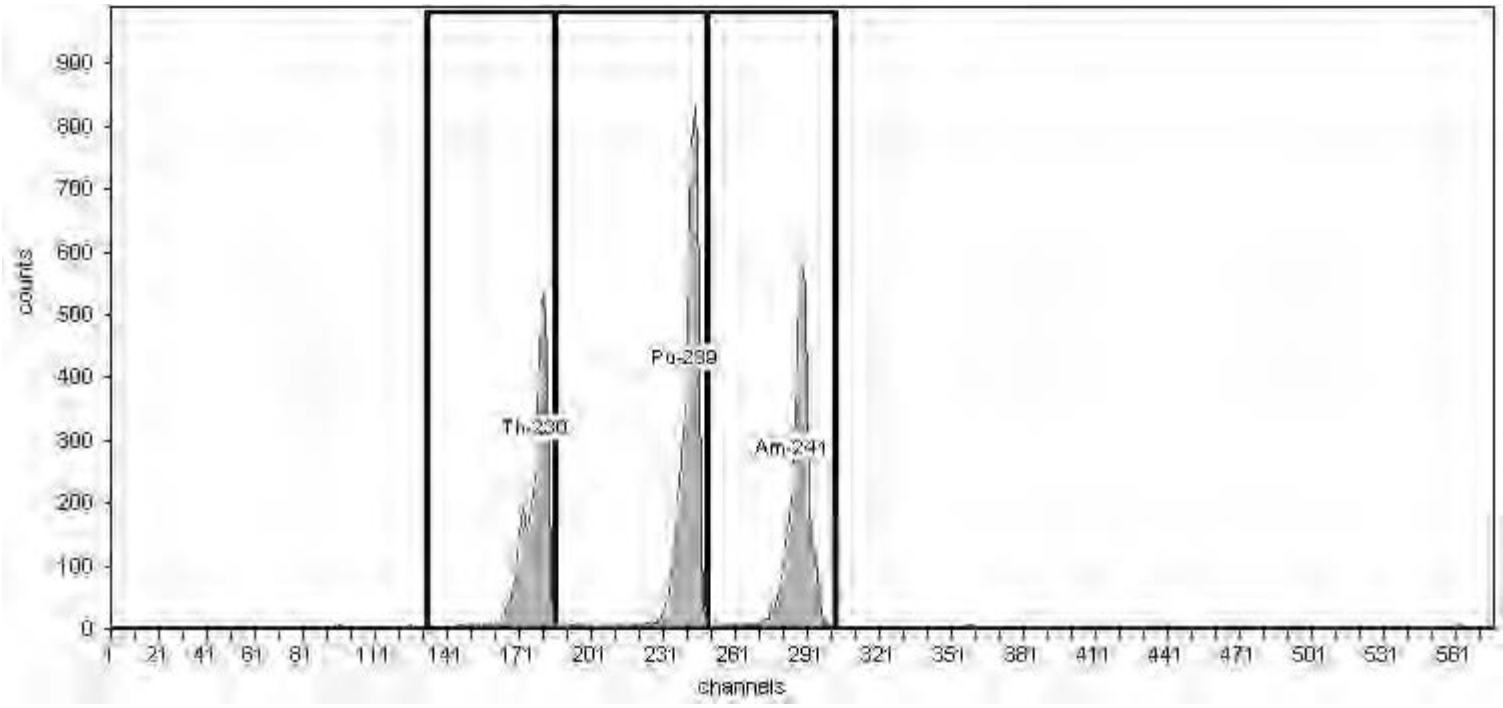
Certificate ID: 82233-334
Prepared by: Analytics

Certification Date: 6/3/2010 12:00:00PM
Description:

Acquisition

Detector: AV23 , SN: 48-158FF3
Acquisition Start Date: 5/20/2018 4:12:39PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 25.12% +/- 0.48% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	4,251.00	70.85
Pu-239	240	5.16	186	249	0.00	5,708.00	95.13
Am-241	284	5.49	249	303	0.00	4,582.00	76.37

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:31:54AM 5/21/2018

Calibration

Sample Name: ICV-1370621;AV47-05202018
Description:
Detector: AV47

Calibration Date: 5/21/2018 10:31:51AM
Analyst: 60040

Source Info

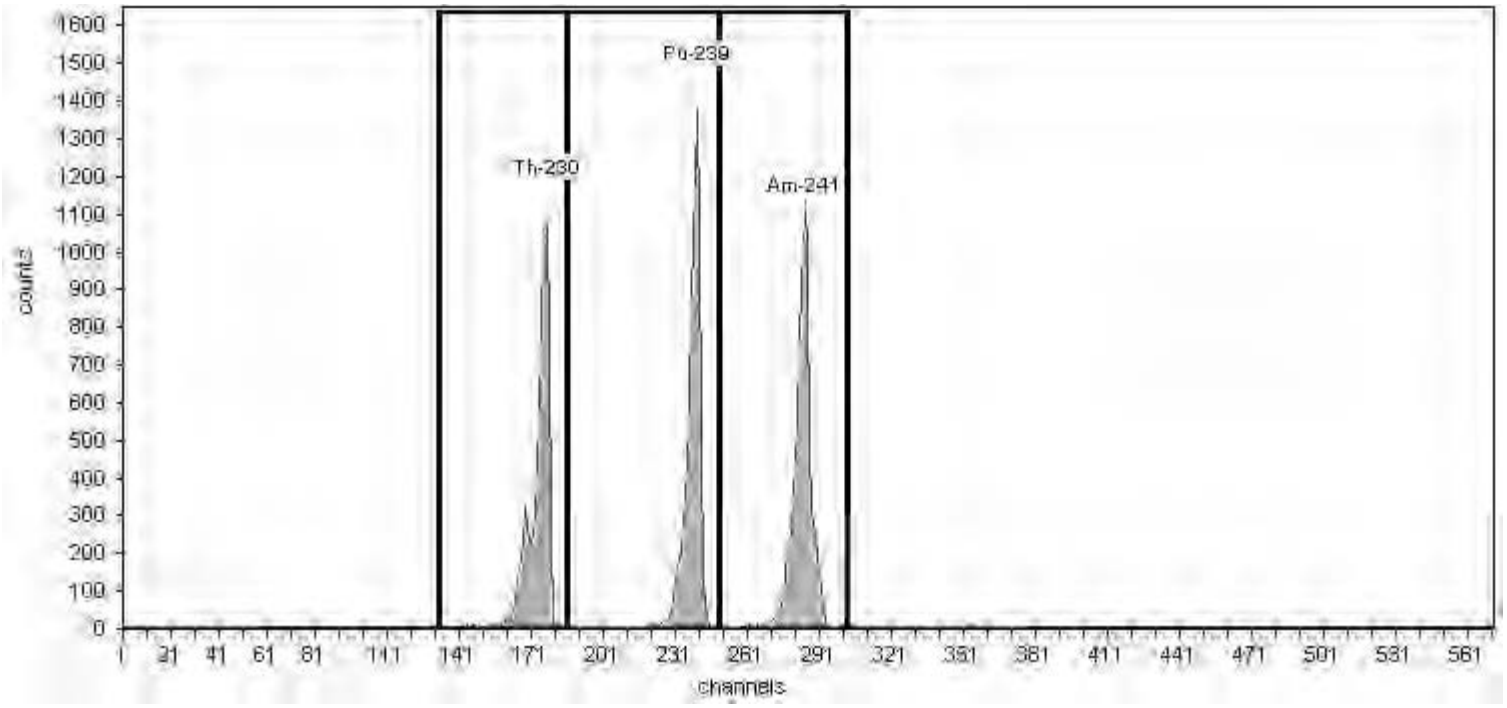
Certificate ID: 108345_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/22/2018 11:00:00AM
Description:

Acquisition

Detector: AV47 , SN: 46-032336
Acquisition Start Date: 5/20/2018 4:15:04PM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 26.86% +/- 0.36% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,975.00	116.25
Pu-239	240	5.16	186	249	0.00	7,481.00	124.68
Am-241	284	5.49	249	303	0.00	7,719.00	128.65

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:32:19AM 5/21/2018

Calibration

Sample Name: ICV-1370620;AV48-05202018
Description:
Detector: AV48

Calibration Date: 5/21/2018 10:32:15AM
Analyst: 60040

Source Info

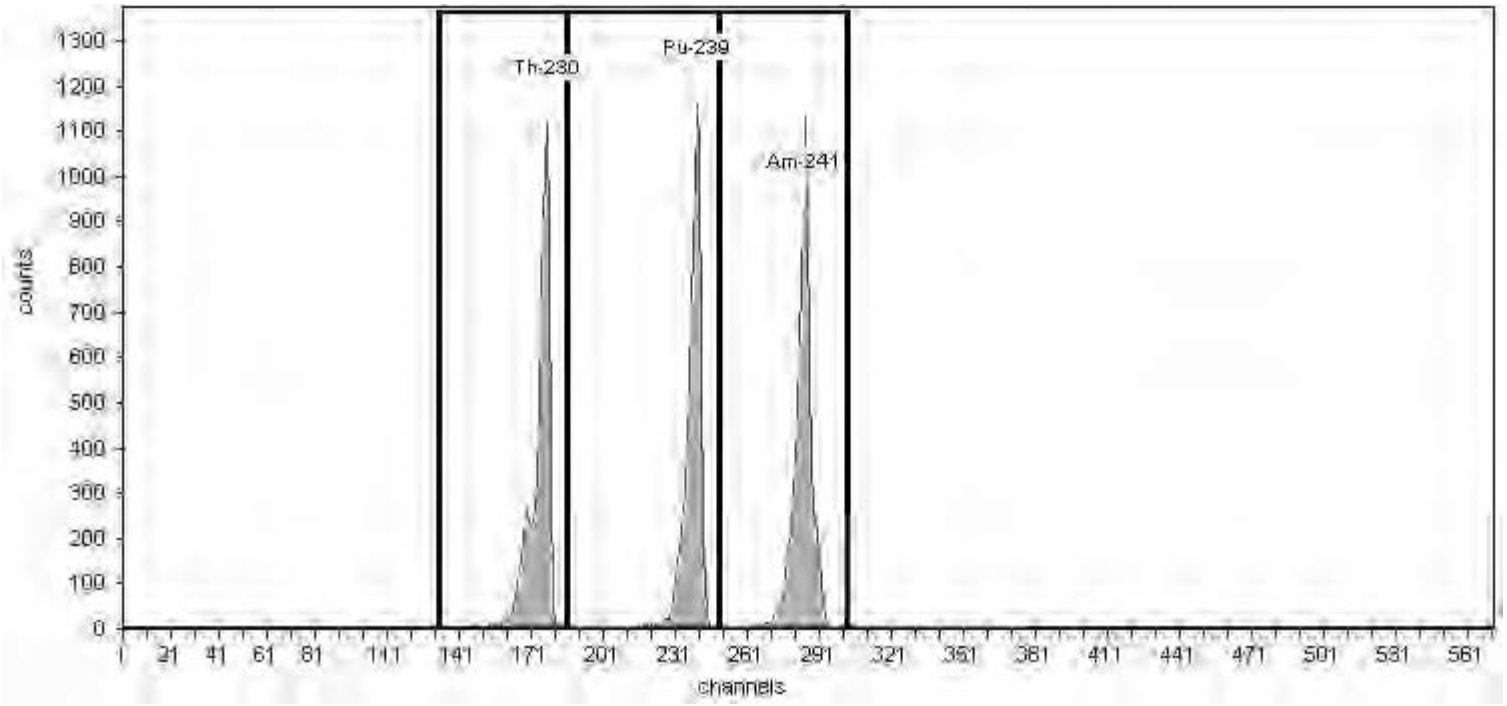
Certificate ID: 108348_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/23/2018 11:00:00PM
Description:

Acquisition

Detector: AV48 , SN: 46-033P6
Acquisition Start Date: 5/20/2018 4:15:27PM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 26.68% +/- 0.37% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,607.00	110.12
Pu-239	240	5.16	186	249	0.00	6,842.00	114.03
Am-241	284	5.49	249	303	0.00	7,223.00	120.38

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THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:45:18PM 5/23/2018

Calibration

Sample Name: ICV-7107;AV52-05232018
Description:
Detector: AV52

Calibration Date: 5/23/2018 12:36:43PM
Analyst: 60040

Source Info

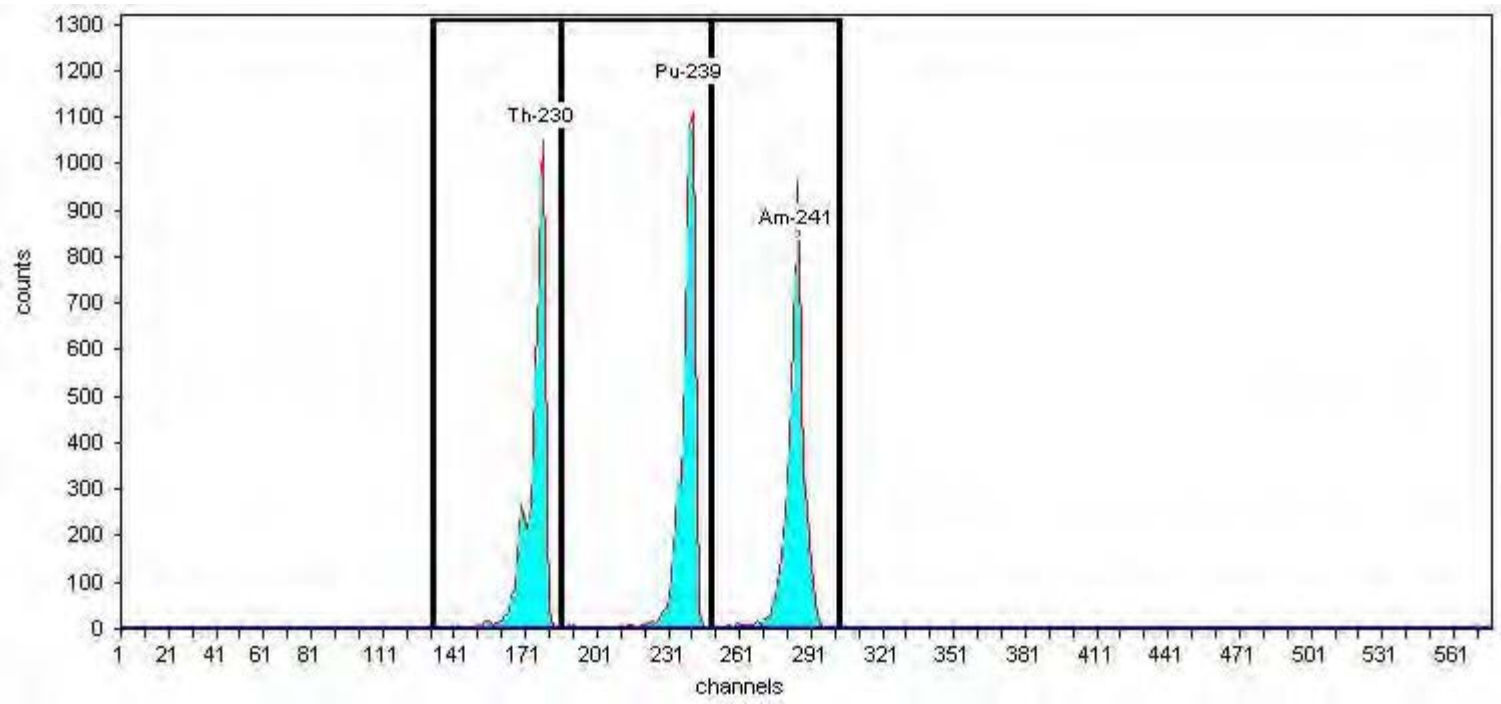
Certificate ID: 82232-334
Prepared by: Analytics

Certification Date: 6/3/2010 12:00:00PM
Description:

Acquisition

Detector: AV52 , SN: 49-155N7
Acquisition Start Date: 5/23/2018 11:26:49AM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 24.78% +/- 0.39% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,649.00	110.82
Pu-239	240	5.16	186	249	0.00	6,607.00	110.12
Am-241	284	5.49	249	303	0.00	6,357.00	105.95

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:45:51PM 5/23/2018

Calibration

Sample Name: ICV-9885;AV54-05232018
Description:
Detector: AV54

Calibration Date: 5/23/2018 12:37:06PM
Analyst: 60040

Source Info

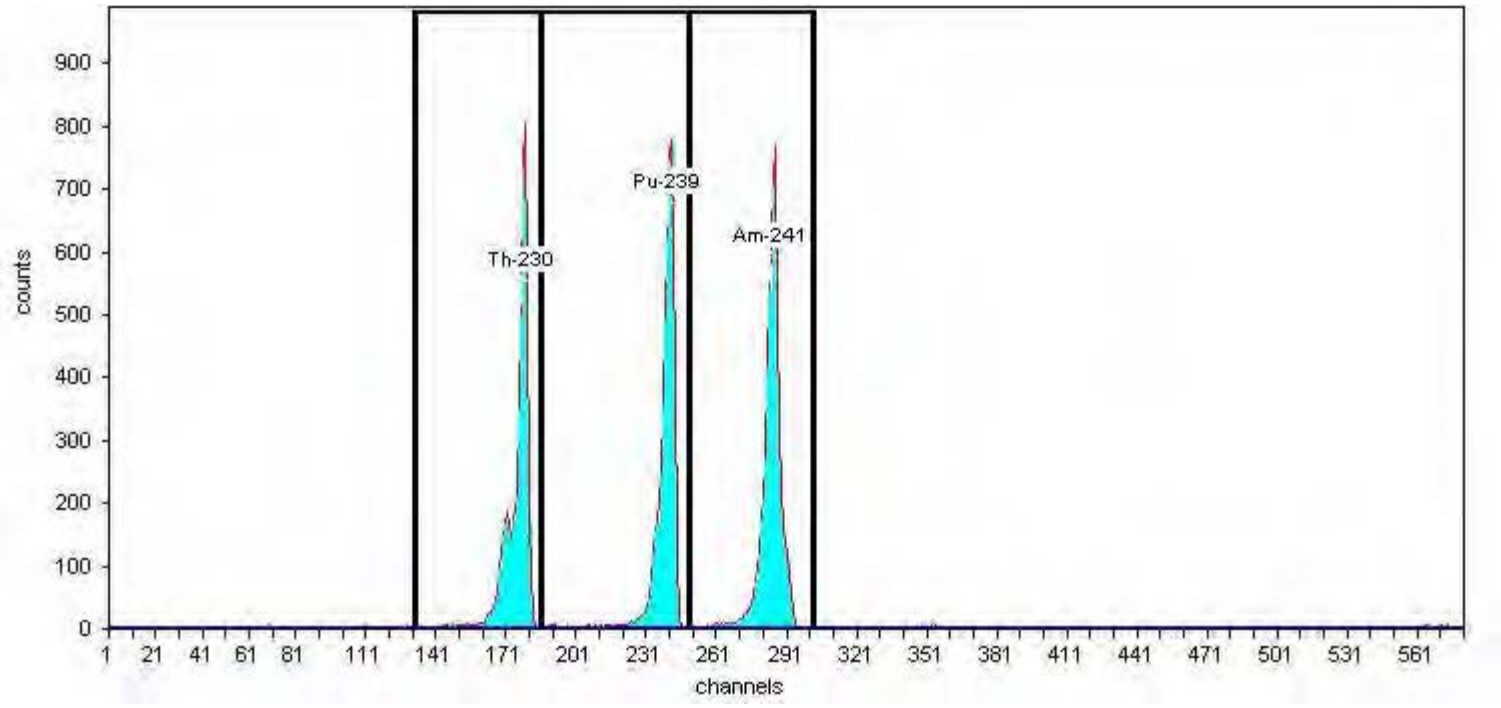
Certificate ID: 82246-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV54 , SN: 46-033P4
Acquisition Start Date: 5/23/2018 11:27:55AM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 23.48% +/- 0.46% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	4,671.00	77.85
Pu-239	240	5.16	186	249	0.00	4,552.00	75.87
Am-241	284	5.49	249	303	0.00	5,021.00	83.68

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:47:34PM 5/23/2018

Calibration

Sample Name: ICV-8874;AV56-05232018
Description:
Detector: AV56

Calibration Date: 5/23/2018 12:37:46PM
Analyst: 60040

Source Info

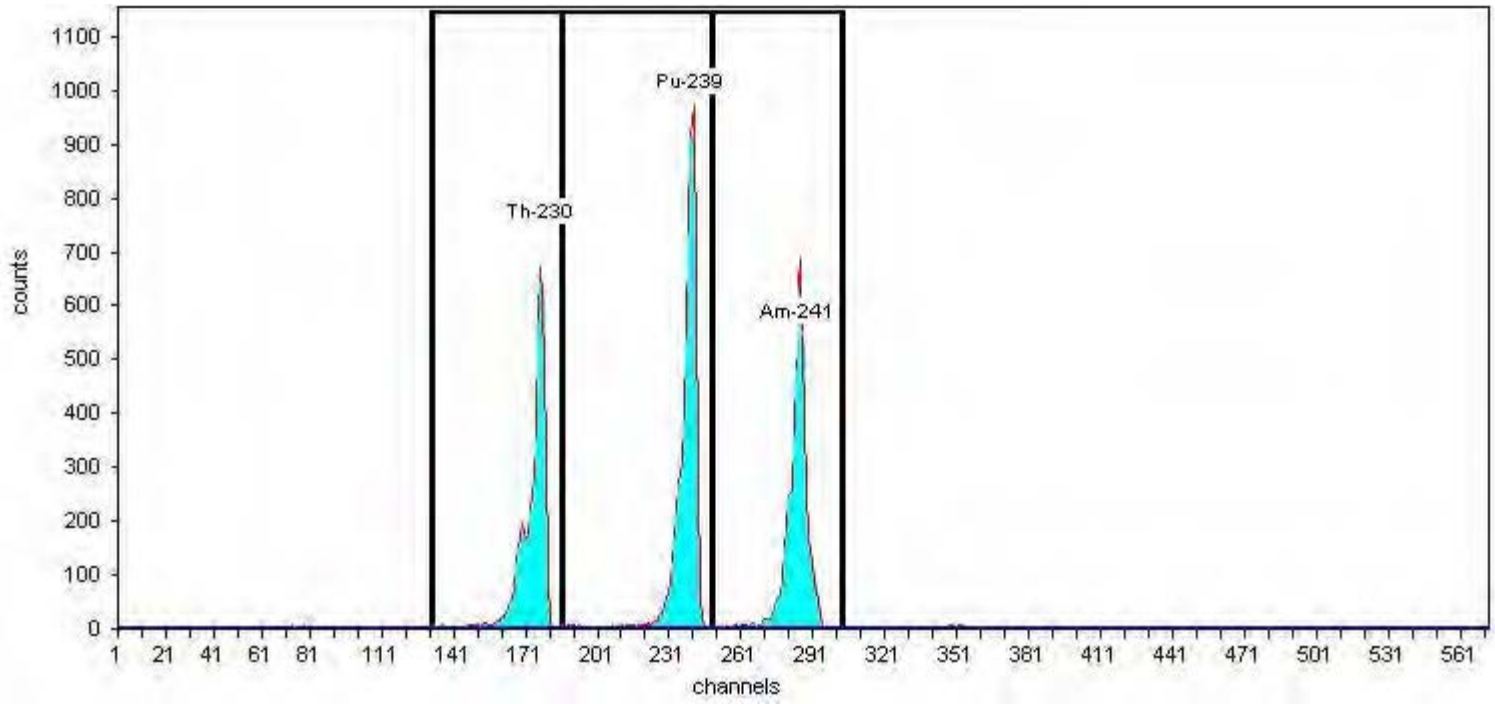
Certificate ID: 82233-334
Prepared by: Analytics

Certification Date: 6/3/2010 12:00:00PM
Description:

Acquisition

Detector: AV56 , SN: 52-059EE5
Acquisition Start Date: 5/23/2018 11:28:59AM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 26.10% +/- 0.49% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	4,451.00	74.18
Pu-239	240	5.16	186	249	0.00	5,941.00	99.02
Am-241	284	5.49	249	303	0.00	4,711.00	78.52

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:47:47PM 5/23/2018

Calibration

Sample Name: ICV-9793;AV57-05232018
Description:
Detector: AV57

Calibration Date: 5/23/2018 12:38:02PM
Analyst: 60040

Source Info

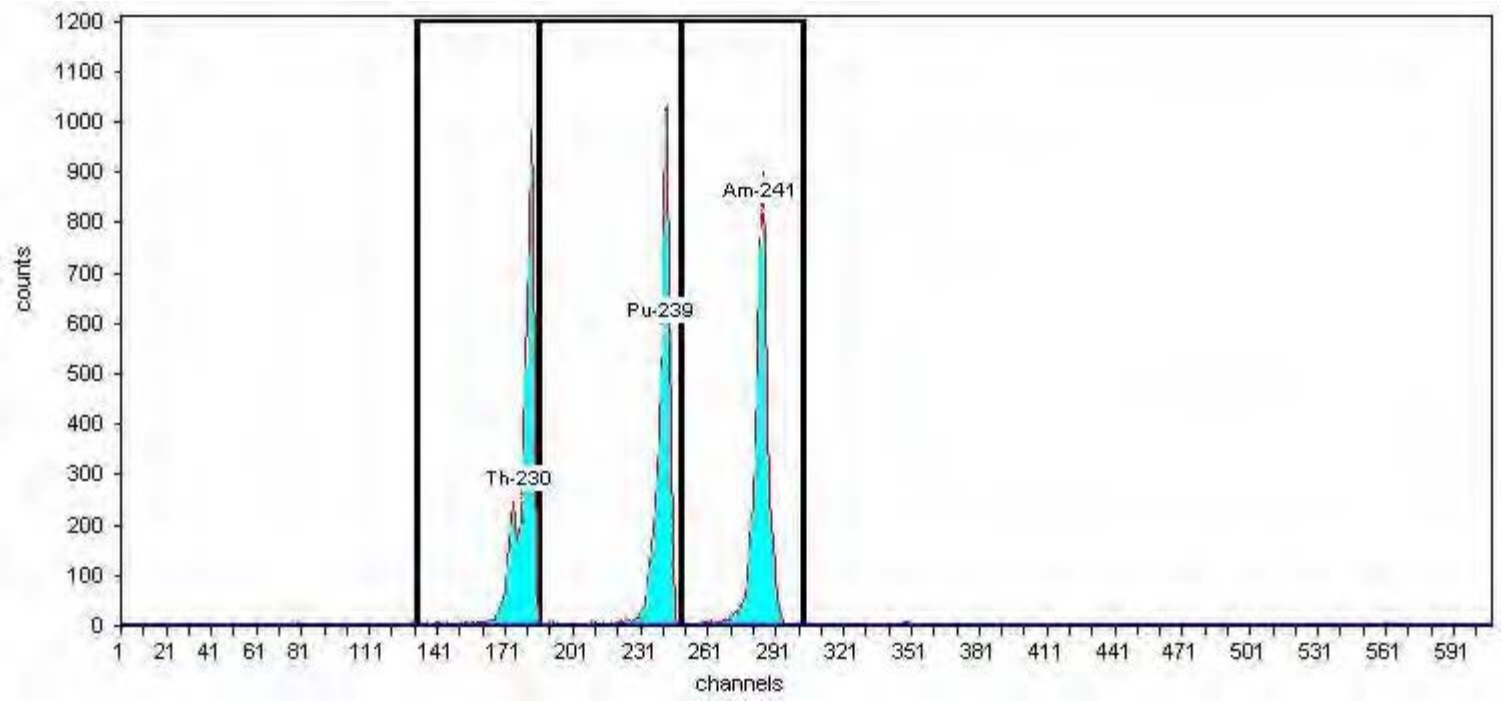
Certificate ID: 82241-334
Prepared by: Analytics

Certification Date: 6/8/2010 12:00:00PM
Description:

Acquisition

Detector: AV57 , SN: 48-158EE3
Acquisition Start Date: 5/23/2018 11:29:28AM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 22.83% +/- 0.40% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,505.00	91.75
Pu-239	240	5.16	186	249	0.00	5,549.00	92.48
Am-241	284	5.49	249	303	0.00	5,372.00	89.53

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:48:09PM 5/23/2018

Calibration

Sample Name: ICV-9792;AV58-05232018
Description:
Detector: AV58

Calibration Date: 5/23/2018 12:38:17PM
Analyst: 60040

Source Info

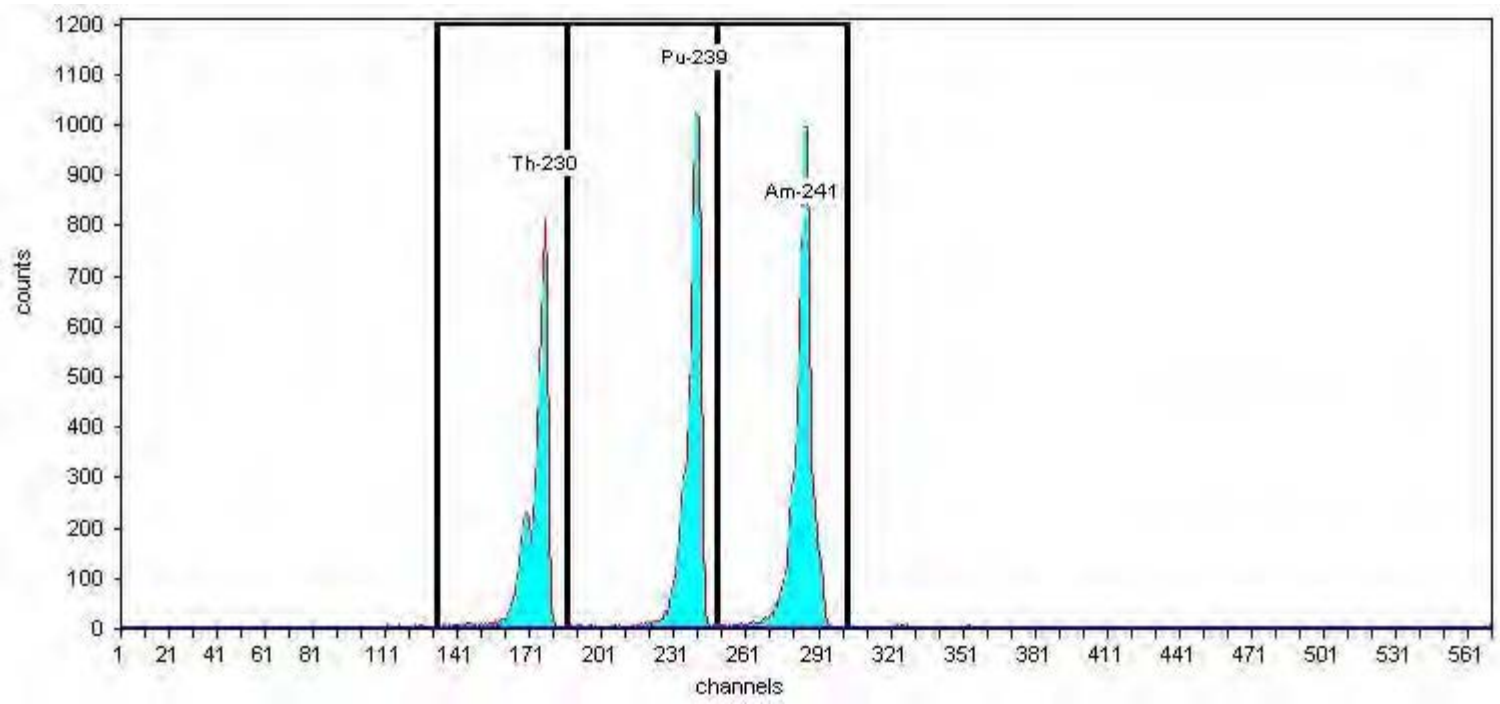
Certificate ID: 82240-334
Prepared by: Analytics

Certification Date: 6/8/2010 12:00:00PM
Description:

Acquisition

Detector: AV58 , SN: 52-102 C5
Acquisition Start Date: 5/23/2018 11:29:48AM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 24.10% +/- 0.39% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,316.00	88.60
Pu-239	240	5.16	186	249	0.00	6,366.00	106.10
Am-241	284	5.49	249	303	0.00	7,114.00	118.57

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:15:32PM 5/21/2018

Calibration

Sample Name: ICV-1368447;AV60-05212018
Description:
Detector: AV60

Calibration Date: 5/21/2018 12:15:28PM
Analyst: 60040

Source Info

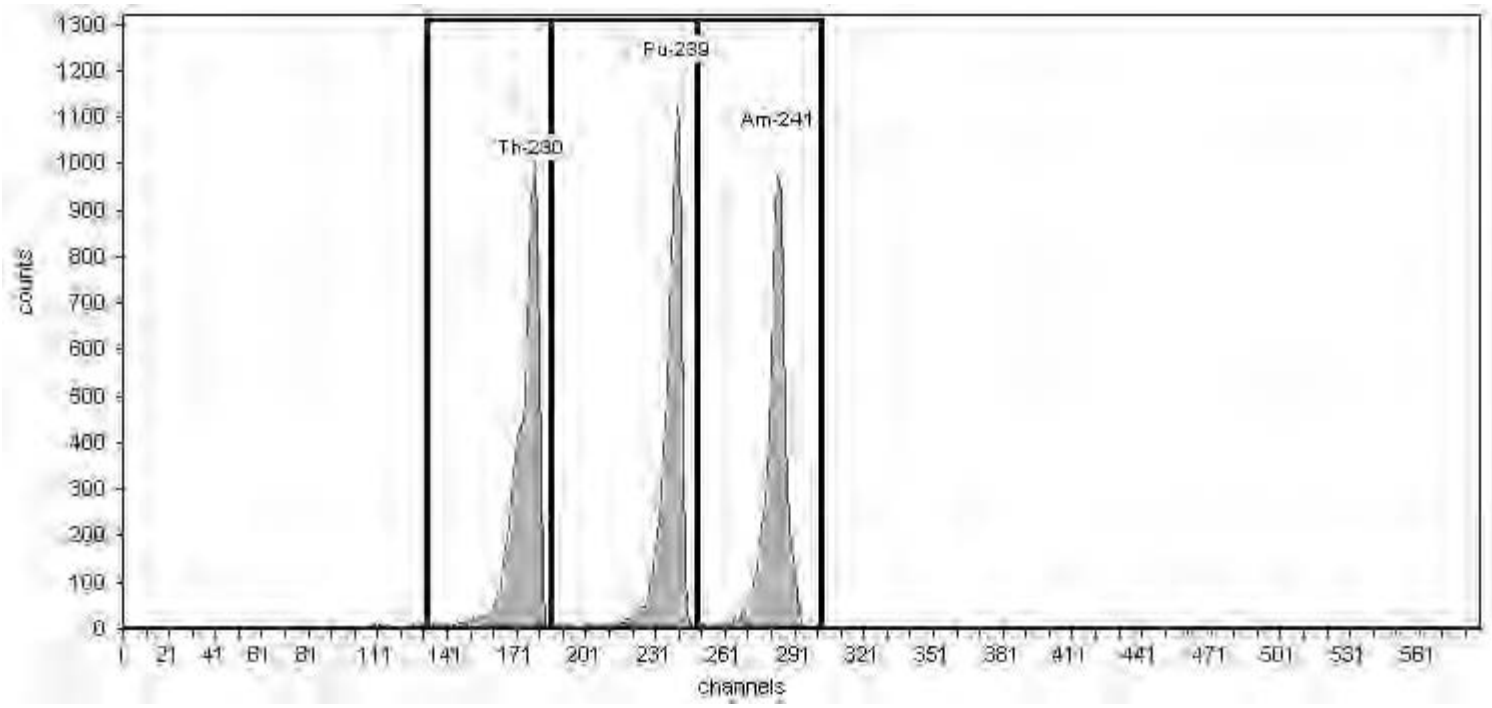
Certificate ID: 108002_00001
Prepared by: Eckert & Ziegler

Certification Date: 12/1/2017 11:00:00AM
Description:

Acquisition

Detector: AV60 , SN: 49-027117
Acquisition Start Date: 5/21/2018 10:36:05AM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 28.15% +/- 0.35% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	9,480.00	158.00
Pu-239	240	5.16	186	249	0.00	8,623.00	143.72
Am-241	284	5.49	249	303	0.00	8,202.00	136.70

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:16:02PM 5/21/2018

Calibration

Sample Name: ICV-1368446;AV62-05212018
Description:
Detector: AV62

Calibration Date: 5/21/2018 12:15:56PM
Analyst: 60040

Source Info

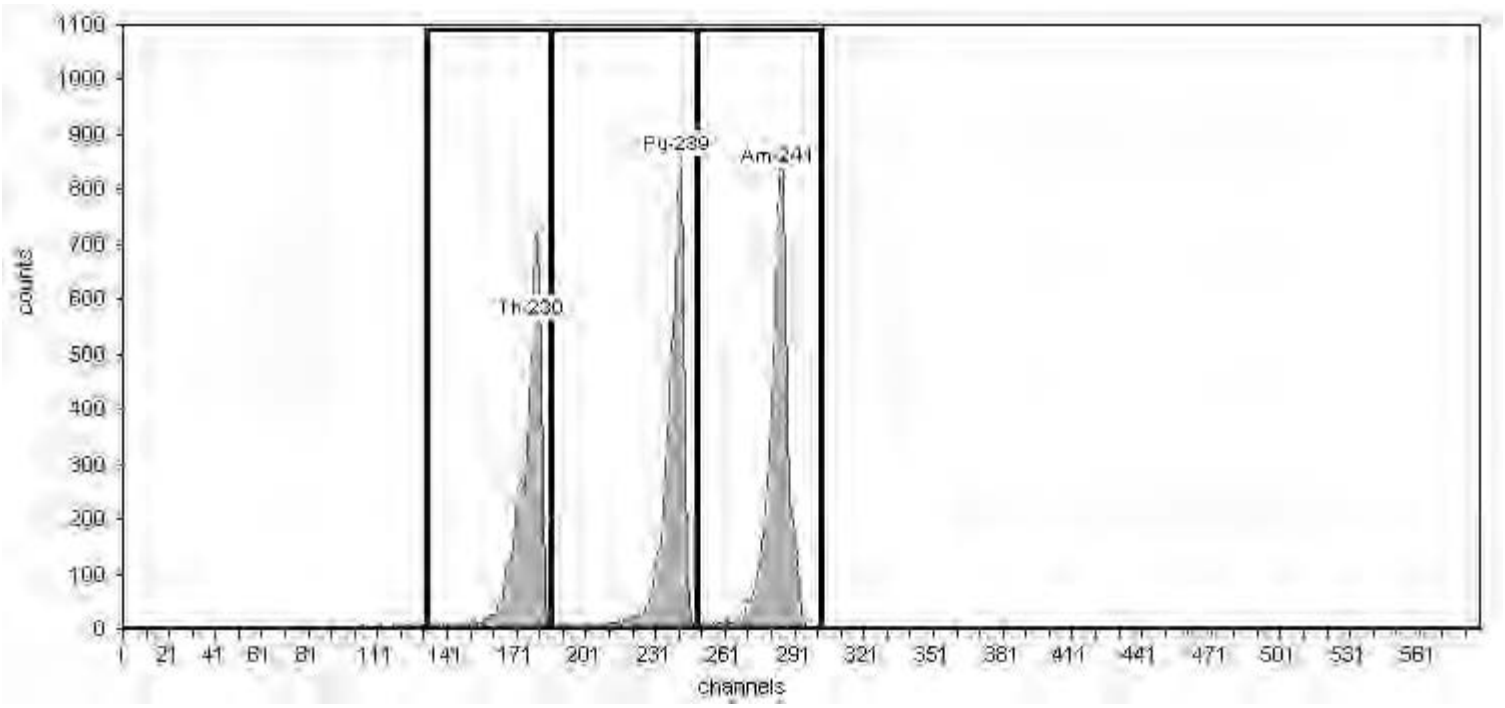
Certificate ID: 108001_00001
Prepared by: Eckert & Ziegler

Certification Date: 12/6/2017 11:00:00AM
Description:

Acquisition

Detector: AV62 , SN: 52-060FF2
Acquisition Start Date: 5/21/2018 10:36:30AM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 28.08% +/- 0.40% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,095.00	101.58
Pu-239	240	5.16	186	249	0.00	6,782.00	113.03
Am-241	284	5.49	249	303	0.00	7,286.00	121.43

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:16:21PM 5/21/2018

Calibration

Sample Name: ICV-1370622;AV63-05212018
Description:
Detector: AV63

Calibration Date: 5/21/2018 12:16:17PM
Analyst: 60040

Source Info

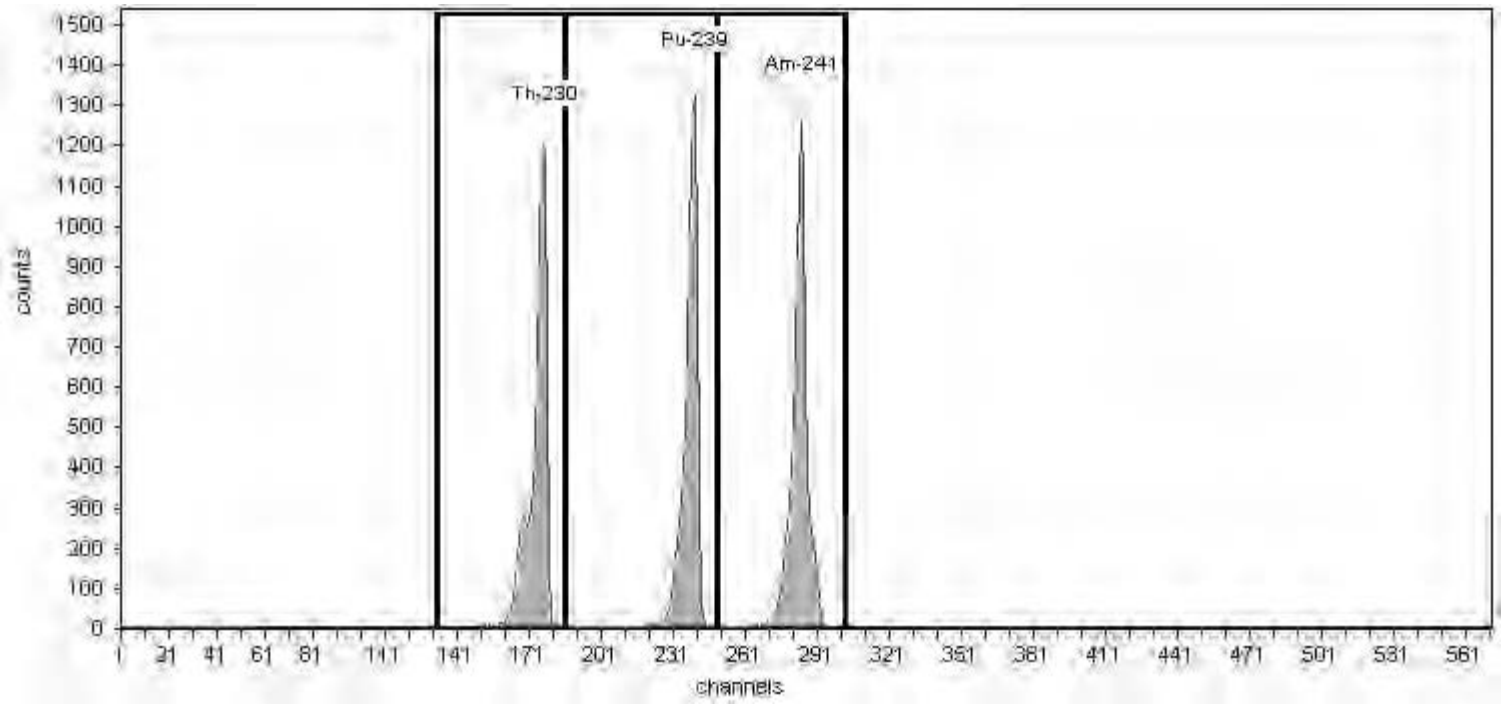
Certificate ID: 108346_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/22/2018 11:00:00AM
Description:

Acquisition

Detector: AV63 , SN: 47-029ff2
Acquisition Start Date: 5/21/2018 10:36:50AM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 26.87% +/- 0.36% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	7,411.00	123.52
Pu-239	240	5.16	186	249	0.00	7,462.00	124.37
Am-241	284	5.49	249	303	0.00	7,785.00	129.75

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:16:33PM 5/21/2018

Calibration

Sample Name: ICV-1370621;AV64-05212018
Description:
Detector: AV64

Calibration Date: 5/21/2018 12:16:30PM
Analyst: 60040

Source Info

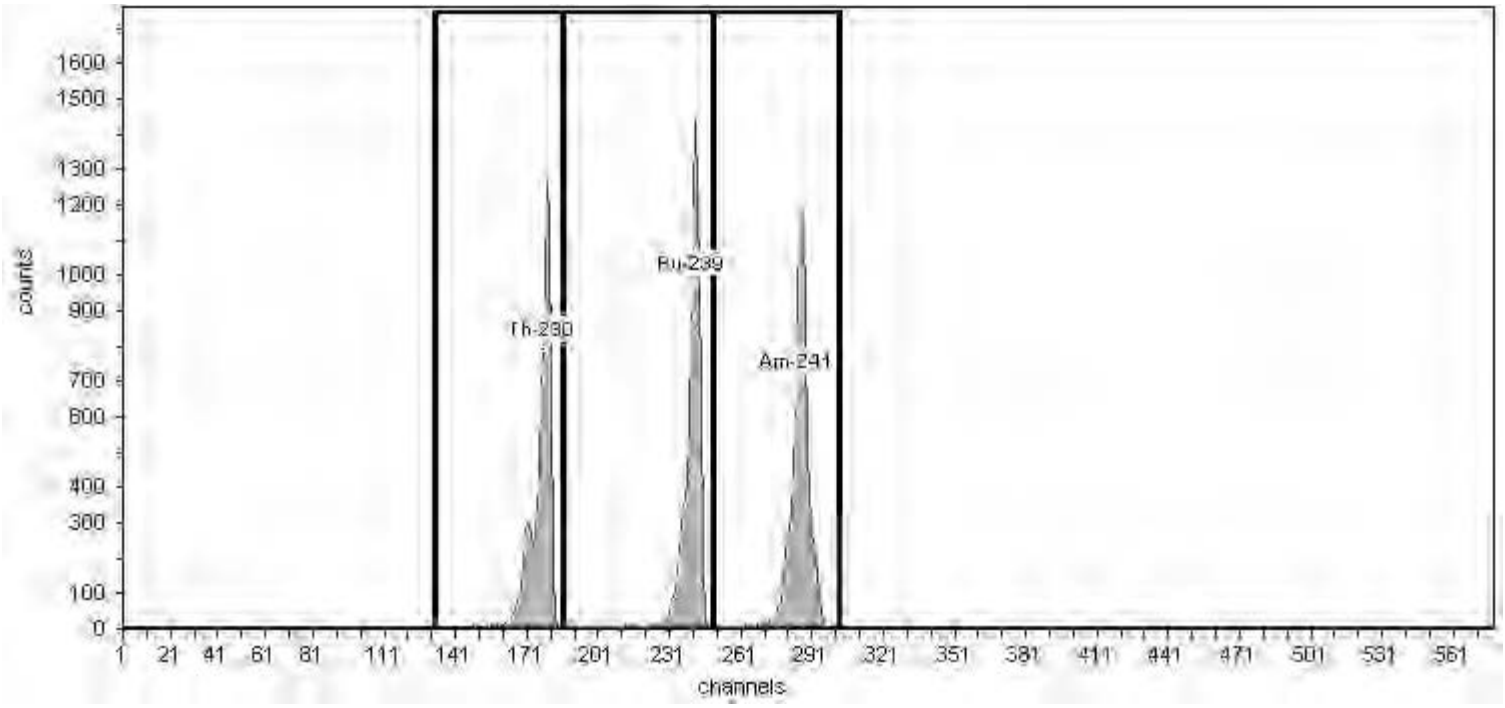
Certificate ID: 108345_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/22/2018 11:00:00AM
Description:

Acquisition

Detector: AV64 , SN: 43-028v3
Acquisition Start Date: 5/21/2018 10:37:21AM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 28.42% +/- 0.37% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	7,547.00	125.78
Pu-239	240	5.16	186	249	0.00	7,867.00	131.12
Am-241	284	5.49	249	303	0.00	8,042.00	134.03

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:17:02PM 5/21/2018

Calibration

Sample Name: ICV-1370619;AV66-05212018
Description:
Detector: AV66

Calibration Date: 5/21/2018 12:16:58PM
Analyst: 60040

Source Info

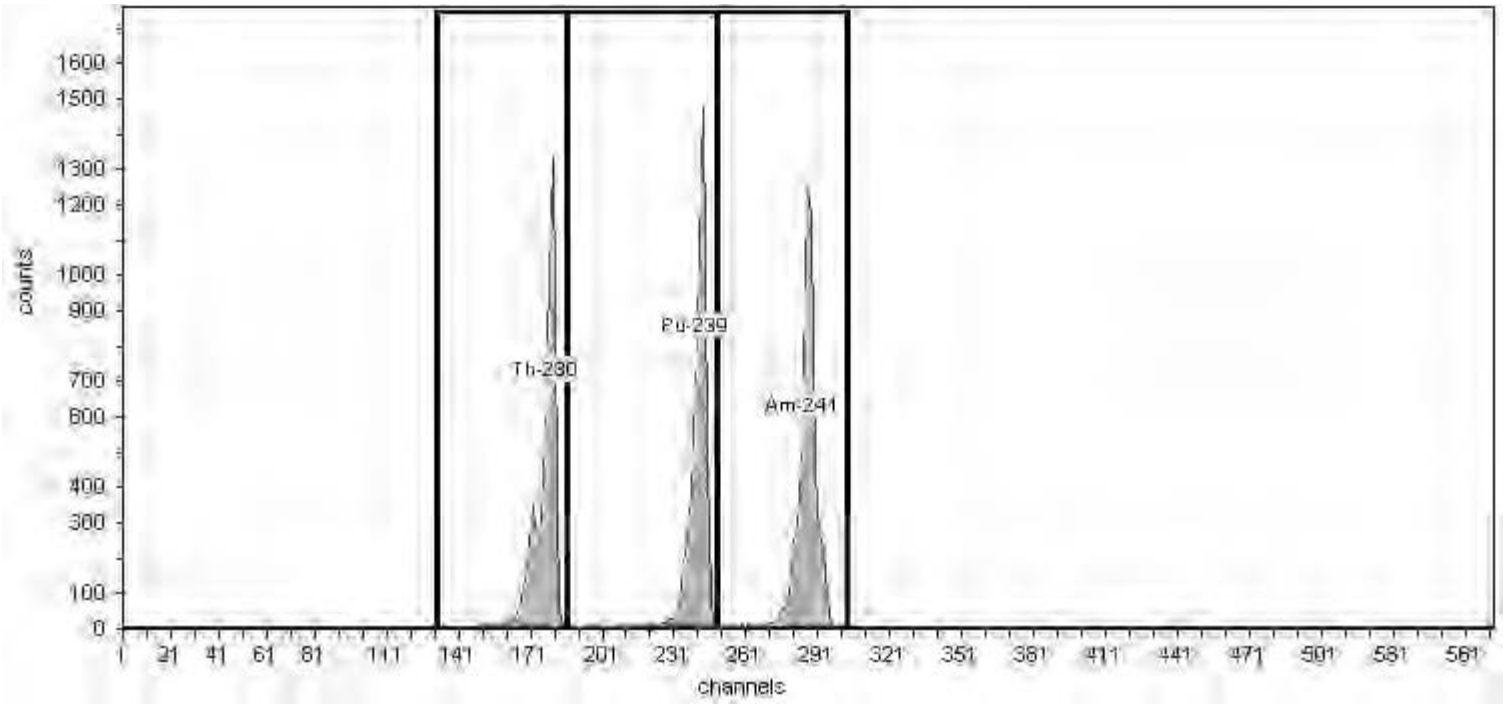
Certificate ID: 108347_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/23/2018 11:00:00AM
Description:

Acquisition

Detector: AV66 , SN: 48-158EE2
Acquisition Start Date: 5/21/2018 10:38:03AM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 27.33% +/- 0.35% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	7,887.00	131.45
Pu-239	240	5.16	186	249	0.00	8,137.00	135.62
Am-241	284	5.49	249	303	0.00	8,372.00	139.53

Monthly Calibration Verifications

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:52:56AM 7/11/2018

Calibration

Sample Name: CCV-9793;AV7-07102018
Description:
Detector: AV7

Calibration Date: 7/11/2018 10:52:53AM
Analyst: 60040

Source Info

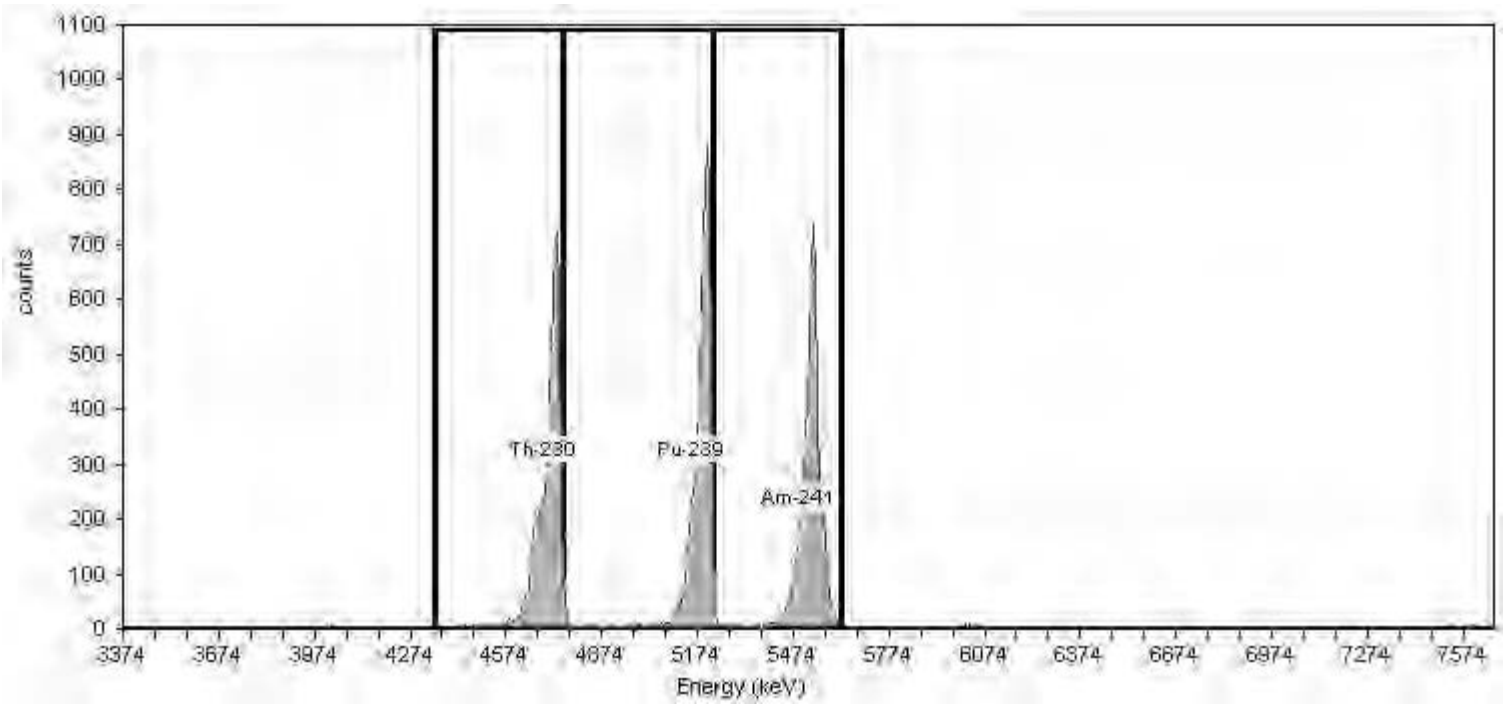
Certificate ID: 82241-334
Prepared by: Analytics

Certification Date: 6/8/2010 12:00:00PM
Description:

Acquisition

Detector: AV7 , SN: 48-158EE5
Acquisition Start Date: 7/10/2018 4:56:23PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 22.77% +/- 0.40% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,254.00	87.57
Pu-239	240	5.16	186	249	0.00	5,589.00	93.15
Am-241	284	5.49	249	303	0.00	5,551.00	92.52

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:53:07AM 7/11/2018

Calibration

Sample Name: CCV-9795;AV8-07102018
Description:
Detector: AV8

Calibration Date: 7/11/2018 10:53:03AM
Analyst: 60040

Source Info

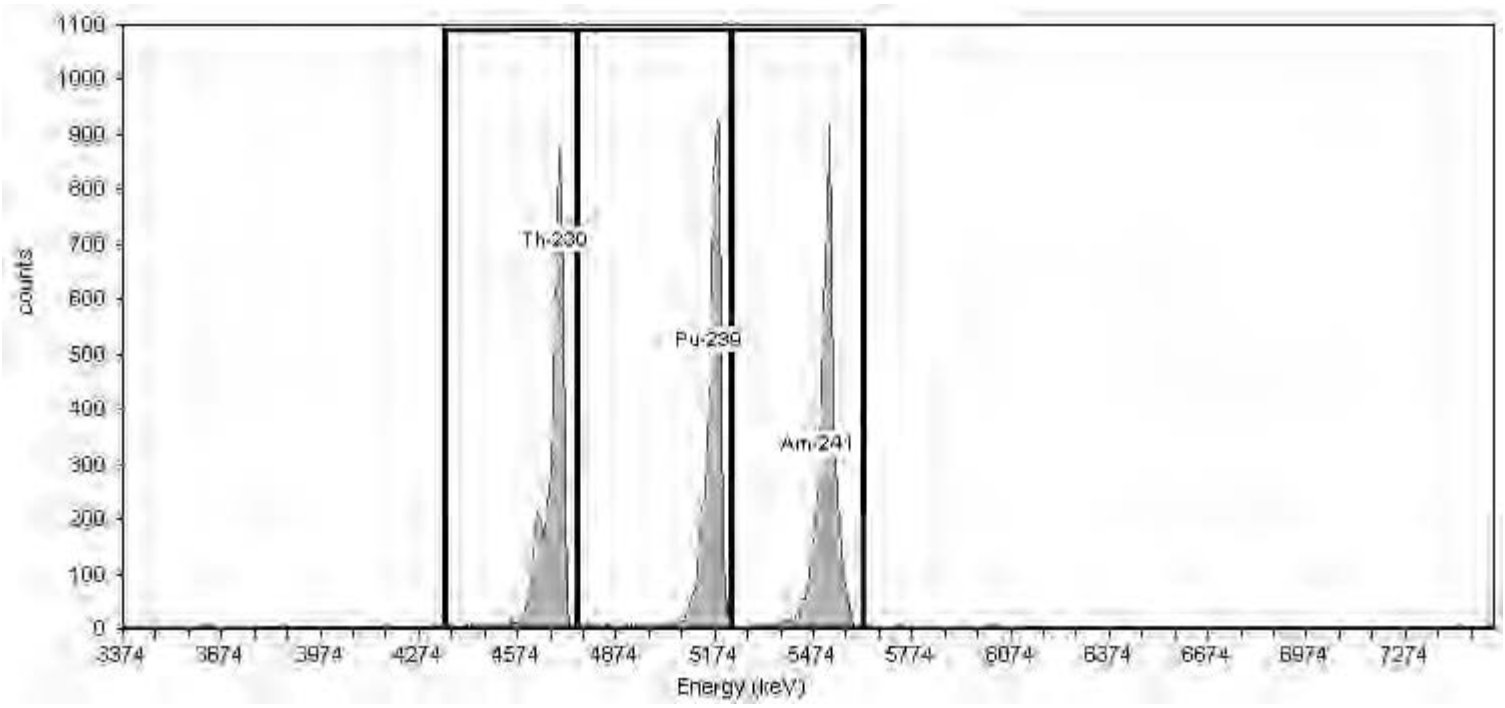
Certificate ID: 82243-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV8 , SN: 41-137Q6
Acquisition Start Date: 7/10/2018 4:56:46PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 25.76% +/- 0.45% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,396.00	89.93
Pu-239	240	5.16	186	249	0.00	5,633.00	93.88
Am-241	284	5.49	249	303	0.00	5,804.00	96.73

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:53:37AM 7/11/2018

Calibration

Sample Name: CCV-9885;AV10-07102018
Description:
Detector: AV10

Calibration Date: 7/11/2018 10:53:33AM
Analyst: 60040

Source Info

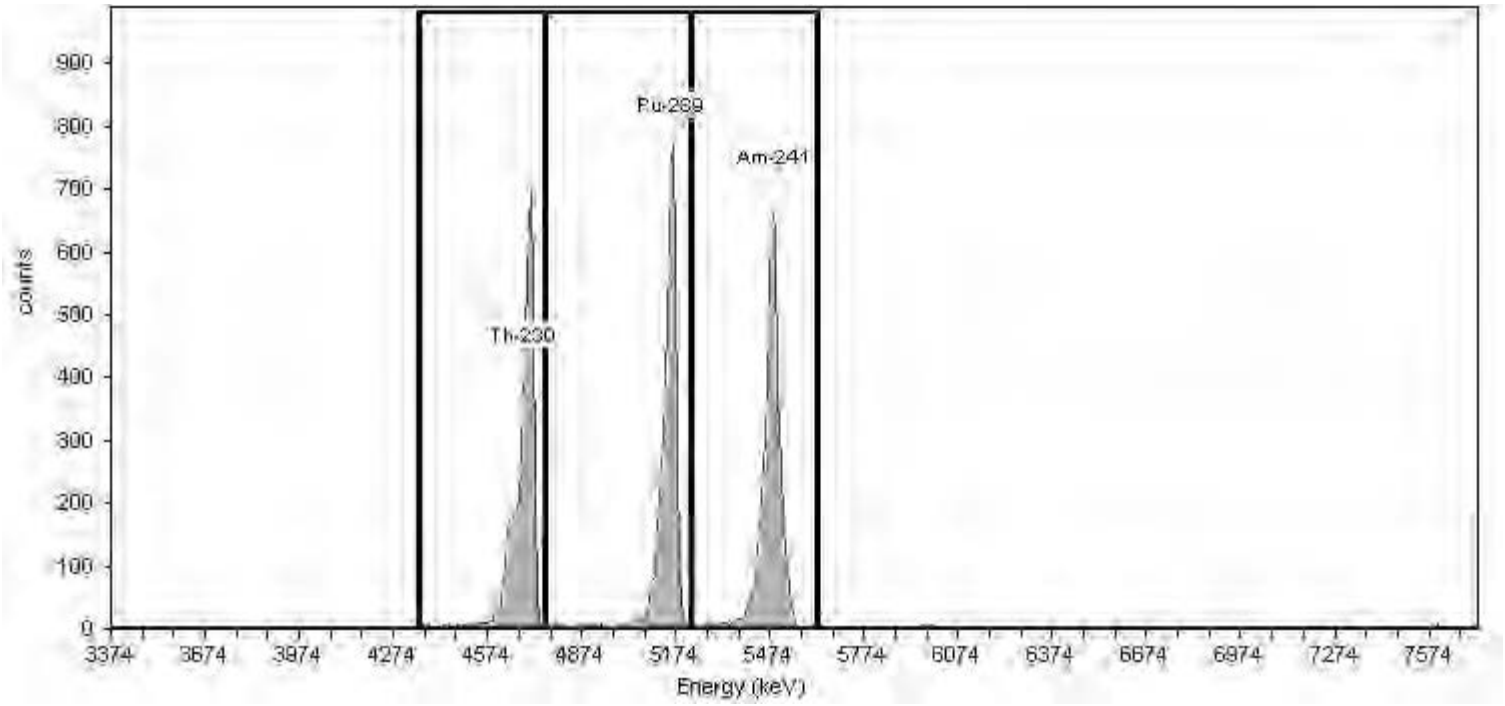
Certificate ID: 82246-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV10 , SN: 49-155N2
Acquisition Start Date: 7/10/2018 4:57:19PM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 23.79% +/- 0.46% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	4,677.00	77.95
Pu-239	240	5.16	186	249	0.00	4,733.00	78.88
Am-241	284	5.49	249	303	0.00	5,033.00	83.88

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:54:27AM 7/11/2018

Calibration

Sample Name: CCV-1368447;AV12-07102018
Description:
Detector: AV12

Calibration Date: 7/11/2018 10:54:24AM
Analyst: 60040

Source Info

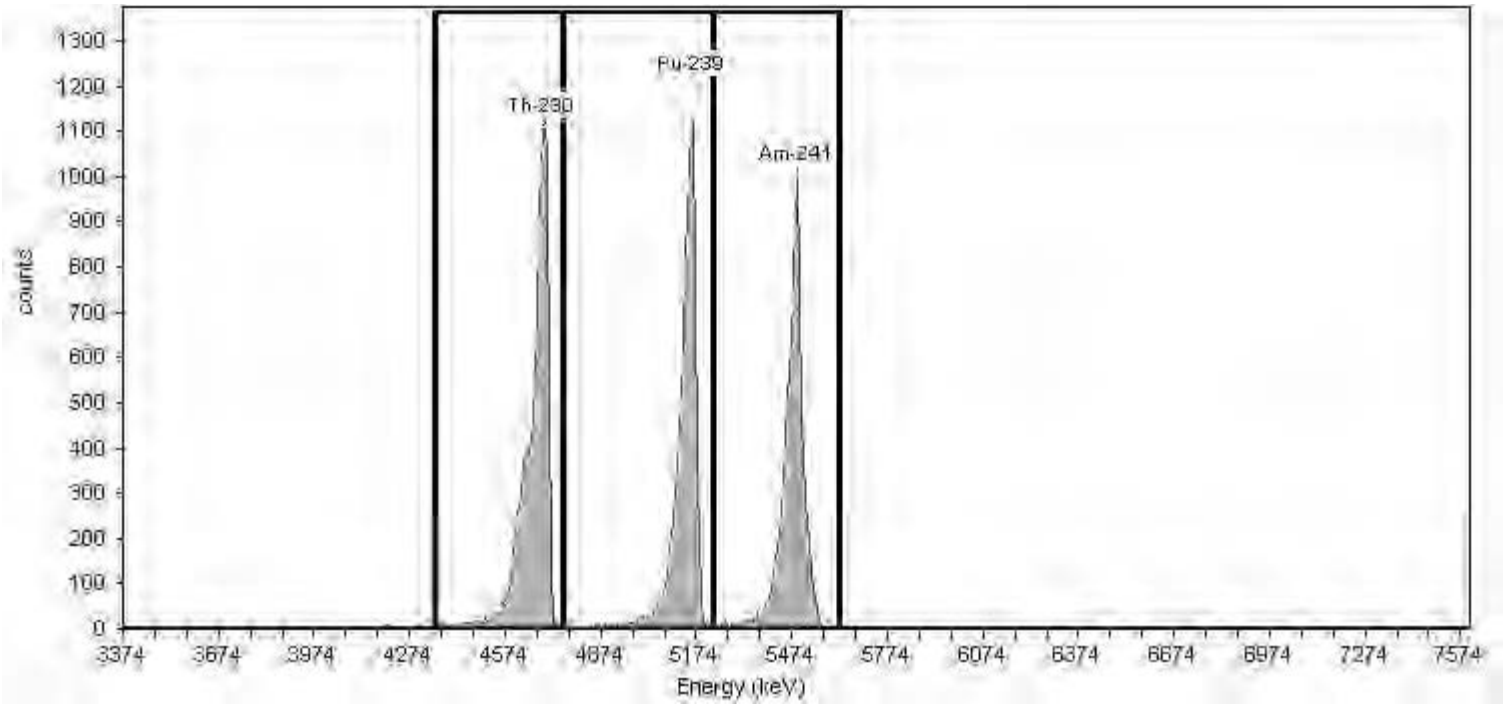
Certificate ID: 108002_00001
Prepared by: Eckert & Ziegler

Certification Date: 12/1/2017 11:00:00AM
Description:

Acquisition

Detector: AV12 , SN: 51-082B7
Acquisition Start Date: 7/10/2018 5:01:15PM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 27.91% +/- 0.35% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	9,557.00	159.28
Pu-239	240	5.16	186	249	0.00	8,555.00	142.58
Am-241	284	5.49	249	303	0.00	7,975.00	132.92

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:55:01AM 7/11/2018

Calibration

Sample Name: CCV-1370622;AV14-07102018
Description:
Detector: AV14

Calibration Date: 7/11/2018 10:54:57AM
Analyst: 60040

Source Info

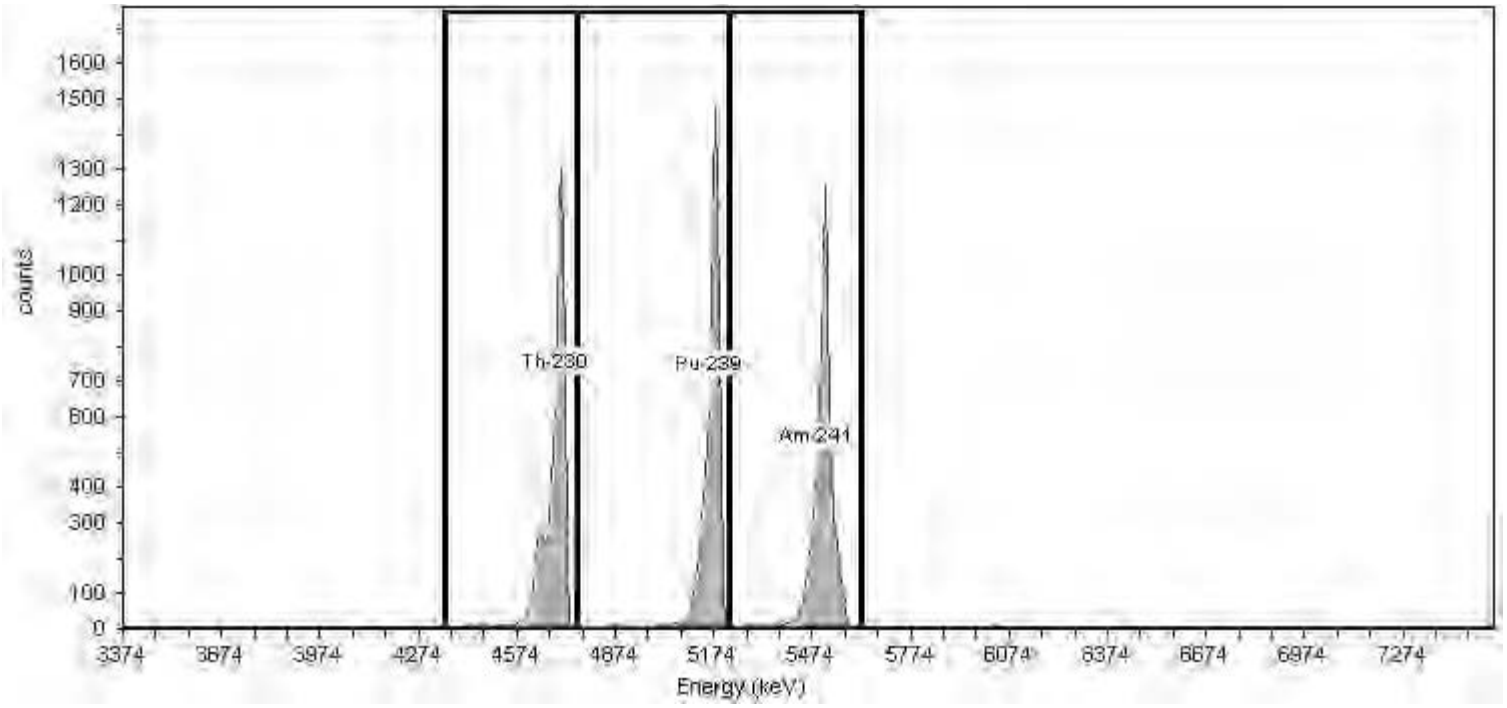
Certificate ID: 108346_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/22/2018 11:00:00AM
Description:

Acquisition

Detector: AV14 , SN: 50-060W4
Acquisition Start Date: 7/10/2018 5:03:12PM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 27.23% +/- 0.36% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	7,396.00	123.27
Pu-239	240	5.16	186	249	0.00	7,737.00	128.95
Am-241	284	5.49	249	303	0.00	7,819.00	130.32

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:55:14AM 7/11/2018

Calibration

Sample Name: CCV-1370619;AV15-07102018
Description:
Detector: AV15

Calibration Date: 7/11/2018 10:55:10AM
Analyst: 60040

Source Info

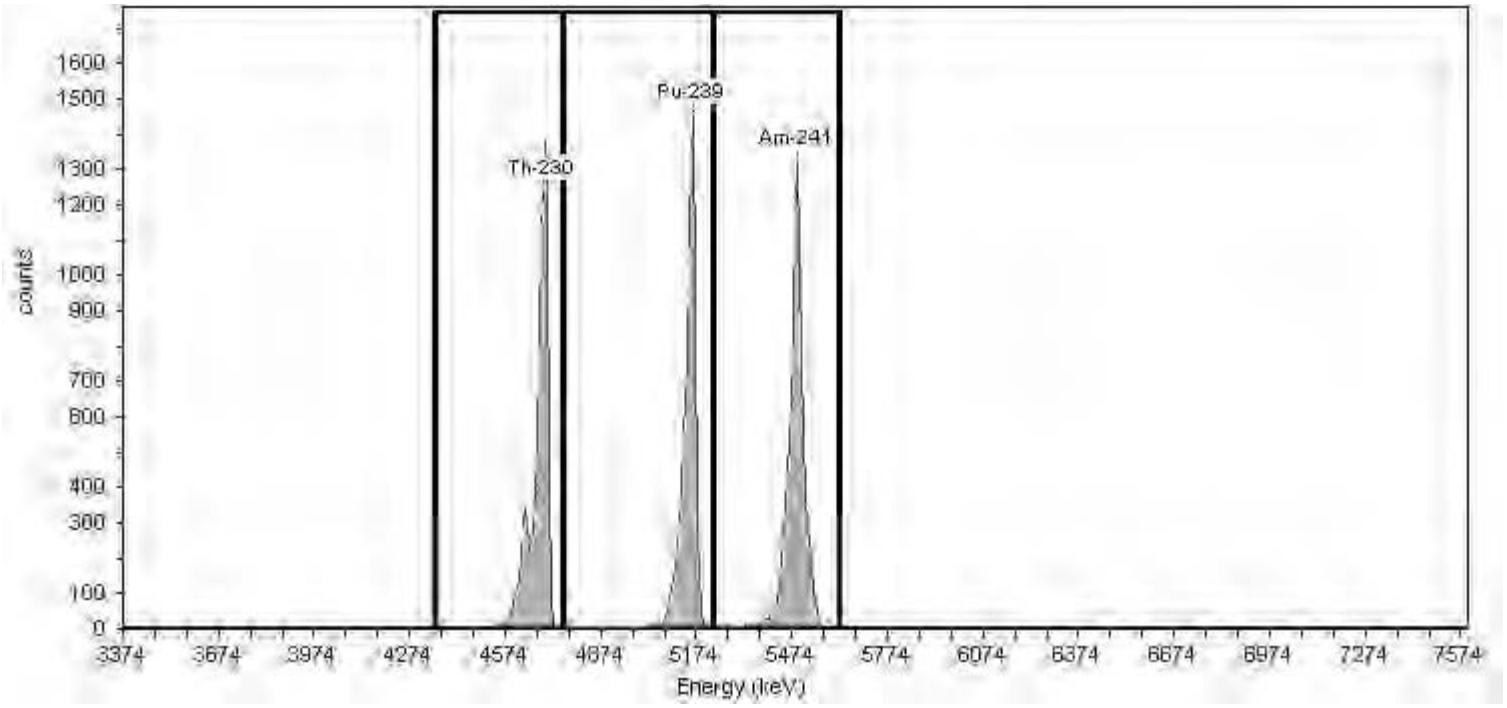
Certificate ID: 108347_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/23/2018 11:00:00AM
Description:

Acquisition

Detector: AV15 , SN: 41-172C5
Acquisition Start Date: 7/10/2018 5:03:46PM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 27.13% +/- 0.35% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	7,892.00	131.53
Pu-239	240	5.16	186	249	0.00	7,850.00	130.83
Am-241	284	5.49	249	303	0.00	8,460.00	141.00

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:55:26AM 7/11/2018

Calibration

Sample Name: CCV-1370620;AV16-07102018
Description:
Detector: AV16

Calibration Date: 7/11/2018 10:55:23AM
Analyst: 60040

Source Info

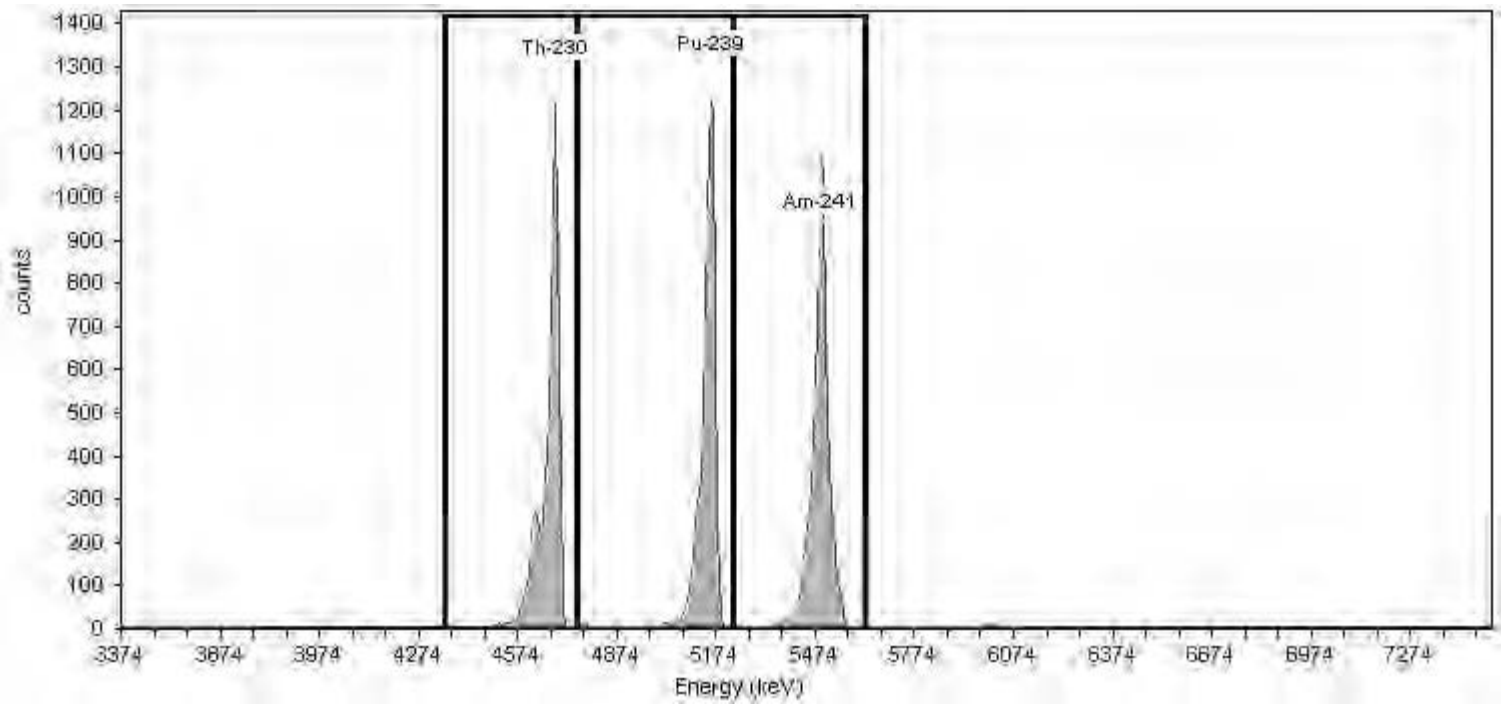
Certificate ID: 108348_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/23/2018 11:00:00PM
Description:

Acquisition

Detector: AV16 , SN: 51-082B6
Acquisition Start Date: 7/10/2018 5:04:30PM
Live Time: 60.00 min.
Real Time: 60.05 min.
Efficiency: 27.02% +/- 0.37% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,824.00	113.73
Pu-239	240	5.16	186	249	0.00	6,902.00	115.03
Am-241	284	5.49	249	303	0.00	7,214.00	120.23

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:27:08PM 7/11/2018

Calibration

Sample Name: CCV-7107;AV17-07112018
Description:
Detector: AV17

Calibration Date: 7/11/2018 12:27:05PM
Analyst: 60040

Source Info

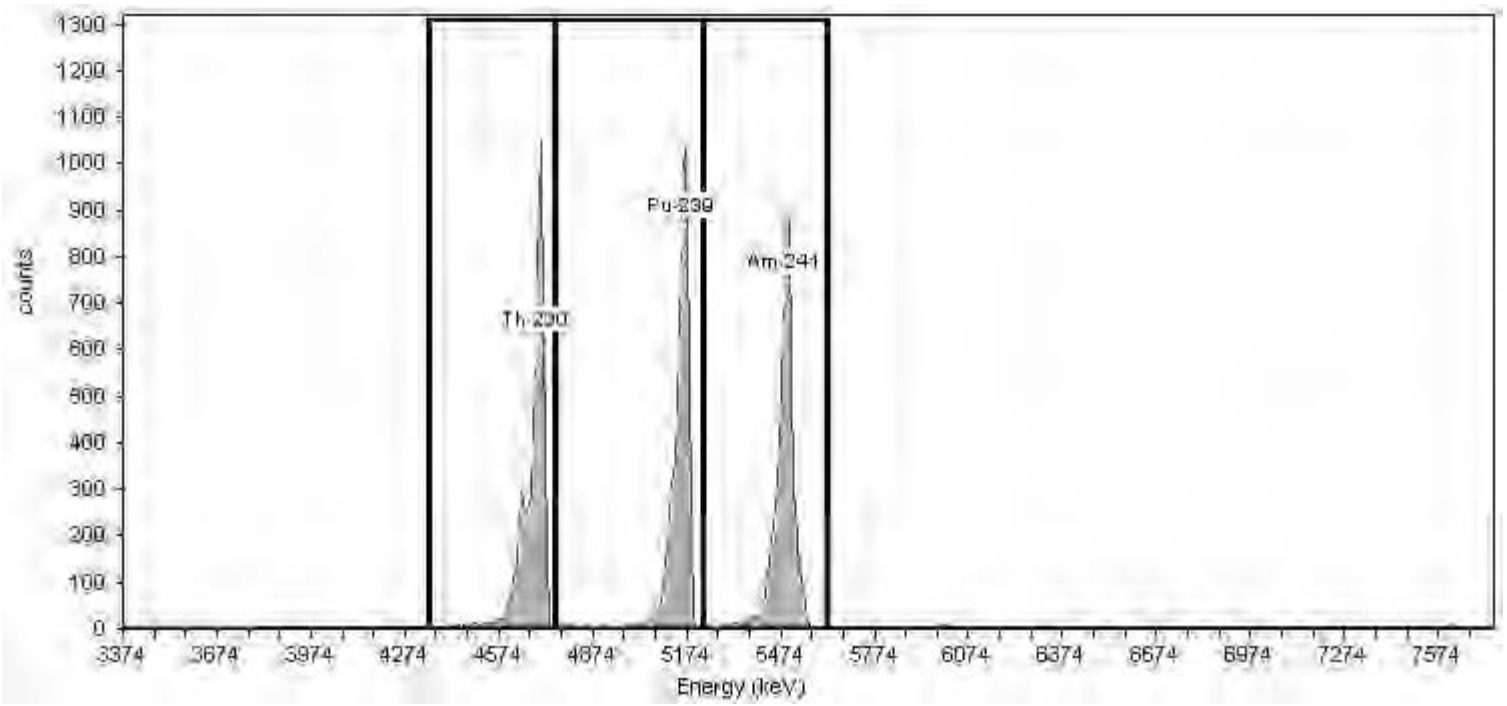
Certificate ID: 82232-334
Prepared by: Analytics

Certification Date: 6/3/2010 12:00:00PM
Description:

Acquisition

Detector: AV17 , SN: 50-051C4
Acquisition Start Date: 7/11/2018 11:07:59AM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 24.16% +/- 0.39% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,600.00	110.00
Pu-239	240	5.16	186	249	0.00	6,322.00	105.37
Am-241	284	5.49	249	303	0.00	6,185.00	103.08

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:27:32PM 7/11/2018

Calibration

Sample Name: CCV-8877;AV19-07112018
Description:
Detector: AV19

Calibration Date: 7/11/2018 12:27:29PM
Analyst: 60040

Source Info

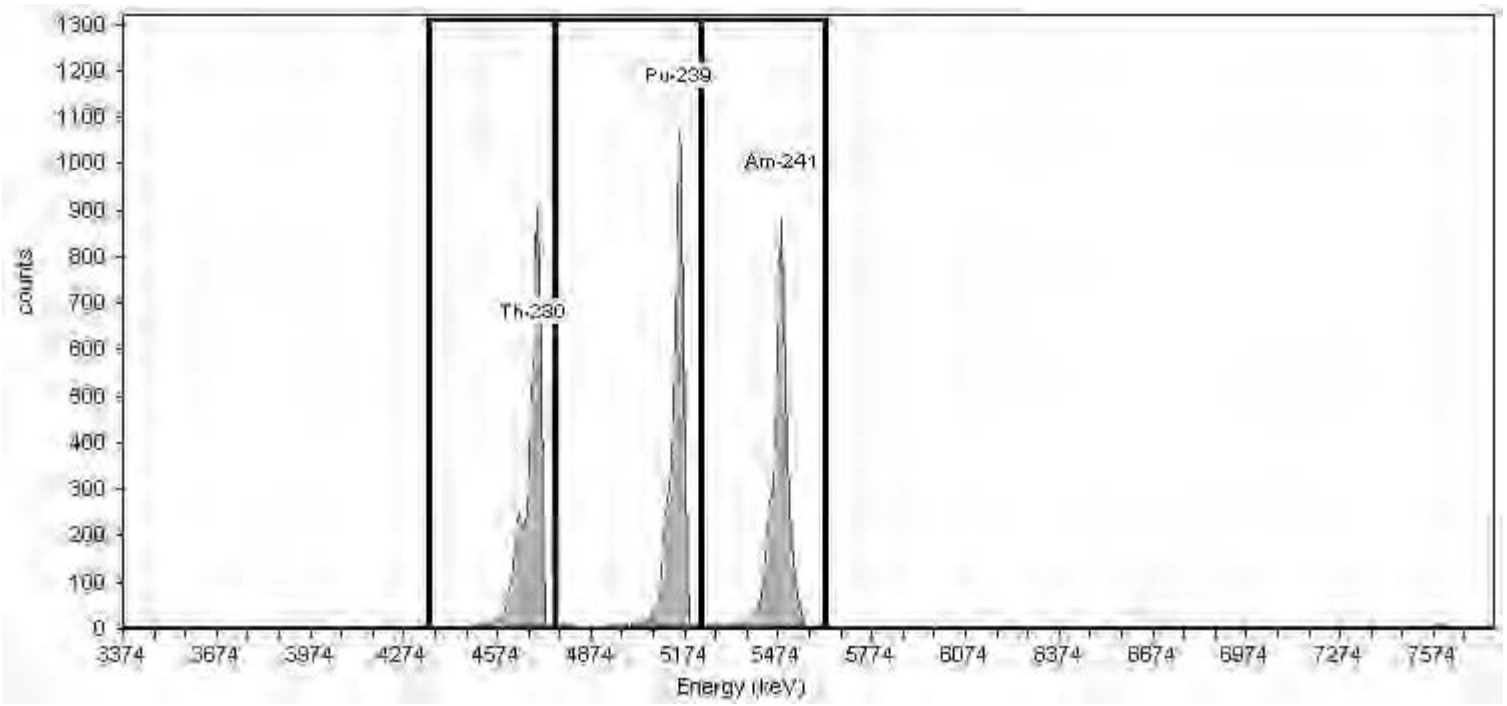
Certificate ID: 82236-334
Prepared by: Analytics

Certification Date: 6/2/2010 12:00:00PM
Description:

Acquisition

Detector: AV19 , SN: 50-025FF5
Acquisition Start Date: 7/11/2018 11:08:20AM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 23.61% +/- 0.40% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,681.00	94.68
Pu-239	240	5.16	186	249	0.00	6,119.00	101.98
Am-241	284	5.49	249	303	0.00	5,772.00	96.20

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:27:45PM 7/11/2018

Calibration

Sample Name: CCV-9520;AV20-07112018
Description:
Detector: AV20

Calibration Date: 7/11/2018 12:27:41PM
Analyst: 60040

Source Info

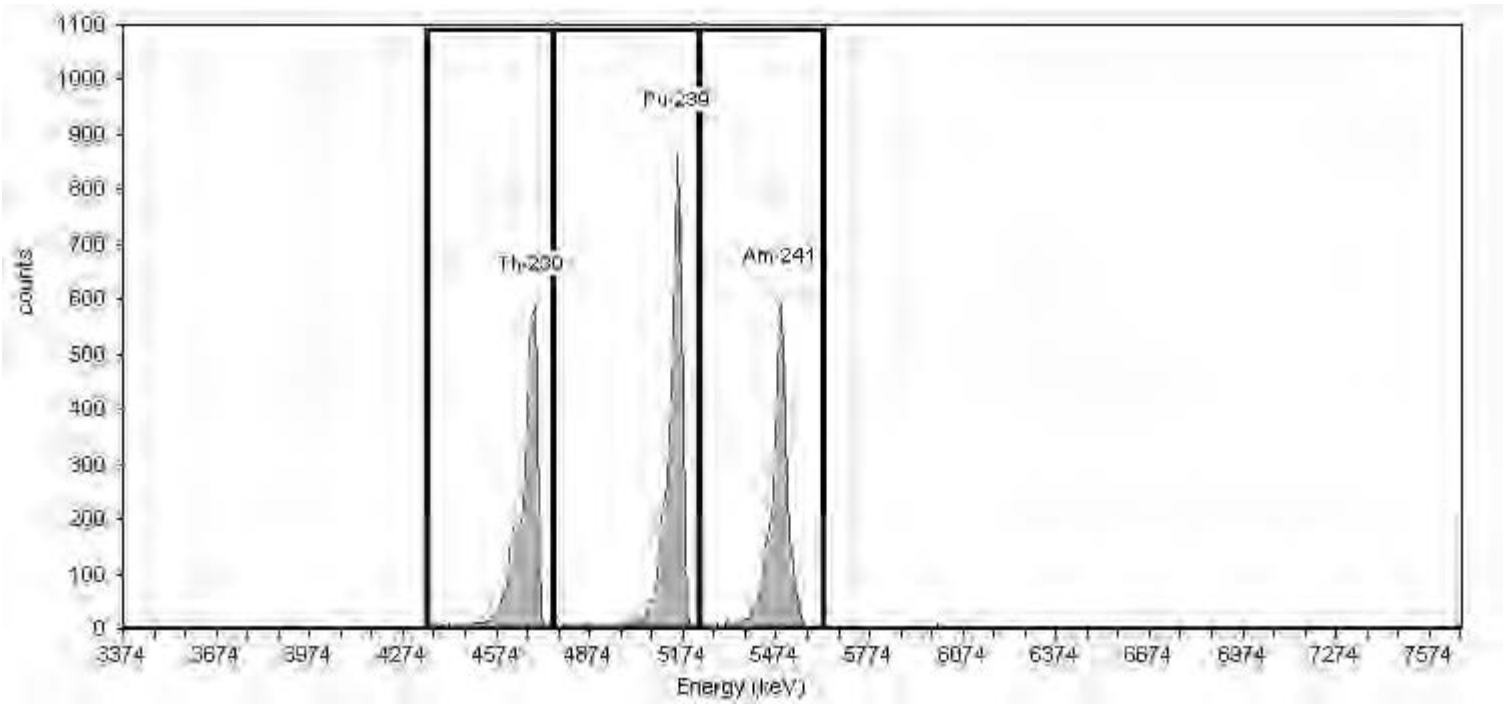
Certificate ID: 82237-334
Prepared by: Analytics

Certification Date: 6/1/2010 12:00:00PM
Description:

Acquisition

Detector: AV20 , SN: 48-121A7
Acquisition Start Date: 7/11/2018 11:08:38AM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 22.42% +/- 0.43% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	4,551.00	75.85
Pu-239	240	5.16	186	249	0.00	5,432.00	90.53
Am-241	284	5.49	249	303	0.00	4,410.00	73.50

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:27:58PM 7/11/2018

Calibration

Sample Name: CCV-9792;AV21-07112018
Description:
Detector: AV21

Calibration Date: 7/11/2018 12:27:54PM
Analyst: 60040

Source Info

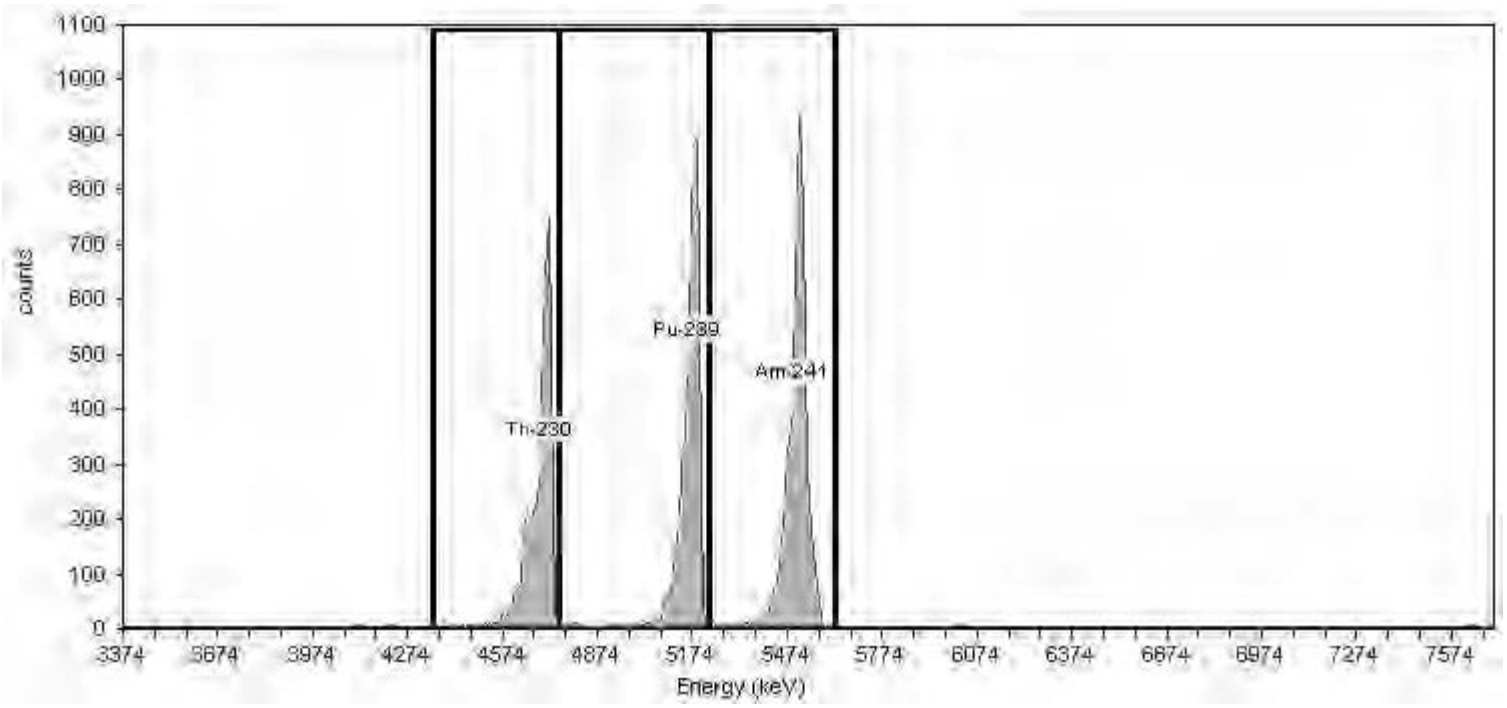
Certificate ID: 82240-334
Prepared by: Analytics

Certification Date: 6/8/2010 12:00:00PM
Description:

Acquisition

Detector: AV21 , SN: 48-102BB6
Acquisition Start Date: 7/11/2018 11:08:55AM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 23.20% +/- 0.38% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,224.00	87.07
Pu-239	240	5.16	186	249	0.00	6,035.00	100.58
Am-241	284	5.49	249	303	0.00	6,830.00	113.83

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:28:24PM 7/11/2018

Calibration

Sample Name: CCV-9795;AV23-07112018
Description:
Detector: AV23

Calibration Date: 7/11/2018 12:28:19PM
Analyst: 60040

Source Info

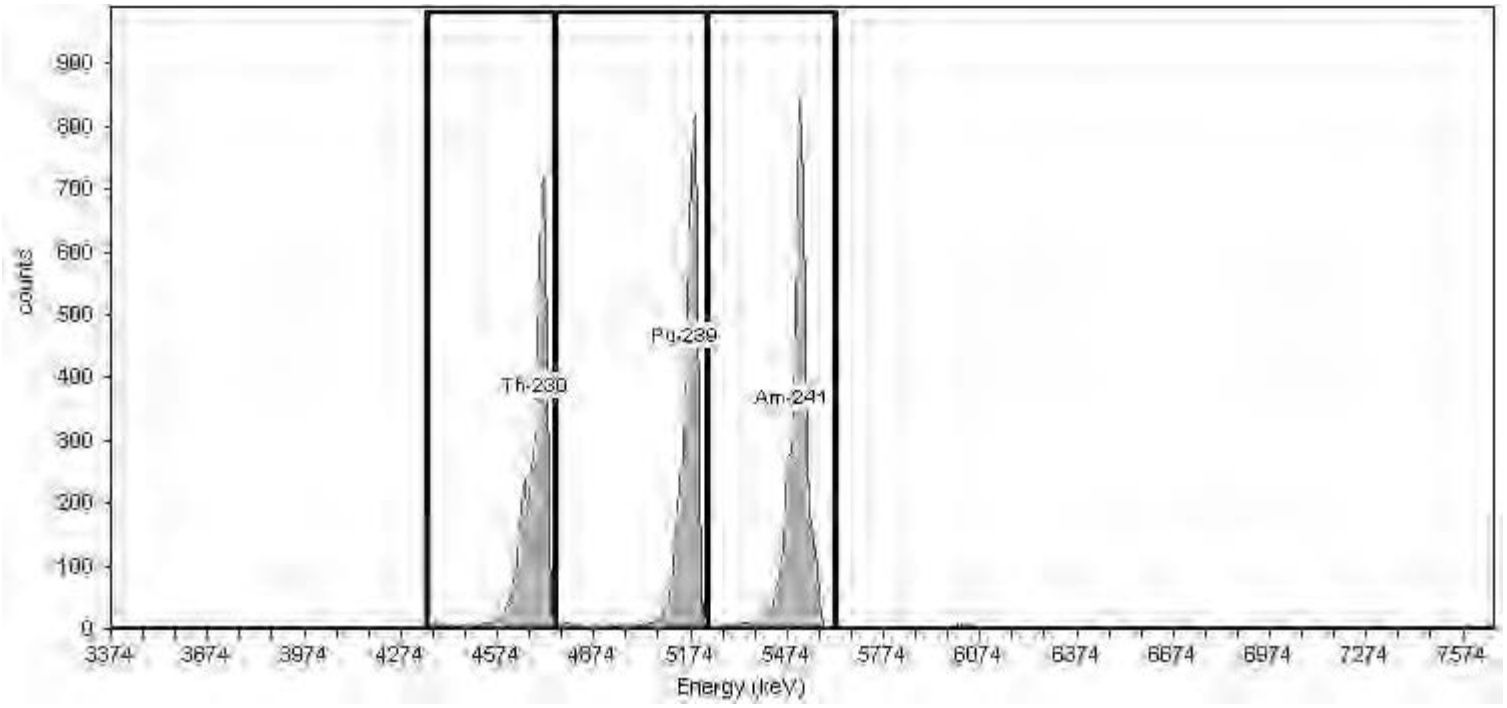
Certificate ID: 82243-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV23 , SN: 48-158FF3
Acquisition Start Date: 7/11/2018 11:09:23AM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 24.63% +/- 0.44% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,108.00	85.13
Pu-239	240	5.16	186	249	0.00	5,296.00	88.27
Am-241	284	5.49	249	303	0.00	5,687.00	94.78

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
12:30:01PM 7/11/2018

Calibration

Sample Name: CCV-1370622;AV47-07112018
Description:
Detector: AV47

Calibration Date: 7/11/2018 12:29:57PM
Analyst: 60040

Source Info

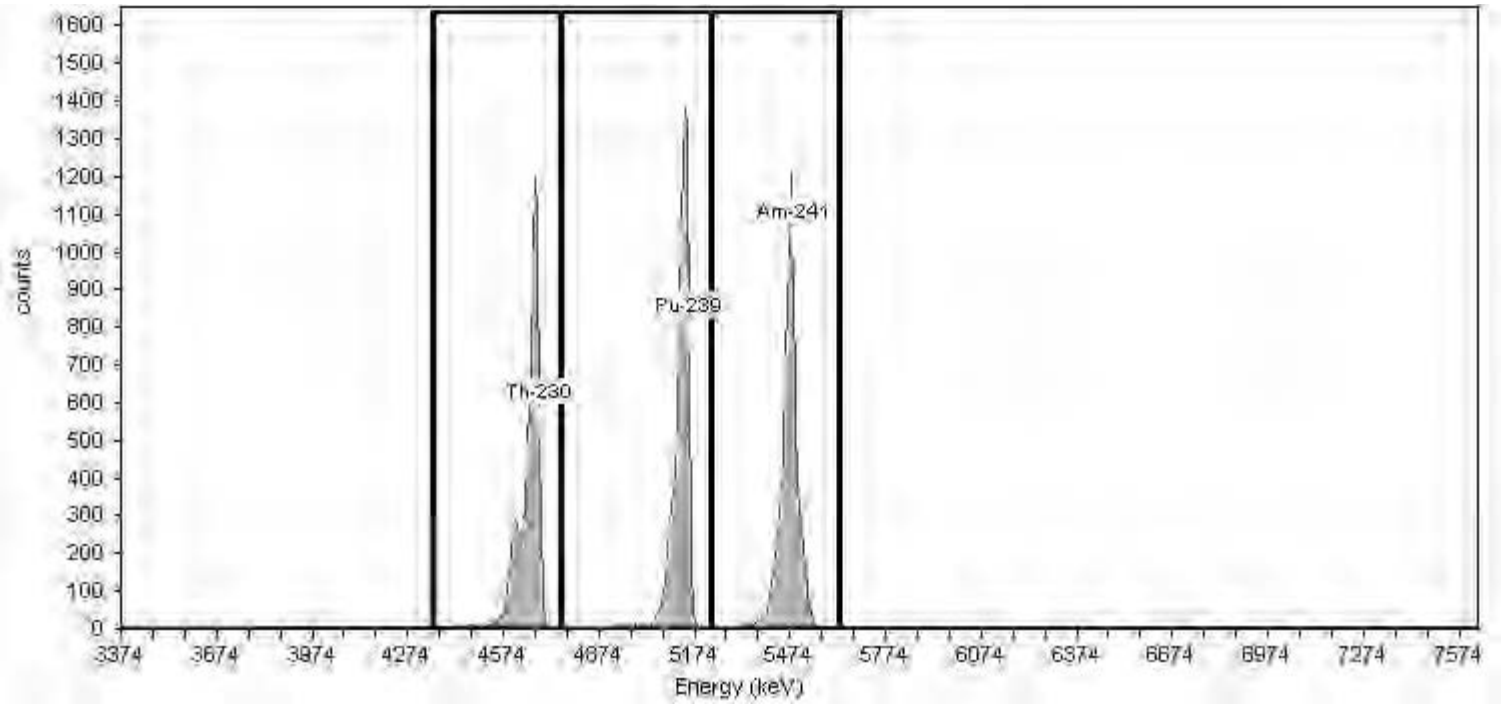
Certificate ID: 108346_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/22/2018 11:00:00AM
Description:

Acquisition

Detector: AV47 , SN: 46-032336
Acquisition Start Date: 7/11/2018 11:10:55AM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 26.62% +/- 0.36% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	7,236.00	120.60
Pu-239	240	5.16	186	249	0.00	7,711.00	128.52
Am-241	284	5.49	249	303	0.00	7,499.00	124.98

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
1:46:42PM 7/11/2018

Calibration

Sample Name: CCV-1370619;AV48-07112018
Description:
Detector: AV48

Calibration Date: 7/11/2018 1:46:38PM
Analyst: 60040

Source Info

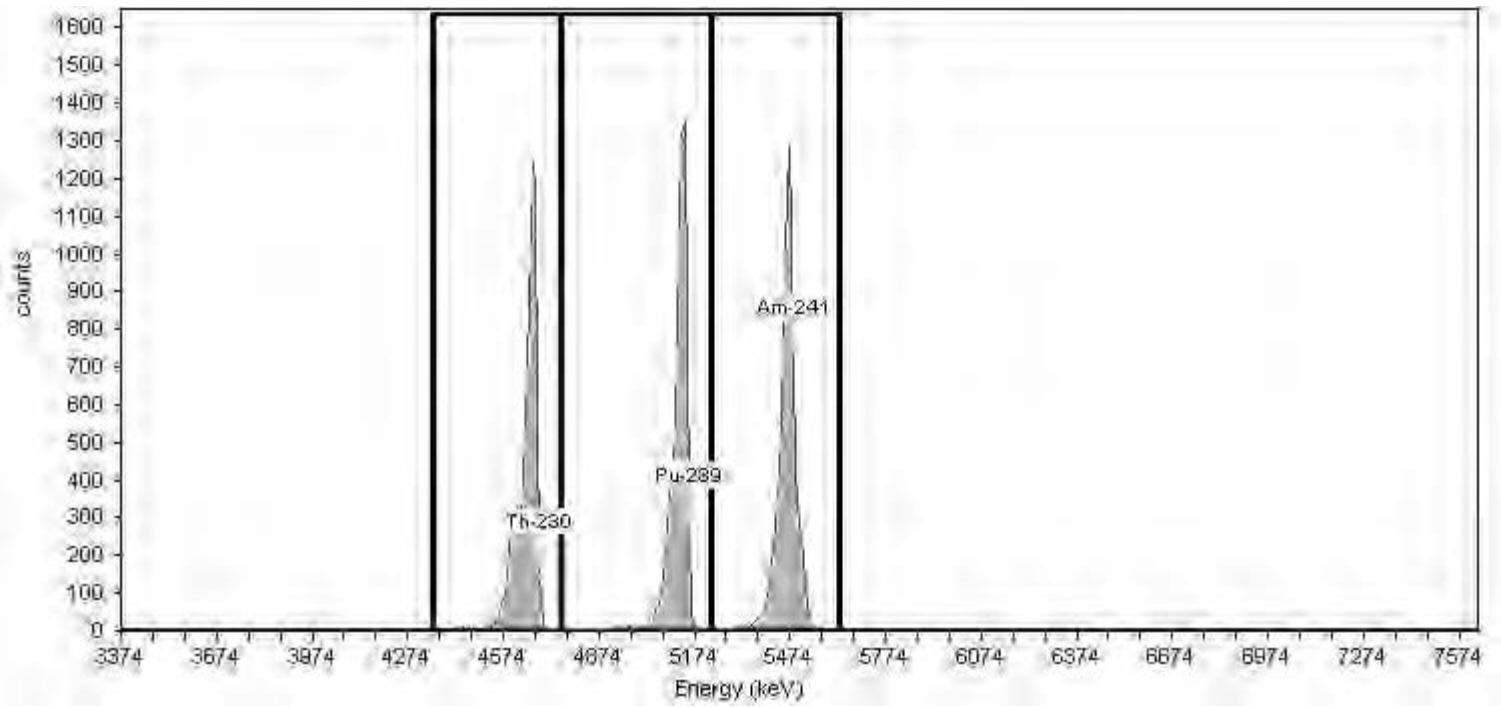
Certificate ID: 108347_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/23/2018 11:00:00AM
Description:

Acquisition

Detector: AV48 , SN: 46-033P6
Acquisition Start Date: 7/11/2018 12:36:39PM
Live Time: 60.00 min.
Real Time: 60.02 min.
Efficiency: 27.07% +/- 0.35% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	7,892.00	131.53
Pu-239	240	5.16	186	249	0.00	7,827.00	130.45
Am-241	284	5.49	249	303	0.00	8,433.00	140.55

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
1:49:46PM 7/11/2018

Calibration

Sample Name: CCV-8877;AV52-07112018a
Description:
Detector: AV52

Calibration Date: 7/11/2018 1:49:42PM
Analyst: 60040

Source Info

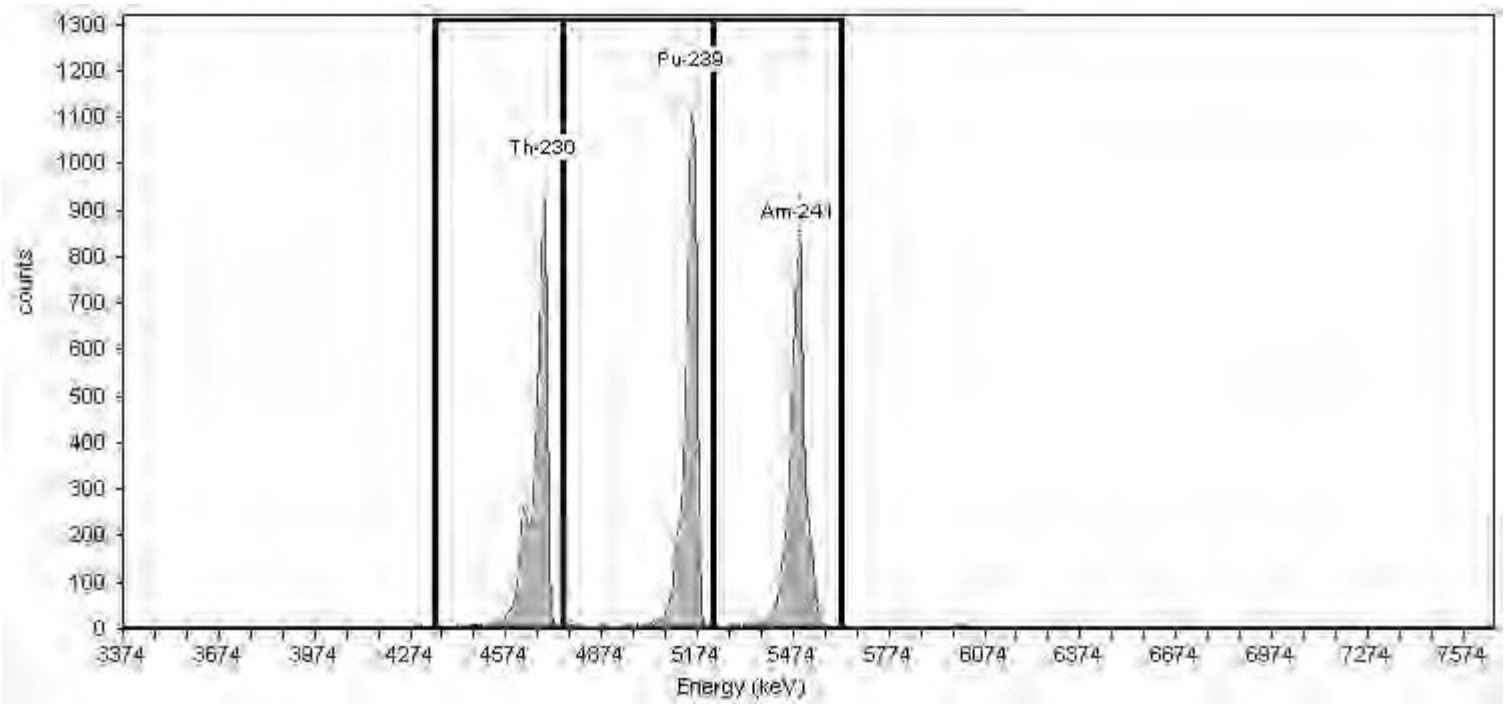
Certificate ID: 82236-334
Prepared by: Analytics

Certification Date: 6/2/2010 12:00:00PM
Description:

Acquisition

Detector: AV52 , SN: 49-155N7
Acquisition Start Date: 7/11/2018 12:40:07PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 25.00% +/- 0.41% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,121.00	102.02
Pu-239	240	5.16	186	249	0.00	6,373.00	106.22
Am-241	284	5.49	249	303	0.00	6,077.00	101.28

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
1:48:11PM 7/11/2018

Calibration

Sample Name: CCV-9792;AV54-07112018
Description:
Detector: AV54

Calibration Date: 7/11/2018 1:48:01PM
Analyst: 60040

Source Info

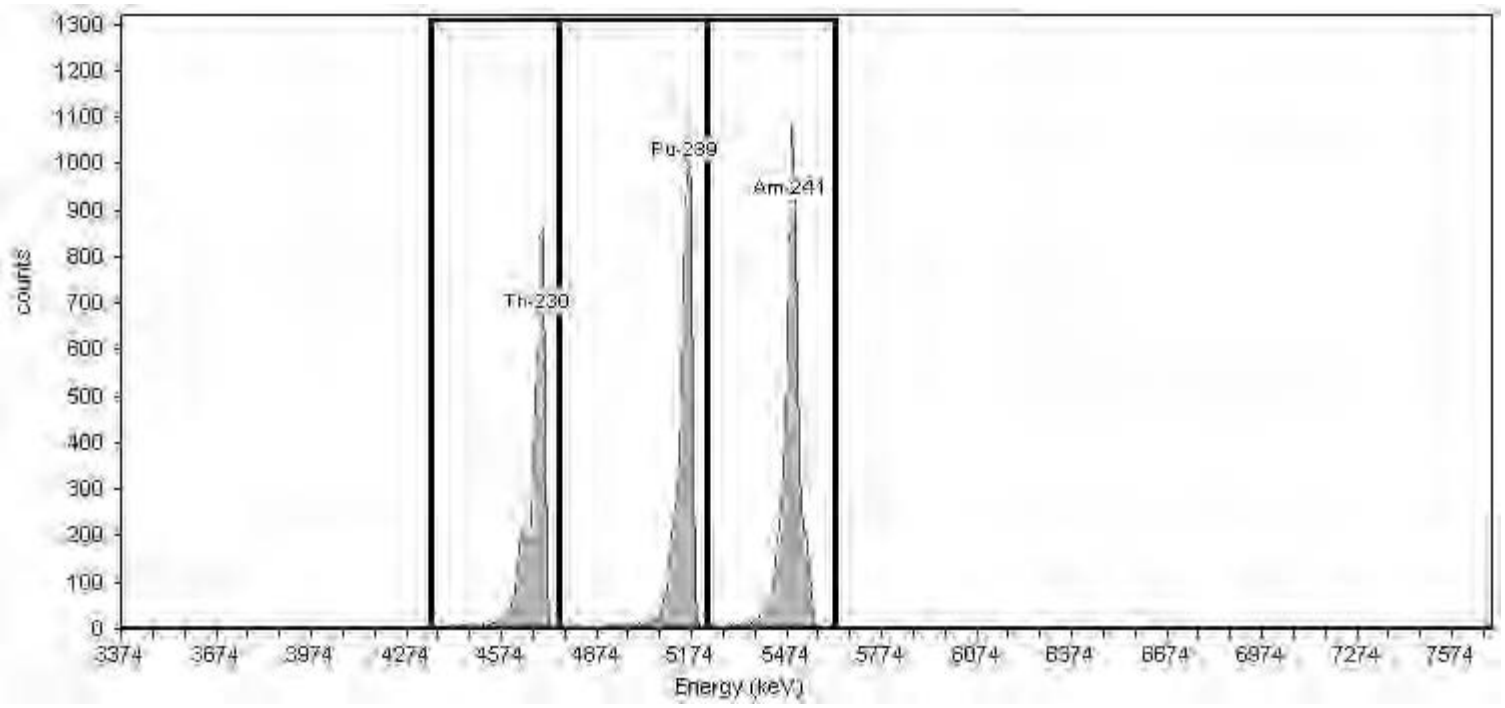
Certificate ID: 82240-334
Prepared by: Analytics

Certification Date: 6/8/2010 12:00:00PM
Description:

Acquisition

Detector: AV54 , SN: 46-033P4
Acquisition Start Date: 7/11/2018 12:38:13PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 23.43% +/- 0.39% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,231.00	87.18
Pu-239	240	5.16	186	249	0.00	6,099.00	101.65
Am-241	284	5.49	249	303	0.00	6,944.00	115.73

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
1:50:06PM 7/11/2018

Calibration

Sample Name: CCV-9795;AV56-07112018a
Description:
Detector: AV56

Calibration Date: 7/11/2018 1:50:01PM
Analyst: 60040

Source Info

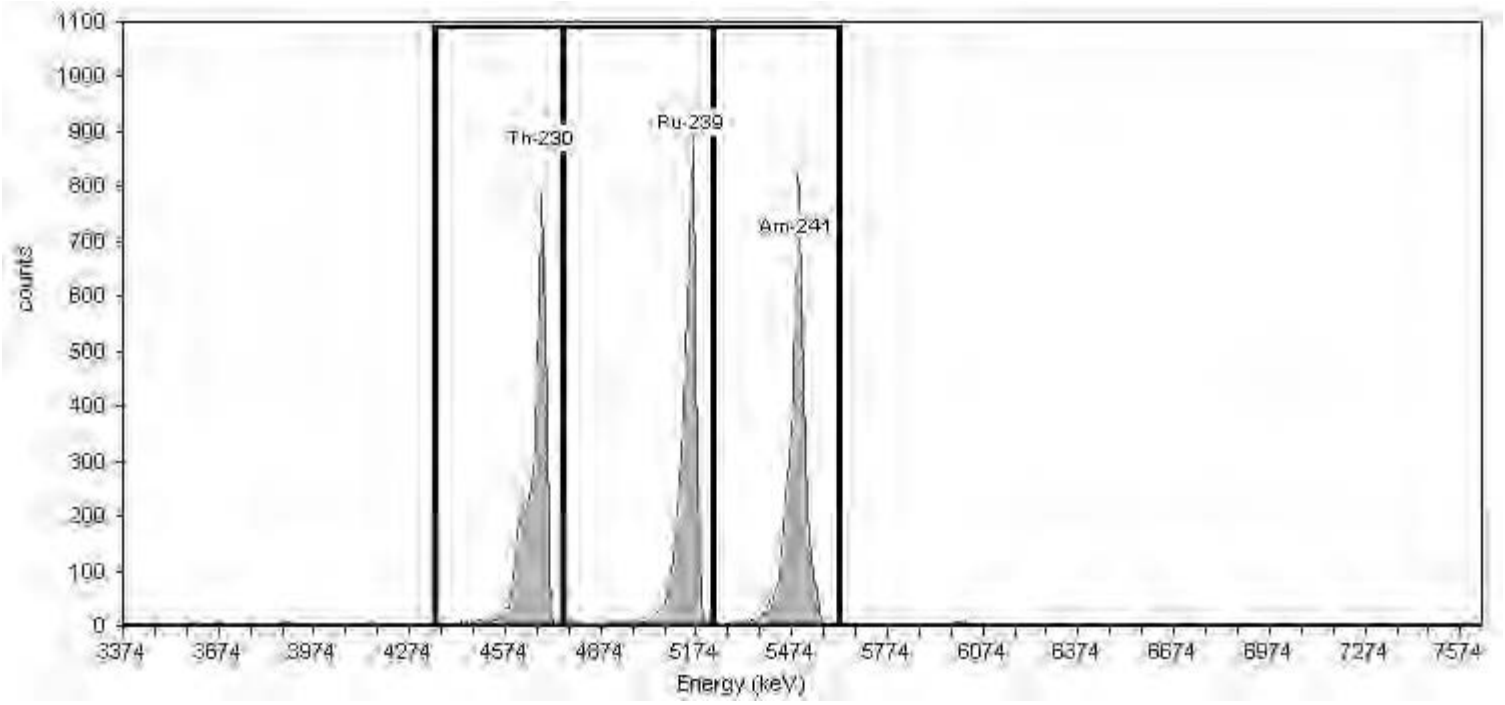
Certificate ID: 82243-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV56 , SN: 52-059EE5
Acquisition Start Date: 7/11/2018 12:40:33PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 25.21% +/- 0.45% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,301.00	88.35
Pu-239	240	5.16	186	249	0.00	5,441.00	90.68
Am-241	284	5.49	249	303	0.00	5,725.00	95.42

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
1:48:57PM 7/11/2018

Calibration

Sample Name: CCV-9817;AV57-07112018
Description:
Detector: AV57

Calibration Date: 7/11/2018 1:48:53PM
Analyst: 60040

Source Info

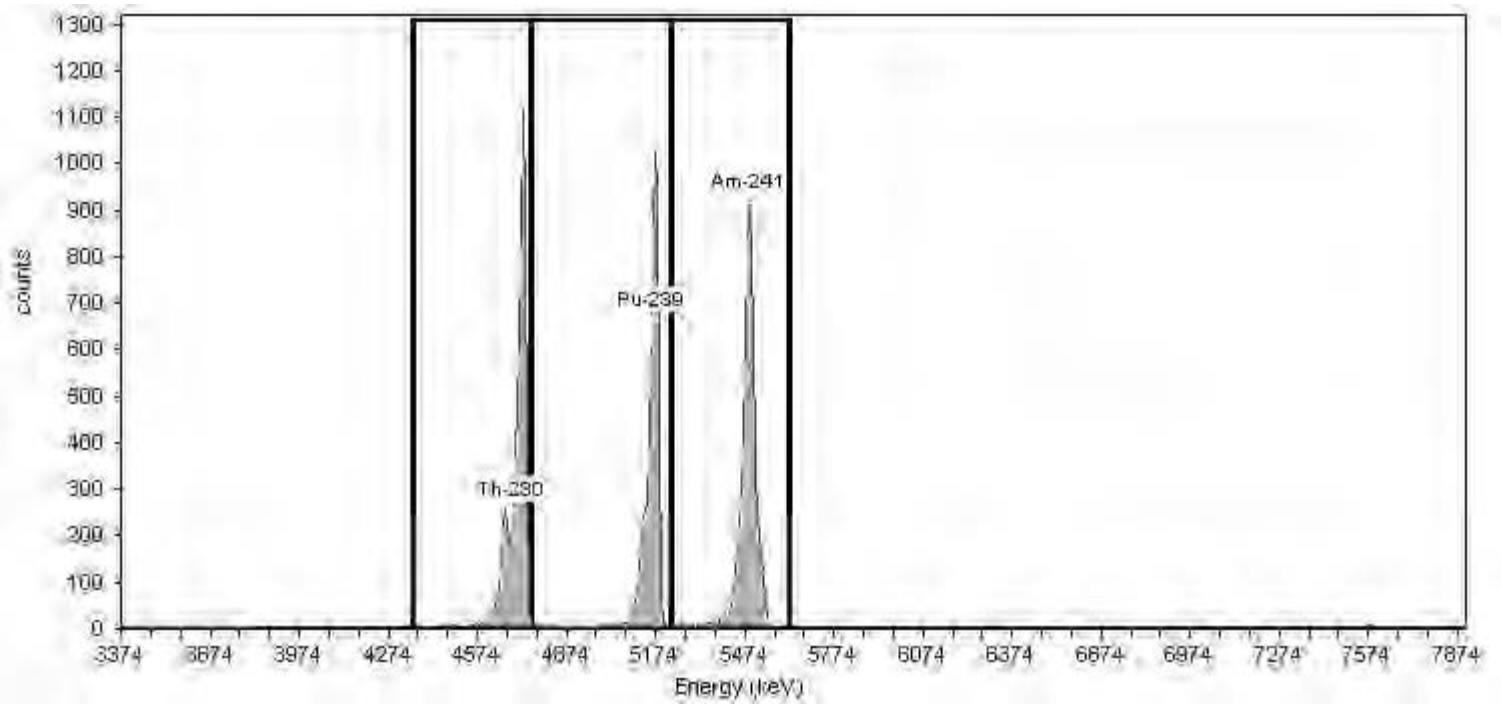
Certificate ID: 82244-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV57 , SN: 48-158EE3
Acquisition Start Date: 7/11/2018 12:39:03PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 22.56% +/- 0.39% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	5,941.00	99.02
Pu-239	240	5.16	186	249	0.00	5,425.00	90.42
Am-241	284	5.49	249	303	0.00	5,598.00	93.30

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
1:51:40PM 7/11/2018

Calibration

Sample Name: CCV-9885;AV58-07112018b
Description:
Detector: AV58

Calibration Date: 7/11/2018 1:51:36PM
Analyst: 60040

Source Info

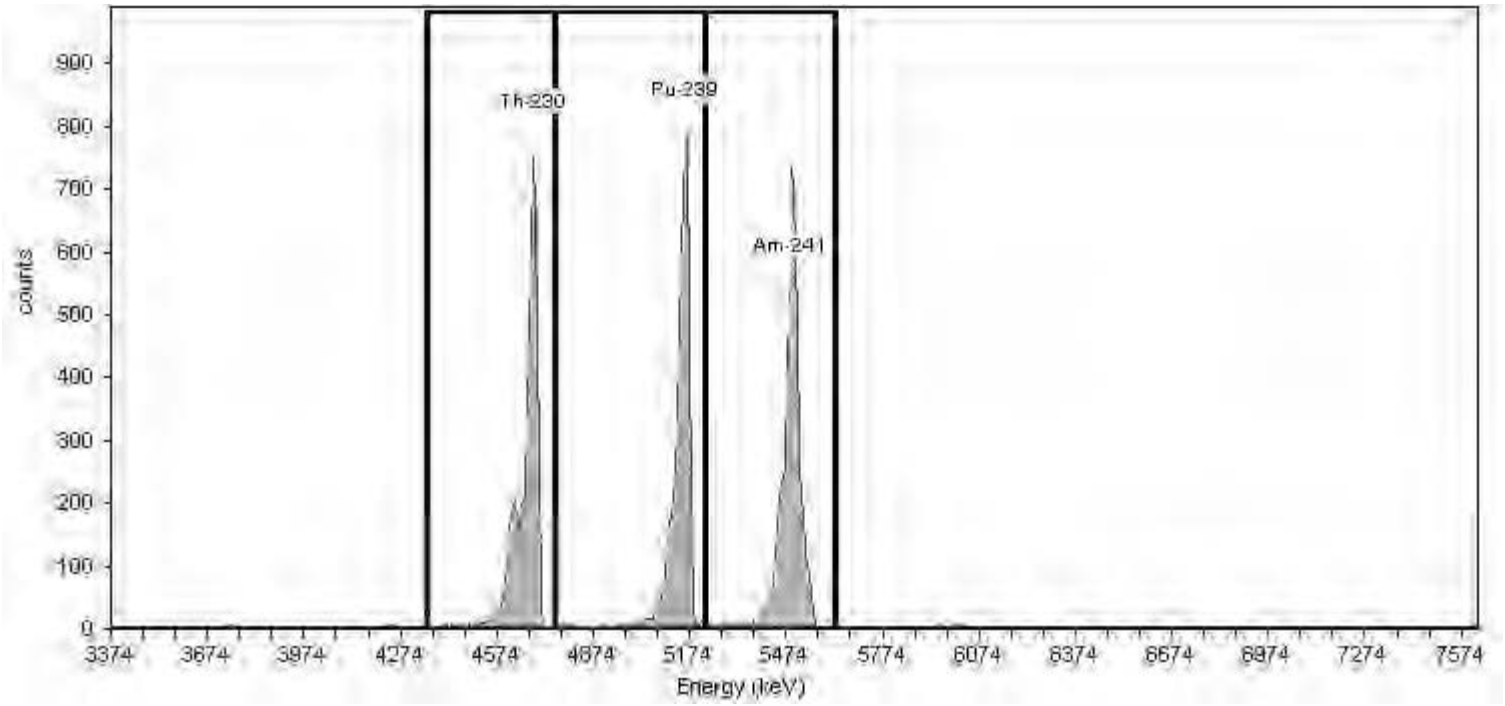
Certificate ID: 82246-334
Prepared by: Analytics

Certification Date: 6/9/2010 12:00:00PM
Description:

Acquisition

Detector: AV58 , SN: 52-102 C5
Acquisition Start Date: 7/11/2018 12:42:31PM
Live Time: 60.00 min.
Real Time: 60.04 min.
Efficiency: 24.06% +/- 0.47% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	4,796.00	79.93
Pu-239	240	5.16	186	249	0.00	4,746.00	79.10
Am-241	284	5.49	249	303	0.00	5,061.00	84.35

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
1:49:29PM 7/11/2018

Calibration

Sample Name: CCV-1368446;AV60-07112018
Description:
Detector: AV60

Calibration Date: 7/11/2018 1:49:24PM
Analyst: 60040

Source Info

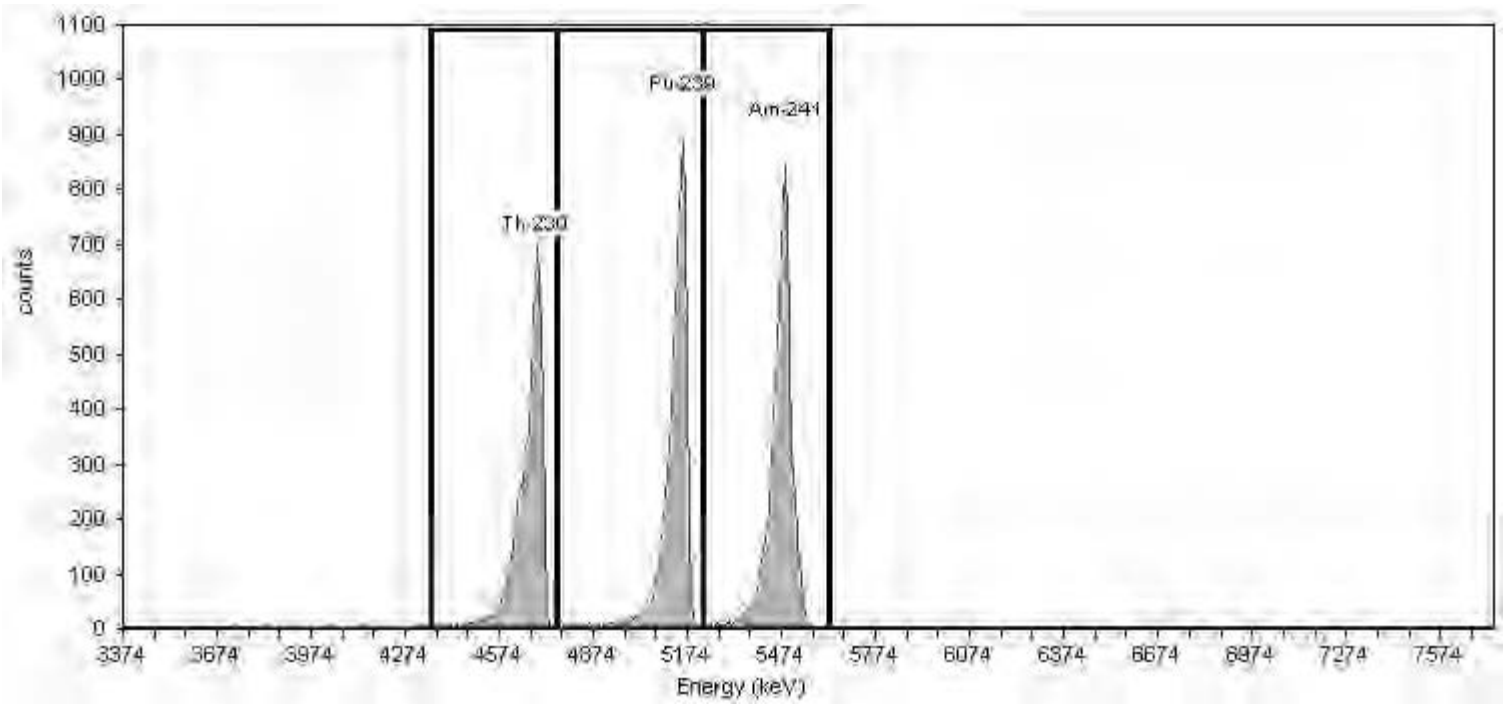
Certificate ID: 108001_00001
Prepared by: Eckert & Ziegler

Certification Date: 12/6/2017 11:00:00AM
Description:

Acquisition

Detector: AV60 , SN: 49-027117
Acquisition Start Date: 7/11/2018 12:39:38PM
Live Time: 60.00 min.
Real Time: 60.03 min.
Efficiency: 28.27% +/- 0.40% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,202.00	103.37
Pu-239	240	5.16	186	249	0.00	6,823.00	113.72
Am-241	284	5.49	249	303	0.00	7,277.00	121.28

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
1:50:58PM 7/11/2018

Calibration

Sample Name: CCV-1368447;AV62-07112018
Description:
Detector: AV62

Calibration Date: 7/11/2018 1:50:53PM
Analyst: 60040

Source Info

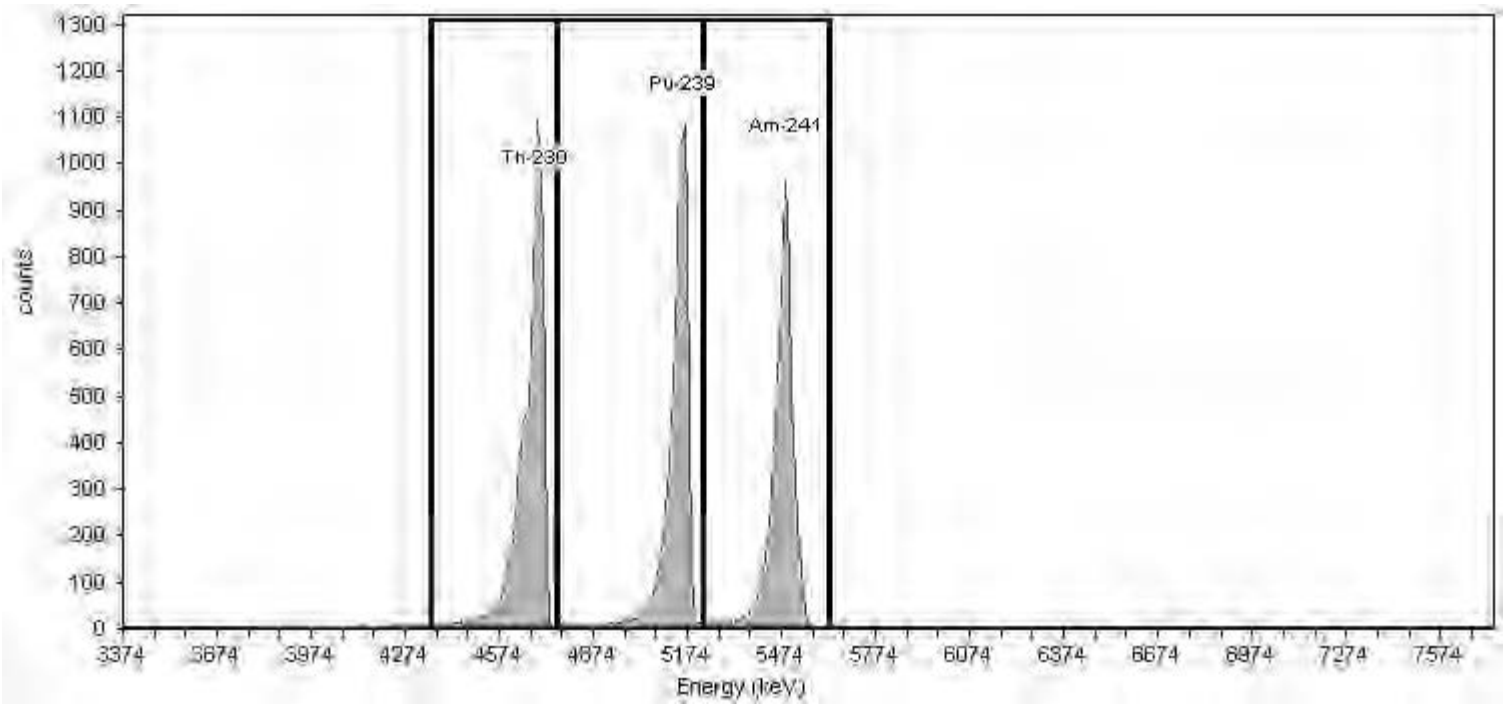
Certificate ID: 108002_00001
Prepared by: Eckert & Ziegler

Certification Date: 12/1/2017 11:00:00AM
Description:

Acquisition

Detector: AV62 , SN: 52-060FF2
Acquisition Start Date: 7/11/2018 12:41:10PM
Live Time: 60.00 min.
Real Time: 60.03 min.
Efficiency: 28.59% +/- 0.35% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	9,586.00	159.77
Pu-239	240	5.16	186	249	0.00	8,827.00	147.12
Am-241	284	5.49	249	303	0.00	8,304.00	138.40

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
1:51:12PM 7/11/2018

Calibration

Sample Name: CCV-1370621;AV63-07112018
Description:
Detector: AV63

Calibration Date: 7/11/2018 1:51:08PM
Analyst: 60040

Source Info

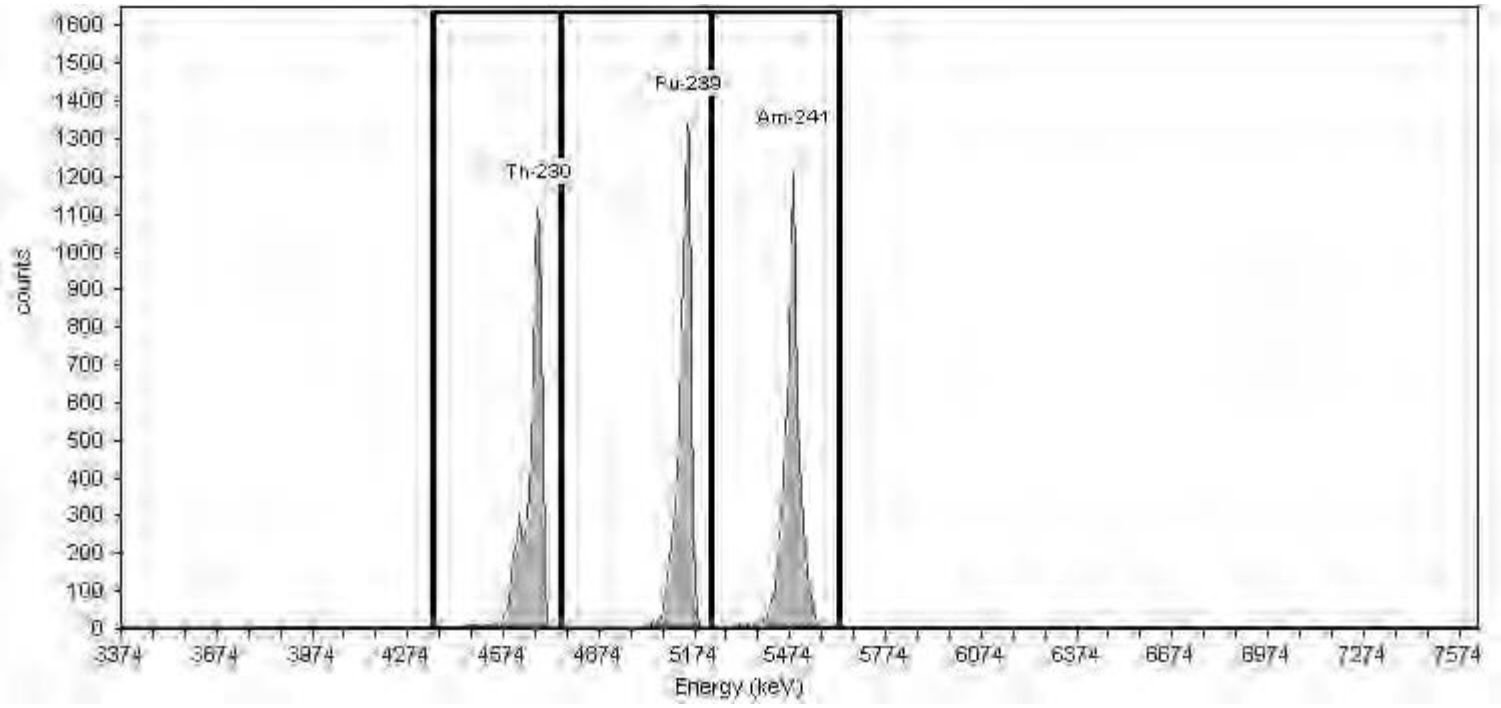
Certificate ID: 108345_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/22/2018 11:00:00AM
Description:

Acquisition

Detector: AV63 , SN: 47-029ff2
Acquisition Start Date: 7/11/2018 12:41:30PM
Live Time: 60.00 min.
Real Time: 60.03 min.
Efficiency: 26.73% +/- 0.36% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,987.00	116.45
Pu-239	240	5.16	186	249	0.00	7,572.00	126.20
Am-241	284	5.49	249	303	0.00	7,509.00	125.15

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
1:51:28PM 7/11/2018

Calibration

Sample Name: CCV-1370622;AV64-07112018
Description:
Detector: AV64

Calibration Date: 7/11/2018 1:51:24PM
Analyst: 60040

Source Info

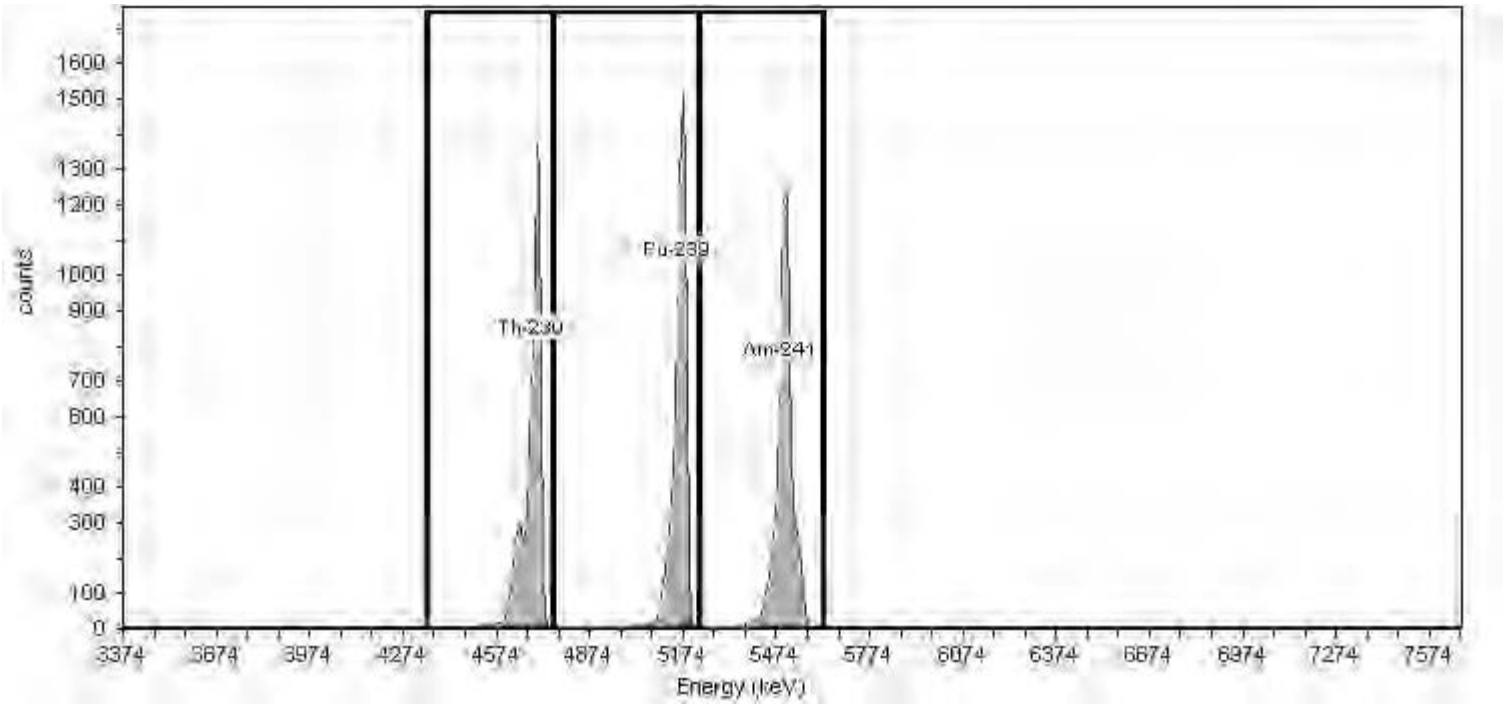
Certificate ID: 108346_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/22/2018 11:00:00AM
Description:

Acquisition

Detector: AV64 , SN: 43-028v3
Acquisition Start Date: 7/11/2018 12:41:31PM
Live Time: 60.00 min.
Real Time: 60.03 min.
Efficiency: 28.44% +/- 0.37% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	7,799.00	129.98
Pu-239	240	5.16	186	249	0.00	8,075.00	134.58
Am-241	284	5.49	249	303	0.00	8,103.00	135.05

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Calibration Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
3:25:31PM 7/11/2018

Calibration

Sample Name: CCV-1370620;AV66-07112018
Description:
Detector: AV66

Calibration Date: 7/11/2018 3:25:27PM
Analyst: 60040

Source Info

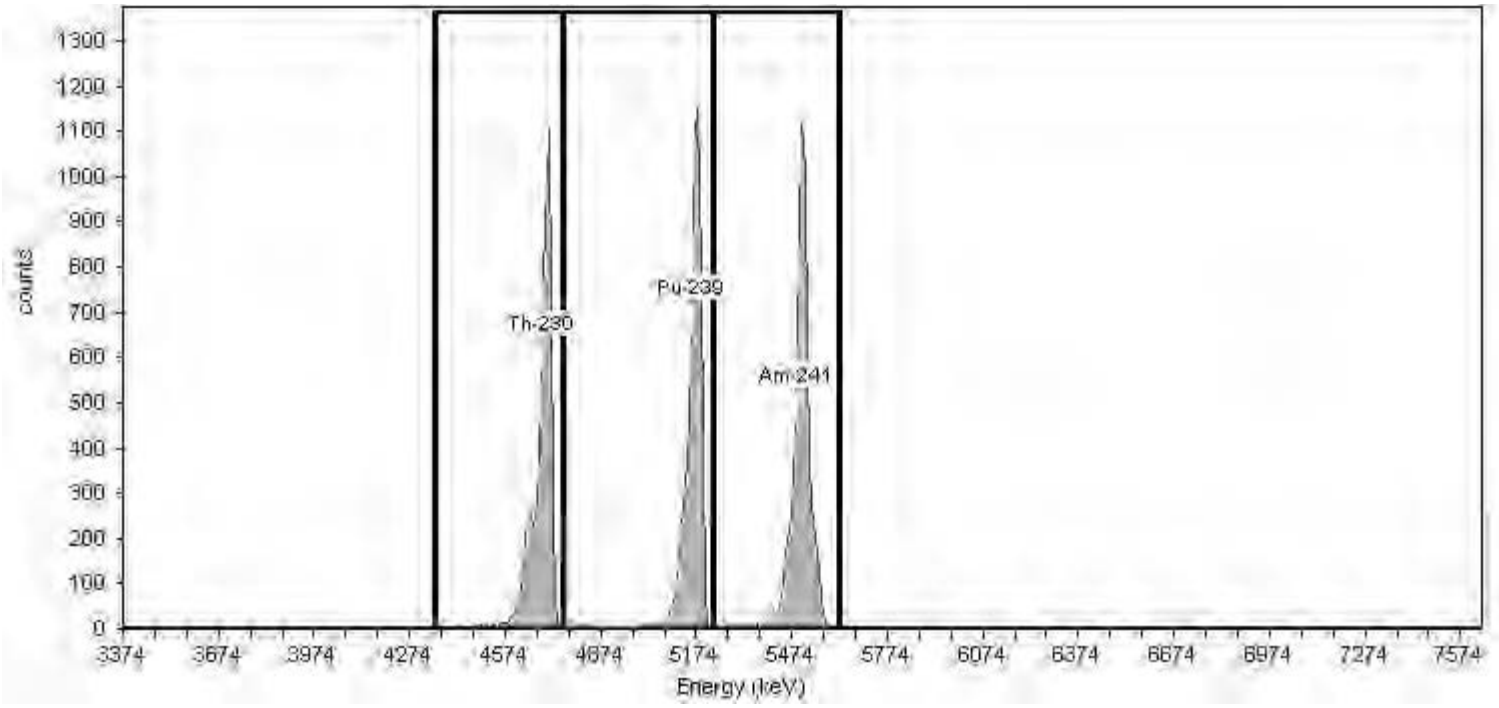
Certificate ID: 108348_00001
Prepared by: Eckert & Ziegler

Certification Date: 1/23/2018 11:00:00PM
Description:

Acquisition

Detector: AV66 , SN: 48-158EE2
Acquisition Start Date: 7/11/2018 2:03:17PM
Live Time: 60.00 min.
Real Time: 60.02 min.
Efficiency: 26.67% +/- 0.37% TPU(2 sigma)

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2



General Analysis

Method: Manual (ROI)
Algorithm: Linear

Initial Calibration: No
Shelf: 1

Nuclide Activity Summary

Nuclide	Peak Channel	Peak Energy MeV	ROI Start Channel	ROI End Channel	Peak FWHM keV	Gross Counts	Net Count Rate (cpm)
Th-230	177	4.69	132	186	0.00	6,691.00	111.52
Pu-239	240	5.16	186	249	0.00	6,757.00	112.62
Am-241	284	5.49	249	303	0.00	7,214.00	120.23

Monthly Backgrounds

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:56:36AM 7/13/2018

Sample

Sample Name: ICB;AV7
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

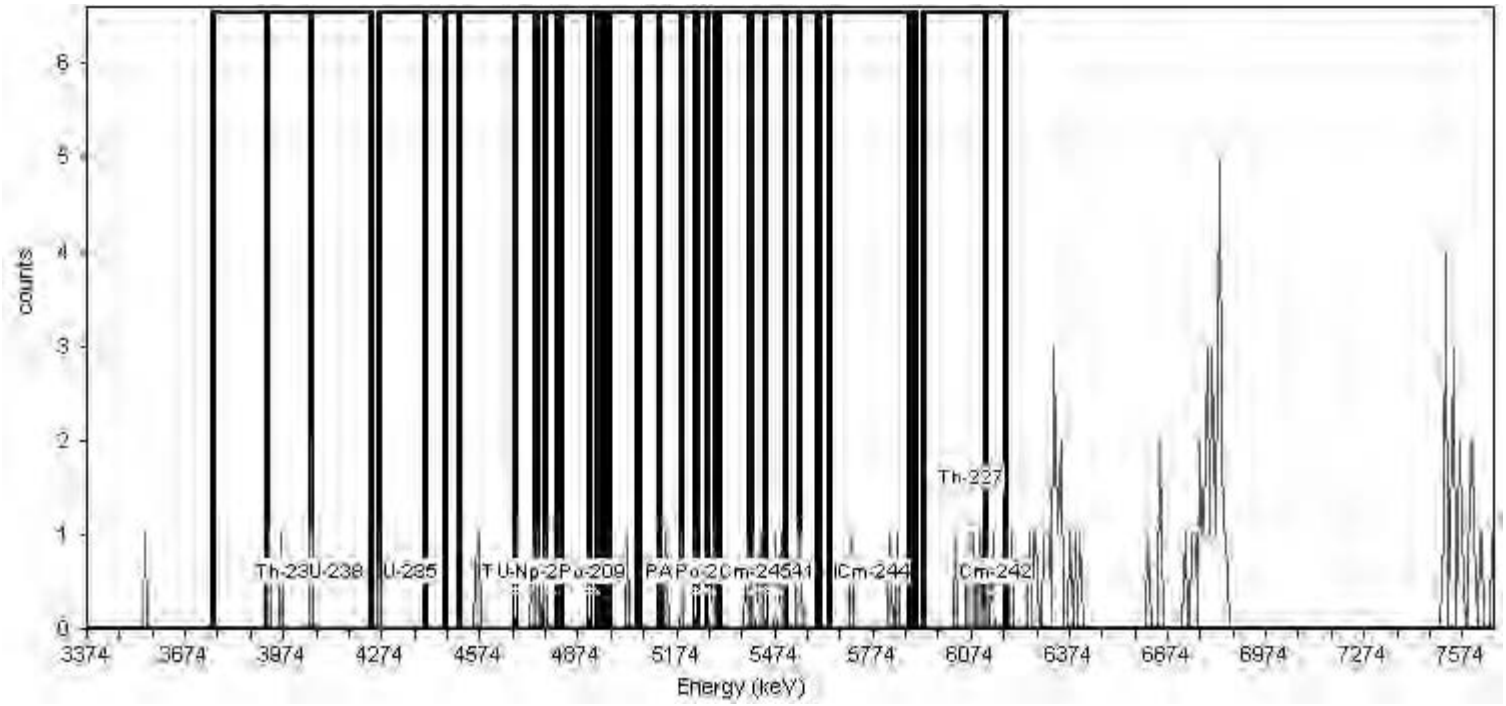
Analyst: 60040

Acquisition

Detector: AV7 , SN: 48-158EE5
Acquisition Start Date: 7/12/2018 1:39:27PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Calibration Name: IC-9793;AV7-05142018
Calibration Date: 5/14/2018 6:26:13PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 22.98% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 101.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	4.00	4.167E-003	2.329E-003
U-238	4.14	3.92	4.24	4.00	4.167E-003	2.329E-003
U-235	4.36	4.26	4.46	1.00	1.042E-003	1.473E-003
Th-230	4.68	4.40	4.75	4.00	4.167E-003	2.329E-003
U-234	4.71	4.51	4.82	5.00	5.208E-003	2.552E-003
Pu-242	4.90	4.68	4.95	3.00	3.125E-003	2.083E-003
Th-229	4.86	4.74	5.12	3.00	3.125E-003	2.083E-003
Np-237	4.78	4.77	4.81	1.00	1.042E-003	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	3.00	3.125E-003	2.083E-003
Am-243	5.23	5.05	5.31	3.00	3.125E-003	2.083E-003
U-232	5.25	5.06	5.40	4.00	4.167E-003	2.329E-003
Th-228	5.45	5.19	5.51	8.00	8.333E-003	3.125E-003
Po-210	5.28	5.23	5.29	1.00	1.042E-003	1.473E-003
Pu-238	5.47	5.27	5.55	9.00	9.375E-003	3.294E-003
Am-241	5.48	5.30	5.60	8.00	8.333E-003	3.125E-003
Cm-245	5.42	5.40	5.45	3.00	3.125E-003	2.083E-003
Pu-236	5.76	5.61	5.89	3.00	3.125E-003	2.083E-003
Cm-244	5.78	5.64	5.90	3.00	3.125E-003	2.083E-003
Th-227	6.07	5.93	6.18	7.00	7.292E-003	2.946E-003
Cm-242	6.15	6.12	6.18	2.00	2.083E-003	1.804E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:56:47AM 7/13/2018

Sample

Sample Name: ICB;AV8
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

Analyst: 60040

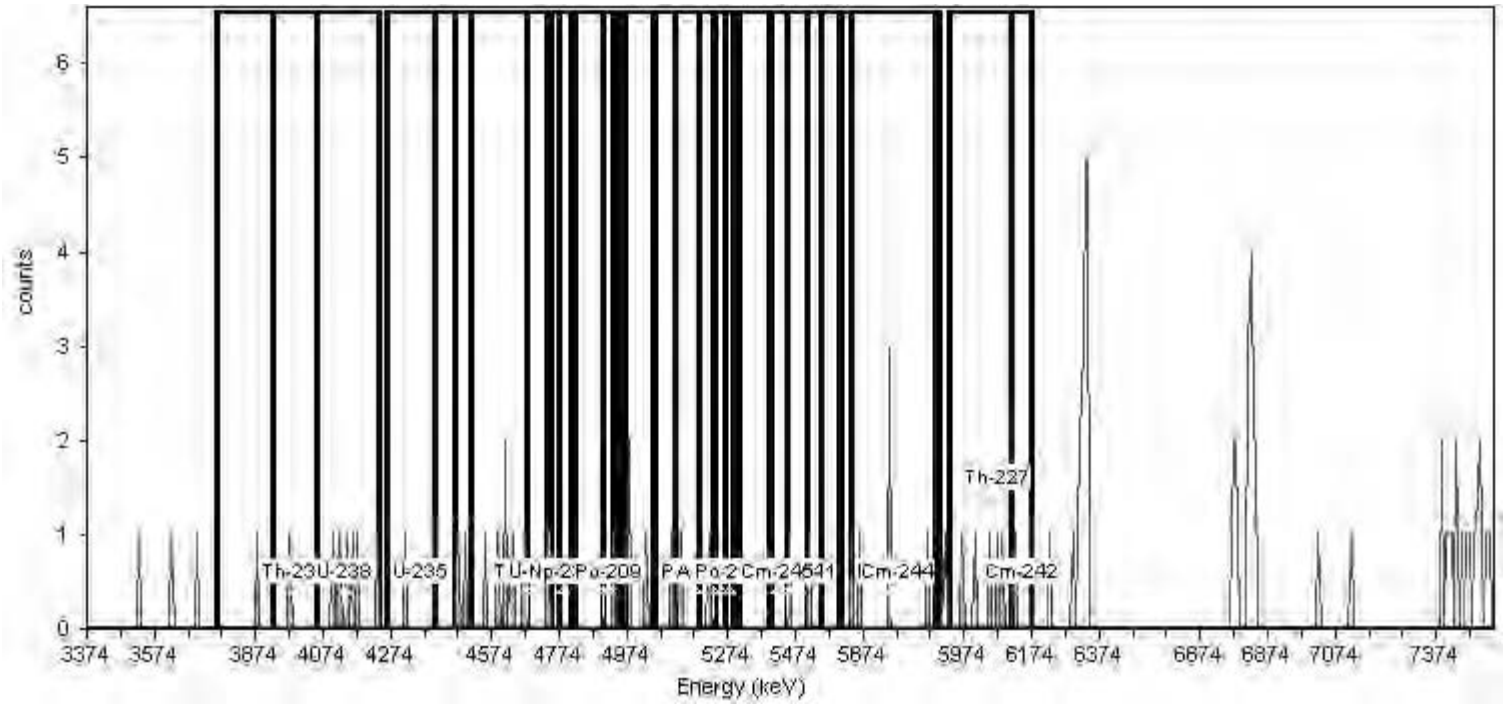
Acquisition

Detector: AV8 , SN: 41-137Q6
Acquisition Start Date: 7/12/2018 1:39:28PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Calibration Name: IC-9795;AV8-05142018
Calibration Date: 5/14/2018 6:26:27PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 25.96% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 99.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-230	4.68	4.40	4.75	11.00	1.146E-002	3.608E-003
U-234	4.71	4.51	4.82	9.00	9.375E-003	3.294E-003
Pu-242	4.90	4.68	4.95	2.00	2.083E-003	1.804E-003
Th-229	4.86	4.74	5.12	6.00	6.250E-003	2.756E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	1.00	1.042E-003	1.473E-003
Pu-239	5.18	4.97	5.24	7.00	7.292E-003	2.946E-003
Am-243	5.23	5.05	5.31	4.00	4.167E-003	2.329E-003
U-232	5.25	5.06	5.40	4.00	4.167E-003	2.329E-003
Th-228	5.45	5.19	5.51	2.00	2.083E-003	1.804E-003
Po-210	5.28	5.23	5.29	0.00	0.000E+000	1.473E-003
Pu-238	5.47	5.27	5.55	2.00	2.083E-003	1.804E-003
Am-241	5.48	5.30	5.60	2.00	2.083E-003	1.804E-003
Cm-245	5.42	5.40	5.45	0.00	0.000E+000	1.473E-003
Pu-236	5.76	5.61	5.89	6.00	6.250E-003	2.756E-003
Cm-244	5.78	5.64	5.90	6.00	6.250E-003	2.756E-003
Th-227	6.07	5.93	6.18	6.00	6.250E-003	2.756E-003
Cm-242	6.15	6.12	6.18	1.00	1.042E-003	1.473E-003
Th-232	3.99	3.75	4.05	2.00	2.083E-003	1.804E-003
U-238	4.14	3.92	4.24	7.00	7.292E-003	2.946E-003
U-235	4.36	4.26	4.46	1.00	1.042E-003	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:57:05AM 7/13/2018

Sample

Sample Name: ICB;AV10
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

Analyst: 60040

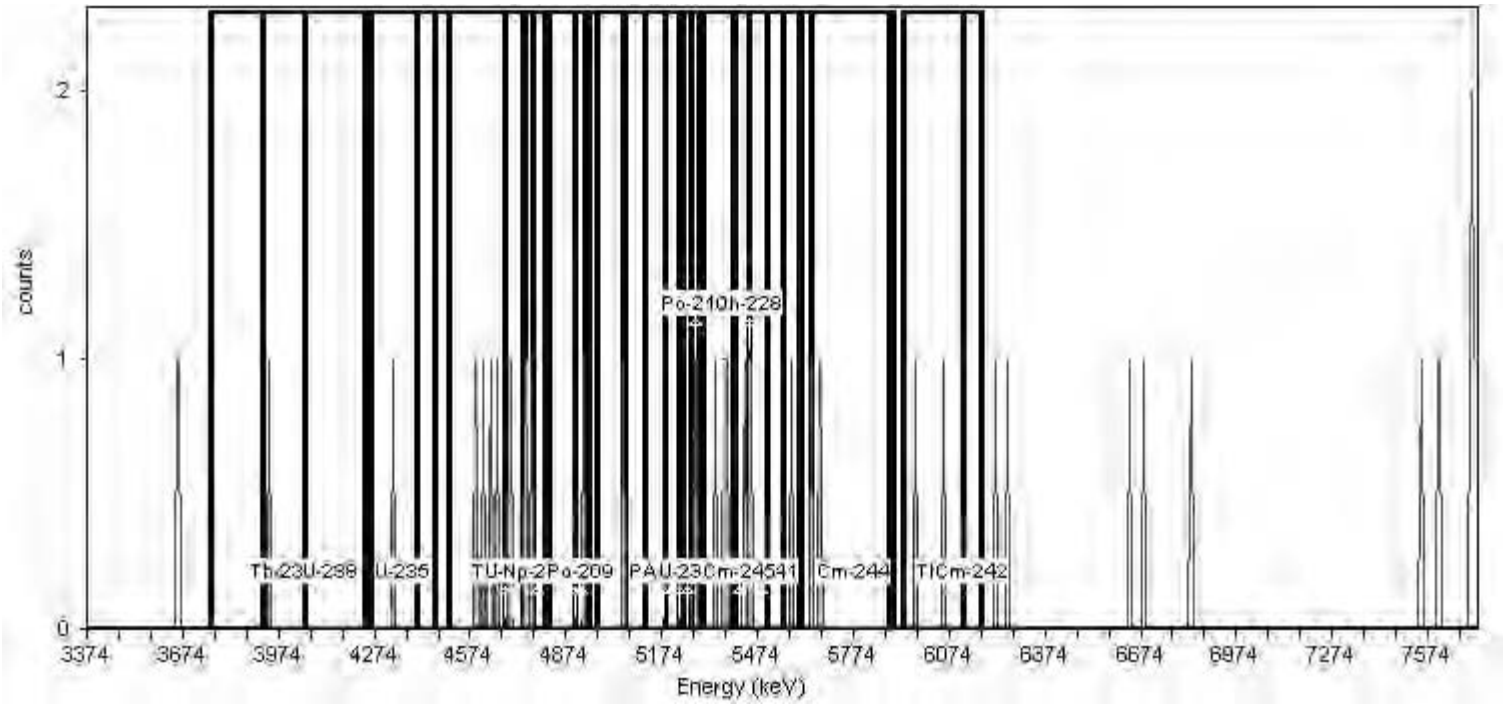
Acquisition

Detector: AV10 , SN: 49-155N2
Acquisition Start Date: 7/12/2018 1:39:32PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Calibration Name: IC-9885;AV10-05142018
Calibration Date: 5/14/2018 6:26:57PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 23.49% +/- 0.35% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 39.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-230	4.68	4.40	4.75	7.00	7.292E-003	2.946E-003
U-234	4.71	4.51	4.82	8.00	8.333E-003	3.125E-003
Pu-242	4.90	4.68	4.95	5.00	5.208E-003	2.552E-003
Th-229	4.86	4.74	5.12	4.00	4.167E-003	2.329E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	1.00	1.042E-003	1.473E-003
Pu-239	5.18	4.97	5.24	1.00	1.042E-003	1.473E-003
Th-232	3.99	3.75	4.05	1.00	1.042E-003	1.473E-003
U-238	4.14	3.92	4.24	1.00	1.042E-003	1.473E-003
U-235	4.36	4.26	4.46	1.00	1.042E-003	1.473E-003
Am-243	5.23	5.05	5.31	2.00	2.083E-003	1.804E-003
U-232	5.25	5.06	5.40	5.00	5.208E-003	2.552E-003
Th-228	5.45	5.19	5.51	8.00	8.333E-003	3.125E-003
Po-210	5.28	5.23	5.29	1.00	1.042E-003	1.473E-003
Pu-238	5.47	5.27	5.55	8.00	8.333E-003	3.125E-003
Am-241	5.48	5.30	5.60	8.00	8.333E-003	3.125E-003
Cm-245	5.42	5.40	5.45	2.00	2.083E-003	1.804E-003
Pu-236	5.76	5.61	5.89	2.00	2.083E-003	1.804E-003
Cm-244	5.78	5.64	5.90	2.00	2.083E-003	1.804E-003
Th-227	6.07	5.93	6.18	2.00	2.083E-003	1.804E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:57:29AM 7/13/2018

Sample

Sample Name: ICB;AV12
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

Analyst: 60040

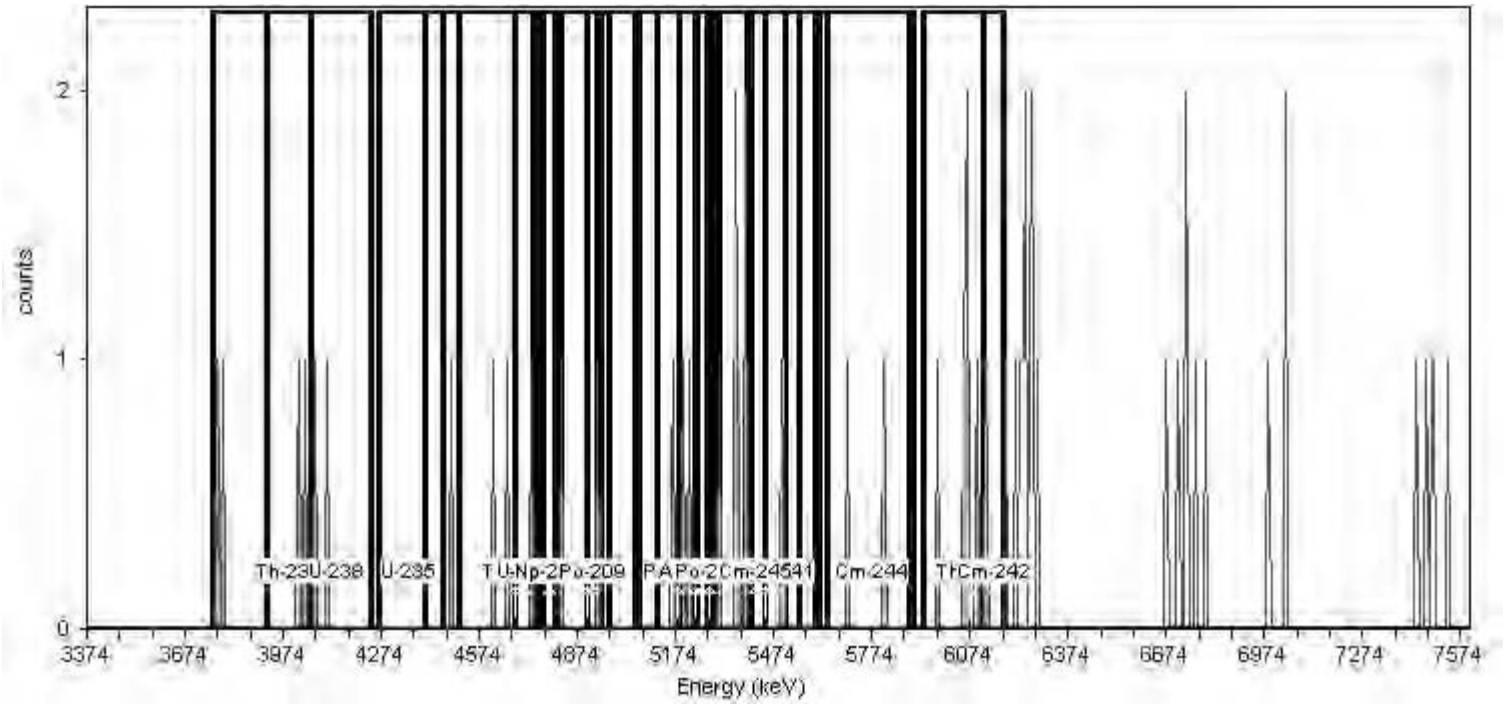
Acquisition

Detector: AV12 , SN: 51-082B7
Acquisition Start Date: 7/12/2018 1:39:36PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Calibration Name: IC-1368447; AV12-05142018
Calibration Date: 5/14/2018 6:27:24PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 27.78% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 55.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	4.00	4.167E-003	2.329E-003
U-238	4.14	3.92	4.24	4.00	4.167E-003	2.329E-003
U-235	4.36	4.26	4.46	0.00	0.000E+000	1.473E-003
Th-230	4.68	4.40	4.75	4.00	4.167E-003	2.329E-003
U-234	4.71	4.51	4.82	4.00	4.167E-003	2.329E-003
Pu-242	4.90	4.68	4.95	3.00	3.125E-003	2.083E-003
Th-229	4.86	4.74	5.12	2.00	2.083E-003	1.804E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	1.00	1.042E-003	1.473E-003
Pu-239	5.18	4.97	5.24	3.00	3.125E-003	2.083E-003
Am-243	5.23	5.05	5.31	4.00	4.167E-003	2.329E-003
U-232	5.25	5.06	5.40	9.00	9.375E-003	3.294E-003
Th-228	5.45	5.19	5.51	9.00	9.375E-003	3.294E-003
Po-210	5.28	5.23	5.29	0.00	0.000E+000	1.473E-003
Pu-238	5.47	5.27	5.55	7.00	7.292E-003	2.946E-003
Am-241	5.48	5.30	5.60	7.00	7.292E-003	2.946E-003
Cm-245	5.42	5.40	5.45	0.00	0.000E+000	1.473E-003
Pu-236	5.76	5.61	5.89	2.00	2.083E-003	1.804E-003
Cm-244	5.78	5.64	5.90	2.00	2.083E-003	1.804E-003
Th-227	6.07	5.93	6.18	6.00	6.250E-003	2.756E-003
Cm-242	6.15	6.12	6.18	1.00	1.042E-003	1.473E-003

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:57:54AM 7/13/2018

Sample

Sample Name: ICB;AV14
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

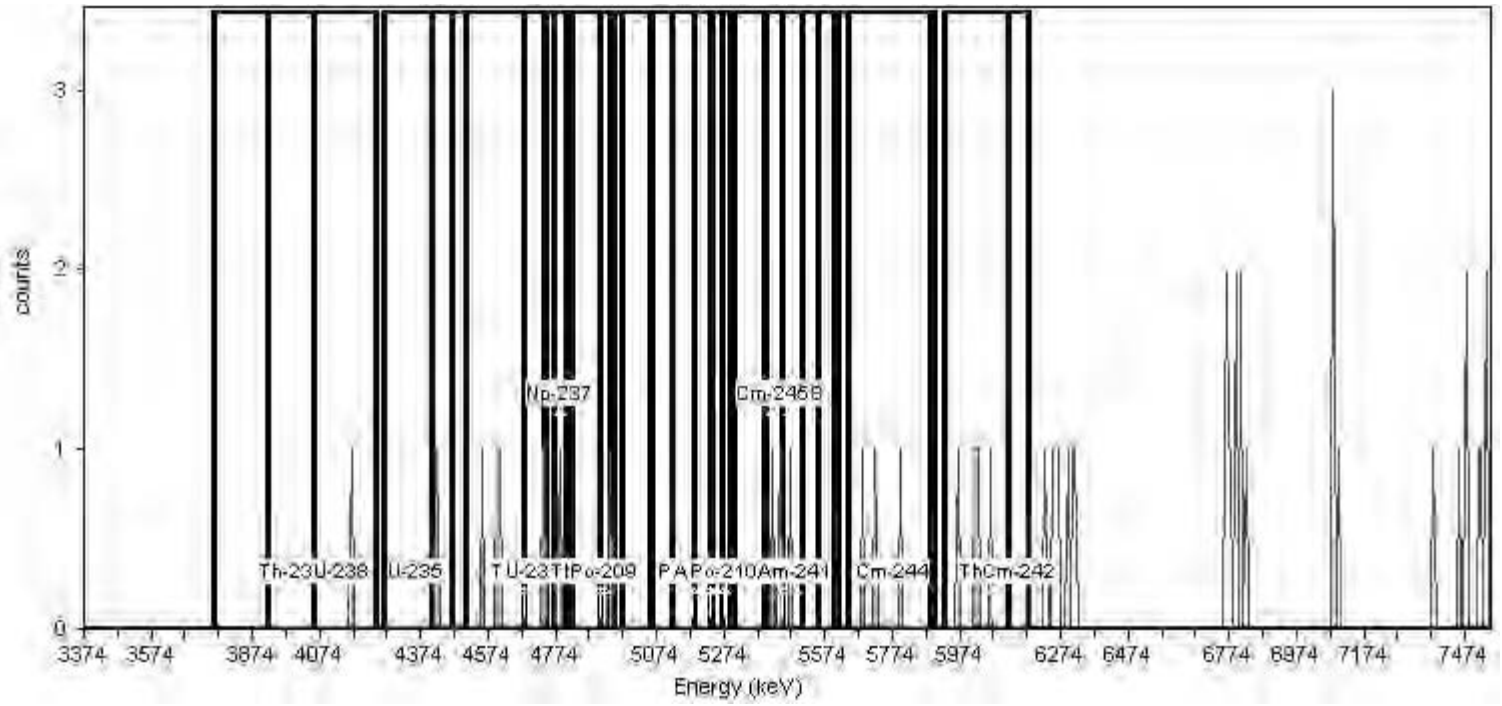
Analyst: 60040

Acquisition

Detector: AV14 , SN: 50-060W4
Acquisition Start Date: 7/12/2018 1:39:27PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Calibration Name: IC-1370622;AV14-05142018
Calibration Date: 5/14/2018 6:27:53PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 26.40% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 47.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-230	4.68	4.40	4.75	6.00	6.250E-003	2.756E-003
U-234	4.71	4.51	4.82	6.00	6.250E-003	2.756E-003
Pu-242	4.90	4.68	4.95	4.00	4.167E-003	2.329E-003
Th-229	4.86	4.74	5.12	3.00	3.125E-003	2.083E-003
Np-237	4.78	4.77	4.81	1.00	1.042E-003	1.473E-003
Po-209	4.92	4.90	4.93	1.00	1.042E-003	1.473E-003
Pu-239	5.18	4.97	5.24	0.00	0.000E+000	1.473E-003
Am-243	5.23	5.05	5.31	0.00	0.000E+000	1.473E-003
U-232	5.25	5.06	5.40	0.00	0.000E+000	1.473E-003
Th-228	5.45	5.19	5.51	3.00	3.125E-003	2.083E-003
Po-210	5.28	5.23	5.29	0.00	0.000E+000	1.473E-003
Pu-238	5.47	5.27	5.55	3.00	3.125E-003	2.083E-003
Am-241	5.48	5.30	5.60	3.00	3.125E-003	2.083E-003
Cm-245	5.42	5.40	5.45	2.00	2.083E-003	1.804E-003
Th-232	3.99	3.75	4.05	0.00	0.000E+000	1.473E-003
U-238	4.14	3.92	4.24	1.00	1.042E-003	1.473E-003
U-235	4.36	4.26	4.46	1.00	1.042E-003	1.473E-003
Pu-236	5.76	5.61	5.89	3.00	3.125E-003	2.083E-003
Cm-244	5.78	5.64	5.90	3.00	3.125E-003	2.083E-003
Th-227	6.07	5.93	6.18	4.00	4.167E-003	2.329E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:58:05AM 7/13/2018

Sample

Sample Name: ICB;AV15
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

Analyst: 60040

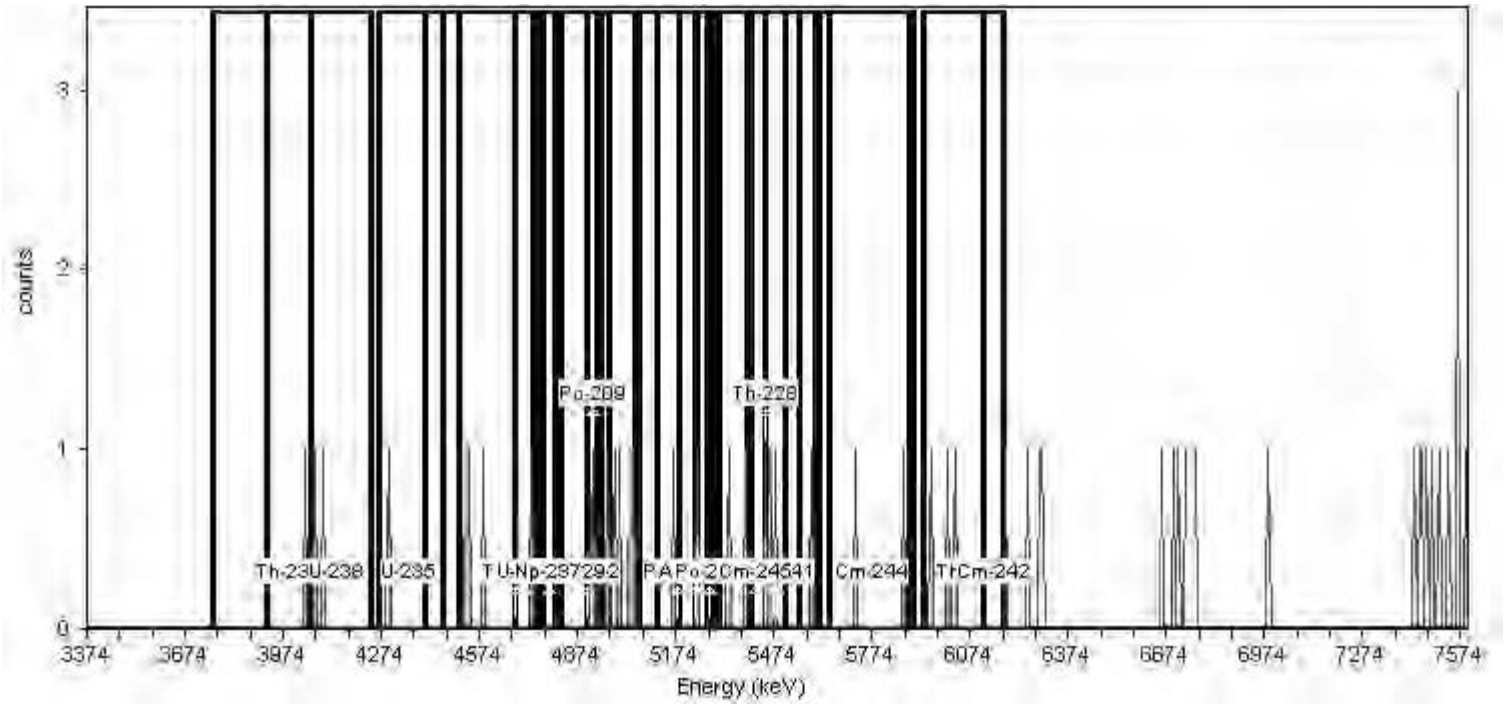
Acquisition

Detector: AV15 , SN: 41-172C5
Acquisition Start Date: 7/12/2018 1:39:30PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Calibration Name: IC-1370619;AV15-05142018
Calibration Date: 5/14/2018 6:28:04PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 27.26% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 52.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	1.00	1.042E-003	1.473E-003
U-238	4.14	3.92	4.24	3.00	3.125E-003	2.083E-003
U-235	4.36	4.26	4.46	1.00	1.042E-003	1.473E-003
Th-230	4.68	4.40	4.75	4.00	4.167E-003	2.329E-003
U-234	4.71	4.51	4.82	4.00	4.167E-003	2.329E-003
Pu-242	4.90	4.68	4.95	2.00	2.083E-003	1.804E-003
Th-229	4.86	4.74	5.12	7.00	7.292E-003	2.946E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	1.00	1.042E-003	1.473E-003
Pu-239	5.18	4.97	5.24	7.00	7.292E-003	2.946E-003
Am-243	5.23	5.05	5.31	2.00	2.083E-003	1.804E-003
U-232	5.25	5.06	5.40	4.00	4.167E-003	2.329E-003
Th-228	5.45	5.19	5.51	6.00	6.250E-003	2.756E-003
Po-210	5.28	5.23	5.29	1.00	1.042E-003	1.473E-003
Pu-238	5.47	5.27	5.55	5.00	5.208E-003	2.552E-003
Am-241	5.48	5.30	5.60	6.00	6.250E-003	2.756E-003
Cm-245	5.42	5.40	5.45	1.00	1.042E-003	1.473E-003
Pu-236	5.76	5.61	5.89	2.00	2.083E-003	1.804E-003
Cm-244	5.78	5.64	5.90	2.00	2.083E-003	1.804E-003
Th-227	6.07	5.93	6.18	3.00	3.125E-003	2.083E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:58:14AM 7/13/2018

Sample

Sample Name: ICB;AV16
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

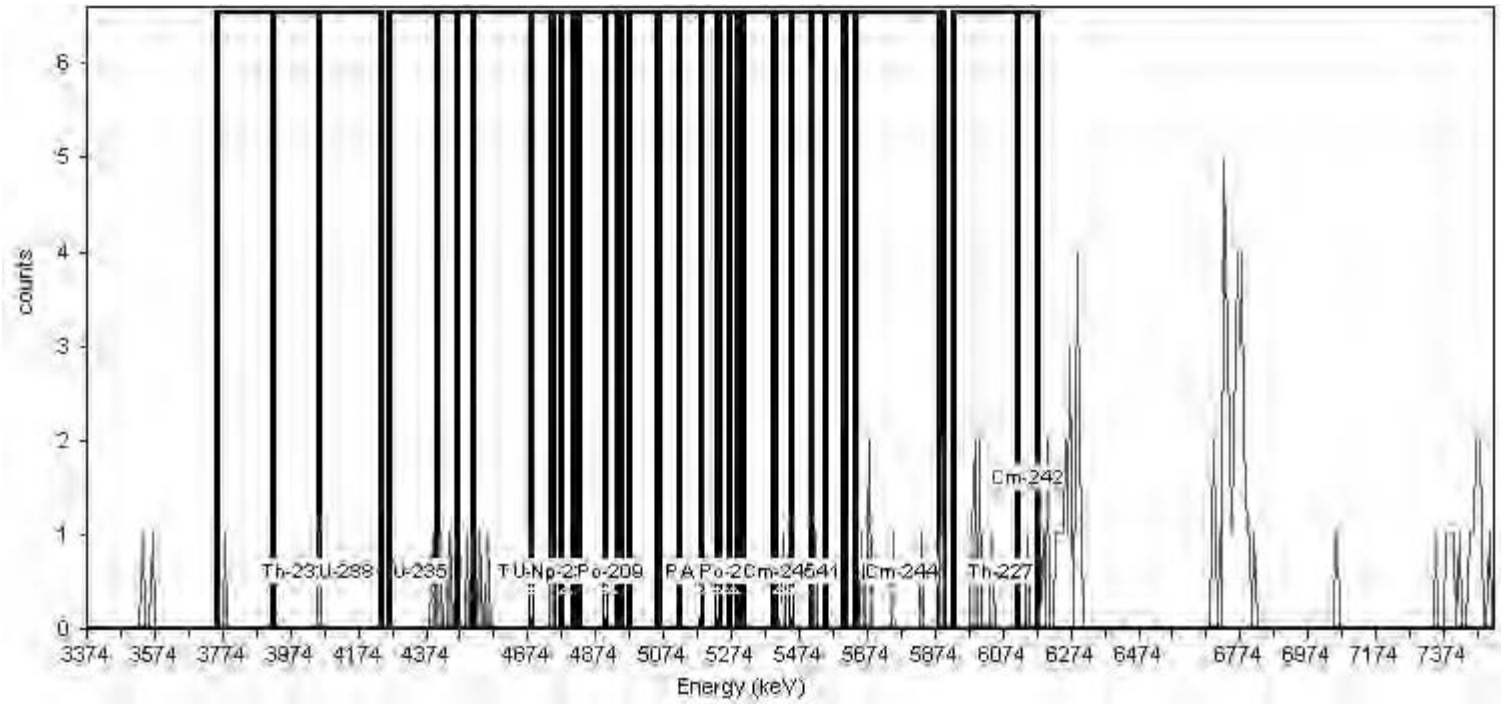
Analyst: 60040

Acquisition

Detector: AV16 , SN: 51-082B6
Acquisition Start Date: 7/12/2018 1:39:32PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Calibration Name: IC-137620;AV16-05142018
Calibration Date: 5/14/2018 6:28:17PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 26.96% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 98.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-230	4.68	4.40	4.75	6.00	6.250E-003	2.756E-003
U-234	4.71	4.51	4.82	3.00	3.125E-003	2.083E-003
Pu-242	4.90	4.68	4.95	1.00	1.042E-003	1.473E-003
Th-229	4.86	4.74	5.12	1.00	1.042E-003	1.473E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	0.00	0.000E+000	1.473E-003
Am-243	5.23	5.05	5.31	0.00	0.000E+000	1.473E-003
U-232	5.25	5.06	5.40	0.00	0.000E+000	1.473E-003
Th-228	5.45	5.19	5.51	1.00	1.042E-003	1.473E-003
Po-210	5.28	5.23	5.29	0.00	0.000E+000	1.473E-003
Pu-238	5.47	5.27	5.55	2.00	2.083E-003	1.804E-003
Am-241	5.48	5.30	5.60	2.00	2.083E-003	1.804E-003
Cm-245	5.42	5.40	5.45	1.00	1.042E-003	1.473E-003
Pu-236	5.76	5.61	5.89	5.00	5.208E-003	2.552E-003
Cm-244	5.78	5.64	5.90	7.00	7.292E-003	2.946E-003
Th-227	6.07	5.93	6.18	7.00	7.292E-003	2.946E-003
Cm-242	6.15	6.12	6.18	1.00	1.042E-003	1.473E-003
Th-232	3.99	3.75	4.05	2.00	2.083E-003	1.804E-003
U-238	4.14	3.92	4.24	1.00	1.042E-003	1.473E-003
U-235	4.36	4.26	4.46	3.00	3.125E-003	2.083E-003

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
4:13:59AM 7/14/2018

Sample

Sample Name: ICB;AV17
Comment:

Spectrum #2 Analysis #1

Batch

Batch Name: July2018
Description:

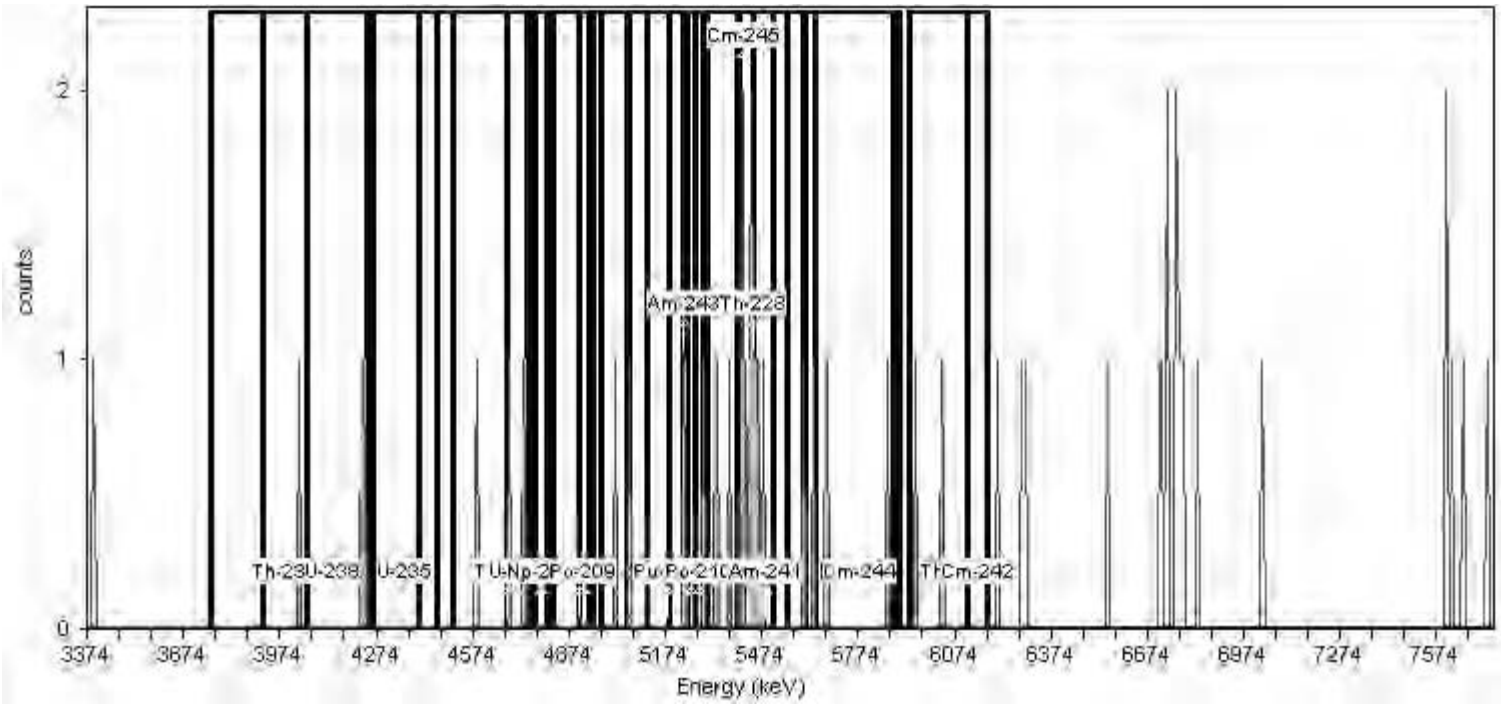
Analyst: 60040

Acquisition

Detector: AV17 , SN: 50-051C4
Acquisition Start Date: 7/13/2018 12:11:23PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Calibration Name: IC-7107;AV17-05142018a
Calibration Date: 5/15/2018 12:29:12PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.09% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 52.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	1.00	1.042E-003	1.473E-003
U-238	4.14	3.92	4.24	3.00	3.125E-003	2.083E-003
U-235	4.36	4.26	4.46	0.00	0.000E+000	1.473E-003
Th-230	4.68	4.40	4.75	3.00	3.125E-003	2.083E-003
U-234	4.71	4.51	4.82	3.00	3.125E-003	2.083E-003
Pu-242	4.90	4.68	4.95	2.00	2.083E-003	1.804E-003
Th-229	4.86	4.74	5.12	2.00	2.083E-003	1.804E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	3.00	3.125E-003	2.083E-003
Am-243	5.23	5.05	5.31	3.00	3.125E-003	2.083E-003
U-232	5.25	5.06	5.40	6.00	6.250E-003	2.756E-003
Th-228	5.45	5.19	5.51	15.00	1.563E-002	4.167E-003
Po-210	5.28	5.23	5.29	2.00	2.083E-003	1.804E-003
Pu-238	5.47	5.27	5.55	14.00	1.458E-002	4.034E-003
Am-241	5.48	5.30	5.60	14.00	1.458E-002	4.034E-003
Cm-245	5.42	5.40	5.45	7.00	7.292E-003	2.946E-003
Pu-236	5.76	5.61	5.89	4.00	4.167E-003	2.329E-003
Cm-244	5.78	5.64	5.90	3.00	3.125E-003	2.083E-003
Th-227	6.07	5.93	6.18	2.00	2.083E-003	1.804E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:58:34AM 7/13/2018

Sample

Sample Name: ICB;AV19
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

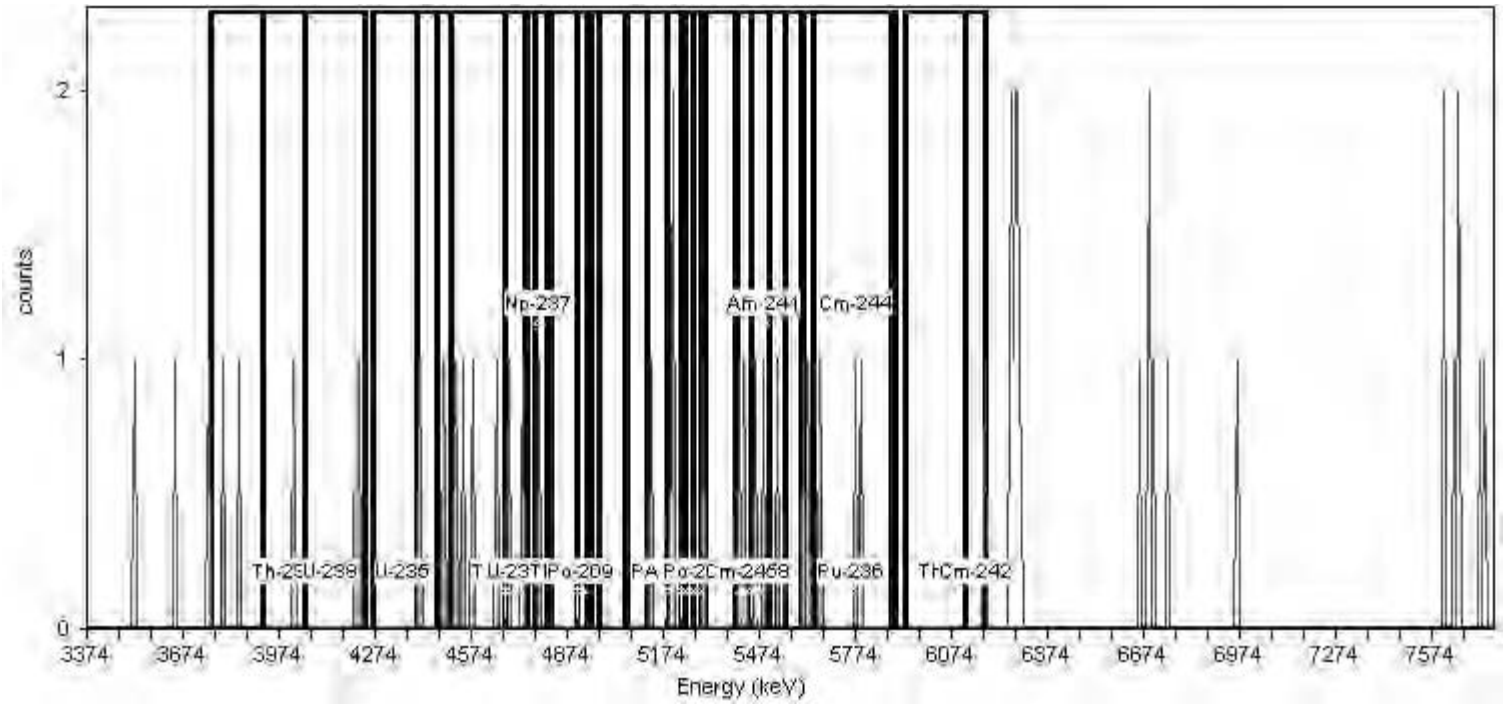
Analyst: 60040

Acquisition

Detector: AV19 , SN: 50-025FF5
Acquisition Start Date: 7/12/2018 1:39:36PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-8877;AV19-05142018
Calibration Date: 5/15/2018 12:27:55PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 23.60% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 53.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-230	4.68	4.40	4.75	8.00	8.333E-003	3.125E-003
U-234	4.71	4.51	4.82	7.00	7.292E-003	2.946E-003
Pu-242	4.90	4.68	4.95	3.00	3.125E-003	2.083E-003
Th-229	4.86	4.74	5.12	1.00	1.042E-003	1.473E-003
Np-237	4.78	4.77	4.81	1.00	1.042E-003	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	3.00	3.125E-003	2.083E-003
Th-232	3.99	3.75	4.05	3.00	3.125E-003	2.083E-003
U-238	4.14	3.92	4.24	3.00	3.125E-003	2.083E-003
U-235	4.36	4.26	4.46	1.00	1.042E-003	1.473E-003
Am-243	5.23	5.05	5.31	4.00	4.167E-003	2.329E-003
U-232	5.25	5.06	5.40	4.00	4.167E-003	2.329E-003
Th-228	5.45	5.19	5.51	7.00	7.292E-003	2.946E-003
Po-210	5.28	5.23	5.29	0.00	0.000E+000	1.473E-003
Pu-238	5.47	5.27	5.55	6.00	6.250E-003	2.756E-003
Am-241	5.48	5.30	5.60	6.00	6.250E-003	2.756E-003
Cm-245	5.42	5.40	5.45	2.00	2.083E-003	1.804E-003
Pu-236	5.76	5.61	5.89	5.00	5.208E-003	2.552E-003
Cm-244	5.78	5.64	5.90	3.00	3.125E-003	2.083E-003
Th-227	6.07	5.93	6.18	1.00	1.042E-003	1.473E-003
Cm-242	6.15	6.12	6.18	1.00	1.042E-003	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:58:43AM 7/13/2018

Sample

Sample Name: ICB;AV20
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

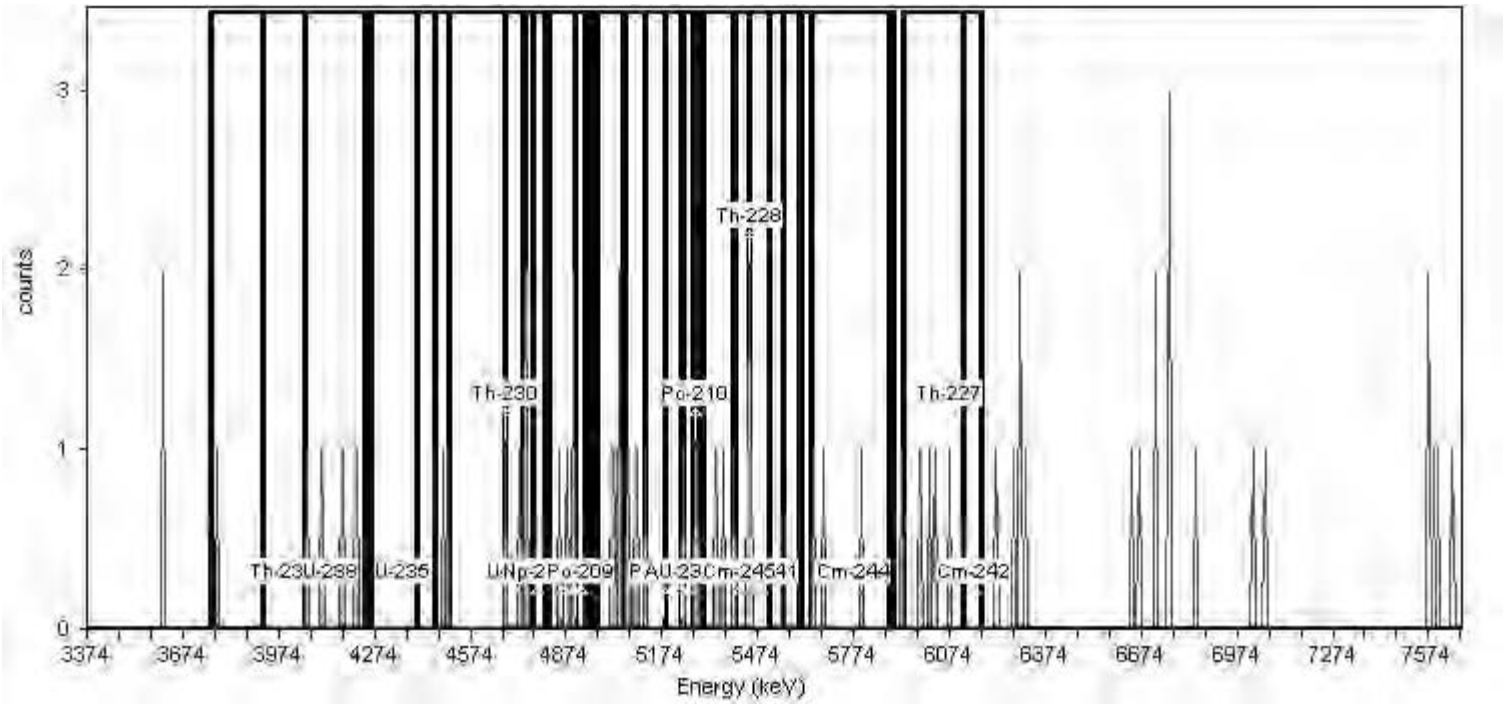
Analyst: 60040

Acquisition

Detector: AV20 , SN: 48-121A7
Acquisition Start Date: 7/12/2018 1:39:38PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-9520;AV20-05142018
Calibration Date: 5/15/2018 12:28:08PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 22.15% +/- 0.32% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 66.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	1.00	1.042E-003	1.473E-003
U-238	4.14	3.92	4.24	6.00	6.250E-003	2.756E-003
U-235	4.36	4.26	4.46	0.00	0.000E+000	1.473E-003
Th-230	4.68	4.40	4.75	6.00	6.250E-003	2.756E-003
U-234	4.71	4.51	4.82	4.00	4.167E-003	2.329E-003
Pu-242	4.90	4.68	4.95	8.00	8.333E-003	3.125E-003
Th-229	4.86	4.74	5.12	14.00	1.458E-002	4.034E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	9.00	9.375E-003	3.294E-003
Am-243	5.23	5.05	5.31	7.00	7.292E-003	2.946E-003
U-232	5.25	5.06	5.40	10.00	1.042E-002	3.455E-003
Th-228	5.45	5.19	5.51	10.00	1.042E-002	3.455E-003
Po-210	5.28	5.23	5.29	3.00	3.125E-003	2.083E-003
Pu-238	5.47	5.27	5.55	9.00	9.375E-003	3.294E-003
Am-241	5.48	5.30	5.60	7.00	7.292E-003	2.946E-003
Cm-245	5.42	5.40	5.45	4.00	4.167E-003	2.329E-003
Pu-236	5.76	5.61	5.89	3.00	3.125E-003	2.083E-003
Cm-244	5.78	5.64	5.90	3.00	3.125E-003	2.083E-003
Th-227	6.07	5.93	6.18	4.00	4.167E-003	2.329E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:58:52AM 7/13/2018

Sample

Sample Name: ICB;AV21
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

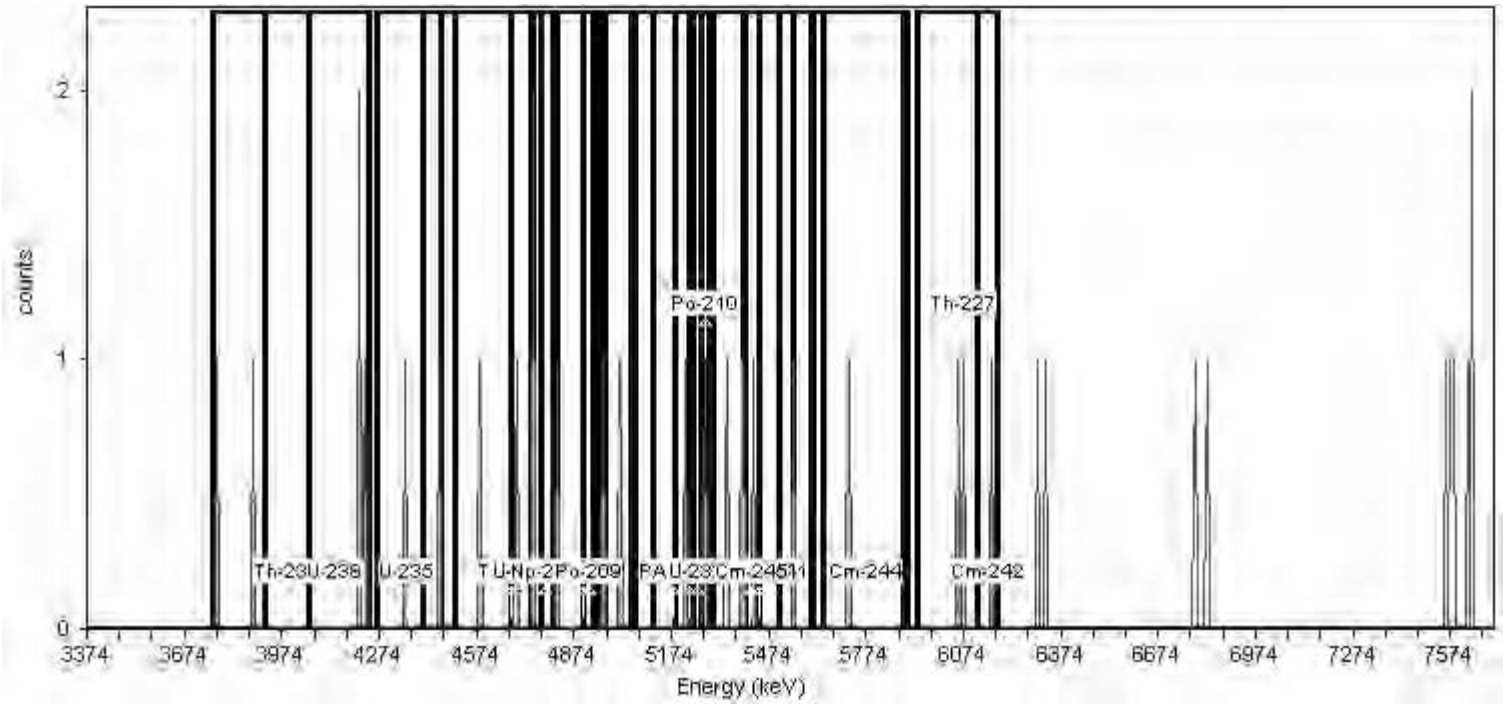
Analyst: 60040

Acquisition

Detector: AV21 , SN: 48-102BB6
Acquisition Start Date: 7/12/2018 1:39:41PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-9792;AV21-05142018
Calibration Date: 5/15/2018 12:28:21PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 23.43% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 36.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	2.00	2.083E-003	1.804E-003
U-238	4.14	3.92	4.24	3.00	3.125E-003	2.083E-003
U-235	4.36	4.26	4.46	2.00	2.083E-003	1.804E-003
Th-230	4.68	4.40	4.75	5.00	5.208E-003	2.552E-003
U-234	4.71	4.51	4.82	5.00	5.208E-003	2.552E-003
Pu-242	4.90	4.68	4.95	4.00	4.167E-003	2.329E-003
Th-229	4.86	4.74	5.12	5.00	5.208E-003	2.552E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	2.00	2.083E-003	1.804E-003
Am-243	5.23	5.05	5.31	2.00	2.083E-003	1.804E-003
U-232	5.25	5.06	5.40	5.00	5.208E-003	2.552E-003
Th-228	5.45	5.19	5.51	6.00	6.250E-003	2.756E-003
Po-210	5.28	5.23	5.29	1.00	1.042E-003	1.473E-003
Pu-238	5.47	5.27	5.55	6.00	6.250E-003	2.756E-003
Am-241	5.48	5.30	5.60	5.00	5.208E-003	2.552E-003
Cm-245	5.42	5.40	5.45	2.00	2.083E-003	1.804E-003
Pu-236	5.76	5.61	5.89	2.00	2.083E-003	1.804E-003
Cm-244	5.78	5.64	5.90	2.00	2.083E-003	1.804E-003
Th-227	6.07	5.93	6.18	3.00	3.125E-003	2.083E-003
Cm-242	6.15	6.12	6.18	1.00	1.042E-003	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:59:17AM 7/13/2018

Sample

Sample Name: ICB;AV23
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

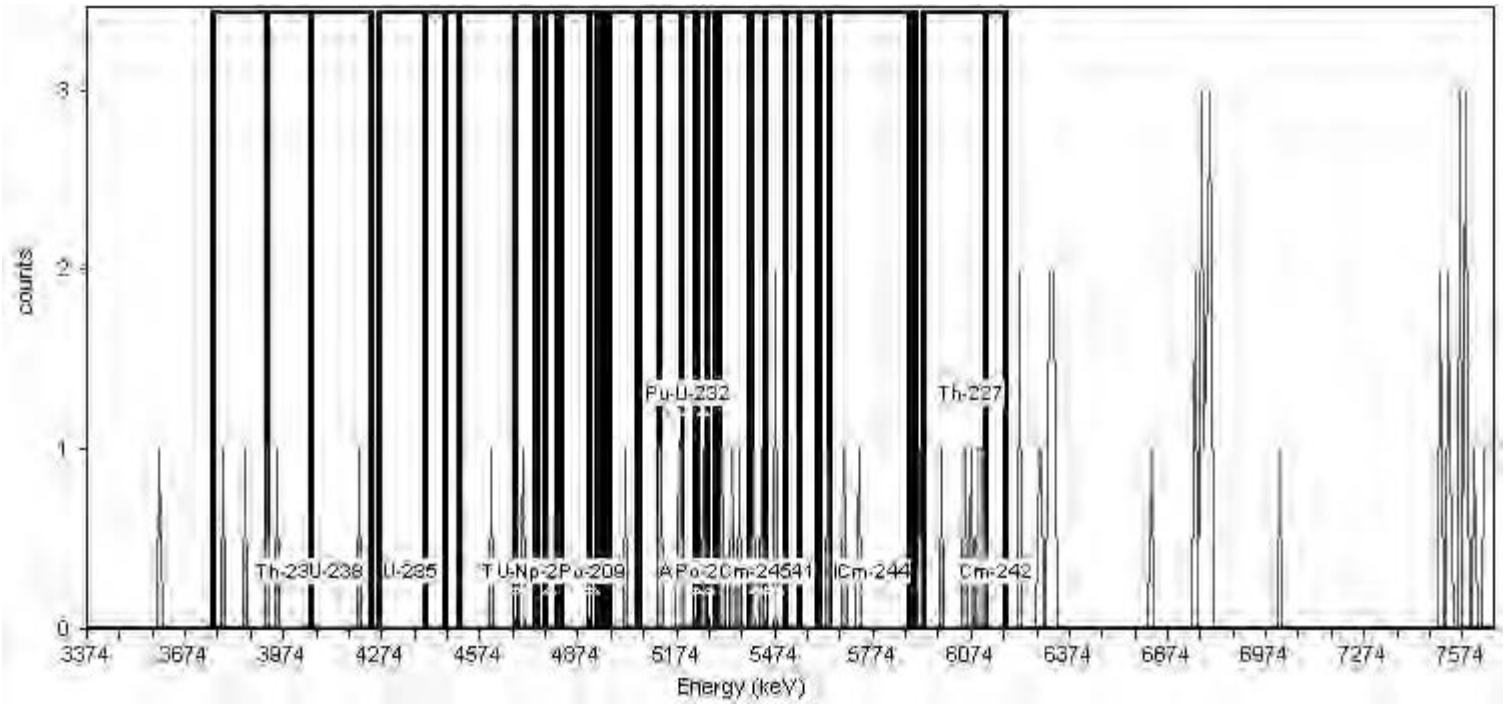
Analyst: 60040

Acquisition

Detector: AV23 , SN: 48-158FF3
Acquisition Start Date: 7/12/2018 1:39:44PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-9795;AV23-05142018
Calibration Date: 5/15/2018 12:28:43PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.46% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 76.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-230	4.68	4.40	4.75	2.00	2.083E-003	1.804E-003
U-234	4.71	4.51	4.82	2.00	2.083E-003	1.804E-003
Pu-242	4.90	4.68	4.95	1.00	1.042E-003	1.473E-003
Th-229	4.86	4.74	5.12	2.00	2.083E-003	1.804E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	5.00	5.208E-003	2.552E-003
Am-243	5.23	5.05	5.31	5.00	5.208E-003	2.552E-003
U-232	5.25	5.06	5.40	8.00	8.333E-003	3.125E-003
Th-228	5.45	5.19	5.51	9.00	9.375E-003	3.294E-003
Po-210	5.28	5.23	5.29	1.00	1.042E-003	1.473E-003
Pu-238	5.47	5.27	5.55	7.00	7.292E-003	2.946E-003
Am-241	5.48	5.30	5.60	7.00	7.292E-003	2.946E-003
Cm-245	5.42	5.40	5.45	2.00	2.083E-003	1.804E-003
Th-232	3.99	3.75	4.05	4.00	4.167E-003	2.329E-003
U-238	4.14	3.92	4.24	3.00	3.125E-003	2.083E-003
U-235	4.36	4.26	4.46	0.00	0.000E+000	1.473E-003
Pu-236	5.76	5.61	5.89	3.00	3.125E-003	2.083E-003
Cm-244	5.78	5.64	5.90	2.00	2.083E-003	1.804E-003
Th-227	6.07	5.93	6.18	7.00	7.292E-003	2.946E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:00:21AM 7/13/2018

Sample

Sample Name: ICB;AV47
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

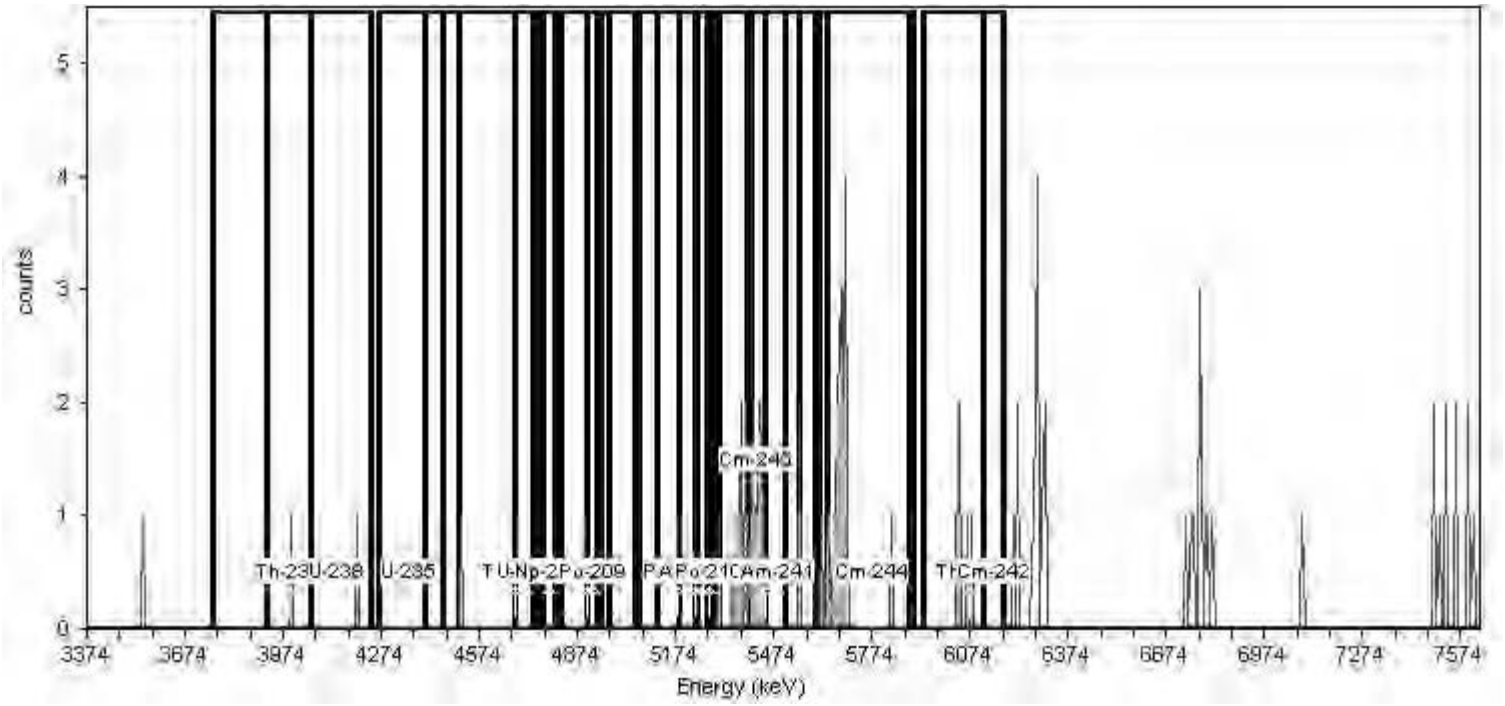
Analyst: 60040

Acquisition

Detector: AV47 , SN: 46-032336
Acquisition Start Date: 7/12/2018 1:39:57PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-1370622;AV47-05142018
Calibration Date: 5/15/2018 12:27:14PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 27.02% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 78.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	1.00	1.042E-003	1.473E-003
U-238	4.14	3.92	4.24	2.00	2.083E-003	1.804E-003
U-235	4.36	4.26	4.46	0.00	0.000E+000	1.473E-003
Th-230	4.68	4.40	4.75	1.00	1.042E-003	1.473E-003
U-234	4.71	4.51	4.82	1.00	1.042E-003	1.473E-003
Pu-242	4.90	4.68	4.95	0.00	0.000E+000	1.473E-003
Th-229	4.86	4.74	5.12	0.00	0.000E+000	1.473E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	0.00	0.000E+000	1.473E-003
Am-243	5.23	5.05	5.31	1.00	1.042E-003	1.473E-003
U-232	5.25	5.06	5.40	9.00	9.375E-003	3.294E-003
Th-228	5.45	5.19	5.51	16.00	1.667E-002	4.295E-003
Po-210	5.28	5.23	5.29	0.00	0.000E+000	1.473E-003
Pu-238	5.47	5.27	5.55	18.00	1.875E-002	4.541E-003
Am-241	5.48	5.30	5.60	18.00	1.875E-002	4.541E-003
Cm-245	5.42	5.40	5.45	8.00	8.333E-003	3.125E-003
Pu-236	5.76	5.61	5.89	17.00	1.771E-002	4.419E-003
Cm-244	5.78	5.64	5.90	16.00	1.667E-002	4.295E-003
Th-227	6.07	5.93	6.18	6.00	6.250E-003	2.756E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:00:30AM 7/13/2018

Sample

Sample Name: ICB;AV48
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

Analyst: 60040

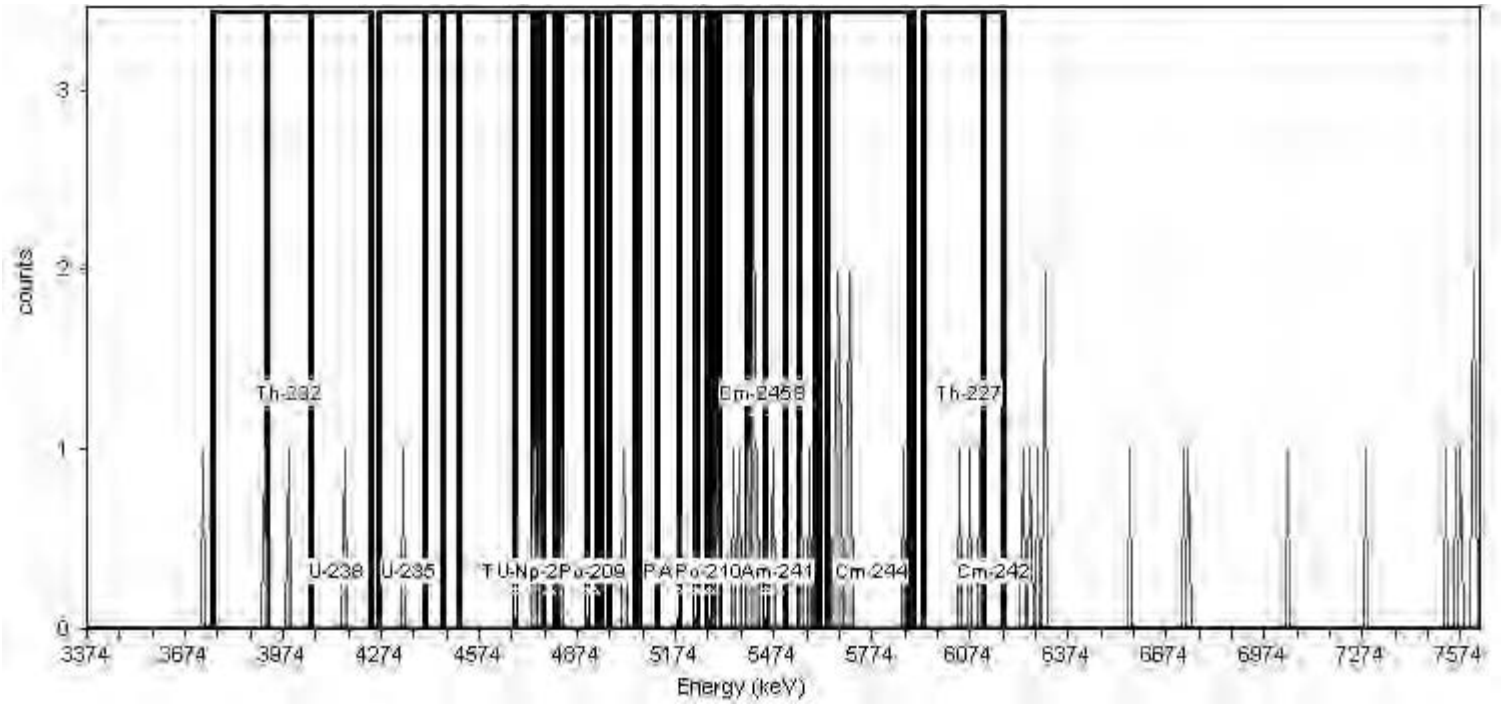
Acquisition

Detector: AV48 , SN: 46-033P6
Acquisition Start Date: 7/12/2018 1:39:58PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-1370619;AV48-05142018
Calibration Date: 5/15/2018 12:27:25PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 27.06% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI

Nuclide Library: Background ROI Library

Total Background Counts: 50.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	2.00	2.083E-003	1.804E-003
U-238	4.14	3.92	4.24	2.00	2.083E-003	1.804E-003
U-235	4.36	4.26	4.46	1.00	1.042E-003	1.473E-003
Th-230	4.68	4.40	4.75	1.00	1.042E-003	1.473E-003
U-234	4.71	4.51	4.82	3.00	3.125E-003	2.083E-003
Pu-242	4.90	4.68	4.95	3.00	3.125E-003	2.083E-003
Th-229	4.86	4.74	5.12	4.00	4.167E-003	2.329E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	1.00	1.042E-003	1.473E-003
Am-243	5.23	5.05	5.31	1.00	1.042E-003	1.473E-003
U-232	5.25	5.06	5.40	4.00	4.167E-003	2.329E-003
Th-228	5.45	5.19	5.51	10.00	1.042E-002	3.455E-003
Po-210	5.28	5.23	5.29	0.00	0.000E+000	1.473E-003
Pu-238	5.47	5.27	5.55	10.00	1.042E-002	3.455E-003
Am-241	5.48	5.30	5.60	12.00	1.250E-002	3.756E-003
Cm-245	5.42	5.40	5.45	6.00	6.250E-003	2.756E-003
Pu-236	5.76	5.61	5.89	10.00	1.042E-002	3.455E-003
Cm-244	5.78	5.64	5.90	10.00	1.042E-002	3.455E-003
Th-227	6.07	5.93	6.18	3.00	3.125E-003	2.083E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:01:15AM 7/13/2018

Sample

Sample Name: ICB;AV52
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

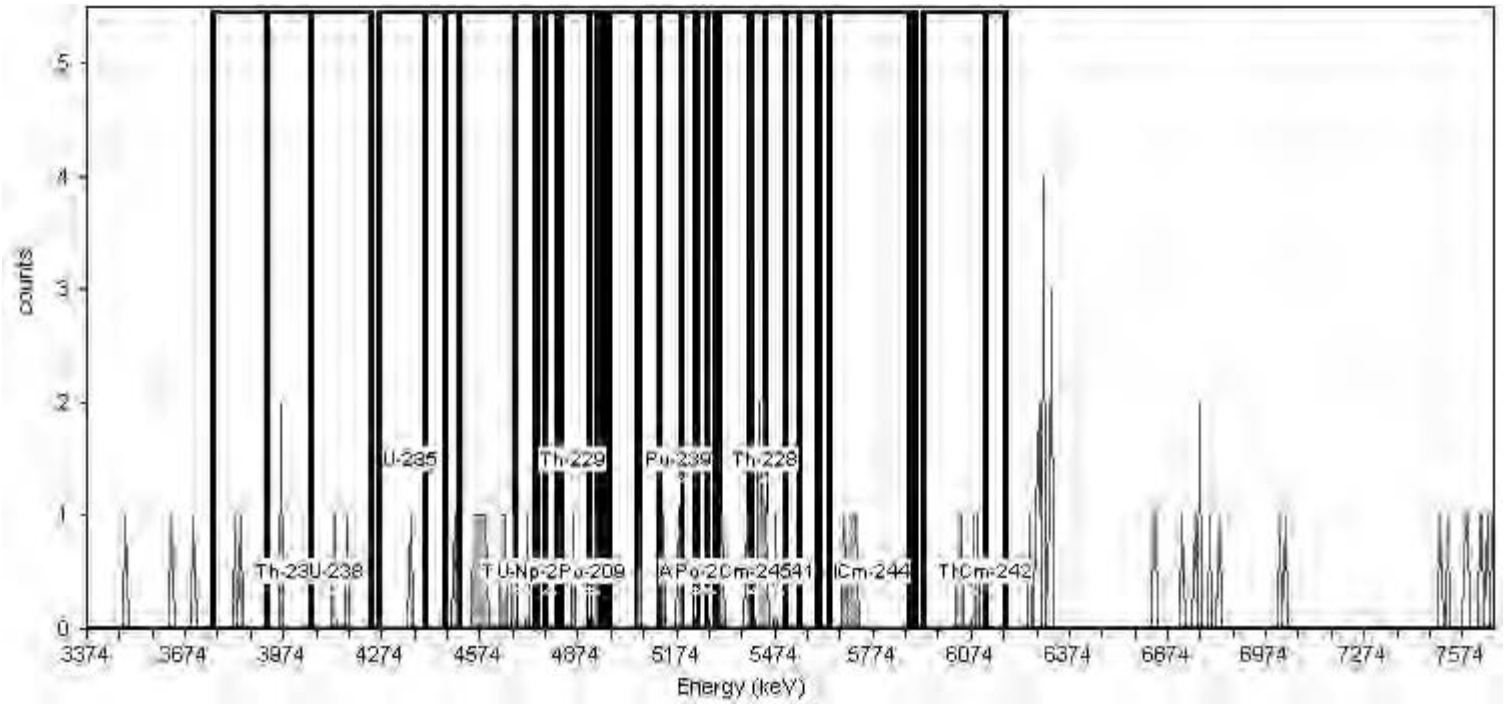
Analyst: 60040

Acquisition

Detector: AV52 , SN: 49-155N7
Acquisition Start Date: 7/12/2018 1:40:02PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Calibration Name: IC-8877;AV52-05152018
Calibration Date: 5/15/2018 3:36:50PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.50% +/- 0.30% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 76.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	4.00	4.167E-003	2.329E-003
U-238	4.14	3.92	4.24	5.00	5.208E-003	2.552E-003
U-235	4.36	4.26	4.46	1.00	1.042E-003	1.473E-003
Th-230	4.68	4.40	4.75	12.00	1.250E-002	3.756E-003
U-234	4.71	4.51	4.82	11.00	1.146E-002	3.608E-003
Pu-242	4.90	4.68	4.95	3.00	3.125E-003	2.083E-003
Th-229	4.86	4.74	5.12	3.00	3.125E-003	2.083E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	1.00	1.042E-003	1.473E-003
Pu-239	5.18	4.97	5.24	3.00	3.125E-003	2.083E-003
Am-243	5.23	5.05	5.31	3.00	3.125E-003	2.083E-003
U-232	5.25	5.06	5.40	5.00	5.208E-003	2.552E-003
Th-228	5.45	5.19	5.51	9.00	9.375E-003	3.294E-003
Po-210	5.28	5.23	5.29	0.00	0.000E+000	1.473E-003
Pu-238	5.47	5.27	5.55	9.00	9.375E-003	3.294E-003
Am-241	5.48	5.30	5.60	9.00	9.375E-003	3.294E-003
Cm-245	5.42	5.40	5.45	6.00	6.250E-003	2.756E-003
Pu-236	5.76	5.61	5.89	5.00	5.208E-003	2.552E-003
Cm-244	5.78	5.64	5.90	5.00	5.208E-003	2.552E-003
Th-227	6.07	5.93	6.18	4.00	4.167E-003	2.329E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:01:35AM 7/13/2018

Sample

Sample Name: ICB;AV54
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

Analyst: 60040

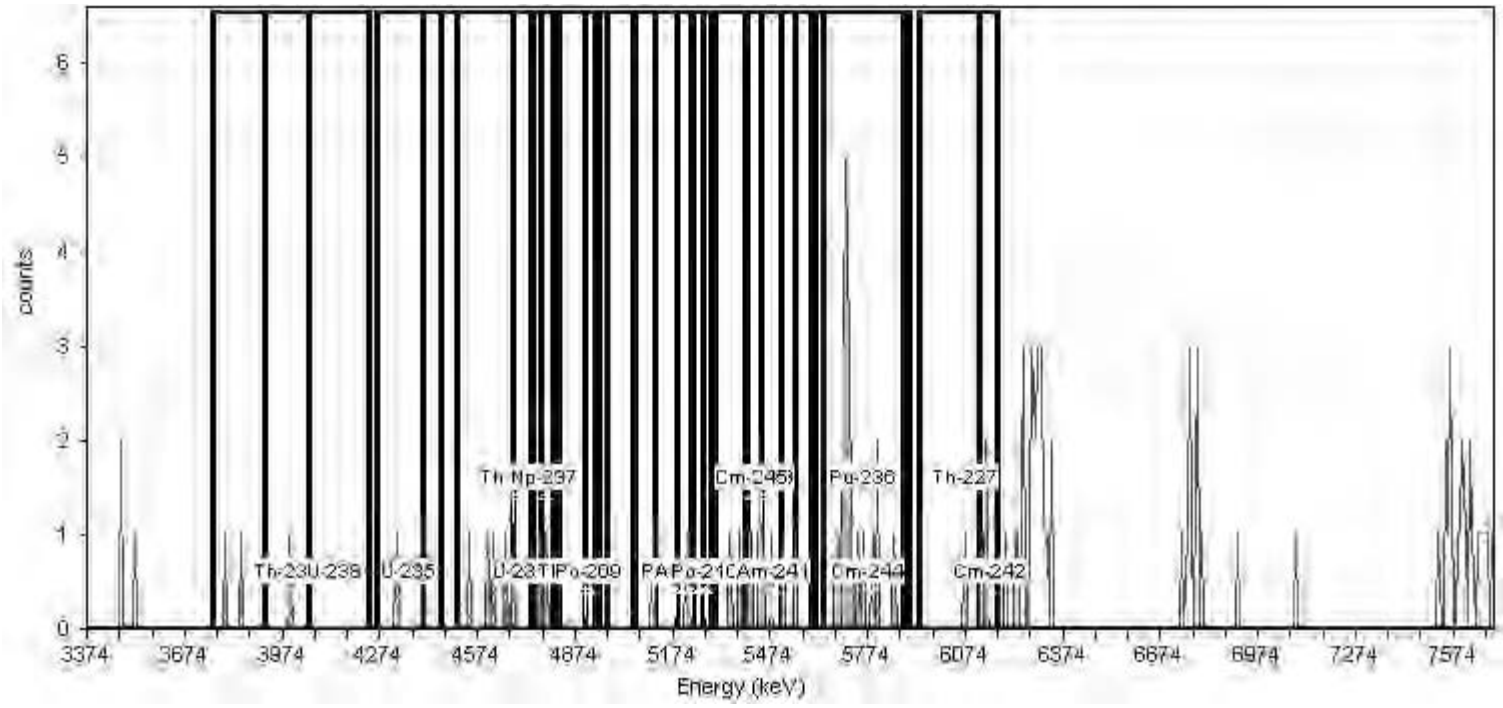
Acquisition

Detector: AV54 , SN: 46-033P4
Acquisition Start Date: 7/12/2018 1:40:04PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Calibration Name: IC-9792;AV54-05152018
Calibration Date: 5/15/2018 3:37:57PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 23.62% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 110.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	3.00	3.125E-003	2.083E-003
U-238	4.14	3.92	4.24	1.00	1.042E-003	1.473E-003
U-235	4.36	4.26	4.46	1.00	1.042E-003	1.473E-003
Th-230	4.68	4.40	4.75	5.00	5.208E-003	2.552E-003
U-234	4.71	4.51	4.82	7.00	7.292E-003	2.946E-003
Pu-242	4.90	4.68	4.95	3.00	3.125E-003	2.083E-003
Th-229	4.86	4.74	5.12	3.00	3.125E-003	2.083E-003
Np-237	4.78	4.77	4.81	1.00	1.042E-003	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	3.00	3.125E-003	2.083E-003
Am-243	5.23	5.05	5.31	3.00	3.125E-003	2.083E-003
U-232	5.25	5.06	5.40	5.00	5.208E-003	2.552E-003
Th-228	5.45	5.19	5.51	11.00	1.146E-002	3.608E-003
Po-210	5.28	5.23	5.29	0.00	0.000E+000	1.473E-003
Pu-238	5.47	5.27	5.55	11.00	1.146E-002	3.608E-003
Am-241	5.48	5.30	5.60	11.00	1.146E-002	3.608E-003
Cm-245	5.42	5.40	5.45	5.00	5.208E-003	2.552E-003
Pu-236	5.76	5.61	5.89	20.00	2.083E-002	4.774E-003
Cm-244	5.78	5.64	5.90	20.00	2.083E-002	4.774E-003
Th-227	6.07	5.93	6.18	4.00	4.167E-003	2.329E-003
Cm-242	6.15	6.12	6.18	3.00	3.125E-003	2.083E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:01:59AM 7/13/2018

Sample

Sample Name: ICB;AV56
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

Analyst: 60040

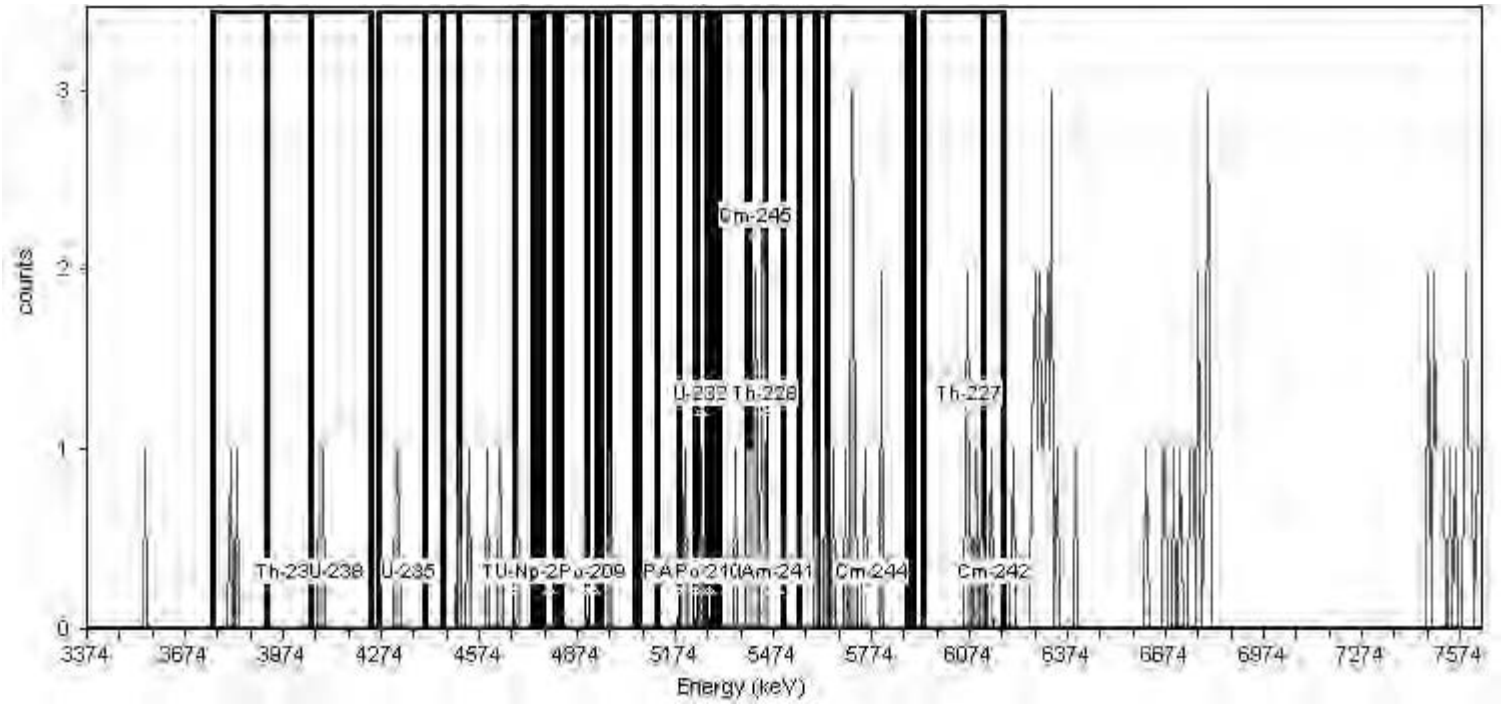
Acquisition

Detector: AV56 , SN: 52-059EE5
Acquisition Start Date: 7/12/2018 1:40:09PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Calibration Name: IC-9795;AV56-05152018
Calibration Date: 5/15/2018 3:38:31PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 25.25% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 93.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	2.00	2.083E-003	1.804E-003
U-238	4.14	3.92	4.24	2.00	2.083E-003	1.804E-003
U-235	4.36	4.26	4.46	2.00	2.083E-003	1.804E-003
Th-230	4.68	4.40	4.75	5.00	5.208E-003	2.552E-003
U-234	4.71	4.51	4.82	5.00	5.208E-003	2.552E-003
Pu-242	4.90	4.68	4.95	1.00	1.042E-003	1.473E-003
Th-229	4.86	4.74	5.12	1.00	1.042E-003	1.473E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	2.00	2.083E-003	1.804E-003
Am-243	5.23	5.05	5.31	2.00	2.083E-003	1.804E-003
U-232	5.25	5.06	5.40	5.00	5.208E-003	2.552E-003
Th-228	5.45	5.19	5.51	13.00	1.354E-002	3.898E-003
Po-210	5.28	5.23	5.29	1.00	1.042E-003	1.473E-003
Pu-238	5.47	5.27	5.55	11.00	1.146E-002	3.608E-003
Am-241	5.48	5.30	5.60	12.00	1.250E-002	3.756E-003
Cm-245	5.42	5.40	5.45	10.00	1.042E-002	3.455E-003
Pu-236	5.76	5.61	5.89	10.00	1.042E-002	3.455E-003
Cm-244	5.78	5.64	5.90	9.00	9.375E-003	3.294E-003
Th-227	6.07	5.93	6.18	6.00	6.250E-003	2.756E-003
Cm-242	6.15	6.12	6.18	1.00	1.042E-003	1.473E-003

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:02:08AM 7/13/2018

Sample

Sample Name: ICB;AV57
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

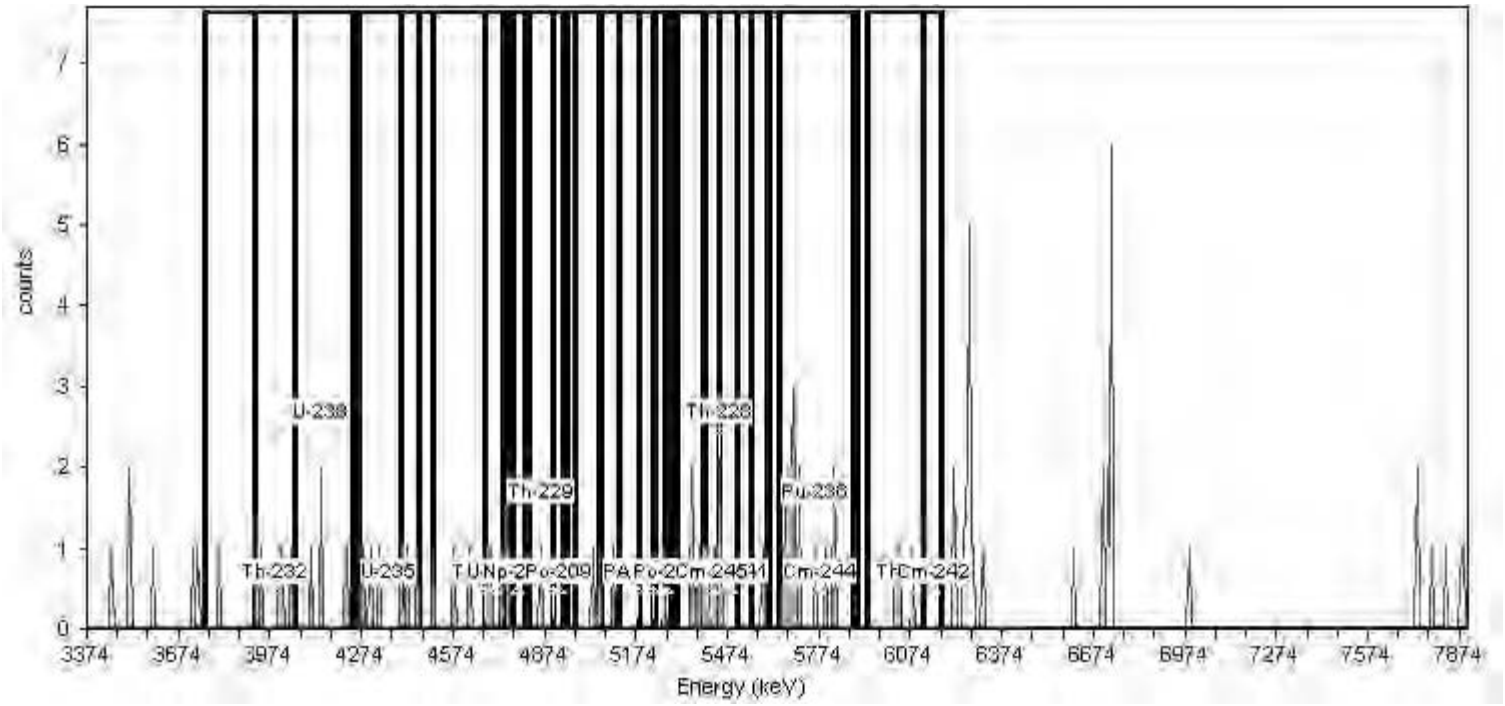
Analyst: 60040

Acquisition

Detector: AV57 , SN: 48-158EE3
Acquisition Start Date: 7/12/2018 1:40:11PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Calibration Name: IC-9817;AV57-05152018
Calibration Date: 5/15/2018 3:38:42PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 22.40% +/- 0.28% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 103.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-230	4.68	4.40	4.75	11.00	1.146E-002	3.608E-003
U-234	4.71	4.51	4.82	8.00	8.333E-003	3.125E-003
Pu-242	4.90	4.68	4.95	6.00	6.250E-003	2.756E-003
Th-229	4.86	4.74	5.12	6.00	6.250E-003	2.756E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	3.00	3.125E-003	2.083E-003
Am-243	5.23	5.05	5.31	3.00	3.125E-003	2.083E-003
U-232	5.25	5.06	5.40	7.00	7.292E-003	2.946E-003
Th-228	5.45	5.19	5.51	12.00	1.250E-002	3.756E-003
Po-210	5.28	5.23	5.29	1.00	1.042E-003	1.473E-003
Pu-238	5.47	5.27	5.55	11.00	1.146E-002	3.608E-003
Am-241	5.48	5.30	5.60	12.00	1.250E-002	3.756E-003
Cm-245	5.42	5.40	5.45	7.00	7.292E-003	2.946E-003
Th-232	3.99	3.75	4.05	6.00	6.250E-003	2.756E-003
U-238	4.14	3.92	4.24	10.00	1.042E-002	3.455E-003
U-235	4.36	4.26	4.46	6.00	6.250E-003	2.756E-003
Pu-236	5.76	5.61	5.89	18.00	1.875E-002	4.541E-003
Cm-244	5.78	5.64	5.90	18.00	1.875E-002	4.541E-003
Th-227	6.07	5.93	6.18	3.00	3.125E-003	2.083E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
4:14:53AM 7/14/2018

Sample

Sample Name: ICB;AV58
Comment:

Spectrum #2 Analysis #1

Batch

Batch Name: July2018
Description:

Analyst: 60040

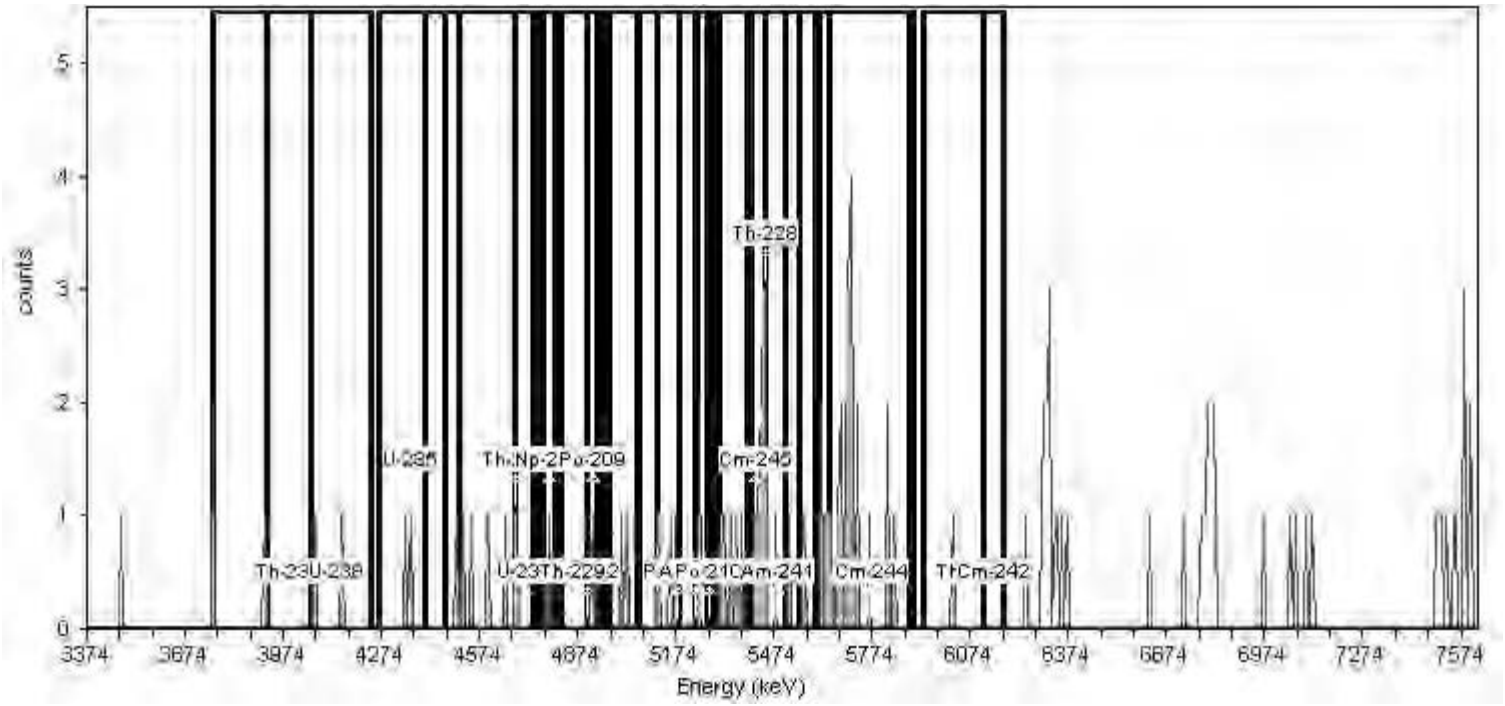
Acquisition

Detector: AV58 , SN: 52-102 C5
Acquisition Start Date: 7/13/2018 12:11:31PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-9885;AV58-05152018
Calibration Date: 5/15/2018 3:38:55PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 24.05% +/- 0.36% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 109.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-230	4.68	4.40	4.75	7.00	7.292E-003	2.946E-003
U-234	4.71	4.51	4.82	7.00	7.292E-003	2.946E-003
Pu-242	4.90	4.68	4.95	4.00	4.167E-003	2.329E-003
Th-229	4.86	4.74	5.12	5.00	5.208E-003	2.552E-003
Np-237	4.78	4.77	4.81	1.00	1.042E-003	1.473E-003
Po-209	4.92	4.90	4.93	1.00	1.042E-003	1.473E-003
Pu-239	5.18	4.97	5.24	5.00	5.208E-003	2.552E-003
Am-243	5.23	5.05	5.31	5.00	5.208E-003	2.552E-003
U-232	5.25	5.06	5.40	10.00	1.042E-002	3.455E-003
Th-228	5.45	5.19	5.51	18.00	1.875E-002	4.541E-003
Po-210	5.28	5.23	5.29	2.00	2.083E-003	1.804E-003
Pu-238	5.47	5.27	5.55	17.00	1.771E-002	4.419E-003
Am-241	5.48	5.30	5.60	18.00	1.875E-002	4.541E-003
Cm-245	5.42	5.40	5.45	10.00	1.042E-002	3.455E-003
Pu-236	5.76	5.61	5.89	23.00	2.396E-002	5.103E-003
Cm-244	5.78	5.64	5.90	20.00	2.083E-002	4.774E-003
Th-227	6.07	5.93	6.18	1.00	1.042E-003	1.473E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003
Th-232	3.99	3.75	4.05	3.00	3.125E-003	2.083E-003
U-238	4.14	3.92	4.24	2.00	2.083E-003	1.804E-003
U-235	4.36	4.26	4.46	2.00	2.083E-003	1.804E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
4:15:11AM 7/14/2018

Sample

Sample Name: ICB;AV60
Comment:

Spectrum #2 Analysis #1

Batch

Batch Name: July2018
Description:

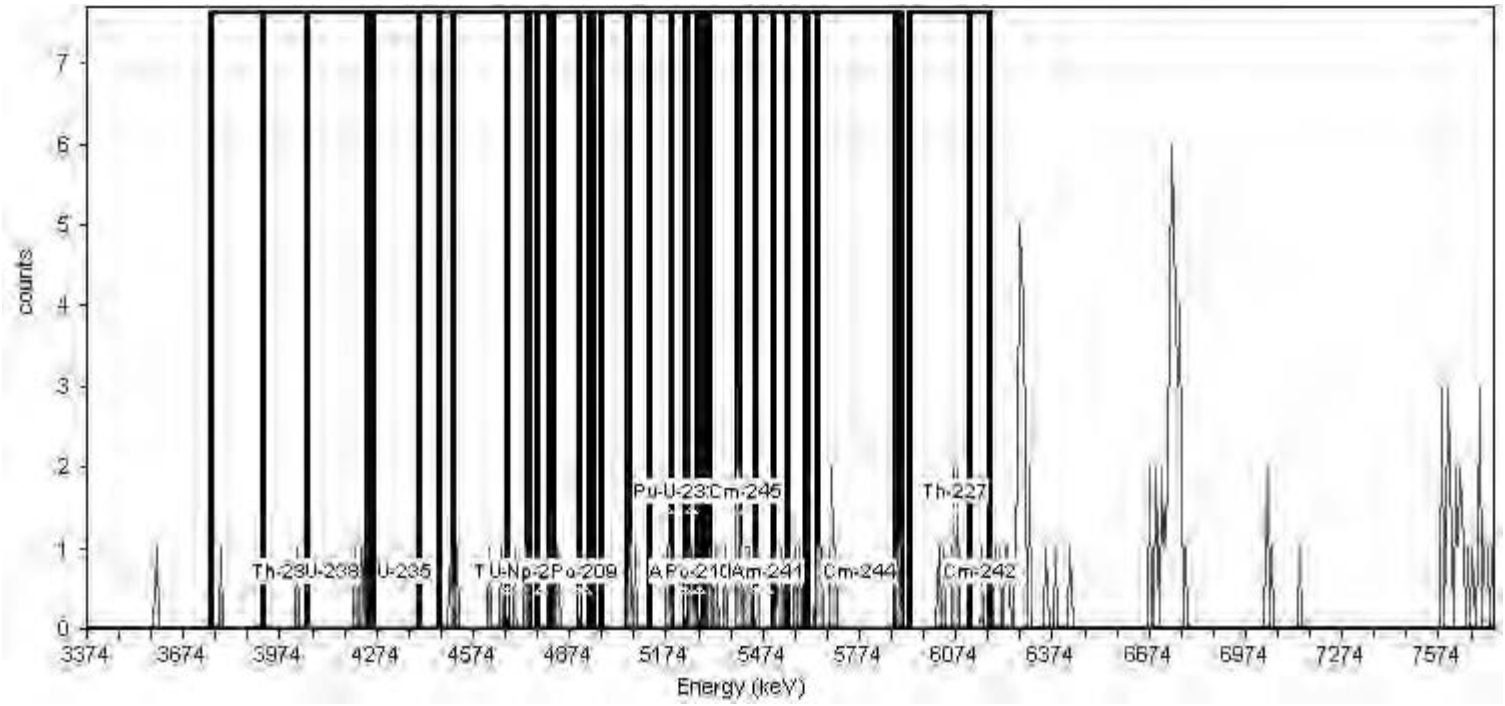
Analyst: 60040

Acquisition

Detector: AV60 , SN: 49-027117
Acquisition Start Date: 7/13/2018 12:11:34PM
Live Time: 960.00 min.
Real Time: 960.00 min.
Calibration Name: IC-1368446;AV60-05152018
Calibration Date: 5/15/2018 3:39:06PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 28.28% +/- 0.26% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 130.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	2.00	2.083E-003	1.804E-003
U-238	4.14	3.92	4.24	3.00	3.125E-003	2.083E-003
U-235	4.36	4.26	4.46	0.00	0.000E+000	1.473E-003
Th-230	4.68	4.40	4.75	6.00	6.250E-003	2.756E-003
U-234	4.71	4.51	4.82	5.00	5.208E-003	2.552E-003
Pu-242	4.90	4.68	4.95	3.00	3.125E-003	2.083E-003
Th-229	4.86	4.74	5.12	3.00	3.125E-003	2.083E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	3.00	3.125E-003	2.083E-003
Am-243	5.23	5.05	5.31	5.00	5.208E-003	2.552E-003
U-232	5.25	5.06	5.40	11.00	1.146E-002	3.608E-003
Th-228	5.45	5.19	5.51	12.00	1.250E-002	3.756E-003
Po-210	5.28	5.23	5.29	1.00	1.042E-003	1.473E-003
Pu-238	5.47	5.27	5.55	13.00	1.354E-002	3.898E-003
Am-241	5.48	5.30	5.60	15.00	1.563E-002	4.167E-003
Cm-245	5.42	5.40	5.45	7.00	7.292E-003	2.946E-003
Pu-236	5.76	5.61	5.89	7.00	7.292E-003	2.946E-003
Cm-244	5.78	5.64	5.90	8.00	8.333E-003	3.125E-003
Th-227	6.07	5.93	6.18	8.00	8.333E-003	3.125E-003
Cm-242	6.15	6.12	6.18	1.00	1.042E-003	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:02:38AM 7/13/2018

Sample

Sample Name: ICB;AV62
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

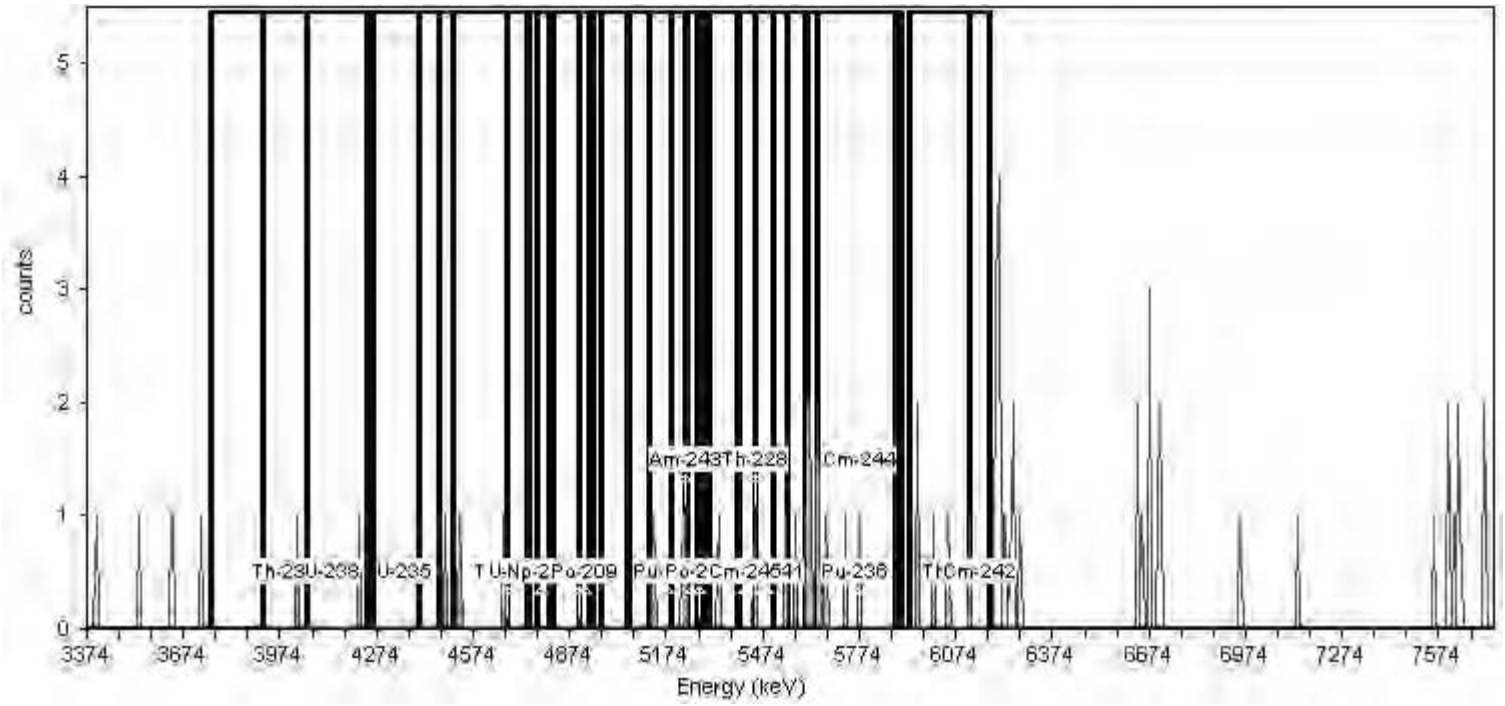
Analyst: 60040

Acquisition

Detector: AV62 , SN: 52-060FF2
Acquisition Start Date: 7/12/2018 1:40:16PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-1368447;AV62-05152018
Calibration Date: 5/15/2018 3:39:22PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 28.40% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 66.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	1.00	1.042E-003	1.473E-003
U-238	4.14	3.92	4.24	2.00	2.083E-003	1.804E-003
U-235	4.36	4.26	4.46	0.00	0.000E+000	1.473E-003
Th-230	4.68	4.40	4.75	3.00	3.125E-003	2.083E-003
U-234	4.71	4.51	4.82	2.00	2.083E-003	1.804E-003
Pu-242	4.90	4.68	4.95	0.00	0.000E+000	1.473E-003
Th-229	4.86	4.74	5.12	0.00	0.000E+000	1.473E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	3.00	3.125E-003	2.083E-003
Am-243	5.23	5.05	5.31	3.00	3.125E-003	2.083E-003
U-232	5.25	5.06	5.40	4.00	4.167E-003	2.329E-003
Th-228	5.45	5.19	5.51	4.00	4.167E-003	2.329E-003
Po-210	5.28	5.23	5.29	1.00	1.042E-003	1.473E-003
Pu-238	5.47	5.27	5.55	3.00	3.125E-003	2.083E-003
Am-241	5.48	5.30	5.60	4.00	4.167E-003	2.329E-003
Cm-245	5.42	5.40	5.45	1.00	1.042E-003	1.473E-003
Pu-236	5.76	5.61	5.89	11.00	1.146E-002	3.608E-003
Cm-244	5.78	5.64	5.90	6.00	6.250E-003	2.756E-003
Th-227	6.07	5.93	6.18	5.00	5.208E-003	2.552E-003
Cm-242	6.15	6.12	6.18	1.00	1.042E-003	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:02:47AM 7/13/2018

Sample

Sample Name: ICB;AV63
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

Analyst: 60040

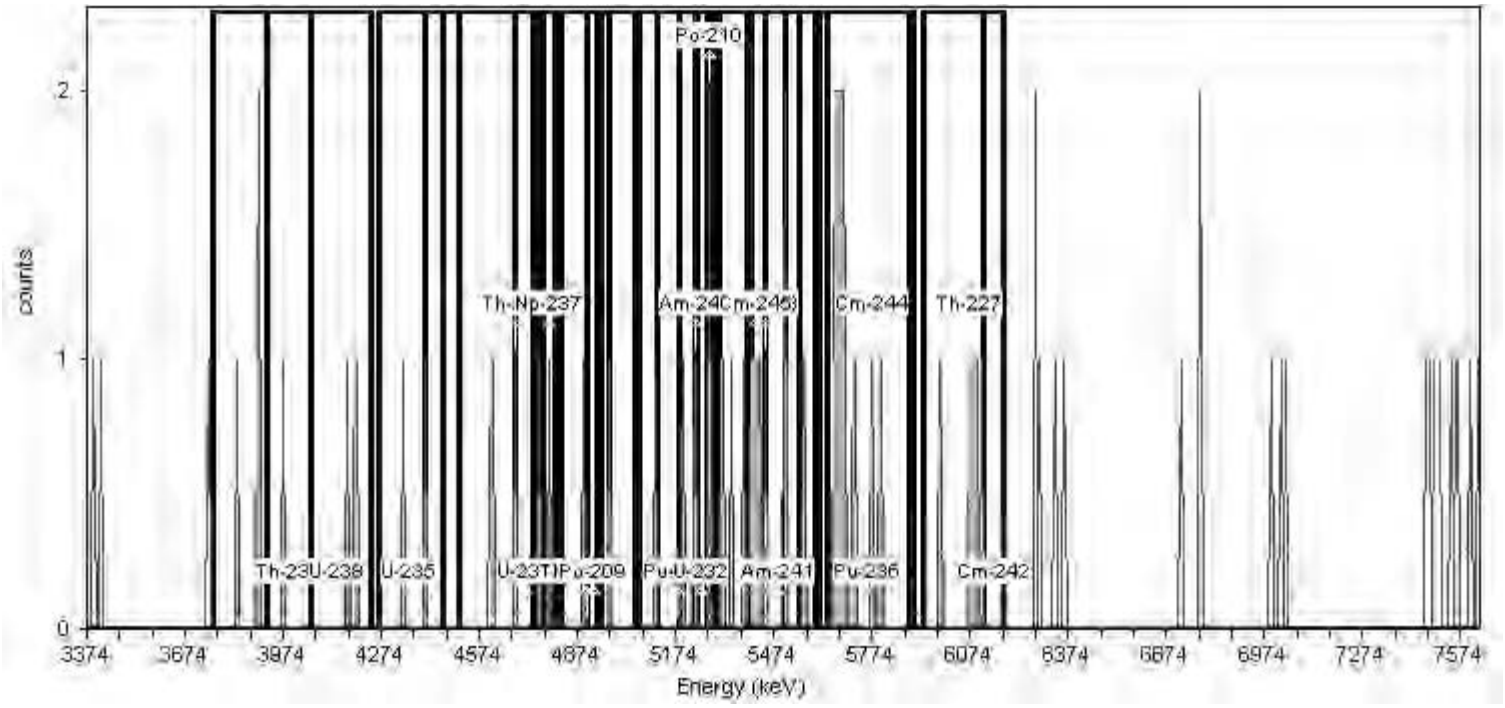
Acquisition

Detector: AV63 , SN: 47-029ff2
Acquisition Start Date: 7/12/2018 1:40:17PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-1370621;AV63-05152018
Calibration Date: 5/15/2018 3:39:32PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 26.80% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 80.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-230	4.68	4.40	4.75	4.00	4.167E-003	2.329E-003
U-234	4.71	4.51	4.82	5.00	5.208E-003	2.552E-003
Pu-242	4.90	4.68	4.95	4.00	4.167E-003	2.329E-003
Th-229	4.86	4.74	5.12	5.00	5.208E-003	2.552E-003
Np-237	4.78	4.77	4.81	1.00	1.042E-003	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	4.00	4.167E-003	2.329E-003
Th-232	3.99	3.75	4.05	5.00	5.208E-003	2.552E-003
U-238	4.14	3.92	4.24	4.00	4.167E-003	2.329E-003
U-235	4.36	4.26	4.46	2.00	2.083E-003	1.804E-003
Am-243	5.23	5.05	5.31	5.00	5.208E-003	2.552E-003
U-232	5.25	5.06	5.40	10.00	1.042E-002	3.455E-003
Th-228	5.45	5.19	5.51	16.00	1.667E-002	4.295E-003
Po-210	5.28	5.23	5.29	3.00	3.125E-003	2.083E-003
Pu-238	5.47	5.27	5.55	14.00	1.458E-002	4.034E-003
Am-241	5.48	5.30	5.60	13.00	1.354E-002	3.898E-003
Cm-245	5.42	5.40	5.45	6.00	6.250E-003	2.756E-003
Pu-236	5.76	5.61	5.89	15.00	1.563E-002	4.167E-003
Cm-244	5.78	5.64	5.90	15.00	1.563E-002	4.167E-003
Th-227	6.07	5.93	6.18	6.00	6.250E-003	2.756E-003
Cm-242	6.15	6.12	6.18	0.00	0.000E+000	1.473E-003

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:02:56AM 7/13/2018

Sample

Sample Name: ICB;AV64
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

Analyst: 60040

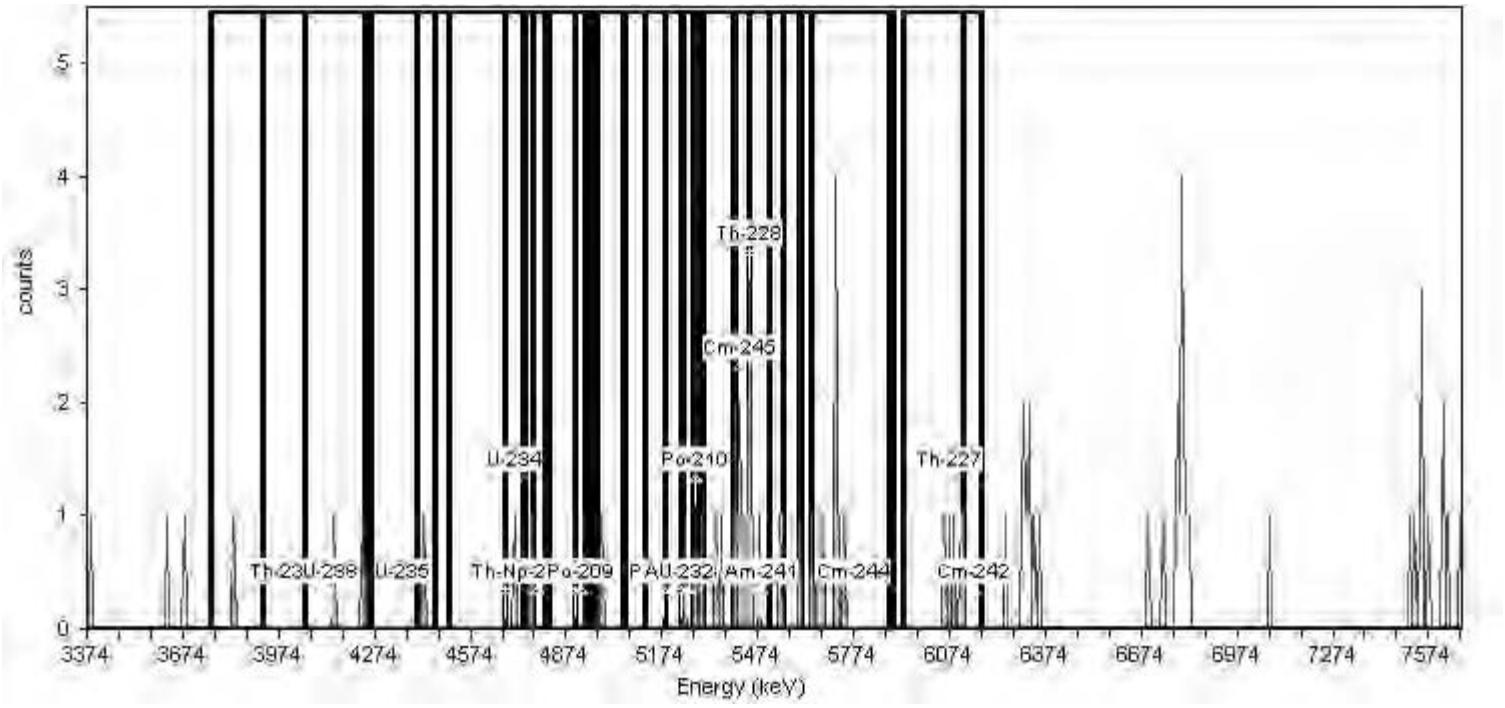
Acquisition

Detector: AV64 , SN: 43-028v3
Acquisition Start Date: 7/12/2018 1:40:19PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-1370622;AV64-05152018
Calibration Date: 5/15/2018 3:39:44PM

Energy Calibration Equation:

Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 28.38% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 80.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	1.00	1.042E-003	1.473E-003
U-238	4.14	3.92	4.24	2.00	2.083E-003	1.804E-003
U-235	4.36	4.26	4.46	1.00	1.042E-003	1.473E-003
Th-230	4.68	4.40	4.75	2.00	2.083E-003	1.804E-003
U-234	4.71	4.51	4.82	2.00	2.083E-003	1.804E-003
Pu-242	4.90	4.68	4.95	2.00	2.083E-003	1.804E-003
Th-229	4.86	4.74	5.12	2.00	2.083E-003	1.804E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	1.00	1.042E-003	1.473E-003
Am-243	5.23	5.05	5.31	3.00	3.125E-003	2.083E-003
U-232	5.25	5.06	5.40	7.00	7.292E-003	2.946E-003
Th-228	5.45	5.19	5.51	18.00	1.875E-002	4.541E-003
Po-210	5.28	5.23	5.29	2.00	2.083E-003	1.804E-003
Pu-238	5.47	5.27	5.55	18.00	1.875E-002	4.541E-003
Am-241	5.48	5.30	5.60	18.00	1.875E-002	4.541E-003
Cm-245	5.42	5.40	5.45	10.00	1.042E-002	3.455E-003
Pu-236	5.76	5.61	5.89	11.00	1.146E-002	3.608E-003
Cm-244	5.78	5.64	5.90	11.00	1.146E-002	3.608E-003
Th-227	6.07	5.93	6.18	5.00	5.208E-003	2.552E-003
Cm-242	6.15	6.12	6.18	1.00	1.042E-003	1.473E-003

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Background Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
6:03:20AM 7/13/2018

Sample

Sample Name: ICB;AV66
Comment:

Spectrum #1 Analysis #1

Batch

Batch Name: July2018
Description:

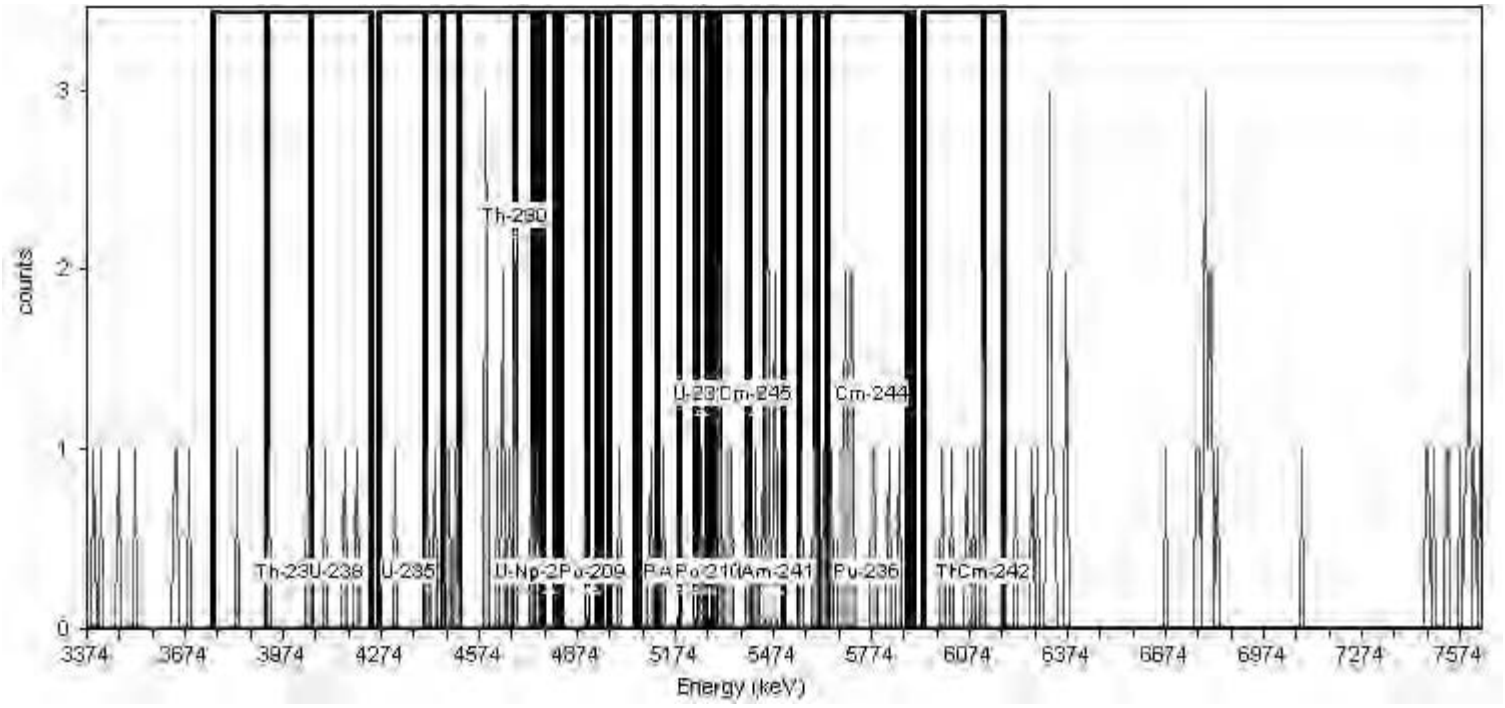
Analyst: 60040

Acquisition

Detector: AV66 , SN: 48-158EE2
Acquisition Start Date: 7/12/2018 1:40:22PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Calibration Name: IC-1370620;AV66-05152018
Calibration Date: 5/15/2018 3:40:08PM

Energy Calibration Equation:
Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2

Efficiency: 27.12% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = 11/05_BackgroundROI
Nuclide Library: Background ROI Library
Total Background Counts: 112.00

Nuclide Summary (ROI)

RegionName	Peak Energy (MeV)	Start Energy (MeV)	End Energy (MeV)	GrossCounts	Count Rate (CPM)	CR Uncertainty (CPM)
Th-232	3.99	3.75	4.05	3.00	3.125E-003	2.083E-003
U-238	4.14	3.92	4.24	5.00	5.208E-003	2.552E-003
U-235	4.36	4.26	4.46	3.00	3.125E-003	2.083E-003
Th-230	4.68	4.40	4.75	18.00	1.875E-002	4.541E-003
U-234	4.71	4.51	4.82	13.00	1.354E-002	3.898E-003
Pu-242	4.90	4.68	4.95	4.00	4.167E-003	2.329E-003
Th-229	4.86	4.74	5.12	3.00	3.125E-003	2.083E-003
Np-237	4.78	4.77	4.81	0.00	0.000E+000	1.473E-003
Po-209	4.92	4.90	4.93	0.00	0.000E+000	1.473E-003
Pu-239	5.18	4.97	5.24	3.00	3.125E-003	2.083E-003
Am-243	5.23	5.05	5.31	5.00	5.208E-003	2.552E-003
U-232	5.25	5.06	5.40	9.00	9.375E-003	3.294E-003
Th-228	5.45	5.19	5.51	15.00	1.563E-002	4.167E-003
Po-210	5.28	5.23	5.29	1.00	1.042E-003	1.473E-003
Pu-238	5.47	5.27	5.55	14.00	1.458E-002	4.034E-003
Am-241	5.48	5.30	5.60	17.00	1.771E-002	4.419E-003
Cm-245	5.42	5.40	5.45	3.00	3.125E-003	2.083E-003
Pu-236	5.76	5.61	5.89	15.00	1.563E-002	4.167E-003
Cm-244	5.78	5.64	5.90	14.00	1.458E-002	4.034E-003
Th-227	6.07	5.93	6.18	7.00	7.292E-003	2.946E-003
Cm-242	6.15	6.12	6.18	1.00	1.042E-003	1.473E-003

Run Logs

Alpha Spectroscopy Run Log

Detector: AV7

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 15:47	140	IC 160-371856/1		371856			PS
05/18/18 19:26	60	ICV 160-371945/1		371945			PS
07/10/18 16:56	60	CCV 160-375346/1		375346			PS
07/12/18 13:39	960	ICB 160-375509/1		375509			PS
08/04/18 11:00	1	PULSER 160-380567/1		380567			ALS
08/04/18 14:31	180	MB 160-377729/1-A		380567	377729	A-01-R	ALS

Detector: AV8

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 15:47	140	IC 160-371857/1		371857			PS
05/18/18 19:27	60	ICV 160-371946/1		371946			PS
07/10/18 16:56	60	CCV 160-375347/1		375347			PS
07/12/18 13:39	960	ICB 160-375520/1		375520			PS
08/04/18 11:00	1	PULSER 160-380576/1		380576			ALS
08/04/18 14:30	180	LCS 160-377729/2-A		380576	377729	A-01-R	ALS

Detector: AV10

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 15:48	140	IC 160-371831/1		371831			PS
05/19/18 16:12	60	ICV 160-371947/1		371947			PS
07/10/18 16:57	60	CCV 160-375335/1		375335			PS
07/12/18 13:39	960	ICB 160-375438/1		375438			PS
08/04/18 11:00	1	PULSER 160-380507/1		380507			ALS
08/04/18 14:30	180	490-155782-F-2-F DU		380507	377729	A-01-R	ALS

Detector: AV12

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 15:52	140	IC 160-371833/1		371833			PS
05/18/18 19:32	60	ICV 160-371935/1		371935			PS
07/10/18 17:01	60	CCV 160-375337/1		375337			PS
07/12/18 13:39	960	ICB 160-375451/1		375451			PS
08/04/18 11:00	1	PULSER 160-380519/1		380519			ALS
08/04/18 14:30	180	160-29479-1	CRC-B1-0002	380519	377729	A-01-R	ALS

Detector: AV14

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 15:54	140	IC 160-371835/1		371835			PS
05/18/18 19:32	60	ICV 160-371938/1		371938			PS
07/10/18 17:03	60	CCV 160-375339/1		375339			PS
07/12/18 13:39	960	ICB 160-375471/1		375471			PS
08/04/18 11:00	1	PULSER 160-380538/1		380538			ALS
08/04/18 14:30	180	160-29479-2	CRC-B1-1820	380538	377729	A-01-R	ALS

Detector: AV15

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 15:57	140	IC 160-371836/1		371836			PS
05/18/18 19:34	60	ICV 160-371939/1		371939			PS

Alpha Spectroscopy Run Log

Detector: AV15 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
07/10/18 17:03	60	CCV 160-375340/1		375340			PS
07/12/18 13:39	960	ICB 160-375472/1		375472			PS
08/04/18 11:00	1	PULSER 160-380539/1		380539			ALS
08/04/18 14:30	180	160-29479-3	CRC-B1-1214	380539	377729	A-01-R	ALS

Detector: AV16

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 15:59	140	IC 160-371837/1		371837			RTM
05/18/18 19:35	60	ICV 160-371940/1		371940			PS
07/10/18 17:04	60	CCV 160-375341/1		375341			PS
07/12/18 13:39	960	ICB 160-375473/1		375473			PS
08/04/18 11:00	1	PULSER 160-380540/1		380540			ALS
08/04/18 14:30	180	160-29479-4	CRC-B7-1416	380540	377729	A-01-R	ALS

Detector: AV17

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 18:47	140	IC 160-371838/1		371838			PS
05/20/18 16:10	60	ICV 160-371950/1		371950			PS
07/11/18 11:07	60	CCV 160-375374/1		375374			PS
07/13/18 12:11	960	ICB 160-375877/1		375877			PS
08/04/18 11:00	1	PULSER 160-380541/1		380541			ALS
08/04/18 14:30	180	160-29479-5	CRC-B7-2224	380541	377729	A-01-R	ALS

Detector: AV19

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 18:35	140	IC 160-371840/1		371840			PS
05/20/18 16:11	60	ICV 160-371952/1		371952			PS
07/11/18 11:08	60	CCV 160-375375/1		375375			PS
07/12/18 13:39	960	ICB 160-375475/1		375475			PS
08/04/18 11:00	1	PULSER 160-380542/1		380542			ALS
08/04/18 14:30	180	160-29479-6	CRC-B7-2628	380542	377729	A-01-R	ALS

Detector: AV20

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 18:36	140	IC 160-371842/1		371842			PS
05/20/18 16:11	60	ICV 160-371953/1		371953			PS
07/11/18 11:08	60	CCV 160-375376/1		375376			PS
07/12/18 13:39	960	ICB 160-375477/1		375477			PS
08/04/18 11:01	1	PULSER 160-380543/1		380543			ALS
08/04/18 14:30	180	160-29479-7	CRC-B20-1214	380543	377729	A-01-R	ALS

Detector: AV21

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 18:36	140	IC 160-371843/1		371843			PS
05/20/18 16:11	60	ICV 160-371954/1		371954			PS
07/11/18 11:08	60	CCV 160-375377/1		375377			PS
07/12/18 13:39	960	ICB 160-375478/1		375478			PS

Alpha Spectroscopy Run Log

Detector: AV21 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/04/18 11:01	1	PULSER 160-380544/1		380544			ALS
08/04/18 14:30	180	160-29479-8	CRC-B20-1820	380544	377729	A-01-R	ALS

Detector: AV23

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 18:37	140	IC 160-371845/1		371845			PS
05/20/18 16:12	60	ICV 160-371956/1		371956			PS
07/11/18 11:09	60	CCV 160-375379/1		375379			PS
07/12/18 13:39	960	ICB 160-375480/1		375480			PS
08/04/18 11:01	1	PULSER 160-380545/1		380545			ALS
08/04/18 14:31	180	160-29479-9	CRC-B20-2628	380545	377729	A-01-R	ALS

Detector: AV47

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 18:40	140	IC 160-371853/1		371853			PS
05/20/18 16:15	60	ICV 160-371962/1		371962			PS
07/11/18 11:10	60	CCV 160-375385/1		375385			PS
07/12/18 13:39	960	ICB 160-375488/1		375488			PS
08/04/18 11:01	1	PULSER 160-380552/1		380552			ALS
08/04/18 14:34	180	MB 160-377742/1-A		380552	377742	A-01-R	ALS

Detector: AV48

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/14/18 18:40	140	IC 160-371854/1		371854			PS
05/20/18 16:15	60	ICV 160-371963/1		371963			PS
07/11/18 12:36	60	CCV 160-375386/1		375386			PS
07/12/18 13:39	960	ICB 160-375489/1		375489			PS
08/04/18 11:01	1	PULSER 160-380553/1		380553			ALS
08/04/18 14:34	180	LCS 160-377742/2-A		380553	377742	A-01-R	ALS

Detector: AV52

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/15/18 12:36	140	IC 160-371861/1		371861			PS
05/23/18 11:26	60	ICV 160-371998/1		371998			PS
07/11/18 12:40	60	CCV 160-375390/1		375390			PS
07/12/18 13:40	960	ICB 160-375493/1		375493			PS
08/04/18 11:01	1	PULSER 160-380555/1		380555			ALS
08/04/18 14:34	180	490-155782-F-2-H DU		380555	377742	A-01-R	ALS

Detector: AV54

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/15/18 12:37	140	IC 160-371863/1		371863			PS
05/23/18 11:27	60	ICV 160-372000/1		372000			PS
07/11/18 12:38	60	CCV 160-375392/1		375392			PS
07/12/18 13:40	960	ICB 160-375495/1		375495			PS
08/04/18 11:01	1	PULSER 160-380557/1		380557			ALS
08/04/18 14:34	180	160-29479-1	CRC-B1-0002	380557	377742	A-01-R	ALS

Alpha Spectroscopy Run Log

Detector: AV56

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/15/18 12:38	140	IC 160-371865/1		371865			PS
05/23/18 11:28	60	ICV 160-372002/1		372002			PS
07/11/18 12:40	60	CCV 160-375394/1		375394			PS
07/12/18 13:40	960	ICB 160-375497/1		375497			PS
08/04/18 11:01	1	PULSER 160-380558/1		380558			ALS
08/04/18 14:34	180	160-29479-2	CRC-B1-1820	380558	377742	A-01-R	ALS

Detector: AV57

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/15/18 12:38	140	IC 160-371866/1		371866			PS
05/23/18 11:29	60	ICV 160-372003/1		372003			PS
07/11/18 12:39	60	CCV 160-375395/1		375395			PS
07/12/18 13:40	960	ICB 160-375498/1		375498			PS
08/04/18 11:01	1	PULSER 160-380559/1		380559			ALS
08/04/18 14:34	180	160-29479-3	CRC-B1-1214	380559	377742	A-01-R	ALS

Detector: AV58

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/15/18 12:39	140.002 994791 667	IC 160-371867/1		371867			PS
05/23/18 11:29	60	ICV 160-372004/1		372004			PS
07/11/18 12:42	60	CCV 160-375396/1		375396			PS
07/13/18 12:11	960	ICB 160-375884/1		375884			PS
08/04/18 11:01	1	PULSER 160-380560/1		380560			ALS
08/04/18 14:34	180	160-29479-4	CRC-B7-1416	380560	377742	A-01-R	ALS

Detector: AV60

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/15/18 12:39	140	IC 160-371868/1		371868			PS
05/21/18 10:36	60	ICV 160-371965/1		371965			PS
07/11/18 12:39	60	CCV 160-375397/1		375397			PS
07/13/18 12:11	960	ICB 160-375886/1		375886			PS
08/04/18 11:01	1	PULSER 160-380561/1		380561			ALS
08/04/18 14:34	180	160-29479-5	CRC-B7-2224	380561	377742	A-01-R	ALS

Detector: AV62

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/15/18 12:40	140	IC 160-371869/1		371869			PS
05/21/18 10:36	60	ICV 160-371966/1		371966			PS
07/11/18 12:41	60	CCV 160-375398/1		375398			PS
07/12/18 13:40	960	ICB 160-375502/1		375502			PS
08/04/18 11:01	1	PULSER 160-380562/1		380562			ALS
08/04/18 14:34	180	160-29479-6	CRC-B7-2628	380562	377742	A-01-R	ALS

Alpha Spectroscopy Run Log

Detector: AV63

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/15/18 12:40	140	IC 160-371870/1		371870			PS
05/21/18 10:36	60	ICV 160-371967/1		371967			PS
07/11/18 12:41	60	CCV 160-375399/1		375399			PS
07/12/18 13:40	960	ICB 160-375503/1		375503			PS
08/04/18 11:01	1	PULSER 160-380563/1		380563			ALS
08/04/18 14:34	180	160-29479-7	CRC-B20-1214	380563	377742	A-01-R	ALS

Detector: AV64

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/15/18 12:40	140	IC 160-371871/1		371871			PS
05/21/18 10:37	60	ICV 160-371968/1		371968			PS
07/11/18 12:41	60	CCV 160-375400/1		375400			PS
07/12/18 13:40	960	ICB 160-375504/1		375504			PS
08/04/18 11:01	1	PULSER 160-380564/1		380564			ALS
08/04/18 14:34	180	160-29479-8	CRC-B20-1820	380564	377742	A-01-R	ALS

Detector: AV66

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/15/18 12:41	140.005 338541 667	IC 160-371873/1		371873			PS
05/21/18 10:38	60	ICV 160-371970/1		371970			PS
07/11/18 14:03	60	CCV 160-375402/1		375402			PS
07/12/18 13:40	960	ICB 160-375506/1		375506			PS
08/04/18 11:01	1	PULSER 160-380565/1		380565			ALS
08/04/18 14:34	180	160-29479-9	CRC-B20-2628	380565	377742	A-01-R	ALS

GAMMA SPECTROSCOPY

Method 901.1
Ra-226

Radium-226 & Other Gamma Emitters (GS) by Method 901.1

Prep Batch: 376740

Fill Geometry, 21-Day In-Growth

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 376740

Lab ID: MB 160-376740/1-A | Analyzed: 08/09/18 01:24 | Ts: 30 | Sigma: 2
Client ID: | Detector: GV12 | Decay Corrected: No

Analyte	MB Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Actinium-227	0.1402	0.289	0.289	U	pCi/g		1.43	381202
Radium-226	-0.1323	0.149	0.149	U	pCi/g	1.00	0.490	381202
Radium-228	-0.01752	0.246	0.246	U	pCi/g		0.306	381202
Thallium-208	-0.004696	0.00383	0.00386	U	pCi/g		0.131	381202
Thorium-232	-0.01752	0.246	0.246	U	pCi/g		0.306	381202
Thorium-234	0.5011	0.905	0.907	U	pCi/g		1.38	381202
Uranium-235	0.07006	0.107	0.107	U	pCi/g		0.669	381202
Uranium-238	0.5011	0.905	0.907	U	pCi/g		1.38	381202
Actinium-228	-0.01752	0.246	0.246	U	pCi/g		0.306	381202
Bismuth-212	-0.4385	1.02	1.02	U	pCi/g		1.75	381202
Bismuth-214	-0.1323	0.149	0.149	U	pCi/g		0.490	381202
Lead-210	0.9041	1.49	1.49	U	pCi/g		2.30	381202
Lead-212	-0.05787	0.0648	0.0651	U	pCi/g		0.179	381202
Lead-214	0.009031	0.128	0.128	U	pCi/g		0.186	381202
Potassium-40	0.5436	0.384	0.388		pCi/g		0.501	381202
Protactinium-231	0.3578	1.36	1.36	U	pCi/g		4.55	381202

Lab ID: LCS 160-376740/2-A | Analyzed: 08/09/18 01:24 | Ts: 30 | Sigma: 2
Client ID: | Detector: GV19 | Decay Corrected: No

Analyte	LCS Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Americium-241	99.26	1.70	11.7		pCi/g		1.22	381207
Cesium-137	31.67	0.817	3.34		pCi/g		0.273	381207
Cobalt-60	13.89	0.444	1.45		pCi/g		0.137	381207

Lab ID: 160-29479-1 | Analyzed: 08/09/18 01:23 | Ts: 60 | Sigma: 2
Client ID: CRC-B1-0002 | Detector: GV8 | Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Actinium-227	0.576	0.614	0.618	U	pCi/g		1.01	381210
Radium-226	11.3	0.671	1.29		pCi/g	1.00	0.296	381210
Radium-228	0.341	0.578	0.579	U	pCi/g		0.660	381210
Thallium-208	0.343	0.147	0.151		pCi/g		0.151	381210
Thorium-232	0.341	0.578	0.579	U	pCi/g		0.660	381210
Thorium-234	4.27	0.995	1.08		pCi/g		2.63	381210
Uranium-235	1.27	0.697	0.708		pCi/g		0.832	381210

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 376740

Lab ID: 160-29479-1 Analyzed: 08/09/18 01:23 Ts: 60 Sigma: 2
Client ID: CRC-B1-0002 Detector: GV8 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Uranium-238	4.27	0.995	1.08		pCi/g		2.63	381210
Actinium-228	0.341	0.578	0.579	U	pCi/g		0.660	381210
Bismuth-212	-0.644	2.12	2.12	U	pCi/g		3.60	381210
Bismuth-214	11.3	0.671	1.29		pCi/g		0.296	381210
Lead-210	9.31	1.52	1.94		pCi/g		2.05	381210
Lead-212	0.763	0.181	0.198		pCi/g		0.244	381210
Lead-214	11.8	0.608	1.29		pCi/g		0.333	381210
Potassium-40	14.0	2.33	2.69		pCi/g		1.45	381210
Protactinium-231	0.000	1.44	1.44	U	pCi/g		15.7	381210

Lab ID: 160-29479-2 Analyzed: 08/09/18 18:44 Ts: 30 Sigma: 2
Client ID: CRC-B1-1820 Detector: GV17 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Actinium-227	-0.325	0.721	0.722	U	pCi/g		1.03	381206
Radium-226	0.329	0.133	0.138		pCi/g	1.00	0.143	381206
Radium-228	0.272	0.265	0.267	U	pCi/g		0.305	381206
Thallium-208	0.0719	0.0558	0.0563		pCi/g		0.0691	381206
Thorium-232	0.272	0.265	0.267	U	pCi/g		0.305	381206
Thorium-234	0.667	0.504	0.509	U	pCi/g		1.43	381206
Uranium-235	-0.0465	0.316	0.316	U	pCi/g		0.623	381206
Uranium-238	0.667	0.504	0.509	U	pCi/g		1.43	381206
Actinium-228	0.272	0.265	0.267	U	pCi/g		0.305	381206
Bismuth-212	0.341	0.601	0.602	U	pCi/g		1.02	381206
Bismuth-214	0.329	0.133	0.138		pCi/g		0.143	381206
Lead-210	0.349	1.34	1.34	U	pCi/g		2.00	381206
Lead-212	0.212	0.0797	0.0842		pCi/g		0.107	381206
Lead-214	0.371	0.105	0.112		pCi/g		0.101	381206
Potassium-40	13.1	1.65	2.12		pCi/g		0.779	381206
Protactinium-231	-0.0000000405	2.32	2.32	U	pCi/g		3.97	381206

Lab ID: 160-29479-2 DU Analyzed: 08/09/18 06:35 Ts: 30 Sigma: 2
Client ID: CRC-B1-1820 Detector: GV9 Decay Corrected: No

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Actinium-227	0.0000	0.338	0.338	U	pCi/g		1.08	381204

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 376740

Lab ID: 160-29479-2 DU | Analyzed: 08/09/18 06:35 | Ts: 30 | Sigma: 2
Client ID: CRC-B1-1820 | Detector: GV9 | Decay Corrected: No

Analyte	DU Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Radium-226	0.2690	0.0991	0.103		pCi/g	1.00	0.111	381204
Radium-228	0.1903	0.164	0.166		pCi/g		0.176	381204
Thallium-208	0.07889	0.0732	0.0737		pCi/g		0.0607	381204
Thorium-232	0.1903	0.164	0.166		pCi/g		0.176	381204
Thorium-234	0.4880	1.06	1.07	U	pCi/g		1.79	381204
Uranium-235	-0.1655	0.281	0.282	U	pCi/g		0.893	381204
Uranium-238	0.4880	1.06	1.07	U	pCi/g		1.79	381204
Actinium-228	0.1903	0.164	0.166		pCi/g		0.176	381204
Bismuth-212	0.1810	0.390	0.390	U	pCi/g		0.678	381204
Bismuth-214	0.2690	0.0991	0.103		pCi/g		0.111	381204
Lead-210	-0.4156	1.31	1.31	U	pCi/g		2.22	381204
Lead-212	0.1927	0.0599	0.0649		pCi/g		0.0731	381204
Lead-214	0.4207	0.0992	0.108		pCi/g		0.0790	381204
Potassium-40	13.23	1.48	2.01		pCi/g		0.611	381204
Protactinium-231	0.5503	1.97	1.97	U	pCi/g		3.33	381204

Lab ID: 160-29479-3 | Analyzed: 08/09/18 01:27 | Ts: 30 | Sigma: 2
Client ID: CRC-B1-1214 | Detector: GV17 | Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Actinium-227	0.160	0.637	0.637	U	pCi/g		0.927	381206
Radium-226	0.338	0.121	0.126		pCi/g	1.00	0.125	381206
Radium-228	0.442	0.155	0.162		pCi/g		0.135	381206
Thallium-208	0.129	0.0470	0.0489		pCi/g		0.0447	381206
Thorium-232	0.442	0.155	0.162		pCi/g		0.135	381206
Thorium-234	0.617	1.02	1.02	U	pCi/g		1.49	381206
Uranium-235	0.0596	0.137	0.137	U	pCi/g		0.622	381206
Uranium-238	0.617	1.02	1.02	U	pCi/g		1.49	381206
Actinium-228	0.442	0.155	0.162		pCi/g		0.135	381206
Bismuth-212	0.211	0.812	0.812	U	pCi/g		1.42	381206
Bismuth-214	0.338	0.121	0.126		pCi/g		0.125	381206
Lead-210	1.69	1.27	1.28	U	pCi/g		1.72	381206
Lead-212	0.157	0.0767	0.0793		pCi/g		0.109	381206
Lead-214	0.490	0.112	0.123		pCi/g		0.111	381206
Potassium-40	13.8	1.73	2.24		pCi/g		0.811	381206
Protactinium-231	-0.149	0.544	0.544	U	pCi/g		4.24	381206

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 376740

Lab ID: 160-29479-4 Analyzed: 08/09/18 02:03 Ts: 30 Sigma: 2
Client ID: CRC-B7-1416 Detector: GV15 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Actinium-227	-0.146	0.849	0.849	U	pCi/g		1.45	381205
Radium-226	0.422	0.163	0.168		pCi/g	1.00	0.157	381205
Radium-228	0.335	0.150	0.154		pCi/g		0.123	381205
Thallium-208	0.0464	0.0826	0.0827	U	pCi/g		0.0963	381205
Thorium-232	0.335	0.150	0.154		pCi/g		0.123	381205
Thorium-234	0.295	1.62	1.62	U	pCi/g		2.74	381205
Uranium-235	0.0778	0.198	0.198	U	pCi/g		0.938	381205
Uranium-238	0.295	1.62	1.62	U	pCi/g		2.74	381205
Actinium-228	0.335	0.150	0.154		pCi/g		0.123	381205
Bismuth-212	-0.392	0.939	0.940	U	pCi/g		1.62	381205
Bismuth-214	0.422	0.163	0.168		pCi/g		0.157	381205
Lead-210	-0.993	1.28	1.29	U	pCi/g		2.86	381205
Lead-212	0.133	0.0766	0.0785		pCi/g		0.0955	381205
Lead-214	0.290	0.126	0.129		pCi/g		0.181	381205
Potassium-40	11.9	1.93	2.29		pCi/g		0.995	381205
Protactinium-231	0.397	1.47	1.47	U	pCi/g		4.79	381205

Lab ID: 160-29479-5 Analyzed: 08/09/18 06:36 Ts: 30 Sigma: 2
Client ID: CRC-B7-2224 Detector: GV12 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Actinium-227	0.372	0.368	0.370	U	pCi/g		1.63	381202
Radium-226	0.671	0.176	0.189		pCi/g	1.00	0.159	381202
Radium-228	0.160	0.286	0.286	U	pCi/g		0.326	381202
Thallium-208	0.126	0.0971	0.0979		pCi/g		0.0952	381202
Thorium-232	0.160	0.286	0.286	U	pCi/g		0.326	381202
Thorium-234	0.586	0.707	0.710	U	pCi/g		1.98	381202
Uranium-235	0.133	0.604	0.604	U	pCi/g		1.02	381202
Uranium-238	0.586	0.707	0.710	U	pCi/g		1.98	381202
Actinium-228	0.160	0.286	0.286	U	pCi/g		0.326	381202
Bismuth-212	0.266	0.813	0.814	U	pCi/g		1.42	381202
Bismuth-214	0.671	0.176	0.189		pCi/g		0.159	381202
Lead-210	0.942	1.63	1.63	U	pCi/g		2.47	381202
Lead-212	0.395	0.0970	0.105		pCi/g		0.102	381202
Lead-214	0.551	0.146	0.156		pCi/g		0.191	381202
Potassium-40	13.6	1.96	2.39		pCi/g		0.861	381202

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 376740

Lab ID: 160-29479-5 Analyzed: 08/09/18 06:36 Ts: 30 Sigma: 2
Client ID: CRC-B7-2224 Detector: GV12 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Protactinium-231	0.000	0.557	0.557	U	pCi/g		5.39	381202

Lab ID: 160-29479-6 Analyzed: 08/09/18 06:36 Ts: 30 Sigma: 2
Client ID: CRC-B7-2628 Detector: GV14 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Actinium-227	-0.359	0.716	0.717	U	pCi/g		1.16	381203
Radium-226	0.470	0.145	0.153		pCi/g	1.00	0.134	381203
Radium-228	0.657	0.203	0.214		pCi/g		0.115	381203
Thallium-208	0.141	0.0503	0.0524		pCi/g		0.0422	381203
Thorium-232	0.657	0.203	0.214		pCi/g		0.115	381203
Thorium-234	1.09	0.665	0.675	U	pCi/g		1.84	381203
Uranium-235	0.219	0.186	0.187	U	pCi/g		0.236	381203
Uranium-238	1.09	0.665	0.675	U	pCi/g		1.84	381203
Actinium-228	0.657	0.203	0.214		pCi/g		0.115	381203
Bismuth-212	-0.0626	0.624	0.624	U	pCi/g		1.44	381203
Bismuth-214	0.470	0.145	0.153		pCi/g		0.134	381203
Lead-210	0.732	1.51	1.51	U	pCi/g		2.22	381203
Lead-212	0.382	0.0977	0.109		pCi/g		0.113	381203
Lead-214	0.539	0.131	0.142		pCi/g		0.113	381203
Potassium-40	12.1	1.78	2.17		pCi/g		0.722	381203
Protactinium-231	0.246	1.44	1.44	U	pCi/g		3.31	381203

Lab ID: 160-29479-7 Analyzed: 08/09/18 06:37 Ts: 30 Sigma: 2
Client ID: CRC-B20-1214 Detector: GV15 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Actinium-227	-0.144	0.948	0.948	U	pCi/g		1.62	381205
Radium-226	0.305	0.141	0.145		pCi/g	1.00	0.157	381205
Radium-228	0.366	0.234	0.237		pCi/g		0.229	381205
Thallium-208	0.140	0.0479	0.0500		pCi/g		0.0303	381205
Thorium-232	0.366	0.234	0.237		pCi/g		0.229	381205
Thorium-234	1.51	0.659	0.677	U	pCi/g		1.75	381205
Uranium-235	-0.0174	0.406	0.406	U	pCi/g		0.840	381205
Uranium-238	1.51	0.659	0.677	U	pCi/g		1.75	381205
Actinium-228	0.366	0.234	0.237		pCi/g		0.229	381205

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 376740

Lab ID: 160-29479-7 Analyzed: 08/09/18 06:37 Ts: 30 Sigma: 2
Client ID: CRC-B20-1214 Detector: GV15 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Bismuth-212	0.359	0.761	0.762	U	pCi/g		1.31	381205
Bismuth-214	0.305	0.141	0.145		pCi/g		0.157	381205
Lead-210	2.75	1.56	1.59		pCi/g		1.83	381205
Lead-212	0.181	0.0811	0.0844		pCi/g		0.109	381205
Lead-214	0.490	0.124	0.134		pCi/g		0.134	381205
Potassium-40	14.0	2.03	2.48		pCi/g		0.723	381205
Protactinium-231	-0.923	3.19	3.19	U	pCi/g		5.37	381205

Lab ID: 160-29479-8 Analyzed: 08/09/18 06:42 Ts: 30 Sigma: 2
Client ID: CRC-B20-1820 Detector: GV17 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Actinium-227	0.287	0.439	0.441	U	pCi/g		1.01	381206
Radium-226	0.357	0.146	0.151		pCi/g	1.00	0.154	381206
Radium-228	0.386	0.131	0.137		pCi/g		0.378	381206
Thallium-208	0.0890	0.0783	0.0789		pCi/g		0.0858	381206
Thorium-232	0.386	0.131	0.137		pCi/g		0.378	381206
Thorium-234	1.55	1.20	1.21	U	pCi/g		1.70	381206
Uranium-235	-0.0112	0.0297	0.0297	U	pCi/g		0.730	381206
Uranium-238	1.55	1.20	1.21	U	pCi/g		1.70	381206
Actinium-228	0.386	0.131	0.137		pCi/g		0.378	381206
Bismuth-212	0.247	0.841	0.841	U	pCi/g		1.47	381206
Bismuth-214	0.357	0.146	0.151		pCi/g		0.154	381206
Lead-210	0.651	1.33	1.33	U	pCi/g		2.02	381206
Lead-212	0.273	0.0836	0.0907		pCi/g		0.0989	381206
Lead-214	0.494	0.135	0.145		pCi/g		0.132	381206
Potassium-40	14.6	1.86	2.39		pCi/g		0.884	381206
Protactinium-231	0.0000000230	2.67	2.67	U	pCi/g		4.58	381206

Lab ID: 160-29479-9 Analyzed: 08/09/18 06:37 Ts: 30 Sigma: 2
Client ID: CRC-B20-2628 Detector: GV19 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Actinium-227	-0.264	1.22	1.22	U	pCi/g		2.06	381207
Radium-226	0.650	0.199	0.210		pCi/g	1.00	0.175	381207
Radium-228	0.554	0.198	0.206		pCi/g		0.235	381207

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 376740

Lab ID: 160-29479-9 Analyzed: 08/09/18 06:37 Ts: 30 Sigma: 2
Client ID: CRC-B20-2628 Detector: GV19 Decay Corrected: No

Analyte	Result	Count Unc	Total Unc	Qualifier	Unit	RL	MDC	Anly Batch
Thallium-208	0.187	0.144	0.145		pCi/g		0.108	381207
Thorium-232	0.554	0.198	0.206		pCi/g		0.235	381207
Thorium-234	4.16	1.04	1.14		pCi/g		2.38	381207
Uranium-235	0.556	0.305	0.310		pCi/g		0.422	381207
Uranium-238	4.16	1.04	1.14		pCi/g		2.38	381207
Actinium-228	0.554	0.198	0.206		pCi/g		0.235	381207
Bismuth-212	0.000	0.840	0.840	U	pCi/g		1.90	381207
Bismuth-214	0.650	0.199	0.210		pCi/g		0.175	381207
Lead-210	1.61	2.12	2.13	U	pCi/g		2.86	381207
Lead-212	0.352	0.111	0.117		pCi/g		0.139	381207
Lead-214	0.670	0.137	0.153		pCi/g		0.0750	381207
Potassium-40	12.3	2.07	2.42		pCi/g		1.35	381207
Protactinium-231	0.888	2.58	2.58	U	pCi/g		5.86	381207

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 376740

Quality Control Summary

Method Blank ID:	Analyte	Parent Result	Spike Added	MB Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
MB 160-376740/1-A	Actinium-227			0.1402	U	pCi/g							.96894531
MB 160-376740/1-A	Radium-226			-0.1323	U	pCi/g							-1.7736483
MB 160-376740/1-A	Radium-228			-0.01752	U	pCi/g							-.14237
MB 160-376740/1-A	Thallium-208			-0.004696	U	pCi/g							-2.4307159
MB 160-376740/1-A	Thorium-232			-0.01752	U	pCi/g							-.14237
MB 160-376740/1-A	Thorium-234			0.5011	U	pCi/g							1.1051717
MB 160-376740/1-A	Uranium-235			0.07006	U	pCi/g							1.3107283
MB 160-376740/1-A	Uranium-238			0.5011	U	pCi/g							1.1051717
MB 160-376740/1-A	Actinium-228			-0.01752	U	pCi/g							-.14237
MB 160-376740/1-A	Bismuth-212			-0.4385	U	pCi/g							-.861731
MB 160-376740/1-A	Bismuth-214			-0.1323	U	pCi/g							-1.7736483
MB 160-376740/1-A	Lead-210			0.9041	U	pCi/g							1.2137360
MB 160-376740/1-A	Lead-212			-0.05787	U	pCi/g							-1.7777797
MB 160-376740/1-A	Lead-214			0.009031	U	pCi/g							.1410421
MB 160-376740/1-A	Potassium-40			0.5436		pCi/g							2.8000019
MB 160-376740/1-A	Protactinium-231			0.3578	U	pCi/g							.52460852

Lab Control Sample ID:	Analyte	Parent Result	Spike Added	LCS Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
LCS 160-376740/2-A	Americium-241		96.8	99.26		pCi/g	103	87 - 116					.3028552534
LCS 160-376740/2-A	Cesium-137		28.2	31.67		pCi/g	112	87 - 120					1.550867582
LCS 160-376740/2-A	Cobalt-60		12.9	13.89		pCi/g	108	87 - 115					1.0109586728

Duplicate ID:	Analyte	Parent Result	Spike Added	DU Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
160-29479-2	Actinium-227	-0.325		0.0000	U	pCi/g			200	0.31	0.82	1	
160-29479-2	Radium-226	0.329		0.2690		pCi/g			20	0.25	0.70	1	
160-29479-2	Radium-228	0.272		0.1903		pCi/g			35	0.19	0.52	1	
160-29479-2	Thallium-208	0.0719		0.07889		pCi/g			9	0.05	0.15	1	
160-29479-2	Thorium-232	0.272		0.1903		pCi/g			35	0.19	0.52	1	
160-29479-2	Thorium-234	0.667		0.4880	U	pCi/g			31	0.11	0.30	1	
160-29479-2	Uranium-235	-0.0465		-0.1655	U	pCi/g			112	0.20	0.56	1	
160-29479-2	Uranium-238	0.667		0.4880	U	pCi/g			31	0.11	0.30	1	

Gamma Spectroscopy Analysis Detail Report
Prep Batch: 376740

Duplicate ID:	Analyte	Parent Result	Spike Added	DU Result	Qualifier	Unit	% Rec	% Rec Limits	RPD	RER	DER	RER Limit	Z Factor
160-29479-2	Actinium-228	0.272		0.1903		pCi/g			35	0.19	0.52	1	
160-29479-2	Bismuth-212	0.341		0.1810	U	pCi/g			61	0.16	0.45	1	
160-29479-2	Bismuth-214	0.329		0.2690		pCi/g			20	0.25	0.70	1	
160-29479-2	Lead-210	0.349		-0.4156	U	pCi/g			2310	0.29	0.82	1	
160-29479-2	Lead-212	0.212		0.1927		pCi/g			9	0.13	0.36	1	
160-29479-2	Lead-214	0.371		0.4207		pCi/g			12	0.22	0.63	1	
160-29479-2	Potassium-40	13.1		13.23		pCi/g			1	0.04	0.11	1	
160-29479-2	Protactinium-231	-0.0000000405		0.5503	U	pCi/g			200	0.13	0.36	1	

Glossary:

Ts = Count Duration, Sample

GAMMA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29479-1

SDG No.:

Batch Number: 376740 Batch Start Date: 07/19/18 15:00 Batch Analyst: Small, Sean J

Batch Method: Fill_Geo-21 Batch End Date: 07/19/18 17:29

Lab Sample ID	Client Sample ID	Method Chain	Basis	TareWeight	GrossWeight	InitialAmount	IngDecDate1	IngDecDate3	Geometry
MB 160-376740/1		Fill_Geo-21, 901.1				291.18 g	7/19/18 16:36	8/9/18	Tuna Can
LCS 160-376740/2		Fill_Geo-21, 901.1				341.9 g	7/19/18 16:36	8/9/18	Tuna Can
160-29479-A-1-B	CRC-B1-0002	Fill_Geo-21, 901.1	T	37.7 g	150.9 g	113.2 g	7/19/18 16:36	8/9/18	100mL d = 1
160-29479-A-2-B	CRC-B1-1820	Fill_Geo-21, 901.1	T	46.5 g	409.4 g	362.9 g	7/19/18 16:36	8/9/18	Tuna can
160-29479-A-2-B DU	CRC-B1-1820	Fill_Geo-21, 901.1	T	46.5 g	409.4 g	362.9 g	7/19/18 16:36	8/9/18	Tuna can
160-29479-A-3-B	CRC-B1-1214	Fill_Geo-21, 901.1	T	47.0 g	395.5 g	348.5 g	7/19/18 16:36	8/9/18	Tuna can
160-29479-B-4-A	CRC-B7-1416	Fill_Geo-21, 901.1	T	46.6 g	397.7 g	351.1 g	7/19/18 16:36	8/9/18	Tuna can
160-29479-A-5-B	CRC-B7-2224	Fill_Geo-21, 901.1	T	47.2 g	371.7 g	324.5 g	7/19/18 16:36	8/9/18	Tuna can
160-29479-B-6-A	CRC-B7-2628	Fill_Geo-21, 901.1	T	46.4 g	372.9 g	326.5 g	7/19/18 16:36	8/9/18	Tuna can
160-29479-A-7-A	CRC-B20-1214	Fill_Geo-21, 901.1	T	46.7 g	384.3 g	337.6 g	7/19/18 16:36	8/9/18	Tuna can
160-29479-B-8-A	CRC-B20-1820	Fill_Geo-21, 901.1	T	46.5 g	366.2 g	319.7 g	7/19/18 16:36	8/9/18	Tuna can
160-29479-B-9-A	CRC-B20-2628	Fill_Geo-21, 901.1	T	46.8 g	381.8 g	335 g	7/19/18 16:36	8/9/18	Tuna can

Lab Sample ID	Client Sample ID	Method Chain	Basis	Tuna Can LCS 00007					
MB 160-376740/1		Fill_Geo-21, 901.1							
LCS 160-376740/2		Fill_Geo-21, 901.1		# g					
160-29479-A-1-B	CRC-B1-0002	Fill_Geo-21, 901.1	T						
160-29479-A-2-B	CRC-B1-1820	Fill_Geo-21, 901.1	T						
160-29479-A-2-B DU	CRC-B1-1820	Fill_Geo-21, 901.1	T						
160-29479-A-3-B	CRC-B1-1214	Fill_Geo-21, 901.1	T						
160-29479-B-4-A	CRC-B7-1416	Fill_Geo-21, 901.1	T						

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GAMMA SPECTROSCOPY BATCH WORKSHEET

Lab Name: TestAmerica St. Louis Job No.: 160-29479-1

SDG No.:

Batch Number: 376740 Batch Start Date: 07/19/18 15:00 Batch Analyst: Small, Sean J

Batch Method: Fill_Geo-21 Batch End Date: 07/19/18 17:29

Lab Sample ID	Client Sample ID	Method Chain	Basis	Tuna Can LCS 00007					
160-29479-A-5-B	CRC-B7-2224	Fill_Geo-21, 901.1	T						
160-29479-B-6-A	CRC-B7-2628	Fill_Geo-21, 901.1	T						
160-29479-A-7-A	CRC-B20-1214	Fill_Geo-21, 901.1	T						
160-29479-B-8-A	CRC-B20-1820	Fill_Geo-21, 901.1	T						
160-29479-B-9-A	CRC-B20-2628	Fill_Geo-21, 901.1	T						

Batch Notes	
Balance ID	1121432711
SOP Number	ST-RC-0003, ST-RC-0025

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Sample Description: 376740_Gamma_MB 160-376740~1-A
Detector: Detector #12
Batch ID: 376740
Work Order Number: Gamma
Lot Number: MB 160-376740~1-A

Decay to Time: 8/9/2018 01:23 Live Time: 1800 sec
Acquisition Time: 8/9/2018 01:24:00 Real Time: 1801 sec
Analysis Time: 8/9/2018 01:54 Dead Time: 0.04 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 12_Soil_TunaCan.Clb
Efficiency Cal Desc: 12_TunaCan_108513
Efficiency Cal Date: 4/20/2018 11:53
Energy Cal Date: 4/20/2018 11:13
Library: Client_Long_Rev14.lib
Bkgd Correction File: 12_2018-07-14_1810.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	-1.081E-01	2733.1	2.955E+00	2.955E+00	1.060E+01
NA-22	0.000E+00	1.#INF	7.024E-02	7.024E-02	5.177E-01
K-40	5.857E+00	35.4	2.071E+00	2.092E+00	5.395E+00
Sc-46	3.587E-02	839.6	3.012E-01	3.012E-01	1.128E+00
CR-51	2.213E+00	188.1	4.164E+00	4.165E+00	1.418E+01
MN-54	3.085E-01	40.8	1.259E-01	1.269E-01	3.789E-01
FE-59	7.411E-02	796.9	5.905E-01	5.906E-01	1.498E+00
Co-56	-4.128E-01	94.3	3.894E-01	3.900E-01	1.224E+00
CO-57	2.153E-01	104.4	2.248E-01	2.251E-01	5.081E-01
CO-58	3.433E-01	38.4	1.318E-01	1.330E-01	3.729E-01
CO-60	0.000E+00	1.#INF	7.266E-02	7.267E-02	5.355E-01
ZN-65	0.000E+00	1.#INF	1.775E-01	1.775E-01	2.366E+00
NB-94	-1.236E-01	349.1	4.315E-01	4.316E-01	1.059E+00
ZR-95	0.000E+00	1.#INF	8.792E-02	8.792E-02	1.771E+00
NB-95	-1.452E-01	173.2	2.515E-01	2.516E-01	9.124E-01
RU-103	2.469E-01	95.4	2.354E-01	2.358E-01	6.147E-01
RH-106	4.341E+00	90.2	3.914E+00	3.920E+00	2.476E+01
AG-108M	-3.156E-01	111.7	3.524E-01	3.528E-01	8.956E-01
AG-110M	1.348E-02	564.7	7.610E-02	7.610E-02	1.531E+00
SN-113	3.813E-01	120.8	4.607E-01	4.611E-01	1.579E+00
SB-124	-2.191E-01	276.6	6.060E-01	6.061E-01	2.084E+00
SB-125	1.211E+00	30.2	3.652E-01	3.703E-01	1.685E+00
I-131	1.908E-01	161.9	3.090E-01	3.092E-01	6.408E-01
Gd-153	-4.190E-01	167.6	7.022E-01	7.026E-01	2.400E+00
Ga-68	3.667E+00	324.3	1.189E+01	1.189E+01	2.964E+01
Tc-99m	1.165E-01	180.7	2.104E-01	2.105E-01	7.251E-01
BA-133	-4.346E-01	116.5	5.063E-01	5.068E-01	1.278E+00
CS-134	-2.758E-01	102.9	2.839E-01	2.842E-01	2.302E+00
CS-137	3.647E-01	95.3	3.476E-01	3.481E-01	1.192E+00
CE-139	1.826E-01	107.7	1.967E-01	1.969E-01	6.713E-01
Ba-140	6.621E-01	146.8	9.717E-01	9.723E-01	2.510E+00
La-140	6.796E-01	35.3	2.396E-01	2.422E-01	6.487E-01
CE-141	3.215E-02	1473.1	4.735E-01	4.735E-01	1.644E+00

CE-144	8.916E-01	170.8	1.523E+00	1.523E+00	5.254E+00
PM-144	-1.974E-01	241.3	4.763E-01	4.764E-01	1.149E+00
EU-152	2.662E+00	28.9	7.686E-01	7.804E-01	3.355E+00
EU-154	1.515E+00	135.5	2.053E+00	2.054E+00	7.388E+00
EU-155	0.000E+00	1.#INF	5.538E-01	5.538E-01	3.495E+00
HF-181	2.935E-02	100.2	2.940E-02	2.944E-02	1.211E+00
Ta-182	0.000E+00	1.#INF	1.826E-01	1.826E-01	2.648E+00
Hg-203	-2.972E-01	96.3	2.863E-01	2.868E-01	9.701E-01
TL-208	-5.059E-02	40.8	2.065E-02	2.081E-02	1.413E+00
pm-146	7.442E-01	96.2	7.161E-01	7.171E-01	1.783E+00
y-88	1.157E-01	354.7	4.103E-01	4.103E-01	1.009E+00
Cd-113m	4.833E+02	673.6	3.256E+03	3.256E+03	1.162E+04
Cd-109	0.000E+00	1.#INF	1.003E+00	1.003E+00	2.232E+01
Cf-251	7.257E-01	134.4	9.754E-01	9.761E-01	2.604E+00
Cf-249	2.183E-01	115.3	2.516E-01	2.519E-01	1.778E+00
Sn-126	1.283E+00	181.2	2.325E+00	2.326E+00	8.000E+00
PB-210	9.740E+00	82.2	8.002E+00	8.025E+00	2.474E+01
PB-212	-6.235E-01	56.0	3.492E-01	3.507E-01	1.929E+00
PB-214	9.729E-02	709.0	6.898E-01	6.898E-01	2.005E+00
BI-207	5.212E-01	28.9	1.505E-01	1.528E-01	7.981E-01
BI-212	-4.724E+00	115.9	5.477E+00	5.482E+00	1.882E+01
U-235	7.548E-01	76.1	5.746E-01	5.759E-01	7.206E+00
BI-214	-1.426E+00	56.2	8.006E-01	8.039E-01	5.276E+00
BI-210M	-5.157E-01	90.8	4.681E-01	4.689E-01	1.580E+00
AC-228	-1.888E-01	702.4	1.326E+00	1.326E+00	3.294E+00
TH-227	1.511E+00	103.0	1.557E+00	1.559E+00	1.539E+01
TH-229	-4.635E+00	107.2	4.968E+00	4.974E+00	1.299E+01
TH-234	5.399E+00	90.3	4.876E+00	4.885E+00	1.482E+01
PA-231	3.854E+00	190.5	7.345E+00	7.347E+00	4.905E+01
PA-233	3.129E-01	304.9	9.538E-01	9.539E-01	4.002E+00
PA-234	-9.055E-01	122.7	1.111E+00	1.112E+00	3.774E+00
PA-234M	2.101E+01	140.1	2.944E+01	2.946E+01	1.074E+02
AM-241	3.300E-01	190.3	6.280E-01	6.282E-01	2.170E+00
Np-237	-1.382E+00	151.7	2.095E+00	2.097E+00	7.097E+00
Ir-192	-4.697E-02	94.6	4.444E-02	4.452E-02	1.936E+00
Cs-136	-2.820E-01	149.5	4.216E-01	4.219E-01	1.470E+00
Np-239	5.471E-01	164.1	8.978E-01	8.983E-01	3.069E+00
Nd-147	-3.126E+00	99.3	3.104E+00	3.109E+00	7.523E+00
TL-210	1.141E-01	178.6	2.037E-01	2.038E-01	1.484E+00
Total	5.569E+02				

Analyst: Morgan Reichert

TestAmerica Inc Spectrum name: 12_Gamma_20181337.An1

Sample description
376740_Gamma_MB 160-376740~1-A

Spectrum Filename: C:\User\SPC\Det12\12_Gamma_20181337.An1

Acquisition information
Start time:	8/9/2018 1:24:00 AM
Live time:	1800
Real time:	1801
Dead time:	0.04 %
Detector ID:	12

Detector system
Ge12 S/N10034336

Calibration
Filename:	12_Soil_TunaCan.Clb

12_TunaCan_108513

Energy Calibration
Created:	4/20/2018 11:13:27 AM
Zero offset:	0.059 keV
Gain:	0.250 keV/channel
Quadratic:	-3.735E-08 keV/channel^2

Efficiency Calibration
Created:	4/20/2018 11:53:09 AM
Type:	Polynomial
Uncertainty:	1.020 %
Coefficients:	-0.363508 -4.707999 0.462125
	-0.051256 0.002384 -0.000043

Library Files
Main analysis library:	Client_Long_Rev14.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters
Analysis engine:	Env32 G800W064
Start channel:	100 (25.08keV)
Stop channel:	8000 (1999.13keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000

Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	8/9/2018 1:23:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	12_2018-07-14_1810.PBC 7/14/2018 6:10:12 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 4 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.0416

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.50	13.	82.15	0.82	1.805E-02	46.54	4.250	PBC<MDA	PB210
50.14	2.	700.00	0.85	2.193E-02	50.14	8.000	PBC<MDA	TH227
59.54	6.	190.28	0.86	2.817E-02	59.54	35.900	PBC<MDA	AM241
63.59	33.	26.10	0.74	2.989E-02	63.29	3.810	PBC<MDA	TH234
					64.28	9.700	6.268E+00	Sn126
80.99	20.	49.18	0.89	3.466E-02	80.99	34.060	PBC<MDA	BA133
92.48	2.	555.36	1.34	3.637E-02	92.59	5.584	PBC<MDA	TH234
93.35	7.	208.60	0.90	3.645E-02	93.35	5.561	PBC<MDA	AC228
106.13	8.	164.10	0.91	3.729E-02	106.13	22.700	PBC<MDA	Np239
121.78	7.	104.91	0.93	3.725E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	1.257E-01	CO57
122.06	7.	117.35	0.93	3.724E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	1.257E-01	CO57
133.02	7.	179.60	0.94	3.673E-02	133.02	43.300	PBC<MDA	HF181
133.54	7.	170.77	0.94	3.670E-02	133.54	11.090	PBC<MDA	CE144
136.30	7.	167.49	0.94	3.652E-02	136.30	5.850	PBC<MDA	HF181
					136.47	10.680	9.333E-01	CO57
136.47	7.	172.81	0.94	3.651E-02	136.30	5.850	PBC<MDA	HF181
					136.47	10.680	9.333E-01	CO57
140.51	7.	180.67	0.95	3.623E-02	140.51	89.300	PBC<MDA	Tc99m
163.38	8.	112.06	0.97	3.428E-02	163.38	5.080	PBC<MDA	U235
165.85	9.	107.73	0.97	3.405E-02	165.85	79.900	PBC<MDA	CE139
176.60	7.	134.42	0.98	3.303E-02	176.60	17.000	PBC<MDA	Cf251
185.72	7.	156.98	0.99	3.215E-02	185.72	54.000	PBC<MDA	U235
205.33	7.	134.42	1.01	3.030E-02	205.33	5.010	PBC<MDA	U235
210.85	6.	147.47	1.02	2.980E-02	210.85	2.990	PBC<MDA	TH229
242.28	3.	355.38	1.05	2.716E-02	242.00	7.430	PBC<MDA	PB214

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
256.24	8.	103.04	1.06	2.608E-02	256.24	7.000	PBC<MDA	TH227
263.70	1.	673.61	1.07	2.554E-02	263.70	0.006	PBC<MDA	Cd113m
277.28	8.	94.06	1.08	2.462E-02	277.28	6.310	PBC<MDA	TL208
284.30	4.	224.62	1.09	2.416E-02	284.30	6.140	PBC<MDA	I131
293.78	2.	708.99	1.10	2.350E-02	295.09	19.300	PBC<MDA	PB214
296.00	9.	178.57	1.10	2.345E-02	296.00	79.000	PBC<MDA	TL210
300.03	9.	184.34	1.11	2.321E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	8.367E+00	PA231
					300.18	6.200	3.321E+00	PA233
300.07	9.	190.55	1.11	2.321E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	8.367E+00	PA231
					300.18	6.200	3.321E+00	PA233
300.18	6.	304.85	1.11	2.320E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	5.365E+00	PA231
					300.18	6.200	2.129E+00	PA233
320.08	9.	188.12	1.13	2.210E-02	320.08	9.940	PBC<MDA	CR51
328.76	7.	93.55	1.13	2.165E-02	328.76	20.300	PBC<MDA	La140
333.44	7.	115.28	1.14	2.142E-02	333.44	15.510	PBC<MDA	Cf249
344.29	7.	140.00	1.15	2.090E-02	344.29	26.500	PBC<MDA	EU152
364.48	3.	233.33	1.17	2.001E-02	364.48	81.700	PBC<MDA	I131
391.69	8.	120.82	1.20	1.893E-02	391.69	64.000	PBC<MDA	SN113
427.88	1.	562.73	1.23	1.770E-02	427.88	29.600	PBC<MDA	SB125
453.88	3.	233.33	1.26	1.692E-02	453.88	65.000	PBC<MDA	pm146
468.06	6.	94.61	1.27	1.653E-02	468.06	51.750	PBC<MDA	Ir192
497.05	6.	95.36	1.30	1.580E-02	497.05	90.900	PBC<MDA	RU103
511.86	39.	41.33	2.56	1.546E-02	511.86	20.000	6.949E+00	RH106
537.26	4.	146.76	1.34	1.491E-02	537.26	24.390	PBC<MDA	Ba140
563.24	5.	153.84	1.36	1.439E-02	563.24	8.350	PBC<MDA	CS134
569.47	1.	932.74	1.37	1.428E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	3.163E-01	PA234
					569.70	97.740	2.655E-02	BI207
569.70	4.	135.41	1.37	1.427E-02	569.32	15.380	1.054E+00	CS134
					569.47	8.200	1.977E+00	PA234
					569.70	97.740	1.659E-01	BI207
635.89	11.	30.15	1.43	1.317E-02	635.89	11.310	4.104E+00	SB125
661.66	7.	95.31	1.45	1.279E-02	661.66	85.210	PBC<MDA	CS137
747.16	5.	96.22	1.53	1.171E-02	747.16	34.000	PBC<MDA	pm146
763.94	0.	932.74	1.55	1.152E-02	763.94	22.280	PBC<MDA	AG110M
810.78	7.	38.39	1.59	1.104E-02	810.78	99.460	PBC<MDA	CO58
815.77	15.	35.26	1.60	1.099E-02	815.77	23.280	3.304E+00	La140
834.85	6.	40.82	1.61	1.081E-02	834.85	99.980	PBC<MDA	MN54
860.56	6.	40.82	1.64	1.057E-02	860.56	12.420	PBC<MDA	TL208
873.23	4.	135.53	1.65	1.046E-02	873.23	12.270	PBC<MDA	EU154
880.53	4.	112.22	1.66	1.040E-02	880.53	6.000	PBC<MDA	PA234
889.28	1.	839.64	1.66	1.033E-02	889.28	99.984	PBC<MDA	Sc46
898.04	2.	354.73	1.67	1.025E-02	898.04	93.700	PBC<MDA	y88
964.11	9.	33.33	1.73	9.739E-03	964.11	14.605	3.515E+00	EU152
1001.00	3.	140.11	1.76	9.476E-03	1001.00	0.837	PBC<MDA	PA234M

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
1037.84	2.	324.35	1.80	9.228E-03	1037.84	14.130	PBC<MDA	Co56
1050.36	9.	90.15	1.81	9.147E-03	1050.36	1.560	PBC<MDA	RH106
1063.66	12.	28.87	1.82	9.063E-03	1063.66	74.500	9.874E-01	BI207
1077.40	2.	324.35	1.83	8.978E-03	1077.40	3.300	PBC<MDA	Ga68
1099.25	1.	796.87	1.85	8.846E-03	1099.25	56.500	PBC<MDA	FE59
1112.07	12.	28.87	1.86	8.770E-03	1112.07	13.644	5.572E+00	EU152
1460.83	8.	35.36	2.16	7.112E-03	1460.83	10.670	5.857E+00	K40
1764.49	7.	37.80	2.40	6.075E-03	1764.49	15.400	PBC<MDA	BI214

No unknown peaks passed sensitivity test.

This section based on library: Client_Long_Rev14.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.65	46.50	46.	13.	0.007	82.15	0.823
TH-227	200.18	50.14	97.	2.	0.001	700.00	0.855
AM-241	237.74	59.54	62.	6.	0.003	190.28	0.865s
TH-234	253.94	63.59	35.	11.	0.006	90.31	0.744s
Sn-126	256.71	64.28	72.	7.	0.004	181.18	0.869s
BA-133	323.50	80.99	23.	20.	0.011	49.18	0.887s
Np-237	345.49	86.49	149.	-12.	-0.006	151.67	0.892s
EU-155	345.70	86.54	137.	-12.	-0.006	145.83	0.892s
Sn-126	347.29	86.94	126.	-12.	-0.006	139.75	0.892s
Sn-126	349.81	87.57	115.	-9.	-0.005	170.78	0.893s
Cd-109	351.68	88.04	124.	0.	0.000	1000.00	0.894s
Nd-147	363.92	91.10	124.	0.	0.000	1000.00	0.897s
TH-234	369.44	92.48	40.	2.	0.001	555.36	1.338s
AC-228	372.91	93.35	113.	7.	0.004	208.60	0.899s
Gd-153	389.50	97.50	93.	-8.	-0.005	167.57	0.903s
Np-239	397.50	99.50	102.	0.	0.000	1000.00	0.905s
Gd-153	412.29	103.20	102.	0.	0.000	1000.00	0.909s
Np-239	414.29	103.70	102.	0.	0.000	1000.00	0.909s
EU-155	420.73	105.31	102.	0.	0.000	1000.00	0.911s
Np-239	424.00	106.13	89.	8.	0.005	164.10	0.912s
EU-152	486.55	121.78	25.	7.	0.004	104.91	0.928
CO-57	487.69	122.06	32.	7.	0.004	117.35	0.928
EU-154	491.84	123.10	64.	-11.	-0.006	105.80	0.929s
PA-234	524.60	131.29	82.	-11.	-0.006	122.71	0.938s
HF-181	531.51	133.02	65.	7.	0.004	179.60	0.939s
CE-144	533.57	133.54	59.	7.	0.004	170.77	0.940s
HF-181	544.61	136.30	57.	7.	0.004	167.49	0.943s
CO-57	545.30	136.47	61.	7.	0.004	172.81	0.943s
Tc-99m	561.44	140.51	67.	7.	0.004	180.67	0.947s
U-235	574.53	143.79	108.	-7.	-0.004	146.72	0.950s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ba-140	649.99	162.66	76.	-12.	-0.006	109.66	0.969s
U-235	652.87	163.38	39.	8.	0.005	112.06	0.970s
CE-139	662.76	165.85	42.	9.	0.005	107.73	0.973s
Cf-251	705.72	176.60	26.	7.	0.004	134.42	0.983s
U-235	742.18	185.72	34.	7.	0.004	156.98	0.992s
TH-229	773.32	193.51	40.	-12.	-0.006	107.20	1.000s
U-235	820.59	205.33	26.	7.	0.004	134.42	1.012s
TH-229	842.65	210.85	18.	6.	0.003	147.47	1.018s
Cf-251	907.22	227.00	26.	-2.	-0.001	573.93	1.034s
PB-212	953.73	238.63	68.	-13.	-0.007	56.01	1.046s
PB-214	967.18	242.00	55.	3.	0.002	355.38	1.049s
TH-227	1024.13	256.24	18.	8.	0.005	103.04	1.063s
Cd-113m	1053.96	263.70	40.	1.	0.001	673.61	1.070s
BI-210M	1062.48	265.83	51.	-12.	-0.007	90.78	1.072s
TL-208	1108.27	277.28	21.	8.	0.004	94.06	1.084s
Hg-203	1115.93	279.20	48.	-11.	-0.006	96.35	1.086s
I-131	1136.32	284.30	18.	4.	0.002	224.62	1.091s
PB-214	1179.47	295.09	111.	2.	0.001	708.99	1.101s
TL-210	1183.11	296.00	113.	9.	0.005	178.57	1.102s
PB-212	1199.22	300.03	121.	9.	0.005	184.34	1.106
PA-231	1199.38	300.07	130.	9.	0.005	190.55	1.106s
PA-233	1199.82	300.18	138.	6.	0.003	304.85	1.107s
PA-231	1209.70	302.65	144.	0.	0.000	1000.00	1.109s
BA-133	1210.50	302.85	144.	0.	0.000	1000.00	1.109s
Ba-140	1218.49	304.85	144.	0.	0.000	1000.00	1.111s
Ir-192	1232.85	308.44	143.	0.	0.000	1000.00	1.115s
PA-233	1247.13	312.01	143.	0.	0.000	1000.00	1.118s
Ir-192	1265.04	316.49	194.	-11.	-0.006	180.94	1.123s
CR-51	1279.41	320.08	131.	9.	0.005	188.12	1.126s
La-140	1314.10	328.76	17.	7.	0.004	93.55	1.135s
Cf-249	1332.81	333.44	28.	7.	0.004	115.28	1.139s
AC-228	1352.33	338.32	55.	-10.	-0.005	112.35	1.144s
Cs-136	1361.32	340.57	65.	-10.	-0.005	120.92	1.146
EU-152	1376.18	344.29	43.	7.	0.004	140.00	1.150s
HF-181	1382.35	345.83	67.	-10.	-0.005	121.97	1.151s
BA-133	1423.02	356.00	32.	-10.	-0.005	116.51	1.162s
I-131	1456.95	364.48	12.	3.	0.002	233.33	1.170s
BA-133	1534.35	383.84	56.	-9.	-0.005	122.22	1.189s
Cf-249	1550.79	387.95	65.	0.	0.000	1000.00	1.193s
SN-113	1565.74	391.69	46.	8.	0.005	120.82	1.196s
SB-125	1710.45	427.88	8.	1.	0.001	562.73	1.232s
AG-108M	1734.69	433.94	24.	-9.	-0.005	111.67	1.238s
pm-146	1814.45	453.88	12.	3.	0.002	233.33	1.257s
SB-125	1852.39	463.37	22.	0.	0.000	1000.00	1.266s
Ir-192	1871.16	468.06	14.	6.	0.003	94.61	1.271s
HF-181	1926.90	482.00	30.	-5.	-0.003	173.21	1.284
La-140	1946.98	487.02	49.	-8.	-0.004	128.70	1.289s
RU-103	1987.11	497.05	8.	6.	0.004	95.36	1.298s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
RH-106	2046.35	511.86	33.	39.	0.021	41.33	2.563
Nd-147	2122.88	531.00	26.	-11.	-0.006	99.31	1.331s
Ba-140	2147.92	537.26	9.	4.	0.002	146.76	1.337s
CS-134	2251.82	563.24	13.	5.	0.003	153.84	1.362s
PA-234	2276.75	569.47	19.	1.	0.000	932.74	1.368s
BI-207	2277.68	569.70	14.	4.	0.002	135.41	1.368s
TL-208	2330.96	583.02	35.	-14.	-0.008	92.60	1.381s
SB-125	2400.87	600.50	94.	-11.	-0.006	129.95	1.397s
SB-124	2409.79	602.73	105.	-5.	-0.003	276.60	1.399s
CS-134	2417.71	604.71	127.	-12.	-0.007	136.76	1.401s
BI-214	2436.11	609.31	148.	-16.	-0.009	56.15	1.405s
AG-108M	2455.99	614.28	146.	0.	0.000	1000.00	1.410s
PM-144	2471.12	618.06	146.	0.	0.000	1000.00	1.414s
SB-125	2542.43	635.89	0.	11.	0.006	30.15	1.430s
I-131	2546.77	636.97	11.	0.	0.000	1000.00	1.432s
AG-110M	2629.92	657.76	29.	-6.	-0.003	140.07	1.451s
CS-137	2645.51	661.66	20.	7.	0.004	95.31	1.455s
PM-144	2785.05	696.54	23.	-4.	-0.002	241.30	1.487s
NB-94	2809.41	702.63	19.	-3.	-0.001	349.11	1.493s
SB-124	2890.04	722.79	22.	-5.	-0.003	140.00	1.512s
AG-108M	2890.65	722.94	27.	0.	0.000	1000.00	1.512s
EU-154	2892.32	723.36	27.	0.	0.000	1000.00	1.512s
ZR-95	2895.69	724.20	27.	0.	0.000	1000.00	1.513s
BI-212	2907.58	727.17	36.	-8.	-0.004	115.93	1.516
pm-146	2941.78	735.72	23.	-12.	-0.007	91.24	1.524s
pm-146	2987.55	747.16	5.	5.	0.003	96.22	1.535
ZR-95	3025.83	756.73	14.	0.	0.000	1000.00	1.543s
AG-110M	3054.69	763.94	5.	0.	0.000	932.74	1.550s
NB-95	3062.08	765.79	12.	-3.	-0.002	173.21	1.552s
PA-234M	3064.57	766.41	3.	0.	0.000	1000.00	1.552s
EU-152	3114.61	778.92	14.	-5.	-0.003	164.92	1.564s
BI-212	3140.62	785.42	14.	-8.	-0.004	105.33	1.570s
CS-134	3182.42	795.87	26.	-8.	-0.004	101.98	1.579s
TL-210	3197.35	799.60	33.	0.	0.000	1000.00	1.583s
CS-134	3206.76	801.95	34.	-1.	-0.001	830.66	1.585s
CO-58	3242.06	810.78	0.	7.	0.004	38.39	1.593s
La-140	3262.05	815.77	7.	15.	0.008	35.26	1.598s
Cs-136	3272.97	818.50	32.	-6.	-0.003	149.54	1.600s
MN-54	3338.38	834.85	0.	6.	0.003	40.82	1.615s
Co-56	3386.08	846.77	20.	-11.	-0.006	94.33	1.626s
TL-208	3441.27	860.56	0.	6.	0.003	40.82	1.638s
NB-94	3483.41	871.10	10.	-3.	-0.002	159.86	1.648s
EU-154	3491.95	873.23	10.	4.	0.002	135.53	1.650s
PA-234	3521.16	880.53	10.	4.	0.002	112.22	1.657s
PA-234	3532.00	883.24	15.	0.	0.000	1000.00	1.659s
AG-110M	3537.78	884.68	15.	0.	0.000	1000.00	1.660
Sc-46	3556.17	889.28	15.	1.	0.000	839.64	1.664s
y-88	3591.22	898.04	10.	2.	0.001	354.73	1.672s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
AC-228	3643.36	911.07	10.	-1.	-0.001	702.38	1.684s
AG-110M	3749.09	937.49	15.	-6.	-0.003	147.67	1.708s
PA-234	3783.21	946.02	10.	-3.	-0.002	238.82	1.716s
EU-152	3855.60	964.11	0.	9.	0.005	33.33	1.732s
AC-228	3875.05	968.97	9.	0.	0.000	1000.00	1.736s
PA-234M	4003.22	1001.00	7.	3.	0.002	140.11	1.765s
EU-154	4018.33	1004.77	3.	0.	0.000	1000.00	1.768s
Co-56	4150.66	1037.84	5.	2.	0.001	324.35	1.798s
Cs-136	4191.60	1048.07	32.	-14.	-0.008	62.60	1.807s
RH-106	4200.76	1050.36	28.	9.	0.005	90.15	1.809s
BI-207	4253.99	1063.66	0.	12.	0.007	28.87	1.820s
Ga-68	4308.98	1077.40	5.	2.	0.001	324.35	1.833s
FE-59	4396.44	1099.25	5.	1.	0.000	796.87	1.852s
EU-152	4447.76	1112.07	0.	12.	0.007	28.87	1.863s
ZN-65	4461.66	1115.55	12.	0.	0.000	1000.00	1.866s
BI-214	4480.63	1120.29	34.	-9.	-0.005	95.09	1.870s
Sc-46	4481.68	1120.55	27.	-12.	-0.006	80.30	1.870s
Ta-182	4484.69	1121.30	6.	0.	0.000	1000.00	1.871s
CO-60	4692.57	1173.24	11.	-6.	-0.003	137.58	1.916s
Ta-182	4755.86	1189.05	0.	0.	0.000	1000.00	1.930s
Ta-182	4885.39	1221.41	11.	-4.	-0.002	188.42	1.957s
Co-56	4952.92	1238.28	11.	-6.	-0.004	130.84	1.972s
NA-22	5098.03	1274.53	0.	0.	0.000	1000.00	2.003s
EU-154	5098.09	1274.54	0.	0.	0.000	1000.00	2.003s
FE-59	5166.35	1291.60	0.	0.	0.000	1000.00	2.017s
TL-210	5252.04	1313.00	6.	-2.	-0.001	343.80	2.036s
CO-60	5330.11	1332.50	0.	0.	0.000	1000.00	2.052s
AG-110M	5537.48	1384.30	0.	0.	0.000	1000.00	2.096s
EU-152	5632.39	1408.00	6.	-1.	-0.001	600.00	2.115s
K-40	5843.92	1460.83	0.	8.	0.004	35.36	2.159s
La-140	6386.02	1596.21	0.	0.	0.000	1000.00	2.269s
SB-124	6765.58	1690.98	0.	0.	0.000	1000.00	2.345s
BI-214	7060.00	1764.49	0.	7.	0.004	37.80	2.403s
Co-56	7087.48	1771.35	18.	-8.	-0.005	79.16	2.408s
y-88	7346.69	1836.06	0.	0.	0.000	1000.00	2.459s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	Peak MDA Value Bq/Sample	COMMENTS
BE-7	C	-1.0811E-01				5.31E+01	
			477.60	-1.081E-01	% (	1.060E+01	2.73E+03 1.05E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
K-40	N	5.8566E+00					4.66E+11	
			1460.83	5.857E+00	?(	5.395E+00	3.54E+01	1.07E+01 G
Sc-46	F	3.5874E-02					8.38E+01	
			889.28	3.587E-02	?(	1.128E+00	8.40E+02	1.00E+02 G
			1120.55	-7.384E-01	+ P	1.721E+00	8.03E+01	1.00E+02 G
CR-51	F	2.2135E+00					2.77E+01	
			320.08	2.213E+00	?(	1.418E+01	1.88E+02	9.94E+00 G
MN-54	C	3.0847E-01					3.12E+02	
			834.85	3.085E-01	?(	3.789E-01	4.08E+01	1.00E+02 G
FE-59	F	7.4108E-02					4.45E+01	
			1099.25	7.411E-02	?(	1.498E+00	7.97E+02	5.65E+01 G
			1291.60	0.000E+00	-	1.210E+00	1.00E+03	4.32E+01 G
Co-56	C	-4.1284E-01					7.73E+01	
			846.77	-5.716E-01	?(	1.224E+00	9.43E+01	9.99E+01 G
			1238.28	-6.583E-01	+	1.912E+00	1.31E+02	6.61E+01 G
			1037.84	7.101E-01	&(	5.740E+00	3.24E+02	1.41E+01 G
			1771.35	-4.970E+00	+	1.327E+01	7.92E+01	1.55E+01 A
CO-57	C	2.1528E-01					2.72E+02	
			122.06	1.257E-01	(	5.081E-01	1.17E+02	8.56E+01 G
			136.47	9.333E-01	?(	5.563E+00	1.73E+02	1.07E+01 G
CO-58	C	3.4330E-01					7.09E+01	
			810.78	3.433E-01	?(	3.729E-01	3.84E+01	9.95E+01 G
NB-94	I	-1.2361E-01					7.41E+06	
			702.63	-1.236E-01	?(	1.059E+00	3.49E+02	9.79E+01 G
			871.10	-1.592E-01	+	9.257E-01	1.60E+02	9.99E+01 G
NB-95	I	-1.4519E-01					6.40E+01	
			765.79	-1.452E-01	?(	9.124E-01	1.73E+02	9.98E+01 G
RU-103	I	2.4690E-01					3.93E+01	
			497.05	2.469E-01	?(	6.147E-01	9.54E+01	9.09E+01 G
			610.30	-2.717E-06	%	4.203E+01	4.48E+08	5.75E+00 GA
RH-106	I	4.3413E+00					3.74E+02	
			621.92	-4.181E-01	%(	2.476E+01	1.72E+03	9.93E+00 G
			1050.36	3.464E+01	?(	1.061E+02	9.02E+01	1.56E+00 G
			511.86	6.949E+00	?	5.322E+00	4.13E+01	2.00E+01 GA

Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
AG-108M	C	-3.1561E-01						1.53E+05	
			433.94	-3.156E-01	?(	8.956E-01	1.12E+02	9.05E+01	G
			722.94	0.000E+00	+	1.373E+00	1.00E+03	9.08E+01	G
			614.28	0.000E+00	+	2.702E+00	1.00E+03	8.98E+01	G
AG-110M	F	1.3476E-02						2.50E+02	
			884.68	0.000E+00	?(	1.531E+00	1.00E+03	7.27E+01	G
			657.76	-2.590E-01	+	1.264E+00	1.40E+02	9.46E+01	G
			937.49	-9.761E-01	+	3.377E+00	1.48E+02	3.44E+01	G
			1384.30	0.000E+00	?(	2.271E+00	1.00E+03	2.43E+01	G
			763.94	7.213E-02	?(	2.765E+00	9.33E+02	2.23E+01	G
SN-113	F	3.8132E-01						1.15E+02	
			391.69	3.813E-01	?(	1.579E+00	1.21E+02	6.40E+01	G
SB-124	F	-2.1908E-01						6.02E+01	
			602.73	-2.191E-01	?(	2.084E+00	2.77E+02	9.83E+01	G
			1690.98	0.000E+00	+	1.359E+00	1.00E+03	4.78E+01	G
			722.79	-2.142E+00	+	1.053E+01	1.40E+02	1.08E+01	G
SB-125	I	1.2114E+00						1.01E+03	
			427.88	1.061E-01	?(	1.685E+00	5.63E+02	2.96E+01	G
			600.50	-2.461E+00	+	1.086E+01	1.30E+02	1.79E+01	G
			635.89	4.104E+00	?(	2.750E+00	3.02E+01	1.13E+01	G
			463.37	0.000E+00	&	7.825E+00	1.00E+03	1.05E+01	G
I-131	I	1.9081E-01						8.02E+00	
			364.48	1.020E-01	?(	6.408E-01	2.33E+02	8.17E+01	G
			284.30	1.373E+00	?(	8.486E+00	2.25E+02	6.14E+00	G
			636.97	0.000E+00	-	1.071E+01	1.00E+03	7.17E+00	G
Gd-153	F	-4.1904E-01						2.42E+02	
			97.50	-4.190E-01	?(	2.400E+00	1.68E+02	3.00E+01	G
			103.20	0.000E+00	+	3.407E+00	1.00E+03	2.18E+01	G
Ga-68	C	3.6665E+00						4.71E-02	
			1077.40	3.667E+00	?(	2.964E+01	3.24E+02	3.30E+00	G
Tc-99m	I	1.1648E-01						2.51E-01	
			140.51	1.165E-01	?(	7.251E-01	1.81E+02	8.93E+01	G
BA-133	F	-4.3458E-01						3.85E+03	
			356.00	-4.346E-01	&(	1.278E+00	1.17E+02	6.20E+01	G
			302.85	0.000E+00	+	7.711E+00	1.00E+03	1.83E+01	G
			383.84	-2.908E+00	+	1.215E+01	1.22E+02	8.94E+00	GA
			80.99	9.256E-01	?	1.187E+00	4.92E+01	3.41E+01	GA

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CS-134	I -2.7585E-01					7.54E+02	
		604.71	-4.971E-01	&(	2.302E+00	1.37E+02	9.76E+01 G
		795.87	-4.354E-01	+	1.524E+00	1.02E+02	8.55E+01 G
		569.32	-8.432E-02	%	5.868E+00	1.87E+03	1.54E+01 G
		801.95	-5.746E-01	+	1.717E+01	8.31E+02	8.69E+00 G
		563.24	2.311E+00	?(	9.019E+00	1.54E+02	8.35E+00 G
CS-137	I 3.6467E-01					1.10E+04	
		661.66	3.647E-01	?(	1.192E+00	9.53E+01	8.52E+01 G
CE-139	F 1.8256E-01					1.38E+02	
		165.85	1.826E-01	?(	6.713E-01	1.08E+02	7.99E+01 G
Ba-140	I 6.6212E-01					1.28E+01	
		537.26	6.621E-01	?(	2.510E+00	1.47E+02	2.44E+01 G
		162.66	-3.034E+00	+	1.127E+01	1.10E+02	6.22E+00 G
		304.85	0.000E+00	&	3.311E+01	1.00E+03	4.29E+00 G
La-140	I 6.7957E-01					1.28E+01	
		1596.21	0.000E+00	?(	6.487E-01	1.00E+03	9.54E+01 G
		487.02	-6.088E-01	+	2.689E+00	1.29E+02	4.55E+01 G
		328.76	8.634E-01	&(	2.771E+00	9.35E+01	2.03E+01 G
		815.77	3.304E+00	?(	3.224E+00	3.53E+01	2.33E+01 G
CE-141	I 3.2146E-02					3.25E+01	
		145.44	3.215E-02	%(	1.644E+00	1.47E+03	4.82E+01 G
CE-144	I 8.9160E-01					2.85E+02	
		133.54	8.916E-01	?(	5.254E+00	1.71E+02	1.11E+01 G
PM-144	C -1.9738E-01					3.63E+02	
		696.54	-1.974E-01	?(	1.149E+00	2.41E+02	9.90E+01 G
		618.06	0.000E+00	+	2.461E+00	1.00E+03	9.91E+01 G
EU-152	F 2.6623E+00					4.94E+03	
		344.29	6.943E-01	?(	3.355E+00	1.40E+02	2.65E+01 G
		1112.07	5.572E+00	?(	3.422E+00	2.89E+01	1.36E+01 G
		121.78	3.763E-01	-	1.357E+00	1.05E+02	2.86E+01 G
		778.92	-1.889E+00	+	7.612E+00	1.65E+02	1.29E+01 G
		964.11	3.515E+00	?(	2.879E+00	3.33E+01	1.46E+01 G
		244.69	-3.242E-08	%	1.014E+01	8.80E+09	7.58E+00 G
		1408.00	-3.611E-01	-	5.101E+00	6.00E+02	2.10E+01 GA
EU-154	I 1.5146E+00					3.14E+03	
		873.23	1.515E+00	?(	7.388E+00	1.36E+02	1.23E+01 G
		123.10	-4.095E-01	-	1.468E+00	1.06E+02	4.08E+01 G
		1274.54	0.000E+00	-	1.470E+00	1.00E+03	3.52E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
		723.36	0.000E+00	-	6.171E+00	1.00E+03	2.02E+01 G
		1004.77	0.000E+00	-	3.445E+00	1.00E+03	1.80E+01 G
		996.33	-9.187E-02	%	9.684E+00	2.72E+03	1.06E+01 G
HF-181	F 2.9354E-02					4.24E+01	
		482.00	-1.992E-01	?(	1.211E+00	1.73E+02	8.05E+01 G
		133.02	2.280E-01	?(	1.412E+00	1.80E+02	4.33E+01 G
		345.83	-1.735E+00	+	7.209E+00	1.22E+02	1.51E+01 G
		136.30	1.703E+00	?(	9.846E+00	1.67E+02	5.85E+00 G
Hg-203	F -2.9719E-01					4.66E+01	
		279.20	-2.972E-01	?(	9.701E-01	9.63E+01	8.15E+01 G
TL-208	N -5.0592E-02					6.98E+02	
		583.02	-6.361E-01	?(	1.413E+00	9.26E+01	8.45E+01 G
		277.28	2.694E+00	(	8.667E+00	9.41E+01	6.31E+00 G
		860.56	2.538E+00	?(	3.118E+00	4.08E+01	1.24E+01 G
pm-146	C 7.4421E-01					2.02E+03	
		747.16	7.442E-01	&(	1.783E+00	9.62E+01	3.40E+01 G
		735.72	-2.471E+00	+	5.259E+00	9.12E+01	2.25E+01 G
		453.88	1.515E-01	-	9.522E-01	2.33E+02	6.50E+01 G
y-88	F 1.1566E-01					1.07E+02	
		898.04	1.157E-01	?(	1.009E+00	3.55E+02	9.37E+01 G
		1836.06	0.000E+00	-	7.036E-01	1.00E+03	9.92E+01 G
Cd-113m	4.8334E+02					5.33E+03	
		263.70	4.833E+02	?(	1.162E+04	6.74E+02	6.00E-03 K
Cf-251	T 7.2565E-01					3.28E+05	
		176.60	7.257E-01	?(	2.604E+00	1.34E+02	1.70E+01 G
		227.00	-5.178E-01	+	8.176E+00	5.74E+02	6.30E+00 GA
Cf-249	T 2.1825E-01					1.28E+05	
		387.95	0.000E+00	&(	1.778E+00	1.00E+03	6.60E+01 G
		333.44	1.147E+00	?(	4.564E+00	1.15E+02	1.55E+01 G
Sn-126	1.2830E+00					3.65E+07	
		87.57	-3.746E-01	-	2.180E+00	1.71E+02	3.75E+01 GA
		64.28	1.283E+00	&(	8.000E+00	1.81E+02	9.70E+00 G
		86.94	-1.999E+00	+	9.469E+00	1.40E+02	9.04E+00 GA
PB-210	N 9.7401E+00					8.14E+03	
		46.54	9.740E+00	(P	2.474E+01	8.22E+01	4.25E+00 G

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Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
PB-212	N	-6.2351E-01						6.98E+02	
			238.63	-6.235E-01	?(P	1.929E+00	5.60E+01	4.33E+01	G
			300.03	6.275E+00		3.943E+01	1.84E+02	3.28E+00	GA
PB-214	N	9.7294E-02						5.84E+05	
			351.93	1.412E-02	%(P	2.005E+00	3.95E+03	3.76E+01	G
			295.09	2.593E-01	&(P	6.335E+00	7.09E+02	1.93E+01	G
			242.00	8.259E-01	?	1.029E+01	3.55E+02	7.43E+00	GA
BI-207	C	5.2122E-01						1.18E+04	
			569.70	1.659E-01	&(	7.981E-01	1.35E+02	9.77E+01	G
			1063.66	9.874E-01	?(	6.064E-01	2.89E+01	7.45E+01	G
BI-212	N	-4.7241E+00						6.98E+02	
			727.17	-4.724E+00	?(	1.882E+01	1.16E+02	7.55E+00	G
			785.42	-3.074E+01	+	7.742E+01	1.05E+02	1.28E+00	GA
U-235	N	7.5479E-01						2.57E+11	
			143.79	-9.978E-01	?(P	7.206E+00	1.47E+02	1.10E+01	G
			205.33	2.684E+00	?(	9.632E+00	1.34E+02	5.01E+00	G
			163.38	2.634E+00	?(	1.011E+01	1.12E+02	5.08E+00	G
			185.72	2.099E-01	P	9.619E-01	1.57E+02	5.40E+01	GA
BI-214	N	-1.4258E+00						5.84E+05	
			609.31	-1.426E+00	?(P	5.276E+00	5.62E+01	4.61E+01	G
			1120.29	-3.881E+00	+	1.255E+01	9.51E+01	1.51E+01	G
			1764.49	4.157E+00	+	4.376E+00	3.78E+01	1.54E+01	G
BI-210M	T	-5.1567E-01						1.10E+09	
			265.83	-5.157E-01	?(	1.580E+00	9.08E+01	5.00E+01	G
			304.90	5.769E-02	%	5.046E+00	2.53E+03	2.80E+01	G
AC-228	N	-1.8880E-01						2.10E+03	
			911.07	-1.888E-01	?(	3.294E+00	7.02E+02	2.90E+01	G
			968.97	0.000E+00	+	5.473E+00	1.00E+03	1.75E+01	G
			338.32	-2.127E+00	+	8.139E+00	1.12E+02	1.20E+01	G
			93.35	2.010E+00	?	1.434E+01	2.09E+02	5.56E+00	XA
TH-227	N	1.5107E+00						7.95E+03	
			50.14	6.332E-01	?(	1.539E+01	7.00E+02	8.00E+00	G
			256.24	2.514E+00	?(	6.897E+00	1.03E+02	7.00E+00	G
TH-229	N	-4.6346E+00						2.68E+06	
			193.51	-4.635E+00	?(	1.299E+01	1.07E+02	4.40E+00	G
			210.85	3.534E+00	+	1.413E+01	1.47E+02	2.99E+00	G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
TH-234	N	5.3991E+00					1.63E+12	
			63.29	5.399E+00	*(P	1.482E+01	9.03E+01	3.81E+00 G
			92.59	4.855E-01	- P	8.825E+00	5.55E+02	5.58E+00 G
PA-231	N	3.8544E+00					1.20E+07	
			302.65	0.000E+00	?(	4.905E+01	1.00E+03	2.88E+00 G
			300.07	8.367E+00	?(	5.432E+01	1.91E+02	2.46E+00 G
PA-233	C	3.1286E-01					7.82E+08	
			312.01	0.000E+00	?(	4.002E+00	1.00E+03	3.60E+01 G
			300.18	2.129E+00	?(	2.223E+01	3.05E+02	6.20E+00 G
PA-234	N	-9.0551E-01					1.63E+12	
			131.29	-9.055E-01	?(	3.774E+00	1.23E+02	1.80E+01 G
			946.02	-1.260E+00	+	7.326E+00	2.39E+02	1.34E+01 G
			569.47	3.163E-01	+	1.092E+01	9.33E+02	8.20E+00 G
			883.24	0.000E+00	+	1.158E+01	1.00E+03	9.60E+00 G
			880.53	4.006E+00	?	1.586E+01	1.12E+02	6.00E+00 GA
PA-234M	N	2.1014E+01					1.63E+12	
			1001.00	2.101E+01	?(	1.074E+02	1.40E+02	8.37E-01 G
			766.41	0.000E+00	-	1.696E+02	1.00E+03	2.94E-01 G
AM-241	T	3.3002E-01					1.58E+05	
			59.54	3.300E-01	&(	2.170E+00	1.90E+02	3.59E+01 G
Np-237	F	-1.3815E+00					2.14E+06	
			86.49	-1.382E+00	?(	7.097E+00	1.52E+02	1.31E+01 G
Ir-192	F	-4.6973E-02					7.40E+01	
			316.49	-3.160E-01	?(	1.936E+00	1.81E+02	8.70E+01 G
			468.06	4.056E-01	?(	1.322E+00	9.46E+01	5.18E+01 G
			308.44	0.000E+00	+	4.499E+00	1.00E+03	3.18E+01 G
Cs-136	F	-2.8196E-01					1.30E+01	
			818.50	-2.820E-01	?(	1.470E+00	1.50E+02	1.00E+02 G
			1048.07	-1.065E+00	+	2.193E+00	6.26E+01	8.00E+01 G
			340.57	-5.485E-01	+	2.260E+00	1.21E+02	4.69E+01 G
Np-239	T	5.4709E-01					2.36E+00	
			103.70	0.000E+00	-	3.093E+00	1.00E+03	2.40E+01 X
			106.13	5.471E-01	?(	3.069E+00	1.64E+02	2.27E+01 G
			99.50	0.000E+00	-	4.980E+00	1.00E+03	1.50E+01 X
Nd-147		-3.1260E+00					1.11E+01	
			531.00	-3.126E+00	?(	7.523E+00	9.93E+01	1.30E+01 G
			91.10	0.000E+00	+	2.957E+00	1.00E+03	2.83E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
TL-210	N 1.1407E-01					5.84E+05	
		799.60	0.000E+00	?(	1.484E+00	1.00E+03	9.90E+01 G
		296.00	2.569E-01	?(	1.565E+00	1.79E+02	7.90E+01 G
		1313.00	-5.700E-01	+	4.721E+00	3.44E+02	2.10E+01 GA

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity
TH-227	50.14	97.	2.	0.001	700.00	6.332E-01
AM-241	59.54	62.	6.	0.003	190.28	3.300E-01
Sn-126	64.28	72.	7.	0.004	181.18	1.283E+00
BA-133	80.99	23.	20.	0.011	49.18	9.256E-01
Np-237	86.49	149.	-12.	-0.006	151.67	-1.382E+00
EU-155	86.54	137.	-12.	-0.006	145.83	-5.896E-01
Sn-126	86.94	126.	-12.	-0.006	139.75	-1.999E+00
Sn-126	87.57	115.	-9.	-0.005	170.78	-3.746E-01
AC-228	93.35	113.	7.	0.004	208.60	2.010E+00
Gd-153	97.50	93.	-8.	-0.005	167.57	-4.190E-01

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Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Np-239	106.13	89.	8.	0.005	164.10	5.471E-01	
EU-152	121.78	25.	7.	0.004	104.91	3.763E-01	
CO-57	122.06	32.	7.	0.004	117.35	1.257E-01	
EU-154	123.10	64.	-11.	-0.006	105.80	-4.095E-01	
PA-234	131.29	82.	-11.	-0.006	122.71	-9.055E-01	
HF-181	133.02	65.	7.	0.004	179.60	2.280E-01	
CE-144	133.54	59.	7.	0.004	170.77	8.916E-01	
HF-181	136.30	57.	7.	0.004	167.49	1.703E+00	
CO-57	136.47	61.	7.	0.004	172.81	9.333E-01	
Tc-99m	140.51	67.	7.	0.004	180.67	1.165E-01	
U-235	143.79	108.	-7.	-0.004	146.72	-9.978E-01	P
Ba-140	162.66	76.	-12.	-0.006	109.66	-3.034E+00	
U-235	163.38	39.	8.	0.005	112.06	2.634E+00	
CE-139	165.85	42.	9.	0.005	107.73	1.826E-01	
Cf-251	176.60	26.	7.	0.004	134.42	7.257E-01	
U-235	185.72	34.	7.	0.004	156.98	2.099E-01	P
TH-229	193.51	40.	-12.	-0.006	107.20	-4.635E+00	
U-235	205.33	26.	7.	0.004	134.42	2.684E+00	
TH-229	210.85	18.	6.	0.003	147.47	3.534E+00	
Cf-251	227.00	26.	-2.	-0.001	573.93	-5.178E-01	
TH-227	256.24	18.	8.	0.005	103.04	2.514E+00	
Cd-113m	263.70	40.	1.	0.001	673.61	4.833E+02	
BI-210M	265.83	51.	-12.	-0.007	90.78	-5.157E-01	
TL-208	277.28	21.	8.	0.004	94.06	2.694E+00	
Hg-203	279.20	48.	-11.	-0.006	96.35	-2.972E-01	
I-131	284.30	18.	4.	0.002	224.62	1.373E+00	
TL-210	296.00	113.	9.	0.005	178.57	2.569E-01	
PA-231	300.07	130.	9.	0.005	190.55	8.367E+00	
PA-233	300.18	138.	6.	0.003	304.85	2.129E+00	
Ir-192	316.49	194.	-11.	-0.006	180.94	-3.160E-01	
CR-51	320.08	131.	9.	0.005	188.12	2.213E+00	
Cf-249	333.44	28.	7.	0.004	115.28	1.147E+00	
AC-228	338.32	55.	-10.	-0.005	112.35	-2.127E+00	
Cs-136	340.57	65.	-10.	-0.005	120.92	-5.485E-01	
EU-152	344.29	43.	7.	0.004	140.00	6.943E-01	
HF-181	345.83	67.	-10.	-0.005	121.97	-1.735E+00	
BA-133	356.00	32.	-10.	-0.005	116.51	-4.346E-01	
I-131	364.48	12.	3.	0.002	233.33	1.020E-01	
BA-133	383.84	56.	-9.	-0.005	122.22	-2.908E+00	
SN-113	391.69	46.	8.	0.005	120.82	3.813E-01	
SB-125	427.88	8.	1.	0.001	562.73	1.061E-01	
AG-108M	433.94	24.	-9.	-0.005	111.67	-3.156E-01	
pm-146	453.88	12.	3.	0.002	233.33	1.515E-01	
Ir-192	468.06	14.	6.	0.003	94.61	4.056E-01	
HF-181	482.00	30.	-5.	-0.003	173.21	-1.992E-01	
RU-103	497.05	8.	6.	0.004	95.36	2.469E-01	
RH-106	511.86	33.	39.	0.021	41.33	6.949E+00	
Nd-147	531.00	26.	-11.	-0.006	99.31	-3.126E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
Ba-140	537.26	9.	4.	0.002	146.76	6.621E-01		
CS-134	563.24	13.	5.	0.003	153.84	2.311E+00		
PA-234	569.47	19.	1.	0.000	932.74	3.163E-01		
BI-207	569.70	14.	4.	0.002	135.41	1.659E-01		
TL-208	583.02	35.	-14.	-0.008	92.60	-6.361E-01		
SB-125	600.50	94.	-11.	-0.006	129.95	-2.461E+00		
SB-124	602.73	105.	-5.	-0.003	276.60	-2.191E-01		
CS-134	604.71	127.	-12.	-0.007	136.76	-4.971E-01		
BI-214	609.31	148.	-16.	-0.009	56.15	-1.426E+00		P
SB-125	635.89	0.	11.	0.006	30.15	4.104E+00		
AG-110M	657.76	29.	-6.	-0.003	140.07	-2.590E-01		
CS-137	661.66	20.	7.	0.004	95.31	3.647E-01		
PM-144	696.54	23.	-4.	-0.002	241.30	-1.974E-01		
NB-94	702.63	19.	-3.	-0.001	349.11	-1.236E-01		
SB-124	722.79	22.	-5.	-0.003	140.00	-2.142E+00		
BI-212	727.17	36.	-8.	-0.004	115.93	-4.724E+00		
pm-146	735.72	23.	-12.	-0.007	91.24	-2.471E+00		
pm-146	747.16	5.	5.	0.003	96.22	7.442E-01		
AG-110M	763.94	5.	0.	0.000	932.74	7.213E-02		
NB-95	765.79	12.	-3.	-0.002	173.21	-1.452E-01		
EU-152	778.92	14.	-5.	-0.003	164.92	-1.889E+00		
BI-212	785.42	14.	-8.	-0.004	105.33	-3.074E+01		
CS-134	795.87	26.	-8.	-0.004	101.98	-4.354E-01		
CS-134	801.95	34.	-1.	-0.001	830.66	-5.746E-01		
CO-58	810.78	0.	7.	0.004	38.39	3.433E-01		
Cs-136	818.50	32.	-6.	-0.003	149.54	-2.820E-01		
MN-54	834.85	0.	6.	0.003	40.82	3.085E-01		
Co-56	846.77	20.	-11.	-0.006	94.33	-5.716E-01		
TL-208	860.56	0.	6.	0.003	40.82	2.538E+00		
NB-94	871.10	10.	-3.	-0.002	159.86	-1.592E-01		
EU-154	873.23	10.	4.	0.002	135.53	1.515E+00		
PA-234	880.53	10.	4.	0.002	112.22	4.006E+00		
Sc-46	889.28	15.	1.	0.000	839.64	3.587E-02		
y-88	898.04	10.	2.	0.001	354.73	1.157E-01		
AC-228	911.07	10.	-1.	-0.001	702.38	-1.888E-01		
AG-110M	937.49	15.	-6.	-0.003	147.67	-9.761E-01		
PA-234	946.02	10.	-3.	-0.002	238.82	-1.260E+00		
EU-152	964.11	0.	9.	0.005	33.33	3.515E+00		
PA-234M	1001.00	7.	3.	0.002	140.11	2.101E+01		
Co-56	1037.84	5.	2.	0.001	324.35	7.101E-01		
Cs-136	1048.07	32.	-14.	-0.008	62.60	-1.065E+00		
RH-106	1050.36	28.	9.	0.005	90.15	3.464E+01		
BI-207	1063.66	0.	12.	0.007	28.87	9.874E-01		
Ga-68	1077.40	5.	2.	0.001	324.35	3.667E+00		
FE-59	1099.25	5.	1.	0.000	796.87	7.411E-02		
EU-152	1112.07	0.	12.	0.007	28.87	5.572E+00		
BI-214	1120.29	34.	-9.	-0.005	95.09	-3.881E+00		
Sc-46	1120.55	27.	-12.	-0.006	80.30	-7.384E-01		P

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CO-60	1173.24	11.	-6.	-0.003	137.58	-3.740E-01	
Ta-182	1221.41	11.	-4.	-0.002	188.42	-1.091E+00	
Co-56	1238.28	11.	-6.	-0.004	130.84	-6.583E-01	
TL-210	1313.00	6.	-2.	-0.001	343.80	-5.700E-01	
EU-152	1408.00	6.	-1.	-0.001	600.00	-3.611E-01	
BI-214	1764.49	0.	7.	0.004	37.80	4.157E+00	
Co-56	1771.35	18.	-8.	-0.005	79.16	-4.970E+00	

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

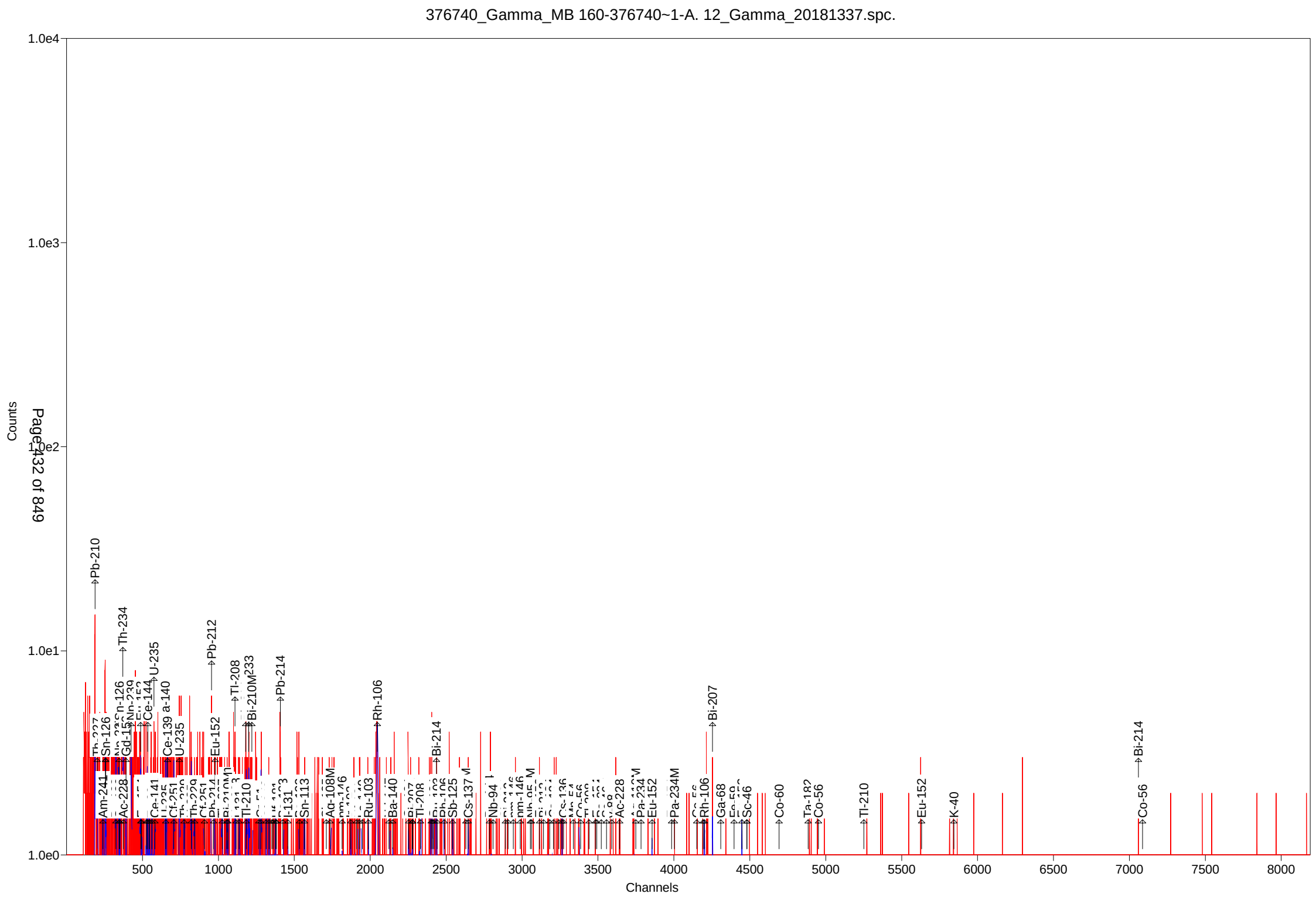
Nuclide		Activity Bq/Sample	Time of Count Activity Bq/Sample	Time Corrected Uncertainty Counting	1 Sigma MDA Bq/Sample
BE-7	#A	-1.0811E-01	-1.0811E-01	2.733E+03%	1.06E+01
NA-22	#A	0.0000E+00	0.0000E+00	1.000E+03%	5.18E-01
K-40	#	5.8566E+00	5.8566E+00	3.536E+01%	5.40E+00
Sc-46	#A	3.5873E-02	3.5874E-02	8.396E+02%	1.13E+00
CR-51	#A	2.2134E+00	2.2135E+00	1.881E+02%	1.42E+01
MN-54	#A	3.0847E-01	3.0847E-01	4.082E+01%	3.79E-01
FE-59	#A	7.4107E-02	7.4108E-02	7.969E+02%	1.50E+00
Co-56	#A	-4.1284E-01	-4.1284E-01	9.433E+01%	1.22E+00
CO-57	#A	2.1528E-01	2.1528E-01	1.044E+02%	5.08E-01
CO-58	#A	3.4329E-01	3.4330E-01	3.839E+01%	3.73E-01
CO-60	#A	0.0000E+00	0.0000E+00	1.000E+03%	5.36E-01
ZN-65	#A	0.0000E+00	0.0000E+00	1.000E+03%	2.37E+00
NB-94	#A	-1.2361E-01	-1.2361E-01	3.491E+02%	1.06E+00
ZR-95	#A	0.0000E+00	0.0000E+00	7.071E+02%	1.77E+00
NB-95	#A	-1.4519E-01	-1.4519E-01	1.732E+02%	9.12E-01
RU-103	#A	2.4690E-01	2.4690E-01	9.536E+01%	6.15E-01
RH-106	#A	4.3413E+00	4.3413E+00	9.015E+01%	2.48E+01
AG-108M	#A	-3.1561E-01	-3.1561E-01	1.117E+02%	8.96E-01
AG-110M	#A	1.3476E-02	1.3476E-02	5.647E+02%	1.53E+00
SN-113	#A	3.8132E-01	3.8132E-01	1.208E+02%	1.58E+00
SB-124	#A	-2.1908E-01	-2.1908E-01	2.766E+02%	2.08E+00
SB-125	#A	1.2114E+00	1.2114E+00	3.015E+01%	1.69E+00
I-131	#A	1.9080E-01	1.9081E-01	1.619E+02%	6.41E-01
Gd-153	#A	-4.1904E-01	-4.1904E-01	1.676E+02%	2.40E+00
Ga-68	#A	3.6293E+00	3.6665E+00	3.243E+02%	2.96E+01
Tc-99m	#A	1.1625E-01	1.1648E-01	1.807E+02%	7.25E-01
BA-133	#A	-4.3458E-01	-4.3458E-01	1.165E+02%	1.28E+00
CS-134	#A	-2.7585E-01	-2.7585E-01	1.029E+02%	2.30E+00
CS-137	#A	3.6467E-01	3.6467E-01	9.531E+01%	1.19E+00
CE-139	#A	1.8256E-01	1.8256E-01	1.077E+02%	6.71E-01
Ba-140	#A	6.6210E-01	6.6212E-01	1.468E+02%	2.51E+00
La-140	#C	6.7955E-01	6.7957E-01	3.526E+01%	6.49E-01
CE-141	#A	3.2145E-02	3.2146E-02	1.473E+03%	1.64E+00

CE-144	#A	8.9160E-01	8.9160E-01	1.708E+02%	5.25E+00
PM-144	#A	-1.9738E-01	-1.9738E-01	2.413E+02%	1.15E+00
EU-152	#A	2.6623E+00	2.6623E+00	2.887E+01%	3.35E+00
EU-154	#A	1.5146E+00	1.5146E+00	1.355E+02%	7.39E+00
EU-155	#A	0.0000E+00	0.0000E+00	1.000E+03%	3.50E+00
HF-181	#A	2.9354E-02	2.9354E-02	1.002E+02%	1.21E+00
Ta-182	#A	0.0000E+00	0.0000E+00	7.071E+02%	2.65E+00
Hg-203	#A	-2.9719E-01	-2.9719E-01	9.635E+01%	9.70E-01
TL-208	#A	-5.0592E-02	-5.0592E-02	4.082E+01%	1.41E+00
pm-146	#A	7.4421E-01	7.4421E-01	9.622E+01%	1.78E+00
y-88	#A	1.1566E-01	1.1566E-01	3.547E+02%	1.01E+00
Cd-113m	#A	4.8334E+02	4.8334E+02	6.736E+02%	1.16E+04
Cd-109	#A	0.0000E+00	0.0000E+00	1.000E+03%	2.23E+01
Cf-251	#A	7.2565E-01	7.2565E-01	1.344E+02%	2.60E+00
Cf-249	#A	2.1825E-01	2.1825E-01	1.153E+02%	1.78E+00
Sn-126	#A	1.2830E+00	1.2830E+00	1.812E+02%	8.00E+00
PB-210	A	9.7401E+00	9.7401E+00	8.215E+01%	2.47E+01
PB-212	A	-6.2351E-01	-6.2351E-01	5.601E+01%	1.93E+00
PB-214	#A	9.7294E-02	9.7294E-02	7.090E+02%	2.00E+00
BI-207	#A	5.2122E-01	5.2122E-01	2.887E+01%	7.98E-01
BI-212	#A	-4.7241E+00	-4.7241E+00	1.159E+02%	1.88E+01
U-235	#A	7.5479E-01	7.5479E-01	7.612E+01%	7.21E+00
BI-214	#A	-1.4258E+00	-1.4258E+00	5.615E+01%	5.28E+00
BI-210M	#A	-5.1567E-01	-5.1567E-01	9.078E+01%	1.58E+00
AC-228	#A	-1.8880E-01	-1.8880E-01	7.024E+02%	3.29E+00
TH-227	#A	1.5107E+00	1.5107E+00	1.030E+02%	1.54E+01
TH-229	#A	-4.6346E+00	-4.6346E+00	1.072E+02%	1.30E+01
TH-234	#A	5.3991E+00	5.3991E+00	9.031E+01%	1.48E+01
PA-231	#A	3.8544E+00	3.8544E+00	1.905E+02%	4.91E+01
PA-233	#A	3.1286E-01	3.1286E-01	3.049E+02%	4.00E+00
PA-234	#A	-9.0551E-01	-9.0551E-01	1.227E+02%	3.77E+00
PA-234M	#A	2.1014E+01	2.1014E+01	1.401E+02%	1.07E+02
AM-241	#A	3.3002E-01	3.3002E-01	1.903E+02%	2.17E+00
Np-237	#A	-1.3815E+00	-1.3815E+00	1.517E+02%	7.10E+00
Ir-192	#A	-4.6973E-02	-4.6973E-02	9.461E+01%	1.94E+00
Cs-136	#A	-2.8195E-01	-2.8196E-01	1.495E+02%	1.47E+00
Np-239	#A	5.4698E-01	5.4709E-01	1.641E+02%	3.07E+00
Nd-147	#A	-3.1259E+00	-3.1260E+00	9.931E+01%	7.52E+00
TL-210	#A	1.1407E-01	1.1407E-01	1.786E+02%	1.48E+00

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (25.1 to 1999.1 keV)	0.000E+00	Bq/Sample
Total Decayed Activity (25.1 to 1999.1 keV)	0.0000000E+00	Bq/Sample


376740_Gamma_MB 160-376740~1-A. 12_Gamma_20181337.spc.
Counts
1.0e4
1.0e3
1.0e2
1.0e1
1.0e0
Channels
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
7500
8000
Pb-210
Th-234
Sn-126
U-235
Ce-139
a-140
Pb-212
Eu-152
Tl-208
Bi-210M
233
Pb-214
Rh-106
Bi-214
Ru-103
Ba-140
Tl-208
Sb-125
Cs-137
Nb-94
Bi-207
Pa-234M
Eu-152
Pa-234M
Rh-106
Ga-68
Sc-46
Co-60
Ta-182
Co-56
Tl-210
Eu-152
K-40
Bi-214
Co-56

Test America St. Louis Spectrum ID: 19_Gamma_20181430

Sample Description: 376740_Gamma_LCS 160-376740~2-A
Detector: Detector #19
Batch ID: 376740
Work Order Number: Gamma
Lot Number: LCS 160-376740~2-A

Decay to Time: 8/9/2018 01:24 Live Time: 1800 sec
Acquisition Time: 8/9/2018 01:24:38 Real Time: 1807 sec
Analysis Time: 8/9/2018 01:54 Dead Time: 0.39 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 19_Soil_TunaCan.Clb
Efficiency Cal Desc: 19_TunaCan_108513
Efficiency Cal Date: 4/16/2018 12:11
Energy Cal Date: 4/16/2018 11:22
Library: Client_Long_Rev14.lib
Bkgd Correction File: 19_2018-07-14_1824.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	-1.733E+01	103.3	1.790E+01	1.793E+01	5.942E+01
NA-22	-8.579E-01	89.2	7.654E-01	7.666E-01	2.589E+00
K-40	-8.758E+00	117.7	1.031E+01	1.032E+01	2.260E+01
Sc-46	-1.965E+00	103.2	2.027E+00	2.029E+00	6.749E+00
CR-51	-1.029E-01	19726.8	2.029E+01	2.029E+01	6.779E+01
MN-54	6.870E-02	2282.0	1.568E+00	1.568E+00	3.608E+00
FE-59	-2.738E+00	124.9	3.421E+00	3.423E+00	8.341E+00
Co-56	1.615E+00	60.1	9.717E-01	9.751E-01	3.113E+00
CO-57	0.000E+00	1.#INF	2.645E-01	2.645E-01	2.982E+00
CO-58	-1.965E+00	69.7	1.369E+00	1.373E+00	5.414E+00
CO-60	1.758E+02	1.6	2.809E+00	9.194E+00	1.731E+00
ZN-65	-5.404E+00	74.6	4.032E+00	4.041E+00	1.336E+01
NB-94	2.298E+00	49.6	1.140E+00	1.146E+00	2.529E+00
ZR-95	6.529E-01	384.9	2.513E+00	2.513E+00	5.771E+00
NB-95	1.520E+00	69.6	1.057E+00	1.060E+00	3.501E+00
RU-103	1.657E-01	995.9	1.651E+00	1.651E+00	3.892E+00
RH-106	-1.645E+01	62.3	1.025E+01	1.029E+01	4.216E+01
AG-108M	9.753E-01	111.6	1.088E+00	1.089E+00	3.975E+00
AG-110M	2.056E+00	84.6	1.738E+00	1.741E+00	8.054E+00
SN-113	2.211E+00	101.7	2.249E+00	2.251E+00	7.467E+00
SB-124	-1.623E+00	130.0	2.109E+00	2.111E+00	7.019E+00
SB-125	4.263E+00	90.2	3.846E+00	3.852E+00	1.213E+01
I-131	8.053E-01	142.0	1.143E+00	1.144E+00	3.802E+00
Gd-153	1.511E+00	342.2	5.170E+00	5.171E+00	1.716E+01
Ga-68	-2.844E+01	250.6	7.128E+01	7.129E+01	1.570E+02
Tc-99m	0.000E+00	1.#INF	6.690E-01	6.690E-01	4.962E+00
BA-133	-2.159E+00	97.9	2.112E+00	2.115E+00	7.012E+00
CS-134	2.789E-01	94.2	2.626E-01	2.630E-01	6.957E+00
CS-137	4.007E+02	1.3	5.169E+00	2.110E+01	3.450E+00
CE-139	1.100E+00	97.3	1.071E+00	1.072E+00	3.551E+00
Ba-140	2.189E+00	236.3	5.172E+00	5.173E+00	1.221E+01
La-140	-1.907E+00	65.2	1.244E+00	1.247E+00	3.211E+00
CE-141	1.726E+00	151.1	2.607E+00	2.609E+00	8.649E+00

CE-144	0.000E+00	1.#INF	2.755E+00	2.755E+00	3.817E+01
PM-144	9.322E-01	89.4	8.337E-01	8.351E-01	2.485E+00
EU-152	2.666E+00	97.8	2.607E+00	2.611E+00	2.248E+01
EU-154	9.128E+00	78.9	7.201E+00	7.216E+00	4.008E+01
EU-155	1.707E+00	130.8	2.233E+00	2.235E+00	2.416E+01
HF-181	-2.287E+00	105.1	2.404E+00	2.407E+00	7.978E+00
Ta-182	6.026E+00	87.5	5.273E+00	5.282E+00	2.012E+01
Hg-203	4.552E-01	299.9	1.365E+00	1.365E+00	3.322E+00
TL-208	3.828E+00	32.0	1.225E+00	1.241E+00	2.796E+00
pm-146	-5.523E+00	65.3	3.606E+00	3.617E+00	1.086E+01
y-88	0.000E+00	1.#INF	1.977E+00	1.977E+00	4.375E+00
Cd-113m	3.103E+04	44.8	1.391E+04	1.403E+04	3.384E+04
Cd-109	2.367E+01	130.7	3.094E+01	3.097E+01	1.026E+02
Cf-251	-1.735E+00	295.7	5.131E+00	5.132E+00	1.303E+01
Cf-249	1.432E+00	148.2	2.122E+00	2.123E+00	7.804E+00
Sn-126	-2.254E+01	217.0	4.891E+01	4.893E+01	1.616E+02
PB-210	1.112E+04	1.0	1.128E+02	7.035E+02	2.161E+02
PB-212	1.935E+00	131.5	2.544E+00	2.546E+00	8.456E+00
PB-214	1.107E+01	22.3	2.470E+00	2.533E+00	6.562E+00
BI-207	-5.575E-01	164.6	9.174E-01	9.179E-01	3.102E+00
BI-212	1.083E+01	139.0	1.506E+01	1.507E+01	5.071E+01
U-235	4.671E+00	196.4	9.173E+00	9.176E+00	3.930E+01
BI-214	1.001E+01	18.4	1.840E+00	1.909E+00	5.178E+00
BI-210M	-2.262E+00	88.7	2.007E+00	2.010E+00	6.655E+00
AC-228	8.181E+00	47.9	3.922E+00	3.944E+00	1.577E+01
TH-227	1.834E+01	155.9	2.859E+01	2.861E+01	9.476E+01
TH-229	-1.055E+00	2037.8	2.151E+01	2.151E+01	5.477E+01
TH-234	-6.875E+01	113.3	7.791E+01	7.801E+01	4.129E+02
PA-231	3.606E+00	705.8	2.545E+01	2.545E+01	2.238E+02
PA-233	1.717E+00	319.8	5.489E+00	5.490E+00	1.826E+01
PA-234	2.305E+00	118.5	2.732E+00	2.735E+00	7.934E+00
PA-234M	2.787E+02	63.7	1.776E+02	1.782E+02	7.164E+02
AM-241	1.256E+03	0.9	1.076E+01	7.389E+01	1.546E+01
Np-237	6.879E+00	129.4	8.901E+00	8.910E+00	2.952E+01
Ir-192	1.279E+00	88.5	1.132E+00	1.135E+00	7.672E+00
Cs-136	2.831E-01	76.5	2.166E-01	2.172E-01	5.873E+00
Np-239	3.819E+00	174.8	6.675E+00	6.679E+00	2.212E+01
Nd-147	1.009E+01	92.1	9.298E+00	9.315E+00	2.171E+01
TL-210	6.070E-01	167.7	1.018E+00	1.018E+00	4.992E+00
Total	4.443E+04				

Analyst: Morgan Reichert

TestAmerica Inc Spectrum name: 19_Gamma_20181430.An1

Sample description
376740_Gamma_LCS 160-376740~2-A

Spectrum Filename: C:\User\SPC\Det19\19_Gamma_20181430.An1

Acquisition information
Start time:	8/9/2018 1:24:38 AM
Live time:	1800
Real time:	1807
Dead time:	0.39 %
Detector ID:	19

Detector system
Ge19 SN/11146715

Calibration
Filename: 19_Soil_TunaCan.Clb
19_TunaCan_108513

Energy Calibration
Created:	4/16/2018 11:22:57 AM
Zero offset:	0.177 keV
Gain:	0.250 keV/channel
Quadratic:	-3.735E-08 keV/channel^2

Efficiency Calibration
Created:	4/16/2018 12:11:21 PM
Type:	Polynomial
Uncertainty:	0.841 %
Coefficients:	-0.371612 -4.869309 0.466742
	-0.049787 0.002234 -0.000039

Library Files
Main analysis library:	Client_Long_Rev14.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters
Analysis engine:	Env32 G800W064
Start channel:	150 (37.71keV)
Stop channel:	8000 (1999.42keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000

Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	8/9/2018 1:24:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	19_2018-07-14_1824.PBC 7/14/2018 6:24:20 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 31 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1441

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.72	14542.	1.01	0.93	1.720E-02	46.54	4.250	1.112E+04	PB210
49.95	53.	154.62	0.94	2.030E-02	50.14	8.000	1.780E+01	TH227
59.69	21205.	0.86	0.91	2.620E-02	59.54	35.900	1.256E+03	AM241
80.99	20.	279.79	0.97	3.218E-02	80.99	34.060	PBC<MDA	BA133
86.49	54.	129.41	0.97	3.300E-02	86.49	13.100	PBC<MDA	Np237
					86.54	30.700	2.935E+00	EU155
					86.94	9.040	9.951E+00	Sn126
86.54	54.	130.84	0.97	3.301E-02	86.49	13.100	PBC<MDA	Np237
					86.54	30.700	2.935E+00	EU155
					86.94	9.040	9.951E+00	Sn126
86.89	54.	131.94	0.97	3.306E-02	86.49	13.100	PBC<MDA	Np237
					86.54	30.700	2.936E+00	EU155
					86.94	9.040	9.955E+00	Sn126
87.96	77.	44.74	0.47	3.319E-02	87.57	37.500	3.442E+00	Sn126
					88.04	3.790	3.400E+01	Cd109
91.10	45.	147.54	0.97	3.352E-02	91.10	28.300	PBC<MDA	Nd147
93.35	54.	175.82	0.98	3.372E-02	93.35	5.561	PBC<MDA	AC228
97.50	28.	342.15	0.98	3.401E-02	97.50	30.000	PBC<MDA	Gd153
106.13	54.	174.77	0.99	3.430E-02	106.13	22.700	PBC<MDA	Np239
112.36	46.	55.54	0.61	3.429E-02				
121.78	25.	185.26	1.00	3.401E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	4.772E-01	CO57
131.24	25.	118.55	0.28	3.348E-02	131.29	18.000	PBC<MDA	PA234
143.79	39.	196.37	1.02	3.254E-02	143.79	10.960	PBC<MDA	U235
145.44	49.	151.07	1.02	3.240E-02	145.44	48.200	PBC<MDA	CE141
163.38	5.	881.49	1.04	3.076E-02	163.38	5.080	PBC<MDA	U235
165.85	48.	97.33	1.04	3.053E-02	165.85	79.900	PBC<MDA	CE139

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
185.44	66.	58.35	0.98	2.864E-02	185.72	54.000	PBC<MDA	U235
227.00	46.	95.24	1.10	2.503E-02	227.00	6.300	PBC<MDA	Cf251
238.65	36.	131.50	1.11	2.413E-02	238.63	43.300	PBC<MDA	PB212
242.01	46.	103.84	1.11	2.388E-02	242.00	7.430	PBC<MDA	PB214
263.21	75.	44.84	1.58	2.238E-02	263.70	0.006	PBC<MDA	Cd113m
279.20	14.	299.89	1.14	2.141E-02	279.20	81.460	PBC<MDA	Hg203
294.85	107.	30.89	2.97	2.050E-02	295.09	19.300	1.505E+01	PB214
					296.00	79.000	3.685E+00	TL210
296.00	40.	167.69	1.16	2.045E-02	296.00	79.000	PBC<MDA	TL210
300.03	40.	170.27	1.16	2.023E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	PBC<MDA	PA231
					300.18	6.200	PBC<MDA	PA233
300.07	7.	996.40	1.16	2.023E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	7.828E+00	PA231
					300.18	6.200	3.107E+00	PA233
313.00	22.	319.75	1.17	1.962E-02	312.01	36.000	PBC<MDA	PA233
328.76	41.	140.47	1.18	1.882E-02	328.76	20.300	PBC<MDA	La140
333.44	39.	148.16	1.19	1.861E-02	333.44	15.510	PBC<MDA	Cf249
338.40	62.	47.94	1.71	1.839E-02	338.32	12.010	PBC<MDA	AC228
351.63	109.	32.23	1.27	1.782E-02	351.93	37.600	9.021E+00	PB214
391.69	42.	101.69	1.24	1.637E-02	391.69	64.000	PBC<MDA	SN113
433.59	22.	182.76	1.27	1.510E-02	433.94	90.480	PBC<MDA	AG108M
453.88	30.	128.13	1.29	1.458E-02	453.88	65.000	PBC<MDA	pm146
463.37	47.	90.20	1.30	1.434E-02	463.37	10.470	PBC<MDA	SB125
468.06	45.	88.54	1.30	1.423E-02	468.06	51.750	PBC<MDA	Ir192
497.05	4.	995.92	1.33	1.358E-02	497.05	90.900	PBC<MDA	RU103
511.86	73.	74.11	2.59	1.328E-02	511.86	20.000	PBC<MDA	RH106
531.00	30.	92.10	1.35	1.291E-02	531.00	13.000	PBC<MDA	Nd147
537.26	12.	236.29	1.36	1.279E-02	537.26	24.390	PBC<MDA	Ba140
563.24	21.	129.36	1.38	1.234E-02	563.24	8.350	PBC<MDA	CS134
569.32	11.	156.52	1.38	1.224E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	6.274E+00	PA234
					569.70	97.740	5.265E-01	BI207
583.05	70.	32.01	1.45	1.202E-02	583.02	84.500	3.828E+00	TL208
609.32	95.	18.37	1.42	1.163E-02	609.31	46.090	9.800E+00	BI214
618.06	14.	153.92	1.42	1.151E-02	618.06	99.100	PBC<MDA	PM144
636.97	16.	141.95	1.44	1.125E-02	636.97	7.170	PBC<MDA	I131
657.76	27.	439.49	1.46	1.098E-02	657.76	94.640	PBC<MDA	AG110M
661.75	6719.	1.29	1.40	1.093E-02	661.66	85.210	4.007E+02	CS137
696.54	23.	91.13	1.49	1.052E-02	696.54	99.000	PBC<MDA	PM144
702.63	42.	49.63	1.49	1.045E-02	702.63	97.900	PBC<MDA	NB94
722.02	18.	127.95	1.51	1.024E-02	722.94	90.840	PBC<MDA	AG108M
727.17	15.	139.04	1.51	1.019E-02	727.17	7.550	PBC<MDA	BI212
735.72	20.	108.01	1.52	1.010E-02	735.72	22.500	PBC<MDA	pm146
756.73	6.	384.93	1.53	9.896E-03	756.73	54.460	PBC<MDA	ZR95
765.79	27.	69.56	1.54	9.809E-03	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	5.163E+02	PA234M
766.41	22.	86.88	1.54	9.803E-03	765.79	99.790	PBC<MDA	NB95

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
					766.41	0.294	4.153E+02	PA234M
779.42	22.	97.81	1.55	9.687E-03	778.92	12.940	PBC<MDA	EU152
785.42	26.	88.16	1.56	9.628E-03	785.42	1.280	PBC<MDA	BI212
801.95	8.	290.41	1.57	9.481E-03	801.95	8.690	PBC<MDA	CS134
846.77	27.	84.73	1.60	9.108E-03	846.77	99.935	PBC<MDA	Co56
884.68	33.	84.55	1.63	8.818E-03	884.68	72.680	PBC<MDA	AG110M
911.95	15.	216.45	1.65	8.629E-03	911.07	29.000	PBC<MDA	AC228
964.11	6.	400.59	1.69	8.274E-03	964.11	14.605	PBC<MDA	EU152
969.65	29.	72.13	1.69	8.244E-03	968.97	17.460	PBC<MDA	AC228
996.33	32.	78.89	1.71	8.075E-03	996.33	10.600	PBC<MDA	EU154
1001.00	28.	93.26	1.72	8.047E-03	1001.00	0.837	PBC<MDA	PA234M
1048.07	21.	76.52	1.75	7.775E-03	1048.07	80.000	PBC<MDA	Cs136
1121.30	30.	95.07	1.80	7.389E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	6.355E+00	Ta182
1173.37	2293.	2.23	1.84	7.138E-03	1173.24	99.900	1.787E+02	CO60
1189.05	11.	146.93	1.85	7.065E-03	1189.05	16.200	PBC<MDA	Ta182
1238.28	13.	85.40	1.89	6.848E-03	1238.28	66.070	PBC<MDA	Co56
1332.63	2011.	2.29	1.86	6.465E-03	1332.50	99.980	1.728E+02	CO60
1690.98	4.	158.45	2.18	5.307E-03	1690.98	47.790	PBC<MDA	SB124
1764.69	15.	41.47	2.22	5.112E-03	1764.49	15.400	PBC<MDA	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
448.39	112.36	260.	46.	1.341E+03	55.54	0.605	- sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: Client_Long_Rev14.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.30	46.54	3607.	14542.	8.079	1.01	0.935D
TH-227	199.70	50.14	3531.	54.	0.030	155.88	0.938D
AM-241	237.86	59.69	3074.	21205.	11.780	0.86	0.909
TH-234	252.25	63.29	27998.	-130.	-0.072	113.33	0.950s
Sn-126	256.21	64.28	28514.	-110.	-0.061	216.98	0.951

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BA-133	323.00	80.99	957.	20.	0.011	279.79	0.966s
Np-237	344.99	86.49	2373.	54.	0.030	129.41	0.971s
EU-155	345.20	86.54	2426.	54.	0.030	130.84	0.971s
Sn-126	346.79	86.94	2470.	54.	0.030	131.94	0.971s
Sn-126	349.31	87.57	2482.	54.	0.030	69.49	0.972D
Cd-109	351.19	88.04	2429.	54.	0.030	130.72	0.972A
Nd-147	363.42	91.10	2167.	45.	0.025	147.54	0.975s
TH-234	369.37	92.59	2351.	-84.	-0.047	66.44	0.976s
AC-228	372.41	93.35	4440.	54.	0.030	175.82	0.977
Gd-153	389.00	97.50	4494.	28.	0.015	342.15	0.981s
Np-239	396.99	99.50	4522.	0.	0.000	1000.00	0.982
Gd-153	411.78	103.20	4522.	0.	0.000	1000.00	0.986s
Np-239	413.78	103.70	4522.	0.	0.000	1000.00	0.986s
Np-239	423.49	106.13	4348.	54.	0.030	174.77	0.988s
EU-152	486.04	121.78	1060.	25.	0.014	185.26	1.002
CO-57	487.18	122.06	1085.	0.	0.000	1000.00	1.003s
EU-154	491.33	123.10	1146.	-55.	-0.031	88.03	1.004s
PA-234	524.09	131.29	320.	25.	0.014	118.55	0.280D
HF-181	531.00	133.02	2950.	-44.	-0.024	175.21	1.013s
CE-144	533.06	133.54	2906.	0.	0.000	1000.00	1.013s
HF-181	544.09	136.30	2906.	0.	0.000	1000.00	1.015s
CO-57	544.79	136.47	2906.	0.	0.000	1000.00	1.016s
Tc-99m	560.92	140.51	2906.	0.	0.000	1000.00	1.019s
U-235	574.02	143.79	2867.	39.	0.022	196.37	1.022s
CE-141	580.63	145.44	2661.	49.	0.027	151.07	1.024s
Ba-140	649.47	162.66	1011.	-48.	-0.027	94.23	1.039s
U-235	652.34	163.38	929.	5.	0.003	881.49	1.040s
CE-139	662.23	165.85	1081.	48.	0.027	97.33	1.042
Cf-251	705.19	176.60	609.	-16.	-0.009	295.69	1.051s
U-235	740.53	185.44	413.	66.	0.037	58.35	0.983s
TH-229	842.11	210.85	653.	-22.	-0.012	214.25	1.082
Cf-251	906.68	227.00	524.	46.	0.025	95.24	1.096
PB-212	953.18	238.63	1126.	36.	0.020	131.50	1.106
PB-214	966.63	242.00	1122.	46.	0.026	103.84	1.109s
EU-152	977.41	244.69	1390.	-50.	-0.028	106.00	1.111s
Cd-113m	1051.43	263.21	288.	75.	0.042	44.84	1.581s
BI-210M	1061.92	265.83	784.	-45.	-0.025	88.73	1.130s
Hg-203	1115.37	279.20	475.	14.	0.008	299.89	1.141
I-131	1135.76	284.30	512.	-41.	-0.023	109.18	1.146s
PB-214	1177.94	294.85	258.	107.	0.060	30.89	2.974s
TL-210	1182.54	296.00	2204.	40.	0.022	167.69	1.156s
PB-212	1198.65	300.03	2244.	40.	0.022	170.27	1.159
PA-231	1198.81	300.07	2438.	7.	0.004	996.40	1.159s
PA-233	1199.25	300.18	2445.	0.	0.000	1000.00	1.159
PA-231	1209.13	302.65	2445.	0.	0.000	1000.00	1.162
BA-133	1209.93	302.85	2445.	0.	0.000	1000.00	1.162
Ba-140	1217.92	304.85	2445.	0.	0.000	1000.00	1.164s
BI-210M	1218.11	304.90	2445.	0.	0.000	1000.00	1.164s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ir-192	1232.27	308.44	2445.	0.	0.000	1000.00	1.167s
PA-233	1246.56	312.01	2423.	22.	0.012	319.75	1.170s
Ir-192	1264.46	316.49	2445.	0.	0.000	1000.00	1.173s
La-140	1313.52	328.76	1617.	41.	0.023	140.47	1.184s
Cf-249	1332.23	333.44	1658.	39.	0.022	148.16	1.188
AC-228	1352.04	338.40	224.	62.	0.034	47.94	1.709s
Cs-136	1360.74	340.57	1697.	0.	0.000	1000.00	1.194s
HF-181	1381.77	345.83	432.	-14.	-0.008	281.71	1.199s
PB-214	1404.97	351.63	269.	109.	0.060	32.23	1.266
BA-133	1422.43	356.00	847.	-43.	-0.024	97.86	1.207s
BA-133	1533.76	383.84	1023.	-17.	-0.009	272.46	1.231s
Cf-249	1550.19	387.95	1039.	0.	0.000	1000.00	1.235s
SN-113	1565.14	391.69	878.	42.	0.023	101.69	1.238s
AG-108M	1734.08	433.94	416.	22.	0.012	182.76	1.273s
pm-146	1813.83	453.88	372.	30.	0.017	128.13	1.290s
SB-125	1851.76	463.37	872.	47.	0.026	90.20	1.298
Ir-192	1870.53	468.06	788.	45.	0.025	88.54	1.302
BE-7	1908.66	477.60	1105.	-46.	-0.026	103.31	1.310s
HF-181	1926.26	482.00	1151.	-46.	-0.026	105.11	1.313
La-140	1946.35	487.02	1121.	-45.	-0.025	105.51	1.317s
RU-103	1986.48	497.05	323.	4.	0.002	995.92	1.326s
RH-106	2045.71	511.86	440.	73.	0.041	74.11	2.588s
Nd-147	2122.23	531.00	182.	30.	0.017	92.10	1.354
Ba-140	2147.27	537.26	200.	12.	0.007	236.29	1.359s
CS-134	2251.16	563.24	178.	21.	0.012	129.36	1.380s
CS-134	2275.49	569.32	152.	11.	0.006	156.52	1.385s
BI-207	2277.02	569.70	189.	-12.	-0.007	164.57	1.385s
TL-208	2330.40	583.05	108.	70.	0.039	32.01	1.454
SB-125	2400.20	600.50	973.	-34.	-0.019	86.11	1.410
SB-124	2409.12	602.73	940.	-34.	-0.019	129.97	1.412s
CS-134	2417.03	604.71	906.	-34.	-0.019	127.52	1.414
BI-214	2435.44	609.31	103.	95.	0.053	18.37	1.417D
RU-103	2439.39	610.30	872.	-34.	-0.019	124.78	1.418s
PM-144	2470.44	618.06	212.	14.	0.008	153.92	1.424s
RH-106	2485.86	621.92	322.	-34.	-0.019	62.34	1.427
SB-125	2541.74	635.89	236.	-31.	-0.017	68.50	1.439
I-131	2546.08	636.97	235.	16.	0.009	141.95	1.440
AG-110M	2629.23	657.76	6915.	27.	0.015	439.49	1.456s
CS-137	2645.18	661.75	140.	6719.	3.733	1.29	1.401
PM-144	2784.35	696.54	89.	23.	0.013	91.13	1.487s
NB-94	2808.70	702.63	89.	42.	0.024	49.63	1.492s
SB-124	2889.33	722.79	250.	-15.	-0.008	154.58	1.507s
AG-108M	2889.93	722.94	247.	18.	0.010	127.95	1.507s
EU-154	2891.61	723.36	235.	0.	0.000	1000.00	1.508s
ZR-95	2894.98	724.20	235.	0.	0.000	1000.00	1.508s
BI-212	2906.86	727.17	210.	15.	0.008	139.04	1.511s
pm-146	2941.07	735.72	103.	20.	0.011	108.01	1.518s
pm-146	2986.83	747.16	187.	-34.	-0.019	65.28	1.526s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
ZR-95	3025.11	756.73	131.	6.	0.004	384.93	1.534
AG-110M	3053.97	763.94	149.	-14.	-0.008	123.43	1.539s
NB-95	3061.35	765.79	160.	27.	0.015	69.56	1.541s
PA-234M	3063.85	766.41	164.	22.	0.012	86.88	1.541s
EU-152	3113.88	778.92	98.	22.	0.012	97.81	1.551s
BI-212	3139.88	785.42	112.	26.	0.015	88.16	1.556s
CS-134	3181.68	795.87	288.	-20.	-0.011	122.07	1.564s
TL-210	3196.61	799.60	308.	0.	0.000	1000.00	1.567s
CS-134	3206.02	801.95	289.	8.	0.005	290.41	1.569
CO-58	3241.32	810.78	360.	-33.	-0.018	69.68	1.575s
La-140	3261.30	815.77	319.	-18.	-0.010	127.87	1.579s
Cs-136	3272.22	818.50	424.	-17.	-0.009	174.80	1.581s
Co-56	3385.32	846.77	107.	27.	0.015	84.73	1.603s
TL-208	3440.51	860.56	201.	-23.	-0.013	98.29	1.614
NB-94	3482.65	871.10	187.	-27.	-0.015	75.00	1.621s
PA-234	3520.39	880.53	527.	-38.	-0.021	86.99	1.628
PA-234	3531.23	883.24	489.	-38.	-0.021	83.81	1.630
AG-110M	3537.01	884.68	375.	33.	0.018	84.55	1.632
Sc-46	3555.40	889.28	498.	-31.	-0.017	103.16	1.635s
y-88	3590.45	898.04	175.	0.	0.000	1000.00	1.642
AC-228	3642.58	911.07	215.	15.	0.008	216.45	1.651s
AG-110M	3748.30	937.49	220.	-11.	-0.006	297.97	1.671
PA-234	3782.42	946.02	250.	-28.	-0.016	125.58	1.677
EU-152	3854.81	964.11	319.	6.	0.004	400.59	1.691
AC-228	3874.26	968.97	202.	29.	0.016	72.13	1.694s
EU-154	3983.73	996.33	294.	32.	0.018	78.89	1.714s
PA-234M	4002.41	1001.00	326.	28.	0.016	93.26	1.718s
EU-154	4017.53	1004.77	433.	-35.	-0.020	84.84	1.721s
Co-56	4149.84	1037.84	185.	-37.	-0.021	82.67	1.745s
Cs-136	4190.78	1048.07	120.	21.	0.012	76.52	1.752s
RH-106	4199.94	1050.36	229.	-34.	-0.019	64.99	1.754s
BI-207	4253.17	1063.66	165.	-27.	-0.015	106.35	1.763s
Ga-68	4308.15	1077.40	155.	-11.	-0.006	250.65	1.773s
FE-59	4395.60	1099.25	171.	-21.	-0.012	124.94	1.789s
EU-152	4446.92	1112.07	400.	-35.	-0.020	81.73	1.798
ZN-65	4460.81	1115.55	353.	-37.	-0.020	74.61	1.800s
Ta-182	4483.84	1121.30	378.	30.	0.016	95.07	1.804s
CO-60	4692.22	1173.37	47.	2293.	1.274	2.23	1.838
Ta-182	4754.99	1189.05	48.	11.	0.006	146.93	1.852s
Ta-182	4884.51	1221.41	70.	-24.	-0.013	67.46	1.874s
Co-56	4952.04	1238.28	21.	13.	0.007	85.40	1.886s
NA-22	5097.14	1274.53	37.	-10.	-0.006	89.22	1.910s
EU-154	5097.19	1274.54	48.	0.	0.000	1000.00	1.910s
FE-59	5165.45	1291.60	27.	-5.	-0.003	255.75	1.922s
TL-210	5251.13	1313.00	43.	-19.	-0.011	81.22	1.936s
CO-60	5329.73	1332.63	14.	2011.	1.117	2.29	1.864
AG-110M	5536.55	1384.30	11.	-3.	-0.002	243.10	1.984s
EU-152	5631.44	1408.00	45.	-20.	-0.011	83.37	1.999s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
K-40	5842.95	1460.83	25.	-10.	-0.006	117.69	2.033s
La-140	6385.01	1596.21	36.	-18.	-0.010	65.22	2.119s
SB-124	6764.54	1690.98	6.	4.	0.002	158.45	2.176s
BI-214	7058.94	1764.49	12.	15.	0.008	41.47	2.219s
Co-56	7086.41	1771.35	18.	0.	0.000	1000.00	2.223s
y-88	7345.60	1836.06	12.	-7.	-0.004	87.53	2.261

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
BE-7	C	-1.7331E+01				5.31E+01	
			477.60	-1.733E+01	?(	5.942E+01	1.03E+02 1.05E+01 G
NA-22	C	-8.5792E-01				9.50E+02	
			1274.53	-8.579E-01	?(	2.589E+00	8.92E+01 9.99E+01 G
K-40	N	-8.7584E+00				4.66E+11	
			1460.83	-8.758E+00	?(P	2.260E+01	1.18E+02 1.07E+01 G
Sc-46	F	-1.9648E+00				8.38E+01	
			889.28	-1.965E+00	&(	6.749E+00	1.03E+02 1.00E+02 G
			1120.55	0.000E+00	} P	7.404E+00	1.44E+03 1.00E+02 G
CR-51	F	-1.0285E-01				2.77E+01	
			320.08	-1.029E-01	%(P	6.779E+01	1.97E+04 9.94E+00 G
MN-54	C	6.8702E-02				3.12E+02	
			834.85	6.870E-02	&(P	3.608E+00	2.28E+03 1.00E+02 G
FE-59	F	-2.7378E+00				4.45E+01	
			1099.25	-2.738E+00	?(P	8.341E+00	1.25E+02 5.65E+01 G
			1291.60	-9.057E-01	+	5.196E+00	2.56E+02 4.32E+01 G
Co-56	C	1.6154E+00				7.73E+01	
			846.77	1.627E+00	?(P	3.113E+00	8.47E+01 9.99E+01 G
			1238.28	1.598E+00	&(P	2.982E+00	8.54E+01 6.61E+01 G
			1037.84	-1.853E+01	+	3.318E+01	8.27E+01 1.41E+01 G
			1771.35	0.000E+00	-	1.603E+01	1.00E+03 1.55E+01 A
CO-58	C	-1.9653E+00				7.09E+01	
			810.78	-1.965E+00	?(P	5.414E+00	6.97E+01 9.95E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CO-60	F	1.7575E+02					1.93E+03	
			1332.50	1.728E+02	(	1.731E+00	2.29E+00	1.00E+02 G
			1173.24	1.787E+02	(	2.691E+00	2.23E+00	9.99E+01 G
ZN-65	F	-5.4043E+00					2.44E+02	
			1115.55	-5.404E+00	?(	1.336E+01	7.46E+01	5.06E+01 G
NB-94	I	2.2978E+00					7.41E+06	
			702.63	2.298E+00	&(	2.529E+00	4.96E+01	9.79E+01 G
			871.10	-1.663E+00	-	4.139E+00	7.50E+01	9.99E+01 G
ZR-95	I	6.5288E-01					6.40E+01	
			756.73	6.529E-01	?(	5.771E+00	3.85E+02	5.45E+01 G
			724.20	0.000E+00	&	9.127E+00	1.00E+03	4.42E+01 G
NB-95	I	1.5202E+00					6.40E+01	
			765.79	1.520E+00	&(	3.501E+00	6.96E+01	9.98E+01 G
RU-103	I	1.6574E-01					3.93E+01	
			497.05	1.657E-01	?(P	3.892E+00	9.96E+02	9.09E+01 G
			610.30	-2.811E+01	+	1.167E+02	1.25E+02	5.75E+00 GA
RH-106	I	-1.6450E+01					3.74E+02	
			621.92	-1.645E+01	&(P	4.216E+01	6.23E+01	9.93E+00 G
			1050.36	-1.567E+02	+	3.361E+02	6.50E+01	1.56E+00 G
			511.86	1.529E+01	+	2.102E+01	7.41E+01	2.00E+01 GA
AG-108M	C	9.7525E-01					1.53E+05	
			433.94	8.947E-01	?(	3.975E+00	1.83E+02	9.05E+01 G
			722.94	1.056E+00	&(	4.535E+00	1.28E+02	9.08E+01 G
			614.28	-8.197E-02	&	7.638E+00	2.78E+03	8.98E+01 G
AG-110M	F	2.0556E+00					2.50E+02	
			884.68	2.868E+00	?(	8.054E+00	8.46E+01	7.27E+01 G
			657.76	1.432E+00	?(	2.086E+01	4.39E+02	9.46E+01 G
			937.49	-2.105E+00	&	1.375E+01	2.98E+02	3.44E+01 G
			1384.30	-1.216E+00	-	6.709E+00	2.43E+02	2.43E+01 G
			763.94	-3.637E+00	+	1.514E+01	1.23E+02	2.23E+01 G
SN-113	F	2.2114E+00					1.15E+02	
			391.69	2.211E+00	?(	7.467E+00	1.02E+02	6.40E+01 G
SB-124	F	-1.6227E+00					6.02E+01	
			602.73	-1.623E+00	&(	7.019E+00	1.30E+02	9.83E+01 G
			1690.98	8.645E-01	+ P	3.105E+00	1.58E+02	4.78E+01 G
			722.79	-7.363E+00	&	3.832E+01	1.55E+02	1.08E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
SB-125	I	4.2635E+00					1.01E+03	
			427.88	-3.688E-01	%(	1.213E+01	1.35E+03	2.96E+01 G
			600.50	-8.928E+00	+ P	3.918E+01	8.61E+01	1.79E+01 G
			635.89	-1.340E+01	+ P	3.239E+01	6.85E+01	1.13E+01 G
			463.37	1.736E+01	(P	5.192E+01	9.02E+01	1.05E+01 G
I-131	I	8.0534E-01					8.02E+00	
			364.48	-6.223E-02	%(P	3.802E+00	4.40E+03	8.17E+01 G
			284.30	-1.757E+01	&	4.636E+01	1.09E+02	6.14E+00 G
			636.97	1.069E+01	(P	5.106E+01	1.42E+02	7.17E+00 G
Gd-153	F	1.5111E+00					2.42E+02	
			97.50	1.511E+00	?(	1.716E+01	3.42E+02	3.00E+01 G
			103.20	0.000E+00	-	2.352E+01	1.00E+03	2.18E+01 G
Ga-68	C	-2.8437E+01					4.71E-02	
			1077.40	-2.844E+01	&(	1.570E+02	2.51E+02	3.30E+00 G
BA-133	F	-2.1585E+00					3.85E+03	
			356.00	-2.159E+00	&(	7.012E+00	9.79E+01	6.20E+01 G
			302.85	0.000E+00	+	3.518E+01	1.00E+03	1.83E+01 G
			383.84	-6.226E+00	&	5.668E+01	2.72E+02	8.94E+00 GA
			80.99	1.001E+00	+ P	7.445E+00	2.80E+02	3.41E+01 GA
CS-134	I	2.7895E-01					7.54E+02	
			604.71	-1.639E+00	?(	6.957E+00	1.28E+02	9.76E+01 G
			795.87	-1.363E+00	+	5.572E+00	1.22E+02	8.55E+01 G
			569.32	3.344E+00	?(	1.773E+01	1.57E+02	1.54E+01 G
			801.95	5.619E+00	?(	5.522E+01	2.90E+02	8.69E+00 G
			563.24	1.150E+01	&(	3.495E+01	1.29E+02	8.35E+00 G
CS-137	I	4.0069E+02					1.10E+04	
			661.66	4.007E+02	(	3.450E+00	1.29E+00	8.52E+01 G
CE-139	F	1.0999E+00					1.38E+02	
			165.85	1.100E+00	&(	3.551E+00	9.73E+01	7.99E+01 G
Ba-140	I	2.1887E+00					1.28E+01	
			537.26	2.189E+00	?(P	1.221E+01	2.36E+02	2.44E+01 G
			162.66	-1.399E+01	+	4.371E+01	9.42E+01	6.22E+00 G
			304.85	0.000E+00	&	1.511E+02	1.00E+03	4.29E+00 G
La-140	I	-1.9067E+00					1.28E+01	
			1596.21	-1.907E+00	?(P	3.211E+00	6.52E+01	9.54E+01 G
			487.02	-4.011E+00	+	1.405E+01	1.06E+02	4.55E+01 G
			328.76	5.925E+00	&	2.765E+01	1.40E+02	2.03E+01 G
			815.77	-4.598E+00	& P	2.190E+01	1.28E+02	2.33E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CE-141	I	1.7259E+00					3.25E+01	
			145.44	1.726E+00	?(	8.649E+00	1.51E+02	4.82E+01 G
PM-144	C	9.3215E-01					3.63E+02	
			696.54	1.202E+00	&(	2.485E+00	9.11E+01	9.90E+01 G
			618.06	6.631E-01	?(P	3.442E+00	1.54E+02	9.91E+01 G
EU-152	F	2.6657E+00					4.94E+03	
			344.29	4.045E-01	%(	2.248E+01	1.66E+03	2.65E+01 G
			1112.07	-1.937E+01	+	5.254E+01	8.17E+01	1.36E+01 G
			121.78	1.429E+00	(	8.826E+00	1.85E+02	2.86E+01 G
			778.92	9.751E+00	?(	2.165E+01	9.78E+01	1.29E+01 G
			964.11	2.912E+00	(	3.949E+01	4.01E+02	1.46E+01 G
			244.69	-1.553E+01	+	5.460E+01	1.06E+02	7.58E+00 G
			1408.00	-8.411E+00	&	1.457E+01	8.34E+01	2.10E+01 GA
EU-154	I	9.1281E+00					3.14E+03	
			873.23	-6.781E-01	&(	4.008E+01	1.73E+03	1.23E+01 G
			123.10	-2.207E+00	&	6.436E+00	8.80E+01	4.08E+01 G
			1274.54	0.000E+00	+	8.225E+00	1.00E+03	3.52E+01 G
			723.36	0.000E+00	+	1.991E+01	1.00E+03	2.02E+01 G
			1004.77	-1.361E+01	+	3.833E+01	8.48E+01	1.80E+01 G
			996.33	2.048E+01	*(	5.362E+01	7.89E+01	1.06E+01 G
EU-155	I	1.7068E+00					1.81E+03	
			105.31	-7.113E-02	%(P	2.416E+01	6.00E+03	2.12E+01 G
			86.54	2.935E+00	&(	1.273E+01	1.31E+02	3.07E+01 G
HF-181	F	-2.2873E+00					4.24E+01	
			482.00	-2.287E+00	?(	7.978E+00	1.05E+02	8.05E+01 G
			133.02	-1.692E+00	+	9.838E+00	1.75E+02	4.33E+01 G
			345.83	-2.957E+00	+	2.030E+01	2.82E+02	1.51E+01 G
			136.30	0.000E+00	&	7.279E+01	1.00E+03	5.85E+00 G
Ta-182	F	6.0265E+00					1.14E+02	
			1121.30	6.355E+00	&(	2.012E+01	9.51E+01	3.49E+01 G
			1221.41	-7.108E+00	+ P	1.238E+01	6.75E+01	2.70E+01 G
			1189.05	5.318E+00	&(P	1.699E+01	1.47E+02	1.62E+01 G
Hg-203	F	4.5515E-01					4.66E+01	
			279.20	4.552E-01	&(	3.322E+00	3.00E+02	8.15E+01 G
TL-208	N	3.8279E+00					6.98E+02	
			583.02	3.828E+00	(	2.796E+00	3.20E+01	8.45E+01 G
			277.28	-1.345E+00	%	4.854E+01	1.07E+03	6.31E+00 G
			860.56	-1.143E+01	- P	3.418E+01	9.83E+01	1.24E+01 G

Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
pm-146	C	-5.5234E+00						2.02E+03	
			747.16	-5.523E+00	?(P	1.086E+01	6.53E+01	3.40E+01	G
			735.72	4.969E+00	&	1.220E+01	1.08E+02	2.25E+01	G
			453.88	1.747E+00	+ P	5.432E+00	1.28E+02	6.50E+01	G
Cd-113m		3.1031E+04						5.33E+03	
			263.70	3.103E+04	(	3.384E+04	4.48E+01	6.00E-03	K
Cd-109	F	2.3672E+01						4.53E+02	
								Derived Ave Activity	
			88.04	2.367E+01	}(	1.026E+02	1.31E+02	3.79E+00	G
Cf-251	T	-1.7353E+00						3.28E+05	
			176.60	-1.735E+00	?(	1.303E+01	2.96E+02	1.70E+01	G
			227.00	1.604E+01		3.854E+01	9.52E+01	6.30E+00	GA
Cf-249	T	1.4320E+00						1.28E+05	
			387.95	0.000E+00	(	7.804E+00	1.00E+03	6.60E+01	G
			333.44	7.525E+00	&(	3.705E+01	1.48E+02	1.55E+01	G
Sn-126		-2.2542E+01						3.65E+07	
			87.57	2.395E+00	}	1.050E+01	6.95E+01	3.75E+01	GA
			64.28	-2.254E+01	(	1.616E+02	2.17E+02	9.70E+00	G
			86.94	9.955E+00	&	4.355E+01	1.32E+02	9.04E+00	GA
PB-210	N	1.1123E+04						8.14E+03	
			46.54	1.112E+04	(P	2.161E+02	1.01E+00	4.25E+00	G
PB-212	N	1.9348E+00						6.98E+02	
			238.63	1.935E+00	?(P	8.456E+00	1.31E+02	4.33E+01	G
			300.03	3.308E+01	P	1.870E+02	1.70E+02	3.28E+00	GA
PB-214	N	1.1065E+01						5.84E+05	
			351.93	9.021E+00	(	6.562E+00	3.22E+01	3.76E+01	G
			295.09	1.505E+01	*(	1.089E+01	3.09E+01	1.93E+01	G
			242.00	1.443E+01	?	4.971E+01	1.04E+02	7.43E+00	GA
BI-207	C	-5.5747E-01						1.18E+04	
			569.70	-5.575E-01	&(	3.102E+00	1.65E+02	9.77E+01	G
			1063.66	-2.619E+00	+	6.068E+00	1.06E+02	7.45E+01	G
BI-212	N	1.0830E+01						6.98E+02	
			727.17	1.083E+01	&(	5.071E+01	1.39E+02	7.55E+00	G
			785.42	1.178E+02	& P	2.349E+02	8.82E+01	1.28E+00	GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
U-235	N	4.6713E+00					2.57E+11	
			143.79	6.030E+00	?(P	3.930E+01	1.96E+02	1.10E+01 G
			205.33	5.800E-01	& P	5.047E+01	3.42E+03	5.01E+00 G
			163.38	1.741E+00	&(P	5.145E+01	8.81E+02	5.08E+00 G
			185.72	2.379E+00	* P	3.498E+00	5.84E+01	5.40E+01 GA
BI-214	N	1.0014E+01					5.84E+05	
			609.31	9.800E+00	(P	5.178E+00	1.84E+01	4.61E+01 G
			1120.29	0.000E+00	} P	4.740E+01	1.46E+03	1.51E+01 G
			1764.49	1.066E+01	?(P	1.326E+01	4.15E+01	1.54E+01 G
BI-210M	T	-2.2618E+00					1.10E+09	
			265.83	-2.262E+00	?(	6.655E+00	8.87E+01	5.00E+01 G
			304.90	0.000E+00	&	2.315E+01	1.00E+03	2.80E+01 G
AC-228	N	8.1815E+00					2.10E+03	
			911.07	3.330E+00	&(	1.577E+01	2.16E+02	2.90E+01 G
			968.97	1.114E+01	?(	2.663E+01	7.21E+01	1.75E+01 G
			338.32	1.559E+01	(	1.822E+01	4.79E+01	1.20E+01 G
			93.35	1.593E+01		9.279E+01	1.76E+02	5.56E+00 XA
TH-227	N	1.8341E+01					7.95E+03	
			50.14	1.834E+01	!(	9.476E+01	1.56E+02	8.00E+00 G
			256.24	-1.156E+00	%	3.796E+01	1.29E+03	7.00E+00 G
TH-229	N	-1.0554E+00					2.68E+06	
			193.51	-1.055E+00	&(	5.477E+01	2.04E+03	4.40E+00 G
			210.85	-1.578E+01	& P	8.584E+01	2.14E+02	2.99E+00 G
TH-234	N	-6.8750E+01					1.63E+12	
			63.29	-6.875E+01	(P	4.129E+02	1.13E+02	3.81E+00 G
			92.59	-2.484E+01	+ P	6.759E+01	6.64E+01	5.58E+00 G
PA-231	N	3.6062E+00					1.20E+07	
			302.65	0.000E+00	?(	2.238E+02	1.00E+03	2.88E+00 G
			300.07	7.828E+00	(	2.599E+02	9.96E+02	2.46E+00 G
PA-233	C	1.7166E+00					7.82E+08	
			312.01	1.717E+00	&(P	1.826E+01	3.20E+02	3.60E+01 G
			300.18	0.000E+00	-	1.033E+02	1.00E+03	6.20E+00 G
PA-234	N	2.3046E+00					1.63E+12	
			131.29	2.305E+00	(	7.934E+00	1.19E+02	1.80E+01 G
			946.02	-1.383E+01	-	3.774E+01	1.26E+02	1.34E+01 G
			569.47	0.000E+00	}	3.546E+01	1.51E+03	8.20E+00 G
			883.24	-2.493E+01	-	6.932E+01	8.38E+01	9.60E+00 G
			880.53	-3.975E+01	-	1.148E+02	8.70E+01	6.00E+00 GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PA-234M	N	2.7868E+02					1.63E+12	
			1001.00	2.307E+02	?(P	7.164E+02	9.33E+01	8.37E-01 G
			766.41	4.153E+02	&(	1.204E+03	8.69E+01	2.94E-01 G
AM-241	T	1.2557E+03					1.58E+05	
			59.54	1.256E+03	(	1.546E+01	8.57E-01	3.59E+01 G
Np-237	F	6.8786E+00					2.14E+06	
			86.49	6.879E+00	&(	2.952E+01	1.29E+02	1.31E+01 G
Ir-192	F	1.2791E+00					7.40E+01	
			316.49	0.000E+00	?(	7.672E+00	1.00E+03	8.70E+01 G
			468.06	3.431E+00	(	1.007E+01	8.85E+01	5.18E+01 G
			308.44	0.000E+00	&	2.061E+01	1.00E+03	3.18E+01 G
Cs-136	F	2.8310E-01					1.30E+01	
			818.50	-1.001E+00	?(	5.873E+00	1.75E+02	1.00E+02 G
			1048.07	1.889E+00	&(	4.808E+00	7.65E+01	8.00E+01 G
			340.57	0.000E+00	-	1.260E+01	1.00E+03	4.69E+01 G
Np-239	T	3.8194E+00					2.36E+00	
			103.70	0.000E+00	-	2.136E+01	1.00E+03	2.40E+01 X
			106.13	3.819E+00	&(	2.212E+01	1.75E+02	2.27E+01 G
			99.50	0.000E+00	&	3.432E+01	1.00E+03	1.50E+01 X
Nd-147		1.0095E+01					1.11E+01	
			531.00	1.009E+01	(	2.171E+01	9.21E+01	1.30E+01 G
			91.10	2.627E+00	-	1.286E+01	1.48E+02	2.83E+01 G
TL-210	N	6.0703E-01					5.84E+05	
			799.60	0.000E+00	?(	4.992E+00	1.00E+03	9.90E+01 G
			296.00	1.367E+00	&(	7.615E+00	1.68E+02	7.90E+01 G
			1313.00	-7.706E+00	+	1.341E+01	8.12E+01	2.10E+01 GA

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went
    negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide
    failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.

& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

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********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
TH-234	63.29	27998.	-130.	-0.072	113.33	-6.875E+01	P
BA-133	80.99	957.	20.	0.011	279.79	1.001E+00	P
Np-237	86.49	2373.	54.	0.030	129.41	6.879E+00	
EU-155	86.54	2426.	54.	0.030	130.84	2.935E+00	
Nd-147	91.10	2167.	45.	0.025	147.54	2.627E+00	
TH-234	92.59	2351.	-84.	-0.047	66.44	-2.484E+01	P
Gd-153	97.50	4494.	28.	0.015	342.15	1.511E+00	
Np-239	106.13	4348.	54.	0.030	174.77	3.819E+00	
EU-154	123.10	1146.	-55.	-0.031	88.03	-2.207E+00	
HF-181	133.02	2950.	-44.	-0.024	175.21	-1.692E+00	
Ba-140	162.66	1011.	-48.	-0.027	94.23	-1.399E+01	
Cf-251	176.60	609.	-16.	-0.009	295.69	-1.735E+00	
TH-229	210.85	653.	-22.	-0.012	214.25	-1.578E+01	P
Cf-251	227.00	524.	46.	0.025	95.24	1.604E+01	
BI-210M	265.83	784.	-45.	-0.025	88.73	-2.262E+00	
I-131	284.30	512.	-41.	-0.023	109.18	-1.757E+01	
TL-210	296.00	2204.	40.	0.022	167.69	1.367E+00	
PA-231	300.07	2438.	7.	0.004	996.40	7.828E+00	
La-140	328.76	1617.	41.	0.023	140.47	5.925E+00	
Cf-249	333.44	1658.	39.	0.022	148.16	7.525E+00	
HF-181	345.83	432.	-14.	-0.008	281.71	-2.957E+00	
BA-133	356.00	847.	-43.	-0.024	97.86	-2.159E+00	
BA-133	383.84	1023.	-17.	-0.009	272.46	-6.226E+00	
SN-113	391.69	878.	42.	0.023	101.69	2.211E+00	
pm-146	453.88	372.	30.	0.017	128.13	1.747E+00	P
Ir-192	468.06	788.	45.	0.025	88.54	3.431E+00	
BE-7	477.60	1105.	-46.	-0.026	103.31	-1.733E+01	
HF-181	482.00	1151.	-46.	-0.026	105.11	-2.287E+00	
La-140	487.02	1121.	-45.	-0.025	105.51	-4.011E+00	
RU-103	497.05	323.	4.	0.002	995.92	1.657E-01	P

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Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
RH-106	511.86	440.	73.	0.041	74.11	1.529E+01		
Nd-147	531.00	182.	30.	0.017	92.10	1.009E+01		
Ba-140	537.26	200.	12.	0.007	236.29	2.189E+00	P	
CS-134	563.24	178.	21.	0.012	129.36	1.150E+01		
CS-134	569.32	152.	11.	0.006	156.52	3.344E+00		
BI-207	569.70	189.	-12.	-0.007	164.57	-5.575E-01		
SB-124	602.73	940.	-34.	-0.019	129.97	-1.623E+00		
CS-134	604.71	906.	-34.	-0.019	127.52	-1.639E+00		
RU-103	610.30	872.	-34.	-0.019	124.78	-2.811E+01		
PM-144	618.06	212.	14.	0.008	153.92	6.631E-01	P	
RH-106	621.92	322.	-34.	-0.019	62.34	-1.645E+01	P	
I-131	636.97	235.	16.	0.009	141.95	1.069E+01	P	
AG-110M	657.76	6915.	27.	0.015	439.49	1.432E+00		
PM-144	696.54	89.	23.	0.013	91.13	1.202E+00		
NB-94	702.63	89.	42.	0.024	49.63	2.298E+00		
SB-124	722.79	250.	-15.	-0.008	154.58	-7.363E+00		
BI-212	727.17	210.	15.	0.008	139.04	1.083E+01		
pm-146	735.72	103.	20.	0.011	108.01	4.969E+00		
pm-146	747.16	187.	-34.	-0.019	65.28	-5.523E+00	P	
ZR-95	756.73	131.	6.	0.004	384.93	6.529E-01		
AG-110M	763.94	149.	-14.	-0.008	123.43	-3.637E+00		
NB-95	765.79	160.	27.	0.015	69.56	1.520E+00		
PA-234M	766.41	164.	22.	0.012	86.88	4.153E+02		
BI-212	785.42	112.	26.	0.015	88.16	1.178E+02	P	
CS-134	795.87	288.	-20.	-0.011	122.07	-1.363E+00		
CS-134	801.95	289.	8.	0.005	290.41	5.619E+00		
CO-58	810.78	360.	-33.	-0.018	69.68	-1.965E+00	P	
La-140	815.77	319.	-18.	-0.010	127.87	-4.598E+00	P	
Cs-136	818.50	424.	-17.	-0.009	174.80	-1.001E+00		
Co-56	846.77	107.	27.	0.015	84.73	1.627E+00	P	
NB-94	871.10	187.	-27.	-0.015	75.00	-1.663E+00		
AG-110M	884.68	375.	33.	0.018	84.55	2.868E+00		
AG-110M	937.49	220.	-11.	-0.006	297.97	-2.105E+00		
EU-154	996.33	294.	32.	0.018	78.89	2.048E+01		
PA-234M	1001.00	326.	28.	0.016	93.26	2.307E+02	P	
EU-154	1004.77	433.	-35.	-0.020	84.84	-1.361E+01		
Co-56	1037.84	185.	-37.	-0.021	82.67	-1.853E+01		
Cs-136	1048.07	120.	21.	0.012	76.52	1.889E+00		
RH-106	1050.36	229.	-34.	-0.019	64.99	-1.567E+02		
BI-207	1063.66	165.	-27.	-0.015	106.35	-2.619E+00		
Ga-68	1077.40	155.	-11.	-0.006	250.65	-2.844E+01		
FE-59	1099.25	171.	-21.	-0.012	124.94	-2.738E+00	P	
ZN-65	1115.55	353.	-37.	-0.020	74.61	-5.404E+00		
Ta-182	1121.30	378.	30.	0.016	95.07	6.355E+00		
Ta-182	1189.05	48.	11.	0.006	146.93	5.318E+00	P	
Ta-182	1221.41	70.	-24.	-0.013	67.46	-7.108E+00	P	
Co-56	1238.28	21.	13.	0.007	85.40	1.598E+00	P	
NA-22	1274.53	37.	-10.	-0.006	89.22	-8.579E-01		

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
FE-59	1291.60	27.	-5.	-0.003	255.75	-9.057E-01		
TL-210	1313.00	43.	-19.	-0.011	81.22	-7.706E+00		
AG-110M	1384.30	11.	-3.	-0.002	243.10	-1.216E+00		
K-40	1460.83	25.	-10.	-0.006	117.69	-8.758E+00		P
La-140	1596.21	36.	-18.	-0.010	65.22	-1.907E+00		P
SB-124	1690.98	6.	4.	0.002	158.45	8.645E-01		P
y-88	1836.06	12.	-7.	-0.004	87.53	-8.176E-01		P

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

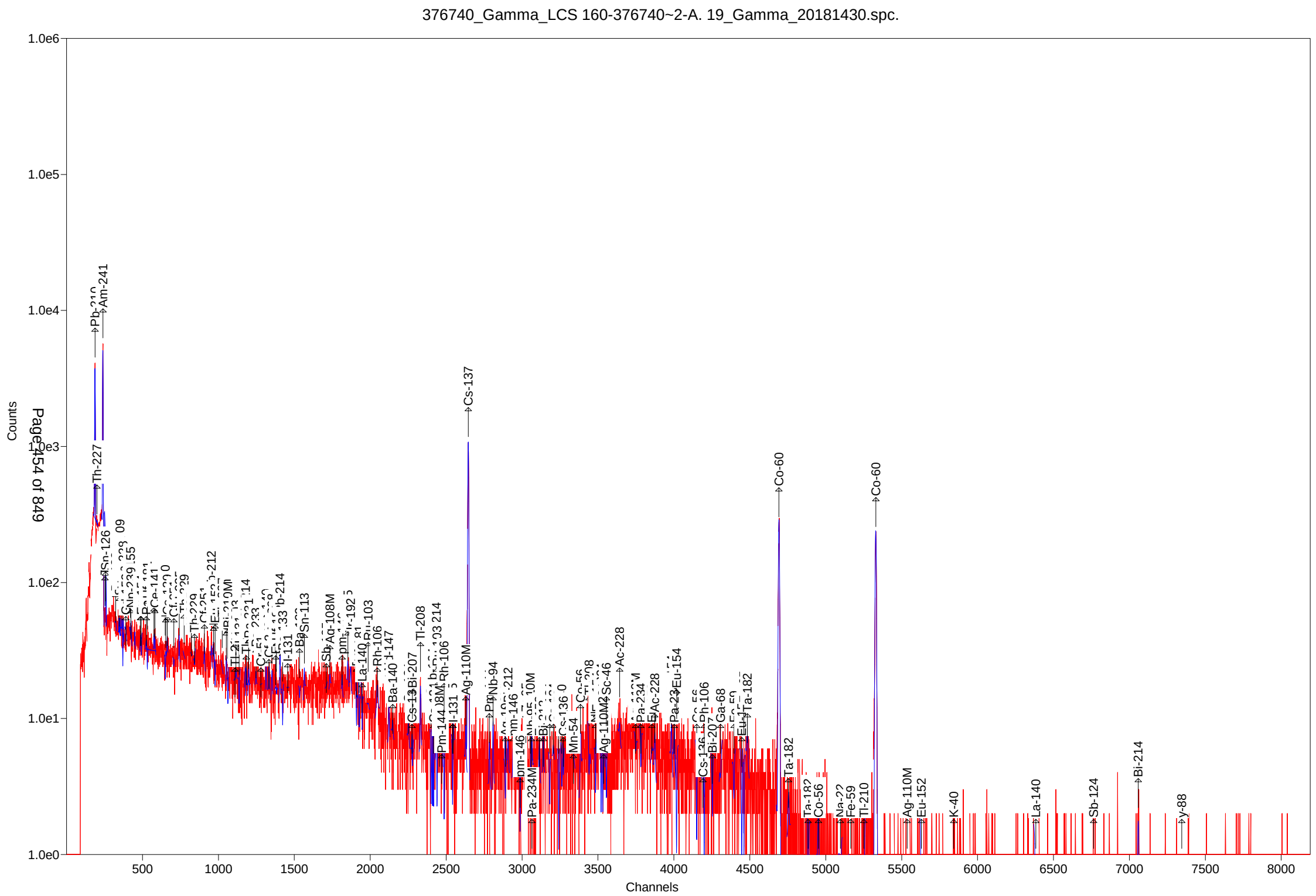
Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
BE-7	#A	-1.7331E+01	-1.7331E+01	1.033E+02%	5.94E+01
NA-22	#A	-8.5792E-01	-8.5792E-01	8.922E+01%	2.59E+00
K-40	#A	-8.7584E+00	-8.7584E+00	1.177E+02%	2.26E+01
Sc-46	#A	-1.9648E+00	-1.9648E+00	1.032E+02%	6.75E+00
CR-51	#A	-1.0285E-01	-1.0285E-01	1.973E+04%	6.78E+01
MN-54	#A	6.8702E-02	6.8702E-02	2.282E+03%	3.61E+00
FE-59	#A	-2.7378E+00	-2.7378E+00	1.249E+02%	8.34E+00
Co-56	#A	1.6154E+00	1.6154E+00	6.015E+01%	3.11E+00
CO-57	#A	0.0000E+00	0.0000E+00	7.071E+02%	2.98E+00
CO-58	#A	-1.9653E+00	-1.9653E+00	6.968E+01%	5.41E+00
CO-60		1.7575E+02	1.7575E+02	1.598E+00%	1.73E+00
ZN-65	#A	-5.4043E+00	-5.4043E+00	7.461E+01%	1.34E+01
NB-94	#A	2.2978E+00	2.2978E+00	4.963E+01%	2.53E+00
ZR-95	#A	6.5287E-01	6.5288E-01	3.849E+02%	5.77E+00
NB-95	#A	1.5202E+00	1.5202E+00	6.956E+01%	3.50E+00
RU-103	#A	1.6574E-01	1.6574E-01	9.959E+02%	3.89E+00
RH-106	#A	-1.6450E+01	-1.6450E+01	6.234E+01%	4.22E+01
AG-108M	#A	9.7525E-01	9.7525E-01	1.116E+02%	3.98E+00
AG-110M	#A	2.0556E+00	2.0556E+00	8.455E+01%	8.05E+00
SN-113	#A	2.2114E+00	2.2114E+00	1.017E+02%	7.47E+00
SB-124	#A	-1.6227E+00	-1.6227E+00	1.300E+02%	7.02E+00
SB-125	A	4.2635E+00	4.2635E+00	9.020E+01%	1.21E+01
I-131	#A	8.0531E-01	8.0534E-01	1.420E+02%	3.80E+00
Gd-153	#A	1.5111E+00	1.5111E+00	3.422E+02%	1.72E+01
Ga-68	#A	-2.8253E+01	-2.8437E+01	2.506E+02%	1.57E+02
Tc-99m	#A	0.0000E+00	0.0000E+00	1.000E+03%	4.96E+00
BA-133	#A	-2.1585E+00	-2.1585E+00	9.786E+01%	7.01E+00
CS-134	#A	2.7895E-01	2.7895E-01	9.415E+01%	6.96E+00
CS-137		4.0069E+02	4.0069E+02	1.290E+00%	3.45E+00
CE-139	A	1.0999E+00	1.0999E+00	9.733E+01%	3.55E+00
Ba-140	#A	2.1886E+00	2.1887E+00	2.363E+02%	1.22E+01
La-140	#A	-1.9067E+00	-1.9067E+00	6.522E+01%	3.21E+00
CE-141	#A	1.7258E+00	1.7259E+00	1.511E+02%	8.65E+00

CE-144 #A	0.0000E+00	0.0000E+00	1.000E+03%		3.82E+01
PM-144 #A	9.3215E-01	9.3215E-01	8.944E+01%		2.48E+00
EU-152 A	2.6657E+00	2.6657E+00	9.781E+01%		2.25E+01
EU-154 #A	9.1281E+00	9.1281E+00	7.889E+01%		4.01E+01
EU-155 #A	1.7068E+00	1.7068E+00	1.308E+02%		2.42E+01
HF-181 #A	-2.2873E+00	-2.2873E+00	1.051E+02%		7.98E+00
Ta-182 #A	6.0265E+00	6.0265E+00	8.750E+01%		2.01E+01
Hg-203 #A	4.5515E-01	4.5515E-01	2.999E+02%		3.32E+00
TL-208	3.8279E+00	3.8279E+00	3.201E+01%		2.80E+00
pm-146 #A	-5.5234E+00	-5.5234E+00	6.528E+01%		1.09E+01
y-88 #A	0.0000E+00	0.0000E+00	1.000E+03%		4.38E+00
Cd-113m A	3.1031E+04	3.1031E+04	4.484E+01%		3.38E+04
Cd-109 #A	2.3672E+01	2.3672E+01	1.307E+02%		1.03E+02
Cf-251 #A	-1.7353E+00	-1.7353E+00	2.957E+02%		1.30E+01
Cf-249 #A	1.4320E+00	1.4320E+00	1.482E+02%		7.80E+00
Sn-126 #A	-2.2542E+01	-2.2542E+01	2.170E+02%		1.62E+02
PB-210	1.1123E+04	1.1123E+04	1.014E+00%		2.16E+02
PB-212 A	1.9348E+00	1.9348E+00	1.315E+02%		8.46E+00
PB-214	1.1065E+01	1.1065E+01	2.232E+01%		6.56E+00
BI-207 #A	-5.5747E-01	-5.5747E-01	1.646E+02%		3.10E+00
BI-212 #A	1.0830E+01	1.0830E+01	1.390E+02%		5.07E+01
U-235 #A	4.6713E+00	4.6713E+00	1.964E+02%		3.93E+01
BI-214	1.0014E+01	1.0014E+01	1.837E+01%		5.18E+00
BI-210M#A	-2.2618E+00	-2.2618E+00	8.873E+01%		6.66E+00
AC-228 A	8.1815E+00	8.1815E+00	4.794E+01%		1.58E+01
TH-227 #A	1.8341E+01	1.8341E+01	1.559E+02%		9.48E+01
TH-229 #A	-1.0554E+00	-1.0554E+00	2.038E+03%		5.48E+01
TH-234 #A	-6.8750E+01	-6.8750E+01	1.133E+02%		4.13E+02
PA-231 #A	3.6062E+00	3.6062E+00	7.058E+02%		2.24E+02
PA-233 #A	1.7166E+00	1.7166E+00	3.198E+02%		1.83E+01
PA-234 A	2.3046E+00	2.3046E+00	1.185E+02%		7.93E+00
PA-234M#A	2.7868E+02	2.7868E+02	6.373E+01%		7.16E+02
AM-241	1.2557E+03	1.2557E+03	8.565E-01%		1.55E+01
Np-237 #A	6.8786E+00	6.8786E+00	1.294E+02%		2.95E+01
Ir-192 #A	1.2791E+00	1.2791E+00	8.854E+01%		7.67E+00
Cs-136 #A	2.8309E-01	2.8310E-01	7.652E+01%		5.87E+00
Np-239 #A	3.8189E+00	3.8194E+00	1.748E+02%		2.21E+01
Nd-147 #A	1.0095E+01	1.0095E+01	9.210E+01%		2.17E+01
TL-210 #A	6.0703E-01	6.0703E-01	1.677E+02%		4.99E+00

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.7 to 1999.4 keV)	4.401E+04	Bq/Sample
Total Decayed Activity (37.7 to 1999.4 keV)	4.4010684E+04	Bq/Sample


376740_Gamma_LCS 160-376740~2-A. 19_Gamma_20181430.spc.
Counts
Channels
1.0e6
1.0e5
1.0e4
1.0e3
1.0e2
1.0e1
1.0e0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
7500
8000
Th-227
Pb-210
Am-241
Sn-126
Cs-137
Co-60
Co-60
Ag-110M
Ta-182
Bi-214
Sb-124
La-140
K-40
Eu-152
Ag-110M
Ta-182
Co-56
Na-22
Fe-59
Tl-210
y-88
Ac-228
Sc-46
Mn-54
Bi-207
Tl-208
Rh-106
Ba-140
La-140
Pu-103
Sn-113
I-131
Th-229
Ce-141
Pa-234M
Pa-234
Ga-68
Eu-154
Eu-155
Nb-94
Pm-146
Pm-147
Ag-108M
Cs-136
Bi-212
Pb-214

Test America St. Louis Spectrum ID: 8_Gamma_20182794

Sample Description: 376740_Gamma_160-29479-A-1-C
Detector: Detector # 8
Batch ID: 376740
Work Order Number: Gamma
Lot Number: 160-29479-A-1-C

Decay to Time: 8/9/2018 01:23 Live Time: 3600 sec
Acquisition Time: 8/9/2018 01:23:47 Real Time: 3695 sec
Analysis Time: 8/9/2018 02:25 Dead Time: 2.57 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 8_Liquid_D=1 100ml.Clb
Efficiency Cal Desc: 8_100mLD=1_85520-334_090811
Efficiency Cal Date: 9/8/2011 11:02
Energy Cal Date: 2/28/2012 10:34
Library: Client_Long_Rev14.lib
Bkgd Correction File: 8_2018-07-14_1855.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	2.271E+00	102.8	2.334E+00	2.337E+00	5.519E+00
NA-22	1.010E-02	2197.7	2.219E-01	2.219E-01	8.109E-01
K-40	5.872E+01	8.3	4.881E+00	5.639E+00	6.074E+00
Sc-46	2.354E-01	166.3	3.915E-01	3.916E-01	1.327E+00
CR-51	2.545E+00	231.7	5.896E+00	5.897E+00	1.961E+01
MN-54	-1.574E-01	241.8	3.805E-01	3.806E-01	8.822E-01
FE-59	-1.086E+00	84.4	9.170E-01	9.184E-01	2.011E+00
Co-56	2.308E+00	12.8	2.961E-01	3.165E-01	6.104E-01
CO-57	1.771E-01	107.2	1.897E-01	1.900E-01	6.312E-01
CO-58	-4.477E-01	84.8	3.795E-01	3.802E-01	1.265E+00
CO-60	-6.576E-02	583.9	3.840E-01	3.840E-01	9.187E-01
ZN-65	0.000E+00	1.#INF	2.479E-01	2.479E-01	4.994E+00
NB-94	-4.447E-01	91.1	4.049E-01	4.055E-01	9.163E-01
ZR-95	4.818E-01	97.2	4.685E-01	4.691E-01	1.089E+00
NB-95	-7.906E-02	572.0	4.522E-01	4.522E-01	1.536E+00
RU-103	2.576E-01	94.6	2.436E-01	2.439E-01	5.771E-01
RH-106	3.313E+00	243.5	8.067E+00	8.069E+00	3.027E+01
AG-108M	-3.571E-01	102.3	3.653E-01	3.657E-01	8.012E-01
AG-110M	1.687E-01	261.0	4.403E-01	4.403E-01	1.887E+00
SN-113	3.652E-01	129.2	4.719E-01	4.722E-01	1.578E+00
SB-124	-1.647E-02	143.2	2.358E-02	2.360E-02	3.111E+00
SB-125	7.890E-01	72.5	5.720E-01	5.733E-01	2.190E+00
I-131	5.483E-01	74.6	4.092E-01	4.100E-01	6.814E-01
Gd-153	6.635E-01	232.5	1.543E+00	1.543E+00	5.110E+00
Ga-68	-2.132E+00	740.8	1.579E+01	1.579E+01	3.621E+01
Tc-99m	-2.367E-01	140.1	3.316E-01	3.319E-01	1.101E+00
BA-133	-4.280E-01	245.1	1.049E+00	1.049E+00	3.488E+00
CS-134	-4.989E-02	68.0	3.393E-02	3.401E-02	3.121E+00
CS-137	-1.268E-01	283.5	3.596E-01	3.596E-01	1.243E+00
CE-139	1.906E-01	129.7	2.471E-01	2.475E-01	8.239E-01
Ba-140	-1.046E+00	111.2	1.163E+00	1.164E+00	2.750E+00
La-140	6.762E-01	42.7	2.885E-01	2.904E-01	8.660E-01
CE-141	2.489E-01	232.4	5.786E-01	5.787E-01	1.927E+00

CE-144	-1.773E+00	147.8	2.619E+00	2.621E+00	8.696E+00
PM-144	-4.056E-01	93.7	3.799E-01	3.804E-01	8.613E-01
EU-152	1.306E+00	89.9	1.174E+00	1.176E+00	4.055E+00
EU-154	-3.222E+00	87.6	2.824E+00	2.828E+00	9.444E+00
EU-155	9.106E-01	256.0	2.331E+00	2.331E+00	7.719E+00
HF-181	9.986E-02	75.4	7.529E-02	7.545E-02	1.370E+00
Ta-182	6.589E-01	307.2	2.024E+00	2.024E+00	6.836E+00
Hg-203	-3.319E-01	83.8	2.781E-01	2.786E-01	9.235E-01
TL-208	1.436E+00	21.4	3.076E-01	3.155E-01	6.344E-01
pm-146	-1.185E+00	89.7	1.063E+00	1.065E+00	2.416E+00
y-88	2.837E-01	35.4	1.003E-01	1.012E-01	8.082E-01
Cd-113m	-3.995E+03	78.2	3.126E+03	3.134E+03	1.037E+04
Cd-109	4.556E+00	273.3	1.245E+01	1.245E+01	4.124E+01
Cf-251	1.066E+00	108.8	1.161E+00	1.163E+00	2.942E+00
Cf-249	3.663E-01	125.5	4.595E-01	4.599E-01	1.536E+00
Sn-126	1.184E+00	124.1	1.469E+00	1.470E+00	4.894E+00
PB-210	3.898E+01	8.2	3.187E+00	4.070E+00	8.566E+00
PB-212	3.197E+00	11.8	3.781E-01	4.153E-01	1.022E+00
PB-214	4.936E+01	2.6	1.272E+00	2.709E+00	1.396E+00
BI-207	1.856E-01	101.1	1.877E-01	1.879E-01	7.669E-01
BI-212	-2.696E+00	164.9	4.446E+00	4.448E+00	1.508E+01
U-235	5.326E+00	27.4	1.460E+00	1.483E+00	3.486E+00
BI-214	4.726E+01	3.0	1.404E+00	2.694E+00	1.239E+00
BI-210M	-3.964E-01	56.9	2.255E-01	2.264E-01	1.445E+00
AC-228	1.427E+00	84.8	1.210E+00	1.212E+00	2.765E+00
TH-227	2.412E+00	53.3	1.286E+00	1.293E+00	4.215E+00
TH-229	5.028E+00	93.4	4.698E+00	4.708E+00	1.189E+01
TH-234	1.788E+01	11.7	2.085E+00	2.261E+00	1.103E+01
PA-231	0.000E+00	1.#INF	3.013E+00	3.013E+00	6.572E+01
PA-233	0.000E+00	1.#INF	1.548E-01	1.548E-01	5.390E+00
PA-234	9.703E-01	149.1	1.447E+00	1.448E+00	4.808E+00
PA-234M	2.662E+01	63.7	1.695E+01	1.700E+01	1.669E+02
AM-241	-8.059E-01	36.7	2.957E-01	2.984E-01	2.117E+00
Np-237	0.000E+00	1.#INF	3.681E+00	3.681E+00	1.219E+01
Ir-192	1.925E-01	91.6	1.762E-01	1.766E-01	2.256E+00
Cs-136	-7.873E-02	504.5	3.972E-01	3.972E-01	1.357E+00
Np-239	-9.021E-01	246.9	2.228E+00	2.228E+00	7.378E+00
Nd-147	3.278E-01	249.4	8.175E-01	8.177E-01	4.996E+00
TL-210	0.000E+00	1.#INF	8.922E-02	8.922E-02	1.107E+00
Total	2.850E+02				

Analyst: Morgan Reichert

TestAmerica Inc Spectrum name: 8_Gamma_20182794.An1

Sample description
376740_Gamma_160-29479-A-1-C

Spectrum Filename: C:\User\SPC\Det8\8_Gamma_20182794.An1

Acquisition information
Start time:	8/9/2018 1:23:47 AM
Live time:	3600
Real time:	3695
Dead time:	2.57 %
Detector ID:	8

Detector system
Ge 8 SN/174

Calibration
Filename: 8_Liquid_D=1 100ml.Clb
8_100mLD=1_85520-334_090811

Energy Calibration
Created:	2/28/2012 10:34:41 AM
Zero offset:	0.052 keV
Gain:	0.250 keV/channel
Quadratic:	5.282E-10 keV/channel^2

Efficiency Calibration
Created:	9/8/2011 11:02:09 AM
Knee Energy:	165.85 keV
Above the Knee:	Quadratic Uncertainty = 2.01 %
Log(Eff):	-1.433327E-01 + (-3.358738E-01*Log(E)) + (-4.197546E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 0.26 %
Log(Eff):	-1.110432E+01 + (3.982559E+00*Log(E)) + (-4.672682E-01*Log(E)^2)

Library Files
Main analysis library:	Client_Long_Rev14.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters
Analysis engine:	Env32 G800W064
Start channel:	150 (37.55keV)
Stop channel:	8000 (1999.97keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	8/9/2018 1:23:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	8_2018-07-14_1855.PBC 7/14/2018 6:55:12 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 34 cutoff: 5.00E+01 %

Energy Calibration

Normalized diff: 0.1308

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.54	400.	8.17	1.01	6.704E-02	46.54	4.250	3.899E+01	PB210
50.15	48.	53.51	1.01	6.888E-02	50.14	8.000	2.403E+00	TH227
53.30	117.	24.05	1.02	7.014E-02				
63.50	226.	19.84	0.70	7.250E-02	63.29	3.810	1.717E+01	TH234
					64.28	9.700	8.916E+00	Sn126
74.76	749.	5.83	1.03	7.282E-02				
77.13	1334.	3.57	1.04	7.268E-02				
83.76	242.	12.78	1.04	7.198E-02				
87.04	400.	8.78	1.04	7.150E-02	86.49	13.100	1.185E+01	Np237
					86.54	30.700	5.057E+00	EU155
					86.94	9.040	1.719E+01	Sn126
					87.57	37.500	4.150E+00	Sn126
					88.04	3.790	4.110E+01	Cd109
89.88	160.	18.41	1.05	7.103E-02				
91.10	49.	249.39	1.05	7.081E-02	91.10	28.300	PBC<MDA	Nd147
92.80	339.	9.75	1.05	7.049E-02	92.59	5.584	1.683E+01	TH234
					93.35	5.561	2.403E+01	AC228
97.50	50.	232.52	1.05	6.955E-02	97.50	30.000	PBC<MDA	Gd153
105.31	47.	255.96	1.06	6.778E-02	105.31	21.200	PBC<MDA	EU155
121.33	35.	107.16	1.07	6.353E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	1.771E-01	CO57
131.29	38.	149.12	1.08	6.107E-02	131.29	18.000	PBC<MDA	PA234

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
133.02	38.	150.66	1.08	6.061E-02	133.02	43.300	PBC<MDA	HF181
					133.54	11.090	1.592E+00	CE144
144.08	91.	27.66	1.09	5.774E-02	143.79	10.960	4.009E+00	U235
145.74	25.	232.43	1.09	5.730E-02	145.44	48.200	PBC<MDA	CE141
165.85	28.	129.69	1.10	5.200E-02	165.85	79.900	PBC<MDA	CE139
176.60	32.	108.85	1.11	4.955E-02	176.60	17.000	PBC<MDA	Cf251
186.02	601.	6.42	1.25	4.760E-02	185.72	54.000	6.488E+00	U235
193.51	37.	93.44	1.13	4.617E-02	193.51	4.400	PBC<MDA	TH229
205.37	65.	47.34	2.50	4.408E-02	205.33	5.010	PBC<MDA	U235
227.00	4.	832.17	1.15	4.073E-02	227.00	6.300	PBC<MDA	Cf251
238.67	195.	11.81	1.16	3.915E-02	238.63	43.300	3.201E+00	PB212
242.06	562.	5.30	1.16	3.871E-02	242.00	7.430	5.431E+01	PB214
277.28	27.	96.81	1.19	3.471E-02	277.28	6.310	PBC<MDA	TL208
284.30	16.	161.74	1.19	3.401E-02	284.30	6.140	PBC<MDA	I131
295.27	1250.	3.84	1.11	3.298E-02	295.09	19.300	5.453E+01	PB214
					296.00	79.000	1.336E+01	TL210
320.08	28.	231.68	1.22	3.088E-02	320.08	9.940	PBC<MDA	CR51
328.76	62.	42.66	1.23	3.021E-02	328.76	20.300	PBC<MDA	La140
344.29	25.	134.29	1.24	2.908E-02	344.29	26.500	PBC<MDA	EU152
345.83	29.	131.19	1.24	2.897E-02	345.83	15.070	PBC<MDA	HF181
351.91	1908.	2.58	1.27	2.856E-02	351.93	37.600	4.936E+01	PB214
364.48	17.	131.17	1.25	2.774E-02	364.48	81.700	PBC<MDA	I131
383.84	23.	123.47	1.27	2.657E-02	383.84	8.940	PBC<MDA	BA133
386.42	23.	125.46	1.27	2.633E-02	387.95	66.000	PBC<MDA	Cf249
391.69	22.	129.22	1.27	2.612E-02	391.69	64.000	PBC<MDA	SN113
395.98	46.	44.76	0.31	2.589E-02				
463.37	18.	97.89	1.32	2.267E-02	463.37	10.470	PBC<MDA	SB125
468.06	22.	91.58	1.33	2.247E-02	468.06	51.750	PBC<MDA	Ir192
477.60	19.	102.78	1.33	2.209E-02	477.60	10.520	PBC<MDA	BE7
497.05	18.	94.58	1.35	2.135E-02	497.05	90.900	PBC<MDA	RU103
511.86	111.	29.44	2.61	2.082E-02	511.86	20.000	7.405E+00	RH106
569.32	19.	68.00	1.40	1.899E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	3.462E+00	PA234
					569.70	97.740	2.906E-01	BI207
569.70	4.	404.83	1.40	1.898E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	6.542E-01	PA234
					569.70	97.740	5.491E-02	BI207
582.48	81.	21.42	1.05	1.860E-02	583.02	84.500	1.436E+00	TL208
609.27	1403.	2.97	1.41	1.790E-02	609.31	46.090	4.726E+01	BI214
					610.30	5.750	3.793E+02	RU103
618.06	20.	284.85	1.43	1.768E-02	618.06	99.100	PBC<MDA	PM144
621.92	19.	304.08	1.43	1.758E-02	621.92	9.930	PBC<MDA	RH106
635.89	17.	72.50	1.44	1.724E-02	635.89	11.310	PBC<MDA	SB125
636.97	13.	82.23	1.44	1.722E-02	636.97	7.170	PBC<MDA	I131
661.66	-6.	283.49	1.46	1.665E-02	661.66	85.210	PBC<MDA	CS137
722.79	2.	761.58	1.50	1.540E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	3.973E-02	AG108M
					723.36	20.220	1.786E-01	EU154

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
756.73	14.	97.24	1.52	1.478E-02	756.73	54.460	PBC<MDA	ZR95
766.41	23.	74.64	1.53	1.461E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	1.470E+02	PA234M
785.42	68.	19.57	1.54	1.430E-02	785.42	1.280	1.027E+02	BI212
846.77	15.	87.63	1.58	1.336E-02	846.77	99.935	PBC<MDA	Co56
889.28	11.	166.28	1.60	1.278E-02	889.28	99.984	PBC<MDA	Sc46
898.04	9.	158.68	1.61	1.267E-02	898.04	93.700	PBC<MDA	y88
911.07	19.	84.77	1.62	1.251E-02	911.07	29.000	PBC<MDA	AC228
964.11	16.	89.91	1.65	1.188E-02	964.11	14.605	PBC<MDA	EU152
1001.00	-5.	103.20	1.67	1.148E-02	1001.00	0.837	PBC<MDA	PA234M
1037.84	16.	87.31	1.69	1.110E-02	1037.84	14.130	PBC<MDA	Co56
1050.36	3.	380.49	1.70	1.098E-02	1050.36	1.560	PBC<MDA	RH106
1063.66	10.	101.11	1.71	1.086E-02	1063.66	74.500	PBC<MDA	BI207
1112.07	4.	794.11	1.74	1.042E-02	1112.07	13.644	PBC<MDA	EU152
1120.28	312.	6.44	1.87	1.035E-02	1120.29	15.100	5.550E+01	BI214
					1120.55	99.987	8.384E+00	Sc46
					1121.30	34.900	2.403E+01	Ta182
1238.28	118.	12.83	1.81	9.428E-03	1238.28	66.070	5.247E+00	Co56
1332.50	-2.	583.91	1.86	8.802E-03	1332.50	99.980	PBC<MDA	CO60
1384.30	5.	261.02	1.88	8.492E-03	1384.30	24.290	PBC<MDA	AG110M
1408.00	16.	84.11	1.90	8.357E-03	1408.00	21.005	PBC<MDA	EU152
1460.60	182.	8.31	1.98	8.071E-03	1460.83	10.670	5.872E+01	K40
1596.21	6.	173.69	1.99	7.418E-03	1596.21	95.400	PBC<MDA	La140
1690.98	7.	143.21	2.03	7.019E-03	1690.98	47.790	PBC<MDA	SB124
1764.41	223.	6.81	1.54	6.738E-03	1764.49	15.400	5.977E+01	BI214
1836.06	8.	35.36	2.10	6.484E-03	1836.06	99.200	3.455E-01	y88

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV		Suspected Nuclide
212.53	53.17	312.	115.	1.632E+03	23.75	1.017	-	sD
298.86	74.77	579.	749.	1.029E+04	5.83	1.034	-	D
308.35	77.14	464.	1334.	1.835E+04	3.57	1.036	-	D
335.16	83.78	359.	242.	3.363E+03	12.80	1.041	-	D
359.61	89.90	362.	159.	2.241E+03	18.68	1.046	-	D
1583.79	395.98	84.	46.	1.777E+03	44.76	0.306	-	sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: Client_Long_Rev14.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.96	46.54	335.	400.	0.111	8.18	1.012D
TH-227	200.37	50.14	302.	48.	0.013	53.30	1.015D
AM-241	237.95	59.54	1732.	-75.	-0.021	36.70	1.022s
TH-234	252.96	63.29	527.	188.	0.052	18.76	1.025D
Sn-126	256.93	64.28	678.	30.	0.008	124.05	1.026D
BA-133	323.77	80.99	7746.	-48.	-0.013	258.66	1.039
Np-237	345.77	86.49	7698.	0.	0.000	256.80	1.043A
EU-155	345.98	86.54	7650.	-48.	-0.013	256.00	1.043D
Sn-126	347.57	86.94	7272.	28.	0.008	143.80	1.044D
Sn-126	350.09	87.57	7259.	114.	0.032	34.46	1.044D
Cd-109	351.97	88.04	7321.	44.	0.012	273.26	1.044A
Nd-147	364.21	91.10	7308.	49.	0.013	249.39	1.047s
TH-234	370.17	92.59	438.	243.	0.068	13.84	1.048D
AC-228	373.21	93.35	7356.	36.	0.010	337.95	1.049s
Gd-153	389.81	97.50	6688.	50.	0.014	232.52	1.052s
Np-239	397.81	99.50	7460.	-49.	-0.014	250.39	1.053
Gd-153	412.62	103.20	7411.	-19.	-0.005	651.02	1.056s
EU-155	421.07	105.31	7244.	47.	0.013	255.96	1.058s
Np-239	424.34	106.13	7448.	-50.	-0.014	246.95	1.058s
EU-152	486.92	121.78	695.	-13.	-0.004	295.60	1.071s
CO-57	488.06	122.06	673.	35.	0.010	107.16	1.071s
EU-154	492.22	123.10	580.	-7.	-0.002	488.02	1.072s
PA-234	525.00	131.29	1620.	38.	0.011	149.12	1.078s
HF-181	531.92	133.02	1659.	38.	0.011	150.66	1.079
CE-144	533.98	133.54	1978.	-43.	-0.012	147.76	1.080s
HF-181	545.02	136.30	1935.	-43.	-0.012	145.88	1.082
CO-57	545.72	136.47	1854.	-43.	-0.012	142.80	1.082
Tc-99m	561.86	140.51	1710.	-42.	-0.012	140.09	1.085s
U-235	574.97	143.79	271.	91.	0.025	27.66	1.088D
CE-141	581.59	145.44	1642.	25.	0.007	232.43	1.089s
Ba-140	650.47	162.66	716.	-41.	-0.011	94.66	1.102s
U-235	653.35	163.38	740.	-13.	-0.003	167.23	1.102s
CE-139	663.24	165.85	669.	28.	0.008	129.69	1.104s
Cf-251	706.23	176.60	345.	32.	0.009	108.85	1.112s
U-235	743.90	186.02	279.	554.	0.154	7.07	1.248s
TH-229	773.87	193.51	326.	37.	0.010	93.44	1.125s
U-235	821.32	205.37	216.	65.	0.018	47.34	2.497s
TH-229	843.24	210.85	408.	-32.	-0.009	124.84	1.138s
Cf-251	907.84	227.00	288.	4.	0.001	832.17	1.151s
PB-212	954.37	238.63	164.	195.	0.054	11.83	1.159D
PB-214	967.84	242.00	163.	562.	0.156	5.30	1.162D
EU-152	978.62	244.69	1336.	-35.	-0.010	150.49	1.164s
TH-227	1024.81	256.24	288.	-12.	-0.003	278.39	1.172
Cd-113m	1054.65	263.70	282.	-31.	-0.009	78.24	1.178

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BI-210M	1063.18	265.83	379.	-26.	-0.007	56.90	1.179
TL-208	1108.99	277.28	327.	27.	0.007	96.81	1.188
Hg-203	1116.66	279.20	379.	-34.	-0.009	83.79	1.189s
I-131	1137.05	284.30	182.	16.	0.005	161.74	1.193
PB-214	1180.94	295.27	187.	1250.	0.347	3.84	1.113
TL-210	1183.86	296.00	2261.	-29.	-0.008	235.50	1.202s
PB-212	1199.98	300.03	2232.	-29.	-0.008	233.45	1.205
PA-231	1200.14	300.07	2203.	-23.	-0.007	283.53	1.205
PA-233	1200.58	300.18	2180.	0.	0.000	1000.00	1.205
PA-231	1210.46	302.65	2180.	0.	0.000	1000.00	1.207s
BA-133	1211.27	302.85	2180.	0.	0.000	1000.00	1.207s
Ba-140	1219.26	304.85	2180.	0.	0.000	1000.00	1.208s
BI-210M	1219.45	304.90	2180.	0.	0.000	1000.00	1.208
Ir-192	1233.62	308.44	2180.	0.	0.000	1000.00	1.211s
PA-233	1247.91	312.01	2180.	0.	0.000	1000.00	1.214s
Ir-192	1265.82	316.49	2180.	0.	0.000	1000.00	1.217s
CR-51	1280.20	320.08	2108.	28.	0.008	231.68	1.219s
La-140	1314.91	328.76	164.	62.	0.017	42.66	1.226s
Cf-249	1333.63	333.44	1038.	-33.	-0.009	137.60	1.229
AC-228	1353.15	338.32	1005.	-33.	-0.009	135.03	1.233
Cs-136	1362.15	340.57	981.	-34.	-0.009	133.28	1.234s
EU-152	1377.01	344.29	555.	25.	0.007	134.29	1.237s
HF-181	1383.19	345.83	687.	29.	0.008	131.19	1.238
PB-214	1407.51	351.91	121.	1908.	0.530	2.58	1.273
BA-133	1423.87	356.00	2182.	-27.	-0.008	245.05	1.245s
I-131	1457.81	364.48	129.	17.	0.005	131.17	1.252s
BA-133	1535.24	383.84	387.	23.	0.006	123.47	1.266s
Cf-249	1551.68	387.95	402.	23.	0.006	125.46	1.269s
SN-113	1566.64	391.69	392.	22.	0.006	129.22	1.271
SB-125	1711.39	427.88	134.	-8.	-0.002	369.51	1.297
AG-108M	1735.64	433.94	165.	-28.	-0.008	102.30	1.301s
pm-146	1815.41	453.88	131.	-13.	-0.004	214.85	1.315s
SB-125	1853.36	463.37	154.	18.	0.005	97.89	1.322s
Ir-192	1872.14	468.06	185.	22.	0.006	91.58	1.325s
BE-7	1910.28	477.60	87.	19.	0.005	102.78	1.332s
HF-181	1927.89	482.00	327.	-25.	-0.007	106.11	1.335
RU-103	1988.12	497.05	65.	18.	0.005	94.58	1.346s
RH-106	2047.36	511.86	140.	111.	0.031	29.44	2.606s
Nd-147	2123.91	531.00	91.	-4.	-0.001	489.37	1.369
Ba-140	2148.95	537.26	95.	-18.	-0.005	111.19	1.373s
CS-134	2252.86	563.24	65.	-5.	-0.001	332.16	1.391s
CS-134	2277.20	569.32	77.	19.	0.005	68.00	1.395s
PA-234	2277.80	569.47	109.	-4.	-0.001	339.28	1.395s
BI-207	2278.73	569.70	108.	4.	0.001	404.83	1.396s
TL-208	2329.85	582.48	51.	81.	0.023	21.42	1.049s
SB-125	2401.92	600.50	1794.	-23.	-0.006	76.87	1.416s
SB-124	2410.85	602.73	1772.	-22.	-0.006	270.84	1.418s
CS-134	2418.76	604.71	1750.	-22.	-0.006	268.90	1.419s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BI-214	2436.99	609.27	54.	1403.	0.390	2.97	1.409
RU-103	2441.12	610.30	1728.	-22.	-0.006	266.52	1.423s
AG-108M	2457.05	614.28	1705.	-22.	-0.006	264.32	1.426s
PM-144	2472.18	618.06	1591.	20.	0.006	284.85	1.428s
RH-106	2487.60	621.92	1620.	19.	0.005	304.08	1.431
SB-125	2543.49	635.89	64.	17.	0.005	72.50	1.440s
I-131	2547.83	636.97	53.	13.	0.004	82.23	1.441s
AG-110M	2630.98	657.76	188.	-25.	-0.007	79.12	1.455s
CS-137	2646.58	661.66	170.	-6.	-0.002	283.49	1.457
PM-144	2786.11	696.54	98.	-23.	-0.006	93.66	1.480s
NB-94	2810.46	702.63	107.	-25.	-0.007	91.05	1.484s
SB-124	2891.09	722.79	115.	2.	0.001	761.58	1.497s
AG-108M	2891.70	722.94	117.	0.	0.000	1000.00	1.498s
EU-154	2893.37	723.36	117.	0.	0.000	1000.00	1.498s
ZR-95	2896.74	724.20	131.	-21.	-0.006	86.81	1.498s
BI-212	2908.63	727.17	166.	-11.	-0.003	164.90	1.500s
pm-146	2942.83	735.72	75.	-21.	-0.006	90.22	1.506s
pm-146	2988.59	747.16	79.	-22.	-0.006	89.71	1.513s
ZR-95	3026.87	756.73	38.	14.	0.004	97.24	1.519s
AG-110M	3055.73	763.94	247.	-34.	-0.009	68.49	1.524s
NB-95	3063.11	765.79	280.	-4.	-0.001	571.97	1.525s
PA-234M	3065.60	766.41	133.	23.	0.006	74.64	1.526s
BI-212	3141.64	785.42	24.	68.	0.019	19.57	1.538s
CS-134	3183.43	795.87	124.	-5.	-0.001	340.17	1.544s
TL-210	3198.36	799.60	128.	0.	0.000	1000.00	1.547s
CS-134	3207.77	801.95	173.	-23.	-0.007	81.81	1.548s
CO-58	3243.06	810.78	167.	-22.	-0.006	84.78	1.554s
La-140	3263.04	815.77	189.	-22.	-0.006	89.74	1.557s
Cs-136	3273.97	818.50	192.	-4.	-0.001	504.49	1.559s
MN-54	3339.36	834.85	75.	-8.	-0.002	241.80	1.569s
Co-56	3387.05	846.77	33.	15.	0.004	87.63	1.577s
TL-208	3442.23	860.56	80.	-21.	-0.006	19.40	1.585s
NB-94	3484.36	871.10	87.	-18.	-0.005	24.18	1.592s
EU-154	3492.89	873.23	122.	-18.	-0.005	87.63	1.593s
PA-234	3522.10	880.53	149.	-20.	-0.006	87.84	1.598s
PA-234	3532.94	883.24	170.	0.	0.000	1000.00	1.599
AG-110M	3538.71	884.68	170.	0.	0.000	1000.00	1.600s
Sc-46	3557.10	889.28	157.	11.	0.003	166.28	1.603s
y-88	3592.14	898.04	47.	9.	0.003	158.68	1.608s
AC-228	3644.26	911.07	51.	19.	0.005	84.77	1.616s
AG-110M	3749.96	937.49	200.	-36.	-0.010	88.21	1.633s
PA-234	3784.07	946.02	70.	-11.	-0.003	169.91	1.638
EU-152	3856.43	964.11	100.	16.	0.005	89.91	1.649
AC-228	3875.88	968.97	158.	-24.	-0.007	77.85	1.652s
EU-154	3985.31	996.33	126.	-8.	-0.002	201.56	1.668s
PA-234M	4003.99	1001.00	139.	-5.	-0.002	103.20	1.671s
EU-154	4019.10	1004.77	179.	-23.	-0.006	83.85	1.673s
Co-56	4151.36	1037.84	35.	16.	0.004	87.31	1.693

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Cs-136	4192.29	1048.07	63.	-19.	-0.005	64.56	1.698s
RH-106	4201.45	1050.36	78.	3.	0.001	380.49	1.700s
BI-207	4254.65	1063.66	21.	10.	0.003	101.11	1.708s
Ga-68	4309.61	1077.40	45.	-2.	-0.001	740.78	1.716s
FE-59	4397.02	1099.25	75.	-23.	-0.006	84.40	1.728
EU-152	4448.32	1112.07	384.	4.	0.001	794.11	1.736s
ZN-65	4462.20	1115.55	388.	0.	0.000	1000.00	1.738s
BI-214	4481.14	1120.28	18.	312.	0.087	6.44	1.866
Sc-46	4482.22	1120.55	388.	0.	0.000	1000.00	1.740
Ta-182	4485.22	1121.30	341.	9.	0.002	307.17	1.741
CO-60	4692.97	1173.24	57.	-12.	-0.003	171.02	1.770s
Ta-182	4756.23	1189.05	40.	-8.	-0.002	177.36	1.779
Co-56	4953.16	1238.28	21.	118.	0.033	12.83	1.806
EU-154	5098.22	1274.54	27.	0.	0.000	1000.00	1.826s
FE-59	5166.43	1291.60	43.	-13.	-0.004	160.31	1.835s
TL-210	5252.05	1313.00	48.	-13.	-0.004	124.27	1.847s
CO-60	5330.06	1332.50	32.	-2.	-0.001	583.91	1.857s
AG-110M	5537.25	1384.30	32.	5.	0.001	261.02	1.884s
EU-152	5632.07	1408.00	32.	16.	0.004	84.11	1.896s
K-40	5842.46	1460.60	12.	182.	0.051	8.31	1.984
La-140	6384.93	1596.21	17.	6.	0.002	173.69	1.990s
SB-124	6764.03	1690.98	17.	7.	0.002	143.21	2.034s
BI-214	7057.73	1764.41	4.	223.	0.062	6.81	1.536s
Co-56	7085.51	1771.35	260.	-12.	-0.003	184.94	2.070s
y-88	7344.36	1836.06	0.	8.	0.002	35.36	2.098s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
BE-7	C	2.2712E+00				5.31E+01	
			477.60	2.271E+00	&(P	5.519E+00 1.03E+02 1.05E+01	G
NA-22	C	1.0095E-02				9.50E+02	
			1274.53	1.010E-02	%(	8.109E-01 2.20E+03 9.99E+01	G
K-40	N	5.8719E+01				4.66E+11	
			1460.83	5.872E+01	(P	6.074E+00 8.31E+00 1.07E+01	G
Sc-46	F	2.3542E-01				8.38E+01	
			889.28	2.354E-01	?(	1.327E+00 1.66E+02 1.00E+02	G
			1120.55	0.000E+00	-	2.538E+00 1.00E+03 1.00E+02	G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CR-51	F 2.5448E+00					2.77E+01	
		320.08	2.545E+00	?(	1.961E+01	2.32E+02	9.94E+00 G
MN-54	C -1.5737E-01					3.12E+02	
		834.85	-1.574E-01	?(	8.822E-01	2.42E+02	1.00E+02 G
FE-59	F -1.0864E+00					4.45E+01	
		1099.25	-1.086E+00	?(	2.011E+00	8.44E+01	5.65E+01 G
		1291.60	-9.090E-01	& P	2.355E+00	1.60E+02	4.32E+01 G
Co-56	C 2.3081E+00					7.73E+01	
		846.77	3.016E-01	*(	6.104E-01	8.76E+01	9.99E+01 G
		1238.28	5.247E+00	(	1.081E+00	1.28E+01	6.61E+01 G
		1037.84	2.756E+00	?(	5.361E+00	8.73E+01	1.41E+01 G
		1771.35	-3.332E+00	+	2.079E+01	1.85E+02	1.55E+01 A
CO-57	C 1.7706E-01					2.72E+02	
		122.06	1.771E-01	&(	6.312E-01	1.07E+02	8.56E+01 G
		136.47	-1.869E+00	&	8.861E+00	1.43E+02	1.07E+01 G
CO-58	C -4.4769E-01					7.09E+01	
		810.78	-4.477E-01	?(	1.265E+00	8.48E+01	9.95E+01 G
CO-60	F -6.5759E-02					1.93E+03	
		1332.50	-6.576E-02	&(P	9.187E-01	5.84E+02	1.00E+02 G
		1173.24	-3.366E-01	+ P	1.063E+00	1.71E+02	9.99E+01 G
NB-94	I -4.4472E-01					7.41E+06	
		702.63	-4.447E-01	?(	9.163E-01	9.11E+01	9.79E+01 G
		871.10	-3.745E-01	+ P	9.833E-01	2.42E+01	9.99E+01 G
ZR-95	I 4.8178E-01					6.40E+01	
		756.73	4.818E-01	?(P	1.089E+00	9.72E+01	5.45E+01 G
		724.20	-8.674E-01	+ P	2.296E+00	8.68E+01	4.42E+01 G
NB-95	I -7.9064E-02					6.40E+01	
		765.79	-7.906E-02	&(	1.536E+00	5.72E+02	9.98E+01 G
RU-103	I 2.5756E-01					3.93E+01	
		497.05	2.576E-01	?(P	5.771E-01	9.46E+01	9.09E+01 G
		610.30	-5.980E+00	+	5.308E+01	2.67E+02	5.75E+00 GA
RH-106	I 3.3126E+00					3.74E+02	
		621.92	2.987E+00	&(P	3.027E+01	3.04E+02	9.93E+00 G
		1050.36	5.386E+00	?(P	7.114E+01	3.80E+02	1.56E+00 G
		511.86	7.405E+00	?	3.859E+00	2.94E+01	2.00E+01 GA

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AG-108M	C -3.5706E-01					1.53E+05	
		433.94	-3.571E-01	?(P	8.012E-01	1.02E+02	9.05E+01 G
		722.94	0.000E+00	+	1.055E+00	1.00E+03	9.08E+01 G
		614.28	-3.856E-01	+	3.395E+00	2.64E+02	8.98E+01 G
AG-110M	F 1.6867E-01					2.50E+02	
		884.68	0.000E+00	?(	1.887E+00	1.00E+03	7.27E+01 G
		657.76	-4.435E-01	+	1.167E+00	7.91E+01	9.46E+01 G
		937.49	-2.381E+00	+	4.552E+00	8.82E+01	3.44E+01 G
		1384.30	6.734E-01	?(	3.915E+00	2.61E+02	2.43E+01 G
		763.94	-2.851E+00	&	6.456E+00	6.85E+01	2.23E+01 G
SN-113	F 3.6515E-01					1.15E+02	
		391.69	3.652E-01	?(P	1.578E+00	1.29E+02	6.40E+01 G
SB-124	F -1.6466E-02					6.02E+01	
		602.73	-3.449E-01	?(	3.111E+00	2.71E+02	9.83E+01 G
		1690.98	5.796E-01	?(	1.815E+00	1.43E+02	4.78E+01 G
		722.79	3.338E-01	?(	8.792E+00	7.62E+02	1.08E+01 G
SB-125	I 7.8897E-01					1.01E+03	
		427.88	-2.983E-01	&(P	2.190E+00	3.70E+02	2.96E+01 G
		600.50	-1.952E+00	+ P	1.717E+01	7.69E+01	1.79E+01 G
		635.89	2.365E+00	(	5.703E+00	7.25E+01	1.13E+01 G
		463.37	2.160E+00	&(P	7.076E+00	9.79E+01	1.05E+01 G
I-131	I 5.4827E-01					8.02E+00	
		364.48	2.111E-01	?(P	6.814E-01	1.31E+02	8.17E+01 G
		284.30	2.192E+00	&(P	8.712E+00	1.62E+02	6.14E+00 G
		636.97	2.983E+00	?(	8.228E+00	8.22E+01	7.17E+00 G
Gd-153	F 6.6347E-01					2.42E+02	
		97.50	6.635E-01	&(	5.110E+00	2.33E+02	3.00E+01 G
		103.20	-3.492E-01	+	7.537E+00	6.51E+02	2.18E+01 G
Ga-68	C -2.1318E+00					4.71E-02	
		1077.40	-2.132E+00	&(	3.621E+01	7.41E+02	3.30E+00 G
Tc-99m	I -2.3673E-01					2.51E-01	
		140.51	-2.367E-01	&(	1.101E+00	1.40E+02	8.93E+01 G
BA-133	F -4.2797E-01					3.85E+03	
		356.00	-4.280E-01	?(	3.488E+00	2.45E+02	6.20E+01 G
		302.85	0.000E+00	+	1.033E+01	1.00E+03	1.83E+01 G
		383.84	2.674E+00	?	1.104E+01	1.23E+02	8.94E+00 GA
		80.99	-5.435E-01	+	4.656E+00	2.59E+02	3.41E+01 GA

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CS-134	I -4.9894E-02					7.54E+02	
		604.71	-3.485E-01	?(	3.121E+00	2.69E+02	9.76E+01 G
		795.87	-1.073E-01	&	1.253E+00	3.40E+02	8.55E+01 G
		569.32	1.845E+00	&(	4.155E+00	6.80E+01	1.54E+01 G
		801.95	-5.345E+00	+	1.456E+01	8.18E+01	8.69E+00 G
		563.24	-8.678E-01	+	6.991E+00	3.32E+02	8.35E+00 G
CS-137	I -1.2684E-01					1.10E+04	
		661.66	-1.268E-01	?(P	1.243E+00	2.83E+02	8.52E+01 G
CE-139	F 1.9055E-01					1.38E+02	
		165.85	1.906E-01	?(	8.239E-01	1.30E+02	7.99E+01 G
Ba-140	I -1.0457E+00					1.28E+01	
		537.26	-1.046E+00	?(	2.750E+00	1.11E+02	2.44E+01 G
		162.66	-3.426E+00	+	1.077E+01	9.47E+01	6.22E+00 G
		304.85	0.000E+00	+	4.439E+01	1.00E+03	4.29E+00 G
La-140	I 6.7619E-01					1.28E+01	
		1596.21	2.259E-01	?(P	8.660E-01	1.74E+02	9.54E+01 G
		487.02	4.388E-02	%	2.235E+00	1.50E+03	4.55E+01 G
		328.76	2.792E+00	?(P	2.829E+00	4.27E+01	2.03E+01 G
		815.77	-1.927E+00	+	5.772E+00	8.97E+01	2.33E+01 G
CE-141	I 2.4892E-01					3.25E+01	
		145.44	2.489E-01	&(	1.927E+00	2.32E+02	4.82E+01 G
CE-144	I -1.7726E+00					2.85E+02	
		133.54	-1.773E+00	(	8.696E+00	1.48E+02	1.11E+01 G
PM-144	C -4.0559E-01					3.63E+02	
		696.54	-4.056E-01	?(	8.613E-01	9.37E+01	9.90E+01 G
		618.06	3.149E-01	+	2.990E+00	2.85E+02	9.91E+01 G
EU-152	F 1.3059E+00					4.94E+03	
		344.29	9.046E-01	&(P	4.055E+00	1.34E+02	2.65E+01 G
		1112.07	6.839E-01	?(	1.839E+01	7.94E+02	1.36E+01 G
		121.78	-1.935E-01	-	1.918E+00	2.96E+02	2.86E+01 G
		778.92	-1.886E-01	% P	5.178E+00	1.08E+03	1.29E+01 G
		964.11	2.615E+00	?(	7.883E+00	8.99E+01	1.46E+01 G
		244.69	-3.301E+00	+	1.652E+01	1.50E+02	7.58E+00 G
		1408.00	2.537E+00	P	4.608E+00	8.41E+01	2.10E+01 GA
EU-154	I -3.2224E+00					3.14E+03	
		873.23	-3.222E+00	&(	9.444E+00	8.76E+01	1.23E+01 G
		123.10	-7.536E-02	&	1.237E+00	4.88E+02	4.08E+01 G
		1274.54	0.000E+00	+	2.316E+00	1.00E+03	3.52E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
		723.36	0.000E+00 +		4.742E+00	1.00E+03	2.02E+01 G
		1004.77	-3.137E+00 +		8.764E+00	8.39E+01	1.80E+01 G
		996.33	-1.819E+00 +		1.251E+01	2.02E+02	1.06E+01 G
EU-155	I 9.1055E-01					1.81E+03	
		105.31	9.106E-01 ?(	P	7.719E+00	2.56E+02	2.12E+01 G
		86.54	-6.117E-01 &		5.186E+00	2.56E+02	3.07E+01 G
HF-181	F 9.9857E-02					4.24E+01	
		482.00	-3.867E-01 (		1.370E+00	1.06E+02	8.05E+01 G
		133.02	4.069E-01 (		2.037E+00	1.51E+02	4.33E+01 G
		345.83	1.816E+00 (		7.944E+00	1.31E+02	1.51E+01 G
		136.30	-3.409E+00 +		1.651E+01	1.46E+02	5.85E+00 G
Ta-182	F 6.5890E-01					1.14E+02	
		1121.30	6.589E-01 (		6.836E+00	3.07E+02	3.49E+01 G
		1221.41	-3.591E-02 %		3.359E+00	4.17E+03	2.70E+01 G
		1189.05	-1.401E+00 +		5.636E+00	1.77E+02	1.62E+01 G
Hg-203	F -3.3190E-01					4.66E+01	
		279.20	-3.319E-01 &(		9.235E-01	8.38E+01	8.15E+01 G
TL-208	N 1.4364E+00					6.98E+02	
		583.02	1.436E+00 (P		6.344E-01	2.14E+01	8.45E+01 G
		277.28	3.421E+00 + P		1.103E+01	9.68E+01	6.31E+00 G
		860.56	-3.599E+00 & P		7.547E+00	1.94E+01	1.24E+01 G
pm-146	C -1.1855E+00					2.02E+03	
		747.16	-1.185E+00 ?(		2.416E+00	8.97E+01	3.40E+01 G
		735.72	-1.706E+00 +		3.501E+00	9.02E+01	2.25E+01 G
		453.88	-2.464E-01 + P		1.039E+00	2.15E+02	6.50E+01 G
y-88	F 2.8373E-01					1.07E+02	
		898.04	2.184E-01 &(		8.082E-01	1.59E+02	9.37E+01 G
		1836.06	3.455E-01 ?(		3.183E-01	3.54E+01	9.92E+01 G
Cd-113m	-3.9951E+03					5.33E+03	
		263.70	-3.995E+03 &(		1.037E+04	7.82E+01	6.00E-03 K
Cd-109	F 4.5560E+00					4.53E+02	
						Derived Ave Activity	
		88.04	4.556E+00 }(		4.124E+01	2.73E+02	3.79E+00 G
Cf-251	T 1.0662E+00					3.28E+05	
		176.60	1.066E+00 &(		2.942E+00	1.09E+02	1.70E+01 G
		227.00	4.330E-01 ?		8.854E+00	8.32E+02	6.30E+00 GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Cf-249	T	3.6627E-01					1.28E+05	
			387.95	3.663E-01	&(	1.536E+00	1.25E+02	6.60E+01 G
			333.44	-2.002E+00	+	9.168E+00	1.38E+02	1.55E+01 G
Sn-126		1.1840E+00					3.65E+07	
			87.57	1.184E+00	}	4.146E+00	3.45E+01	3.75E+01 GA
			64.28	1.184E+00	(	4.894E+00	1.24E+02	9.70E+00 G
			86.94	1.184E+00	}	1.719E+01	1.44E+02	9.04E+00 GA
PB-210	N	3.8981E+01					8.14E+03	
			46.54	3.898E+01	(P	8.566E+00	8.18E+00	4.25E+00 G
PB-212	N	3.1971E+00					6.98E+02	
			238.63	3.197E+00	(P	1.022E+00	1.18E+01	4.33E+01 G
			300.03	-7.469E+00	-	5.798E+01	2.33E+02	3.28E+00 GA
PB-214	N	4.9357E+01					5.84E+05	
			351.93	4.936E+01	(P	1.396E+00	2.58E+00	3.76E+01 G
			295.09	5.453E+01	+	2.895E+00	3.84E+00	1.93E+01 G
			242.00	5.431E+01	+	6.001E+00	5.30E+00	7.43E+00 GA
BI-207	C	1.8560E-01					1.18E+04	
			569.70	5.491E-02	?(	7.669E-01	4.05E+02	9.77E+01 G
			1063.66	3.571E-01	&(P	8.349E-01	1.01E+02	7.45E+01 G
BI-212	N	-2.6959E+00					6.98E+02	
			727.17	-2.696E+00	*(P	1.508E+01	1.65E+02	7.55E+00 G
			785.42	1.027E+02	P	3.903E+01	1.96E+01	1.28E+00 GA
U-235	N	5.3260E+00					2.57E+11	
			143.79	4.009E+00	(P	3.486E+00	2.77E+01	1.10E+01 G
			205.33	8.208E+00	*(P	8.951E+00	4.73E+01	5.01E+00 G
			163.38	-1.305E+00	- P	1.344E+01	1.67E+02	5.08E+00 G
			185.72	5.978E+00	* P	8.695E-01	7.07E+00	5.40E+01 GA
BI-214	N	4.7257E+01					5.84E+05	
			609.31	4.726E+01	(P	1.239E+00	2.97E+00	4.61E+01 G
			1120.29	5.550E+01	+ P	3.977E+00	6.44E+00	1.51E+01 G
			1764.49	5.977E+01	+ P	3.130E+00	6.81E+00	1.54E+01 G
BI-210M	T	-3.9638E-01					1.10E+09	
			265.83	-3.964E-01	?(P	1.445E+00	5.69E+01	5.00E+01 G
			304.90	0.000E+00	+	6.801E+00	1.00E+03	2.80E+01 G
AC-228	N	1.4274E+00					2.10E+03	
			911.07	1.427E+00	?(	2.765E+00	8.48E+01	2.90E+01 G
			968.97	-3.185E+00	+	8.246E+00	7.78E+01	1.75E+01 G

Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
			338.32	-2.624E+00	+		1.179E+01	1.35E+02	1.20E+01 G
			93.35	2.550E+00	?		2.855E+01	3.38E+02	5.56E+00 XA
TH-227	N	2.4124E+00						7.95E+03	
			50.14	2.412E+00	(		4.215E+00	5.33E+01	8.00E+00 G
			256.24	-1.288E+00	-		8.776E+00	2.78E+02	7.00E+00 G
TH-229	N	5.0277E+00						2.68E+06	
			193.51	5.028E+00	(P		1.189E+01	9.34E+01	4.40E+00 G
			210.85	-6.886E+00	+		2.084E+01	1.25E+02	2.99E+00 G
TH-234	N	1.7885E+01						1.63E+12	
			63.29	1.894E+01	(P		1.103E+01	1.88E+01	3.81E+00 G
			92.59	1.716E+01	(P		7.066E+00	1.38E+01	5.58E+00 G
PA-234	N	9.7029E-01						1.63E+12	
			131.29	9.703E-01	?(		4.808E+00	1.49E+02	1.80E+01 G
			946.02	-1.887E+00	+		7.152E+00	1.70E+02	1.34E+01 G
			569.47	-7.857E-01	&		9.180E+00	3.39E+02	8.20E+00 G
			883.24	0.000E+00	&		1.426E+01	1.00E+03	9.60E+00 G
			880.53	-7.298E+00	+		2.141E+01	8.78E+01	6.00E+00 GA
PA-234M	N	2.6622E+01						1.63E+12	
			1001.00	-1.566E+01	?(P		1.669E+02	1.03E+02	8.37E-01 G
			766.41	1.470E+02	&(		3.645E+02	7.46E+01	2.94E-01 G
AM-241	T	-8.0592E-01						1.58E+05	
			59.54	-8.059E-01	&(P		2.117E+00	3.67E+01	3.59E+01 G
Ir-192	F	1.9246E-01						7.40E+01	
			316.49	0.000E+00	&(		2.256E+00	1.00E+03	8.70E+01 G
			468.06	5.162E-01	&(		1.579E+00	9.16E+01	5.18E+01 G
			308.44	0.000E+00	-		6.055E+00	1.00E+03	3.18E+01 G
Cs-136	F	-7.8730E-02						1.30E+01	
			818.50	-7.873E-02	?(		1.357E+00	5.04E+02	1.00E+02 G
			1048.07	-5.892E-01	+		1.256E+00	6.46E+01	8.00E+01 G
			340.57	-6.765E-01	+		3.001E+00	1.33E+02	4.69E+01 G
Np-239	T	-9.0215E-01						2.36E+00	
			103.70	2.005E-01	&		6.888E+00	1.04E+03	2.40E+01 X
			106.13	-9.021E-01	&(		7.378E+00	2.47E+02	2.27E+01 G
			99.50	-1.318E+00	+		1.093E+01	2.50E+02	1.50E+01 X
Nd-147		3.2782E-01						1.11E+01	
			531.00	-4.238E-01	?(		4.996E+00	4.89E+02	1.30E+01 G
			91.10	6.731E-01	?(		5.559E+00	2.49E+02	2.83E+01 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went
    negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide
    failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the
    library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity
    to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
AM-241	59.54	1732.	-75.	-0.021	36.70	-8.059E-01	P
BA-133	80.99	7746.	-48.	-0.013	258.66	-5.435E-01	
EU-155	86.54	7650.	-48.	-0.013	256.00	-6.117E-01	
Nd-147	91.10	7308.	49.	0.013	249.39	6.731E-01	
AC-228	93.35	7356.	36.	0.010	337.95	2.550E+00	
Gd-153	97.50	6688.	50.	0.014	232.52	6.635E-01	
Np-239	99.50	7460.	-49.	-0.014	250.39	-1.318E+00	
Gd-153	103.20	7411.	-19.	-0.005	651.02	-3.492E-01	
EU-155	105.31	7244.	47.	0.013	255.96	9.106E-01	P
Np-239	106.13	7448.	-50.	-0.014	246.95	-9.021E-01	
EU-152	121.78	695.	-13.	-0.004	295.60	-1.935E-01	
EU-154	123.10	580.	-7.	-0.002	488.02	-7.536E-02	
PA-234	131.29	1620.	38.	0.011	149.12	9.703E-01	
CE-144	133.54	1978.	-43.	-0.012	147.76	-1.773E+00	
Tc-99m	140.51	1710.	-42.	-0.012	140.09	-2.367E-01	
Ba-140	162.66	716.	-41.	-0.011	94.66	-3.426E+00	
CE-139	165.85	669.	28.	0.008	129.69	1.906E-01	
Cf-251	176.60	345.	32.	0.009	108.85	1.066E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
TH-229	193.51	326.	37.	0.010	93.44	5.028E+00		P
TH-229	210.85	408.	-32.	-0.009	124.84	-6.886E+00		
Cf-251	227.00	288.	4.	0.001	832.17	4.330E-01		
EU-152	244.69	1336.	-35.	-0.010	150.49	-3.301E+00		
Cd-113m	263.70	282.	-31.	-0.009	78.24	-3.995E+03		
BI-210M	265.83	379.	-26.	-0.007	56.90	-3.964E-01		P
Hg-203	279.20	379.	-34.	-0.009	83.79	-3.319E-01		
I-131	284.30	182.	16.	0.005	161.74	2.192E+00		P
TL-210	296.00	2261.	-29.	-0.008	235.50	-3.060E-01		
PA-231	300.07	2203.	-23.	-0.007	283.53	-8.143E+00		
CR-51	320.08	2108.	28.	0.008	231.68	2.545E+00		
La-140	328.76	164.	62.	0.017	42.66	2.792E+00		P
AC-228	338.32	1005.	-33.	-0.009	135.03	-2.624E+00		
Cs-136	340.57	981.	-34.	-0.009	133.28	-6.765E-01		
EU-152	344.29	555.	25.	0.007	134.29	9.046E-01		P
BA-133	356.00	2182.	-27.	-0.008	245.05	-4.280E-01		
I-131	364.48	129.	17.	0.005	131.17	2.111E-01		P
BA-133	383.84	387.	23.	0.006	123.47	2.674E+00		
SN-113	391.69	392.	22.	0.006	129.22	3.652E-01		P
SB-125	427.88	134.	-8.	-0.002	369.51	-2.983E-01		P
AG-108M	433.94	165.	-28.	-0.008	102.30	-3.571E-01		P
pm-146	453.88	131.	-13.	-0.004	214.85	-2.464E-01		P
SB-125	463.37	154.	18.	0.005	97.89	2.160E+00		P
Ir-192	468.06	185.	22.	0.006	91.58	5.162E-01		
BE-7	477.60	87.	19.	0.005	102.78	2.271E+00		P
RU-103	497.05	65.	18.	0.005	94.58	2.576E-01		P
RH-106	511.86	140.	111.	0.031	29.44	7.405E+00		
Nd-147	531.00	91.	-4.	-0.001	489.37	-4.238E-01		
Ba-140	537.26	95.	-18.	-0.005	111.19	-1.046E+00		
CS-134	563.24	65.	-5.	-0.001	332.16	-8.678E-01		
CS-134	569.32	77.	19.	0.005	68.00	1.845E+00		
PA-234	569.47	109.	-4.	-0.001	339.28	-7.857E-01		
BI-207	569.70	108.	4.	0.001	404.83	5.491E-02		
SB-125	600.50	1794.	-23.	-0.006	76.87	-1.952E+00		P
SB-124	602.73	1772.	-22.	-0.006	270.84	-3.449E-01		
CS-134	604.71	1750.	-22.	-0.006	268.90	-3.485E-01		
RU-103	610.30	1728.	-22.	-0.006	266.52	-5.980E+00		
AG-108M	614.28	1705.	-22.	-0.006	264.32	-3.856E-01		
PM-144	618.06	1591.	20.	0.006	284.85	3.149E-01		
RH-106	621.92	1620.	19.	0.005	304.08	2.987E+00		P
SB-125	635.89	64.	17.	0.005	72.50	2.365E+00		
I-131	636.97	53.	13.	0.004	82.23	2.983E+00		
AG-110M	657.76	188.	-25.	-0.007	79.12	-4.435E-01		
CS-137	661.66	170.	-6.	-0.002	283.49	-1.268E-01		P
PM-144	696.54	98.	-23.	-0.006	93.66	-4.056E-01		
NB-94	702.63	107.	-25.	-0.007	91.05	-4.447E-01		
SB-124	722.79	115.	2.	0.001	761.58	3.338E-01		
ZR-95	724.20	131.	-21.	-0.006	86.81	-8.674E-01		P

(Page 18 of 21)

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
BI-212	727.17	166.	-11.	-0.003	164.90	-2.696E+00		P
pm-146	735.72	75.	-21.	-0.006	90.22	-1.706E+00		
pm-146	747.16	79.	-22.	-0.006	89.71	-1.185E+00		
ZR-95	756.73	38.	14.	0.004	97.24	4.818E-01		P
AG-110M	763.94	247.	-34.	-0.009	68.49	-2.851E+00		
NB-95	765.79	280.	-4.	-0.001	571.97	-7.906E-02		
PA-234M	766.41	133.	23.	0.006	74.64	1.470E+02		
BI-212	785.42	24.	68.	0.019	19.57	1.027E+02		P
CS-134	795.87	124.	-5.	-0.001	340.17	-1.073E-01		
CS-134	801.95	173.	-23.	-0.007	81.81	-5.345E+00		
CO-58	810.78	167.	-22.	-0.006	84.78	-4.477E-01		
La-140	815.77	189.	-22.	-0.006	89.74	-1.927E+00		
Cs-136	818.50	192.	-4.	-0.001	504.49	-7.873E-02		
MN-54	834.85	75.	-8.	-0.002	241.80	-1.574E-01		
NB-94	871.10	87.	-18.	-0.005	24.18	-3.745E-01		P
EU-154	873.23	122.	-18.	-0.005	87.63	-3.222E+00		
PA-234	880.53	149.	-20.	-0.006	87.84	-7.298E+00		
Sc-46	889.28	157.	11.	0.003	166.28	2.354E-01		
y-88	898.04	47.	9.	0.003	158.68	2.184E-01		
AC-228	911.07	51.	19.	0.005	84.77	1.427E+00		
AG-110M	937.49	200.	-36.	-0.010	88.21	-2.381E+00		
PA-234	946.02	70.	-11.	-0.003	169.91	-1.887E+00		
EU-152	964.11	100.	16.	0.005	89.91	2.615E+00		
AC-228	968.97	158.	-24.	-0.007	77.85	-3.185E+00		
EU-154	996.33	126.	-8.	-0.002	201.56	-1.819E+00		
PA-234M	1001.00	139.	-5.	-0.002	103.20	-1.566E+01		P
EU-154	1004.77	179.	-23.	-0.006	83.85	-3.137E+00		
Cs-136	1048.07	63.	-19.	-0.005	64.56	-5.892E-01		
RH-106	1050.36	78.	3.	0.001	380.49	5.386E+00		P
BI-207	1063.66	21.	10.	0.003	101.11	3.571E-01		P
Ga-68	1077.40	45.	-2.	-0.001	740.78	-2.132E+00		
FE-59	1099.25	75.	-23.	-0.006	84.40	-1.086E+00		
EU-152	1112.07	384.	4.	0.001	794.11	6.839E-01		
Ta-182	1121.30	341.	9.	0.002	307.17	6.589E-01		
CO-60	1173.24	57.	-12.	-0.003	171.02	-3.366E-01		P
Ta-182	1189.05	40.	-8.	-0.002	177.36	-1.401E+00		
FE-59	1291.60	43.	-13.	-0.004	160.31	-9.090E-01		P
TL-210	1313.00	48.	-13.	-0.004	124.27	-1.927E+00		
CO-60	1332.50	32.	-2.	-0.001	583.91	-6.576E-02		P
AG-110M	1384.30	32.	5.	0.001	261.02	6.734E-01		
EU-152	1408.00	32.	16.	0.004	84.11	2.537E+00		P
La-140	1596.21	17.	6.	0.002	173.69	2.259E-01		P
SB-124	1690.98	17.	7.	0.002	143.21	5.796E-01		
y-88	1836.06	0.	8.	0.002	35.36	3.455E-01		

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

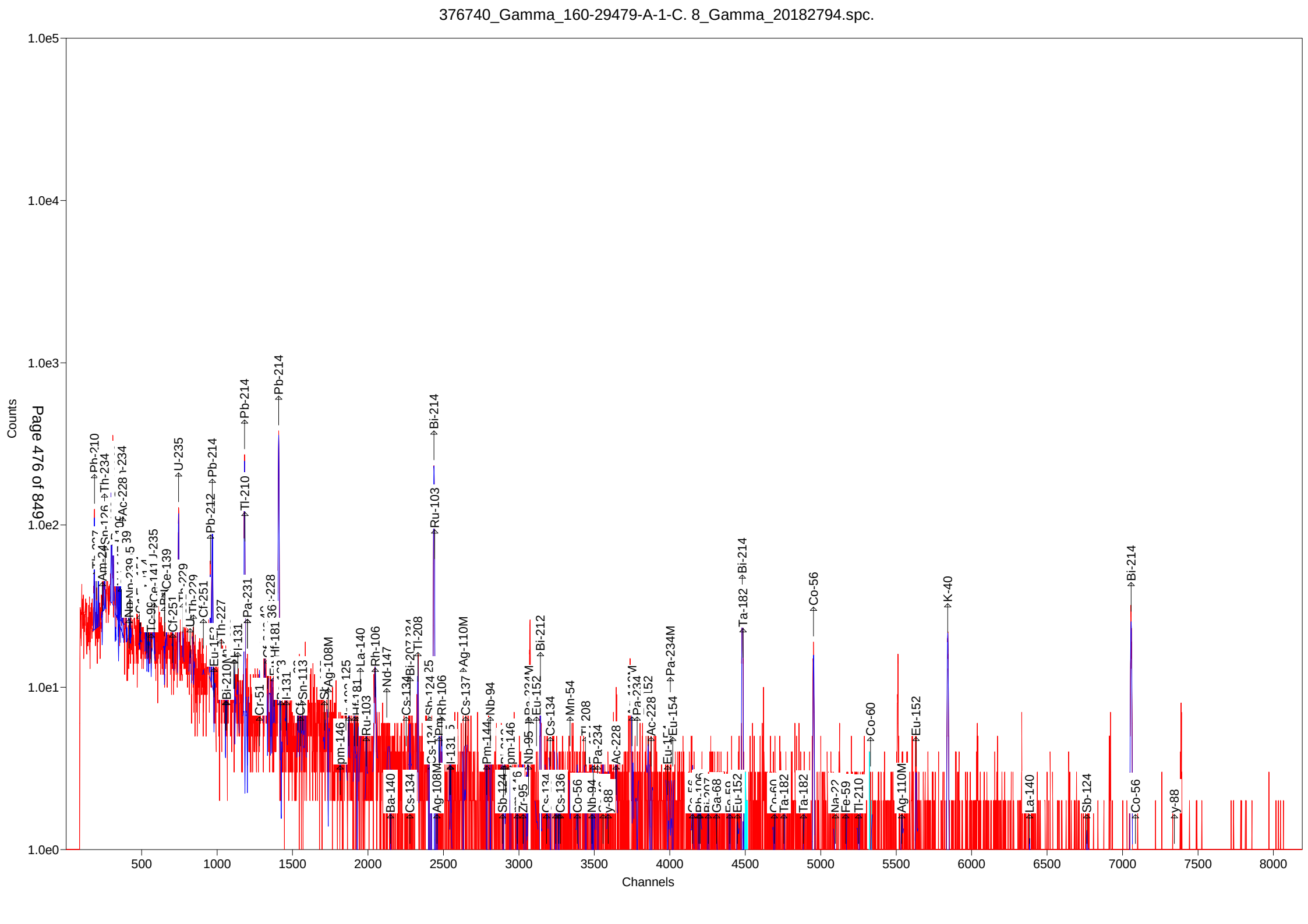
Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
BE-7	#A	2.2711E+00	2.2712E+00	1.028E+02%	5.52E+00
NA-22	#A	1.0095E-02	1.0095E-02	2.198E+03%	8.11E-01
K-40		5.8719E+01	5.8719E+01	8.313E+00%	6.07E+00
Sc-46	#A	2.3542E-01	2.3542E-01	1.663E+02%	1.33E+00
CR-51	#A	2.5448E+00	2.5448E+00	2.317E+02%	1.96E+01
MN-54	#A	-1.5737E-01	-1.5737E-01	2.418E+02%	8.82E-01
FE-59	#A	-1.0864E+00	-1.0864E+00	8.440E+01%	2.01E+00
Co-56	#	2.3081E+00	2.3081E+00	1.283E+01%	6.10E-01
CO-57	#A	1.7706E-01	1.7706E-01	1.072E+02%	6.31E-01
CO-58	#A	-4.4769E-01	-4.4769E-01	8.478E+01%	1.27E+00
CO-60	#A	-6.5759E-02	-6.5759E-02	5.839E+02%	9.19E-01
ZN-65	#A	0.0000E+00	0.0000E+00	1.000E+03%	4.99E+00
NB-94	#A	-4.4472E-01	-4.4472E-01	9.105E+01%	9.16E-01
ZR-95	#A	4.8178E-01	4.8178E-01	9.724E+01%	1.09E+00
NB-95	#A	-7.9064E-02	-7.9064E-02	5.720E+02%	1.54E+00
RU-103	#A	2.5756E-01	2.5756E-01	9.458E+01%	5.77E-01
RH-106	#A	3.3126E+00	3.3126E+00	2.435E+02%	3.03E+01
AG-108M	#A	-3.5706E-01	-3.5706E-01	1.023E+02%	8.01E-01
AG-110M	#A	1.6867E-01	1.6867E-01	2.610E+02%	1.89E+00
SN-113	#A	3.6515E-01	3.6515E-01	1.292E+02%	1.58E+00
SB-124	#A	-1.6466E-02	-1.6466E-02	1.432E+02%	3.11E+00
SB-125	#A	7.8897E-01	7.8897E-01	7.250E+01%	2.19E+00
I-131	#A	5.4824E-01	5.4827E-01	7.463E+01%	6.81E-01
Gd-153	#A	6.6346E-01	6.6347E-01	2.325E+02%	5.11E+00
Ga-68	#A	-2.1148E+00	-2.1318E+00	7.408E+02%	3.62E+01
Tc-99m	#A	-2.3637E-01	-2.3673E-01	1.401E+02%	1.10E+00
BA-133	#A	-4.2797E-01	-4.2797E-01	2.451E+02%	3.49E+00
CS-134	#A	-4.9894E-02	-4.9894E-02	6.800E+01%	3.12E+00
CS-137	#A	-1.2684E-01	-1.2684E-01	2.835E+02%	1.24E+00
CE-139	#A	1.9055E-01	1.9055E-01	1.297E+02%	8.24E-01
Ba-140	#A	-1.0457E+00	-1.0457E+00	1.112E+02%	2.75E+00
La-140	#A	6.7617E-01	6.7619E-01	4.266E+01%	8.66E-01
CE-141	#A	2.4892E-01	2.4892E-01	2.324E+02%	1.93E+00
CE-144	#A	-1.7726E+00	-1.7726E+00	1.478E+02%	8.70E+00
PM-144	#A	-4.0559E-01	-4.0559E-01	9.366E+01%	8.61E-01
EU-152	#A	1.3059E+00	1.3059E+00	8.991E+01%	4.05E+00
EU-154	#A	-3.2224E+00	-3.2224E+00	8.763E+01%	9.44E+00
EU-155	#A	9.1055E-01	9.1055E-01	2.560E+02%	7.72E+00
HF-181	A	9.9856E-02	9.9857E-02	7.540E+01%	1.37E+00
Ta-182	#A	6.5890E-01	6.5890E-01	3.072E+02%	6.84E+00
Hg-203	#A	-3.3190E-01	-3.3190E-01	8.379E+01%	9.23E-01
TL-208		1.4363E+00	1.4364E+00	2.142E+01%	6.34E-01
pm-146	#A	-1.1855E+00	-1.1855E+00	8.971E+01%	2.42E+00

y-88	#A	2.8373E-01	2.8373E-01	3.536E+01%	8.08E-01
Cd-113m	#A	-3.9951E+03	-3.9951E+03	7.824E+01%	1.04E+04
Cd-109	#A	4.5560E+00	4.5560E+00	2.733E+02%	4.12E+01
Cf-251	#A	1.0662E+00	1.0662E+00	1.088E+02%	2.94E+00
Cf-249	#A	3.6627E-01	3.6627E-01	1.255E+02%	1.54E+00
Sn-126	A	1.1840E+00	1.1840E+00	1.241E+02%	4.89E+00
PB-210	#	3.8981E+01	3.8981E+01	8.177E+00%	8.57E+00
PB-212		3.1971E+00	3.1971E+00	1.183E+01%	1.02E+00
PB-214		4.9357E+01	4.9357E+01	2.578E+00%	1.40E+00
BI-207	#A	1.8560E-01	1.8560E-01	1.011E+02%	7.67E-01
BI-212	#A	-2.6959E+00	-2.6959E+00	1.649E+02%	1.51E+01
U-235	#	5.3260E+00	5.3260E+00	2.741E+01%	3.49E+00
BI-214		4.7257E+01	4.7257E+01	2.972E+00%	1.24E+00
BI-210M	#A	-3.9638E-01	-3.9638E-01	5.690E+01%	1.45E+00
AC-228	#A	1.4274E+00	1.4274E+00	8.477E+01%	2.76E+00
TH-227	A	2.4124E+00	2.4124E+00	5.330E+01%	4.21E+00
TH-229	#A	5.0277E+00	5.0277E+00	9.344E+01%	1.19E+01
TH-234		1.7885E+01	1.7885E+01	1.166E+01%	1.10E+01
PA-231	#A	0.0000E+00	0.0000E+00	1.000E+03%	6.57E+01
PA-233	#A	0.0000E+00	0.0000E+00	7.071E+02%	5.39E+00
PA-234	#A	9.7029E-01	9.7029E-01	1.491E+02%	4.81E+00
PA-234M	#A	2.6622E+01	2.6622E+01	6.368E+01%	1.67E+02
AM-241	#A	-8.0592E-01	-8.0592E-01	3.670E+01%	2.12E+00
Np-237	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.22E+01
Ir-192	#A	1.9246E-01	1.9246E-01	9.158E+01%	2.26E+00
Cs-136	#A	-7.8728E-02	-7.8730E-02	5.045E+02%	1.36E+00
Np-239	#A	-9.0200E-01	-9.0215E-01	2.469E+02%	7.38E+00
Nd-147	#A	3.2781E-01	3.2782E-01	2.494E+02%	5.00E+00
TL-210	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.11E+00

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.5 to 2000.0 keV) 2.246E+02 Bq/Sample
Total Decayed Activity (37.5 to 2000.0 keV) 2.2457025E+02 Bq/Sample


376740_Gamma_160-29479-A-1-C. 8_Gamma_20182794.spc.
Counts
Channels
1.0e5
1.0e4
1.0e3
1.0e2
1.0e1
1.0e0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
7500
8000
Pb-214
Bi-214
Ru-103
Ta-182
Co-56
K-40
Co-60
Eu-152
Ag-110M
Ac-228
Pa-234M
Pa-234
Eu-154
Cs-137
Ag-110M
Cs-134
Cs-136
Mn-54
Nb-95
Zr-95
Nb-94
Pm-144
Sb-124
Rh-106
Ba-140
La-140
Y-88
Na-22
Fe-59
Ga-68
Tl-210
Pb-212
Th-227
Pa-231
Tl-208
Bi-212
Eu-152
Cf-251
U-235
Th-229
Ac-228
Th-234
Pb-210
Am-241
Ce-139
Ce-141
Hf-181
La-140
Rh-106
Nd-147
Ag-108M
Sn-113
Cr-51
Tl-201
Sb-124
Co-60
Eu-152
K-40
Bi-214
Co-56
Y-88
La-140
Sb-124
Co-56

Sample Description: 376740_Gamma_160-29479-A-2-D
Detector: Detector #17
Batch ID: 376740
Work Order Number: Gamma
Lot Number: 160-29479-A-2-D

Decay to Time: 8/9/2018 18:44 Live Time: 1800 sec
Acquisition Time: 8/9/2018 18:44:31 Real Time: 1852 sec
Analysis Time: 8/9/2018 19:15 Dead Time: 2.81 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 17_Soil_TunaCan.Clb
Efficiency Cal Desc: 17_TunaCan_90099_032612
Efficiency Cal Date: 4/12/2012 09:28
Energy Cal Date: 2/29/2012 10:33
Library: Client_Long_Rev14.lib
Bkgd Correction File: 17_2018-07-14_1832.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	-2.595E+00	122.2	3.171E+00	3.174E+00	1.084E+01
NA-22	-1.055E-01	287.7	3.037E-01	3.037E-01	1.135E+00
K-40	1.755E+02	6.3	1.109E+01	1.427E+01	1.046E+01
Sc-46	2.552E-01	149.4	3.813E-01	3.816E-01	1.333E+00
CR-51	-3.281E+00	106.7	3.501E+00	3.505E+00	1.180E+01
MN-54	1.222E-01	250.6	3.062E-01	3.063E-01	7.764E-01
FE-59	3.569E-01	90.4	3.228E-01	3.233E-01	2.353E+00
Co-56	7.696E-01	45.3	3.483E-01	3.506E-01	7.851E-01
CO-57	2.005E-01	109.8	2.201E-01	2.204E-01	7.433E-01
CO-58	3.237E-01	92.9	3.006E-01	3.011E-01	1.029E+00
CO-60	-5.460E-01	130.7	7.134E-01	7.139E-01	1.588E+00
ZN-65	-6.195E-01	214.4	1.328E+00	1.328E+00	4.594E+00
NB-94	2.468E-01	129.3	3.190E-01	3.193E-01	8.025E-01
ZR-95	3.735E-01	161.4	6.027E-01	6.030E-01	1.536E+00
NB-95	4.256E-01	84.1	3.580E-01	3.586E-01	1.209E+00
RU-103	4.465E-01	50.8	2.270E-01	2.281E-01	5.458E-01
RH-106	2.578E+00	252.0	6.496E+00	6.498E+00	2.216E+01
AG-108M	7.680E-03	2934.9	2.254E-01	2.254E-01	6.447E-01
AG-110M	2.597E-01	146.3	3.798E-01	3.801E-01	2.010E+00
SN-113	4.616E-01	133.2	6.148E-01	6.152E-01	2.085E+00
SB-124	3.314E-01	195.3	6.473E-01	6.475E-01	2.166E+00
SB-125	8.491E-01	66.6	5.657E-01	5.674E-01	2.791E+00
I-131	-1.689E-01	131.4	2.220E-01	2.221E-01	9.881E-01
Gd-153	4.454E-01	134.5	5.992E-01	5.998E-01	2.149E+00
Ga-68	1.156E+01	93.6	1.082E+01	1.084E+01	2.593E+01
Tc-99m	1.038E-02	2898.3	3.009E-01	3.009E-01	1.033E+00
BA-133	-4.134E-01	163.5	6.757E-01	6.761E-01	2.294E+00
CS-134	4.797E-01	73.6	3.533E-01	3.542E-01	2.248E+00
CS-137	2.644E-01	116.4	3.079E-01	3.082E-01	1.069E+00
CE-139	-2.000E-01	163.9	3.277E-01	3.283E-01	1.111E+00
Ba-140	-1.818E-01	142.1	2.584E-01	2.585E-01	3.460E+00
La-140	4.086E-01	105.9	4.328E-01	4.334E-01	1.092E+00
CE-141	3.925E-01	103.4	4.058E-01	4.063E-01	1.368E+00

CE-144	0.000E+00	1.#INF	1.082E+00	1.082E+00	8.258E+00
PM-144	1.886E-01	187.9	3.543E-01	3.545E-01	8.935E-01
EU-152	1.147E-01	137.8	1.581E-01	1.582E-01	5.607E+00
EU-154	4.223E+00	27.0	1.138E+00	1.159E+00	9.894E+00
EU-155	-1.504E-02	6786.5	1.021E+00	1.021E+00	3.723E+00
HF-181	3.464E-01	107.9	3.738E-01	3.742E-01	1.275E+00
Ta-182	2.404E+00	92.1	2.213E+00	2.217E+00	7.438E+00
Hg-203	-3.921E-01	98.7	3.869E-01	3.876E-01	1.301E+00
TL-208	9.653E-01	38.8	3.750E-01	3.783E-01	9.274E-01
pm-146	2.693E-01	120.7	3.250E-01	3.253E-01	2.037E+00
y-88	1.780E-01	238.7	4.249E-01	4.250E-01	1.058E+00
Cd-113m	-3.208E+03	143.0	4.587E+03	4.592E+03	1.563E+04
Cd-109	-7.151E+00	147.0	1.051E+01	1.052E+01	3.521E+01
Cf-251	-1.396E+00	114.5	1.598E+00	1.603E+00	4.324E+00
Cf-249	-2.379E-01	135.9	3.232E-01	3.235E-01	2.170E+00
Sn-126	1.247E+00	242.0	3.017E+00	3.018E+00	1.030E+01
PB-210	4.691E+00	192.4	9.025E+00	9.030E+00	2.688E+01
PB-212	2.844E+00	18.8	5.348E-01	5.655E-01	1.437E+00
PB-214	4.986E+00	14.1	7.046E-01	7.507E-01	1.352E+00
BI-207	-3.528E-02	830.7	2.931E-01	2.931E-01	1.054E+00
BI-212	4.578E+00	88.1	4.034E+00	4.041E+00	1.371E+01
U-235	-6.244E-01	339.6	2.121E+00	2.121E+00	8.360E+00
BI-214	4.421E+00	20.2	8.949E-01	9.239E-01	1.926E+00
BI-210M	2.337E-01	234.4	5.478E-01	5.480E-01	1.884E+00
AC-228	3.653E+00	48.8	1.781E+00	1.791E+00	4.090E+00
TH-227	-4.365E+00	110.9	4.840E+00	4.846E+00	1.383E+01
TH-229	-3.662E-01	1594.8	5.840E+00	5.840E+00	1.625E+01
TH-234	8.951E+00	37.8	3.382E+00	3.414E+00	1.918E+01
PA-231	-5.444E-07	2858424734.7	1.556E+01	1.556E+01	5.334E+01
PA-233	6.484E-01	124.1	8.049E-01	8.057E-01	2.735E+00
PA-234	8.422E-01	106.7	8.986E-01	8.996E-01	4.948E+00
PA-234M	3.461E+01	97.1	3.362E+01	3.366E+01	1.369E+02
AM-241	-8.825E-01	109.3	9.648E-01	9.659E-01	2.746E+00
Np-237	-2.082E+00	160.5	3.341E+00	3.343E+00	1.119E+01
Ir-192	-4.334E-02	76.2	3.302E-02	3.312E-02	1.196E+00
Cs-136	2.943E-01	93.0	2.738E-01	2.743E-01	1.157E+00
Np-239	-1.334E-01	736.1	9.817E-01	9.818E-01	3.377E+00
Nd-147	-1.008E+00	281.4	2.836E+00	2.837E+00	7.326E+00
TL-210	3.198E-01	103.0	3.294E-01	3.300E-01	1.133E+00
Total	2.780E+02				

Analyst: Morgan Reichert

TestAmerica Inc Spectrum name: 17_Gamma_20182718.An1

Sample description
376740_Gamma_160-29479-A-2-D

Spectrum Filename: C:\User\SPC\Det17\17_Gamma_20182718.An1

Acquisition information
Start time:	8/9/2018 6:44:31 PM
Live time:	1800
Real time:	1852
Dead time:	2.81 %
Detector ID:	17

Detector system
Ge17 SN/11080671

Calibration
Filename: 17_Soil_TunaCan.Clb
17_TunaCan_90099_032612

Energy Calibration
Created:	2/29/2012 10:33:23 AM
Zero offset:	0.108 keV
Gain:	0.250 keV/channel
Quadratic:	-2.584E-08 keV/channel^2

Efficiency Calibration
Created:	4/12/2012 9:28:42 AM
Knee Energy:	165.85 keV
Above the Knee:	Quadratic Uncertainty = 0.91 %
Log(Eff):	-5.264190E-01 + (-4.024164E-01*Log(E)) + (-2.604461E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 1.00 %
Log(Eff):	-2.343889E+01 + (8.582715E+00*Log(E)) + (-9.075430E-01*Log(E)^2)

Library Files
Main analysis library:	Client_Long_Rev14.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters
Analysis engine:	Env32 G800W064
Start channel:	100 (25.12keV)
Stop channel:	8000 (1999.54keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	8/9/2018 6:44:00 PM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	17_2018-07-14_1832.PBC 7/14/2018 6:32:39 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 11 cutoff: 5.00E+01 %

Energy Calibration

Normalized diff: 0.1043

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.46	8.	192.40	0.91	2.100E-02	46.54	4.250	PBC<MDA	PB210
63.34	14.	93.49	1.01	3.164E-02	63.29	3.810	PBC<MDA	TH234
64.28	7.	242.02	0.79	3.216E-02	64.28	9.700	PBC<MDA	Sn126
74.87	54.	24.76	0.80	3.681E-02				
77.31	67.	21.86	0.80	3.767E-02				
92.92	85.	18.01	0.90	4.150E-02	92.59	5.584	PBC<MDA	TH234
					93.35	5.561	2.035E+01	AC228
97.50	10.	144.74	0.82	4.213E-02	97.50	30.000	PBC<MDA	Gd153
103.20	8.	226.80	0.83	4.265E-02	103.20	21.800	PBC<MDA	Gd153
122.06	13.	109.79	0.85	4.276E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	2.005E-01	CO57
145.44	14.	103.38	0.87	4.059E-02	145.44	48.200	PBC<MDA	CE141
162.66	9.	191.49	0.88	3.813E-02	162.66	6.220	PBC<MDA	Ba140
163.38	-2.	905.28	0.88	3.802E-02	163.38	5.080	PBC<MDA	U235
185.07	54.	27.59	0.43	3.554E-02	185.72	54.000	PBC<MDA	U235
227.00	10.	125.38	0.94	3.093E-02	227.00	6.300	PBC<MDA	Cf251
238.44	81.	16.71	0.78	2.990E-02	238.63	43.300	2.970E+00	PB212
241.74	24.	37.57	0.96	2.960E-02	242.00	7.430	PBC<MDA	PB214
265.83	6.	234.40	0.98	2.774E-02	265.83	50.000	PBC<MDA	BI210M
295.10	40.	24.48	1.60	2.580E-02	295.09	19.300	4.488E+00	PB214
304.85	2.	832.11	1.02	2.522E-02	304.85	4.290	PBC<MDA	Ba140
					304.90	28.000	1.312E-01	BI210M

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
312.01	10.	124.14	1.02	2.481E-02	312.01	36.000	PBC<MDA	PA233
328.76	9.	106.58	1.04	2.391E-02	328.76	20.300	PBC<MDA	La140
333.44	5.	252.19	1.04	2.368E-02	333.44	15.510	PBC<MDA	Cf249
351.84	81.	14.14	0.99	2.280E-02	351.93	37.600	5.241E+00	PB214
391.69	11.	133.18	1.09	2.112E-02	391.69	64.000	PBC<MDA	SN113
453.88	2.	583.24	1.15	1.900E-02	453.88	65.000	PBC<MDA	pm146
463.37	9.	100.78	1.16	1.872E-02	463.37	10.470	PBC<MDA	SB125
468.06	8.	113.00	1.16	1.859E-02	468.06	51.750	PBC<MDA	Ir192
482.00	9.	107.90	1.18	1.820E-02	482.00	80.500	PBC<MDA	HF181
487.02	7.	139.77	1.18	1.806E-02	487.02	45.500	PBC<MDA	La140
497.05	13.	50.83	1.19	1.779E-02	497.05	90.900	PBC<MDA	RU103
511.86	73.	24.98	2.45	1.742E-02	511.86	20.000	1.165E+01	RH106
569.32	10.	73.65	1.25	1.612E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	4.093E+00	PA234
					569.70	97.740	3.435E-01	BI207
583.02	23.	38.84	1.26	1.584E-02	583.02	84.500	9.653E-01	TL208
600.50	8.	206.02	1.28	1.550E-02	600.50	17.860	PBC<MDA	SB125
602.73	9.	195.32	1.28	1.546E-02	602.73	98.260	PBC<MDA	SB124
604.71	9.	200.72	1.28	1.542E-02	604.71	97.620	PBC<MDA	CS134
609.39	60.	20.24	1.42	1.533E-02	609.31	46.090	4.727E+00	BI214
610.30	2.	857.20	1.29	1.531E-02	610.30	5.750	PBC<MDA	RU103
621.92	7.	251.97	1.30	1.510E-02	621.92	9.930	PBC<MDA	RH106
635.89	9.	76.71	1.31	1.486E-02	635.89	11.310	PBC<MDA	SB125
636.97	2.	353.88	1.31	1.484E-02	636.97	7.170	PBC<MDA	I131
657.76	6.	147.63	1.33	1.449E-02	657.76	94.640	PBC<MDA	AG110M
661.66	6.	116.43	1.33	1.443E-02	661.66	85.210	PBC<MDA	CS137
696.54	5.	187.90	1.36	1.389E-02	696.54	99.000	PBC<MDA	PM144
702.63	6.	129.28	1.37	1.380E-02	702.63	97.900	PBC<MDA	NB94
722.79	1.	842.61	1.39	1.351E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	4.527E-02	AG108M
					723.36	20.220	2.035E-01	EU154
727.17	8.	88.11	1.39	1.345E-02	727.17	7.550	PBC<MDA	BI212
735.72	5.	120.71	1.40	1.333E-02	735.72	22.500	PBC<MDA	pm146
747.16	1.	458.94	1.41	1.318E-02	747.16	34.000	PBC<MDA	pm146
756.73	5.	161.35	1.41	1.306E-02	756.73	54.460	PBC<MDA	ZR95
765.79	10.	84.10	1.42	1.294E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
766.41	4.	110.82	1.42	1.293E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
778.92	4.	199.72	1.43	1.278E-02	778.92	12.940	PBC<MDA	EU152
785.42	5.	120.39	1.44	1.270E-02	785.42	1.280	PBC<MDA	BI212
795.87	7.	95.06	1.45	1.257E-02	795.87	85.530	PBC<MDA	CS134
799.60	7.	103.01	1.45	1.253E-02	799.60	98.960	PBC<MDA	TL210
810.78	7.	92.88	1.46	1.240E-02	810.78	99.460	PBC<MDA	CO58
815.77	7.	105.92	1.47	1.234E-02	815.77	23.280	PBC<MDA	La140
818.50	5.	143.41	1.47	1.231E-02	818.50	100.000	PBC<MDA	Cs136
834.85	3.	250.62	1.48	1.213E-02	834.85	99.980	PBC<MDA	MN54
846.77	4.	184.30	1.49	1.200E-02	846.77	99.935	PBC<MDA	Co56

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
873.23	5.	141.57	1.51	1.172E-02	873.23	12.270	PBC<MDA	EU154
880.53	7.	93.48	1.52	1.165E-02	880.53	6.000	PBC<MDA	PA234
883.24	7.	106.69	1.52	1.162E-02	883.24	9.600	PBC<MDA	PA234
884.68	3.	255.95	1.52	1.161E-02	884.68	72.680	PBC<MDA	AG110M
889.28	5.	149.45	1.53	1.156E-02	889.28	99.984	PBC<MDA	Sc46
898.04	3.	238.68	1.53	1.148E-02	898.04	93.700	PBC<MDA	y88
911.07	22.	48.76	1.55	1.135E-02	911.07	29.000	PBC<MDA	AC228
996.33	14.	26.95	1.62	1.061E-02	996.33	10.600	6.801E+00	EU154
1001.00	4.	159.55	1.62	1.057E-02	1001.00	0.837	PBC<MDA	PA234M
1037.84	6.	122.85	1.65	1.028E-02	1037.84	14.130	PBC<MDA	Co56
1048.07	6.	118.53	1.66	1.021E-02	1048.07	80.000	PBC<MDA	Cs136
1077.40	6.	93.64	1.68	9.992E-03	1077.40	3.300	PBC<MDA	Ga68
1120.11	9.	126.30	1.72	9.697E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	PBC<MDA	Sc46
1121.12	15.	92.07	1.72	9.691E-03	1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	2.404E+00	Ta182
1238.28	14.	45.27	1.81	8.977E-03	1238.28	66.070	1.351E+00	Co56
1291.60	6.	90.44	1.85	8.689E-03	1291.60	43.200	PBC<MDA	FE59
1384.30	2.	324.35	1.93	8.233E-03	1384.30	24.290	PBC<MDA	AG110M
1460.65	266.	6.32	1.94	7.894E-03	1460.83	10.670	1.755E+02	K40
1764.95	2.	249.60	2.21	6.804E-03	1764.49	15.400	PBC<MDA	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
298.90	74.85	63.	54.	1.476E+03	24.76	0.802	-	sD
308.65	77.29	74.	67.	1.791E+03	21.86	0.804	-	sD
739.51	185.07	42.	54.	1.520E+03	27.59	0.432	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev14.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.30	46.46	75.	8.	0.004	192.40	0.908
TH-227	200.03	50.14	90.	-15.	-0.008	110.90	0.778s
AM-241	237.59	59.54	114.	-17.	-0.009	109.32	0.787s
TH-234	252.81	63.34	70.	14.	0.008	93.49	1.009s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Sn-126	256.56	64.28	140.	7.	0.004	242.02	0.792s
BA-133	323.36	80.99	130.	-19.	-0.011	76.83	0.807s
Np-237	345.35	86.49	493.	-20.	-0.011	160.46	0.813s
EU-155	345.56	86.54	473.	-20.	-0.011	157.23	0.813s
Sn-126	347.15	86.94	453.	-20.	-0.011	153.94	0.813s
Sn-126	349.67	87.57	434.	-20.	-0.011	150.49	0.814
Cd-109	351.55	88.04	414.	-20.	-0.011	147.01	0.814
Nd-147	363.79	91.10	390.	-19.	-0.011	145.32	0.817s
TH-234	371.07	92.92	85.	44.	0.024	37.78	0.899s
Gd-153	389.37	97.50	98.	10.	0.006	144.74	0.823s
Np-239	397.37	99.50	155.	-10.	-0.005	186.19	0.825s
Gd-153	412.16	103.20	147.	8.	0.004	226.80	0.828s
Np-239	414.16	103.70	155.	0.	0.000	1000.00	0.829s
Np-239	423.88	106.13	146.	-2.	-0.001	736.10	0.831
EU-152	486.43	121.78	173.	-18.	-0.010	106.62	0.846s
CO-57	487.57	122.06	99.	13.	0.007	109.79	0.846s
EU-154	491.73	123.10	135.	-16.	-0.009	104.79	0.847s
PA-234	524.49	131.29	194.	-10.	-0.005	209.60	0.855
HF-181	531.41	133.02	203.	0.	0.000	1000.00	0.856s
CE-144	533.46	133.54	203.	0.	0.000	1000.00	0.857s
HF-181	544.50	136.30	203.	0.	0.000	1000.00	0.859s
U-235	574.43	143.79	192.	-5.	-0.003	339.63	0.866s
CE-141	581.05	145.44	95.	14.	0.008	103.38	0.868s
Ba-140	649.90	162.66	144.	9.	0.005	191.49	0.884s
U-235	652.78	163.38	131.	-2.	-0.001	905.28	0.885s
CE-139	662.67	165.85	157.	-11.	-0.006	163.89	0.887s
Cf-251	705.64	176.60	97.	-16.	-0.009	114.50	0.897s
U-235	742.10	185.72	141.	-26.	-0.015	66.69	0.905s
TH-229	842.58	210.85	80.	-13.	-0.007	125.54	0.929s
Cf-251	907.16	227.00	43.	10.	0.005	125.38	0.944
PB-212	953.67	238.63	44.	66.	0.037	18.81	0.954D
PB-214	967.13	242.00	28.	24.	0.013	37.57	0.957D
EU-152	977.91	244.69	214.	-5.	-0.003	410.93	0.960s
TH-227	1024.08	256.24	50.	-6.	-0.004	195.88	0.971
Cd-113m	1053.91	263.70	91.	-10.	-0.005	142.97	0.978s
BI-210M	1062.44	265.83	90.	6.	0.003	234.40	0.979s
TL-208	1108.23	277.28	72.	-10.	-0.005	141.26	0.990s
Hg-203	1115.89	279.20	108.	-15.	-0.009	98.68	0.992s
I-131	1136.28	284.30	44.	0.	0.000	1000.00	0.996s
PB-214	1179.45	295.10	19.	40.	0.022	24.48	1.595s
TL-210	1183.07	296.00	286.	-14.	-0.008	173.04	1.007s
PB-212	1199.19	300.03	273.	-15.	-0.008	67.52	1.011s
PA-231	1199.35	300.07	258.	-14.	-0.008	163.98	1.011s
Ba-140	1218.46	304.85	95.	2.	0.001	832.11	1.015s
BI-210M	1218.64	304.90	97.	0.	0.000	1000.00	1.015
Ir-192	1232.82	308.44	97.	0.	0.000	1000.00	1.019s
PA-233	1247.10	312.01	78.	10.	0.006	124.14	1.022s
Ir-192	1265.01	316.49	86.	-13.	-0.007	102.23	1.026

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CR-51	1279.38	320.08	109.	-14.	-0.008	106.69	1.029s
La-140	1314.07	328.76	22.	9.	0.005	106.58	1.037s
Cf-249	1332.79	333.44	44.	5.	0.003	252.19	1.041s
AC-228	1352.30	338.32	134.	-16.	-0.009	60.14	1.046s
Cs-136	1361.30	340.57	147.	-14.	-0.008	124.28	1.048s
EU-152	1376.16	344.29	161.	-5.	-0.003	189.92	1.051s
PB-214	1406.36	351.84	15.	81.	0.045	14.14	0.991
BA-133	1423.00	356.00	140.	-10.	-0.006	163.45	1.062s
I-131	1456.93	364.48	40.	-9.	-0.005	131.44	1.070s
BA-133	1534.34	383.84	112.	-13.	-0.007	85.13	1.087s
Cf-249	1550.77	387.95	125.	-12.	-0.007	135.90	1.091s
SN-113	1565.73	391.69	106.	11.	0.006	133.18	1.094s
SB-125	1710.44	427.88	33.	-10.	-0.006	112.03	1.127s
pm-146	1814.44	453.88	24.	2.	0.001	583.24	1.150s
SB-125	1852.38	463.37	37.	9.	0.005	100.78	1.158s
Ir-192	1871.15	468.06	38.	8.	0.004	113.00	1.163s
BE-7	1909.29	477.59	56.	-9.	-0.005	122.22	1.171s
HF-181	1926.89	482.00	44.	9.	0.005	107.90	1.175s
La-140	1946.98	487.02	20.	7.	0.004	139.77	1.180s
RU-103	1987.11	497.05	8.	13.	0.007	50.83	1.188s
RH-106	2046.35	511.86	40.	73.	0.041	24.98	2.452s
Nd-147	2122.88	531.00	32.	-4.	-0.002	281.37	1.219s
Ba-140	2147.92	537.26	24.	-7.	-0.004	142.14	1.224s
CS-134	2251.82	563.24	24.	-1.	-0.001	762.99	1.247s
CS-134	2276.15	569.32	21.	10.	0.005	73.65	1.252s
PA-234	2276.75	569.47	35.	-2.	-0.001	486.40	1.253s
BI-207	2277.67	569.70	34.	-1.	-0.001	830.66	1.253s
TL-208	2330.95	583.02	18.	23.	0.013	38.84	1.264s
SB-125	2400.86	600.50	122.	8.	0.004	206.02	1.280s
SB-124	2409.78	602.73	147.	9.	0.005	195.32	1.282s
CS-134	2417.70	604.71	156.	9.	0.005	200.72	1.284s
BI-214	2436.43	609.39	22.	60.	0.033	20.24	1.418
RU-103	2440.05	610.30	165.	2.	0.001	857.20	1.288s
AG-108M	2455.98	614.28	167.	0.	0.000	1000.00	1.292
PM-144	2471.11	618.06	167.	0.	0.000	1000.00	1.295s
RH-106	2486.52	621.92	150.	7.	0.004	251.97	1.299s
SB-125	2542.41	635.89	18.	9.	0.005	76.71	1.311s
I-131	2546.75	636.97	30.	2.	0.001	353.88	1.312s
AG-110M	2629.90	657.76	34.	6.	0.003	147.63	1.330s
CS-137	2645.49	661.66	20.	6.	0.003	116.43	1.333s
PM-144	2785.03	696.54	17.	5.	0.003	187.90	1.363s
NB-94	2809.38	702.63	13.	6.	0.003	129.28	1.368s
SB-124	2890.01	722.79	35.	1.	0.001	842.61	1.386s
AG-108M	2890.61	722.94	36.	0.	0.000	1000.00	1.386s
EU-154	2892.29	723.36	36.	0.	0.000	1000.00	1.386s
ZR-95	2895.66	724.20	36.	0.	0.000	1000.00	1.387s
BI-212	2907.54	727.17	23.	8.	0.005	88.11	1.390
pm-146	2941.74	735.72	9.	5.	0.003	120.71	1.397s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
pm-146	2987.51	747.16	9.	1.	0.001	458.94	1.407s
ZR-95	3025.79	756.73	13.	5.	0.003	161.35	1.415s
AG-110M	3054.64	763.94	44.	-7.	-0.004	139.24	1.421s
NB-95	3062.03	765.79	30.	10.	0.005	84.10	1.423s
PA-234M	3064.52	766.41	9.	4.	0.002	110.82	1.423s
EU-152	3114.56	778.92	13.	4.	0.002	199.72	1.434s
BI-212	3140.56	785.42	10.	5.	0.003	120.39	1.440s
CS-134	3182.35	795.87	17.	7.	0.004	95.06	1.448s
TL-210	3197.29	799.60	23.	7.	0.004	103.01	1.451s
CS-134	3206.69	801.95	57.	-11.	-0.006	98.86	1.454s
CO-58	3241.99	810.78	19.	7.	0.004	92.88	1.461s
La-140	3261.97	815.77	26.	7.	0.004	105.92	1.465s
Cs-136	3272.90	818.50	24.	5.	0.003	143.41	1.467
MN-54	3338.30	834.85	9.	3.	0.001	250.62	1.481s
Co-56	3385.99	846.77	9.	4.	0.002	184.30	1.491s
NB-94	3483.32	871.10	19.	-6.	-0.003	115.72	1.512s
EU-154	3491.85	873.23	24.	5.	0.003	141.57	1.514s
PA-234	3521.06	880.53	21.	7.	0.004	93.48	1.520s
PA-234	3531.90	883.24	28.	7.	0.004	106.69	1.522s
AG-110M	3537.67	884.68	36.	3.	0.002	255.95	1.523s
Sc-46	3556.06	889.28	29.	5.	0.003	149.45	1.527s
y-88	3591.11	898.04	15.	3.	0.002	238.68	1.534s
AC-228	3643.24	911.07	21.	22.	0.012	48.76	1.545s
AG-110M	3748.95	937.49	28.	-10.	-0.006	116.62	1.567s
PA-234	3783.07	946.02	56.	-19.	-0.011	86.79	1.574s
EU-152	3855.45	964.11	55.	-11.	-0.006	101.33	1.589s
AC-228	3874.90	968.97	67.	-2.	-0.001	700.21	1.593
EU-154	3984.36	996.33	0.	14.	0.008	26.95	1.616s
PA-234M	4003.04	1001.00	17.	4.	0.002	159.55	1.620s
EU-154	4018.15	1004.77	21.	0.	0.000	1000.00	1.623s
Co-56	4150.45	1037.84	10.	6.	0.003	122.85	1.650s
Cs-136	4191.39	1048.07	18.	6.	0.003	118.53	1.658s
RH-106	4200.55	1050.36	39.	-11.	-0.006	86.84	1.661s
Ga-68	4308.74	1077.40	5.	6.	0.003	93.64	1.683s
FE-59	4396.18	1099.25	20.	-1.	-0.001	988.26	1.700s
EU-152	4447.49	1112.07	80.	-13.	-0.007	98.85	1.711
ZN-65	4461.38	1115.55	66.	-5.	-0.003	214.37	1.713s
BI-214	4480.35	1120.29	62.	9.	0.005	126.30	1.717s
Sc-46	4481.41	1120.55	71.	-10.	-0.005	125.17	1.717s
Ta-182	4484.41	1121.30	83.	15.	0.008	92.07	1.718s
CO-60	4692.24	1173.24	25.	-8.	-0.004	141.88	1.760s
Ta-182	4755.52	1189.05	15.	-3.	-0.002	289.64	1.772s
Ta-182	4885.02	1221.41	37.	-14.	-0.008	100.43	1.798s
Co-56	4952.53	1238.28	6.	14.	0.008	45.27	1.812s
NA-22	5097.60	1274.53	11.	-2.	-0.001	287.75	1.840s
EU-154	5097.66	1274.54	12.	0.	0.000	1000.00	1.840s
FE-59	5165.90	1291.60	5.	6.	0.004	90.44	1.854s
TL-210	5251.56	1313.00	27.	-9.	-0.005	139.63	1.870s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CO-60	5329.61	1332.50	21.	-8.	-0.005	130.66	1.886s
AG-110M	5536.92	1384.30	5.	2.	0.001	324.35	1.926s
EU-152	5631.79	1408.00	11.	-4.	-0.002	172.46	1.944s
K-40	5842.51	1460.65	8.	266.	0.148	6.32	1.936
SB-124	6764.55	1690.98	0.	0.	0.000	1000.00	2.157s
BI-214	7058.84	1764.49	13.	2.	0.001	249.60	2.211s
Co-56	7086.31	1771.35	16.	-1.	0.000	848.53	2.216s
y-88	7345.39	1836.06	0.	0.	0.000	1000.00	2.262s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	Peak MDA Value Bq/Sample	COMMENTS
BE-7	C	-2.5948E+00				5.31E+01	
			477.60	-2.595E+00	?(	1.084E+01 1.22E+02	1.05E+01 G
NA-22	C	-1.0554E-01				9.50E+02	
			1274.53	-1.055E-01	?(	1.135E+00 2.88E+02	9.99E+01 G
K-40	N	1.7547E+02				4.66E+11	
			1460.83	1.755E+02	(P	1.046E+01 6.32E+00	1.07E+01 G
Sc-46	F	2.5516E-01				8.38E+01	
			889.28	2.552E-01	?(	1.333E+00 1.49E+02	1.00E+02 G
			1120.55	-5.635E-01	+	2.403E+00 1.25E+02	1.00E+02 G
CR-51	F	-3.2813E+00				2.77E+01	
			320.08	-3.281E+00	?(	1.180E+01 1.07E+02	9.94E+00 G
MN-54	C	1.2218E-01				3.12E+02	
			834.85	1.222E-01	?(	7.764E-01 2.51E+02	1.00E+02 G
FE-59	F	3.5688E-01				4.45E+01	
			1099.25	-9.993E-02	?(	2.353E+00 9.88E+02	5.65E+01 G
			1291.60	9.543E-01	?(	1.994E+00 9.04E+01	4.32E+01 G
Co-56	C	7.6957E-01				7.73E+01	
			846.77	1.699E-01	?(	7.851E-01 1.84E+02	9.99E+01 G
			1238.28	1.351E+00	?(P	1.285E+00 4.53E+01	6.61E+01 G
			1037.84	2.294E+00	?(	6.671E+00 1.23E+02	1.41E+01 G
			1771.35	-3.527E-01	+	1.119E+01 8.49E+02	1.55E+01 A

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CO-57	C	2.0050E-01					2.72E+02	
			122.06	2.005E-01	(	7.433E-01	1.10E+02	8.56E+01 G
			136.47	-1.250E-01	%	8.449E+00	1.97E+03	1.07E+01 G
CO-58	C	3.2366E-01					7.09E+01	
			810.78	3.237E-01	?(	1.029E+00	9.29E+01	9.95E+01 G
CO-60	F	-5.4600E-01					1.93E+03	
			1332.50	-5.460E-01	?(	1.588E+00	1.31E+02	1.00E+02 G
			1173.24	-4.754E-01	+	1.546E+00	1.42E+02	9.99E+01 G
ZN-65	F	-6.1948E-01					2.44E+02	
			1115.55	-6.195E-01	?(	4.594E+00	2.14E+02	5.06E+01 G
NB-94	I	2.4676E-01					7.41E+06	
			702.63	2.468E-01	&(	8.025E-01	1.29E+02	9.79E+01 G
			871.10	-2.683E-01	+	1.082E+00	1.16E+02	9.99E+01 G
ZR-95	I	3.7354E-01					6.40E+01	
			756.73	3.735E-01	&(P	1.536E+00	1.61E+02	5.45E+01 G
			724.20	0.000E+00	-	2.861E+00	1.00E+03	4.42E+01 G
NB-95	I	4.2563E-01					6.40E+01	
			765.79	4.256E-01	?(	1.209E+00	8.41E+01	9.98E+01 G
RU-103	I	4.4650E-01					3.93E+01	
			497.05	4.465E-01	?(	5.458E-01	5.08E+01	9.09E+01 G
			610.30	1.341E+00	?	3.946E+01	8.57E+02	5.75E+00 GA
RH-106	I	2.5782E+00					3.74E+02	
			621.92	2.578E+00	?(P	2.216E+01	2.52E+02	9.93E+00 G
			1050.36	-3.787E+01	+	1.110E+02	8.68E+01	1.56E+00 G
			511.86	1.165E+01	?	5.132E+00	2.50E+01	2.00E+01 GA
AG-108M	C	7.6798E-03					1.53E+05	
			433.94	7.680E-03	&(P	6.447E-01	2.93E+03	9.05E+01 G
			722.94	0.000E+00	-	1.389E+00	1.00E+03	9.08E+01 G
			614.28	0.000E+00	-	2.553E+00	1.00E+03	8.98E+01 G
AG-110M	F	2.5971E-01					2.50E+02	
			884.68	2.222E-01	?(	2.010E+00	2.56E+02	7.27E+01 G
			657.76	2.363E-01	?(	1.213E+00	1.48E+02	9.46E+01 G
			937.49	-1.455E+00	+	3.983E+00	1.17E+02	3.44E+01 G
			1384.30	4.630E-01	?(	3.743E+00	3.24E+02	2.43E+01 G
			763.94	-1.346E+00	&	6.467E+00	1.39E+02	2.23E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
SN-113	F 4.6160E-01					1.15E+02	
		391.69	4.616E-01	?(P	2.085E+00	1.33E+02	6.40E+01 G
SB-124	F 3.3139E-01					6.02E+01	
		602.73	3.260E-01	?(	2.166E+00	1.95E+02	9.83E+01 G
		1690.98	0.000E+00	-	1.218E+00	1.00E+03	4.78E+01 G
		722.79	3.804E-01	?(	1.152E+01	8.43E+02	1.08E+01 G
SB-125	I 8.4907E-01					1.01E+03	
		427.88	-9.466E-01	?(	2.791E+00	1.12E+02	2.96E+01 G
		600.50	1.547E+00	&(	1.088E+01	2.06E+02	1.79E+01 G
		635.89	2.871E+00	?(P	7.389E+00	7.67E+01	1.13E+01 G
		463.37	2.552E+00	&(	8.766E+00	1.01E+02	1.05E+01 G
I-131	I -1.6887E-01					8.02E+00	
		364.48	-2.855E-01	&(	9.881E-01	1.31E+02	8.17E+01 G
		284.30	0.000E+00	+	1.149E+01	1.00E+03	6.14E+00 G
		636.97	1.160E+00	&(	1.469E+01	3.54E+02	7.17E+00 G
Gd-153	F 4.4540E-01					2.42E+02	
		97.50	4.362E-01	&(	2.149E+00	1.45E+02	3.00E+01 G
		103.20	4.581E-01	&(	3.542E+00	2.27E+02	2.18E+01 G
Ga-68	C 1.1556E+01					4.71E-02	
		1077.40	1.156E+01	?(	2.593E+01	9.36E+01	3.30E+00 G
Tc-99m	I 1.0382E-02					2.51E-01	
		140.51	1.038E-02	%(	1.033E+00	2.90E+03	8.93E+01 G
BA-133	F -4.1342E-01					3.85E+03	
		356.00	-4.134E-01	&(	2.294E+00	1.63E+02	6.20E+01 G
		302.85	-8.557E-08	%	8.384E+00	2.86E+09	1.83E+01 G
		383.84	-3.910E+00	+ P	1.511E+01	8.51E+01	8.94E+00 GA
		80.99	-8.109E-01	+ P	2.345E+00	7.68E+01	3.41E+01 GA
CS-134	I 4.7972E-01					7.54E+02	
		604.71	3.294E-01	?(	2.248E+00	2.01E+02	9.76E+01 G
		795.87	3.453E-01	?(P	1.126E+00	9.51E+01	8.55E+01 G
		569.32	2.182E+00	?(	5.374E+00	7.36E+01	1.54E+01 G
		801.95	-5.780E+00	+	1.934E+01	9.89E+01	8.69E+00 G
		563.24	-4.947E-01	+ P	1.050E+01	7.63E+02	8.35E+00 G
CS-137	I 2.6441E-01					1.10E+04	
		661.66	2.644E-01	?(P	1.069E+00	1.16E+02	8.52E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CE-139	F	-1.9995E-01					1.38E+02	
			165.85	-2.000E-01	(	1.111E+00	1.64E+02	7.99E+01 G
Ba-140	I	-1.8177E-01					1.28E+01	
			537.26	-9.483E-01	?(	3.460E+00	1.42E+02	2.44E+01 G
			162.66	2.108E+00	@(	1.373E+01	1.91E+02	6.22E+00 G
			304.85	8.559E-01	&(	2.476E+01	8.32E+02	4.29E+00 G
La-140	I	4.0864E-01					1.28E+01	
			1596.21	2.636E-02	%(	1.092E+00	1.68E+03	9.54E+01 G
			487.02	4.440E-01	?(P	1.607E+00	1.40E+02	4.55E+01 G
			328.76	9.968E-01	?(P	2.818E+00	1.07E+02	2.03E+01 G
			815.77	1.393E+00	?(	5.076E+00	1.06E+02	2.33E+01 G
CE-141	I	3.9250E-01					3.25E+01	
			145.44	3.925E-01	?(	1.368E+00	1.03E+02	4.82E+01 G
PM-144	C	1.8857E-01					3.63E+02	
			696.54	1.886E-01	?(	8.935E-01	1.88E+02	9.90E+01 G
			618.06	0.000E+00	-	2.325E+00	1.00E+03	9.91E+01 G
EU-152	F	1.1475E-01					4.94E+03	
			344.29	-4.574E-01	?(P	5.607E+00	1.90E+02	2.65E+01 G
			1112.07	-5.554E+00	+	1.851E+01	9.88E+01	1.36E+01 G
			121.78	-8.124E-01	+	2.906E+00	1.07E+02	2.86E+01 G
			778.92	1.286E+00	?(P	6.594E+00	2.00E+02	1.29E+01 G
			964.11	-3.789E+00	+	1.302E+01	1.01E+02	1.46E+01 G
			244.69	-1.264E+00	+	1.769E+01	4.11E+02	7.58E+00 G
			1408.00	-1.238E+00	+ P	5.868E+00	1.72E+02	2.10E+01 GA
EU-154	I	4.2228E+00					3.14E+03	
			873.23	1.995E+00	&(	9.894E+00	1.42E+02	1.23E+01 G
			123.10	-5.142E-01	-	1.811E+00	1.05E+02	4.08E+01 G
			1274.54	0.000E+00	-	3.430E+00	1.00E+03	3.52E+01 G
			723.36	0.000E+00	-	6.241E+00	1.00E+03	2.02E+01 G
			1004.77	0.000E+00	-	6.993E+00	1.00E+03	1.80E+01 G
			996.33	6.801E+00	&(	3.641E+00	2.70E+01	1.06E+01 G
EU-155	I	-1.5042E-02					1.81E+03	
			105.31	-1.504E-02	%(P	3.723E+00	6.79E+03	2.12E+01 G
			86.54	-8.884E-01	&	4.677E+00	1.57E+02	3.07E+01 G
HF-181	F	3.4643E-01					4.24E+01	
			482.00	3.464E-01	?(	1.275E+00	1.08E+02	8.05E+01 G
			133.02	0.000E+00	-	2.113E+00	1.00E+03	4.33E+01 G
			345.83	2.349E-01	% P	9.924E+00	1.23E+03	1.51E+01 G
			136.30	0.000E+00	-	1.576E+01	1.00E+03	5.85E+00 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Ta-182	F 2.4041E+00					1.14E+02	
		1121.30	2.404E+00	?(	7.438E+00	9.21E+01	3.49E+01 G
		1221.41	-3.251E+00	+	7.072E+00	1.00E+02	2.70E+01 G
		1189.05	-1.111E+00	-	7.685E+00	2.90E+02	1.62E+01 G
Hg-203	F -3.9210E-01					4.66E+01	
		279.20	-3.921E-01	?(	1.301E+00	9.87E+01	8.15E+01 G
TL-208	N 9.6530E-01					6.98E+02	
		583.02	9.653E-01	*(P	9.274E-01	3.88E+01	8.45E+01 G
		277.28	-3.200E+00	- P	1.379E+01	1.41E+02	6.31E+00 G
		860.56	2.099E-01	& P	9.537E+00	1.85E+03	1.24E+01 G
pm-146	C 2.6925E-01					2.02E+03	
		747.16	1.653E-01	?(	2.037E+00	4.59E+02	3.40E+01 G
		735.72	9.877E-01	?(	3.042E+00	1.21E+02	2.25E+01 G
		453.88	7.495E-02	?(P	1.156E+00	5.83E+02	6.50E+01 G
y-88	F 1.7803E-01					1.07E+02	
		898.04	1.780E-01	?(P	1.058E+00	2.39E+02	9.37E+01 G
		1836.06	0.000E+00	-	6.260E-01	1.00E+03	9.92E+01 G
Cd-113m	-3.2085E+03					5.33E+03	
		263.70	-3.208E+03	?(	1.563E+04	1.43E+02	6.00E-03 K
Cd-109	F -7.1509E+00					4.53E+02	
		88.04	-7.151E+00	?(	3.521E+01	1.47E+02	3.79E+00 G
Cf-251	T -1.3960E+00					3.28E+05	
		176.60	-1.396E+00	&(	4.324E+00	1.14E+02	1.70E+01 G
		227.00	2.756E+00	&	9.518E+00	1.25E+02	6.30E+00 GA
Cf-249	T -2.3785E-01					1.28E+05	
		387.95	-4.715E-01	&(	2.170E+00	1.36E+02	6.60E+01 G
		333.44	7.564E-01	?(	5.086E+00	2.52E+02	1.55E+01 G
Sn-126	1.2466E+00					3.65E+07	
		87.57	-7.241E-01	+	3.649E+00	1.50E+02	3.75E+01 GA
		64.28	1.247E+00	?(	1.030E+01	2.42E+02	9.70E+00 G
		86.94	-3.011E+00	+	1.552E+01	1.54E+02	9.04E+00 GA
PB-210	N 4.6911E+00					8.14E+03	
		46.54	4.691E+00	(P	2.688E+01	1.92E+02	4.25E+00 G
PB-212	N 2.8437E+00					6.98E+02	
		238.63	2.844E+00	(P	1.437E+00	1.88E+01	4.33E+01 G
		300.03	-9.778E+00	- P	5.296E+01	6.75E+01	3.28E+00 GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PB-214	N	4.9855E+00					5.84E+05	
			351.93	5.241E+00	(P	1.352E+00	1.41E+01	3.76E+01 G
			295.09	4.488E+00	(P	2.556E+00	2.45E+01	1.93E+01 G
			242.00	6.020E+00		6.932E+00	3.76E+01	7.43E+00 GA
BI-207	C	-3.5284E-02					1.18E+04	
			569.70	-3.528E-02	?(	1.054E+00	8.31E+02	9.77E+01 G
			1063.66	1.245E-02	& P	1.570E+00	5.12E+03	7.45E+01 G
BI-212	N	4.5784E+00					6.98E+02	
			727.17	4.578E+00	?(	1.371E+01	8.81E+01	7.55E+00 G
			785.42	1.871E+01	? P	5.843E+01	1.20E+02	1.28E+00 GA
U-235	N	-6.2437E-01					2.57E+11	
			143.79	-6.244E-01	(P	8.360E+00	3.40E+02	1.10E+01 G
			205.33	-2.367E-01	& P	1.374E+01	2.06E+03	5.01E+00 G
			163.38	-5.141E-01	& P	1.611E+01	9.05E+02	5.08E+00 G
			185.72	-7.613E-01	+ P	1.686E+00	6.67E+01	5.40E+01 GA
BI-214	N	4.4206E+00					5.84E+05	
			609.31	4.727E+00	(P	1.926E+00	2.02E+01	4.61E+01 G
			1120.29	3.487E+00	?(P	1.500E+01	1.26E+02	1.51E+01 G
			1764.49	1.127E+00	- P	1.030E+01	2.50E+02	1.54E+01 G
BI-210M	T	2.3372E-01					1.10E+09	
			265.83	2.337E-01	?(P	1.884E+00	2.34E+02	5.00E+01 G
			304.90	0.000E+00	-	3.825E+00	1.00E+03	2.80E+01 G
AC-228	N	3.6530E+00					2.10E+03	
			911.07	3.653E+00	(P	4.090E+00	4.88E+01	2.90E+01 G
			968.97	-4.446E-01	- P	1.201E+01	7.00E+02	1.75E+01 G
			338.32	-3.116E+00	- P	1.119E+01	6.01E+01	1.20E+01 G
			93.35	-3.118E-01	%	2.332E+01	2.21E+03	5.56E+00 XA
TH-227	N	-4.3647E+00					7.95E+03	
			50.14	-4.365E+00	?(	1.383E+01	1.11E+02	8.00E+00 G
			256.24	-1.782E+00	+ P	9.982E+00	1.96E+02	7.00E+00 G
TH-229	N	-3.6617E-01					2.68E+06	
			193.51	-3.662E-01	%(	1.625E+01	1.59E+03	4.40E+00 G
			210.85	-7.425E+00	+	2.535E+01	1.26E+02	2.99E+00 G
TH-234	N	8.9515E+00					1.63E+12	
			63.29	6.578E+00	(P	1.918E+01	9.35E+01	3.81E+00 G
			92.59	1.057E+01	(P	1.096E+01	3.78E+01	5.58E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PA-231	N	-5.4439E-07					1.20E+07	
			302.65	-5.444E-07	%(	5.334E+01	2.86E+09	2.88E+00 G
			300.07	-1.245E+01	+	6.876E+01	1.64E+02	2.46E+00 G
PA-233	C	6.4836E-01					7.82E+08	
			312.01	6.484E-01	?(P	2.735E+00	1.24E+02	3.60E+01 G
			300.18	-1.385E-01	&	2.466E+01	5.19E+03	6.20E+00 G
PA-234	N	8.4225E-01					1.63E+12	
			131.29	-6.961E-01	?(	4.948E+00	2.10E+02	1.80E+01 G
			946.02	-7.126E+00	+	1.412E+01	8.68E+01	1.34E+01 G
			569.47	-7.294E-01	+	1.269E+01	4.86E+02	8.20E+00 G
			883.24	3.727E+00	?(	1.366E+01	1.07E+02	9.60E+00 G
			880.53	5.940E+00	?	1.899E+01	9.35E+01	6.00E+00 GA
PA-234M	N	3.4610E+01					1.63E+12	
			1001.00	2.433E+01	?(P	1.369E+02	1.60E+02	8.37E-01 G
			766.41	6.388E+01	?(P	2.491E+02	1.11E+02	2.94E-01 G
AM-241	T	-8.8254E-01					1.58E+05	
			59.54	-8.825E-01	?(	2.746E+00	1.09E+02	3.59E+01 G
Np-237	F	-2.0820E+00					2.14E+06	
			86.49	-2.082E+00	&(	1.119E+01	1.60E+02	1.31E+01 G
Ir-192	F	-4.3338E-02					7.40E+01	
			316.49	-3.467E-01	?(	1.196E+00	1.02E+02	8.70E+01 G
			468.06	4.669E-01	?(	1.809E+00	1.13E+02	5.18E+01 G
			308.44	0.000E+00	&	3.401E+00	1.00E+03	3.18E+01 G
Cs-136	F	2.9428E-01					1.30E+01	
			818.50	2.303E-01	?(	1.157E+00	1.43E+02	1.00E+02 G
			1048.07	3.743E-01	?(	1.548E+00	1.19E+02	8.00E+01 G
			340.57	-7.162E-01	+	3.003E+00	1.24E+02	4.69E+01 G
Np-239	T	-1.3337E-01					2.36E+00	
			103.70	0.000E+00	+	3.293E+00	1.00E+03	2.40E+01 X
			106.13	-1.334E-01	?(	3.377E+00	7.36E+02	2.27E+01 G
			99.50	-8.389E-01	+	5.306E+00	1.86E+02	1.50E+01 X
Nd-147		-1.0080E+00					1.11E+01	
			531.00	-1.008E+00	?(	7.326E+00	2.81E+02	1.30E+01 G
			91.10	-9.277E-01	+	4.517E+00	1.45E+02	2.83E+01 G
TL-210	N	3.1982E-01					5.84E+05	
			799.60	3.198E-01	?(	1.133E+00	1.03E+02	9.90E+01 G
			296.00	-3.825E-01	+	2.229E+00	1.73E+02	7.90E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1313.00-2.673E+00 +	8.257E+00	1.40E+02	2.10E+01	GA

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

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********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
TH-227	50.14	90.	-15.	-0.008	110.90	-4.365E+00	
AM-241	59.54	114.	-17.	-0.009	109.32	-8.825E-01	
Sn-126	64.28	140.	7.	0.004	242.02	1.247E+00	
BA-133	80.99	130.	-19.	-0.011	76.83	-8.109E-01	P
Np-237	86.49	493.	-20.	-0.011	160.46	-2.082E+00	
EU-155	86.54	473.	-20.	-0.011	157.23	-8.884E-01	
Sn-126	86.94	453.	-20.	-0.011	153.94	-3.011E+00	
Sn-126	87.57	434.	-20.	-0.011	150.49	-7.241E-01	
Cd-109	88.04	414.	-20.	-0.011	147.01	-7.151E+00	
Nd-147	91.10	390.	-19.	-0.011	145.32	-9.277E-01	
Gd-153	97.50	98.	10.	0.006	144.74	4.362E-01	
Np-239	99.50	155.	-10.	-0.005	186.19	-8.389E-01	
Gd-153	103.20	147.	8.	0.004	226.80	4.581E-01	
Np-239	106.13	146.	-2.	-0.001	736.10	-1.334E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
EU-152	121.78	173.	-18.	-0.010	106.62	-8.124E-01		
CO-57	122.06	99.	13.	0.007	109.79	2.005E-01		
EU-154	123.10	135.	-16.	-0.009	104.79	-5.142E-01		
PA-234	131.29	194.	-10.	-0.005	209.60	-6.961E-01		
U-235	143.79	192.	-5.	-0.003	339.63	-6.244E-01	P	
CE-141	145.44	95.	14.	0.008	103.38	3.925E-01		
Ba-140	162.66	144.	9.	0.005	191.49	2.108E+00		
U-235	163.38	131.	-2.	-0.001	905.28	-5.141E-01	P	
CE-139	165.85	157.	-11.	-0.006	163.89	-2.000E-01		
Cf-251	176.60	97.	-16.	-0.009	114.50	-1.396E+00		
U-235	185.72	141.	-26.	-0.015	66.69	-7.613E-01	P	
TH-229	210.85	80.	-13.	-0.007	125.54	-7.425E+00		
Cf-251	227.00	43.	10.	0.005	125.38	2.756E+00		
EU-152	244.69	214.	-5.	-0.003	410.93	-1.264E+00		
TH-227	256.24	50.	-6.	-0.004	195.88	-1.782E+00	P	
Cd-113m	263.70	91.	-10.	-0.005	142.97	-3.208E+03		
BI-210M	265.83	90.	6.	0.003	234.40	2.337E-01	P	
Hg-203	279.20	108.	-15.	-0.009	98.68	-3.921E-01		
TL-210	296.00	286.	-14.	-0.008	173.04	-3.825E-01		
PA-231	300.07	258.	-14.	-0.008	163.98	-1.245E+01		
Ba-140	304.85	95.	2.	0.001	832.11	8.559E-01		
PA-233	312.01	78.	10.	0.006	124.14	6.484E-01	P	
Ir-192	316.49	86.	-13.	-0.007	102.23	-3.467E-01		
CR-51	320.08	109.	-14.	-0.008	106.69	-3.281E+00		
La-140	328.76	22.	9.	0.005	106.58	9.968E-01	P	
Cf-249	333.44	44.	5.	0.003	252.19	7.564E-01		
AC-228	338.32	134.	-16.	-0.009	60.14	-3.116E+00	P	
Cs-136	340.57	147.	-14.	-0.008	124.28	-7.162E-01		
EU-152	344.29	161.	-5.	-0.003	189.92	-4.574E-01	P	
BA-133	356.00	140.	-10.	-0.006	163.45	-4.134E-01		
I-131	364.48	40.	-9.	-0.005	131.44	-2.855E-01		
BA-133	383.84	112.	-13.	-0.007	85.13	-3.910E+00	P	
Cf-249	387.95	125.	-12.	-0.007	135.90	-4.715E-01		
SN-113	391.69	106.	11.	0.006	133.18	4.616E-01	P	
SB-125	427.88	33.	-10.	-0.006	112.03	-9.466E-01		
pm-146	453.88	24.	2.	0.001	583.24	7.495E-02	P	
SB-125	463.37	37.	9.	0.005	100.78	2.552E+00		
Ir-192	468.06	38.	8.	0.004	113.00	4.669E-01		
BE-7	477.59	56.	-9.	-0.005	122.22	-2.595E+00		
HF-181	482.00	44.	9.	0.005	107.90	3.464E-01		
La-140	487.02	20.	7.	0.004	139.77	4.440E-01	P	
RU-103	497.05	8.	13.	0.007	50.83	4.465E-01		
RH-106	511.86	40.	73.	0.041	24.98	1.165E+01		
Nd-147	531.00	32.	-4.	-0.002	281.37	-1.008E+00		
Ba-140	537.26	24.	-7.	-0.004	142.14	-9.483E-01		
CS-134	563.24	24.	-1.	-0.001	762.99	-4.947E-01	P	
CS-134	569.32	21.	10.	0.005	73.65	2.182E+00		
PA-234	569.47	35.	-2.	-0.001	486.40	-7.294E-01		

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
BI-207	569.70	34.	-1.	-0.001	830.66	-3.528E-02		
SB-125	600.50	122.	8.	0.004	206.02	1.547E+00		
SB-124	602.73	147.	9.	0.005	195.32	3.260E-01		
CS-134	604.71	156.	9.	0.005	200.72	3.294E-01		
RU-103	610.30	165.	2.	0.001	857.20	1.341E+00		
RH-106	621.92	150.	7.	0.004	251.97	2.578E+00		P
SB-125	635.89	18.	9.	0.005	76.71	2.871E+00		P
I-131	636.97	30.	2.	0.001	353.88	1.160E+00		
AG-110M	657.76	34.	6.	0.003	147.63	2.363E-01		
CS-137	661.66	20.	6.	0.003	116.43	2.644E-01		P
PM-144	696.54	17.	5.	0.003	187.90	1.886E-01		
NB-94	702.63	13.	6.	0.003	129.28	2.468E-01		
SB-124	722.79	35.	1.	0.001	842.61	3.804E-01		
BI-212	727.17	23.	8.	0.005	88.11	4.578E+00		
pm-146	735.72	9.	5.	0.003	120.71	9.877E-01		
pm-146	747.16	9.	1.	0.001	458.94	1.653E-01		
ZR-95	756.73	13.	5.	0.003	161.35	3.735E-01		P
AG-110M	763.94	44.	-7.	-0.004	139.24	-1.346E+00		
NB-95	765.79	30.	10.	0.005	84.10	4.256E-01		
PA-234M	766.41	9.	4.	0.002	110.82	6.388E+01		P
EU-152	778.92	13.	4.	0.002	199.72	1.286E+00		P
BI-212	785.42	10.	5.	0.003	120.39	1.871E+01		P
CS-134	795.87	17.	7.	0.004	95.06	3.453E-01		P
TL-210	799.60	23.	7.	0.004	103.01	3.198E-01		
CS-134	801.95	57.	-11.	-0.006	98.86	-5.780E+00		
CO-58	810.78	19.	7.	0.004	92.88	3.237E-01		
La-140	815.77	26.	7.	0.004	105.92	1.393E+00		
Cs-136	818.50	24.	5.	0.003	143.41	2.303E-01		
MN-54	834.85	9.	3.	0.001	250.62	1.222E-01		
Co-56	846.77	9.	4.	0.002	184.30	1.699E-01		
NB-94	871.10	19.	-6.	-0.003	115.72	-2.683E-01		
EU-154	873.23	24.	5.	0.003	141.57	1.995E+00		
PA-234	880.53	21.	7.	0.004	93.48	5.940E+00		
PA-234	883.24	28.	7.	0.004	106.69	3.727E+00		
AG-110M	884.68	36.	3.	0.002	255.95	2.222E-01		
Sc-46	889.28	29.	5.	0.003	149.45	2.552E-01		
y-88	898.04	15.	3.	0.002	238.68	1.780E-01		P
AC-228	911.07	21.	22.	0.012	48.76	3.653E+00		P
AG-110M	937.49	28.	-10.	-0.006	116.62	-1.455E+00		
PA-234	946.02	56.	-19.	-0.011	86.79	-7.126E+00		
EU-152	964.11	55.	-11.	-0.006	101.33	-3.789E+00		
AC-228	968.97	67.	-2.	-0.001	700.21	-4.446E-01		P
EU-154	996.33	0.	14.	0.008	26.95	6.801E+00		
PA-234M	1001.00	17.	4.	0.002	159.55	2.433E+01		P
Co-56	1037.84	10.	6.	0.003	122.85	2.294E+00		
Cs-136	1048.07	18.	6.	0.003	118.53	3.743E-01		
RH-106	1050.36	39.	-11.	-0.006	86.84	-3.787E+01		
Ga-68	1077.40	5.	6.	0.003	93.64	1.156E+01		

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
FE-59	1099.25	20.	-1.	-0.001	988.26	-9.993E-02		
EU-152	1112.07	80.	-13.	-0.007	98.85	-5.554E+00		
ZN-65	1115.55	66.	-5.	-0.003	214.37	-6.195E-01		
Sc-46	1120.55	71.	-10.	-0.005	125.17	-5.635E-01		
CO-60	1173.24	25.	-8.	-0.004	141.88	-4.754E-01		
Co-56	1238.28	6.	14.	0.008	45.27	1.351E+00	P	
NA-22	1274.53	11.	-2.	-0.001	287.75	-1.055E-01		
FE-59	1291.60	5.	6.	0.004	90.44	9.543E-01		
TL-210	1313.00	27.	-9.	-0.005	139.63	-2.673E+00		
CO-60	1332.50	21.	-8.	-0.005	130.66	-5.460E-01		
AG-110M	1384.30	5.	2.	0.001	324.35	4.630E-01		
EU-152	1408.00	11.	-4.	-0.002	172.46	-1.238E+00	P	
Co-56	1771.35	16.	-1.	0.000	848.53	-3.527E-01		

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

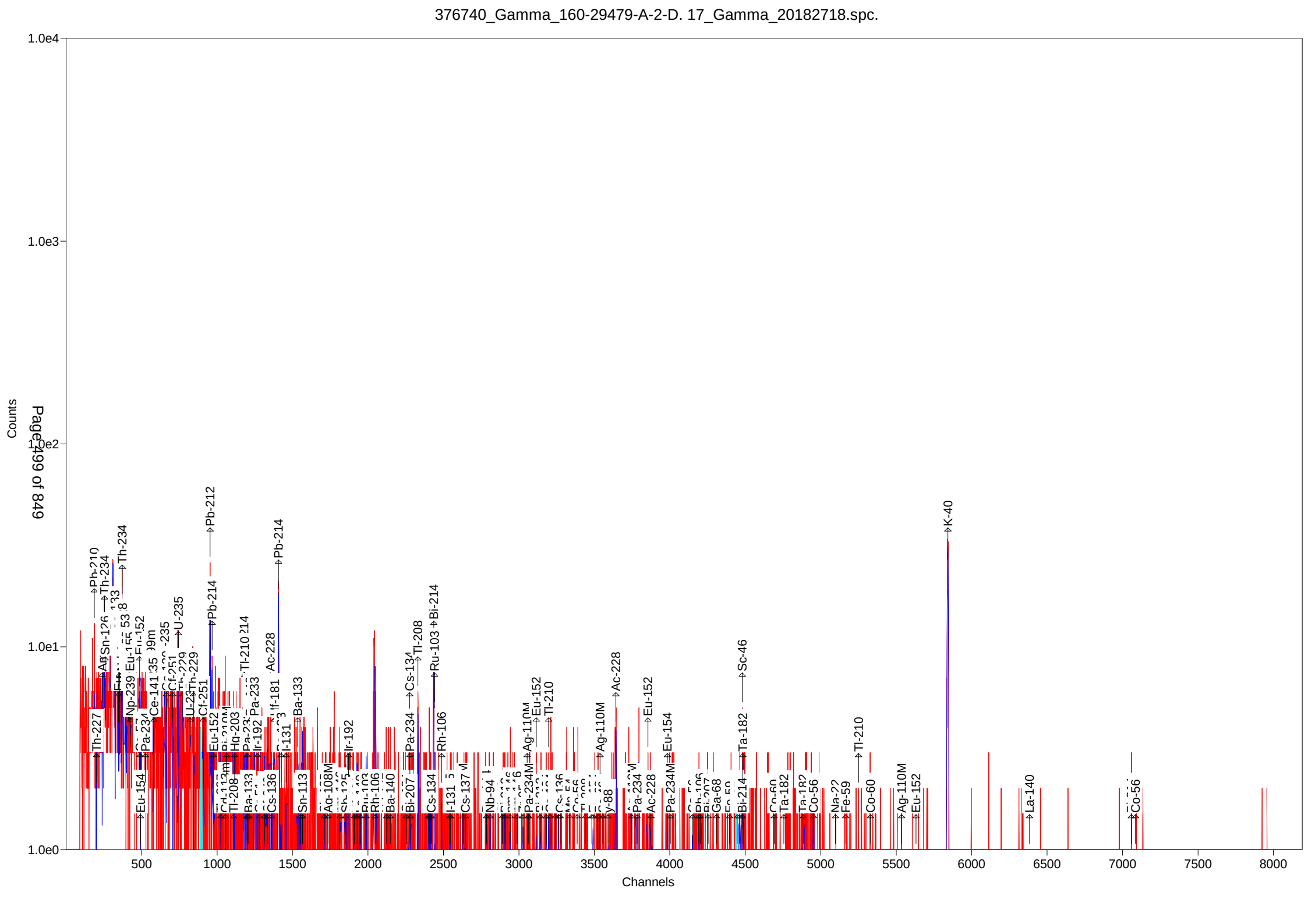
Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
BE-7	#A	-2.5948E+00	-2.5948E+00	1.222E+02%	1.08E+01
NA-22	#A	-1.0554E-01	-1.0554E-01	2.877E+02%	1.14E+00
K-40		1.7547E+02	1.7547E+02	6.317E+00%	1.05E+01
Sc-46	#A	2.5516E-01	2.5516E-01	1.494E+02%	1.33E+00
CR-51	#A	-3.2813E+00	-3.2813E+00	1.067E+02%	1.18E+01
MN-54	#A	1.2218E-01	1.2218E-01	2.506E+02%	7.76E-01
FE-59	#A	3.5688E-01	3.5688E-01	9.044E+01%	2.35E+00
Co-56	#A	7.6956E-01	7.6957E-01	4.527E+01%	7.85E-01
CO-57	#A	2.0050E-01	2.0050E-01	1.098E+02%	7.43E-01
CO-58	#A	3.2366E-01	3.2366E-01	9.288E+01%	1.03E+00
CO-60	#A	-5.4600E-01	-5.4600E-01	1.307E+02%	1.59E+00
ZN-65	#A	-6.1948E-01	-6.1948E-01	2.144E+02%	4.59E+00
NB-94	#A	2.4676E-01	2.4676E-01	1.293E+02%	8.02E-01
ZR-95	#A	3.7354E-01	3.7354E-01	1.614E+02%	1.54E+00
NB-95	#A	4.2562E-01	4.2563E-01	8.410E+01%	1.21E+00
RU-103	#A	4.4650E-01	4.4650E-01	5.083E+01%	5.46E-01
RH-106	#A	2.5782E+00	2.5782E+00	2.520E+02%	2.22E+01
AG-108M	#A	7.6798E-03	7.6798E-03	2.935E+03%	6.45E-01
AG-110M	#A	2.5971E-01	2.5971E-01	1.463E+02%	2.01E+00
SN-113	#A	4.6160E-01	4.6160E-01	1.332E+02%	2.08E+00
SB-124	#A	3.3139E-01	3.3139E-01	1.953E+02%	2.17E+00
SB-125	#A	8.4907E-01	8.4907E-01	6.663E+01%	2.79E+00
I-131	#A	-1.6887E-01	-1.6887E-01	1.314E+02%	9.88E-01
Gd-153	#A	4.4540E-01	4.4540E-01	1.345E+02%	2.15E+00
Ga-68	#A	1.1496E+01	1.1556E+01	9.364E+01%	2.59E+01
Tc-99m	#A	1.0371E-02	1.0382E-02	2.898E+03%	1.03E+00
BA-133	#A	-4.1342E-01	-4.1342E-01	1.635E+02%	2.29E+00

CS-134 #A	4.7972E-01	4.7972E-01	7.365E+01%		2.25E+00
CS-137 #A	2.6441E-01	2.6441E-01	1.164E+02%		1.07E+00
CE-139 #A	-1.9995E-01	-1.9995E-01	1.639E+02%		1.11E+00
Ba-140 #A	-1.8176E-01	-1.8177E-01	1.421E+02%		3.46E+00
La-140 #A	4.0863E-01	4.0864E-01	1.059E+02%		1.09E+00
CE-141 #A	3.9250E-01	3.9250E-01	1.034E+02%		1.37E+00
CE-144 #A	0.0000E+00	0.0000E+00	1.000E+03%		8.26E+00
PM-144 #A	1.8857E-01	1.8857E-01	1.879E+02%		8.93E-01
EU-152 #A	1.1475E-01	1.1475E-01	1.378E+02%		5.61E+00
EU-154 #A	4.2228E+00	4.2228E+00	2.695E+01%		9.89E+00
EU-155 #A	-1.5042E-02	-1.5042E-02	6.787E+03%		3.72E+00
HF-181 #A	3.4643E-01	3.4643E-01	1.079E+02%		1.28E+00
Ta-182 #A	2.4041E+00	2.4041E+00	9.207E+01%		7.44E+00
Hg-203 #A	-3.9210E-01	-3.9210E-01	9.868E+01%		1.30E+00
TL-208 #	9.6530E-01	9.6530E-01	3.884E+01%		9.27E-01
pm-146 #A	2.6925E-01	2.6925E-01	1.207E+02%		2.04E+00
y-88 #A	1.7803E-01	1.7803E-01	2.387E+02%		1.06E+00
Cd-113m#A	-3.2085E+03	-3.2085E+03	1.430E+02%		1.56E+04
Cd-109 #A	-7.1509E+00	-7.1509E+00	1.470E+02%		3.52E+01
Cf-251 #A	-1.3960E+00	-1.3960E+00	1.145E+02%		4.32E+00
Cf-249 #A	-2.3785E-01	-2.3785E-01	1.359E+02%		2.17E+00
Sn-126 #A	1.2466E+00	1.2466E+00	2.420E+02%		1.03E+01
PB-210 A	4.6911E+00	4.6911E+00	1.924E+02%		2.69E+01
PB-212	2.8437E+00	2.8437E+00	1.881E+01%		1.44E+00
PB-214	4.9855E+00	4.9855E+00	1.413E+01%		1.35E+00
BI-207 #A	-3.5284E-02	-3.5284E-02	8.307E+02%		1.05E+00
BI-212 #A	4.5784E+00	4.5784E+00	8.811E+01%		1.37E+01
U-235 #A	-6.2437E-01	-6.2437E-01	3.396E+02%		8.36E+00
BI-214	4.4206E+00	4.4206E+00	2.024E+01%		1.93E+00
BI-210M#A	2.3372E-01	2.3372E-01	2.344E+02%		1.88E+00
AC-228 #A	3.6530E+00	3.6530E+00	4.876E+01%		4.09E+00
TH-227 #A	-4.3647E+00	-4.3647E+00	1.109E+02%		1.38E+01
TH-229 #A	-3.6617E-01	-3.6617E-01	1.595E+03%		1.63E+01
TH-234 A	8.9515E+00	8.9515E+00	3.778E+01%		1.92E+01
PA-231 #A	-5.4439E-07	-5.4439E-07	2.858E+09%		5.33E+01
PA-233 #A	6.4836E-01	6.4836E-01	1.241E+02%		2.74E+00
PA-234 #A	8.4225E-01	8.4225E-01	1.067E+02%		4.95E+00
PA-234M#A	3.4610E+01	3.4610E+01	9.713E+01%		1.37E+02
AM-241 #A	-8.8254E-01	-8.8254E-01	1.093E+02%		2.75E+00
Np-237 #A	-2.0820E+00	-2.0820E+00	1.605E+02%		1.12E+01
Ir-192 #A	-4.3338E-02	-4.3338E-02	7.619E+01%		1.20E+00
Cs-136 #A	2.9427E-01	2.9428E-01	9.303E+01%		1.16E+00
Np-239 #A	-1.3336E-01	-1.3337E-01	7.361E+02%		3.38E+00
Nd-147 #A	-1.0079E+00	-1.0080E+00	2.814E+02%		7.33E+00
TL-210 #A	3.1982E-01	3.1982E-01	1.030E+02%		1.13E+00

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (25.1 to 1999.5 keV) 1.877E+02 Bq/Sample
Total Decayed Activity (25.1 to 1999.5 keV) 1.8772200E+02 Bq/Sample


376740_Gamma_160-29479-A-2-D. 17_Gamma_20182718.spc.
Counts
Channels
1.0e4
1.0e3
1.0e2
1.0e1
1.0e0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
7500
8000
Pb-212
Pb-214
Th-234
Ac-228
U-235
Bi-214
Tl-208
Ru-103
Sc-46
K-40
Ag-110M
Eu-152
Tl-210
Co-60
Co-56
La-140

Test America St. Louis Spectrum ID: 9_Gamma_20183355

Sample Description: 376740_Gamma_160-29479-A-2-E DU
Detector: Detector # 9
Batch ID: 376740
Work Order Number: Gamma
Lot Number: 160-29479-A-2-E DU

Decay to Time: 8/9/2018 06:34 Live Time: 1800 sec
Acquisition Time: 8/9/2018 06:35:06 Real Time: 1803 sec
Analysis Time: 8/9/2018 07:05 Dead Time: 0.17 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 9_Soil_TunaCan.Clb
Efficiency Cal Desc: 9_Soil_TunaCan_90099_050312
Efficiency Cal Date: 6/14/2012 10:19
Energy Cal Date: 3/1/2012 13:57
Library: Client_Long_Rev14.lib
Bkgd Correction File: 9_2018-07-14_1810.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	-3.513E+00	100.9	3.545E+00	3.549E+00	1.192E+01
NA-22	5.108E-02	591.6	3.022E-01	3.022E-01	1.120E+00
K-40	1.777E+02	5.6	9.961E+00	1.349E+01	8.205E+00
Sc-46	1.351E-01	290.8	3.931E-01	3.931E-01	1.377E+00
CR-51	2.520E+00	164.4	4.142E+00	4.144E+00	1.396E+01
MN-54	3.663E-02	988.3	3.620E-01	3.620E-01	8.626E-01
FE-59	3.201E-01	233.8	7.481E-01	7.483E-01	1.715E+00
Co-56	8.009E-01	35.7	2.862E-01	2.891E-01	9.636E-01
CO-57	-7.343E-02	223.6	1.642E-01	1.642E-01	5.651E-01
CO-58	-3.600E-01	103.9	3.742E-01	3.746E-01	1.272E+00
CO-60	3.604E-01	91.3	3.290E-01	3.295E-01	7.463E-01
ZN-65	1.942E-01	519.9	1.010E+00	1.010E+00	3.544E+00
NB-94	3.504E-01	98.1	3.438E-01	3.442E-01	1.164E+00
ZR-95	4.893E-01	95.9	4.692E-01	4.699E-01	1.095E+00
NB-95	-5.849E-01	68.7	4.021E-01	4.033E-01	1.333E+00
RU-103	-1.458E-01	215.2	3.138E-01	3.138E-01	7.757E-01
RH-106	1.270E+00	166.1	2.110E+00	2.111E+00	1.905E+01
AG-108M	9.728E-02	201.6	1.961E-01	1.962E-01	6.591E-01
AG-110M	4.137E-01	83.7	3.464E-01	3.470E-01	1.268E+00
SN-113	1.539E-01	265.2	4.081E-01	4.082E-01	1.412E+00
SB-124	4.598E-01	109.4	5.030E-01	5.035E-01	1.664E+00
SB-125	1.498E+00	35.7	5.355E-01	5.410E-01	1.242E+00
I-131	2.587E-01	95.9	2.481E-01	2.485E-01	6.269E-01
Gd-153	3.224E-01	119.8	3.860E-01	3.865E-01	3.745E+00
Ga-68	3.709E+00	324.8	1.205E+01	1.205E+01	2.850E+01
Tc-99m	-2.819E-01	156.5	4.411E-01	4.413E-01	1.474E+00
BA-133	-2.304E-02	121.2	2.793E-02	2.795E-02	1.999E+00
CS-134	4.593E-01	60.0	2.755E-01	2.766E-01	1.730E+00
CS-137	-1.286E-02	3201.0	4.117E-01	4.117E-01	1.312E+00
CE-139	2.338E-01	107.4	2.512E-01	2.522E-01	8.448E-01
Ba-140	2.273E-01	127.6	2.900E-01	2.903E-01	2.632E+00
La-140	1.521E-02	146.8	2.233E-02	2.234E-02	1.220E+00
CE-141	4.187E-01	167.2	7.000E-01	7.003E-01	2.346E+00

CE-144	-2.146E+00	148.6	3.189E+00	3.191E+00	1.066E+01
PM-144	-4.710E-01	78.4	3.692E-01	3.700E-01	1.302E+00
EU-152	8.850E-01	72.0	6.376E-01	6.393E-01	4.658E+00
EU-154	2.608E+00	68.8	1.796E+00	1.801E+00	5.962E+00
EU-155	-1.643E-02	5613.1	9.221E-01	9.221E-01	3.318E+00
HF-181	-4.860E-01	103.5	5.031E-01	5.037E-01	1.691E+00
Ta-182	2.044E+00	69.1	1.413E+00	1.417E+00	4.710E+00
Hg-203	-3.436E-01	85.5	2.937E-01	2.944E-01	9.829E-01
TL-208	1.059E+00	46.4	4.916E-01	4.947E-01	8.150E-01
pm-146	5.937E-01	138.4	8.220E-01	8.226E-01	1.994E+00
y-88	3.074E-01	102.6	3.153E-01	3.157E-01	7.540E-01
Cd-113m	3.841E+03	85.9	3.298E+03	3.307E+03	1.107E+04
Cd-109	0.000E+00	1.#INF	8.977E+00	8.977E+00	3.037E+01
Cf-251	-6.227E-01	196.8	1.226E+00	1.227E+00	3.202E+00
Cf-249	2.879E-01	122.4	3.524E-01	3.527E-01	1.203E+00
Sn-126	1.919E+00	160.3	3.077E+00	3.079E+00	1.038E+01
PB-210	-5.581E+00	157.2	8.772E+00	8.779E+00	2.974E+01
PB-212	2.587E+00	15.5	4.020E-01	4.355E-01	9.817E-01
PB-214	5.649E+00	11.8	6.660E-01	7.278E-01	1.061E+00
BI-207	-7.820E-02	268.0	2.096E-01	2.096E-01	7.786E-01
BI-212	2.430E+00	107.6	2.616E+00	2.619E+00	9.106E+00
U-235	-2.223E+00	85.0	1.889E+00	1.893E+00	1.198E+01
BI-214	3.612E+00	18.4	6.657E-01	6.916E-01	1.497E+00
BI-210M	-1.515E-02	2685.3	4.068E-01	4.068E-01	1.425E+00
AC-228	2.556E+00	43.2	1.104E+00	1.111E+00	2.357E+00
TH-227	0.000E+00	1.#INF	2.272E+00	2.272E+00	1.454E+01
TH-229	4.523E+00	86.0	3.891E+00	3.907E+00	1.182E+01
TH-234	6.553E+00	109.0	7.146E+00	7.154E+00	2.398E+01
PA-231	7.390E+00	179.1	1.323E+01	1.324E+01	4.469E+01
PA-233	-1.271E-01	111.3	1.414E-01	1.416E-01	4.127E+00
PA-234	8.530E-01	84.3	7.191E-01	7.205E-01	6.264E+00
PA-234M	-8.508E+01	45.4	3.862E+01	3.885E+01	2.382E+02
AM-241	-9.157E-01	108.7	9.952E-01	9.964E-01	3.329E+00
Np-237	0.000E+00	1.#INF	2.867E+00	2.867E+00	9.599E+00
Ir-192	1.747E-02	103.1	1.801E-02	1.804E-02	1.682E+00
Cs-136	4.199E-01	90.8	3.811E-01	3.819E-01	1.286E+00
Np-239	-3.986E-01	229.6	9.152E-01	9.155E-01	3.107E+00
Nd-147	1.737E+00	91.5	1.590E+00	1.593E+00	3.914E+00
TL-210	2.320E-01	98.1	2.276E-01	2.280E-01	7.441E-01
Total	4.081E+03				

Analyst: kody Saulters

TestAmerica Inc Spectrum name: 9_Gamma_20183355.An1

Sample description
376740_Gamma_160-29479-A-2-E DU

Spectrum Filename: C:\User\SPC\Det9\9_Gamma_20183355.An1

Acquisition information
Start time:	8/9/2018 6:35:06 AM
Live time:	1800
Real time:	1803
Dead time:	0.17 %
Detector ID:	9

Detector system
Ge9 S/N100228730

Calibration
Filename: 9_Soil_TunaCan.Clb
9_Soil_TunaCan_90099_050312

Energy Calibration
Created:	3/1/2012 1:57:17 PM
Zero offset:	0.074 keV
Gain:	0.250 keV/channel
Quadratic:	-2.269E-08 keV/channel^2

Efficiency Calibration
Created:	6/14/2012 10:19:51 AM
Knee Energy:	165.85 keV
Above the Knee:	Quadratic Uncertainty = 1.30 %
Log(Eff):	-8.079856E-01 + (-2.367265E-01*Log(E)) + (-3.950640E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 1.42 %
Log(Eff):	-2.387916E+01 + (8.875647E+00*Log(E)) + (-9.401100E-01*Log(E)^2)

Library Files
Main analysis library:	Client_Long_Rev14.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters
Analysis engine:	Env32 G800W064
Start channel:	100 (25.08keV)
Stop channel:	8000 (1999.34keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	8/9/2018 6:34:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	9_2018-07-14_1810.PBC 7/14/2018 6:10:12 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 20 cutoff: 5.00E+01 %

Energy Calibration

Normalized diff: 0.1657

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
63.29	18.	109.04	1.01	3.921E-02	63.29	3.810	PBC<MDA	TH234
64.28	13.	160.32	1.02	3.987E-02	64.28	9.700	PBC<MDA	Sn126
77.25	94.	18.16	0.97	4.682E-02				
87.62	30.	40.25	1.04	5.038E-02	87.57	37.500	PBC<MDA	Sn126
93.04	17.	187.06	1.04	5.171E-02	92.59	5.584	PBC<MDA	TH234
					93.35	5.561	3.220E+00	AC228
99.50	16.	114.77	1.05	5.266E-02	99.50	15.000	PBC<MDA	Np239
103.20	16.	119.76	1.05	5.303E-02	103.20	21.800	PBC<MDA	Gd153
					103.70	24.000	6.954E-01	Np239
121.78	10.	144.73	1.07	5.305E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	1.265E-01	CO57
145.44	18.	167.17	1.09	5.012E-02	145.44	48.200	PBC<MDA	CE141
165.85	16.	107.44	1.11	4.736E-02	165.85	79.900	PBC<MDA	CE139
185.72	39.	36.50	1.13	4.403E-02	185.72	54.000	9.191E-01	U235
193.51	15.	105.56	1.14	4.287E-02	193.51	4.400	PBC<MDA	TH229
205.33	3.	395.81	1.15	4.123E-02	205.33	5.010	PBC<MDA	U235
210.85	10.	135.84	1.15	4.052E-02	210.85	2.990	PBC<MDA	TH229
238.42	76.	17.70	0.53	3.734E-02	238.63	43.300	2.613E+00	PB212
241.74	29.	31.93	1.18	3.697E-02	242.00	7.430	5.792E+00	PB214
263.70	14.	85.87	1.20	3.489E-02	263.70	0.006	PBC<MDA	Cd113m
277.28	13.	85.41	1.21	3.372E-02	277.28	6.310	PBC<MDA	TL208
295.01	7.	283.68	1.23	3.232E-02	295.09	19.300	PBC<MDA	PB214

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
296.00	12.	166.42	1.23	3.225E-02	296.00	79.000	PBC<MDA	TL210
300.00	1.	632.46	1.24	3.195E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	8.854E-01	PA231
					300.18	6.200	3.514E-01	PA233
300.18	12.	178.32	1.24	3.194E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	8.585E+00	PA231
					300.18	6.200	3.407E+00	PA233
302.57	12.	179.09	1.24	3.176E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	1.162E+00	BA133
302.85	12.	183.59	1.24	3.175E-02	302.65	2.880	7.391E+00	PA231
					302.85	18.330	1.162E+00	BA133
304.85	12.	187.74	1.24	3.160E-02	304.85	4.290	PBC<MDA	Ba140
					304.90	28.000	7.652E-01	BI210M
320.08	14.	164.37	1.25	3.056E-02	320.08	9.940	PBC<MDA	CR51
328.76	12.	146.82	1.26	2.999E-02	328.76	20.300	PBC<MDA	La140
338.08	8.	222.07	1.27	2.940E-02	338.32	12.010	PBC<MDA	AC228
351.70	109.	11.79	1.43	2.860E-02	351.93	37.600	5.649E+00	PB214
364.48	11.	95.91	1.29	2.791E-02	364.48	81.700	PBC<MDA	I131
383.84	17.	56.86	1.31	2.691E-02	383.84	8.940	PBC<MDA	BA133
387.95	9.	122.39	1.31	2.671E-02	387.95	66.000	PBC<MDA	Cf249
391.69	5.	265.18	1.32	2.653E-02	391.69	64.000	PBC<MDA	SN113
427.88	21.	35.75	1.35	2.491E-02	427.88	29.600	1.602E+00	SB125
468.06	10.	103.07	1.38	2.335E-02	468.06	51.750	PBC<MDA	Ir192
511.86	49.	39.98	2.67	2.188E-02	511.86	20.000	6.220E+00	RH106
531.00	9.	91.52	1.44	2.130E-02	531.00	13.000	PBC<MDA	Nd147
563.24	9.	96.03	1.47	2.040E-02	563.24	8.350	PBC<MDA	CS134
569.16	2.	322.89	1.47	2.024E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	7.173E-01	PA234
					569.70	97.740	PBC<MDA	BI207
569.32	9.	68.54	1.47	2.024E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	2.965E+00	PA234
					569.70	97.740	PBC<MDA	BI207
569.70	-3.	268.00	1.47	2.023E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	PBC<MDA	PA234
					569.70	97.740	PBC<MDA	BI207
582.93	21.	51.01	1.48	1.989E-02	583.02	84.500	PBC<MDA	TL208
600.50	9.	180.25	1.50	1.946E-02	600.50	17.860	PBC<MDA	SB125
602.73	9.	192.22	1.50	1.940E-02	602.73	98.260	PBC<MDA	SB124
604.71	9.	191.40	1.50	1.936E-02	604.71	97.620	PBC<MDA	CS134
609.02	61.	18.43	1.76	1.925E-02	609.31	46.090	3.840E+00	BI214
610.30	9.	196.48	1.51	1.922E-02	610.30	5.750	PBC<MDA	RU103
614.28	9.	201.60	1.51	1.913E-02	614.28	89.850	PBC<MDA	AG108M
618.06	4.	494.35	1.51	1.904E-02	618.06	99.100	PBC<MDA	PM144
635.89	5.	114.89	1.53	1.864E-02	635.89	11.310	PBC<MDA	SB125
702.63	11.	98.11	1.58	1.730E-02	702.63	97.900	PBC<MDA	NB94
722.79	8.	109.39	1.60	1.693E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	2.769E-01	AG108M
					723.36	20.220	1.245E+00	EU154

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
727.17	6.	107.62	1.60	1.686E-02	727.17	7.550	PBC<MDA	BI212
747.16	6.	138.44	1.62	1.651E-02	747.16	34.000	PBC<MDA	pm146
756.73	8.	95.90	1.62	1.635E-02	756.73	54.460	PBC<MDA	ZR95
785.42	8.	88.51	1.65	1.590E-02	785.42	1.280	PBC<MDA	BI212
795.87	6.	83.72	1.66	1.574E-02	795.87	85.530	PBC<MDA	CS134
799.60	6.	103.80	1.66	1.568E-02	799.60	98.960	PBC<MDA	TL210
818.50	12.	90.77	1.67	1.540E-02	818.50	100.000	PBC<MDA	Cs136
834.85	1.	988.26	1.69	1.517E-02	834.85	99.980	PBC<MDA	MN54
860.49	8.	97.42	1.71	1.482E-02	860.56	12.420	PBC<MDA	TL208
873.23	8.	68.84	1.72	1.465E-02	873.23	12.270	PBC<MDA	EU154
882.92	7.	159.25	1.72	1.453E-02	883.24	9.600	PBC<MDA	PA234
884.68	8.	83.74	1.73	1.451E-02	884.68	72.680	PBC<MDA	AG110M
889.28	4.	290.84	1.73	1.445E-02	889.28	99.984	PBC<MDA	Sc46
898.04	7.	102.57	1.74	1.434E-02	898.04	93.700	PBC<MDA	y88
910.98	19.	43.19	1.75	1.418E-02	911.07	29.000	2.567E+00	AC228
937.49	3.	238.82	1.77	1.387E-02	937.49	34.360	PBC<MDA	AG110M
946.02	8.	112.15	1.77	1.377E-02	946.02	13.400	PBC<MDA	PA234
964.11	12.	72.04	1.79	1.357E-02	964.11	14.605	PBC<MDA	EU152
968.83	11.	86.83	1.79	1.352E-02	968.97	17.460	PBC<MDA	AC228
1037.84	9.	91.07	1.84	1.281E-02	1037.84	14.130	PBC<MDA	Co56
1050.36	3.	166.13	1.85	1.269E-02	1050.36	1.560	PBC<MDA	RH106
1077.40	2.	324.82	1.87	1.244E-02	1077.40	3.300	PBC<MDA	Ga68
1099.25	4.	233.75	1.89	1.224E-02	1099.25	56.500	PBC<MDA	FE59
1115.55	2.	519.93	1.90	1.210E-02	1115.55	50.600	PBC<MDA	ZN65
1120.29	10.	112.02	1.90	1.206E-02	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	PBC<MDA	Sc46
1121.30	13.	80.45	1.90	1.205E-02	1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	1.747E+00	Ta182
1189.05	9.	112.49	1.95	1.150E-02	1189.05	16.200	PBC<MDA	Ta182
1221.41	3.	327.45	1.97	1.126E-02	1221.41	27.000	PBC<MDA	Ta182
1238.28	26.	35.73	1.98	1.114E-02	1238.28	66.070	1.997E+00	Co56
1274.53	1.	591.61	2.01	1.088E-02	1274.53	99.940	PBC<MDA	NA22
					1274.54	35.190	1.451E-01	EU154
1332.50	7.	91.28	2.05	1.050E-02	1332.50	99.980	PBC<MDA	CO60
1384.30	2.	324.47	2.08	1.018E-02	1384.30	24.290	PBC<MDA	AG110M
1408.00	2.	248.63	2.10	1.004E-02	1408.00	21.005	PBC<MDA	EU152
1460.50	333.	5.61	1.92	9.749E-03	1460.83	10.670	1.777E+02	K40
1764.16	18.	28.24	2.31	8.350E-03	1764.49	15.400	7.593E+00	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
308.59	77.25	53.	94.	2.001E+03	18.16	0.975	-

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev14.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.80	46.54	144.	-11.	-0.006	157.20	0.998s
TH-227	200.20	50.14	155.	0.	0.000	1000.00	1.001s
AM-241	237.77	59.54	266.	-22.	-0.012	108.69	1.010s
TH-234	252.77	63.29	176.	18.	0.010	109.04	1.014s
Sn-126	256.74	64.28	223.	13.	0.007	160.32	1.015
BA-133	323.56	80.99	315.	-23.	-0.013	82.66	1.031s
Np-237	345.55	86.49	564.	0.	0.000	177.66	1.036A
EU-155	345.76	86.54	526.	-19.	-0.011	171.72	1.036s
Sn-126	349.87	87.57	491.	30.	0.017	40.25	1.037D
Cd-109	351.75	88.04	478.	0.	0.000	1000.00	1.038A
Nd-147	363.99	91.10	491.	0.	0.000	1000.00	1.041s
TH-234	369.94	92.59	491.	0.	0.000	1000.00	1.042s
AC-228	372.98	93.35	478.	17.	0.009	187.06	1.043s
Np-239	397.58	99.50	158.	16.	0.009	114.77	1.049s
Gd-153	412.37	103.20	174.	16.	0.009	119.76	1.052
Np-239	424.09	106.13	194.	-9.	-0.005	229.61	1.055s
EU-152	486.65	121.78	107.	10.	0.006	144.73	1.070s
CO-57	487.80	122.06	87.	-6.	-0.003	223.61	1.070s
EU-154	491.95	123.10	112.	-12.	-0.007	124.82	1.071s
PA-234	524.72	131.29	490.	-22.	-0.012	84.31	1.079s
HF-181	531.64	133.02	512.	-22.	-0.012	145.60	1.081
CE-144	533.69	133.54	534.	-22.	-0.012	148.59	1.081s
HF-181	544.74	136.30	557.	-22.	-0.012	151.23	1.084s
CO-57	545.43	136.47	579.	-22.	-0.012	154.17	1.084s
Tc-99m	561.57	140.51	601.	-22.	-0.012	156.48	1.088s
U-235	574.67	143.79	624.	-22.	-0.012	85.00	1.091s
CE-141	581.29	145.44	454.	18.	0.010	167.17	1.092s
Ba-140	650.15	162.66	169.	-20.	-0.011	94.65	1.108s
U-235	653.03	163.38	189.	-20.	-0.011	101.36	1.109s
CE-139	662.92	165.85	138.	16.	0.009	107.44	1.111s
Cf-251	705.90	176.60	81.	-9.	-0.005	196.83	1.122
U-235	742.37	185.72	48.	39.	0.022	36.50	1.130s
TH-229	773.52	193.51	64.	15.	0.009	105.56	1.137s
U-235	820.80	205.33	36.	3.	0.002	395.81	1.148
TH-229	842.87	210.85	45.	10.	0.005	135.84	1.153s
Cf-251	907.45	227.00	92.	-16.	-0.009	120.00	1.168s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PB-212	953.97	238.63	31.	75.	0.042	15.54	1.179D
PB-214	967.43	242.00	27.	29.	0.016	31.93	1.182D
EU-152	978.21	244.69	233.	-16.	-0.009	133.31	1.185s
TH-227	1024.40	256.24	92.	-20.	-0.011	96.89	1.195s
Cd-113m	1054.23	263.70	70.	14.	0.008	85.87	1.202
TL-208	1108.55	277.28	58.	13.	0.007	85.41	1.215
Hg-203	1116.22	279.20	96.	-17.	-0.009	85.49	1.216s
I-131	1136.61	284.30	52.	-3.	-0.002	474.15	1.221
PB-214	1179.77	295.09	190.	7.	0.004	283.68	1.231
TL-210	1183.41	296.00	197.	12.	0.007	166.42	1.231s
PB-212	1199.52	300.03	216.	0.	0.000	761.58	1.235D
PA-231	1199.68	300.07	209.	1.	0.001	632.46	1.235D
PA-233	1200.12	300.18	228.	12.	0.007	178.32	1.235s
PA-231	1210.00	302.65	231.	12.	0.007	179.09	1.237s
BA-133	1210.81	302.85	243.	12.	0.007	183.59	1.238s
Ba-140	1218.80	304.85	256.	12.	0.007	187.74	1.240s
BI-210M	1218.99	304.90	326.	-14.	-0.008	180.72	1.240s
Ir-192	1233.16	308.44	312.	-14.	-0.008	176.36	1.243s
PA-233	1247.44	312.01	298.	-15.	-0.008	133.19	1.246s
Ir-192	1265.35	316.49	283.	-11.	-0.006	211.86	1.250s
CR-51	1279.73	320.08	249.	14.	0.008	164.37	1.253s
La-140	1314.43	328.76	139.	12.	0.006	146.82	1.261s
Cf-249	1333.15	333.44	210.	-15.	-0.008	143.05	1.265s
AC-228	1352.66	338.32	173.	8.	0.005	222.07	1.270
Cs-136	1361.66	340.57	176.	0.	0.000	1000.00	1.272s
EU-152	1376.53	344.29	176.	0.	0.000	1000.00	1.275s
HF-181	1382.70	345.83	176.	0.	0.000	1000.00	1.276s
PB-214	1406.17	351.70	15.	109.	0.061	11.79	1.431s
BA-133	1423.37	356.00	169.	-12.	-0.007	158.36	1.285s
I-131	1457.31	364.48	24.	11.	0.006	95.91	1.293s
BA-133	1534.73	383.84	40.	17.	0.010	56.86	1.310s
Cf-249	1551.17	387.95	58.	9.	0.005	122.39	1.314s
SN-113	1566.12	391.69	75.	5.	0.003	265.18	1.317s
SB-125	1710.86	427.88	9.	21.	0.012	35.75	1.349s
AG-108M	1735.10	433.94	26.	0.	0.000	1000.00	1.354s
pm-146	1814.87	453.88	30.	-6.	-0.004	181.90	1.372s
SB-125	1852.82	463.37	73.	-15.	-0.008	51.34	1.380s
Ir-192	1871.59	468.06	44.	10.	0.005	103.07	1.384s
BE-7	1909.73	477.60	112.	-15.	-0.009	100.91	1.392s
HF-181	1927.34	482.00	131.	-16.	-0.009	103.52	1.396s
La-140	1947.43	487.02	147.	-7.	-0.004	244.54	1.400s
RU-103	1987.56	497.05	30.	-5.	-0.003	215.19	1.409s
RH-106	2046.81	511.86	49.	49.	0.027	39.98	2.672s
Nd-147	2123.35	531.00	13.	9.	0.005	91.52	1.438s
Ba-140	2148.39	537.26	22.	-6.	-0.003	172.86	1.444s
CS-134	2252.30	563.24	14.	9.	0.005	96.03	1.466s
CS-134	2276.64	569.32	14.	9.	0.005	68.54	1.471s
PA-234	2277.24	569.47	23.	2.	0.001	322.89	1.471s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BI-207	2278.16	569.70	29.	-3.	-0.002	268.00	1.471s
TL-208	2331.45	583.02	22.	21.	0.012	51.01	1.482
SB-125	2401.36	600.50	128.	9.	0.005	180.25	1.497s
SB-124	2410.29	602.73	136.	9.	0.005	192.22	1.499s
CS-134	2418.21	604.71	145.	9.	0.005	191.40	1.500s
BI-214	2435.46	609.02	21.	61.	0.034	18.43	1.756
RU-103	2440.56	610.30	154.	9.	0.005	196.48	1.505s
AG-108M	2456.49	614.28	163.	9.	0.005	201.60	1.508s
PM-144	2471.62	618.06	172.	4.	0.002	494.35	1.512s
SB-125	2542.94	635.89	14.	5.	0.003	114.89	1.526s
I-131	2547.28	636.97	43.	-14.	-0.008	78.58	1.527s
AG-110M	2630.43	657.76	45.	-8.	-0.005	137.10	1.544s
PM-144	2785.58	696.54	65.	-15.	-0.008	78.39	1.576s
NB-94	2809.93	702.63	49.	11.	0.006	98.11	1.581s
SB-124	2890.57	722.79	31.	8.	0.004	109.39	1.598
AG-108M	2891.17	722.94	39.	0.	0.000	1000.00	1.598
EU-154	2892.85	723.36	39.	0.	0.000	1000.00	1.598
ZR-95	2896.22	724.20	39.	0.	0.000	1000.00	1.599s
BI-212	2908.11	727.17	15.	6.	0.003	107.62	1.601s
pm-146	2942.31	735.72	28.	-5.	-0.003	228.91	1.608s
pm-146	2988.08	747.16	14.	6.	0.003	138.44	1.617s
ZR-95	3026.36	756.73	10.	8.	0.004	95.90	1.625s
AG-110M	3055.23	763.94	24.	-3.	-0.002	238.05	1.631s
NB-95	3062.61	765.79	60.	-17.	-0.009	68.75	1.632s
PA-234M	3065.10	766.41	73.	-4.	-0.002	285.38	1.633s
EU-152	3115.14	778.92	20.	-3.	-0.002	332.78	1.643s
BI-212	3141.15	785.42	22.	8.	0.005	88.51	1.648s
CS-134	3182.95	795.87	9.	6.	0.003	83.72	1.656s
TL-210	3197.88	799.60	15.	6.	0.003	103.80	1.659s
CS-134	3207.29	801.95	12.	0.	0.000	1000.00	1.661s
CO-58	3242.59	810.78	49.	-10.	-0.006	103.92	1.668s
La-140	3262.58	815.77	60.	0.	0.000	1000.00	1.672s
Cs-136	3273.50	818.50	50.	12.	0.006	90.77	1.674s
MN-54	3338.91	834.85	20.	1.	0.001	988.26	1.687s
Co-56	3386.61	846.77	25.	-7.	-0.004	161.52	1.696s
TL-208	3441.80	860.56	11.	8.	0.004	97.42	1.707s
NB-94	3483.94	871.10	20.	0.	0.000	1000.00	1.715s
EU-154	3492.47	873.23	13.	8.	0.005	68.84	1.717s
PA-234	3521.68	880.53	61.	-9.	-0.005	133.64	1.722s
PA-234	3532.53	883.24	62.	7.	0.004	159.25	1.724s
AG-110M	3538.30	884.68	21.	8.	0.005	83.74	1.725s
Sc-46	3556.69	889.28	50.	4.	0.002	290.84	1.729s
y-88	3591.74	898.04	11.	7.	0.004	102.57	1.736s
AC-228	3643.88	911.07	10.	19.	0.011	43.19	1.746s
AG-110M	3749.60	937.49	10.	3.	0.002	238.82	1.766s
PA-234	3783.72	946.02	15.	8.	0.004	112.15	1.772
EU-152	3856.11	964.11	34.	12.	0.007	72.04	1.786s
AC-228	3875.56	968.97	38.	11.	0.006	86.83	1.790s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
EU-154	3985.03	996.33	75.	-17.	-0.009	77.35	1.810
PA-234M	4003.71	1001.00	92.	-17.	-0.009	45.39	1.814s
EU-154	4018.82	1004.77	110.	-9.	-0.005	174.94	1.816s
Co-56	4151.13	1037.84	11.	9.	0.005	91.07	1.841s
Cs-136	4192.07	1048.07	16.	0.	0.000	1000.00	1.848s
RH-106	4201.23	1050.36	14.	3.	0.002	166.13	1.850
BI-207	4254.46	1063.66	28.	-7.	-0.004	120.77	1.860s
Ga-68	4309.44	1077.40	11.	2.	0.001	324.82	1.870s
FE-59	4396.88	1099.25	16.	4.	0.002	233.75	1.886s
EU-152	4448.20	1112.07	69.	-6.	-0.003	166.57	1.895s
ZN-65	4462.09	1115.55	61.	2.	0.001	519.93	1.897s
BI-214	4481.06	1120.29	52.	10.	0.005	112.02	1.901s
Sc-46	4482.12	1120.55	76.	-14.	-0.008	92.67	1.901s
Ta-182	4485.12	1121.30	50.	13.	0.007	80.45	1.901s
Ta-182	4756.25	1189.05	17.	9.	0.005	112.49	1.949s
Ta-182	4885.75	1221.41	17.	3.	0.002	327.45	1.972s
Co-56	4953.27	1238.28	12.	26.	0.015	35.73	1.984s
NA-22	5098.35	1274.53	17.	1.	0.001	591.61	2.008s
EU-154	5098.40	1274.54	18.	0.	0.000	1000.00	2.008s
FE-59	5166.65	1291.60	23.	-2.	-0.001	674.39	2.020s
TL-210	5252.32	1313.00	11.	-3.	-0.002	243.10	2.034s
CO-60	5330.37	1332.50	6.	7.	0.004	91.28	2.047s
AG-110M	5537.69	1384.30	6.	2.	0.001	324.47	2.082s
EU-152	5632.56	1408.00	7.	2.	0.001	248.63	2.097s
K-40	5842.70	1460.50	7.	333.	0.185	5.61	1.917
La-140	6385.95	1596.21	12.	-3.	-0.002	579.84	2.215s
BI-214	7059.65	1764.49	3.	18.	0.010	28.24	2.314s
Co-56	7087.11	1771.35	32.	-5.	-0.003	171.24	2.318s
y-88	7346.20	1836.06	13.	-5.	-0.003	104.30	2.354s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	Peak MDA Value Bq/Sample	COMMENTS
BE-7	C	-3.5128E+00				5.31E+01	
			477.60	-3.513E+00	?(	1.192E+01 1.01E+02	1.05E+01 G
NA-22	C	5.1077E-02				9.50E+02	
			1274.53	5.108E-02	?(	1.120E+00 5.92E+02	9.99E+01 G
K-40	N	1.7765E+02				4.66E+11	
			1460.83	1.777E+02	(P	8.205E+00 5.61E+00	1.07E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Sc-46	F 1.3515E-01					8.38E+01	
		889.28	1.351E-01	&(	1.377E+00	2.91E+02	1.00E+02 G
		1120.55	-6.400E-01	&	1.995E+00	9.27E+01	1.00E+02 G
CR-51	F 2.5200E+00					2.77E+01	
		320.08	2.520E+00	&(	1.396E+01	1.64E+02	9.94E+00 G
MN-54	C 3.6628E-02					3.12E+02	
		834.85	3.663E-02	?(	8.626E-01	9.88E+02	1.00E+02 G
FE-59	F 3.2005E-01					4.45E+01	
		1099.25	3.201E-01	?(P	1.715E+00	2.34E+02	5.65E+01 G
		1291.60	-1.991E-01	+	2.973E+00	6.74E+02	4.32E+01 G
Co-56	C 8.0093E-01					7.73E+01	
		846.77	-2.593E-01	?(	9.636E-01	1.62E+02	9.99E+01 G
		1238.28	1.997E+00	?(P	1.400E+00	3.57E+01	6.61E+01 G
		1037.84	2.707E+00	?(P	5.554E+00	9.11E+01	1.41E+01 G
		1771.35	-2.084E+00	+	1.251E+01	1.71E+02	1.55E+01 A
CO-57	C -7.3431E-02					2.72E+02	
		122.06	-7.343E-02	&(	5.651E-01	2.24E+02	8.56E+01 G
		136.47	-2.251E+00	&	1.160E+01	1.54E+02	1.07E+01 G
CO-58	C -3.6003E-01					7.09E+01	
		810.78	-3.600E-01	?(	1.272E+00	1.04E+02	9.95E+01 G
CO-60	F 3.6041E-01					1.93E+03	
		1332.50	3.604E-01	?(P	7.463E-01	9.13E+01	1.00E+02 G
		1173.24	-4.121E-02	% P	1.172E+00	1.25E+03	9.99E+01 G
ZN-65	F 1.9420E-01					2.44E+02	
		1115.55	1.942E-01	?(	3.544E+00	5.20E+02	5.06E+01 G
NB-94	I 3.5040E-01					7.41E+06	
		702.63	3.504E-01	?(P	1.164E+00	9.81E+01	9.79E+01 G
		871.10	0.000E+00	-	8.921E-01	1.00E+03	9.99E+01 G
ZR-95	I 4.8927E-01					6.40E+01	
		756.73	4.893E-01	?(P	1.095E+00	9.59E+01	5.45E+01 G
		724.20	0.000E+00	-	2.368E+00	1.00E+03	4.42E+01 G
NB-95	I -5.8493E-01					6.40E+01	
		765.79	-5.849E-01	?(	1.333E+00	6.87E+01	9.98E+01 G

Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
RU-103	I	-1.4580E-01						3.93E+01	
			497.05	-1.458E-01	?(	7.757E-01	2.15E+02	9.09E+01	G
			610.30	4.556E+00	?	3.043E+01	1.96E+02	5.75E+00	GA
RH-106	I	1.2700E+00						3.74E+02	
			621.92	-2.252E-06	%(	1.905E+01	2.46E+08	9.93E+00	G
			1050.36	9.354E+00	&(	5.595E+01	1.66E+02	1.56E+00	G
			511.86	6.220E+00	?	4.485E+00	4.00E+01	2.00E+01	GA
AG-108M	C	9.7276E-02						1.53E+05	
			433.94	0.000E+00	?(	6.591E-01	1.00E+03	9.05E+01	G
			722.94	0.000E+00	&(	1.149E+00	1.00E+03	9.08E+01	G
			614.28	2.936E-01	?(	2.011E+00	2.02E+02	8.98E+01	G
AG-110M	F	4.1369E-01						2.50E+02	
			884.68	4.471E-01	?(	1.268E+00	8.37E+01	7.27E+01	G
			657.76	-2.682E-01	- P	1.100E+00	1.37E+02	9.46E+01	G
			937.49	3.497E-01	?(	2.034E+00	2.39E+02	3.44E+01	G
			1384.30	4.042E-01	?(P	3.215E+00	3.24E+02	2.43E+01	G
			763.94	-4.607E-01	-	3.922E+00	2.38E+02	2.23E+01	G
SN-113	F	1.5391E-01						1.15E+02	
			391.69	1.539E-01	?(P	1.412E+00	2.65E+02	6.40E+01	G
SB-124	F	4.5979E-01						6.02E+01	
			602.73	2.544E-01	?(P	1.664E+00	1.92E+02	9.83E+01	G
			1690.98	-2.252E-02	% P	9.906E-01	1.11E+04	4.78E+01	G
			722.79	2.327E+00	&(	8.739E+00	1.09E+02	1.08E+01	G
SB-125	I	1.4982E+00						1.01E+03	
			427.88	1.602E+00	?(P	1.242E+00	3.57E+01	2.96E+01	G
			600.50	1.441E+00	?(	8.846E+00	1.80E+02	1.79E+01	G
			635.89	1.317E+00	?(	5.308E+00	1.15E+02	1.13E+01	G
			463.37	-3.385E+00	- P	9.569E+00	5.13E+01	1.05E+01	G
I-131	I	2.5868E-01						8.02E+00	
			364.48	2.587E-01	?(P	6.269E-01	9.59E+01	8.17E+01	G
			284.30	-8.188E-01	&	9.912E+00	4.74E+02	6.14E+00	G
			636.97	-6.009E+00	+ P	1.380E+01	7.86E+01	7.17E+00	G
Gd-153	F	3.2235E-01						2.42E+02	
			97.50	-2.022E-07	%(	3.745E+00	5.48E+08	3.00E+01	G
			103.20	7.660E-01	(	3.086E+00	1.20E+02	2.18E+01	G
Ga-68	C	3.7093E+00						4.71E-02	
			1077.40	3.709E+00	(	2.850E+01	3.25E+02	3.30E+00	G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Tc-99m	I	-2.8186E-01					2.51E-01	
			140.51	-2.819E-01	&(	1.474E+00	1.56E+02	8.93E+01 G
BA-133	F	-2.3036E-02					3.85E+03	
			356.00	-3.730E-01	*(	1.999E+00	1.58E+02	6.20E+01 G
			302.85	1.162E+00	&(	7.201E+00	1.84E+02	1.83E+01 G
			383.84	4.034E+00	? P	7.471E+00	5.69E+01	8.94E+00 GA
			80.99	-7.631E-01	+ P	2.884E+00	8.27E+01	3.41E+01 GA
CS-134	I	4.5935E-01					7.54E+02	
			604.71	2.657E-01	?(	1.730E+00	1.91E+02	9.76E+01 G
			795.87	2.426E-01	?(	6.942E-01	8.37E+01	8.55E+01 G
			569.32	1.581E+00	?(	3.595E+00	6.85E+01	1.54E+01 G
			801.95	0.000E+00	-	7.606E+00	1.00E+03	8.69E+00 G
			563.24	2.878E+00	?(	6.570E+00	9.60E+01	8.35E+00 G
CS-137	I	-1.2863E-02					1.10E+04	
			661.66	-1.286E-02	%(P	1.312E+00	3.20E+03	8.52E+01 G
CE-139	F	2.3384E-01					1.38E+02	
			165.85	2.338E-01	?(	8.448E-01	1.07E+02	7.99E+01 G
Ba-140	I	2.2731E-01					1.28E+01	
			537.26	-6.111E-01	?(	2.632E+00	1.73E+02	2.44E+01 G
			162.66	-3.785E+00	& P	1.206E+01	9.46E+01	6.22E+00 G
			304.85	4.994E+00	?(	3.164E+01	1.88E+02	4.29E+00 G
La-140	I	1.5208E-02					1.28E+01	
			1596.21	-2.067E-01	?(P	1.220E+00	5.80E+02	9.54E+01 G
			487.02	-3.817E-01	&	3.185E+00	2.45E+02	4.55E+01 G
			328.76	1.058E+00	?(	5.263E+00	1.47E+02	2.03E+01 G
			815.77	0.000E+00	&	5.997E+00	1.00E+03	2.33E+01 G
CE-141	I	4.1870E-01					3.25E+01	
			145.44	4.187E-01	?(	2.346E+00	1.67E+02	4.82E+01 G
CE-144	I	-2.1461E+00					2.85E+02	
			133.54	-2.146E+00	&(	1.066E+01	1.49E+02	1.11E+01 G
PM-144	C	-4.7101E-01					3.63E+02	
			696.54	-4.710E-01	?(P	1.302E+00	7.84E+01	9.90E+01 G
			618.06	1.111E-01	+	1.880E+00	4.94E+02	9.91E+01 G
EU-152	F	8.8503E-01					4.94E+03	
			344.29	0.000E+00	?(	4.658E+00	1.00E+03	2.65E+01 G
			1112.07	-1.882E+00	+ P	1.386E+01	1.67E+02	1.36E+01 G
			121.78	3.786E-01	?(	1.863E+00	1.45E+02	2.86E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
		778.92	-8.051E-01	+	6.320E+00	3.33E+02	1.29E+01 G
		964.11	3.482E+00	&(	8.357E+00	7.20E+01	1.46E+01 G
		244.69	-3.289E+00	+	1.474E+01	1.33E+02	7.58E+00 G
		1408.00	6.313E-01	? P	3.867E+00	2.49E+02	2.10E+01 GA
EU-154	I 2.6082E+00					3.14E+03	
		873.23	2.608E+00	&(	5.962E+00	6.88E+01	1.23E+01 G
		123.10	-3.172E-01	-	1.340E+00	1.25E+02	4.08E+01 G
		1274.54	0.000E+00	-	3.261E+00	1.00E+03	3.52E+01 G
		723.36	0.000E+00	&	5.165E+00	1.00E+03	2.02E+01 G
		1004.77	-2.032E+00	-	1.213E+01	1.75E+02	1.80E+01 G
		996.33	-6.599E+00	-	1.703E+01	7.74E+01	1.06E+01 G
EU-155	I -1.6427E-02					1.81E+03	
		105.31	-1.643E-02	%(P	3.318E+00	5.61E+03	2.12E+01 G
		86.54	-6.885E-01	+	3.959E+00	1.72E+02	3.07E+01 G
HF-181	F -4.8597E-01					4.24E+01	
		482.00	-4.860E-01	?(	1.691E+00	1.04E+02	8.05E+01 G
		133.02	-5.487E-01	&	2.671E+00	1.46E+02	4.33E+01 G
		345.83	0.000E+00	+	8.216E+00	1.00E+03	1.51E+01 G
		136.30	-4.107E+00	&	2.077E+01	1.51E+02	5.85E+00 G
Ta-182	F 2.0436E+00					1.14E+02	
		1121.30	1.747E+00	?(	4.710E+00	8.05E+01	3.49E+01 G
		1221.41	5.482E-01	-	4.006E+00	3.27E+02	2.70E+01 G
		1189.05	2.683E+00	?(	6.535E+00	1.12E+02	1.62E+01 G
Hg-203	F -3.4359E-01					4.66E+01	
		279.20	-3.436E-01	?(	9.829E-01	8.55E+01	8.15E+01 G
TL-208	N 1.0592E+00					6.98E+02	
		583.02	6.885E-01	?(P	8.150E-01	5.10E+01	8.45E+01 G
		277.28	3.486E+00	(	1.000E+01	8.54E+01	6.31E+00 G
		860.56	2.349E+00	?(P	5.399E+00	9.74E+01	1.24E+01 G
pm-146	C 5.9372E-01					2.02E+03	
		747.16	5.937E-01	?(	1.994E+00	1.38E+02	3.40E+01 G
		735.72	-7.389E-01	+	4.045E+00	2.29E+02	2.25E+01 G
		453.88	-2.267E-01	-	1.016E+00	1.82E+02	6.50E+01 G
y-88	F 3.0736E-01					1.07E+02	
		898.04	3.074E-01	?(P	7.540E-01	1.03E+02	9.37E+01 G
		1836.06	-3.322E-01	+ P	1.343E+00	1.04E+02	9.92E+01 G
Cd-113m	3.8407E+03					5.33E+03	
		263.70	3.841E+03	(	1.107E+04	8.59E+01	6.00E-03 K

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Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Cf-251	T	-6.2265E-01					3.28E+05	
			176.60	-6.227E-01	&(	3.202E+00	1.97E+02	1.70E+01 G
			227.00	-3.657E+00	&	1.083E+01	1.20E+02	6.30E+00 GA
Cf-249	T	2.8791E-01					1.28E+05	
			387.95	2.879E-01	&(	1.203E+00	1.22E+02	6.60E+01 G
			333.44	-1.759E+00	+	8.479E+00	1.43E+02	1.55E+01 G
Sn-126		1.9193E+00					3.65E+07	
			87.57	8.828E-01	}	3.116E+00	4.02E+01	3.75E+01 GA
			64.28	1.919E+00	(	1.038E+01	1.60E+02	9.70E+00 G
			86.94	0.000E+00	}	1.287E+01	1.34E+03	9.04E+00 GA
PB-210	N	-5.5805E+00					8.14E+03	
			46.54	-5.581E+00	(	2.974E+01	1.57E+02	4.25E+00 G
PB-212	N	2.5869E+00					6.98E+02	
			238.63	2.587E+00	(	9.817E-01	1.55E+01	4.33E+01 G
			300.03	0.000E+00	}	3.777E+01	7.62E+02	3.28E+00 GA
PB-214	N	5.6487E+00					5.84E+05	
			351.93	5.649E+00	@(P	1.061E+00	1.18E+01	3.76E+01 G
			295.09	6.190E-01	- P	5.962E+00	2.84E+02	1.93E+01 G
			242.00	5.792E+00	P	5.478E+00	3.19E+01	7.43E+00 GA
BI-207	C	-7.8203E-02					1.18E+04	
			569.70	-7.820E-02	?(P	7.786E-01	2.68E+02	9.77E+01 G
			1063.66	-4.021E-01	+ P	1.618E+00	1.21E+02	7.45E+01 G
BI-212	N	2.4304E+00					6.98E+02	
			727.17	2.430E+00	?(	9.106E+00	1.08E+02	7.55E+00 G
			785.42	2.212E+01	?	6.662E+01	8.85E+01	1.28E+00 GA
U-235	N	-2.2227E+00					2.57E+11	
			143.79	-2.223E+00	?(P	1.198E+01	8.50E+01	1.10E+01 G
			205.33	8.068E-01	&	8.248E+00	3.96E+02	5.01E+00 G
			163.38	-4.598E+00	+	1.560E+01	1.01E+02	5.08E+00 G
			185.72	9.191E-01	+	8.151E-01	3.65E+01	5.40E+01 GA
BI-214	N	3.6122E+00					5.84E+05	
			609.31	3.840E+00	(P	1.497E+00	1.84E+01	4.61E+01 G
			1120.29	2.917E+00	&(P	1.111E+01	1.12E+02	1.51E+01 G
			1764.49	7.593E+00	+ P	4.897E+00	2.82E+01	1.54E+01 G
BI-210M	T	-1.5149E-02					1.10E+09	
			265.83	-1.515E-02	%(	1.425E+00	2.69E+03	5.00E+01 G
			304.90	-8.973E-01	+	5.456E+00	1.81E+02	2.80E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AC-228	N	2.5557E+00					2.10E+03	
			911.07	2.567E+00	?(	2.357E+00	4.32E+01	2.90E+01 G
			968.97	2.538E+00	?(	7.437E+00	8.68E+01	1.75E+01 G
			338.32	1.336E+00	-	1.008E+01	2.22E+02	1.20E+01 G
			93.35	3.220E+00	?	2.020E+01	1.87E+02	5.56E+00 XA
TH-229	N	4.5231E+00					2.68E+06	
			193.51	4.516E+00	?(P	1.182E+01	1.06E+02	4.40E+00 G
			210.85	4.534E+00	&(P	1.554E+01	1.36E+02	2.99E+00 G
TH-234	N	6.5528E+00					1.63E+12	
			63.29	6.553E+00	*(	2.398E+01	1.09E+02	3.81E+00 G
			92.59	0.000E+00	-	2.045E+01	1.00E+03	5.58E+00 G
PA-231	N	7.3896E+00					1.20E+07	
			302.65	7.390E+00	&(	4.469E+01	1.79E+02	2.88E+00 G
			300.07	8.854E-01	}	4.954E+01	6.32E+02	2.46E+00 G
PA-233	C	-1.2710E-01					7.82E+08	
			312.01	-7.358E-01	?(P	4.127E+00	1.33E+02	3.60E+01 G
			300.18	3.407E+00	?(	2.052E+01	1.78E+02	6.20E+00 G
PA-234	N	8.5298E-01					1.63E+12	
			131.29	-1.314E+00	?(P	6.264E+00	8.43E+01	1.80E+01 G
			946.02	2.408E+00	(	6.249E+00	1.12E+02	1.34E+01 G
			569.47	7.173E-01	?(	8.366E+00	3.23E+02	8.20E+00 G
			883.24	2.862E+00	?(	1.568E+01	1.59E+02	9.60E+00 G
			880.53	-5.416E+00	+	2.478E+01	1.34E+02	6.00E+00 GA
PA-234M	N	-8.5078E+01					1.63E+12	
			1001.00	-8.508E+01	?(P	2.382E+02	4.54E+01	8.37E-01 G
			766.41	-5.024E+01	+	4.973E+02	2.85E+02	2.94E-01 G
AM-241	T	-9.1567E-01					1.58E+05	
			59.54	-9.157E-01	?(	3.329E+00	1.09E+02	3.59E+01 G
Ir-192	F	1.7472E-02					7.40E+01	
			316.49	-2.352E-01	?(	1.682E+00	2.12E+02	8.70E+01 G
			468.06	4.425E-01	?(	1.552E+00	1.03E+02	5.18E+01 G
			308.44	-7.997E-01	+	4.746E+00	1.76E+02	3.18E+01 G
Cs-136	F	4.1990E-01					1.30E+01	
			818.50	4.199E-01	?(	1.286E+00	9.08E+01	1.00E+02 G
			1048.07	0.000E+00	-	1.166E+00	1.00E+03	8.00E+01 G
			340.57	0.000E+00	-	2.612E+00	1.00E+03	4.69E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Np-239 T	-3.9858E-01					2.36E+00	
		103.70	8.022E-02 %		2.922E+00	1.06E+03	2.40E+01 X
		106.13	-3.986E-01 &(		3.107E+00	2.30E+02	2.27E+01 G
		99.50	1.118E+00 ?		4.316E+00	1.15E+02	1.50E+01 X
Nd-147	1.7374E+00					1.11E+01	
		531.00	1.737E+00 &(		3.914E+00	9.15E+01	1.30E+01 G
		91.10	0.000E+00 -		4.060E+00	1.00E+03	2.83E+01 G
TL-210 N	2.3205E-01					5.84E+05	
		799.60	2.065E-01 ?(		7.441E-01	1.04E+02	9.90E+01 G
		296.00	2.640E-01 ?(		1.485E+00	1.66E+02	7.90E+01 G
		1313.00	-8.298E-01 +		4.580E+00	2.43E+02	2.10E+01 GA

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went
    negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide
    failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the
    library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity
    to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

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********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
PB-210	46.54	144.	-11.	-0.006	157.20	-5.581E+00	
AM-241	59.54	266.	-22.	-0.012	108.69	-9.157E-01	
TH-234	63.29	176.	18.	0.010	109.04	6.553E+00	
BA-133	80.99	315.	-23.	-0.013	82.66	-7.631E-01	P
EU-155	86.54	526.	-19.	-0.011	171.72	-6.885E-01	
Np-239	99.50	158.	16.	0.009	114.77	1.118E+00	
Gd-153	103.20	174.	16.	0.009	119.76	7.660E-01	
Np-239	106.13	194.	-9.	-0.005	229.61	-3.986E-01	
EU-152	121.78	107.	10.	0.006	144.73	3.786E-01	
CO-57	122.06	87.	-6.	-0.003	223.61	-7.343E-02	
EU-154	123.10	112.	-12.	-0.007	124.82	-3.172E-01	
HF-181	133.02	512.	-22.	-0.012	145.60	-5.487E-01	
CE-144	133.54	534.	-22.	-0.012	148.59	-2.146E+00	
HF-181	136.30	557.	-22.	-0.012	151.23	-4.107E+00	
CO-57	136.47	579.	-22.	-0.012	154.17	-2.251E+00	
Tc-99m	140.51	601.	-22.	-0.012	156.48	-2.819E-01	
U-235	143.79	624.	-22.	-0.012	85.00	-2.223E+00	P
CE-141	145.44	454.	18.	0.010	167.17	4.187E-01	
Ba-140	162.66	169.	-20.	-0.011	94.65	-3.785E+00	P
U-235	163.38	189.	-20.	-0.011	101.36	-4.598E+00	
CE-139	165.85	138.	16.	0.009	107.44	2.338E-01	
Cf-251	176.60	81.	-9.	-0.005	196.83	-6.227E-01	
U-235	185.72	48.	39.	0.022	36.50	9.191E-01	
TH-229	193.51	64.	15.	0.009	105.56	4.516E+00	P
U-235	205.33	36.	3.	0.002	395.81	8.068E-01	
TH-229	210.85	45.	10.	0.005	135.84	4.534E+00	P
Cf-251	227.00	92.	-16.	-0.009	120.00	-3.657E+00	
EU-152	244.69	233.	-16.	-0.009	133.31	-3.289E+00	
TH-227	256.24	92.	-20.	-0.011	96.89	-4.444E+00	
Cd-113m	263.70	70.	14.	0.008	85.87	3.841E+03	
Hg-203	279.20	96.	-17.	-0.009	85.49	-3.436E-01	
I-131	284.30	52.	-3.	-0.002	474.15	-8.188E-01	
TL-210	296.00	197.	12.	0.007	166.42	2.640E-01	
PA-233	300.18	228.	12.	0.007	178.32	3.407E+00	
BA-133	302.85	243.	12.	0.007	183.59	1.162E+00	
Ba-140	304.85	256.	12.	0.007	187.74	4.994E+00	
BI-210M	304.90	326.	-14.	-0.008	180.72	-8.973E-01	
Ir-192	308.44	312.	-14.	-0.008	176.36	-7.997E-01	
PA-233	312.01	298.	-15.	-0.008	133.19	-7.358E-01	P
Ir-192	316.49	283.	-11.	-0.006	211.86	-2.352E-01	
CR-51	320.08	249.	14.	0.008	164.37	2.520E+00	
La-140	328.76	139.	12.	0.006	146.82	1.058E+00	
Cf-249	333.44	210.	-15.	-0.008	143.05	-1.759E+00	
BA-133	356.00	169.	-12.	-0.007	158.36	-3.730E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
I-131	364.48	24.	11.	0.006	95.91	2.587E-01	P
BA-133	383.84	40.	17.	0.010	56.86	4.034E+00	P
Cf-249	387.95	58.	9.	0.005	122.39	2.879E-01	
SN-113	391.69	75.	5.	0.003	265.18	1.539E-01	P
pm-146	453.88	30.	-6.	-0.004	181.90	-2.267E-01	
Ir-192	468.06	44.	10.	0.005	103.07	4.425E-01	
BE-7	477.60	112.	-15.	-0.009	100.91	-3.513E+00	
HF-181	482.00	131.	-16.	-0.009	103.52	-4.860E-01	
La-140	487.02	147.	-7.	-0.004	244.54	-3.817E-01	
RU-103	497.05	30.	-5.	-0.003	215.19	-1.458E-01	
RH-106	511.86	49.	49.	0.027	39.98	6.220E+00	
Nd-147	531.00	13.	9.	0.005	91.52	1.737E+00	
Ba-140	537.26	22.	-6.	-0.003	172.86	-6.111E-01	
CS-134	563.24	14.	9.	0.005	96.03	2.878E+00	
CS-134	569.32	14.	9.	0.005	68.54	1.581E+00	
BI-207	569.70	29.	-3.	-0.002	268.00	-7.820E-02	P
SB-124	602.73	136.	9.	0.005	192.22	2.544E-01	P
CS-134	604.71	145.	9.	0.005	191.40	2.657E-01	
RU-103	610.30	154.	9.	0.005	196.48	4.556E+00	
AG-108M	614.28	163.	9.	0.005	201.60	2.936E-01	
PM-144	618.06	172.	4.	0.002	494.35	1.111E-01	
I-131	636.97	43.	-14.	-0.008	78.58	-6.009E+00	P
AG-110M	657.76	45.	-8.	-0.005	137.10	-2.682E-01	P
PM-144	696.54	65.	-15.	-0.008	78.39	-4.710E-01	P
NB-94	702.63	49.	11.	0.006	98.11	3.504E-01	P
SB-124	722.79	31.	8.	0.004	109.39	2.327E+00	
BI-212	727.17	15.	6.	0.003	107.62	2.430E+00	
pm-146	735.72	28.	-5.	-0.003	228.91	-7.389E-01	
pm-146	747.16	14.	6.	0.003	138.44	5.937E-01	
ZR-95	756.73	10.	8.	0.004	95.90	4.893E-01	P
AG-110M	763.94	24.	-3.	-0.002	238.05	-4.607E-01	
NB-95	765.79	60.	-17.	-0.009	68.75	-5.849E-01	
PA-234M	766.41	73.	-4.	-0.002	285.38	-5.024E+01	
EU-152	778.92	20.	-3.	-0.002	332.78	-8.051E-01	
BI-212	785.42	22.	8.	0.005	88.51	2.212E+01	
CS-134	795.87	9.	6.	0.003	83.72	2.426E-01	
TL-210	799.60	15.	6.	0.003	103.80	2.065E-01	
CO-58	810.78	49.	-10.	-0.006	103.92	-3.600E-01	
Cs-136	818.50	50.	12.	0.006	90.77	4.199E-01	
MN-54	834.85	20.	1.	0.001	988.26	3.663E-02	
Co-56	846.77	25.	-7.	-0.004	161.52	-2.593E-01	
EU-154	873.23	13.	8.	0.005	68.84	2.608E+00	
AG-110M	884.68	21.	8.	0.005	83.74	4.471E-01	
Sc-46	889.28	50.	4.	0.002	290.84	1.351E-01	
y-88	898.04	11.	7.	0.004	102.57	3.074E-01	P
AG-110M	937.49	10.	3.	0.002	238.82	3.497E-01	
EU-152	964.11	34.	12.	0.007	72.04	3.482E+00	
EU-154	996.33	75.	-17.	-0.009	77.35	-6.599E+00	

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Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
PA-234M	1001.00	92.	-17.	-0.009	45.39	-8.508E+01		P
EU-154	1004.77	110.	-9.	-0.005	174.94	-2.032E+00		
Co-56	1037.84	11.	9.	0.005	91.07	2.707E+00		P
RH-106	1050.36	14.	3.	0.002	166.13	9.354E+00		
BI-207	1063.66	28.	-7.	-0.004	120.77	-4.021E-01		P
Ga-68	1077.40	11.	2.	0.001	324.82	3.709E+00		
FE-59	1099.25	16.	4.	0.002	233.75	3.201E-01		P
EU-152	1112.07	69.	-6.	-0.003	166.57	-1.882E+00		P
Sc-46	1120.55	76.	-14.	-0.008	92.67	-6.400E-01		
Ta-182	1121.30	50.	13.	0.007	80.45	1.747E+00		
Ta-182	1189.05	17.	9.	0.005	112.49	2.683E+00		
Ta-182	1221.41	17.	3.	0.002	327.45	5.482E-01		
Co-56	1238.28	12.	26.	0.015	35.73	1.997E+00		P
NA-22	1274.53	17.	1.	0.001	591.61	5.108E-02		
FE-59	1291.60	23.	-2.	-0.001	674.39	-1.991E-01		
TL-210	1313.00	11.	-3.	-0.002	243.10	-8.298E-01		
CO-60	1332.50	6.	7.	0.004	91.28	3.604E-01		P
AG-110M	1384.30	6.	2.	0.001	324.47	4.042E-01		P
EU-152	1408.00	7.	2.	0.001	248.63	6.313E-01		P
La-140	1596.21	12.	-3.	-0.002	579.84	-2.067E-01		P
Co-56	1771.35	32.	-5.	-0.003	171.24	-2.084E+00		
y-88	1836.06	13.	-5.	-0.003	104.30	-3.322E-01		P

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
BE-7	#A	-3.5128E+00	-3.5128E+00	1.009E+02%	1.19E+01
NA-22	#A	5.1077E-02	5.1077E-02	5.916E+02%	1.12E+00
K-40		1.7765E+02	1.7765E+02	5.607E+00%	8.20E+00
Sc-46	#A	1.3515E-01	1.3515E-01	2.908E+02%	1.38E+00
CR-51	#A	2.5200E+00	2.5200E+00	1.644E+02%	1.40E+01
MN-54	#A	3.6628E-02	3.6628E-02	9.883E+02%	8.63E-01
FE-59	#A	3.2005E-01	3.2005E-01	2.338E+02%	1.72E+00
Co-56	#A	8.0093E-01	8.0093E-01	3.573E+01%	9.64E-01
CO-57	#A	-7.3431E-02	-7.3431E-02	2.236E+02%	5.65E-01
CO-58	#A	-3.6002E-01	-3.6003E-01	1.039E+02%	1.27E+00
CO-60	#A	3.6041E-01	3.6041E-01	9.128E+01%	7.46E-01
ZN-65	#A	1.9420E-01	1.9420E-01	5.199E+02%	3.54E+00
NB-94	#A	3.5040E-01	3.5040E-01	9.811E+01%	1.16E+00
ZR-95	#A	4.8926E-01	4.8927E-01	9.590E+01%	1.09E+00
NB-95	#A	-5.8492E-01	-5.8493E-01	6.875E+01%	1.33E+00
RU-103	#A	-1.4580E-01	-1.4580E-01	2.152E+02%	7.76E-01
RH-106	#A	1.2700E+00	1.2700E+00	1.661E+02%	1.90E+01
AG-108M	#A	9.7276E-02	9.7276E-02	2.016E+02%	6.59E-01

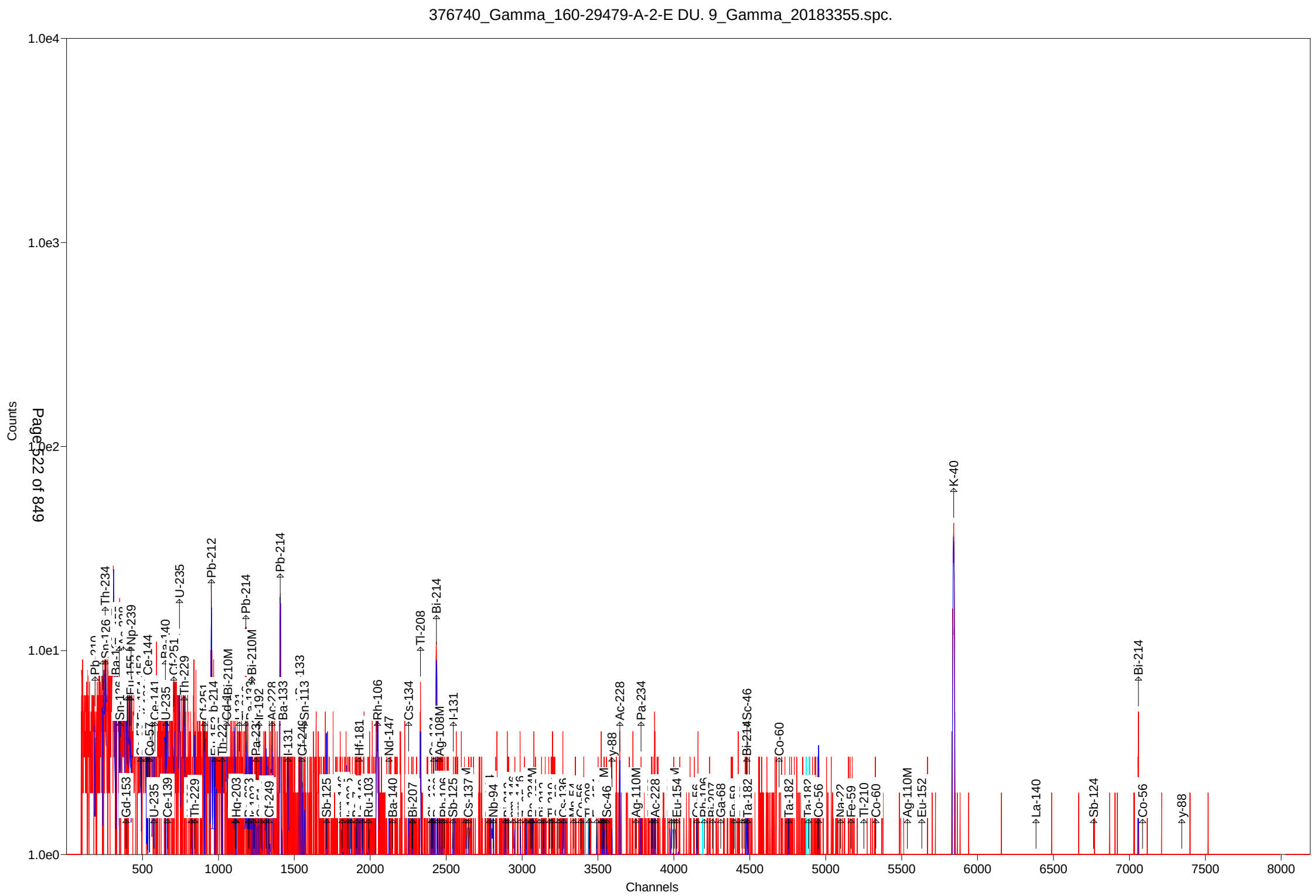
AG-110M#A	4.1369E-01	4.1369E-01	8.374E+01%	1.27E+00
SN-113 #A	1.5391E-01	1.5391E-01	2.652E+02%	1.41E+00
SB-124 #A	4.5979E-01	4.5979E-01	1.094E+02%	1.66E+00
SB-125 #	1.4982E+00	1.4982E+00	3.575E+01%	1.24E+00
I-131 #A	2.5866E-01	2.5868E-01	9.591E+01%	6.27E-01
Gd-153 #A	3.2235E-01	3.2235E-01	1.198E+02%	3.75E+00
Ga-68 #A	3.6679E+00	3.7093E+00	3.248E+02%	2.85E+01
Tc-99m #A	-2.8127E-01	-2.8186E-01	1.565E+02%	1.47E+00
BA-133 #A	-2.3036E-02	-2.3036E-02	1.212E+02%	2.00E+00
CS-134 #A	4.5935E-01	4.5935E-01	5.998E+01%	1.73E+00
CS-137 #A	-1.2863E-02	-1.2863E-02	3.201E+03%	1.31E+00
CE-139 #A	2.3384E-01	2.3384E-01	1.074E+02%	8.45E-01
Ba-140 #A	2.2730E-01	2.2731E-01	1.276E+02%	2.63E+00
La-140 #A	1.5207E-02	1.5208E-02	1.468E+02%	1.22E+00
CE-141 #A	4.1869E-01	4.1870E-01	1.672E+02%	2.35E+00
CE-144 #A	-2.1461E+00	-2.1461E+00	1.486E+02%	1.07E+01
PM-144 #A	-4.7101E-01	-4.7101E-01	7.839E+01%	1.30E+00
EU-152 #A	8.8503E-01	8.8503E-01	7.204E+01%	4.66E+00
EU-154 #A	2.6082E+00	2.6082E+00	6.884E+01%	5.96E+00
EU-155 #A	-1.6427E-02	-1.6427E-02	5.613E+03%	3.32E+00
HF-181 #A	-4.8596E-01	-4.8597E-01	1.035E+02%	1.69E+00
Ta-182 #A	2.0436E+00	2.0436E+00	6.915E+01%	4.71E+00
Hg-203 #A	-3.4358E-01	-3.4359E-01	8.549E+01%	9.83E-01
TL-208	1.0592E+00	1.0592E+00	4.641E+01%	8.15E-01
pm-146 #A	5.9372E-01	5.9372E-01	1.384E+02%	1.99E+00
y-88 #A	3.0736E-01	3.0736E-01	1.026E+02%	7.54E-01
Cd-113m#A	3.8407E+03	3.8407E+03	8.587E+01%	1.11E+04
Cd-109 #A	0.0000E+00	0.0000E+00	1.000E+03%	3.04E+01
Cf-251 #A	-6.2265E-01	-6.2265E-01	1.968E+02%	3.20E+00
Cf-249 #A	2.8791E-01	2.8791E-01	1.224E+02%	1.20E+00
Sn-126 A	1.9193E+00	1.9193E+00	1.603E+02%	1.04E+01
PB-210 #A	-5.5805E+00	-5.5805E+00	1.572E+02%	2.97E+01
PB-212	2.5869E+00	2.5869E+00	1.554E+01%	9.82E-01
PB-214	5.6487E+00	5.6487E+00	1.179E+01%	1.06E+00
BI-207 #A	-7.8203E-02	-7.8203E-02	2.680E+02%	7.79E-01
BI-212 #A	2.4304E+00	2.4304E+00	1.076E+02%	9.11E+00
U-235 #A	-2.2227E+00	-2.2227E+00	8.500E+01%	1.20E+01
BI-214	3.6122E+00	3.6122E+00	1.843E+01%	1.50E+00
BI-210M#A	-1.5149E-02	-1.5149E-02	2.685E+03%	1.43E+00
AC-228 #	2.5557E+00	2.5557E+00	4.319E+01%	2.36E+00
TH-227 #A	0.0000E+00	0.0000E+00	1.000E+03%	1.45E+01
TH-229 #A	4.5231E+00	4.5231E+00	8.602E+01%	1.18E+01
TH-234 #A	6.5528E+00	6.5528E+00	1.090E+02%	2.40E+01
PA-231 #A	7.3896E+00	7.3896E+00	1.791E+02%	4.47E+01
PA-233 #A	-1.2710E-01	-1.2710E-01	1.113E+02%	4.13E+00
PA-234 A	8.5298E-01	8.5298E-01	8.431E+01%	6.26E+00
PA-234M#A	-8.5078E+01	-8.5078E+01	4.539E+01%	2.38E+02
AM-241 #A	-9.1567E-01	-9.1567E-01	1.087E+02%	3.33E+00
Np-237 #A	0.0000E+00	0.0000E+00	1.000E+03%	9.60E+00

Ir-192 #A	1.7472E-02	1.7472E-02	1.031E+02%	1.68E+00
Cs-136 #A	4.1988E-01	4.1990E-01	9.077E+01%	1.29E+00
Np-239 #A	-3.9849E-01	-3.9858E-01	2.296E+02%	3.11E+00
Nd-147 #A	1.7373E+00	1.7374E+00	9.152E+01%	3.91E+00
TL-210 #A	2.3205E-01	2.3205E-01	9.807E+01%	7.44E-01

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (25.1 to 1999.3 keV) 1.931E+02 Bq/Sample
Total Decayed Activity (25.1 to 1999.3 keV) 1.9311758E+02 Bq/Sample


376740_Gamma_160-29479-A-2-E DU. 9_Gamma_20183355.spc.
Counts
1.0e4
1.0e3
1.0e2
1.0e1
1.0e0
Channels
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
7500
8000
Pb-210
Th-234
Sn-126
Np-239
Gd-153
Co-57
Ce-144
Ce-141
U-235
Ce-139
Ra-140
U-235
Cf-251
Th-229
Th-229
Pb-212
Cf-251
Eu-152 b-214
Th-227
Cd-109
Bi-210M
Hg-203
Pa-233
Ir-192
Bi-210M
Pb-214
Ac-228
Ba-133
I-131
Cf-249
Pb-214
Ba-133
Sn-113
Sb-125
Hf-181
Ru-103
Rh-106
Nd-147
Ba-140
Bi-207
Cs-134
Tl-208
Bi-214
Ag-108M
I-131
Cs-137
Nb-94
Sc-46
y-88
Ac-228
Ag-110M
Ac-228
Pa-234
Eu-154
Ta-182
Bi-214
Sc-46
Co-60
Ta-182
Ta-182
Co-56
Na-22
Fe-59
Tl-210
Co-60
Ag-110M
Eu-152
K-40
La-140
Sb-124
Bi-214
Co-56
y-88

Test America St. Louis Spectrum ID: 17_Gamma_20182702

Sample Description: 376740_Gamma_160-29479-A-3-C
Detector: Detector #17
Batch ID: 376740
Work Order Number: Gamma
Lot Number: 160-29479-A-3-C

Decay to Time: 8/9/2018 01:27 Live Time: 1800 sec
Acquisition Time: 8/9/2018 01:27:45 Real Time: 1829 sec
Analysis Time: 8/9/2018 01:58 Dead Time: 1.59 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 17_Soil_TunaCan.Clb
Efficiency Cal Desc: 17_TunaCan_90099_032612
Efficiency Cal Date: 4/12/2012 09:28
Energy Cal Date: 2/29/2012 10:33
Library: Client_Long_Rev14.lib
Bkgd Correction File: 17_2018-07-14_1832.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	-3.320E+00	96.5	3.204E+00	3.209E+00	1.084E+01
NA-22	-2.533E-01	150.0	3.799E-01	3.801E-01	1.352E+00
K-40	1.781E+02	6.3	1.116E+01	1.441E+01	1.046E+01
Sc-46	2.804E-01	93.6	2.623E-01	2.627E-01	1.796E+00
CR-51	1.641E+00	106.6	1.749E+00	1.751E+00	6.019E+00
MN-54	-3.971E-01	111.1	4.411E-01	4.415E-01	1.047E+00
FE-59	-1.890E-01	44.7	8.453E-02	8.506E-02	2.821E+00
Co-56	6.733E-01	34.6	2.328E-01	2.354E-01	1.058E+00
CO-57	7.960E-03	3060.1	2.436E-01	2.436E-01	8.429E-01
CO-58	3.237E-01	92.9	3.006E-01	3.011E-01	1.029E+00
CO-60	4.076E-01	37.8	1.541E-01	1.554E-01	4.829E-01
ZN-65	-8.686E-01	140.6	1.221E+00	1.222E+00	4.195E+00
NB-94	1.371E-01	290.3	3.979E-01	3.980E-01	1.004E+00
ZR-95	2.531E-01	103.2	2.612E-01	2.616E-01	1.536E+00
NB-95	4.657E-01	96.2	4.481E-01	4.487E-01	1.518E+00
RU-103	-4.487E-01	98.7	4.431E-01	4.437E-01	1.105E+00
RH-106	-7.351E-01	52.2	3.834E-01	3.853E-01	2.894E+01
AG-108M	-3.920E-01	103.8	4.070E-01	4.075E-01	9.685E-01
AG-110M	5.122E-01	31.6	1.620E-01	1.641E-01	2.447E+00
SN-113	-4.839E-02	1103.3	5.339E-01	5.339E-01	2.028E+00
SB-124	3.260E-01	193.9	6.322E-01	6.325E-01	2.151E+00
SB-125	8.018E-01	123.0	9.858E-01	9.867E-01	2.491E+00
I-131	4.216E-01	85.9	3.621E-01	3.627E-01	7.514E-01
Gd-153	4.103E-01	151.0	6.196E-01	6.201E-01	2.112E+00
Ga-68	3.952E+00	354.7	1.402E+01	1.402E+01	3.448E+01
Tc-99m	2.076E-01	136.0	2.823E-01	2.826E-01	9.535E-01
BA-133	-4.848E-01	159.0	7.706E-01	7.710E-01	2.605E+00
CS-134	5.375E-01	80.6	4.332E-01	4.341E-01	2.233E+00
CS-137	-3.180E-01	82.0	2.608E-01	2.613E-01	1.387E+00
CE-139	-2.545E-01	132.9	3.381E-01	3.390E-01	1.141E+00
Ba-140	8.577E-01	222.7	1.910E+00	1.910E+00	3.190E+00
La-140	2.670E-01	52.9	1.413E-01	1.420E-01	5.828E-01
CE-141	1.893E-01	265.5	5.027E-01	5.028E-01	1.716E+00

CE-144	-4.108E-01	595.2	2.445E+00	2.445E+00	8.347E+00
PM-144	-4.310E-01	116.8	5.032E-01	5.037E-01	1.218E+00
EU-152	6.192E-01	118.8	7.357E-01	7.364E-01	3.867E+00
EU-154	-1.416E+00	198.5	2.812E+00	2.813E+00	9.985E+00
EU-155	-9.504E-01	98.9	9.400E-01	9.415E-01	3.622E+00
HF-181	1.251E-01	146.4	1.831E-01	1.832E-01	1.555E+00
Ta-182	1.634E+00	72.5	1.185E+00	1.188E+00	5.050E+00
Hg-203	2.630E-01	104.3	2.744E-01	2.748E-01	9.319E-01
TL-208	1.657E+00	18.3	3.032E-01	3.152E-01	5.762E-01
pm-146	4.846E-02	79.9	3.869E-02	3.877E-02	3.025E+00
y-88	-3.557E-01	96.6	3.436E-01	3.441E-01	1.316E+00
Cd-113m	-4.367E+03	100.0	4.368E+03	4.377E+03	1.473E+04
Cd-109	0.000E+00	1.#INF	1.841E+00	1.841E+00	3.290E+01
Cf-251	-7.426E-01	186.1	1.382E+00	1.384E+00	3.797E+00
Cf-249	-1.539E-02	108.4	1.669E-02	1.671E-02	1.908E+00
Sn-126	-2.772E+00	116.6	3.233E+00	3.236E+00	1.088E+01
PB-210	2.181E+01	37.5	8.175E+00	8.275E+00	2.219E+01
PB-212	2.028E+00	24.4	4.943E-01	5.114E-01	1.409E+00
PB-214	6.314E+00	11.4	7.229E-01	7.939E-01	1.427E+00
BI-207	-2.940E-02	829.9	2.440E-01	2.440E-01	8.927E-01
BI-212	2.725E+00	192.2	5.236E+00	5.238E+00	1.826E+01
U-235	7.681E-01	115.2	8.847E-01	8.855E-01	8.019E+00
BI-214	4.360E+00	17.9	7.810E-01	8.132E-01	1.610E+00
BI-210M	4.390E-01	115.1	5.054E-01	5.060E-01	1.714E+00
AC-228	5.695E+00	17.6	1.002E+00	1.043E+00	1.745E+00
TH-227	2.063E+00	199.0	4.104E+00	4.106E+00	1.195E+01
TH-229	1.221E-01	3651.0	4.456E+00	4.456E+00	1.265E+01
TH-234	7.960E+00	82.3	6.551E+00	6.564E+00	1.918E+01
PA-231	-1.921E+00	182.7	3.509E+00	3.511E+00	5.474E+01
PA-233	-1.433E-02	8628.9	1.236E+00	1.236E+00	4.270E+00
PA-234	-1.173E-02	130.3	1.528E-02	1.529E-02	5.220E+00
PA-234M	1.033E+01	98.2	1.014E+01	1.016E+01	2.469E+02
AM-241	2.093E-01	408.9	8.560E-01	8.560E-01	2.494E+00
Np-237	-1.904E+00	161.6	3.077E+00	3.079E+00	1.032E+01
Ir-192	3.898E-02	627.2	2.445E-01	2.445E-01	8.691E-01
Cs-136	1.562E-01	127.2	1.987E-01	1.989E-01	1.235E+00
Np-239	6.686E-01	149.5	9.995E-01	1.000E+00	3.385E+00
Nd-147	-3.202E+00	96.6	3.094E+00	3.099E+00	7.729E+00
TL-210	2.641E-01	122.2	3.226E-01	3.230E-01	1.325E+00
Total	2.611E+02				

Analyst: Morgan Reichert

TestAmerica Inc Spectrum name: 17_Gamma_20182702.An1

Sample description
376740_Gamma_160-29479-A-3-C

Spectrum Filename: C:\User\SPC\Det17\17_Gamma_20182702.An1

Acquisition information
Start time:	8/9/2018 1:27:45 AM
Live time:	1800
Real time:	1829
Dead time:	1.59 %
Detector ID:	17

Detector system
Ge17 SN/11080671

Calibration
Filename: 17_Soil_TunaCan.Clb
17_TunaCan_90099_032612

Energy Calibration
Created:	2/29/2012 10:33:23 AM
Zero offset:	0.108 keV
Gain:	0.250 keV/channel
Quadratic:	-2.584E-08 keV/channel^2

Efficiency Calibration
Created:	4/12/2012 9:28:42 AM
Knee Energy:	165.85 keV
Above the Knee:	Quadratic Uncertainty = 0.91 %
Log(Eff):	-5.264190E-01 + (-4.024164E-01*Log(E)) + (-2.604461E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 1.00 %
Log(Eff):	-2.343889E+01 + (8.582715E+00*Log(E)) + (-9.075430E-01*Log(E)^2)

Library Files
Main analysis library:	Client_Long_Rev14.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters
Analysis engine:	Env32 G800W064
Start channel:	100 (25.12keV)
Stop channel:	8000 (1999.54keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	8/9/2018 1:27:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	17_2018-07-14_1832.PBC 7/14/2018 6:32:39 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 14 cutoff: 5.00E+01 %

Energy Calibration

Normalized diff: 0.1701

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.74	62.	19.02	0.91	2.115E-02	46.54	4.250	PBC<MDA	PB210
50.14	7.	198.98	0.78	2.357E-02	50.14	8.000	PBC<MDA	TH227
59.54	4.	408.89	0.79	2.957E-02	59.54	35.900	PBC<MDA	AM241
63.56	17.	82.30	1.15	3.164E-02	63.29	3.810	PBC<MDA	TH234
75.05	34.	34.77	0.80	3.689E-02				
77.19	58.	23.82	0.80	3.765E-02				
91.10	15.	146.00	0.82	4.119E-02	91.10	28.300	PBC<MDA	Nd147
92.32	5.	282.83	0.82	4.144E-02	92.59	5.584	PBC<MDA	TH234
93.08	17.	143.43	0.82	4.156E-02	93.35	5.561	PBC<MDA	AC228
97.50	9.	151.02	0.82	4.213E-02	97.50	30.000	PBC<MDA	Gd153
99.02	7.	229.91	0.82	4.234E-02	99.50	15.000	PBC<MDA	Np239
103.70	11.	141.87	0.83	4.269E-02	103.70	24.000	PBC<MDA	Np239
106.13	12.	149.50	0.83	4.282E-02	106.13	22.700	PBC<MDA	Np239
120.13	19.	33.41	0.71	4.284E-02				
121.78	13.	118.81	0.85	4.277E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	1.995E-01	CO57
140.51	13.	135.97	0.86	4.119E-02	140.51	89.300	PBC<MDA	Tc99m
145.44	7.	265.52	0.87	4.059E-02	145.44	48.200	PBC<MDA	CE141
185.72	11.	145.25	0.91	3.545E-02	185.72	54.000	PBC<MDA	U235
205.33	11.	115.17	0.92	3.312E-02	205.33	5.010	PBC<MDA	U235
238.58	47.	24.38	0.95	2.989E-02	238.63	43.300	2.028E+00	PB212
241.95	33.	29.59	0.96	2.960E-02	242.00	7.430	8.247E+00	PB214

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
265.83	11.	115.13	0.98	2.774E-02	265.83	50.000	PBC<MDA	BI210M
277.28	6.	206.32	0.99	2.694E-02	277.28	6.310	PBC<MDA	TL208
279.20	10.	104.31	0.99	2.681E-02	279.20	81.460	PBC<MDA	Hg203
295.50	67.	15.74	0.68	2.577E-02	295.09	19.300	7.036E+00	PB214
					296.00	79.000	1.821E+00	TL210
300.03	9.	214.16	1.01	2.550E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	PBC<MDA	PA231
					300.18	6.200	PBC<MDA	PA233
300.07	6.	311.50	1.01	2.550E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	5.754E+00	PA231
					300.18	6.200	2.284E+00	PA233
304.40	5.	384.59	1.02	2.522E-02	304.85	4.290	PBC<MDA	Ba140
					304.90	28.000	4.066E-01	BI210M
316.49	2.	627.16	1.03	2.456E-02	316.49	87.040	PBC<MDA	Ir192
320.08	7.	106.61	1.03	2.437E-02	320.08	9.940	PBC<MDA	CR51
333.44	8.	115.24	1.04	2.368E-02	333.44	15.510	PBC<MDA	Cf249
338.20	8.	145.83	1.05	2.344E-02	338.32	12.010	PBC<MDA	AC228
340.57	10.	127.20	1.05	2.333E-02	340.57	46.900	PBC<MDA	Cs136
344.29	9.	139.97	1.05	2.315E-02	344.29	26.500	PBC<MDA	EU152
345.83	9.	146.38	1.05	2.308E-02	345.83	15.070	PBC<MDA	HF181
351.84	102.	12.69	1.17	2.279E-02	351.93	37.600	6.602E+00	PB214
364.48	8.	115.24	1.07	2.223E-02	364.48	81.700	PBC<MDA	I131
487.02	13.	52.93	1.18	1.806E-02	487.02	45.500	PBC<MDA	La140
511.86	24.	79.88	2.45	1.742E-02	511.86	20.000	PBC<MDA	RH106
537.71	4.	224.54	1.22	1.682E-02	537.26	24.390	PBC<MDA	Ba140
563.24	5.	188.97	1.25	1.624E-02	563.24	8.350	PBC<MDA	CS134
569.47	3.	233.84	1.25	1.611E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	1.331E+00	PA234
					569.70	97.740	1.117E-01	BI207
583.02	39.	18.30	1.26	1.584E-02	583.02	84.500	1.629E+00	TL208
600.50	9.	188.36	1.28	1.550E-02	600.50	17.860	PBC<MDA	SB125
602.73	9.	193.94	1.28	1.546E-02	602.73	98.260	PBC<MDA	SB124
604.71	9.	199.37	1.28	1.542E-02	604.71	97.620	PBC<MDA	CS134
609.49	55.	17.91	1.73	1.533E-02	609.31	46.090	4.360E+00	BI214
					610.30	5.750	3.499E+01	RU103
610.30	7.	251.03	1.29	1.531E-02	610.30	5.750	PBC<MDA	RU103
635.89	5.	122.96	1.31	1.486E-02	635.89	11.310	PBC<MDA	SB125
636.97	5.	127.38	1.31	1.484E-02	636.97	7.170	PBC<MDA	I131
657.76	8.	79.06	1.33	1.449E-02	657.76	94.640	PBC<MDA	AG110M
702.63	3.	290.26	1.37	1.380E-02	702.63	97.900	PBC<MDA	NB94
724.20	8.	103.23	1.39	1.349E-02	724.20	44.150	PBC<MDA	ZR95
727.17	5.	192.18	1.39	1.345E-02	727.17	7.550	PBC<MDA	BI212
735.72	8.	94.03	1.40	1.333E-02	735.72	22.500	PBC<MDA	pm146
765.79	11.	96.23	1.42	1.294E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
766.41	6.	98.16	1.42	1.293E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
778.92	1.	899.10	1.43	1.278E-02	778.92	12.940	PBC<MDA	EU152

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
795.87	8.	92.17	1.45	1.257E-02	795.87	85.530	PBC<MDA	CS134
799.60	6.	147.07	1.45	1.253E-02	799.60	98.960	PBC<MDA	TL210
801.95	5.	141.38	1.45	1.250E-02	801.95	8.690	PBC<MDA	CS134
810.78	7.	92.88	1.46	1.240E-02	810.78	99.460	PBC<MDA	CO58
815.77	1.	632.39	1.47	1.234E-02	815.77	23.280	PBC<MDA	La140
911.44	37.	17.59	0.90	1.135E-02	911.07	29.000	6.296E+00	AC228
946.02	2.	403.11	1.57	1.103E-02	946.02	13.400	PBC<MDA	PA234
968.50	16.	35.58	0.88	1.083E-02	968.97	17.460	4.695E+00	AC228
1001.00	-3.	208.87	1.62	1.057E-02	1001.00	0.837	PBC<MDA	PA234M
1037.84	19.	34.58	1.65	1.028E-02	1037.84	14.130	7.265E+00	Co56
1050.36	8.	77.61	1.66	1.019E-02	1050.36	1.560	PBC<MDA	RH106
1077.40	2.	354.73	1.68	9.992E-03	1077.40	3.300	PBC<MDA	Ga68
1120.51	7.	147.36	1.72	9.697E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	PBC<MDA	Ta182
1120.55	10.	93.55	1.72	9.696E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	5.928E-01	Sc46
					1121.30	34.900	1.699E+00	Ta182
1121.30	10.	87.89	1.72	9.691E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	5.930E-01	Sc46
					1121.30	34.900	1.700E+00	Ta182
1173.24	6.	91.54	1.76	9.359E-03	1173.24	99.900	PBC<MDA	CO60
1189.05	5.	176.07	1.77	9.263E-03	1189.05	16.200	PBC<MDA	Ta182
1221.41	6.	92.97	1.80	9.073E-03	1221.41	27.000	PBC<MDA	Ta182
1238.28	6.	164.06	1.81	8.977E-03	1238.28	66.070	PBC<MDA	Co56
1291.60	5.	44.72	1.85	8.689E-03	1291.60	43.200	PBC<MDA	FE59
1313.00	3.	206.16	1.87	8.579E-03	1313.00	21.000	PBC<MDA	TL210
1332.50	7.	37.80	1.89	8.481E-03	1332.50	99.980	PBC<MDA	CO60
1384.30	10.	31.62	1.93	8.233E-03	1384.30	24.290	2.778E+00	AG110M
1460.84	270.	6.27	2.04	7.894E-03	1460.83	10.670	1.781E+02	K40
1764.53	17.	28.46	2.21	6.804E-03	1764.49	15.400	8.991E+00	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
299.62	75.07	53.	34.	9.262E+02	34.77	0.802	- sD
308.18	77.21	66.	58.	1.542E+03	23.82	0.804	- sD
479.87	120.13	9.	19.	4.357E+02	33.41	0.712	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev14.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	186.44	46.74	50.	35.	0.019	37.49	0.909s
TH-227	200.03	50.14	66.	7.	0.004	198.98	0.778s
AM-241	237.59	59.54	93.	4.	0.002	408.89	0.787s
TH-234	253.66	63.56	70.	17.	0.010	82.30	1.145s
Sn-126	256.56	64.28	157.	-16.	-0.009	116.65	0.792s
BA-133	323.36	80.99	106.	-14.	-0.008	100.02	0.807
Np-237	345.35	86.49	418.	-18.	-0.010	161.58	0.813s
EU-155	345.56	86.54	400.	-18.	-0.010	158.07	0.813
Sn-126	347.15	86.94	381.	-18.	-0.010	154.49	0.813s
Sn-126	349.67	87.57	363.	-3.	-0.002	805.96	0.814s
Cd-109	351.55	88.04	360.	0.	0.000	1000.00	0.814s
Nd-147	363.79	91.10	233.	15.	0.008	146.00	0.817s
TH-234	369.74	92.59	113.	5.	0.003	282.83	0.818D
AC-228	372.78	93.35	291.	17.	0.009	143.43	0.819s
Gd-153	389.37	97.50	95.	9.	0.005	151.02	0.823s
Np-239	397.37	99.50	126.	7.	0.004	229.91	0.825s
Gd-153	412.16	103.20	123.	-4.	-0.002	424.11	0.828s
Np-239	414.16	103.70	108.	11.	0.006	141.87	0.829s
EU-155	420.61	105.31	147.	-16.	-0.009	98.91	0.830s
Np-239	423.88	106.13	147.	12.	0.006	149.50	0.831s
EU-152	486.43	121.78	115.	13.	0.007	118.81	0.846
EU-154	491.73	123.10	129.	0.	0.000	1000.00	0.847s
PA-234	524.49	131.29	216.	-16.	-0.009	130.26	0.855
HF-181	531.41	133.02	190.	-16.	-0.009	122.13	0.856s
CE-144	533.46	133.54	208.	-3.	-0.002	595.16	0.857s
HF-181	544.50	136.30	255.	-17.	-0.009	135.77	0.859
CO-57	545.20	136.47	272.	-5.	-0.003	490.63	0.859
Tc-99m	561.34	140.51	158.	13.	0.007	135.97	0.863s
U-235	574.43	143.79	176.	-5.	-0.003	314.06	0.866s
CE-141	581.05	145.44	153.	7.	0.004	265.52	0.868s
Ba-140	649.90	162.66	138.	-15.	-0.008	115.73	0.884s
U-235	652.78	163.38	160.	-15.	-0.008	108.49	0.885s
CE-139	662.67	165.85	166.	-14.	-0.008	132.86	0.887s
Cf-251	705.64	176.60	73.	-8.	-0.005	186.12	0.897
U-235	742.10	185.72	91.	11.	0.006	145.25	0.905
U-235	820.52	205.33	51.	11.	0.006	115.17	0.924
Cf-251	907.16	227.00	57.	-10.	-0.005	142.26	0.944
PB-212	953.67	238.63	42.	47.	0.026	24.38	0.954D
PB-214	967.13	242.00	30.	33.	0.018	29.59	0.958D
EU-152	977.91	244.69	209.	-10.	-0.005	212.97	0.960s
TH-227	1024.08	256.24	44.	-4.	-0.002	311.04	0.971s
Cd-113m	1053.91	263.70	80.	-13.	-0.007	100.01	0.978s
BI-210M	1062.44	265.83	74.	11.	0.006	115.13	0.979s
TL-208	1108.23	277.28	46.	6.	0.003	206.32	0.990s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Hg-203	1115.89	279.20	53.	10.	0.006	104.31	0.992
PB-214	1180.31	295.31	16.	52.	0.029	19.06	0.663s
TL-210	1183.07	296.00	182.	10.	0.006	195.14	1.007s
PB-212	1199.19	300.03	192.	9.	0.005	214.16	1.011
PA-231	1199.35	300.07	202.	6.	0.004	311.50	1.011s
PA-233	1199.79	300.18	232.	-11.	-0.006	196.02	1.011s
PA-231	1209.66	302.65	221.	-11.	-0.006	190.95	1.013
BA-133	1210.47	302.85	209.	-9.	-0.005	219.73	1.013
Ba-140	1218.46	304.85	195.	5.	0.003	384.59	1.015s
BI-210M	1218.64	304.90	200.	0.	0.000	1000.00	1.015s
Ir-192	1232.82	308.44	200.	0.	0.000	1000.00	1.019s
Ir-192	1265.01	316.49	44.	2.	0.001	627.16	1.026s
CR-51	1279.38	320.08	26.	7.	0.004	106.61	1.029s
Cf-249	1332.79	333.44	22.	8.	0.004	115.24	1.041s
AC-228	1352.30	338.32	62.	8.	0.004	145.83	1.046s
Cs-136	1361.30	340.57	70.	10.	0.005	127.20	1.048s
EU-152	1376.16	344.29	74.	9.	0.005	139.97	1.051s
HF-181	1382.33	345.83	90.	9.	0.005	146.38	1.053s
PB-214	1406.35	351.84	17.	102.	0.057	12.69	1.168s
BA-133	1423.00	356.00	183.	-12.	-0.007	158.96	1.062s
I-131	1456.93	364.48	22.	8.	0.004	115.24	1.070s
BA-133	1534.34	383.84	84.	-12.	-0.007	110.54	1.087s
Cf-249	1550.77	387.95	95.	-8.	-0.004	183.71	1.091s
AG-108M	1734.69	433.94	37.	-13.	-0.007	103.81	1.132s
pm-146	1814.44	453.88	28.	-3.	-0.002	391.37	1.150s
SB-125	1852.38	463.37	66.	-12.	-0.007	99.37	1.158s
Ir-192	1871.15	468.06	84.	-10.	-0.005	138.80	1.163s
BE-7	1909.29	477.59	56.	-12.	-0.006	96.52	1.171s
HF-181	1926.89	482.00	68.	-3.	-0.002	337.61	1.175s
La-140	1946.98	487.02	8.	13.	0.007	52.93	1.180s
RU-103	1987.11	497.05	40.	-13.	-0.007	98.74	1.188s
RH-106	2046.35	511.86	53.	24.	0.013	79.88	2.452s
Nd-147	2122.88	531.00	36.	-13.	-0.007	96.60	1.219s
Ba-140	2147.92	537.26	20.	4.	0.002	224.54	1.224s
CS-134	2251.82	563.24	20.	5.	0.003	188.97	1.247s
CS-134	2276.15	569.32	24.	-5.	-0.003	145.60	1.252s
PA-234	2276.75	569.47	26.	3.	0.002	233.84	1.253s
BI-207	2277.67	569.70	24.	-1.	0.000	829.94	1.253
TL-208	2330.95	583.02	6.	39.	0.022	18.30	1.264s
SB-125	2400.86	600.50	136.	9.	0.005	188.36	1.280s
SB-124	2409.78	602.73	145.	9.	0.005	193.94	1.282s
CS-134	2417.70	604.71	154.	9.	0.005	199.37	1.284s
BI-214	2436.80	609.49	15.	55.	0.031	17.91	1.731s
RU-103	2440.05	610.30	163.	7.	0.004	251.03	1.288s
AG-108M	2455.98	614.28	170.	0.	0.000	1000.00	1.292s
PM-144	2471.11	618.06	170.	0.	0.000	1000.00	1.295s
RH-106	2486.52	621.92	262.	-14.	-0.008	69.71	1.299s
SB-125	2542.41	635.89	13.	5.	0.003	122.96	1.311s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
I-131	2546.75	636.97	15.	5.	0.003	127.38	1.312s
AG-110M	2629.90	657.76	16.	8.	0.004	79.06	1.330s
CS-137	2645.49	661.66	36.	-7.	-0.004	82.02	1.333s
PM-144	2785.03	696.54	35.	-11.	-0.006	116.76	1.363s
NB-94	2809.38	702.63	22.	3.	0.002	290.26	1.368s
SB-124	2890.01	722.79	49.	-13.	-0.007	82.55	1.386s
AG-108M	2890.61	722.94	62.	-2.	-0.001	497.85	1.386s
EU-154	2892.29	723.36	64.	0.	0.000	1000.00	1.386s
ZR-95	2895.66	724.20	33.	8.	0.005	103.23	1.387s
BI-212	2907.54	727.17	43.	5.	0.003	192.18	1.390s
pm-146	2941.74	735.72	13.	8.	0.005	94.03	1.397s
pm-146	2987.51	747.16	22.	-8.	-0.004	129.09	1.407s
ZR-95	3025.79	756.73	13.	-2.	-0.001	262.61	1.415s
AG-110M	3054.64	763.94	50.	-15.	-0.008	71.97	1.421
NB-95	3062.03	765.79	49.	11.	0.006	96.23	1.423s
PA-234M	3064.52	766.41	17.	6.	0.004	98.16	1.423s
EU-152	3114.56	778.92	13.	1.	0.000	899.10	1.434s
BI-212	3140.56	785.42	27.	-11.	-0.006	69.77	1.440s
CS-134	3182.35	795.87	25.	8.	0.005	92.17	1.448s
TL-210	3197.29	799.60	33.	6.	0.003	147.07	1.451s
CS-134	3206.69	801.95	23.	5.	0.003	141.38	1.454s
CO-58	3241.99	810.78	19.	7.	0.004	92.88	1.461s
La-140	3261.97	815.77	26.	1.	0.001	632.39	1.465s
Cs-136	3272.90	818.50	28.	0.	0.000	1000.00	1.467s
MN-54	3338.30	834.85	19.	-9.	-0.005	111.07	1.481s
Co-56	3385.99	846.77	19.	-4.	-0.002	255.36	1.491s
NB-94	3483.32	871.10	17.	0.	0.000	1000.00	1.512s
EU-154	3491.85	873.23	25.	-4.	-0.002	198.55	1.514s
PA-234	3521.06	880.53	41.	-11.	-0.006	91.36	1.520s
PA-234	3531.90	883.24	52.	-3.	-0.002	373.45	1.522s
AG-110M	3537.67	884.68	55.	0.	0.000	1000.00	1.523s
y-88	3591.11	898.04	24.	-7.	-0.004	96.59	1.534s
AC-228	3644.74	911.44	3.	37.	0.021	17.59	0.900s
AG-110M	3748.95	937.49	19.	-5.	-0.003	201.78	1.567s
PA-234	3783.07	946.02	14.	2.	0.001	403.11	1.574s
EU-152	3855.45	964.11	50.	-5.	-0.003	218.53	1.589s
AC-228	3873.00	968.50	5.	16.	0.009	35.58	0.882s
EU-154	3984.36	996.33	51.	-8.	-0.004	133.59	1.616s
PA-234M	4003.04	1001.00	62.	-3.	-0.002	208.87	1.620s
Co-56	4150.45	1037.84	5.	19.	0.011	34.58	1.650s
Cs-136	4191.39	1048.07	25.	-3.	-0.001	270.42	1.658s
RH-106	4200.55	1050.36	16.	8.	0.005	77.61	1.661s
BI-207	4253.77	1063.66	16.	-3.	-0.002	228.56	1.671s
Ga-68	4308.74	1077.40	10.	2.	0.001	354.73	1.683s
FE-59	4396.18	1099.25	30.	-9.	-0.005	137.89	1.700s
EU-152	4447.49	1112.07	65.	-10.	-0.006	114.96	1.711s
ZN-65	4461.38	1115.55	55.	-8.	-0.004	140.59	1.713s
BI-214	4480.35	1120.29	55.	7.	0.004	147.36	1.717s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Sc-46	4481.41	1120.55	42.	10.	0.006	93.55	1.717s
Ta-182	4484.41	1121.30	36.	10.	0.006	87.89	1.718s
CO-60	4692.24	1173.24	5.	6.	0.003	91.54	1.760s
Ta-182	4755.52	1189.05	15.	5.	0.003	176.07	1.772s
Ta-182	4885.02	1221.41	5.	6.	0.003	92.97	1.798s
Co-56	4952.53	1238.28	16.	6.	0.003	164.06	1.812s
NA-22	5097.60	1274.53	16.	-4.	-0.002	150.00	1.840s
EU-154	5097.66	1274.54	20.	0.	0.000	1000.00	1.840s
FE-59	5165.90	1291.60	0.	5.	0.003	44.72	1.854s
TL-210	5251.56	1313.00	5.	3.	0.001	206.16	1.870s
CO-60	5329.61	1332.50	0.	7.	0.004	37.80	1.886s
AG-110M	5536.92	1384.30	0.	10.	0.006	31.62	1.926s
K-40	5843.26	1460.84	8.	270.	0.150	6.27	2.044
La-140	6385.15	1596.21	0.	0.	0.000	1000.00	2.087s
SB-124	6764.55	1690.98	12.	-9.	-0.005	98.76	2.157s
BI-214	7058.84	1764.49	3.	17.	0.009	28.46	2.211s
Co-56	7086.31	1771.35	20.	0.	0.000	1000.00	2.216s
y-88	7345.39	1836.06	0.	0.	0.000	1000.00	2.262s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
BE-7	C	-3.3196E+00				5.31E+01	
			477.60	-3.320E+00	?(	1.084E+01	9.65E+01 1.05E+01 G
NA-22	C	-2.5329E-01				9.50E+02	
			1274.53	-2.533E-01	?(	1.352E+00	1.50E+02 9.99E+01 G
K-40	N	1.7811E+02				4.66E+11	
			1460.83	1.781E+02	(P	1.046E+01	6.27E+00 1.07E+01 G
Sc-46	F	2.8041E-01				8.38E+01	
			889.28	-3.203E-02	%(	1.796E+00	1.58E+03 1.00E+02 G
			1120.55	5.928E-01	?(	1.879E+00	9.36E+01 1.00E+02 G
CR-51	F	1.6407E+00				2.77E+01	
			320.08	1.641E+00	?(	6.019E+00	1.07E+02 9.94E+00 G
MN-54	C	-3.9708E-01				3.12E+02	
			834.85	-3.971E-01	?(	1.047E+00	1.11E+02 1.00E+02 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
FE-59	F -1.8902E-01					4.45E+01	
		1099.25	-8.994E-01	?(	2.821E+00	1.38E+02	5.65E+01 G
		1291.60	7.401E-01	?(	1.091E+00	4.47E+01	4.32E+01 G
Co-56	C 6.7326E-01					7.73E+01	
		846.77	-1.699E-01	?(	1.058E+00	2.55E+02	9.99E+01 G
		1238.28	5.388E-01	&(P	2.013E+00	1.64E+02	6.61E+01 G
		1037.84	7.265E+00	?(	5.021E+00	3.46E+01	1.41E+01 G
		1771.35	0.000E+00	-	1.246E+01	1.00E+03	1.55E+01 A
CO-57	C 7.9595E-03					2.72E+02	
		122.06	7.960E-03	%(	8.429E-01	3.06E+03	8.56E+01 G
		136.47	-5.961E-01	&	9.934E+00	4.91E+02	1.07E+01 G
CO-58	C 3.2366E-01					7.09E+01	
		810.78	3.237E-01	?(	1.029E+00	9.29E+01	9.95E+01 G
CO-60	F 4.0760E-01					1.93E+03	
		1332.50	4.586E-01	?(	4.829E-01	3.78E+01	1.00E+02 G
		1173.24	3.565E-01	?(	7.802E-01	9.15E+01	9.99E+01 G
ZN-65	F -8.6857E-01					2.44E+02	
		1115.55	-8.686E-01	?(	4.195E+00	1.41E+02	5.06E+01 G
NB-94	I 1.3709E-01					7.41E+06	
		702.63	1.371E-01	?(	1.004E+00	2.90E+02	9.79E+01 G
		871.10	0.000E+00	-	1.038E+00	1.00E+03	9.99E+01 G
ZR-95	I 2.5305E-01					6.40E+01	
		756.73	-1.734E-01	?(P	1.536E+00	2.63E+02	5.45E+01 G
		724.20	7.791E-01	?(	2.750E+00	1.03E+02	4.42E+01 G
NB-95	I 4.6567E-01					6.40E+01	
		765.79	4.657E-01	&(	1.518E+00	9.62E+01	9.98E+01 G
RU-103	I -4.4870E-01					3.93E+01	
		497.05	-4.487E-01	?(	1.105E+00	9.87E+01	9.09E+01 G
		610.30	4.584E+00	?	3.921E+01	2.51E+02	5.75E+00 GA
RH-106	I -7.3513E-01					3.74E+02	
		621.92	-5.335E+00	?(P	2.894E+01	6.97E+01	9.93E+00 G
		1050.36	2.855E+01	?(	7.463E+01	7.76E+01	1.56E+00 G
		511.86	3.844E+00	?	5.859E+00	7.99E+01	2.00E+01 GA
AG-108M	C -3.9205E-01					1.53E+05	
		433.94	-3.920E-01	?(P	9.685E-01	1.04E+02	9.05E+01 G
		722.94	-1.020E-01	+	1.781E+00	4.98E+02	9.08E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
		614.28	0.000E+00 +		2.575E+00	1.00E+03	8.98E+01 G
AG-110M	F 5.1224E-01					2.50E+02	
		884.68	0.000E+00 ?(		2.447E+00	1.00E+03	7.27E+01 G
		657.76	3.241E-01 ?(		8.649E-01	7.91E+01	9.46E+01 G
		937.49	-6.791E-01 +		3.324E+00	2.02E+02	3.44E+01 G
		1384.30	2.778E+00 ?(		2.047E+00	3.16E+01	2.43E+01 G
		763.94	-2.851E+00 +		6.828E+00	7.20E+01	2.23E+01 G
SN-113	F -4.8393E-02					1.15E+02	
		391.69	-4.839E-02 %(P		2.028E+00	1.10E+03	6.40E+01 G
SB-124	F 3.2600E-01					6.02E+01	
		602.73	3.260E-01 ?(		2.151E+00	1.94E+02	9.83E+01 G
		1690.98	-1.487E+00 +		3.114E+00	9.88E+01	4.78E+01 G
		722.79	-4.849E+00 +		1.344E+01	8.26E+01	1.08E+01 G
SB-125	I 8.0177E-01					1.01E+03	
		427.88	-6.311E-02 %(		2.491E+00	1.43E+03	2.96E+01 G
		600.50	1.786E+00 &(		1.145E+01	1.88E+02	1.79E+01 G
		635.89	1.511E+00 ?(P		6.542E+00	1.23E+02	1.13E+01 G
		463.37	-3.424E+00 +		1.150E+01	9.94E+01	1.05E+01 G
I-131	I 4.2156E-01					8.02E+00	
		364.48	2.447E-01 ?(		7.514E-01	1.15E+02	8.17E+01 G
		284.30	3.418E-01 &		1.007E+01	1.08E+03	6.14E+00 G
		636.97	2.437E+00 &(		1.094E+01	1.27E+02	7.17E+00 G
Gd-153	F 4.1029E-01					2.42E+02	
		97.50	4.103E-01 ?(		2.112E+00	1.51E+02	3.00E+01 G
		103.20	-2.224E-01 +		3.246E+00	4.24E+02	2.18E+01 G
Ga-68	C 3.9522E+00					4.71E-02	
		1077.40	3.952E+00 ?(		3.448E+01	3.55E+02	3.30E+00 G
Tc-99m	I 2.0765E-01					2.51E-01	
		140.51	2.076E-01 ?(		9.535E-01	1.36E+02	8.93E+01 G
BA-133	F -4.8477E-01					3.85E+03	
		356.00	-4.848E-01 &(		2.605E+00	1.59E+02	6.20E+01 G
		302.85	-1.127E+00 +		8.392E+00	2.20E+02	1.83E+01 G
		383.84	-3.401E+00 + P		1.320E+01	1.11E+02	8.94E+00 GA
		80.99	-5.843E-01 + P		2.128E+00	1.00E+02	3.41E+01 GA
CS-134	I 5.3752E-01					7.54E+02	
		604.71	3.294E-01 (		2.233E+00	1.99E+02	9.76E+01 G
		795.87	4.279E-01 ?(P		1.342E+00	9.22E+01	8.55E+01 G
		569.32	-1.121E+00 &		5.724E+00	1.46E+02	1.54E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
		801.95	2.585E+00	?(	1.282E+01	1.41E+02	8.69E+00 G
		563.24	1.963E+00	?(P	9.690E+00	1.89E+02	8.35E+00 G
CS-137 I	-3.1795E-01					1.10E+04	
		661.66	-3.180E-01	?(P	1.387E+00	8.20E+01	8.52E+01 G
CE-139 F	-2.5449E-01					1.38E+02	
		165.85	-2.545E-01	?(	1.141E+00	1.33E+02	7.99E+01 G
Ba-140 I	8.5771E-01					1.28E+01	
		537.26	5.419E-01	?(	3.190E+00	2.25E+02	2.44E+01 G
		162.66	-3.451E+00	+	1.346E+01	1.16E+02	6.22E+00 G
		304.85	2.653E+00	?(	3.480E+01	3.85E+02	4.29E+00 G
La-140 I	2.6698E-01					1.28E+01	
		1596.21	0.000E+00	?(	5.828E-01	1.00E+03	9.54E+01 G
		487.02	8.496E-01	(P	1.098E+00	5.29E+01	4.55E+01 G
		328.76	6.274E-02	% P	3.204E+00	1.86E+03	2.03E+01 G
		815.77	2.223E-01	?(	5.106E+00	6.32E+02	2.33E+01 G
CE-141 I	1.8932E-01					3.25E+01	
		145.44	1.893E-01	?(	1.716E+00	2.66E+02	4.82E+01 G
CE-144 I	-4.1079E-01					2.85E+02	
		133.54	-4.108E-01	?(	8.347E+00	5.95E+02	1.11E+01 G
PM-144 C	-4.3101E-01					3.63E+02	
		696.54	-4.310E-01	?(	1.218E+00	1.17E+02	9.90E+01 G
		618.06	0.000E+00	+	2.345E+00	1.00E+03	9.91E+01 G
EU-152 F	6.1921E-01					4.94E+03	
		344.29	8.093E-01	?(P	3.867E+00	1.40E+02	2.65E+01 G
		1112.07	-4.302E+00	+	1.682E+01	1.15E+02	1.36E+01 G
		121.78	5.973E-01	(	2.398E+00	1.19E+02	2.86E+01 G
		778.92	2.783E-01	?(P	6.594E+00	8.99E+02	1.29E+01 G
		964.11	-1.632E+00	+	1.243E+01	2.19E+02	1.46E+01 G
		244.69	-2.421E+00	&	1.747E+01	2.13E+02	7.58E+00 G
		1408.00	-1.528E-01	% P	4.430E+00	2.01E+03	2.10E+01 GA
EU-154 I	-1.4161E+00					3.14E+03	
		873.23	-1.416E+00	?(	9.985E+00	1.99E+02	1.23E+01 G
		123.10	0.000E+00	&	1.775E+00	1.00E+03	4.08E+01 G
		1274.54	0.000E+00	+	4.235E+00	1.00E+03	3.52E+01 G
		723.36	0.000E+00	+	8.137E+00	1.00E+03	2.02E+01 G
		1004.77	-1.951E-01	%	1.139E+01	1.65E+03	1.80E+01 G
		996.33	-3.870E+00	+	1.775E+01	1.34E+02	1.06E+01 G

Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
EU-155	I	-9.5037E-01						1.81E+03	
			105.31	-9.504E-01	?(P	3.622E+00	9.89E+01	2.12E+01	G
			86.54	-8.127E-01	+	4.307E+00	1.58E+02	3.07E+01	G
HF-181	F	1.2511E-01						4.24E+01	
			482.00	-1.322E-01	&(	1.555E+00	3.38E+02	8.05E+01	G
			133.02	-4.982E-01	+	2.046E+00	1.22E+02	4.33E+01	G
			345.83	1.500E+00	?(P	7.481E+00	1.46E+02	1.51E+01	G
			136.30	-3.853E+00	+	1.758E+01	1.36E+02	5.85E+00	G
Ta-182	F	1.6340E+00						1.14E+02	
			1121.30	1.700E+00	?(	5.050E+00	8.79E+01	3.49E+01	G
			1221.41	1.418E+00	?(	3.055E+00	9.30E+01	2.70E+01	G
			1189.05	1.851E+00	?(	7.685E+00	1.76E+02	1.62E+01	G
Hg-203	F	2.6303E-01						4.66E+01	
			279.20	2.630E-01	(	9.319E-01	1.04E+02	8.15E+01	G
TL-208	N	1.6572E+00						6.98E+02	
			583.02	1.629E+00	*(P	5.762E-01	1.83E+01	8.45E+01	G
			277.28	2.029E+00	?(P	1.119E+01	2.06E+02	6.31E+00	G
			860.56	2.099E-01	% P	6.427E+00	1.18E+03	1.24E+01	G
pm-146	C	4.8455E-02						2.02E+03	
			747.16	-9.504E-01	?(	3.025E+00	1.29E+02	3.40E+01	G
			735.72	1.558E+00	?(	3.613E+00	9.40E+01	2.25E+01	G
			453.88	-1.499E-01	+ P	1.238E+00	3.91E+02	6.50E+01	G
y-88	F	-3.5574E-01						1.07E+02	
			898.04	-3.557E-01	?(P	1.316E+00	9.66E+01	9.37E+01	G
			1836.06	0.000E+00	+	6.260E-01	1.00E+03	9.92E+01	G
Cd-113m		-4.3673E+03						5.33E+03	
			263.70	-4.367E+03	?(	1.473E+04	1.00E+02	6.00E-03	K
Cf-251	T	-7.4256E-01						3.28E+05	
			176.60	-7.426E-01	?(	3.797E+00	1.86E+02	1.70E+01	G
			227.00	-2.756E+00	+	1.077E+01	1.42E+02	6.30E+00	GA
Cf-249	T	-1.5394E-02						1.28E+05	
			387.95	-3.034E-01	?(	1.908E+00	1.84E+02	6.60E+01	G
			333.44	1.210E+00	&(	3.717E+00	1.15E+02	1.55E+01	G
Sn-126		-2.7716E+00						3.65E+07	
			87.57	-1.226E-01	+	3.349E+00	8.06E+02	3.75E+01	GA
			64.28	-2.772E+00	&(	1.088E+01	1.17E+02	9.70E+00	G
			86.94	-2.754E+00	+	1.427E+01	1.54E+02	9.04E+00	GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PB-210	N	2.1806E+01					8.14E+03	
			46.54	2.181E+01	*(P	2.219E+01	3.75E+01	4.25E+00 G
PB-212	N	2.0277E+00					6.98E+02	
			238.63	2.028E+00	(P	1.409E+00	2.44E+01	4.33E+01 G
			300.03	6.157E+00	+ P	4.472E+01	2.14E+02	3.28E+00 GA
PB-214	N	6.3141E+00					5.84E+05	
			351.93	6.602E+00	(P	1.427E+00	1.27E+01	3.76E+01 G
			295.09	5.753E+00	(P	2.411E+00	1.91E+01	1.93E+01 G
			242.00	8.247E+00		7.169E+00	2.96E+01	7.43E+00 GA
BI-207	C	-2.9404E-02					1.18E+04	
			569.70	-2.940E-02	?(	8.927E-01	8.30E+02	9.77E+01 G
			1063.66	-2.092E-01	+ P	1.570E+00	2.29E+02	7.45E+01 G
BI-212	N	2.7247E+00					6.98E+02	
			727.17	2.725E+00	?(	1.826E+01	1.92E+02	7.55E+00 G
			785.42	-3.712E+01	+ P	9.182E+01	6.98E+01	1.28E+00 GA
U-235	N	7.6810E-01					2.57E+11	
			143.79	-6.244E-01	&(P	8.019E+00	3.14E+02	1.10E+01 G
			205.33	3.814E+00	?(P	1.205E+01	1.15E+02	5.01E+00 G
			163.38	-4.330E+00	+ P	1.771E+01	1.08E+02	5.08E+00 G
			185.72	3.318E-01	P	1.366E+00	1.45E+02	5.40E+01 GA
BI-214	N	4.3597E+00					5.84E+05	
			609.31	4.360E+00	(P	1.610E+00	1.79E+01	4.61E+01 G
			1120.29	2.796E+00	- P	1.414E+01	1.47E+02	1.51E+01 G
			1764.49	8.991E+00	+ P	5.746E+00	2.85E+01	1.54E+01 G
BI-210M	T	4.3897E-01					1.10E+09	
			265.83	4.390E-01	?(P	1.714E+00	1.15E+02	5.00E+01 G
			304.90	0.000E+00	-	5.399E+00	1.00E+03	2.80E+01 G
AC-228	N	5.6945E+00					2.10E+03	
			911.07	6.296E+00	(P	1.745E+00	1.76E+01	2.90E+01 G
			968.97	4.695E+00	(P	3.860E+00	3.56E+01	1.75E+01 G
			338.32	1.561E+00	- P	7.799E+00	1.46E+02	1.20E+01 G
			93.35	4.105E+00	-	1.977E+01	1.43E+02	5.56E+00 XA
TH-227	N	2.0627E+00					7.95E+03	
			50.14	2.063E+00	&(	1.195E+01	1.99E+02	8.00E+00 G
			256.24	-1.038E+00	+ P	9.350E+00	3.11E+02	7.00E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
TH-229	N	1.2206E-01					2.68E+06	
			193.51	1.221E-01	&(	1.265E+01	3.65E+03	4.40E+00 G
			210.85	5.712E-01	&	2.217E+01	1.38E+03	2.99E+00 G
TH-234	N	7.9603E+00					1.63E+12	
			63.29	7.960E+00	@(P	1.918E+01	8.23E+01	3.81E+00 G
			92.59	1.300E+00	- P	1.253E+01	2.83E+02	5.58E+00 G
PA-231	N	-1.9208E+00					1.20E+07	
			302.65	-8.476E+00	?(	5.474E+01	1.91E+02	2.88E+00 G
			300.07	5.754E+00	(	6.099E+01	3.11E+02	2.46E+00 G
PA-233	C	-1.4325E-02					7.82E+08	
			312.01	-1.433E-02	%(P	4.270E+00	8.63E+03	3.60E+01 G
			300.18	-3.906E+00	+	2.589E+01	1.96E+02	6.20E+00 G
PA-234	N	-1.1730E-02					1.63E+12	
			131.29	-1.192E+00	?(	5.220E+00	1.30E+02	1.80E+01 G
			946.02	7.515E-01	&(	7.570E+00	4.03E+02	1.34E+01 G
			569.47	1.331E+00	?(	1.110E+01	2.34E+02	8.20E+00 G
			883.24	-1.376E+00	+	1.806E+01	3.73E+02	9.60E+00 G
			880.53	-8.400E+00	+	2.596E+01	9.14E+01	6.00E+00 GA
PA-234M	N	1.0333E+01					1.63E+12	
			1001.00	-1.900E+01	?(P	2.469E+02	2.09E+02	8.37E-01 G
			766.41	9.383E+01	?(P	3.168E+02	9.82E+01	2.94E-01 G
AM-241	T	2.0934E-01					1.58E+05	
			59.54	2.093E-01	?(	2.494E+00	4.09E+02	3.59E+01 G
Np-237	F	-1.9045E+00					2.14E+06	
			86.49	-1.904E+00	*(	1.032E+01	1.62E+02	1.31E+01 G
Ir-192	F	3.8979E-02					7.40E+01	
			316.49	3.898E-02	&(	8.691E-01	6.27E+02	8.70E+01 G
			468.06	-5.537E-01	+	2.620E+00	1.39E+02	5.18E+01 G
			308.44	0.000E+00	-	4.800E+00	1.00E+03	3.18E+01 G
Cs-136	F	1.5621E-01					1.30E+01	
			818.50	0.000E+00	*(	1.235E+00	1.00E+03	1.00E+02 G
			1048.07	-1.815E-01	+	1.759E+00	2.70E+02	8.00E+01 G
			340.57	4.893E-01	?(	2.122E+00	1.27E+02	4.69E+01 G
Np-239	T	6.6857E-01					2.36E+00	
			103.70	5.765E-01	?	2.778E+00	1.42E+02	2.40E+01 X
			106.13	6.686E-01	?(	3.385E+00	1.50E+02	2.27E+01 G
			99.50	6.124E-01	?	4.813E+00	2.30E+02	1.50E+01 X

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Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Nd-147	-3.2024E+00				1.11E+01	
		531.00	-3.202E+00	?(	7.729E+00	9.66E+01 1.30E+01 G
		91.10	7.160E-01	+	3.519E+00	1.46E+02 2.83E+01 G
TL-210 N	2.6406E-01				5.84E+05	
		799.60	2.590E-01	?(	1.325E+00	1.47E+02 9.90E+01 G
		296.00	2.705E-01	?(	1.790E+00	1.95E+02 7.90E+01 G
		1313.00	8.224E-01	?	4.154E+00	2.06E+02 2.10E+01 GA

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
TH-227	50.14	66.	7.	0.004	198.98	2.063E+00	
AM-241	59.54	93.	4.	0.002	408.89	2.093E-01	
Sn-126	64.28	157.	-16.	-0.009	116.65	-2.772E+00	
BA-133	80.99	106.	-14.	-0.008	100.02	-5.843E-01	P
Np-237	86.49	418.	-18.	-0.010	161.58	-1.904E+00	
EU-155	86.54	400.	-18.	-0.010	158.07	-8.127E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
Sn-126	86.94	381.	-18.	-0.010	154.49	-2.754E+00		
Sn-126	87.57	363.	-3.	-0.002	805.96	-1.226E-01		
Nd-147	91.10	233.	15.	0.008	146.00	7.160E-01		
Gd-153	97.50	95.	9.	0.005	151.02	4.103E-01		
Gd-153	103.20	123.	-4.	-0.002	424.11	-2.224E-01		
EU-155	105.31	147.	-16.	-0.009	98.91	-9.504E-01	P	
EU-152	121.78	115.	13.	0.007	118.81	5.973E-01		
PA-234	131.29	216.	-16.	-0.009	130.26	-1.192E+00		
HF-181	133.02	190.	-16.	-0.009	122.13	-4.982E-01		
CE-144	133.54	208.	-3.	-0.002	595.16	-4.108E-01		
HF-181	136.30	255.	-17.	-0.009	135.77	-3.853E+00		
CO-57	136.47	272.	-5.	-0.003	490.63	-5.961E-01		
Tc-99m	140.51	158.	13.	0.007	135.97	2.076E-01		
U-235	143.79	176.	-5.	-0.003	314.06	-6.244E-01	P	
CE-141	145.44	153.	7.	0.004	265.52	1.893E-01		
U-235	163.38	160.	-15.	-0.008	108.49	-4.330E+00	P	
CE-139	165.85	166.	-14.	-0.008	132.86	-2.545E-01		
Cf-251	176.60	73.	-8.	-0.005	186.12	-7.426E-01		
U-235	185.72	91.	11.	0.006	145.25	3.318E-01	P	
U-235	205.33	51.	11.	0.006	115.17	3.814E+00	P	
Cf-251	227.00	57.	-10.	-0.005	142.26	-2.756E+00		
EU-152	244.69	209.	-10.	-0.005	212.97	-2.421E+00		
TH-227	256.24	44.	-4.	-0.002	311.04	-1.038E+00	P	
Cd-113m	263.70	80.	-13.	-0.007	100.01	-4.367E+03		
BI-210M	265.83	74.	11.	0.006	115.13	4.390E-01	P	
TL-210	296.00	182.	10.	0.006	195.14	2.705E-01		
PA-231	300.07	202.	6.	0.004	311.50	5.754E+00		
PA-233	300.18	232.	-11.	-0.006	196.02	-3.906E+00		
PA-231	302.65	221.	-11.	-0.006	190.95	-8.476E+00		
BA-133	302.85	209.	-9.	-0.005	219.73	-1.127E+00		
Ir-192	316.49	44.	2.	0.001	627.16	3.898E-02		
CR-51	320.08	26.	7.	0.004	106.61	1.641E+00		
Cf-249	333.44	22.	8.	0.004	115.24	1.210E+00		
Cs-136	340.57	70.	10.	0.005	127.20	4.893E-01		
EU-152	344.29	74.	9.	0.005	139.97	8.093E-01	P	
HF-181	345.83	90.	9.	0.005	146.38	1.500E+00	P	
BA-133	356.00	183.	-12.	-0.007	158.96	-4.848E-01		
I-131	364.48	22.	8.	0.004	115.24	2.447E-01		
BA-133	383.84	84.	-12.	-0.007	110.54	-3.401E+00	P	
Cf-249	387.95	95.	-8.	-0.004	183.71	-3.034E-01		
AG-108M	433.94	37.	-13.	-0.007	103.81	-3.920E-01	P	
pm-146	453.88	28.	-3.	-0.002	391.37	-1.499E-01	P	
SB-125	463.37	66.	-12.	-0.007	99.37	-3.424E+00		
Ir-192	468.06	84.	-10.	-0.005	138.80	-5.537E-01		
BE-7	477.59	56.	-12.	-0.006	96.52	-3.320E+00		
HF-181	482.00	68.	-3.	-0.002	337.61	-1.322E-01		
La-140	487.02	8.	13.	0.007	52.93	8.496E-01	P	
RU-103	497.05	40.	-13.	-0.007	98.74	-4.487E-01		

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
RH-106	511.86	53.	24.	0.013	79.88	3.844E+00		
Nd-147	531.00	36.	-13.	-0.007	96.60	-3.202E+00		
CS-134	563.24	20.	5.	0.003	188.97	1.963E+00		P
CS-134	569.32	24.	-5.	-0.003	145.60	-1.121E+00		
PA-234	569.47	26.	3.	0.002	233.84	1.331E+00		
BI-207	569.70	24.	-1.	0.000	829.94	-2.940E-02		
SB-125	600.50	136.	9.	0.005	188.36	1.786E+00		
SB-124	602.73	145.	9.	0.005	193.94	3.260E-01		
CS-134	604.71	154.	9.	0.005	199.37	3.294E-01		
RU-103	610.30	163.	7.	0.004	251.03	4.584E+00		
RH-106	621.92	262.	-14.	-0.008	69.71	-5.335E+00		P
SB-125	635.89	13.	5.	0.003	122.96	1.511E+00		P
I-131	636.97	15.	5.	0.003	127.38	2.437E+00		
AG-110M	657.76	16.	8.	0.004	79.06	3.241E-01		
CS-137	661.66	36.	-7.	-0.004	82.02	-3.180E-01		P
PM-144	696.54	35.	-11.	-0.006	116.76	-4.310E-01		
NB-94	702.63	22.	3.	0.002	290.26	1.371E-01		
SB-124	722.79	49.	-13.	-0.007	82.55	-4.849E+00		
AG-108M	722.94	62.	-2.	-0.001	497.85	-1.020E-01		
ZR-95	724.20	33.	8.	0.005	103.23	7.791E-01		
BI-212	727.17	43.	5.	0.003	192.18	2.725E+00		
pm-146	735.72	13.	8.	0.005	94.03	1.558E+00		
pm-146	747.16	22.	-8.	-0.004	129.09	-9.504E-01		
ZR-95	756.73	13.	-2.	-0.001	262.61	-1.734E-01		P
AG-110M	763.94	50.	-15.	-0.008	71.97	-2.851E+00		
NB-95	765.79	49.	11.	0.006	96.23	4.657E-01		
PA-234M	766.41	17.	6.	0.004	98.16	9.383E+01		P
EU-152	778.92	13.	1.	0.000	899.10	2.783E-01		P
BI-212	785.42	27.	-11.	-0.006	69.77	-3.712E+01		P
CS-134	795.87	25.	8.	0.005	92.17	4.279E-01		P
TL-210	799.60	33.	6.	0.003	147.07	2.590E-01		
CS-134	801.95	23.	5.	0.003	141.38	2.585E+00		
CO-58	810.78	19.	7.	0.004	92.88	3.237E-01		
La-140	815.77	26.	1.	0.001	632.39	2.223E-01		
MN-54	834.85	19.	-9.	-0.005	111.07	-3.971E-01		
Co-56	846.77	19.	-4.	-0.002	255.36	-1.699E-01		
EU-154	873.23	25.	-4.	-0.002	198.55	-1.416E+00		
PA-234	880.53	41.	-11.	-0.006	91.36	-8.400E+00		
PA-234	883.24	52.	-3.	-0.002	373.45	-1.376E+00		
y-88	898.04	24.	-7.	-0.004	96.59	-3.557E-01		P
AG-110M	937.49	19.	-5.	-0.003	201.78	-6.791E-01		
PA-234	946.02	14.	2.	0.001	403.11	7.515E-01		
EU-152	964.11	50.	-5.	-0.003	218.53	-1.632E+00		
EU-154	996.33	51.	-8.	-0.004	133.59	-3.870E+00		
PA-234M	1001.00	62.	-3.	-0.002	208.87	-1.900E+01		P
Co-56	1037.84	5.	19.	0.011	34.58	7.265E+00		
Cs-136	1048.07	25.	-3.	-0.001	270.42	-1.815E-01		
RH-106	1050.36	16.	8.	0.005	77.61	2.855E+01		

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Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BI-207	1063.66	16.	-3.	-0.002	228.56	-2.092E-01	P
Ga-68	1077.40	10.	2.	0.001	354.73	3.952E+00	
FE-59	1099.25	30.	-9.	-0.005	137.89	-8.994E-01	
EU-152	1112.07	65.	-10.	-0.006	114.96	-4.302E+00	
ZN-65	1115.55	55.	-8.	-0.004	140.59	-8.686E-01	
Sc-46	1120.55	42.	10.	0.006	93.55	5.928E-01	
Ta-182	1121.30	36.	10.	0.006	87.89	1.700E+00	
CO-60	1173.24	5.	6.	0.003	91.54	3.565E-01	
Ta-182	1189.05	15.	5.	0.003	176.07	1.851E+00	
Ta-182	1221.41	5.	6.	0.003	92.97	1.418E+00	
Co-56	1238.28	16.	6.	0.003	164.06	5.388E-01	P
NA-22	1274.53	16.	-4.	-0.002	150.00	-2.533E-01	
FE-59	1291.60	0.	5.	0.003	44.72	7.401E-01	
TL-210	1313.00	5.	3.	0.001	206.16	8.224E-01	
CO-60	1332.50	0.	7.	0.004	37.80	4.586E-01	
AG-110M	1384.30	0.	10.	0.006	31.62	2.778E+00	
SB-124	1690.98	12.	-9.	-0.005	98.76	-1.487E+00	

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

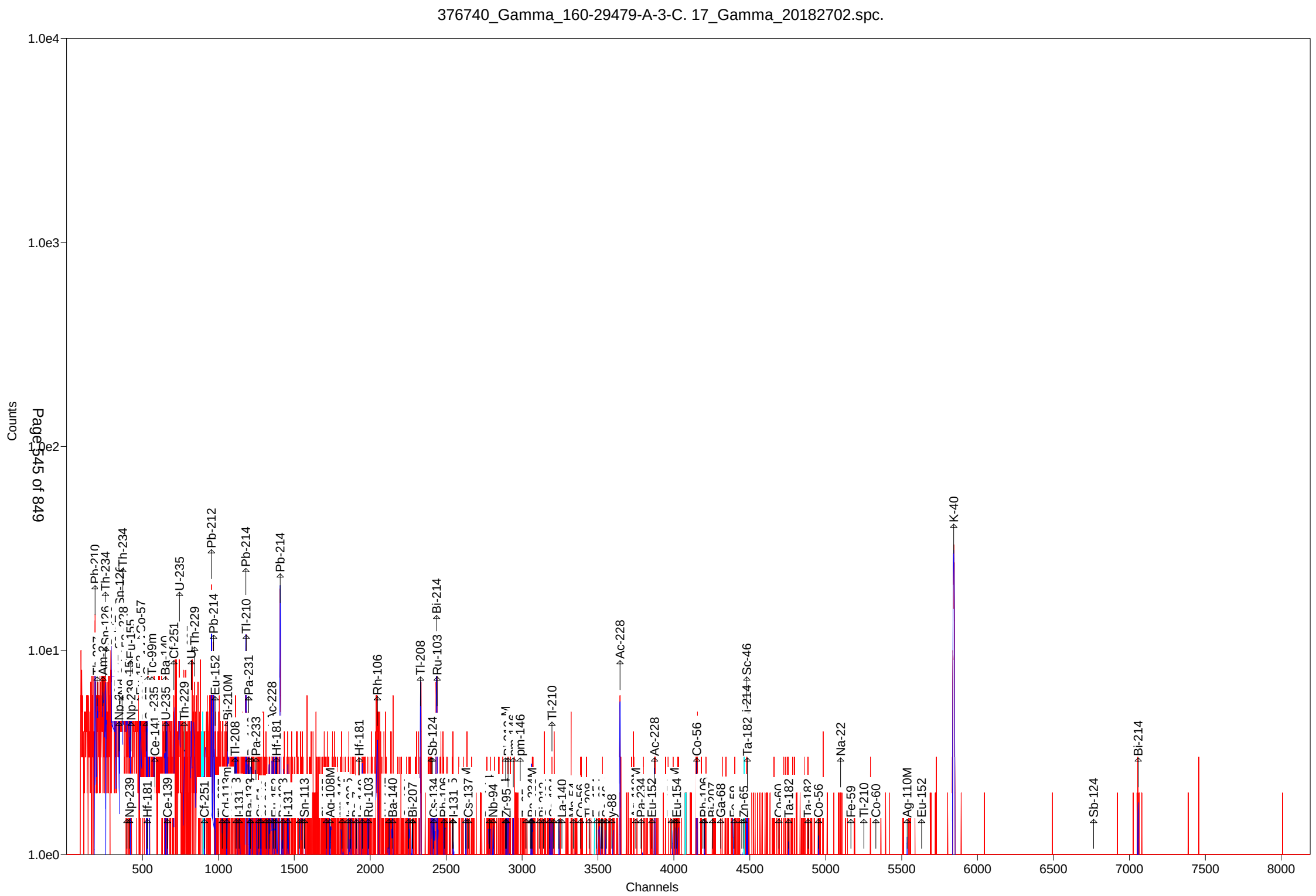
Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty Counting	1 Sigma MDA Bq/Sample
BE-7	#A	-3.3196E+00	-3.3196E+00	9.652E+01%	1.08E+01
NA-22	#A	-2.5329E-01	-2.5329E-01	1.500E+02%	1.35E+00
K-40		1.7811E+02	1.7811E+02	6.268E+00%	1.05E+01
Sc-46	#A	2.8041E-01	2.8041E-01	9.355E+01%	1.80E+00
CR-51	#A	1.6407E+00	1.6407E+00	1.066E+02%	6.02E+00
MN-54	#A	-3.9708E-01	-3.9708E-01	1.111E+02%	1.05E+00
FE-59	#A	-1.8902E-01	-1.8902E-01	4.472E+01%	2.82E+00
Co-56	#A	6.7325E-01	6.7326E-01	3.458E+01%	1.06E+00
CO-57	#A	7.9595E-03	7.9595E-03	3.060E+03%	8.43E-01
CO-58	#A	3.2366E-01	3.2366E-01	9.288E+01%	1.03E+00
CO-60	#A	4.0760E-01	4.0760E-01	3.780E+01%	4.83E-01
ZN-65	#A	-8.6857E-01	-8.6857E-01	1.406E+02%	4.20E+00
NB-94	#A	1.3709E-01	1.3709E-01	2.903E+02%	1.00E+00
ZR-95	#A	2.5305E-01	2.5305E-01	1.032E+02%	1.54E+00
NB-95	#A	4.6567E-01	4.6567E-01	9.623E+01%	1.52E+00
RU-103	#A	-4.4870E-01	-4.4870E-01	9.874E+01%	1.11E+00
RH-106	#A	-7.3513E-01	-7.3513E-01	5.216E+01%	2.89E+01
AG-108M	#A	-3.9205E-01	-3.9205E-01	1.038E+02%	9.69E-01
AG-110M	#A	5.1224E-01	5.1224E-01	3.162E+01%	2.45E+00
SN-113	#A	-4.8392E-02	-4.8393E-02	1.103E+03%	2.03E+00
SB-124	#A	3.2600E-01	3.2600E-01	1.939E+02%	2.15E+00
SB-125	#A	8.0177E-01	8.0177E-01	1.230E+02%	2.49E+00
I-131	#A	4.2154E-01	4.2156E-01	8.589E+01%	7.51E-01

Gd-153 #A	4.1029E-01	4.1029E-01	1.510E+02%		2.11E+00
Ga-68 #A	3.9220E+00	3.9522E+00	3.547E+02%		3.45E+01
Tc-99m #A	2.0735E-01	2.0765E-01	1.360E+02%		9.53E-01
BA-133 #A	-4.8477E-01	-4.8477E-01	1.590E+02%		2.61E+00
CS-134 #A	5.3752E-01	5.3752E-01	8.060E+01%		2.23E+00
CS-137 #A	-3.1795E-01	-3.1795E-01	8.202E+01%		1.39E+00
CE-139 #A	-2.5449E-01	-2.5449E-01	1.329E+02%		1.14E+00
Ba-140 #A	8.5769E-01	8.5771E-01	2.227E+02%		3.19E+00
La-140 #A	2.6698E-01	2.6698E-01	5.293E+01%		5.83E-01
CE-141 #A	1.8932E-01	1.8932E-01	2.655E+02%		1.72E+00
CE-144 #A	-4.1079E-01	-4.1079E-01	5.952E+02%		8.35E+00
PM-144 #A	-4.3101E-01	-4.3101E-01	1.168E+02%		1.22E+00
EU-152 #A	6.1921E-01	6.1921E-01	1.188E+02%		3.87E+00
EU-154 #A	-1.4161E+00	-1.4161E+00	1.985E+02%		9.98E+00
EU-155 #A	-9.5037E-01	-9.5037E-01	9.891E+01%		3.62E+00
HF-181 #A	1.2510E-01	1.2511E-01	1.464E+02%		1.56E+00
Ta-182 #A	1.6340E+00	1.6340E+00	7.255E+01%		5.05E+00
Hg-203 A	2.6303E-01	2.6303E-01	1.043E+02%		9.32E-01
TL-208 #	1.6572E+00	1.6572E+00	1.830E+01%		5.76E-01
pm-146 #A	4.8455E-02	4.8455E-02	7.985E+01%		3.03E+00
y-88 #A	-3.5574E-01	-3.5574E-01	9.659E+01%		1.32E+00
Cd-113m#A	-4.3673E+03	-4.3673E+03	1.000E+02%		1.47E+04
Cd-109 #A	0.0000E+00	0.0000E+00	1.000E+03%		3.29E+01
Cf-251 #A	-7.4256E-01	-7.4256E-01	1.861E+02%		3.80E+00
Cf-249 #A	-1.5394E-02	-1.5394E-02	1.084E+02%		1.91E+00
Sn-126 #A	-2.7716E+00	-2.7716E+00	1.166E+02%		1.09E+01
PB-210 #A	2.1806E+01	2.1806E+01	3.749E+01%		2.22E+01
PB-212	2.0277E+00	2.0277E+00	2.438E+01%		1.41E+00
PB-214	6.3141E+00	6.3141E+00	1.145E+01%		1.43E+00
BI-207 #A	-2.9404E-02	-2.9404E-02	8.299E+02%		8.93E-01
BI-212 #A	2.7247E+00	2.7247E+00	1.922E+02%		1.83E+01
U-235 #A	7.6810E-01	7.6810E-01	1.152E+02%		8.02E+00
BI-214	4.3597E+00	4.3597E+00	1.791E+01%		1.61E+00
BI-210M#A	4.3897E-01	4.3897E-01	1.151E+02%		1.71E+00
AC-228	5.6945E+00	5.6945E+00	1.759E+01%		1.75E+00
TH-227 #A	2.0627E+00	2.0627E+00	1.990E+02%		1.20E+01
TH-229 #A	1.2206E-01	1.2206E-01	3.651E+03%		1.26E+01
TH-234 #A	7.9603E+00	7.9603E+00	8.230E+01%		1.92E+01
PA-231 #A	-1.9208E+00	-1.9208E+00	1.827E+02%		5.47E+01
PA-233 #A	-1.4325E-02	-1.4325E-02	8.629E+03%		4.27E+00
PA-234 #A	-1.1730E-02	-1.1730E-02	1.303E+02%		5.22E+00
PA-234M#A	1.0333E+01	1.0333E+01	9.816E+01%		2.47E+02
AM-241 #A	2.0934E-01	2.0934E-01	4.089E+02%		2.49E+00
Np-237 #A	-1.9045E+00	-1.9045E+00	1.616E+02%		1.03E+01
Ir-192 #A	3.8979E-02	3.8979E-02	6.272E+02%		8.69E-01
Cs-136 #A	1.5621E-01	1.5621E-01	1.272E+02%		1.24E+00
Np-239 #A	6.6847E-01	6.6857E-01	1.495E+02%		3.38E+00
Nd-147 #A	-3.2023E+00	-3.2024E+00	9.660E+01%		7.73E+00
TL-210 #A	2.6406E-01	2.6406E-01	1.222E+02%		1.33E+00

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (25.1 to 1999.5 keV) 2.183E+02 Bq/Sample
Total Decayed Activity (25.1 to 1999.5 keV) 2.1831241E+02 Bq/Sample


376740_Gamma_160-29479-A-3-C. 17_Gamma_20182702.spc.
Counts
1.0e4
1.0e3
1.0e2
1.0e1
1.0e0
Channels
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
7500
8000
Pb-210
Th-234
Th-234
Co-57
Tc-99m
Ba-140
U-235
Cf-251
U-235
Th-229
Th-229
Pb-212
Eu-152
Pb-214
Bi-210M
Tl-208
Pa-231
Tl-210
Pb-214
Pa-233
Hf-181
Pb-214
Rh-106
Hf-181
Ru-103
Tl-208
Ru-103
Bi-214
Sb-124
Tl-210
Ac-228
Ac-228
Sc-46
Co-56
Na-22
K-40
Bi-214
Sb-124

Test America St. Louis Spectrum ID: 15_Gamma_20182595

Sample Description: 376740_Gamma_160-29479-B-4-B
Detector: Detector #15
Batch ID: 376740
Work Order Number: Gamma
Lot Number: 160-29479-B-4-B

Decay to Time: 8/9/2018 02:03 Live Time: 1800 sec
Acquisition Time: 8/9/2018 02:03:43 Real Time: 1801 sec
Analysis Time: 8/9/2018 02:33 Dead Time: 0.07 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 15_Soil_TunaCan.Clb
Efficiency Cal Desc: 15_TunaCan_90099_032212
Efficiency Cal Date: 3/22/2012 13:03
Energy Cal Date: 2/28/2012 16:29
Library: Client_Long_Rev14.lib
Bkgd Correction File: 15_2018-07-21_1011.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	-1.559E+00	199.9	3.116E+00	3.117E+00	1.288E+01
NA-22	5.591E-01	62.8	3.513E-01	3.524E-01	1.138E+00
K-40	1.551E+02	8.1	1.256E+01	1.486E+01	1.292E+01
Sc-46	3.059E-01	84.5	2.584E-01	2.589E-01	2.686E+00
CR-51	-3.841E+00	137.0	5.264E+00	5.268E+00	2.086E+01
MN-54	3.261E-01	92.5	3.017E-01	3.022E-01	7.478E-01
FE-59	9.626E-01	107.8	1.037E+00	1.038E+00	2.353E+00
Co-56	7.701E-01	30.4	2.342E-01	2.376E-01	1.194E+00
CO-57	-1.547E-01	138.6	2.144E-01	2.146E-01	7.320E-01
CO-58	-4.591E-01	117.3	5.384E-01	5.389E-01	1.847E+00
CO-60	-7.947E-01	112.9	8.969E-01	8.978E-01	1.878E+00
ZN-65	-7.995E-01	168.3	1.346E+00	1.346E+00	4.689E+00
NB-94	-6.319E-01	91.8	5.800E-01	5.810E-01	1.317E+00
ZR-95	-6.187E-01	130.5	8.076E-01	8.082E-01	2.290E+00
NB-95	-2.725E-02	1257.0	3.426E-01	3.426E-01	1.269E+00
RU-103	-9.765E-02	486.2	4.748E-01	4.749E-01	1.188E+00
RH-106	-6.519E+00	127.9	8.334E+00	8.341E+00	2.811E+01
AG-108M	2.449E-01	97.5	2.388E-01	2.392E-01	8.047E-01
AG-110M	0.000E+00	1.#INF	3.384E-01	3.384E-01	3.658E+00
SN-113	2.894E-01	150.5	4.356E-01	4.358E-01	1.512E+00
SB-124	-2.793E-01	85.7	2.393E-01	2.398E-01	2.976E+00
SB-125	1.284E+00	71.6	9.187E-01	9.211E-01	1.810E+00
I-131	5.986E-01	50.8	3.043E-01	3.059E-01	5.776E-01
Gd-153	-1.042E+00	181.8	1.894E+00	1.895E+00	6.329E+00
Ga-68	-2.325E+01	126.6	2.944E+01	2.947E+01	6.720E+01
Tc-99m	0.000E+00	1.#INF	1.257E-01	1.257E-01	1.521E+00
BA-133	2.897E-01	206.3	5.977E-01	5.979E-01	2.059E+00
CS-134	-7.940E-02	86.9	6.896E-02	6.909E-02	2.898E+00
CS-137	3.482E-01	124.0	4.319E-01	4.323E-01	1.499E+00
CE-139	0.000E+00	1.#INF	1.810E-01	1.811E-01	9.915E-01
Ba-140	-4.406E-01	105.1	4.628E-01	4.634E-01	4.064E+00
La-140	-1.115E-01	107.0	1.192E-01	1.194E-01	1.493E+00
CE-141	5.260E-01	156.6	8.238E-01	8.242E-01	2.767E+00

CE-144	-2.282E+00	147.6	3.369E+00	3.371E+00	1.131E+01
PM-144	-1.949E-01	290.5	5.663E-01	5.664E-01	1.164E+00
EU-152	1.991E-01	78.0	1.553E-01	1.556E-01	6.089E+00
EU-154	2.232E+00	20.4	4.556E-01	4.698E-01	1.657E+01
EU-155	-1.218E+00	229.3	2.791E+00	2.792E+00	9.332E+00
HF-181	0.000E+00	1.#INF	1.597E-01	1.597E-01	1.756E+00
Ta-182	3.646E-01	89.8	3.274E-01	3.279E-01	6.798E+00
Hg-203	-3.983E-02	815.5	3.248E-01	3.248E-01	1.145E+00
TL-208	6.023E-01	89.0	5.363E-01	5.372E-01	1.251E+00
pm-146	-2.318E-02	303.9	7.044E-02	7.045E-02	3.157E+00
y-88	-1.040E+00	40.3	4.190E-01	4.223E-01	2.025E+00
Cd-113m	3.083E+03	127.5	3.929E+03	3.934E+03	1.348E+04
Cd-109	-6.169E-01	2102.1	1.297E+01	1.297E+01	4.377E+01
Cf-251	-1.681E-01	863.3	1.451E+00	1.451E+00	3.873E+00
Cf-249	6.500E-01	93.1	6.049E-01	6.059E-01	1.643E+00
Sn-126	3.160E+00	121.5	3.840E+00	3.843E+00	1.291E+01
PB-210	-1.290E+01	64.7	8.346E+00	8.381E+00	3.721E+01
PB-212	1.731E+00	28.7	4.976E-01	5.100E-01	1.241E+00
PB-214	3.774E+00	21.7	8.174E-01	8.406E-01	2.352E+00
BI-207	-1.740E-01	145.8	2.537E-01	2.538E-01	9.030E-01
BI-212	-5.092E+00	119.7	6.097E+00	6.103E+00	2.099E+01
U-235	1.010E+00	127.0	1.283E+00	1.284E+00	1.218E+01
BI-214	5.481E+00	19.3	1.056E+00	1.093E+00	2.036E+00
BI-210M	-6.535E-01	73.2	4.786E-01	4.801E-01	1.908E+00
AC-228	4.348E+00	22.4	9.723E-01	9.973E-01	1.602E+00
TH-227	-1.901E+00	290.0	5.512E+00	5.513E+00	1.884E+01
TH-229	1.389E+00	391.3	5.436E+00	5.437E+00	1.454E+01
TH-234	3.826E+00	275.1	1.053E+01	1.053E+01	3.559E+01
PA-231	5.159E+00	185.0	9.544E+00	9.548E+00	6.223E+01
PA-233	1.374E-01	670.5	9.212E-01	9.213E-01	5.097E+00
PA-234	-3.096E-01	96.2	2.979E-01	2.983E-01	6.551E+00
PA-234M	2.486E+01	136.1	3.383E+01	3.385E+01	2.086E+02
AM-241	9.598E-01	117.6	1.128E+00	1.129E+00	3.791E+00
Np-237	-2.121E+00	180.5	3.829E+00	3.831E+00	1.282E+01
Ir-192	-5.179E-02	104.7	5.422E-02	5.430E-02	2.406E+00
Cs-136	2.383E-01	25.0	5.958E-02	6.113E-02	1.575E+00
Np-239	1.317E+00	193.4	2.548E+00	2.550E+00	8.514E+00
Nd-147	1.956E+00	102.9	2.012E+00	2.015E+00	5.073E+00
TL-210	1.527E-01	175.9	2.686E-01	2.688E-01	1.560E+00
Total	3.308E+03				

Analyst: Morgan Reichert

TestAmerica Inc Spectrum name: 15_Gamma_20182595.An1

Sample description
376740_Gamma_160-29479-B-4-B

Spectrum Filename: C:\User\SPC\Det15\15_Gamma_20182595.An1

Acquisition information
Start time:	8/9/2018 2:03:43 AM
Live time:	1800
Real time:	1801
Dead time:	0.07 %
Detector ID:	15

Detector system
Ge15 SN/11012216

Calibration
Filename: 15_Soil_TunaCan.Clb
15_TunaCan_90099_032212

Energy Calibration
Created:	2/28/2012 4:29:17 PM
Zero offset:	0.044 keV
Gain:	0.250 keV/channel
Quadratic:	-3.267E-08 keV/channel^2

Efficiency Calibration
Created:	3/22/2012 1:03:01 PM
Knee Energy:	165.85 keV
Above the Knee:	Quadratic Uncertainty = 1.00 %
Log(Eff):	-6.894897E-01 + (-3.290613E-01*Log(E)) + (-3.875629E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 1.13 %
Log(Eff):	-2.362677E+01 + (8.666669E+00*Log(E)) + (-9.214638E-01*Log(E)^2)

Library Files
Main analysis library:	Client_Long_Rev14.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters
Analysis engine:	Env32 G800W064
Start channel:	100 (25.06keV)
Stop channel:	8000 (1999.52keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	8/9/2018 2:03:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	15_2018-07-21_1011.PBC 7/21/2018 10:11:36 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 8 cutoff: 5.00E+01 %

Energy Calibration

Normalized diff: 0.0847

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
59.54	17.	117.56	0.96	2.737E-02	59.54	35.900	PBC<MDA	AM241
63.29	8.	275.11	0.96	2.924E-02	63.29	3.810	PBC<MDA	TH234
64.28	16.	121.51	0.96	2.970E-02	64.28	9.700	PBC<MDA	Sn126
92.90	21.	67.52	0.58	3.780E-02	92.59	5.584	5.606E+00	TH234
					93.35	5.561	5.615E+00	AC228
106.13	21.	193.44	1.00	3.878E-02	106.13	22.700	PBC<MDA	Np239
121.78	11.	115.35	1.02	3.848E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	1.856E-01	CO57
123.10	12.	90.97	1.02	3.840E-02	123.10	40.790	PBC<MDA	EU154
145.44	17.	156.61	1.04	3.618E-02	145.44	48.200	PBC<MDA	CE141
162.66	8.	163.65	1.05	3.378E-02	162.66	6.220	PBC<MDA	Ba140
185.72	3.	471.65	1.07	3.123E-02	185.72	54.000	PBC<MDA	U235
193.51	3.	391.34	1.08	3.030E-02	193.51	4.400	PBC<MDA	TH229
205.33	10.	127.05	1.09	2.900E-02	205.33	5.010	PBC<MDA	U235
238.61	35.	28.75	1.48	2.592E-02	238.63	43.300	1.731E+00	PB212
242.00	10.	160.37	1.12	2.565E-02	242.00	7.430	PBC<MDA	PB214
263.70	8.	127.48	1.14	2.403E-02	263.70	0.006	PBC<MDA	Cd113m
277.28	11.	89.04	1.15	2.313E-02	277.28	6.310	PBC<MDA	TL208
284.30	6.	210.65	1.16	2.269E-02	284.30	6.140	PBC<MDA	I131
295.09	27.	53.08	1.17	2.205E-02	295.09	19.300	PBC<MDA	PB214
296.00	11.	175.87	1.17	2.200E-02	296.00	79.000	PBC<MDA	TL210
300.07	11.	184.99	1.17	2.177E-02	300.03	3.280	PBC<MDA	PB212

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
					300.07	2.460	1.120E+01	PA231
					300.18	6.200	4.445E+00	PA233
300.17	10.	185.47	1.17	2.177E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	PBC<MDA	PA231
					300.18	6.200	PBC<MDA	PA233
328.76	9.	140.92	1.20	2.028E-02	328.76	20.300	PBC<MDA	La140
333.44	9.	144.72	1.20	2.006E-02	333.44	15.510	PBC<MDA	Cf249
338.32	9.	151.43	1.21	1.983E-02	338.32	12.010	PBC<MDA	AC228
340.57	6.	228.36	1.21	1.973E-02	340.57	46.900	PBC<MDA	Cs136
351.93	51.	21.66	1.22	1.923E-02	351.93	37.600	3.932E+00	PB214
356.00	6.	206.29	1.22	1.906E-02	356.00	62.050	PBC<MDA	BA133
364.48	13.	50.83	1.23	1.871E-02	364.48	81.700	PBC<MDA	I131
383.84	9.	107.10	1.25	1.796E-02	383.84	8.940	PBC<MDA	BA133
387.95	9.	117.06	1.25	1.781E-02	387.95	66.000	PBC<MDA	Cf249
391.69	6.	150.51	1.25	1.767E-02	391.69	64.000	PBC<MDA	SN113
427.88	6.	96.44	1.28	1.647E-02	427.88	29.600	PBC<MDA	SB125
433.94	5.	162.89	1.29	1.629E-02	433.94	90.480	PBC<MDA	AG108M
463.37	8.	92.93	1.31	1.545E-02	463.37	10.470	PBC<MDA	SB125
468.06	8.	108.82	1.32	1.533E-02	468.06	51.750	PBC<MDA	Ir192
511.86	19.	105.48	2.60	1.426E-02	511.86	20.000	PBC<MDA	RH106
531.00	6.	102.87	1.37	1.384E-02	531.00	13.000	PBC<MDA	Nd147
563.24	1.	458.94	1.39	1.319E-02	563.24	8.350	PBC<MDA	CS134
569.47	4.	132.29	1.40	1.307E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	2.073E+00	PA234
					569.70	97.740	1.740E-01	BI207
583.02	6.	155.20	1.41	1.282E-02	583.02	84.500	PBC<MDA	TL208
609.23	58.	19.26	1.77	1.236E-02	609.31	46.090	5.636E+00	BI214
635.89	4.	167.82	1.45	1.193E-02	635.89	11.310	PBC<MDA	SB125
661.66	6.	124.03	1.47	1.155E-02	661.66	85.210	PBC<MDA	CS137
722.79	5.	85.82	1.52	1.072E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	3.074E-01	AG108M
					723.36	20.220	1.382E+00	EU154
722.94	5.	107.24	1.52	1.072E-02	722.79	10.810	2.530E+00	SB124
					722.94	90.840	3.012E-01	AG108M
					723.36	20.220	1.354E+00	EU154
723.36	5.	123.61	1.52	1.072E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	3.013E-01	AG108M
					723.36	20.220	1.354E+00	EU154
735.72	2.	454.80	1.53	1.056E-02	735.72	22.500	PBC<MDA	pm146
766.41	5.	136.06	1.55	1.021E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	9.565E+01	PA234M
785.42	6.	121.84	1.57	9.998E-03	785.42	1.280	PBC<MDA	BI212
801.95	8.	86.85	1.58	9.823E-03	801.95	8.690	PBC<MDA	CS134
834.85	6.	92.51	1.60	9.494E-03	834.85	99.980	PBC<MDA	MN54
846.77	1.	800.00	1.61	9.380E-03	846.77	99.935	PBC<MDA	Co56
911.07	20.	22.36	1.66	8.811E-03	911.07	29.000	4.348E+00	AC228
946.02	1.	857.32	1.68	8.531E-03	946.02	13.400	PBC<MDA	PA234
964.11	6.	77.97	1.70	8.393E-03	964.11	14.605	PBC<MDA	EU152

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
968.97	6.	99.57	1.70	8.357E-03	968.97	17.460	PBC<MDA	AC228
996.33	24.	20.41	1.72	8.158E-03	996.33	10.600	1.542E+01	EU154
1037.84	12.	30.42	1.75	7.875E-03	1037.84	14.130	5.798E+00	Co56
1048.07	16.	25.00	1.75	7.808E-03	1048.07	80.000	1.423E+00	Cs136
1099.25	7.	107.76	1.79	7.491E-03	1099.25	56.500	PBC<MDA	FE59
1120.41	10.	99.46	1.80	7.368E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	PBC<MDA	Sc46
1120.55	9.	84.48	1.80	7.367E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	6.688E-01	Sc46
					1121.30	34.900	1.917E+00	Ta182
1221.72	7.	89.78	1.87	6.830E-03	1221.41	27.000	PBC<MDA	Ta182
1274.53	7.	62.83	1.90	6.579E-03	1274.53	99.940	PBC<MDA	NA22
					1274.54	35.190	1.588E+00	EU154
1461.13	174.	8.10	2.42	5.828E-03	1460.83	10.670	1.551E+02	K40
1765.74	7.	49.08	2.18	4.916E-03	1764.49	15.400	PBC<MDA	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
371.17	92.90	64.	21.	5.629E+02	67.52	0.583	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev14.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV	
PB-210	185.84	46.54	129.	-19.	-0.011	64.70	0.946	s
TH-227	200.23	50.14	148.	-6.	-0.003	289.95	0.950	s
AM-241	237.79	59.54	191.	17.	0.009	117.56	0.958	s
TH-234	252.78	63.29	217.	8.	0.004	275.11	0.962	
Sn-126	256.75	64.28	190.	16.	0.009	121.51	0.963	s
BA-133	323.54	80.99	114.	-12.	-0.007	172.18	0.978	s
Np-237	345.53	86.49	542.	-18.	-0.010	180.51	0.983	
EU-155	345.74	86.54	524.	-18.	-0.010	177.47	0.983	
Sn-126	347.33	86.94	505.	-18.	-0.010	174.34	0.984	
Sn-126	349.84	87.57	518.	-18.	-0.010	176.41	0.984	
Nd-147	363.95	91.10	692.	-21.	-0.012	175.01	0.987	s
TH-234	369.91	92.59	714.	-21.	-0.012	177.41	0.989	s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
AC-228	372.95	93.35	735.	-21.	-0.012	179.89	0.990s
Gd-153	389.54	97.50	757.	-22.	-0.012	181.75	0.993s
Np-239	397.53	99.50	778.	-22.	-0.012	183.95	0.995s
Gd-153	412.32	103.20	800.	-22.	-0.012	185.86	0.998s
Np-239	414.32	103.70	821.	-22.	-0.012	188.24	0.999s
EU-155	420.77	105.31	843.	-18.	-0.010	229.25	1.001s
Np-239	424.03	106.13	804.	21.	0.012	193.44	1.001s
EU-152	486.57	121.78	75.	11.	0.006	115.35	1.016s
CO-57	487.72	122.06	76.	-9.	-0.005	138.64	1.016s
EU-154	491.87	123.10	56.	12.	0.007	90.97	1.017s
PA-234	524.63	131.29	276.	-17.	-0.009	139.78	1.024s
HF-181	531.54	133.02	293.	-17.	-0.009	143.69	1.026s
CE-144	533.60	133.54	310.	-17.	-0.010	147.64	1.026s
CO-57	545.33	136.47	329.	0.	0.000	1000.00	1.029s
Tc-99m	561.46	140.51	329.	0.	0.000	1000.00	1.032s
U-235	574.56	143.79	331.	-2.	-0.001	927.70	1.036s
CE-141	581.17	145.44	326.	17.	0.009	156.61	1.037s
Ba-140	650.01	162.66	92.	8.	0.005	163.65	1.053s
U-235	652.88	163.38	101.	0.	0.000	1000.00	1.053s
CE-139	662.77	165.85	96.	0.	0.000	1000.00	1.055s
Cf-251	705.73	176.60	59.	-2.	-0.001	863.25	1.065
U-235	742.19	185.72	70.	3.	0.002	471.65	1.073
TH-229	773.33	193.51	48.	3.	0.002	391.34	1.080s
U-235	820.60	205.33	40.	10.	0.005	127.05	1.091s
TH-229	842.65	210.85	48.	-2.	-0.001	778.84	1.096s
Cf-251	907.22	227.00	44.	-9.	-0.005	141.86	1.110s
PB-212	953.63	238.61	23.	35.	0.019	28.75	1.485s
PB-214	967.17	242.00	128.	10.	0.006	160.37	1.123s
EU-152	977.95	244.69	131.	-3.	-0.002	369.84	1.126s
TH-227	1024.12	256.24	59.	-16.	-0.009	94.20	1.136s
Cd-113m	1053.94	263.70	48.	8.	0.004	127.48	1.142s
BI-210M	1062.46	265.83	68.	-14.	-0.008	73.23	1.144s
TL-208	1108.25	277.28	45.	11.	0.006	89.04	1.154s
Hg-203	1115.91	279.20	59.	-1.	-0.001	815.47	1.156s
I-131	1136.30	284.30	36.	6.	0.003	210.65	1.160s
PB-214	1179.44	295.09	86.	27.	0.015	53.08	1.170s
TL-210	1183.08	296.00	174.	11.	0.006	175.87	1.170s
PB-212	1199.19	300.03	183.	10.	0.006	185.47	1.174s
PA-231	1199.35	300.07	194.	11.	0.006	184.99	1.174s
PA-233	1199.79	300.18	205.	2.	0.001	893.57	1.174s
PA-231	1209.66	302.65	207.	0.	0.000	1000.00	1.176s
BA-133	1210.47	302.85	207.	0.	0.000	1000.00	1.176s
Ba-140	1218.46	304.85	207.	0.	0.000	1000.00	1.178s
BI-210M	1218.64	304.90	207.	0.	0.000	1000.00	1.178s
Ir-192	1232.81	308.44	207.	0.	0.000	1000.00	1.181s
PA-233	1247.09	312.01	207.	0.	0.000	1000.00	1.184s
Ir-192	1265.00	316.49	266.	-13.	-0.007	178.85	1.188
CR-51	1279.37	320.08	256.	-14.	-0.008	137.04	1.191s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
La-140	1314.06	328.76	78.	9.	0.005	140.92	1.199s
Cf-249	1332.77	333.44	87.	9.	0.005	144.72	1.203s
AC-228	1352.28	338.32	96.	9.	0.005	151.43	1.207s
Cs-136	1361.28	340.57	106.	6.	0.004	228.36	1.209s
EU-152	1376.13	344.29	135.	-11.	-0.006	150.36	1.212s
HF-181	1382.30	345.83	131.	-11.	-0.006	147.97	1.213s
PB-214	1406.71	351.93	36.	51.	0.028	21.66	1.219
BA-133	1422.97	356.00	78.	6.	0.003	206.29	1.222s
I-131	1456.89	364.48	8.	13.	0.007	50.83	1.229s
BA-133	1534.29	383.84	39.	9.	0.005	107.10	1.246s
Cf-249	1550.72	387.95	47.	9.	0.005	117.06	1.249s
SN-113	1565.67	391.69	36.	6.	0.003	150.51	1.253
SB-125	1710.36	427.88	8.	6.	0.004	96.44	1.283s
AG-108M	1734.60	433.94	16.	5.	0.003	162.89	1.288s
SB-125	1852.29	463.37	23.	8.	0.004	92.93	1.312s
Ir-192	1871.05	468.06	30.	8.	0.004	108.82	1.316s
BE-7	1909.18	477.60	53.	-4.	-0.002	199.93	1.324s
HF-181	1926.79	482.00	58.	0.	0.000	1000.00	1.328s
La-140	1946.87	487.02	68.	-11.	-0.006	113.79	1.332s
RU-103	1987.00	497.05	30.	-2.	-0.001	486.24	1.340s
RH-106	2046.22	511.86	56.	19.	0.011	105.48	2.602s
Nd-147	2122.75	531.00	9.	6.	0.004	102.87	1.368s
Ba-140	2147.78	537.26	22.	-7.	-0.004	131.76	1.373s
CS-134	2251.67	563.24	9.	1.	0.001	458.94	1.394s
CS-134	2276.00	569.32	13.	-3.	-0.002	179.51	1.399s
PA-234	2276.59	569.47	12.	4.	0.002	132.29	1.399s
BI-207	2277.52	569.70	15.	-4.	-0.002	145.77	1.399s
TL-208	2330.79	583.02	22.	6.	0.004	155.20	1.410s
SB-125	2400.69	600.50	196.	-13.	-0.007	153.54	1.424s
SB-124	2409.62	602.73	182.	-13.	-0.007	148.30	1.425s
CS-134	2417.53	604.71	169.	-13.	-0.007	142.91	1.427s
BI-214	2435.62	609.23	15.	58.	0.032	19.26	1.773s
RU-103	2439.88	610.30	156.	-13.	-0.007	137.06	1.431s
AG-108M	2455.81	614.28	143.	-13.	-0.007	131.12	1.435s
PM-144	2470.93	618.06	134.	-7.	-0.004	242.94	1.437s
RH-106	2486.35	621.92	157.	-14.	-0.008	127.85	1.440s
SB-125	2542.23	635.89	16.	4.	0.002	167.82	1.451s
I-131	2546.57	636.97	29.	-10.	-0.006	80.39	1.452s
AG-110M	2629.71	657.76	29.	-5.	-0.003	168.73	1.469s
CS-137	2645.30	661.66	26.	6.	0.003	124.03	1.472s
PM-144	2784.82	696.54	19.	-4.	-0.002	290.54	1.499s
NB-94	2809.17	702.63	24.	-12.	-0.007	91.79	1.503s
SB-124	2889.79	722.79	8.	5.	0.003	85.82	1.519s
AG-108M	2890.40	722.94	13.	5.	0.003	107.24	1.519s
EU-154	2892.07	723.36	19.	5.	0.003	123.61	1.519s
ZR-95	2895.44	724.20	47.	-11.	-0.006	96.42	1.520s
BI-212	2907.33	727.17	35.	-7.	-0.004	119.73	1.522
pm-146	2941.53	735.72	14.	2.	0.001	454.80	1.529s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
pm-146	2987.29	747.16	14.	-2.	-0.001	403.11	1.537s
ZR-95	3025.56	756.73	19.	-6.	-0.003	130.53	1.544s
PA-234M	3064.30	766.41	10.	5.	0.003	136.06	1.552s
EU-152	3114.33	778.92	9.	-1.	-0.001	493.71	1.561s
BI-212	3140.33	785.42	9.	6.	0.003	121.84	1.566s
CS-134	3182.12	795.87	26.	-2.	-0.001	492.16	1.574s
TL-210	3197.05	799.60	28.	0.	0.000	1000.00	1.577s
CS-134	3206.46	801.95	19.	8.	0.004	86.85	1.578s
CO-58	3241.75	810.78	40.	-8.	-0.004	117.26	1.585s
Cs-136	3272.66	818.50	28.	-14.	-0.008	87.20	1.591s
MN-54	3338.05	834.85	5.	6.	0.003	92.51	1.603s
Co-56	3385.75	846.77	14.	1.	0.001	800.00	1.612s
TL-208	3440.93	860.56	14.	-3.	-0.002	270.80	1.622s
NB-94	3483.06	871.10	25.	-11.	-0.006	71.00	1.629s
EU-154	3491.60	873.23	44.	-4.	-0.002	271.80	1.631s
PA-234	3520.80	880.53	53.	-13.	-0.007	85.90	1.636s
PA-234	3531.64	883.24	66.	-10.	-0.005	123.84	1.638s
AG-110M	3537.42	884.68	76.	0.	0.000	1000.00	1.639s
Sc-46	3555.81	889.28	77.	-1.	-0.001	672.99	1.642s
y-88	3590.85	898.04	35.	-16.	-0.009	40.28	1.649s
AC-228	3642.98	911.07	0.	20.	0.011	22.36	1.658s
AG-110M	3748.69	937.49	25.	-10.	-0.006	114.38	1.677
PA-234	3782.81	946.02	15.	1.	0.001	857.32	1.683s
EU-152	3855.18	964.11	8.	6.	0.003	77.97	1.696s
AC-228	3874.63	968.97	14.	6.	0.003	99.57	1.699s
EU-154	3984.09	996.33	0.	24.	0.013	20.41	1.718s
PA-234M	4002.77	1001.00	24.	0.	0.000	1000.00	1.722s
EU-154	4017.88	1004.77	35.	-6.	-0.003	144.75	1.724s
Co-56	4150.18	1037.84	0.	12.	0.006	30.42	1.747s
Cs-136	4191.11	1048.07	0.	16.	0.009	25.00	1.754s
RH-106	4200.27	1050.36	16.	0.	0.000	1000.00	1.755s
BI-207	4253.49	1063.66	10.	-4.	-0.002	180.85	1.765s
Ga-68	4308.47	1077.40	25.	-9.	-0.005	126.60	1.774s
FE-59	4395.90	1099.25	11.	7.	0.004	107.76	1.789s
EU-152	4447.22	1112.07	49.	-11.	-0.006	96.55	1.797s
ZN-65	4461.11	1115.55	38.	-5.	-0.003	168.31	1.800s
BI-214	4480.08	1120.29	47.	10.	0.006	99.46	1.803
Sc-46	4481.13	1120.55	24.	9.	0.005	84.48	1.803
Ta-182	4484.13	1121.30	38.	-4.	-0.002	222.82	1.803s
Ta-182	4755.25	1189.05	21.	-5.	-0.003	201.56	1.848s
Ta-182	4884.75	1221.41	5.	7.	0.004	89.78	1.869s
Co-56	4952.26	1238.28	21.	-5.	-0.003	187.55	1.879s
NA-22	5097.34	1274.53	5.	7.	0.004	62.83	1.902s
FE-59	5165.64	1291.60	21.	-6.	-0.004	170.46	1.913s
TL-210	5251.31	1313.00	16.	-6.	-0.003	156.94	1.926s
CO-60	5329.36	1332.50	16.	-9.	-0.005	112.86	1.938s
AG-110M	5536.68	1384.30	17.	-11.	-0.006	92.93	1.970s
EU-152	5631.56	1408.00	6.	-4.	-0.002	160.96	1.984s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
K-40	5844.23	1461.13	6.	174.	0.096	8.10	2.417
La-140	6384.98	1596.21	6.	-4.	-0.002	160.96	2.092s
SB-124	6764.43	1690.98	6.	-4.	-0.002	156.12	2.142s
BI-214	7058.76	1764.49	3.	7.	0.004	49.08	2.181s
Co-56	7086.23	1771.35	20.	-8.	-0.004	91.72	2.184s
y-88	7345.35	1836.06	6.	-2.	-0.001	304.14	2.216s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Peak Code	Peak MDA Value Bq/Sample	COMMENTS
BE-7	C	-1.5587E+00				5.31E+01	
			477.60	-1.559E+00	?(P	1.288E+01	2.00E+02 1.05E+01 G
NA-22	C	5.5914E-01				9.50E+02	
			1274.53	5.591E-01	?(	1.138E+00	6.28E+01 9.99E+01 G
K-40	N	1.5514E+02				4.66E+11	
			1460.83	1.551E+02	(P	1.292E+01	8.10E+00 1.07E+01 G
Sc-46	F	3.0591E-01				8.38E+01	
			889.28	-5.701E-02	?(P	2.686E+00	6.73E+02 1.00E+02 G
			1120.55	6.688E-01	?(	1.913E+00	8.45E+01 1.00E+02 G
CR-51	F	-3.8410E+00				2.77E+01	
			320.08	-3.841E+00	@(P	2.086E+01	1.37E+02 9.94E+00 G
MN-54	C	3.2615E-01				3.12E+02	
			834.85	3.261E-01	?(	7.478E-01	9.25E+01 1.00E+02 G
FE-59	F	9.6260E-01				4.45E+01	
			1099.25	9.626E-01	?(	2.353E+00	1.08E+02 5.65E+01 G
			1291.60	-1.253E+00	+	4.793E+00	1.70E+02 4.32E+01 G
Co-56	C	7.7012E-01				7.73E+01	
			846.77	5.927E-02	?(	1.194E+00	8.00E+02 9.99E+01 G
			1238.28	-6.775E-01	+ P	3.026E+00	1.88E+02 6.61E+01 G
			1037.84	5.798E+00	&(P	3.680E+00	3.04E+01 1.41E+01 G
			1771.35	-5.568E+00	+	1.744E+01	9.17E+01 1.55E+01 A
CO-57	C	-1.5468E-01				2.72E+02	
			122.06	-1.547E-01	&(	7.320E-01	1.39E+02 8.56E+01 G
			136.47	0.000E+00	&	1.219E+01	1.00E+03 1.07E+01 G

Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
CO-58	C	-4.5913E-01						7.09E+01	
			810.78	-4.591E-01	?(	1.847E+00	1.17E+02	9.95E+01	G
CO-60	F	-7.9466E-01						1.93E+03	
			1332.50	-7.947E-01	?(P	1.878E+00	1.13E+02	1.00E+02	G
			1173.24	-5.239E-02	%	1.409E+00	1.12E+03	9.99E+01	G
ZN-65	F	-7.9951E-01						2.44E+02	
			1115.55	-7.995E-01	?(	4.689E+00	1.68E+02	5.06E+01	G
NB-94	I	-6.3193E-01						7.41E+06	
			702.63	-6.319E-01	?(P	1.317E+00	9.18E+01	9.79E+01	G
			871.10	-6.682E-01	+	1.580E+00	7.10E+01	9.99E+01	G
ZR-95	I	-6.1873E-01						6.40E+01	
			756.73	-6.187E-01	?(P	2.290E+00	1.31E+02	5.45E+01	G
			724.20	-1.242E+00	+	4.058E+00	9.64E+01	4.42E+01	G
NB-95	I	-2.7253E-02						6.40E+01	
			765.79	-2.725E-02	%(	1.269E+00	1.26E+03	9.98E+01	G
RU-103	I	-9.7655E-02						3.93E+01	
			497.05	-9.765E-02	(	1.188E+00	4.86E+02	9.09E+01	G
			610.30	-1.030E+01	+	4.770E+01	1.37E+02	5.75E+00	GA
RH-106	I	-6.5186E+00						3.74E+02	
			621.92	-6.519E+00	?(	2.811E+01	1.28E+02	9.93E+00	G
			1050.36	0.000E+00	+	9.756E+01	1.00E+03	1.56E+00	G
			511.86	3.701E+00	+	7.321E+00	1.05E+02	2.00E+01	GA
AG-108M	C	2.4493E-01						1.53E+05	
			433.94	1.885E-01	?(	8.047E-01	1.63E+02	9.05E+01	G
			722.94	3.012E-01	?(	1.127E+00	1.07E+02	9.08E+01	G
			614.28	-6.643E-01	+	2.943E+00	1.31E+02	8.98E+01	G
SN-113	F	2.8939E-01						1.15E+02	
			391.69	2.894E-01	?(P	1.512E+00	1.51E+02	6.40E+01	G
SB-124	F	-2.7933E-01						6.02E+01	
			602.73	-5.942E-01	?(	2.976E+00	1.48E+02	9.83E+01	G
			1690.98	-9.101E-01	+	3.214E+00	1.56E+02	4.78E+01	G
			722.79	2.583E+00	?(	7.616E+00	8.58E+01	1.08E+01	G
SB-125	I	1.2837E+00						1.01E+03	
			427.88	7.183E-01	?(	1.810E+00	9.64E+01	2.96E+01	G
			600.50	-3.255E+00	+	1.687E+01	1.54E+02	1.79E+01	G
			635.89	1.441E+00	?(	8.668E+00	1.68E+02	1.13E+01	G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
		463.37	2.712E+00	?(	8.603E+00	9.29E+01	1.05E+01 G
I-131	I 5.9862E-01					8.02E+00	
		364.48	4.726E-01	(	5.776E-01	5.08E+01	8.17E+01 G
		284.30	2.276E+00	?(P	1.228E+01	2.11E+02	6.14E+00 G
		636.97	-6.720E+00	-	1.817E+01	8.04E+01	7.17E+00 G
Gd-153	F -1.0423E+00					2.42E+02	
		97.50	-1.042E+00	?(	6.329E+00	1.82E+02	3.00E+01 G
		103.20	-1.427E+00	+	8.862E+00	1.86E+02	2.18E+01 G
Ga-68	C -2.3251E+01					4.71E-02	
		1077.40	-2.325E+01	?(	6.720E+01	1.27E+02	3.30E+00 G
BA-133	F 2.8974E-01					3.85E+03	
		356.00	2.897E-01	?(	2.059E+00	2.06E+02	6.20E+01 G
		302.85	0.000E+00	-	9.783E+00	1.00E+03	1.83E+01 G
		383.84	2.996E+00	?	1.096E+01	1.07E+02	8.94E+00 GA
		80.99	-5.633E-01	+ P	2.409E+00	1.72E+02	3.41E+01 GA
CS-134	I -7.9403E-02					7.54E+02	
		604.71	-6.004E-01	?(	2.898E+00	1.43E+02	9.76E+01 G
		795.87	-9.855E-02	+	1.754E+00	4.92E+02	8.55E+01 G
		569.32	-8.289E-01	+	5.391E+00	1.80E+02	1.54E+01 G
		801.95	5.050E+00	?(	1.492E+01	8.69E+01	8.69E+00 G
		563.24	6.726E-01	?(	8.288E+00	4.59E+02	8.35E+00 G
CS-137	I 3.4824E-01					1.10E+04	
		661.66	3.482E-01	?(	1.499E+00	1.24E+02	8.52E+01 G
Ba-140	I -4.4058E-01					1.28E+01	
		537.26	-1.126E+00	?(P	4.064E+00	1.32E+02	2.44E+01 G
		162.66	2.248E+00	?(	1.257E+01	1.64E+02	6.22E+00 G
		304.85	0.000E+00	+	4.201E+01	1.00E+03	4.29E+00 G
La-140	I -1.1148E-01					1.28E+01	
		1596.21	-3.967E-01	?(	1.493E+00	1.61E+02	9.54E+01 G
		487.02	-8.773E-01	+	3.391E+00	1.14E+02	4.55E+01 G
		328.76	1.229E+00	?(P	5.910E+00	1.41E+02	2.03E+01 G
		815.77	-4.081E-02	% P	8.639E+00	3.74E+03	2.33E+01 G
CE-141	I 5.2600E-01					3.25E+01	
		145.44	5.260E-01	?(	2.767E+00	1.57E+02	4.82E+01 G
CE-144	I -2.2821E+00					2.85E+02	
		133.54	-2.282E+00	?(	1.131E+01	1.48E+02	1.11E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PM-144	C -1.9493E-01					3.63E+02	
		696.54	-1.949E-01	?(P	1.164E+00	2.91E+02	9.90E+01 G
		618.06	-3.129E-01	+	2.598E+00	2.43E+02	9.91E+01 G
EU-152	F 1.9915E-01					4.94E+03	
		344.29	-1.194E+00	&(	6.089E+00	1.50E+02	2.65E+01 G
		1112.07	-5.944E+00	+	1.944E+01	9.65E+01	1.36E+01 G
		121.78	5.557E-01	+	2.176E+00	1.15E+02	2.86E+01 G
		778.92	-5.685E-01	+	7.226E+00	4.94E+02	1.29E+01 G
		964.11	2.728E+00	?(	7.202E+00	7.80E+01	1.46E+01 G
		244.69	-7.934E-01	+ P	1.614E+01	3.70E+02	7.58E+00 G
		1408.00	-1.610E+00	+	6.062E+00	1.61E+02	2.10E+01 GA
EU-154	I 2.2322E+00					3.14E+03	
		873.23	-1.734E+00	?(	1.657E+01	2.72E+02	1.23E+01 G
		123.10	4.340E-01	?(	1.331E+00	9.10E+01	4.08E+01 G
		1274.54	1.183E-02	%	4.516E+00	9.92E+03	3.52E+01 G
		723.36	1.354E+00	?(	5.857E+00	1.24E+02	2.02E+01 G
		1004.77	-2.284E+00	+	1.148E+01	1.45E+02	1.80E+01 G
		996.33	1.542E+01	?(	4.735E+00	2.04E+01	1.06E+01 G
EU-155	I -1.2175E+00					1.81E+03	
		105.31	-1.218E+00	&(	9.332E+00	2.29E+02	2.12E+01 G
		86.54	-9.049E-01	+	5.379E+00	1.77E+02	3.07E+01 G
Ta-182	F 3.6462E-01					1.14E+02	
		1121.30	-8.682E-01	?(	6.798E+00	2.23E+02	3.49E+01 G
		1221.41	1.958E+00	?(	4.058E+00	8.98E+01	2.70E+01 G
		1189.05	-2.615E+00	+	1.188E+01	2.02E+02	1.62E+01 G
Hg-203	F -3.9829E-02					4.66E+01	
		279.20	-3.983E-02	?(	1.145E+00	8.15E+02	8.15E+01 G
TL-208	N 6.0231E-01					6.98E+02	
		583.02	3.248E-01	?(	1.251E+00	1.55E+02	8.45E+01 G
		277.28	4.318E+00	?(	1.298E+01	8.90E+01	6.31E+00 G
		860.56	-1.450E+00	+	9.740E+00	2.71E+02	1.24E+01 G
pm-146	C -2.3182E-02					2.02E+03	
		747.16	-3.134E-01	?(	3.157E+00	4.03E+02	3.40E+01 G
		735.72	4.153E-01	&(P	4.741E+00	4.55E+02	2.25E+01 G
		453.88	5.439E-02	%	1.440E+00	1.05E+03	6.50E+01 G
y-88	F -1.0401E+00					1.07E+02	
		898.04	-1.040E+00	?(P	2.025E+00	4.03E+01	9.37E+01 G
		1836.06	-2.363E-01	+	1.668E+00	3.04E+02	9.92E+01 G

Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
Cd-113m		3.0825E+03						5.33E+03	
			263.70	3.083E+03	?(	1.348E+04	1.27E+02	6.00E-03	K
Cd-109	F	-6.1691E-01						4.53E+02	
			88.04	-6.169E-01	%(	4.377E+01	2.10E+03	3.79E+00	G
Cf-251	T	-1.6809E-01						3.28E+05	
			176.60	-1.681E-01	?(	3.873E+00	8.63E+02	1.70E+01	G
			227.00	-2.949E+00	+	1.102E+01	1.42E+02	6.30E+00	GA
Cf-249	T	6.4998E-01						1.28E+05	
			387.95	4.105E-01	&(	1.643E+00	1.17E+02	6.60E+01	G
			333.44	1.669E+00	?(	8.238E+00	1.45E+02	1.55E+01	G
Sn-126		3.1600E+00						3.65E+07	
			87.57	-7.377E-01	-	4.359E+00	1.76E+02	3.75E+01	GA
			64.28	3.160E+00	*(	1.291E+01	1.22E+02	9.70E+00	G
			86.94	-3.067E+00	+	1.792E+01	1.74E+02	9.04E+00	GA
PB-210	N	-1.2901E+01						8.14E+03	
			46.54	-1.290E+01	?(P	3.721E+01	6.47E+01	4.25E+00	G
PB-212	N	1.7309E+00						6.98E+02	
			238.63	1.731E+00	(P	1.241E+00	2.87E+01	4.33E+01	G
			300.03	8.152E+00	+ P	5.122E+01	1.85E+02	3.28E+00	GA
PB-214	N	3.7738E+00						5.84E+05	
			351.93	3.932E+00	(	2.352E+00	2.17E+01	3.76E+01	G
			295.09	3.466E+00	(	5.996E+00	5.31E+01	1.93E+01	G
			242.00	2.964E+00	&	1.615E+01	1.60E+02	7.43E+00	GA
BI-207	C	-1.7401E-01						1.18E+04	
			569.70	-1.740E-01	?(	9.030E-01	1.46E+02	9.77E+01	G
			1063.66	-3.869E-01	+	1.688E+00	1.81E+02	7.45E+01	G
BI-212	N	-5.0923E+00						6.98E+02	
			727.17	-5.092E+00	?(	2.099E+01	1.20E+02	7.55E+00	G
			785.42	2.460E+01	?	7.357E+01	1.22E+02	1.28E+00	GA
U-235	N	1.0101E+00						2.57E+11	
			143.79	-2.178E-01	&(P	1.218E+01	9.28E+02	1.10E+01	G
			205.33	3.696E+00	?(	1.235E+01	1.27E+02	5.01E+00	G
			163.38	0.000E+00	-	1.609E+01	1.00E+03	5.08E+00	G
			185.72	1.098E-01	?	1.371E+00	4.72E+02	5.40E+01	GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
BI-214	N	5.4810E+00					5.84E+05	
			609.31	5.636E+00	*(P	2.036E+00	1.93E+01	4.61E+01 G
			1120.29	5.110E+00	?(P	1.724E+01	9.95E+01	1.51E+01 G
			1764.49	5.382E+00	&(P	7.573E+00	4.91E+01	1.54E+01 G
BI-210M	T	-6.5354E-01					1.10E+09	
			265.83	-6.535E-01	?(P	1.908E+00	7.32E+01	5.00E+01 G
			304.90	0.000E+00	+	6.438E+00	1.00E+03	2.80E+01 G
AC-228	N	4.3483E+00					2.10E+03	
			911.07	4.348E+00	?(	1.602E+00	2.24E+01	2.90E+01 G
			968.97	2.250E+00	-	7.754E+00	9.96E+01	1.75E+01 G
			338.32	2.188E+00	-	1.129E+01	1.51E+02	1.20E+01 G
			93.35	-5.666E+00	-	3.406E+01	1.80E+02	5.56E+00 XA
TH-227	N	-1.9011E+00					7.95E+03	
			50.14	-1.901E+00	?(	1.884E+01	2.90E+02	8.00E+00 G
			256.24	-5.101E+00	+	1.241E+01	9.42E+01	7.00E+00 G
TH-229	N	1.3890E+00					2.68E+06	
			193.51	1.389E+00	?(	1.454E+01	3.91E+02	4.40E+00 G
			210.85	-1.089E+00	&	2.279E+01	7.79E+02	2.99E+00 G
TH-234	N	3.8262E+00					1.63E+12	
			63.29	3.826E+00	(P	3.559E+01	2.75E+02	3.81E+00 G
			92.59	-5.653E+00	+	3.352E+01	1.77E+02	5.58E+00 G
PA-231	N	5.1590E+00					1.20E+07	
			302.65	0.000E+00	?(	6.223E+01	1.00E+03	2.88E+00 G
			300.07	1.120E+01	?(	7.015E+01	1.85E+02	2.46E+00 G
PA-233	C	1.3739E-01					7.82E+08	
			312.01	0.000E+00	?(	5.097E+00	1.00E+03	3.60E+01 G
			300.18	9.351E-01	?(	2.857E+01	8.94E+02	6.20E+00 G
PA-234	N	-3.0960E-01					1.63E+12	
			131.29	-1.395E+00	&(	6.551E+00	1.40E+02	1.80E+01 G
			946.02	4.860E-01	+	1.009E+01	8.57E+02	1.34E+01 G
			569.47	2.073E+00	?(	9.773E+00	1.32E+02	8.20E+00 G
			883.24	-6.148E+00	&	2.596E+01	1.24E+02	9.60E+00 G
			880.53	-1.298E+01	+	3.750E+01	8.59E+01	6.00E+00 GA
PA-234M	N	2.4864E+01					1.63E+12	
			1001.00	0.000E+00	?(	2.086E+02	1.00E+03	8.37E-01 G
			766.41	9.565E+01	?(	3.207E+02	1.36E+02	2.94E-01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AM-241	T 9.5984E-01					1.58E+05	
		59.54	9.598E-01	&(	3.791E+00	1.18E+02	3.59E+01 G
Np-237	F -2.1212E+00					2.14E+06	
		86.49	-2.121E+00	?(	1.282E+01	1.81E+02	1.31E+01 G
Ir-192	F -5.1792E-02					7.40E+01	
		316.49	-3.990E-01	?(	2.406E+00	1.79E+02	8.70E+01 G
		468.06	5.322E-01	?(	1.989E+00	1.09E+02	5.18E+01 G
		308.44	0.000E+00	+	5.728E+00	1.00E+03	3.18E+01 G
Cs-136	F 2.3832E-01					1.30E+01	
		818.50	-7.796E-01	?(	1.575E+00	8.72E+01	1.00E+02 G
		1048.07	1.423E+00	?(	6.555E-01	2.50E+01	8.00E+01 G
		340.57	3.878E-01	?(	3.037E+00	2.28E+02	4.69E+01 G
Np-239	T 1.3173E+00					2.36E+00	
		103.70	-1.297E+00	+	8.152E+00	1.88E+02	2.40E+01 X
		106.13	1.317E+00	*(	8.514E+00	1.93E+02	2.27E+01 G
		99.50	-2.080E+00	+	1.278E+01	1.84E+02	1.50E+01 X
Nd-147	1.9557E+00					1.11E+01	
		531.00	1.956E+00	&(	5.073E+00	1.03E+02	1.30E+01 G
		91.10	-1.120E+00	-	6.551E+00	1.75E+02	2.83E+01 G
TL-210	N 1.5273E-01					5.84E+05	
		799.60	0.000E+00	?(	1.560E+00	1.00E+03	9.90E+01 G
		296.00	3.441E-01	(	2.050E+00	1.76E+02	7.90E+01 G
		1313.00	-2.477E+00	+	8.814E+00	1.57E+02	2.10E+01 GA

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went
    negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide
    failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the
    library energy centroid for positive identification.
P - Peakbackground subtraction

} - Peak is too close to another for the activity
to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
PB-210	46.54	129.	-19.	-0.011	64.70	-1.290E+01	P
TH-227	50.14	148.	-6.	-0.003	289.95	-1.901E+00	
AM-241	59.54	191.	17.	0.009	117.56	9.598E-01	
TH-234	63.29	217.	8.	0.004	275.11	3.826E+00	P
Sn-126	64.28	190.	16.	0.009	121.51	3.160E+00	
BA-133	80.99	114.	-12.	-0.007	172.18	-5.633E-01	P
Np-237	86.49	542.	-18.	-0.010	180.51	-2.121E+00	
EU-155	86.54	524.	-18.	-0.010	177.47	-9.049E-01	
Sn-126	86.94	505.	-18.	-0.010	174.34	-3.067E+00	
Sn-126	87.57	518.	-18.	-0.010	176.41	-7.377E-01	
Nd-147	91.10	692.	-21.	-0.012	175.01	-1.120E+00	
TH-234	92.59	714.	-21.	-0.012	177.41	-5.653E+00	
Gd-153	97.50	757.	-22.	-0.012	181.75	-1.042E+00	
Np-239	99.50	778.	-22.	-0.012	183.95	-2.080E+00	
Gd-153	103.20	800.	-22.	-0.012	185.86	-1.427E+00	
Np-239	103.70	821.	-22.	-0.012	188.24	-1.297E+00	
EU-155	105.31	843.	-18.	-0.010	229.25	-1.218E+00	
Np-239	106.13	804.	21.	0.012	193.44	1.317E+00	
EU-152	121.78	75.	11.	0.006	115.35	5.557E-01	
CO-57	122.06	76.	-9.	-0.005	138.64	-1.547E-01	
EU-154	123.10	56.	12.	0.007	90.97	4.340E-01	
PA-234	131.29	276.	-17.	-0.009	139.78	-1.395E+00	
HF-181	133.02	293.	-17.	-0.009	143.69	-5.835E-01	
CE-144	133.54	310.	-17.	-0.010	147.64	-2.282E+00	
U-235	143.79	331.	-2.	-0.001	927.70	-2.178E-01	P
CE-141	145.44	326.	17.	0.009	156.61	5.260E-01	
Ba-140	162.66	92.	8.	0.005	163.65	2.248E+00	
Cf-251	176.60	59.	-2.	-0.001	863.25	-1.681E-01	
U-235	185.72	70.	3.	0.002	471.65	1.098E-01	
TH-229	193.51	48.	3.	0.002	391.34	1.389E+00	
U-235	205.33	40.	10.	0.005	127.05	3.696E+00	
TH-229	210.85	48.	-2.	-0.001	778.84	-1.089E+00	
Cf-251	227.00	44.	-9.	-0.005	141.86	-2.949E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
EU-152	244.69	131.	-3.	-0.002	369.84	-7.934E-01		P
TH-227	256.24	59.	-16.	-0.009	94.20	-5.101E+00		
Cd-113m	263.70	48.	8.	0.004	127.48	3.083E+03		
BI-210M	265.83	68.	-14.	-0.008	73.23	-6.535E-01		P
TL-208	277.28	45.	11.	0.006	89.04	4.318E+00		
Hg-203	279.20	59.	-1.	-0.001	815.47	-3.983E-02		
TL-210	296.00	174.	11.	0.006	175.87	3.441E-01		
PA-231	300.07	194.	11.	0.006	184.99	1.120E+01		
PA-233	300.18	205.	2.	0.001	893.57	9.351E-01		
Ir-192	316.49	266.	-13.	-0.007	178.85	-3.990E-01		
CR-51	320.08	256.	-14.	-0.008	137.04	-3.841E+00		P
La-140	328.76	78.	9.	0.005	140.92	1.229E+00		P
Cf-249	333.44	87.	9.	0.005	144.72	1.669E+00		
Cs-136	340.57	106.	6.	0.004	228.36	3.878E-01		
EU-152	344.29	135.	-11.	-0.006	150.36	-1.194E+00		
HF-181	345.83	131.	-11.	-0.006	147.97	-2.110E+00		
BA-133	356.00	78.	6.	0.003	206.29	2.897E-01		
BA-133	383.84	39.	9.	0.005	107.10	2.996E+00		
Cf-249	387.95	47.	9.	0.005	117.06	4.105E-01		
SN-113	391.69	36.	6.	0.003	150.51	2.894E-01		P
SB-125	427.88	8.	6.	0.004	96.44	7.183E-01		
AG-108M	433.94	16.	5.	0.003	162.89	1.885E-01		
SB-125	463.37	23.	8.	0.004	92.93	2.712E+00		
Ir-192	468.06	30.	8.	0.004	108.82	5.322E-01		
BE-7	477.60	53.	-4.	-0.002	199.93	-1.559E+00		P
La-140	487.02	68.	-11.	-0.006	113.79	-8.773E-01		
RU-103	497.05	30.	-2.	-0.001	486.24	-9.765E-02		
RH-106	511.86	56.	19.	0.011	105.48	3.701E+00		
Nd-147	531.00	9.	6.	0.004	102.87	1.956E+00		
Ba-140	537.26	22.	-7.	-0.004	131.76	-1.126E+00		P
CS-134	563.24	9.	1.	0.001	458.94	6.726E-01		
CS-134	569.32	13.	-3.	-0.002	179.51	-8.289E-01		
PA-234	569.47	12.	4.	0.002	132.29	2.073E+00		
BI-207	569.70	15.	-4.	-0.002	145.77	-1.740E-01		
TL-208	583.02	22.	6.	0.004	155.20	3.248E-01		
SB-125	600.50	196.	-13.	-0.007	153.54	-3.255E+00		
SB-124	602.73	182.	-13.	-0.007	148.30	-5.942E-01		
CS-134	604.71	169.	-13.	-0.007	142.91	-6.004E-01		
RU-103	610.30	156.	-13.	-0.007	137.06	-1.030E+01		
AG-108M	614.28	143.	-13.	-0.007	131.12	-6.643E-01		
PM-144	618.06	134.	-7.	-0.004	242.94	-3.129E-01		
RH-106	621.92	157.	-14.	-0.008	127.85	-6.519E+00		
SB-125	635.89	16.	4.	0.002	167.82	1.441E+00		
AG-110M	657.76	29.	-5.	-0.003	168.73	-2.361E-01		
CS-137	661.66	26.	6.	0.003	124.03	3.482E-01		
PM-144	696.54	19.	-4.	-0.002	290.54	-1.949E-01		P
NB-94	702.63	24.	-12.	-0.007	91.79	-6.319E-01		P
SB-124	722.79	8.	5.	0.003	85.82	2.583E+00		

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
AG-108M	722.94	13.	5.	0.003	107.24	3.012E-01		
EU-154	723.36	19.	5.	0.003	123.61	1.354E+00		
ZR-95	724.20	47.	-11.	-0.006	96.42	-1.242E+00		
BI-212	727.17	35.	-7.	-0.004	119.73	-5.092E+00		
pm-146	735.72	14.	2.	0.001	454.80	4.153E-01		P
pm-146	747.16	14.	-2.	-0.001	403.11	-3.134E-01		
ZR-95	756.73	19.	-6.	-0.003	130.53	-6.187E-01		P
PA-234M	766.41	10.	5.	0.003	136.06	9.565E+01		
EU-152	778.92	9.	-1.	-0.001	493.71	-5.685E-01		
BI-212	785.42	9.	6.	0.003	121.84	2.460E+01		
CS-134	795.87	26.	-2.	-0.001	492.16	-9.855E-02		
CS-134	801.95	19.	8.	0.004	86.85	5.050E+00		
CO-58	810.78	40.	-8.	-0.004	117.26	-4.591E-01		
Cs-136	818.50	28.	-14.	-0.008	87.20	-7.796E-01		
MN-54	834.85	5.	6.	0.003	92.51	3.261E-01		
Co-56	846.77	14.	1.	0.001	800.00	5.927E-02		
TL-208	860.56	14.	-3.	-0.002	270.80	-1.450E+00		
NB-94	871.10	25.	-11.	-0.006	71.00	-6.682E-01		
EU-154	873.23	44.	-4.	-0.002	271.80	-1.734E+00		
PA-234	880.53	53.	-13.	-0.007	85.90	-1.298E+01		
PA-234	883.24	66.	-10.	-0.005	123.84	-6.148E+00		
Sc-46	889.28	77.	-1.	-0.001	672.99	-5.701E-02		P
y-88	898.04	35.	-16.	-0.009	40.28	-1.040E+00		P
AG-110M	937.49	25.	-10.	-0.006	114.38	-1.881E+00		
PA-234	946.02	15.	1.	0.001	857.32	4.860E-01		
EU-152	964.11	8.	6.	0.003	77.97	2.728E+00		
EU-154	996.33	0.	24.	0.013	20.41	1.542E+01		
EU-154	1004.77	35.	-6.	-0.003	144.75	-2.284E+00		
Co-56	1037.84	0.	12.	0.006	30.42	5.798E+00		P
Cs-136	1048.07	0.	16.	0.009	25.00	1.423E+00		
BI-207	1063.66	10.	-4.	-0.002	180.85	-3.869E-01		
Ga-68	1077.40	25.	-9.	-0.005	126.60	-2.325E+01		
FE-59	1099.25	11.	7.	0.004	107.76	9.626E-01		
EU-152	1112.07	49.	-11.	-0.006	96.55	-5.944E+00		
ZN-65	1115.55	38.	-5.	-0.003	168.31	-7.995E-01		
Sc-46	1120.55	24.	9.	0.005	84.48	6.688E-01		
Co-56	1238.28	21.	-5.	-0.003	187.55	-6.775E-01		P
NA-22	1274.53	5.	7.	0.004	62.83	5.591E-01		
FE-59	1291.60	21.	-6.	-0.004	170.46	-1.253E+00		
TL-210	1313.00	16.	-6.	-0.003	156.94	-2.477E+00		
CO-60	1332.50	16.	-9.	-0.005	112.86	-7.947E-01		P
AG-110M	1384.30	17.	-11.	-0.006	92.93	-4.115E+00		
EU-152	1408.00	6.	-4.	-0.002	160.96	-1.610E+00		
La-140	1596.21	6.	-4.	-0.002	160.96	-3.967E-01		
SB-124	1690.98	6.	-4.	-0.002	156.12	-9.101E-01		
Co-56	1771.35	20.	-8.	-0.004	91.72	-5.568E+00		
y-88	1836.06	6.	-2.	-0.001	304.14	-2.363E-01		

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty (1 Sigma) Counting	MDA Bq/Sample
BE-7	#A	-1.5587E+00	-1.5587E+00	1.999E+02%	1.29E+01
NA-22	#A	5.5914E-01	5.5914E-01	6.283E+01%	1.14E+00
K-40		1.5514E+02	1.5514E+02	8.096E+00%	1.29E+01
Sc-46	#A	3.0591E-01	3.0591E-01	8.448E+01%	2.69E+00
CR-51	#A	-3.8409E+00	-3.8410E+00	1.370E+02%	2.09E+01
MN-54	#A	3.2615E-01	3.2615E-01	9.251E+01%	7.48E-01
FE-59	#A	9.6259E-01	9.6260E-01	1.078E+02%	2.35E+00
Co-56	#A	7.7012E-01	7.7012E-01	3.042E+01%	1.19E+00
CO-57	#A	-1.5468E-01	-1.5468E-01	1.386E+02%	7.32E-01
CO-58	#A	-4.5913E-01	-4.5913E-01	1.173E+02%	1.85E+00
CO-60	#A	-7.9466E-01	-7.9466E-01	1.129E+02%	1.88E+00
ZN-65	#A	-7.9951E-01	-7.9951E-01	1.683E+02%	4.69E+00
NB-94	#A	-6.3193E-01	-6.3193E-01	9.179E+01%	1.32E+00
ZR-95	#A	-6.1872E-01	-6.1873E-01	1.305E+02%	2.29E+00
NB-95	#A	-2.7252E-02	-2.7253E-02	1.257E+03%	1.27E+00
RU-103	#A	-9.7654E-02	-9.7655E-02	4.862E+02%	1.19E+00
RH-106	#A	-6.5186E+00	-6.5186E+00	1.279E+02%	2.81E+01
AG-108M	#A	2.4493E-01	2.4493E-01	9.751E+01%	8.05E-01
AG-110M	#A	0.0000E+00	0.0000E+00	1.000E+03%	3.66E+00
SN-113	#A	2.8939E-01	2.8939E-01	1.505E+02%	1.51E+00
SB-124	#A	-2.7933E-01	-2.7933E-01	8.567E+01%	2.98E+00
SB-125	#A	1.2837E+00	1.2837E+00	7.157E+01%	1.81E+00
I-131	#	5.9860E-01	5.9862E-01	5.083E+01%	5.78E-01
Gd-153	#A	-1.0423E+00	-1.0423E+00	1.818E+02%	6.33E+00
Ga-68	#A	-2.3081E+01	-2.3251E+01	1.266E+02%	6.72E+01
Tc-99m	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.52E+00
BA-133	#A	2.8974E-01	2.8974E-01	2.063E+02%	2.06E+00
CS-134	#A	-7.9403E-02	-7.9403E-02	8.685E+01%	2.90E+00
CS-137	#A	3.4824E-01	3.4824E-01	1.240E+02%	1.50E+00
CE-139	#A	0.0000E+00	0.0000E+00	1.000E+03%	9.92E-01
Ba-140	#A	-4.4057E-01	-4.4058E-01	1.051E+02%	4.06E+00
La-140	#A	-1.1147E-01	-1.1148E-01	1.070E+02%	1.49E+00
CE-141	#A	5.2599E-01	5.2600E-01	1.566E+02%	2.77E+00
CE-144	#A	-2.2821E+00	-2.2821E+00	1.476E+02%	1.13E+01
PM-144	#A	-1.9493E-01	-1.9493E-01	2.905E+02%	1.16E+00
EU-152	#A	1.9915E-01	1.9915E-01	7.797E+01%	6.09E+00
EU-154	#A	2.2322E+00	2.2322E+00	2.041E+01%	1.66E+01
EU-155	#A	-1.2175E+00	-1.2175E+00	2.293E+02%	9.33E+00
HF-181	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.76E+00
Ta-182	#A	3.6462E-01	3.6462E-01	8.978E+01%	6.80E+00
Hg-203	#A	-3.9829E-02	-3.9829E-02	8.155E+02%	1.14E+00
TL-208	#A	6.0231E-01	6.0231E-01	8.904E+01%	1.25E+00
pm-146	#A	-2.3182E-02	-2.3182E-02	3.039E+02%	3.16E+00

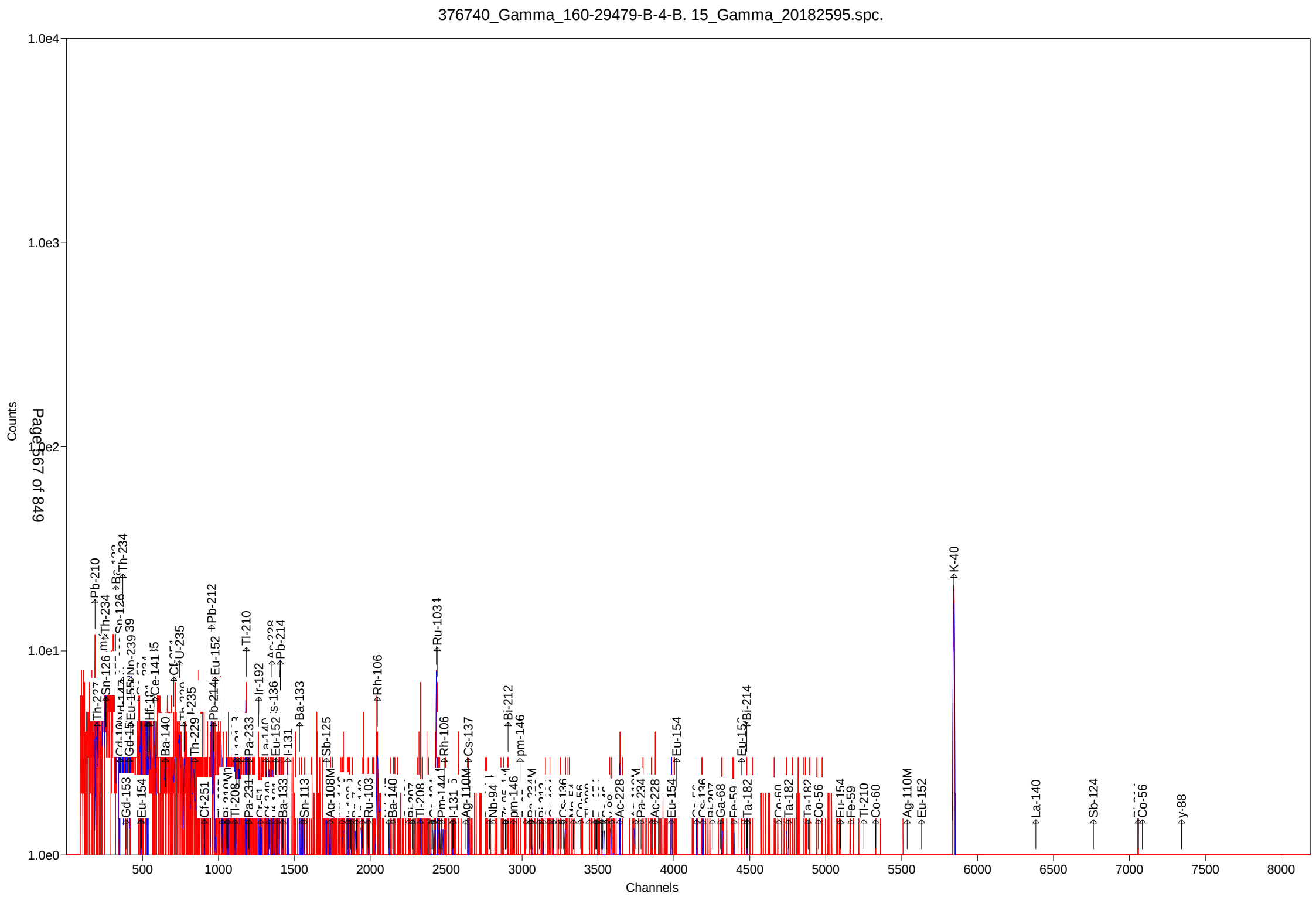
y-88	#A	-1.0401E+00	-1.0401E+00	4.028E+01%	2.03E+00
Cd-113m	#A	3.0825E+03	3.0825E+03	1.275E+02%	1.35E+04
Cd-109	#A	-6.1691E-01	-6.1691E-01	2.102E+03%	4.38E+01
Cf-251	#A	-1.6809E-01	-1.6809E-01	8.633E+02%	3.87E+00
Cf-249	#A	6.4998E-01	6.4998E-01	9.307E+01%	1.64E+00
Sn-126	#A	3.1600E+00	3.1600E+00	1.215E+02%	1.29E+01
PB-210	#A	-1.2901E+01	-1.2901E+01	6.470E+01%	3.72E+01
PB-212		1.7309E+00	1.7309E+00	2.875E+01%	1.24E+00
PB-214	#	3.7738E+00	3.7738E+00	2.166E+01%	2.35E+00
BI-207	#A	-1.7401E-01	-1.7401E-01	1.458E+02%	9.03E-01
BI-212	#A	-5.0923E+00	-5.0923E+00	1.197E+02%	2.10E+01
U-235	#A	1.0101E+00	1.0101E+00	1.270E+02%	1.22E+01
BI-214	#	5.4810E+00	5.4810E+00	1.926E+01%	2.04E+00
BI-210M	#A	-6.5354E-01	-6.5354E-01	7.323E+01%	1.91E+00
AC-228	#	4.3483E+00	4.3483E+00	2.236E+01%	1.60E+00
TH-227	#A	-1.9011E+00	-1.9011E+00	2.900E+02%	1.88E+01
TH-229	#A	1.3890E+00	1.3890E+00	3.913E+02%	1.45E+01
TH-234	#A	3.8262E+00	3.8262E+00	2.751E+02%	3.56E+01
PA-231	#A	5.1590E+00	5.1590E+00	1.850E+02%	6.22E+01
PA-233	#A	1.3739E-01	1.3739E-01	6.705E+02%	5.10E+00
PA-234	#A	-3.0960E-01	-3.0960E-01	9.623E+01%	6.55E+00
PA-234M	#A	2.4864E+01	2.4864E+01	1.361E+02%	2.09E+02
AM-241	#A	9.5984E-01	9.5984E-01	1.176E+02%	3.79E+00
Np-237	#A	-2.1212E+00	-2.1212E+00	1.805E+02%	1.28E+01
Ir-192	#A	-5.1792E-02	-5.1792E-02	1.047E+02%	2.41E+00
Cs-136	#A	2.3832E-01	2.3832E-01	2.500E+01%	1.57E+00
Np-239	#A	1.3172E+00	1.3173E+00	1.934E+02%	8.51E+00
Nd-147	#A	1.9556E+00	1.9557E+00	1.029E+02%	5.07E+00
TL-210	#A	1.5273E-01	1.5273E-01	1.759E+02%	1.56E+00

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (25.1 to 1999.5 keV) 1.623E+02 Bq/Sample
Total Decayed Activity (25.1 to 1999.5 keV) 1.6234846E+02 Bq/Sample

(Page 21 of 21)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Counts
1.0e4
1.0e3
1.0e2
1.0e1
1.0e0
Channels
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
7500
8000
Pb-210
Th-234
Sn-126
Th-234
Sn-126
Th-227
Gd-153
Eu-154
Ba-140
Cf-251
Th-229
Pb-214
Pb-212
Eu-152
Pa-233
Ir-192
Eu-152
Ba-133
I-131
Sn-113
Sb-125
Ag-108M
Ru-103
Rh-106
Ba-140
Ru-103
Rh-106
Pm-144
Cs-137
Ag-110M
Nb-94
Bi-212
pm-146
Ac-228
Eu-154
Eu-154
Bi-214
Ac-228
Ta-182
Co-56
Eu-154
Fe-59
Tl-210
Co-60
Ag-110M
Eu-152
K-40
La-140
Sb-124
Co-56
y-88

Test America St. Louis Spectrum ID: 12_Gamma_20181338

Sample Description: 376740_Gamma_160-29479-A-5-C
Detector: Detector #12
Batch ID: 376740
Work Order Number: Gamma
Lot Number: 160-29479-A-5-C

Decay to Time: 8/9/2018 06:36 Live Time: 1800 sec
Acquisition Time: 8/9/2018 06:36:22 Real Time: 1801 sec
Analysis Time: 8/9/2018 07:06 Dead Time: 0.06 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 12_Soil_TunaCan.Clb
Efficiency Cal Desc: 12_TunaCan_108513
Efficiency Cal Date: 4/20/2018 11:53
Energy Cal Date: 4/20/2018 11:13
Library: Client_Long_Rev14.lib
Bkgd Correction File: 12_2018-07-14_1810.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	-3.817E+00	106.3	4.057E+00	4.061E+00	1.373E+01
NA-22	1.639E-01	158.4	2.597E-01	2.598E-01	9.696E-01
K-40	1.633E+02	7.2	1.176E+01	1.436E+01	1.034E+01
Sc-46	-8.241E-01	92.5	7.622E-01	7.634E-01	2.560E+00
CR-51	2.425E+00	182.9	4.434E+00	4.435E+00	1.506E+01
MN-54	-1.885E-01	255.4	4.814E-01	4.815E-01	1.174E+00
FE-59	5.474E-01	113.3	6.201E-01	6.207E-01	1.498E+00
Co-56	2.805E-01	146.1	4.097E-01	4.100E-01	9.066E-01
CO-57	0.000E+00	1.#INF	1.458E-01	1.458E-01	8.951E-01
CO-58	2.783E-01	134.2	3.736E-01	3.738E-01	1.304E+00
CO-60	5.322E-01	44.3	2.358E-01	2.373E-01	1.003E+00
ZN-65	-2.155E+00	82.1	1.770E+00	1.773E+00	5.914E+00
NB-94	4.635E-02	1126.9	5.224E-01	5.224E-01	1.269E+00
ZR-95	3.707E-02	136.6	5.065E-02	5.069E-02	2.217E+00
NB-95	-1.855E-01	244.9	4.544E-01	4.545E-01	1.596E+00
RU-103	-5.028E-01	94.5	4.753E-01	4.760E-01	1.186E+00
RH-106	3.867E+00	97.6	3.776E+00	3.781E+00	2.724E+01
AG-108M	2.218E-01	105.3	2.336E-01	2.339E-01	9.597E-01
AG-110M	1.229E-01	685.0	8.419E-01	8.420E-01	2.956E+00
SN-113	-1.654E-01	366.4	6.062E-01	6.063E-01	2.101E+00
SB-124	5.413E-01	83.4	4.516E-01	4.524E-01	2.590E+00
SB-125	5.524E-01	86.7	4.790E-01	4.798E-01	3.083E+00
I-131	1.331E-01	104.4	1.390E-01	1.391E-01	1.042E+00
Gd-153	-2.849E-01	391.0	1.114E+00	1.114E+00	3.787E+00
Ga-68	-1.093E+01	187.3	2.047E+01	2.047E+01	4.667E+01
Tc-99m	0.000E+00	1.#INF	1.199E-01	1.199E-01	1.607E+00
BA-133	-5.201E-01	155.7	8.098E-01	8.102E-01	2.741E+00
CS-134	3.696E-01	38.6	1.425E-01	1.438E-01	2.676E+00
CS-137	-8.154E-01	84.9	6.925E-01	6.938E-01	2.319E+00
CE-139	-1.631E-01	238.9	3.896E-01	3.897E-01	1.325E+00
Ba-140	4.584E-01	351.7	1.612E+00	1.612E+00	4.045E+00
La-140	-9.682E-01	97.9	9.480E-01	9.494E-01	1.979E+00
CE-141	2.196E-01	365.6	8.029E-01	8.030E-01	2.718E+00

CE-144	-1.775E+00	204.0	3.619E+00	3.620E+00	1.218E+01
PM-144	-1.518E-02	3079.0	4.675E-01	4.675E-01	1.149E+00
EU-152	1.554E+00	73.3	1.139E+00	1.141E+00	5.218E+00
EU-154	3.872E+00	60.1	2.326E+00	2.335E+00	1.249E+01
EU-155	0.000E+00	1.#INF	5.968E-01	5.968E-01	5.355E+00
HF-181	-2.023E-01	89.9	1.817E-01	1.820E-01	2.031E+00
Ta-182	-8.073E-01	114.3	9.226E-01	9.234E-01	9.779E+00
Hg-203	-1.476E-01	213.4	3.149E-01	3.150E-01	1.091E+00
TL-208	1.516E+00	38.4	5.828E-01	5.878E-01	1.143E+00
pm-146	4.077E-01	107.2	4.371E-01	4.376E-01	1.783E+00
y-88	-1.735E-01	370.9	6.435E-01	6.436E-01	1.504E+00
Cd-113m	1.088E+03	369.7	4.020E+03	4.021E+03	1.407E+04
Cd-109	0.000E+00	1.#INF	4.630E+00	4.631E+00	3.376E+01
Cf-251	-9.236E-01	174.7	1.614E+00	1.615E+00	4.217E+00
Cf-249	3.983E-01	118.3	4.713E-01	4.717E-01	1.804E+00
Sn-126	8.231E-01	529.1	4.355E+00	4.355E+00	1.481E+01
PB-210	1.131E+01	86.3	9.764E+00	9.789E+00	2.966E+01
PB-212	4.742E+00	12.3	5.826E-01	6.329E-01	1.230E+00
PB-214	6.616E+00	13.2	8.759E-01	9.379E-01	2.296E+00
BI-207	1.593E-01	150.0	2.389E-01	2.391E-01	8.502E-01
BI-212	3.199E+00	152.7	4.883E+00	4.886E+00	1.708E+01
U-235	1.599E+00	226.6	3.625E+00	3.626E+00	1.221E+01
BI-214	8.060E+00	13.1	1.058E+00	1.135E+00	1.903E+00
BI-210M	0.000E+00	1.#INF	3.274E-01	3.275E-01	1.737E+00
AC-228	1.915E+00	89.6	1.716E+00	1.719E+00	3.919E+00
TH-227	4.465E+00	49.4	2.207E+00	2.222E+00	1.961E+01
TH-229	4.043E+00	128.8	5.208E+00	5.213E+00	1.631E+01
TH-234	7.033E+00	60.3	4.242E+00	4.261E+00	2.380E+01
PA-231	0.000E+00	1.#INF	3.347E+00	3.347E+00	6.477E+01
PA-233	0.000E+00	1.#INF	3.356E-01	3.356E-01	5.303E+00
PA-234	5.753E-01	78.3	4.505E-01	4.515E-01	5.680E+00
PA-234M	3.299E+01	129.7	4.278E+01	4.281E+01	1.507E+02
AM-241	-2.380E-01	561.0	1.335E+00	1.336E+00	4.533E+00
Np-237	-2.121E+00	142.8	3.029E+00	3.031E+00	1.016E+01
Ir-192	1.852E-01	108.0	2.000E-01	2.003E-01	2.217E+00
Cs-136	2.994E-01	65.8	1.971E-01	1.978E-01	1.534E+00
Np-239	9.532E-01	138.4	1.319E+00	1.320E+00	4.446E+00
Nd-147	-1.705E+00	178.2	3.039E+00	3.040E+00	7.522E+00
TL-210	6.787E-01	38.5	2.613E-01	2.641E-01	7.449E-01
Total	1.359E+03				

Analyst: kody Saulters

TestAmerica Inc Spectrum name: 12_Gamma_20181338.An1

Sample description
376740_Gamma_160-29479-A-5-C

Spectrum Filename: C:\User\SPC\Det12\12_Gamma_20181338.An1

Acquisition information
Start time:	8/9/2018 6:36:22 AM
Live time:	1800
Real time:	1801
Dead time:	0.06 %
Detector ID:	12

Detector system
Ge12 S/N10034336

Calibration
Filename: 12_Soil_TunaCan.Clb
12_TunaCan_108513

Energy Calibration
Created:	4/20/2018 11:13:27 AM
Zero offset:	0.059 keV
Gain:	0.250 keV/channel
Quadratic:	-3.735E-08 keV/channel^2

Efficiency Calibration
Created:	4/20/2018 11:53:09 AM
Type:	Polynomial
Uncertainty:	1.020 %
Coefficients:	-0.363508 -4.707999 0.462125
	-0.051256 0.002384 -0.000043

Library Files
Main analysis library:	Client_Long_Rev14.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters
Analysis engine:	Env32 G800W064
Start channel:	100 (25.08keV)
Stop channel:	8000 (1999.13keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000

Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	8/9/2018 6:36:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	12_2018-07-14_1810.PBC 7/14/2018 6:10:12 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 13 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1370

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.49	16.	86.34	1.16	1.801E-02	46.54	4.250	PBC<MDA	PB210
50.14	9.	214.20	0.85	2.193E-02	50.14	8.000	PBC<MDA	TH227
63.14	22.	82.66	0.67	2.978E-02	63.29	3.810	PBC<MDA	TH234
64.28	4.	529.09	0.87	3.015E-02	64.28	9.700	PBC<MDA	Sn126
77.13	82.	22.53	0.68	3.386E-02				
92.75	16.	87.87	0.90	3.637E-02	92.59	5.584	PBC<MDA	TH234
106.13	15.	138.39	0.91	3.729E-02	106.13	22.700	PBC<MDA	Np239
143.79	11.	226.65	0.95	3.599E-02	143.79	10.960	PBC<MDA	U235
145.44	7.	365.63	0.95	3.586E-02	145.44	48.200	PBC<MDA	CE141
185.72	38.	42.31	0.99	3.215E-02	185.72	54.000	PBC<MDA	U235
193.51	6.	256.58	1.00	3.140E-02	193.51	4.400	PBC<MDA	TH229
210.85	10.	128.81	1.02	2.980E-02	210.85	2.990	PBC<MDA	TH229
226.69	2.	807.96	1.03	2.839E-02	227.00	6.300	PBC<MDA	Cf251
238.50	92.	14.86	1.13	2.744E-02	238.63	43.300	4.280E+00	PB212
241.84	8.	258.58	1.05	2.716E-02	242.00	7.430	PBC<MDA	PB214
244.69	8.	272.66	1.05	2.695E-02	244.69	7.580	PBC<MDA	EU152
256.24	21.	49.42	1.06	2.608E-02	256.24	7.000	PBC<MDA	TH227
263.70	3.	369.68	1.07	2.554E-02	263.70	0.006	PBC<MDA	Cd113m
277.28	11.	91.67	1.08	2.462E-02	277.28	6.310	PBC<MDA	TL208
295.05	65.	18.64	1.09	2.350E-02	295.09	19.300	7.928E+00	PB214
320.08	10.	182.85	1.13	2.210E-02	320.08	9.940	PBC<MDA	CR51
328.76	8.	94.78	1.13	2.165E-02	328.76	20.300	PBC<MDA	La140
333.44	1.	963.22	1.14	2.142E-02	333.44	15.510	PBC<MDA	Cf249
337.82	2.	744.98	1.14	2.118E-02	338.32	12.010	PBC<MDA	AC228
345.83	10.	145.60	1.15	2.083E-02	345.83	15.070	PBC<MDA	HF181
351.91	83.	18.81	0.54	2.055E-02	351.93	37.600	5.942E+00	PB214
383.84	10.	110.09	1.19	1.923E-02	383.84	8.940	PBC<MDA	BA133

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
387.95	10.	118.33	1.19	1.907E-02	387.95	66.000	PBC<MDA	Cf249
433.94	5.	211.97	1.24	1.751E-02	433.94	90.480	PBC<MDA	AG108M
453.88	6.	136.76	1.26	1.692E-02	453.88	65.000	PBC<MDA	pm146
463.37	9.	93.33	1.27	1.666E-02	463.37	10.470	PBC<MDA	SB125
468.06	8.	108.00	1.27	1.653E-02	468.06	51.750	PBC<MDA	Ir192
487.02	9.	161.77	1.29	1.604E-02	487.02	45.500	PBC<MDA	La140
511.86	75.	20.93	2.56	1.546E-02	511.86	20.000	1.354E+01	RH106
537.26	3.	351.72	1.34	1.491E-02	537.26	24.390	PBC<MDA	Ba140
563.24	3.	324.52	1.36	1.439E-02	563.24	8.350	PBC<MDA	CS134
569.47	4.	178.84	1.37	1.428E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	1.740E+00	PA234
					569.70	97.740	1.460E-01	BI207
569.70	4.	150.00	1.37	1.427E-02	569.32	15.380	1.012E+00	CS134
					569.47	8.200	1.898E+00	PA234
					569.70	97.740	1.593E-01	BI207
582.93	28.	38.44	1.38	1.403E-02	583.02	84.500	1.328E+00	TL208
600.50	8.	213.76	1.40	1.373E-02	600.50	17.860	PBC<MDA	SB125
602.73	8.	218.92	1.40	1.369E-02	602.73	98.260	PBC<MDA	SB124
604.71	7.	282.99	1.40	1.366E-02	604.71	97.620	PBC<MDA	CS134
609.08	91.	13.13	1.48	1.358E-02	609.31	46.090	8.060E+00	BI214
636.97	7.	118.49	1.43	1.315E-02	636.97	7.170	PBC<MDA	I131
722.79	5.	83.43	1.51	1.199E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	2.736E-01	AG108M
					723.36	20.220	1.230E+00	EU154
722.94	5.	105.31	1.51	1.199E-02	722.79	10.810	2.253E+00	SB124
					722.94	90.840	2.681E-01	AG108M
					723.36	20.220	1.205E+00	EU154
723.36	5.	122.03	1.51	1.199E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	2.681E-01	AG108M
					723.36	20.220	1.205E+00	EU154
724.20	5.	136.65	1.51	1.198E-02	724.20	44.150	PBC<MDA	ZR95
727.17	5.	152.65	1.52	1.194E-02	727.17	7.550	PBC<MDA	BI212
735.72	4.	204.63	1.52	1.184E-02	735.72	22.500	PBC<MDA	pm146
747.16	2.	207.02	1.53	1.171E-02	747.16	34.000	PBC<MDA	pm146
785.42	9.	90.03	1.57	1.129E-02	785.42	1.280	PBC<MDA	BI212
795.87	7.	38.56	1.58	1.119E-02	795.87	85.530	PBC<MDA	CS134
799.60	13.	38.50	1.58	1.115E-02	799.60	98.960	PBC<MDA	TL210
810.78	6.	134.23	1.59	1.104E-02	810.78	99.460	PBC<MDA	CO58
846.77	5.	146.06	1.63	1.070E-02	846.77	99.935	PBC<MDA	Co56
873.23	10.	85.93	1.65	1.046E-02	873.23	12.270	PBC<MDA	EU154
884.68	2.	684.98	1.66	1.036E-02	884.68	72.680	PBC<MDA	AG110M
911.59	10.	89.61	1.68	1.015E-02	911.07	29.000	PBC<MDA	AC228
946.02	6.	92.00	1.72	9.873E-03	946.02	13.400	PBC<MDA	PA234
964.11	10.	73.27	1.73	9.739E-03	964.11	14.605	PBC<MDA	EU152
996.33	6.	83.99	1.76	9.508E-03	996.33	10.600	PBC<MDA	EU154
1001.00	5.	129.68	1.76	9.476E-03	1001.00	0.837	PBC<MDA	PA234M
1004.77	1.	987.42	1.77	9.450E-03	1004.77	18.010	PBC<MDA	EU154
1048.07	9.	65.82	1.81	9.162E-03	1048.07	80.000	PBC<MDA	Cs136

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
1050.36	6.	97.64	1.81	9.147E-03	1050.36	1.560	PBC<MDA	RH106
1099.25	3.	206.16	1.85	8.846E-03	1099.25	56.500	PBC<MDA	FE59
1120.33	7.	207.23	1.87	8.722E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	PBC<MDA	Sc46
1173.24	15.	44.30	1.92	8.426E-03	1173.24	99.900	9.679E-01	CO60
1189.05	4.	177.92	1.93	8.342E-03	1189.05	16.200	PBC<MDA	Ta182
1238.28	3.	327.45	1.97	8.090E-03	1238.28	66.070	PBC<MDA	Co56
1274.53	2.	158.44	2.00	7.914E-03	1274.53	99.940	PBC<MDA	NA22
					1274.54	35.190	4.655E-01	EU154
1291.60	5.	113.28	2.02	7.834E-03	1291.60	43.200	PBC<MDA	FE59
1332.50	1.	427.57	2.05	7.647E-03	1332.50	99.980	PBC<MDA	CO60
1408.00	8.	35.36	2.12	7.324E-03	1408.00	21.005	2.889E+00	EU152
1460.76	223.	7.20	2.16	7.112E-03	1460.83	10.670	1.633E+02	K40

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
308.07	77.13	77.	82.	2.425E+03	22.53	0.683	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev14.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV	
PB-210	185.60	46.49	67.	16.	0.009	86.34	1.156	s
TH-227	200.18	50.14	162.	9.	0.005	214.20	0.855	
AM-241	237.74	59.54	293.	-4.	-0.002	561.01	0.865	s
TH-234	252.15	63.14	97.	22.	0.012	82.66	0.666	
Sn-126	256.71	64.28	261.	4.	0.002	529.09	0.869	s
BA-133	323.50	80.99	137.	-20.	-0.011	107.85	0.887	s
Np-237	345.49	86.49	314.	-18.	-0.010	142.79	0.892	s
EU-155	345.70	86.54	296.	-3.	-0.002	730.30	0.892	s
Sn-126	347.29	86.94	293.	0.	0.000	1000.00	0.892	s
Sn-126	349.81	87.57	293.	0.	0.000	1000.00	0.893	s
Cd-109	351.68	88.04	293.	0.	0.000	1000.00	0.894	s
TH-234	369.87	92.59	93.	16.	0.009	87.87	0.898	D
AC-228	372.91	93.35	161.	-3.	-0.002	656.97	0.899	s
Gd-153	389.50	97.50	243.	-6.	-0.003	391.03	0.903	s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Np-239	397.50	99.50	248.	0.	0.000	1000.00	0.905s
Gd-153	412.29	103.20	248.	0.	0.000	1000.00	0.909
Np-239	414.29	103.70	248.	0.	0.000	1000.00	0.909
EU-155	420.73	105.31	248.	0.	0.000	1000.00	0.911
Np-239	424.00	106.13	195.	15.	0.008	138.39	0.912
EU-152	486.55	121.78	105.	-4.	-0.002	365.72	0.928s
CO-57	487.69	122.06	109.	0.	0.000	1000.00	0.928s
EU-154	491.84	123.10	116.	-17.	-0.009	94.20	0.929s
PA-234	524.60	131.29	195.	-17.	-0.009	121.38	0.938
HF-181	531.51	133.02	345.	-3.	-0.002	776.85	0.939s
CE-144	533.57	133.54	345.	-13.	-0.007	203.95	0.940s
HF-181	544.61	136.30	358.	0.	0.000	1000.00	0.943
CO-57	545.30	136.47	358.	0.	0.000	1000.00	0.943
Tc-99m	561.44	140.51	358.	0.	0.000	1000.00	0.947s
U-235	574.53	143.79	325.	11.	0.006	226.65	0.950
CE-141	581.15	145.44	308.	7.	0.004	365.63	0.952s
Ba-140	649.99	162.66	171.	-17.	-0.010	108.35	0.969s
U-235	652.87	163.38	188.	-18.	-0.010	113.41	0.970
CE-139	662.76	165.85	178.	-8.	-0.004	238.88	0.973s
Cf-251	705.72	176.60	73.	-9.	-0.005	174.74	0.983s
U-235	742.18	185.72	67.	38.	0.021	42.31	0.992s
TH-229	773.32	193.51	66.	6.	0.003	256.58	1.000s
TH-229	842.65	210.85	48.	10.	0.006	128.81	1.018s
Cf-251	907.22	227.00	51.	2.	0.001	807.96	1.034s
PB-212	953.73	238.63	26.	101.	0.056	12.29	1.045D
PB-214	967.18	242.00	236.	8.	0.005	258.58	1.049s
EU-152	977.96	244.69	224.	8.	0.004	272.66	1.051s
TH-227	1024.13	256.24	26.	21.	0.012	49.42	1.063s
Cd-113m	1053.96	263.70	60.	3.	0.002	369.68	1.070s
BI-210M	1062.48	265.83	63.	0.	0.000	1000.00	1.072s
TL-208	1108.27	277.28	48.	11.	0.006	91.67	1.084
Hg-203	1115.93	279.20	61.	-5.	-0.003	213.41	1.086s
PB-214	1179.30	295.05	22.	65.	0.036	18.64	1.092
TL-210	1183.11	296.00	300.	-13.	-0.007	194.91	1.102s
PB-212	1199.22	300.03	288.	-13.	-0.007	190.16	1.106
PA-231	1199.38	300.07	275.	-13.	-0.007	185.99	1.106
PA-233	1199.82	300.18	262.	-5.	-0.003	449.09	1.107
PA-231	1209.70	302.65	257.	0.	0.000	1000.00	1.109s
BA-133	1210.50	302.85	257.	0.	0.000	1000.00	1.109s
Ba-140	1218.49	304.85	257.	0.	0.000	1000.00	1.111s
BI-210M	1218.68	304.90	257.	0.	0.000	1000.00	1.111s
Ir-192	1232.85	308.44	257.	0.	0.000	1000.00	1.115
PA-233	1247.13	312.01	257.	0.	0.000	1000.00	1.118s
Ir-192	1265.04	316.49	257.	0.	0.000	1000.00	1.123s
CR-51	1279.41	320.08	149.	10.	0.005	182.85	1.126s
La-140	1314.10	328.76	24.	8.	0.004	94.78	1.135s
Cf-249	1332.81	333.44	57.	1.	0.001	963.22	1.139s
AC-228	1352.33	338.32	110.	2.	0.001	744.98	1.144s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Cs-136	1361.32	340.57	112.	0.	0.000	1000.00	1.146
EU-152	1376.18	344.29	112.	0.	0.000	1000.00	1.150s
HF-181	1382.35	345.83	101.	10.	0.006	145.60	1.151s
PB-214	1406.66	351.91	39.	83.	0.046	18.81	0.537s
BA-133	1423.02	356.00	164.	-12.	-0.007	155.71	1.162s
I-131	1456.95	364.48	36.	-7.	-0.004	172.02	1.170s
BA-133	1534.35	383.84	57.	10.	0.006	110.09	1.189s
Cf-249	1550.79	387.95	67.	10.	0.006	118.33	1.193s
SN-113	1565.74	391.69	86.	-4.	-0.002	366.42	1.196s
SB-125	1710.45	427.88	32.	-10.	-0.006	115.18	1.232s
AG-108M	1734.69	433.94	28.	5.	0.003	211.97	1.238s
pm-146	1814.45	453.88	16.	6.	0.003	136.76	1.257s
SB-125	1852.39	463.37	29.	9.	0.005	93.33	1.266
Ir-192	1871.16	468.06	30.	8.	0.004	108.00	1.271s
BE-7	1909.29	477.60	72.	-12.	-0.007	106.28	1.280s
HF-181	1926.90	482.00	93.	-13.	-0.007	105.34	1.284s
La-140	1946.98	487.02	97.	9.	0.005	161.77	1.289s
RU-103	1987.11	497.05	36.	-13.	-0.007	94.52	1.298s
RH-106	2046.35	511.86	27.	75.	0.042	20.93	2.563s
Nd-147	2122.88	531.00	26.	-6.	-0.003	178.21	1.331s
Ba-140	2147.92	537.26	26.	3.	0.002	351.72	1.337s
CS-134	2251.82	563.24	17.	3.	0.001	324.52	1.362s
CS-134	2276.15	569.32	22.	-2.	-0.001	402.49	1.367s
PA-234	2276.75	569.47	20.	4.	0.002	178.84	1.368s
BI-207	2277.68	569.70	16.	4.	0.002	150.00	1.368s
TL-208	2330.96	583.02	22.	28.	0.016	38.44	1.381
SB-125	2400.87	600.50	158.	8.	0.005	213.76	1.397s
SB-124	2409.79	602.73	166.	8.	0.005	218.92	1.399s
CS-134	2417.71	604.71	174.	7.	0.004	282.99	1.401
BI-214	2435.19	609.08	16.	91.	0.050	13.13	1.481s
RU-103	2440.06	610.30	181.	0.	0.000	1000.00	1.406s
AG-108M	2455.99	614.28	181.	0.	0.000	1000.00	1.410s
PM-144	2471.12	618.06	181.	0.	0.000	1000.00	1.414s
SB-125	2542.43	635.89	41.	-14.	-0.008	69.92	1.430s
I-131	2546.77	636.97	35.	7.	0.004	118.49	1.432s
AG-110M	2629.92	657.76	57.	-14.	-0.008	79.57	1.451s
CS-137	2645.51	661.66	84.	-16.	-0.009	84.93	1.455s
SB-124	2890.04	722.79	7.	5.	0.003	83.43	1.512
AG-108M	2890.65	722.94	13.	5.	0.003	105.31	1.512s
EU-154	2892.32	723.36	18.	5.	0.003	122.03	1.512s
ZR-95	2895.69	724.20	23.	5.	0.003	136.65	1.513s
BI-212	2907.58	727.17	29.	5.	0.003	152.65	1.516s
pm-146	2941.78	735.72	14.	4.	0.002	204.63	1.524s
pm-146	2987.55	747.16	5.	2.	0.001	207.02	1.535s
ZR-95	3025.83	756.73	23.	-4.	-0.002	241.30	1.543s
AG-110M	3054.69	763.94	29.	-6.	-0.003	130.24	1.550s
NB-95	3062.08	765.79	42.	-4.	-0.002	244.95	1.552s
PA-234M	3064.57	766.41	54.	-1.	-0.001	786.61	1.552s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
EU-152	3114.61	778.92	14.	-1.	-0.001	800.00	1.564s
BI-212	3140.62	785.42	14.	9.	0.005	90.03	1.570s
CS-134	3182.42	795.87	0.	7.	0.004	38.56	1.579s
TL-210	3197.35	799.60	7.	13.	0.007	38.50	1.583s
CS-134	3206.76	801.95	20.	0.	0.000	1000.00	1.585s
CO-58	3242.06	810.78	24.	6.	0.003	134.23	1.593s
La-140	3262.05	815.77	30.	0.	0.000	1000.00	1.598s
Cs-136	3272.97	818.50	35.	0.	0.000	1000.00	1.600s
MN-54	3338.38	834.85	19.	-4.	-0.002	255.36	1.615s
Co-56	3386.08	846.77	10.	5.	0.003	146.06	1.626s
TL-208	3441.27	860.56	30.	-5.	-0.003	244.95	1.638s
NB-94	3483.41	871.10	30.	-12.	-0.007	70.71	1.648s
EU-154	3491.95	873.23	32.	10.	0.006	85.93	1.650s
PA-234	3521.16	880.53	52.	-13.	-0.007	84.28	1.657s
PA-234	3532.00	883.24	65.	-6.	-0.003	207.87	1.659s
AG-110M	3537.78	884.68	64.	2.	0.001	684.98	1.660s
Sc-46	3556.17	889.28	93.	-15.	-0.009	92.49	1.664s
y-88	3591.22	898.04	25.	-3.	-0.002	370.93	1.672s
AC-228	3643.36	911.07	15.	10.	0.006	89.61	1.684
AG-110M	3749.09	937.49	25.	-13.	-0.007	88.99	1.708s
PA-234	3783.21	946.02	5.	6.	0.003	92.00	1.716s
EU-152	3855.60	964.11	24.	10.	0.006	73.27	1.732s
AC-228	3875.05	968.97	51.	-11.	-0.006	94.68	1.736s
EU-154	3984.54	996.33	10.	6.	0.003	83.99	1.761s
PA-234M	4003.22	1001.00	16.	5.	0.003	129.68	1.765s
EU-154	4018.33	1004.77	21.	1.	0.000	987.42	1.768s
Co-56	4150.66	1037.84	32.	-13.	-0.007	102.72	1.798s
Cs-136	4191.60	1048.07	13.	9.	0.005	65.82	1.807s
RH-106	4200.76	1050.36	16.	6.	0.003	97.64	1.809s
BI-207	4253.99	1063.66	32.	-15.	-0.008	89.53	1.820s
Ga-68	4308.98	1077.40	16.	-5.	-0.003	187.26	1.833s
FE-59	4396.44	1099.25	5.	3.	0.001	206.16	1.852s
EU-152	4447.76	1112.07	108.	-17.	-0.010	89.06	1.863s
ZN-65	4461.66	1115.55	91.	-17.	-0.010	82.12	1.866s
BI-214	4480.63	1120.29	111.	7.	0.004	207.23	1.870s
Sc-46	4481.68	1120.55	106.	-2.	-0.001	508.44	1.870s
Ta-182	4484.69	1121.30	119.	-11.	-0.006	143.45	1.871s
CO-60	4692.57	1173.24	5.	15.	0.008	44.30	1.916s
Ta-182	4755.86	1189.05	11.	4.	0.002	177.92	1.930s
Ta-182	4885.39	1221.41	17.	0.	0.000	1000.00	1.957s
Co-56	4952.92	1238.28	17.	3.	0.002	327.45	1.972s
NA-22	5098.03	1274.53	6.	2.	0.001	158.44	2.003s
EU-154	5098.09	1274.54	8.	0.	0.000	1000.00	2.003s
FE-59	5166.35	1291.60	6.	5.	0.003	113.28	2.017
TL-210	5252.04	1313.00	23.	-11.	-0.006	109.06	2.036s
CO-60	5330.11	1332.50	6.	1.	0.001	427.57	2.052s
AG-110M	5537.48	1384.30	0.	0.	0.000	1000.00	2.096s
EU-152	5632.39	1408.00	0.	8.	0.004	35.36	2.115s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
K-40	5843.92	1460.83	6.	223.	0.124	7.20	2.159s
La-140	6386.02	1596.21	18.	-11.	-0.006	97.91	2.269s
SB-124	6765.58	1690.98	0.	0.	0.000	1000.00	2.345s
Co-56	7087.48	1771.35	0.	0.	0.000	1000.00	2.408s
y-88	7346.69	1836.06	7.	-1.	0.000	994.99	2.459s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
BE-7	C	-3.8170E+00				5.31E+01	
			477.60	-3.817E+00 ?(		1.373E+01 1.06E+02	1.05E+01 G
NA-22	C	1.6390E-01				9.50E+02	
			1274.53	1.639E-01 ?(		9.696E-01 1.58E+02	9.99E+01 G
K-40	N	1.6325E+02				4.66E+11	
			1460.83	1.633E+02 ?(		1.034E+01 7.20E+00	1.07E+01 G
Sc-46	F	-8.2411E-01				8.38E+01	
			889.28	-8.241E-01 ?(		2.560E+00 9.25E+01	1.00E+02 G
			1120.55	-1.521E-01 + P		3.235E+00 5.08E+02	1.00E+02 G
CR-51	F	2.4247E+00				2.77E+01	
			320.08	2.425E+00 ?(		1.506E+01 1.83E+02	9.94E+00 G
MN-54	C	-1.8851E-01				3.12E+02	
			834.85	-1.885E-01 ?(		1.174E+00 2.55E+02	1.00E+02 G
FE-59	F	5.4737E-01				4.45E+01	
			1099.25	2.964E-01 ?(		1.498E+00 2.06E+02	5.65E+01 G
			1291.60	8.756E-01 ?(		2.266E+00 1.13E+02	4.32E+01 G
Co-56	C	2.8051E-01				7.73E+01	
			846.77	2.598E-01 ?(		9.066E-01 1.46E+02	9.99E+01 G
			1238.28	3.118E-01 ?(		2.279E+00 3.27E+02	6.61E+01 G
			1037.84	-5.539E+00 +		1.239E+01 1.03E+02	1.41E+01 G
			1771.35	0.000E+00 -		4.369E+00 1.00E+03	1.55E+01 A
CO-58	C	2.7831E-01				7.09E+01	
			810.78	2.783E-01 ?(		1.304E+00 1.34E+02	9.95E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CO-60	F	5.3224E-01					1.93E+03	
			1332.50	9.689E-02	?(	1.003E+00	4.28E+02	1.00E+02 G
			1173.24	9.679E-01	?(	8.891E-01	4.43E+01	9.99E+01 G
ZN-65	F	-2.1549E+00					2.44E+02	
			1115.55	-2.155E+00	?(	5.914E+00	8.21E+01	5.06E+01 G
NB-94	I	4.6352E-02					7.41E+06	
			702.63	4.635E-02	%(	1.269E+00	1.13E+03	9.79E+01 G
			871.10	-6.367E-01	+	1.498E+00	7.07E+01	9.99E+01 G
ZR-95	I	3.7069E-02					6.40E+01	
			756.73	-3.810E-01	?(	2.217E+00	2.41E+02	5.45E+01 G
			724.20	5.528E-01	?(	2.644E+00	1.37E+02	4.42E+01 G
NB-95	I	-1.8552E-01					6.40E+01	
			765.79	-1.855E-01	?(	1.596E+00	2.45E+02	9.98E+01 G
RU-103	I	-5.0285E-01					3.93E+01	
			497.05	-5.028E-01	?(	1.186E+00	9.45E+01	9.09E+01 G
			610.30	0.000E+00	+	4.658E+01	1.00E+03	5.75E+00 GA
RH-106	I	3.8673E+00					3.74E+02	
			621.92	6.272E-01	%(	2.724E+01	1.27E+03	9.93E+00 G
			1050.36	2.449E+01	?(	8.248E+01	9.76E+01	1.56E+00 G
			511.86	1.354E+01	?	4.812E+00	2.09E+01	2.00E+01 GA
AG-108M	C	2.2181E-01					1.53E+05	
			433.94	1.753E-01	?(	9.597E-01	2.12E+02	9.05E+01 G
			722.94	2.681E-01	?(	9.850E-01	1.05E+02	9.08E+01 G
			614.28	0.000E+00	-	2.995E+00	1.00E+03	8.98E+01 G
AG-110M	F	1.2291E-01					2.50E+02	
			884.68	1.229E-01	?(	2.956E+00	6.85E+02	7.27E+01 G
			657.76	-6.522E-01	+	1.736E+00	7.96E+01	9.46E+01 G
			937.49	-2.115E+00	+	4.231E+00	8.90E+01	3.44E+01 G
			1384.30	0.000E+00	-	2.271E+00	1.00E+03	2.43E+01 G
			763.94	-1.334E+00	+	6.032E+00	1.30E+02	2.23E+01 G
SN-113	F	-1.6544E-01					1.15E+02	
			391.69	-1.654E-01	*(	2.101E+00	3.66E+02	6.40E+01 G
SB-124	F	5.4127E-01					6.02E+01	
			602.73	3.479E-01	?(	2.590E+00	2.19E+02	9.83E+01 G
			1690.98	0.000E+00	-	1.359E+00	1.00E+03	4.78E+01 G
			722.79	2.299E+00	?(	6.568E+00	8.34E+01	1.08E+01 G

Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
SB-125	I	5.5238E-01						1.01E+03	
			427.88	-1.061E+00	?(	3.083E+00	1.15E+02	2.96E+01	G
			600.50	1.906E+00	?(	1.386E+01	2.14E+02	1.79E+01	G
			635.89	-5.248E+00	+	1.219E+01	6.99E+01	1.13E+01	G
			463.37	2.803E+00	(	8.902E+00	9.33E+01	1.05E+01	G
I-131	I	1.3307E-01						8.02E+00	
			364.48	-2.379E-01	(	1.042E+00	1.72E+02	8.17E+01	G
			284.30	2.496E-01	&	1.047E+01	1.52E+03	6.14E+00	G
			636.97	4.360E+00	&(	1.778E+01	1.18E+02	7.17E+00	G
Gd-153	F	-2.8495E-01						2.42E+02	
			97.50	-2.849E-01	?(	3.787E+00	3.91E+02	3.00E+01	G
			103.20	0.000E+00	+	5.220E+00	1.00E+03	2.18E+01	G
Ga-68	C	-1.0929E+01						4.71E-02	
			1077.40	-1.093E+01	?(	4.667E+01	1.87E+02	3.30E+00	G
BA-133	F	-5.2006E-01						3.85E+03	
			356.00	-5.201E-01	?(	2.741E+00	1.56E+02	6.20E+01	G
			302.85	0.000E+00	+	1.018E+01	1.00E+03	1.83E+01	G
			383.84	3.270E+00	&	1.225E+01	1.10E+02	8.94E+00	GA
			80.99	-9.282E-01	+	2.691E+00	1.08E+02	3.41E+01	GA
CS-134	I	3.6962E-01						7.54E+02	
			604.71	2.775E-01	?(	2.676E+00	2.83E+02	9.76E+01	G
			795.87	3.905E-01	?(	4.279E-01	3.86E+01	8.55E+01	G
			569.32	-4.216E-01	+	6.172E+00	4.02E+02	1.54E+01	G
			801.95	0.000E+00	-	1.359E+01	1.00E+03	8.69E+00	G
			563.24	1.233E+00	?(	1.022E+01	3.25E+02	8.35E+00	G
CS-137	I	-8.1543E-01						1.10E+04	
			661.66	-8.154E-01	?(	2.319E+00	8.49E+01	8.52E+01	G
CE-139	F	-1.6308E-01						1.38E+02	
			165.85	-1.631E-01	?(	1.325E+00	2.39E+02	7.99E+01	G
Ba-140	I	4.5838E-01						1.28E+01	
			537.26	4.584E-01	&(	4.045E+00	3.52E+02	2.44E+01	G
			162.66	-4.550E+00	+	1.655E+01	1.08E+02	6.22E+00	G
			304.85	0.000E+00	-	4.372E+01	1.00E+03	4.29E+00	G
La-140	I	-9.6823E-01						1.28E+01	
			1596.21	-9.682E-01	?(	1.979E+00	9.79E+01	9.54E+01	G
			487.02	6.716E-01	+	3.708E+00	1.62E+02	4.55E+01	G
			328.76	9.970E-01	+	3.228E+00	9.48E+01	2.03E+01	G
			815.77	0.000E+00	+	6.131E+00	1.00E+03	2.33E+01	G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CE-141	I	2.1959E-01					3.25E+01	
			145.44	2.196E-01	&(	2.718E+00	3.66E+02	4.82E+01 G
CE-144	I	-1.7745E+00					2.85E+02	
			133.54	-1.775E+00	&(	1.218E+01	2.04E+02	1.11E+01 G
PM-144	C	-1.5183E-02					3.63E+02	
			696.54	-1.518E-02	%(	1.149E+00	3.08E+03	9.90E+01 G
			618.06	0.000E+00	+	2.728E+00	1.00E+03	9.91E+01 G
EU-152	F	1.5542E+00					4.94E+03	
			344.29	0.000E+00	&(	5.218E+00	1.00E+03	2.65E+01 G
			1112.07	-7.960E+00	+	2.374E+01	8.91E+01	1.36E+01 G
			121.78	-2.087E-01	+	2.633E+00	3.66E+02	2.86E+01 G
			778.92	-3.778E-01	&	7.612E+00	8.00E+02	1.29E+01 G
			964.11	4.075E+00	?(	9.976E+00	7.33E+01	1.46E+01 G
			244.69	2.130E+00	?(	1.971E+01	2.73E+02	7.58E+00 G
			1408.00	2.889E+00	?	2.662E+00	3.54E+01	2.10E+01 GA
EU-154	I	3.8721E+00					3.14E+03	
			873.23	4.301E+00	?(	1.249E+01	8.59E+01	1.23E+01 G
			123.10	-6.142E-01	-	1.940E+00	9.42E+01	4.08E+01 G
			1274.54	0.000E+00	-	3.170E+00	1.00E+03	3.52E+01 G
			723.36	1.205E+00	-	5.147E+00	1.22E+02	2.02E+01 G
			1004.77	2.176E-01	&	7.911E+00	9.87E+02	1.80E+01 G
			996.33	3.376E+00	?(	9.684E+00	8.40E+01	1.06E+01 G
HF-181	F	-2.0227E-01					4.24E+01	
			482.00	-5.715E-01	&(	2.031E+00	1.05E+02	8.05E+01 G
			133.02	-1.183E-01	+	3.117E+00	7.77E+02	4.33E+01 G
			345.83	1.770E+00	?(	8.768E+00	1.46E+02	1.51E+01 G
			136.30	0.000E+00	+	2.363E+01	1.00E+03	5.85E+00 G
Ta-182	F	-8.0731E-01					1.14E+02	
			1121.30	-2.009E+00	&(	9.779E+00	1.43E+02	3.49E+01 G
			1221.41	0.000E+00	&	5.518E+00	1.00E+03	2.70E+01 G
			1189.05	1.781E+00	?(	7.371E+00	1.78E+02	1.62E+01 G
Hg-203	F	-1.4756E-01					4.66E+01	
			279.20	-1.476E-01	?(	1.091E+00	2.13E+02	8.15E+01 G
TL-208	N	1.5161E+00					6.98E+02	
			583.02	1.328E+00	?(	1.143E+00	3.84E+01	8.45E+01 G
			277.28	4.041E+00	(	1.252E+01	9.17E+01	6.31E+00 G
			860.56	-2.115E+00	-	1.194E+01	2.45E+02	1.24E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
pm-146	C	4.0770E-01					2.02E+03	
			747.16	3.256E-01	?(	1.783E+00	2.07E+02	3.40E+01 G
			735.72	8.341E-01	?(	4.201E+00	2.05E+02	2.25E+01 G
			453.88	3.031E-01	?(	1.078E+00	1.37E+02	6.50E+01 G
y-88	F	-1.7348E-01					1.07E+02	
			898.04	-1.735E-01	?(	1.504E+00	3.71E+02	9.37E+01 G
			1836.06	-6.365E-02	+	1.407E+00	9.95E+02	9.92E+01 G
Cd-113m		1.0875E+03					5.33E+03	
			263.70	1.088E+03	?(	1.407E+04	3.70E+02	6.00E-03 K
Cf-251	T	-9.2356E-01					3.28E+05	
			176.60	-9.236E-01	?(	4.217E+00	1.75E+02	1.70E+01 G
			227.00	5.178E-01	?	1.121E+01	8.08E+02	6.30E+00 GA
Cf-249	T	3.9831E-01					1.28E+05	
			387.95	4.482E-01	?(	1.804E+00	1.18E+02	6.60E+01 G
			333.44	1.861E-01	?(	6.331E+00	9.63E+02	1.55E+01 G
Sn-126		8.2312E-01					3.65E+07	
			87.57	0.000E+00	&	3.418E+00	1.00E+03	3.75E+01 GA
			64.28	8.231E-01	&(	1.481E+01	5.29E+02	9.70E+00 G
			86.94	0.000E+00	-	1.421E+01	1.00E+03	9.04E+00 GA
PB-210	N	1.1309E+01					8.14E+03	
			46.54	1.131E+01	(P	2.966E+01	8.63E+01	4.25E+00 G
PB-212	N	4.7418E+00					6.98E+02	
			238.63	4.742E+00	(P	1.230E+00	1.23E+01	4.33E+01 G
			300.03	-9.307E+00	-	5.966E+01	1.90E+02	3.28E+00 GA
PB-214	N	6.6156E+00					5.84E+05	
			351.93	5.942E+00	@(P	2.296E+00	1.88E+01	3.76E+01 G
			295.09	7.928E+00	(P	3.026E+00	1.86E+01	1.93E+01 G
			242.00	2.331E+00	&	2.043E+01	2.59E+02	7.43E+00 GA
BI-207	C	1.5929E-01					1.18E+04	
			569.70	1.593E-01	?(	8.502E-01	1.50E+02	9.77E+01 G
			1063.66	-1.234E+00	+	2.392E+00	8.95E+01	7.45E+01 G
BI-212	N	3.1990E+00					6.98E+02	
			727.17	3.199E+00	?(	1.708E+01	1.53E+02	7.55E+00 G
			785.42	3.633E+01	?	7.742E+01	9.00E+01	1.28E+00 GA

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Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
U-235	N	1.5994E+00					2.57E+11	
			143.79	1.599E+00	?(P	1.221E+01	2.27E+02	1.10E+01 G
			205.33	4.880E-01	%	1.523E+01	1.17E+03	5.01E+00 G
			163.38	-5.587E+00	&	2.127E+01	1.13E+02	5.08E+00 G
			185.72	1.202E+00	@ P	1.311E+00	4.23E+01	5.40E+01 GA
BI-214	N	8.0602E+00					5.84E+05	
			609.31	8.060E+00	(P	1.903E+00	1.31E+01	4.61E+01 G
			1120.29	3.087E+00	-	2.188E+01	2.07E+02	1.51E+01 G
			1764.49	-1.979E-01	%	1.409E+01	1.92E+03	1.54E+01 G
AC-228	N	1.9153E+00					2.10E+03	
			911.07	1.915E+00	?(	3.919E+00	8.96E+01	2.90E+01 G
			968.97	-3.695E+00	+	1.183E+01	9.47E+01	1.75E+01 G
			338.32	4.368E-01	-	1.126E+01	7.45E+02	1.20E+01 G
			93.35	-7.511E-01	-	1.693E+01	6.57E+02	5.56E+00 XA
TH-227	N	4.4650E+00					7.95E+03	
			50.14	2.691E+00	?(	1.961E+01	2.14E+02	8.00E+00 G
			256.24	6.492E+00	&(	8.009E+00	4.94E+01	7.00E+00 G
TH-229	N	4.0435E+00					2.68E+06	
			193.51	2.412E+00	?(	1.631E+01	2.57E+02	4.40E+00 G
			210.85	6.444E+00	?(	2.175E+01	1.29E+02	2.99E+00 G
TH-234	N	7.0327E+00					1.63E+12	
			63.29	1.079E+01	(P	2.380E+01	8.27E+01	3.81E+00 G
			92.59	4.472E+00	(P	1.304E+01	8.79E+01	5.58E+00 G
PA-234	N	5.7532E-01					1.63E+12	
			131.29	-1.392E+00	(	5.680E+00	1.21E+02	1.80E+01 G
			946.02	2.506E+00	?(	5.513E+00	9.20E+01	1.34E+01 G
			569.47	1.740E+00	?(	1.109E+01	1.79E+02	8.20E+00 G
			883.24	-3.133E+00	+	2.252E+01	2.08E+02	9.60E+00 G
			880.53	-1.147E+01	+	3.247E+01	8.43E+01	6.00E+00 GA
PA-234M	N	3.2986E+01					1.63E+12	
			1001.00	3.299E+01	&(	1.507E+02	1.30E+02	8.37E-01 G
			766.41	-2.192E+01	&	6.091E+02	7.87E+02	2.94E-01 G
AM-241	T	-2.3804E-01					1.58E+05	
			59.54	-2.380E-01	?(	4.533E+00	5.61E+02	3.59E+01 G
Np-237	F	-2.1211E+00					2.14E+06	
			86.49	-2.121E+00	?(	1.016E+01	1.43E+02	1.31E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Ir-192	F 1.8520E-01					7.40E+01	
		316.49	0.000E+00	(	2.217E+00	1.00E+03	8.70E+01 G
		468.06	4.967E-01	?(	1.842E+00	1.08E+02	5.18E+01 G
		308.44	0.000E+00	-	5.960E+00	1.00E+03	3.18E+01 G
Cs-136	F 2.9938E-01					1.30E+01	
		818.50	0.000E+00	?(	1.534E+00	1.00E+03	1.00E+02 G
		1048.07	6.736E-01	?(	1.462E+00	6.58E+01	8.00E+01 G
		340.57	0.000E+00	-	2.924E+00	1.00E+03	4.69E+01 G
Np-239	T 9.5321E-01					2.36E+00	
		103.70	0.000E+00	-	4.739E+00	1.00E+03	2.40E+01 X
		106.13	9.532E-01	?(	4.446E+00	1.38E+02	2.27E+01 G
		99.50	0.000E+00	-	7.629E+00	1.00E+03	1.50E+01 X
Nd-147	-1.7050E+00					1.11E+01	
		531.00	-1.705E+00	?(	7.522E+00	1.78E+02	1.30E+01 G
		91.10	2.711E-02	%	4.431E+00	4.80E+03	2.83E+01 G
TL-210	N 6.7875E-01					5.84E+05	
		799.60	6.787E-01	&(	7.449E-01	3.85E+01	9.90E+01 G
		296.00	-3.811E-01	-	2.504E+00	1.95E+02	7.90E+01 G
		1313.00	-3.648E+00	-	8.515E+00	1.09E+02	2.10E+01 GA

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went
    negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide
    failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the
    library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity
    to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape

P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
TH-227	50.14	162.	9.	0.005	214.20	2.691E+00	
AM-241	59.54	293.	-4.	-0.002	561.01	-2.380E-01	
Sn-126	64.28	261.	4.	0.002	529.09	8.231E-01	
BA-133	80.99	137.	-20.	-0.011	107.85	-9.282E-01	
Np-237	86.49	314.	-18.	-0.010	142.79	-2.121E+00	
EU-155	86.54	296.	-3.	-0.002	730.30	-1.699E-01	
Gd-153	97.50	243.	-6.	-0.003	391.03	-2.849E-01	
Np-239	106.13	195.	15.	0.008	138.39	9.532E-01	
EU-152	121.78	105.	-4.	-0.002	365.72	-2.087E-01	
EU-154	123.10	116.	-17.	-0.009	94.20	-6.142E-01	
PA-234	131.29	195.	-17.	-0.009	121.38	-1.392E+00	
HF-181	133.02	345.	-3.	-0.002	776.85	-1.183E-01	
CE-144	133.54	345.	-13.	-0.007	203.95	-1.775E+00	
U-235	143.79	325.	11.	0.006	226.65	1.599E+00	P
CE-141	145.44	308.	7.	0.004	365.63	2.196E-01	
Ba-140	162.66	171.	-17.	-0.010	108.35	-4.550E+00	
U-235	163.38	188.	-18.	-0.010	113.41	-5.587E+00	
CE-139	165.85	178.	-8.	-0.004	238.88	-1.631E-01	
U-235	185.72	67.	38.	0.021	42.31	1.202E+00	P
TH-229	193.51	66.	6.	0.003	256.58	2.412E+00	
TH-229	210.85	48.	10.	0.006	128.81	6.444E+00	
EU-152	244.69	224.	8.	0.004	272.66	2.130E+00	
TH-227	256.24	26.	21.	0.012	49.42	6.492E+00	
Cd-113m	263.70	60.	3.	0.002	369.68	1.088E+03	
Hg-203	279.20	61.	-5.	-0.003	213.41	-1.476E-01	
TL-210	296.00	300.	-13.	-0.007	194.91	-3.811E-01	
PA-231	300.07	275.	-13.	-0.007	185.99	-1.241E+01	
PA-233	300.18	262.	-5.	-0.003	449.09	-1.979E+00	
CR-51	320.08	149.	10.	0.005	182.85	2.425E+00	
La-140	328.76	24.	8.	0.004	94.78	9.970E-01	
Cf-249	333.44	57.	1.	0.001	963.22	1.861E-01	
HF-181	345.83	101.	10.	0.006	145.60	1.770E+00	
BA-133	356.00	164.	-12.	-0.007	155.71	-5.201E-01	
I-131	364.48	36.	-7.	-0.004	172.02	-2.379E-01	
BA-133	383.84	57.	10.	0.006	110.09	3.270E+00	
Cf-249	387.95	67.	10.	0.006	118.33	4.482E-01	
SN-113	391.69	86.	-4.	-0.002	366.42	-1.654E-01	
SB-125	427.88	32.	-10.	-0.006	115.18	-1.061E+00	
AG-108M	433.94	28.	5.	0.003	211.97	1.753E-01	
pm-146	453.88	16.	6.	0.003	136.76	3.031E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
SB-125	463.37	29.	9.	0.005	93.33	2.803E+00	
Ir-192	468.06	30.	8.	0.004	108.00	4.967E-01	
BE-7	477.60	72.	-12.	-0.007	106.28	-3.817E+00	
HF-181	482.00	93.	-13.	-0.007	105.34	-5.715E-01	
La-140	487.02	97.	9.	0.005	161.77	6.716E-01	
RU-103	497.05	36.	-13.	-0.007	94.52	-5.028E-01	
RH-106	511.86	27.	75.	0.042	20.93	1.354E+01	
Nd-147	531.00	26.	-6.	-0.003	178.21	-1.705E+00	
Ba-140	537.26	26.	3.	0.002	351.72	4.584E-01	
CS-134	563.24	17.	3.	0.001	324.52	1.233E+00	
CS-134	569.32	22.	-2.	-0.001	402.49	-4.216E-01	
PA-234	569.47	20.	4.	0.002	178.84	1.740E+00	
BI-207	569.70	16.	4.	0.002	150.00	1.593E-01	
SB-125	600.50	158.	8.	0.005	213.76	1.906E+00	
SB-124	602.73	166.	8.	0.005	218.92	3.479E-01	
CS-134	604.71	174.	7.	0.004	282.99	2.775E-01	
SB-125	635.89	41.	-14.	-0.008	69.92	-5.248E+00	
I-131	636.97	35.	7.	0.004	118.49	4.360E+00	
AG-110M	657.76	57.	-14.	-0.008	79.57	-6.522E-01	
CS-137	661.66	84.	-16.	-0.009	84.93	-8.154E-01	
SB-124	722.79	7.	5.	0.003	83.43	2.299E+00	
AG-108M	722.94	13.	5.	0.003	105.31	2.681E-01	
EU-154	723.36	18.	5.	0.003	122.03	1.205E+00	
ZR-95	724.20	23.	5.	0.003	136.65	5.528E-01	
BI-212	727.17	29.	5.	0.003	152.65	3.199E+00	
pm-146	735.72	14.	4.	0.002	204.63	8.341E-01	
pm-146	747.16	5.	2.	0.001	207.02	3.256E-01	
ZR-95	756.73	23.	-4.	-0.002	241.30	-3.810E-01	
AG-110M	763.94	29.	-6.	-0.003	130.24	-1.334E+00	
NB-95	765.79	42.	-4.	-0.002	244.95	-1.855E-01	
PA-234M	766.41	54.	-1.	-0.001	786.61	-2.192E+01	
EU-152	778.92	14.	-1.	-0.001	800.00	-3.778E-01	
BI-212	785.42	14.	9.	0.005	90.03	3.633E+01	
CS-134	795.87	0.	7.	0.004	38.56	3.905E-01	
TL-210	799.60	7.	13.	0.007	38.50	6.787E-01	
CO-58	810.78	24.	6.	0.003	134.23	2.783E-01	
MN-54	834.85	19.	-4.	-0.002	255.36	-1.885E-01	
Co-56	846.77	10.	5.	0.003	146.06	2.598E-01	
NB-94	871.10	30.	-12.	-0.007	70.71	-6.367E-01	
EU-154	873.23	32.	10.	0.006	85.93	4.301E+00	
PA-234	880.53	52.	-13.	-0.007	84.28	-1.147E+01	
PA-234	883.24	65.	-6.	-0.003	207.87	-3.133E+00	
AG-110M	884.68	64.	2.	0.001	684.98	1.229E-01	
Sc-46	889.28	93.	-15.	-0.009	92.49	-8.241E-01	
y-88	898.04	25.	-3.	-0.002	370.93	-1.735E-01	
AG-110M	937.49	25.	-13.	-0.007	88.99	-2.115E+00	
PA-234	946.02	5.	6.	0.003	92.00	2.506E+00	
EU-152	964.11	24.	10.	0.006	73.27	4.075E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
EU-154	996.33	10.	6.	0.003	83.99	3.376E+00		
PA-234M	1001.00	16.	5.	0.003	129.68	3.299E+01		
EU-154	1004.77	21.	1.	0.000	987.42	2.176E-01		
Co-56	1037.84	32.	-13.	-0.007	102.72	-5.539E+00		
Cs-136	1048.07	13.	9.	0.005	65.82	6.736E-01		
RH-106	1050.36	16.	6.	0.003	97.64	2.449E+01		
BI-207	1063.66	32.	-15.	-0.008	89.53	-1.234E+00		
Ga-68	1077.40	16.	-5.	-0.003	187.26	-1.093E+01		
FE-59	1099.25	5.	3.	0.001	206.16	2.964E-01		
EU-152	1112.07	108.	-17.	-0.010	89.06	-7.960E+00		
ZN-65	1115.55	91.	-17.	-0.010	82.12	-2.155E+00		
Sc-46	1120.55	106.	-2.	-0.001	508.44	-1.521E-01	P	
Ta-182	1121.30	119.	-11.	-0.006	143.45	-2.009E+00		
CO-60	1173.24	5.	15.	0.008	44.30	9.679E-01		
Ta-182	1189.05	11.	4.	0.002	177.92	1.781E+00		
Co-56	1238.28	17.	3.	0.002	327.45	3.118E-01		
NA-22	1274.53	6.	2.	0.001	158.44	1.639E-01		
FE-59	1291.60	6.	5.	0.003	113.28	8.756E-01		
TL-210	1313.00	23.	-11.	-0.006	109.06	-3.648E+00		
CO-60	1332.50	6.	1.	0.001	427.57	9.689E-02		
EU-152	1408.00	0.	8.	0.004	35.36	2.889E+00		
La-140	1596.21	18.	-11.	-0.006	97.91	-9.682E-01		
y-88	1836.06	7.	-1.	0.000	994.99	-6.365E-02		

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty (1 Sigma) Counting	MDA Bq/Sample
BE-7	#A	-3.8170E+00	-3.8170E+00	1.063E+02%	1.37E+01
NA-22	#A	1.6390E-01	1.6390E-01	1.584E+02%	9.70E-01
K-40	#	1.6325E+02	1.6325E+02	7.203E+00%	1.03E+01
Sc-46	#A	-8.2411E-01	-8.2411E-01	9.249E+01%	2.56E+00
CR-51	#A	2.4247E+00	2.4247E+00	1.829E+02%	1.51E+01
MN-54	#A	-1.8851E-01	-1.8851E-01	2.554E+02%	1.17E+00
FE-59	#A	5.4737E-01	5.4737E-01	1.133E+02%	1.50E+00
Co-56	#A	2.8051E-01	2.8051E-01	1.461E+02%	9.07E-01
CO-57	#A	0.0000E+00	0.0000E+00	7.071E+02%	8.95E-01
CO-58	#A	2.7831E-01	2.7831E-01	1.342E+02%	1.30E+00
CO-60	#A	5.3224E-01	5.3224E-01	4.430E+01%	1.00E+00
ZN-65	#A	-2.1549E+00	-2.1549E+00	8.212E+01%	5.91E+00
NB-94	#A	4.6352E-02	4.6352E-02	1.127E+03%	1.27E+00
ZR-95	#A	3.7069E-02	3.7069E-02	1.366E+02%	2.22E+00
NB-95	#A	-1.8552E-01	-1.8552E-01	2.449E+02%	1.60E+00
RU-103	#A	-5.0285E-01	-5.0285E-01	9.452E+01%	1.19E+00
RH-106	#A	3.8673E+00	3.8673E+00	9.764E+01%	2.72E+01

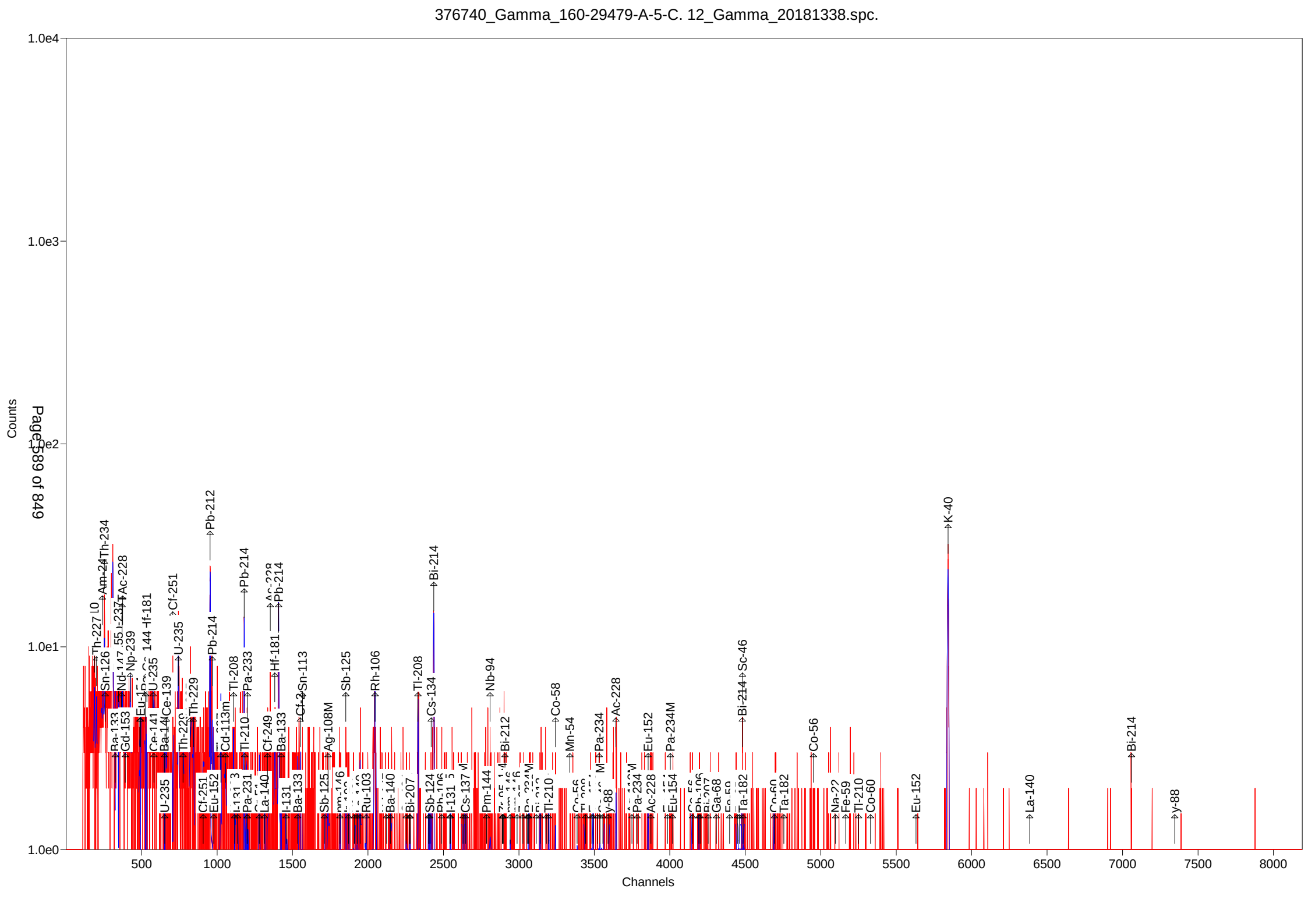
AG-108M#A	2.2181E-01	2.2181E-01	1.053E+02%	9.60E-01
AG-110M#A	1.2291E-01	1.2291E-01	6.850E+02%	2.96E+00
SN-113 #A	-1.6544E-01	-1.6544E-01	3.664E+02%	2.10E+00
SB-124 #A	5.4127E-01	5.4127E-01	8.343E+01%	2.59E+00
SB-125 #A	5.5238E-01	5.5238E-01	8.671E+01%	3.08E+00
I-131 #A	1.3307E-01	1.3307E-01	1.044E+02%	1.04E+00
Gd-153 #A	-2.8495E-01	-2.8495E-01	3.910E+02%	3.79E+00
Ga-68 #A	-1.0888E+01	-1.0929E+01	1.873E+02%	4.67E+01
Tc-99m #A	0.0000E+00	0.0000E+00	1.000E+03%	1.61E+00
BA-133 #A	-5.2006E-01	-5.2006E-01	1.557E+02%	2.74E+00
CS-134 #A	3.6962E-01	3.6962E-01	3.856E+01%	2.68E+00
CS-137 #A	-8.1543E-01	-8.1543E-01	8.493E+01%	2.32E+00
CE-139 #A	-1.6308E-01	-1.6308E-01	2.389E+02%	1.32E+00
Ba-140 #A	4.5837E-01	4.5838E-01	3.517E+02%	4.04E+00
La-140 #A	-9.6822E-01	-9.6823E-01	9.791E+01%	1.98E+00
CE-141 #A	2.1959E-01	2.1959E-01	3.656E+02%	2.72E+00
CE-144 #A	-1.7745E+00	-1.7745E+00	2.040E+02%	1.22E+01
PM-144 #A	-1.5183E-02	-1.5183E-02	3.079E+03%	1.15E+00
EU-152 #A	1.5542E+00	1.5542E+00	7.327E+01%	5.22E+00
EU-154 #A	3.8721E+00	3.8721E+00	6.008E+01%	1.25E+01
EU-155 #A	0.0000E+00	0.0000E+00	1.000E+03%	5.36E+00
HF-181 #A	-2.0227E-01	-2.0227E-01	8.985E+01%	2.03E+00
Ta-182 #A	-8.0731E-01	-8.0731E-01	1.143E+02%	9.78E+00
Hg-203 #A	-1.4756E-01	-1.4756E-01	2.134E+02%	1.09E+00
TL-208	1.5161E+00	1.5161E+00	3.844E+01%	1.14E+00
pm-146 #A	4.0770E-01	4.0770E-01	1.072E+02%	1.78E+00
y-88 #A	-1.7348E-01	-1.7348E-01	3.709E+02%	1.50E+00
Cd-113m#A	1.0875E+03	1.0875E+03	3.697E+02%	1.41E+04
Cd-109 #A	0.0000E+00	0.0000E+00	1.000E+03%	3.38E+01
Cf-251 #A	-9.2356E-01	-9.2356E-01	1.747E+02%	4.22E+00
Cf-249 #A	3.9831E-01	3.9831E-01	1.183E+02%	1.80E+00
Sn-126 #A	8.2312E-01	8.2312E-01	5.291E+02%	1.48E+01
PB-210 A	1.1309E+01	1.1309E+01	8.634E+01%	2.97E+01
PB-212	4.7418E+00	4.7418E+00	1.229E+01%	1.23E+00
PB-214	6.6156E+00	6.6156E+00	1.324E+01%	2.30E+00
BI-207 #A	1.5929E-01	1.5929E-01	1.500E+02%	8.50E-01
BI-212 #A	3.1990E+00	3.1990E+00	1.527E+02%	1.71E+01
U-235 #A	1.5994E+00	1.5994E+00	2.266E+02%	1.22E+01
BI-214 #	8.0602E+00	8.0602E+00	1.313E+01%	1.90E+00
BI-210M#A	0.0000E+00	0.0000E+00	7.071E+02%	1.74E+00
AC-228 #A	1.9153E+00	1.9153E+00	8.961E+01%	3.92E+00
TH-227 #A	4.4650E+00	4.4650E+00	4.942E+01%	1.96E+01
TH-229 #A	4.0435E+00	4.0435E+00	1.288E+02%	1.63E+01
TH-234 A	7.0327E+00	7.0327E+00	6.032E+01%	2.38E+01
PA-231 #A	0.0000E+00	0.0000E+00	1.000E+03%	6.48E+01
PA-233 #A	0.0000E+00	0.0000E+00	1.000E+03%	5.30E+00
PA-234 #A	5.7532E-01	5.7532E-01	7.830E+01%	5.68E+00
PA-234M#A	3.2986E+01	3.2986E+01	1.297E+02%	1.51E+02
AM-241 #A	-2.3804E-01	-2.3804E-01	5.610E+02%	4.53E+00

Np-237 #A	-2.1211E+00	-2.1211E+00	1.428E+02%	1.02E+01
Ir-192 #A	1.8520E-01	1.8520E-01	1.080E+02%	2.22E+00
Cs-136 #A	2.9938E-01	2.9938E-01	6.582E+01%	1.53E+00
Np-239 #A	9.5314E-01	9.5321E-01	1.384E+02%	4.45E+00
Nd-147 #A	-1.7050E+00	-1.7050E+00	1.782E+02%	7.52E+00
TL-210 #A	6.7875E-01	6.7875E-01	3.850E+01%	7.45E-01

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

--- S U M M A R Y ---

Total Activity (25.1 to 1999.1 keV) 1.861E+02 Bq/Sample
Total Decayed Activity (25.1 to 1999.1 keV) 1.8610300E+02 Bq/Sample


376740_Gamma_160-29479-A-5-C. 12_Gamma_20181338.spc.
Counts
Channels
1.0e4
1.0e3
1.0e2
1.0e1
1.0e0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
7500
8000
Th-227
Am-241
Th-234
Sn-126
Ra-223
Nd-147
Np-239
Ac-228
Gd-153
Eu-155
Hf-181
Ce-141
Ba-140
Ce-139
U-235
Th-229
Cf-251
U-235
Pb-212
Eu-152
Pb-214
Cd-113m
Tl-208
Pa-231
Tl-210
Pa-233
La-140
Cf-249
Hf-181
Ac-228
Pb-214
Ba-133
I-131
Ba-133
Cf-249
Sn-113
Sb-125
Ag-108M
Sb-125
Rh-106
Ru-103
Ba-140
Bi-207
Tl-208
Sb-124
Cs-134
Bi-214
Cs-137
Pm-144
Nb-94
Bi-212
Co-58
Mn-54
Pa-234
Ac-228
Eu-152
Pa-234M
Eu-154
Sc-46
Bi-214
Ta-182
Co-56
Na-22
Fe-59
Tl-210
Co-60
Eu-152
K-40
Ta-182
Co-60
La-140
Bi-214
y-88

Test America St. Louis Spectrum ID: 14_Gamma_20182994

Sample Description: 376740_Gamma_160-29479-B-6-B
Detector: Detector #14
Batch ID: 376740
Work Order Number: Gamma
Lot Number: 160-29479-B-6-B

Decay to Time: 8/9/2018 06:36 Live Time: 1800 sec
Acquisition Time: 8/9/2018 06:36:39 Real Time: 1802 sec
Analysis Time: 8/9/2018 07:07 Dead Time: 0.13 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 14_Soil_TunaCan.Clb
Efficiency Cal Desc: 14_TunaCan_90099_042312
Efficiency Cal Date: 4/23/2012 11:29
Energy Cal Date: 2/28/2012 10:48
Library: Client_Long_Rev14.lib
Bkgd Correction File: 14_2018-07-14_1759.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	-2.222E+00	144.7	3.214E+00	3.216E+00	1.107E+01
NA-22	-4.813E-02	703.6	3.386E-01	3.386E-01	1.294E+00
K-40	1.464E+02	7.3	1.073E+01	1.309E+01	8.720E+00
Sc-46	3.010E-01	199.5	6.003E-01	6.005E-01	2.079E+00
CR-51	7.882E-01	371.9	2.931E+00	2.931E+00	1.019E+01
MN-54	-2.893E-01	167.1	4.834E-01	4.836E-01	1.166E+00
FE-59	6.192E-01	100.8	6.241E-01	6.249E-01	1.973E+00
Co-56	6.264E-01	88.7	5.557E-01	5.567E-01	1.187E+00
CO-57	0.000E+00	1.#INF	7.262E-02	7.262E-02	7.635E-01
CO-58	3.007E-01	110.6	3.324E-01	3.328E-01	1.154E+00
CO-60	5.923E-01	24.0	1.423E-01	1.453E-01	1.607E+00
ZN-65	0.000E+00	1.#INF	1.278E-01	1.278E-01	4.065E+00
NB-94	4.295E-02	785.7	3.375E-01	3.375E-01	8.865E-01
ZR-95	-1.146E-02	87.1	9.983E-03	1.000E-02	2.112E+00
NB-95	0.000E+00	1.#INF	6.745E-02	6.745E-02	1.367E+00
RU-103	2.662E-01	101.4	2.701E-01	2.704E-01	6.981E-01
RH-106	4.694E+00	86.0	4.037E+00	4.044E+00	2.140E+01
AG-108M	-4.269E-01	93.9	4.008E-01	4.014E-01	1.085E+00
AG-110M	4.419E-03	28.9	1.276E-03	1.295E-03	2.954E+00
SN-113	-5.499E-01	117.9	6.480E-01	6.487E-01	2.192E+00
SB-124	3.630E-01	215.7	7.829E-01	7.831E-01	2.284E+00
SB-125	8.151E-01	75.2	6.129E-01	6.143E-01	2.514E+00
I-131	2.632E-01	114.3	3.009E-01	3.012E-01	8.579E-01
Gd-153	5.690E-01	118.7	6.753E-01	6.762E-01	2.281E+00
Ga-68	1.336E+01	122.9	1.641E+01	1.643E+01	3.884E+01
Tc-99m	-2.460E-01	124.0	3.051E-01	3.054E-01	1.026E+00
BA-133	3.049E-01	247.0	7.530E-01	7.531E-01	2.295E+00
CS-134	2.847E-01	139.0	3.957E-01	3.960E-01	2.367E+00
CS-137	-5.184E-01	89.0	4.616E-01	4.624E-01	1.561E+00
CE-139	2.551E-01	114.5	2.921E-01	2.931E-01	9.849E-01
Ba-140	6.553E-01	233.3	1.529E+00	1.529E+00	2.768E+00
La-140	1.868E-01	104.9	1.960E-01	1.962E-01	1.258E+00
CE-141	-4.448E-01	127.6	5.675E-01	5.679E-01	1.909E+00

CE-144	1.740E+00	130.4	2.269E+00	2.271E+00	7.645E+00
PM-144	1.781E-01	190.7	3.397E-01	3.398E-01	8.690E-01
EU-152	9.814E-01	147.2	1.444E+00	1.445E+00	3.871E+00
EU-154	2.157E+00	111.4	2.402E+00	2.405E+00	8.418E+00
EU-155	0.000E+00	1.#INF	4.292E-01	4.292E-01	3.614E+00
HF-181	3.971E-01	121.3	4.816E-01	4.820E-01	1.444E+00
Ta-182	1.895E+00	66.0	1.250E+00	1.253E+00	5.200E+00
Hg-203	2.380E-01	100.6	2.394E-01	2.398E-01	8.159E-01
TL-208	1.702E+00	17.8	3.037E-01	3.163E-01	5.099E-01
pm-146	7.219E-01	100.6	7.260E-01	7.270E-01	1.724E+00
y-88	6.807E-02	564.9	3.845E-01	3.846E-01	1.001E+00
Cd-113m	-4.208E+03	101.6	4.275E+03	4.284E+03	1.445E+04
Cd-109	5.261E+00	154.6	8.134E+00	8.139E+00	2.737E+01
Cf-251	-4.131E-01	337.1	1.392E+00	1.393E+00	3.852E+00
Cf-249	7.458E-01	53.9	4.023E-01	4.041E-01	1.560E+00
Sn-126	2.668E+00	128.1	3.416E+00	3.419E+00	1.150E+01
PB-210	8.846E+00	103.2	9.130E+00	9.144E+00	2.678E+01
PB-212	4.618E+00	12.8	5.900E-01	6.613E-01	1.368E+00
PB-214	6.509E+00	12.1	7.905E-01	8.598E-01	1.359E+00
BI-207	2.828E-01	99.8	2.823E-01	2.826E-01	9.926E-01
BI-212	-7.562E-01	498.5	3.769E+00	3.770E+00	1.739E+01
U-235	2.647E+00	42.4	1.121E+00	1.130E+00	2.849E+00
BI-214	5.673E+00	15.5	8.775E-01	9.257E-01	1.618E+00
BI-210M	3.992E-01	106.4	4.248E-01	4.254E-01	1.666E+00
AC-228	7.936E+00	15.4	1.225E+00	1.290E+00	1.393E+00
TH-227	-4.337E+00	99.7	4.325E+00	4.331E+00	1.399E+01
TH-229	2.747E+00	161.0	4.421E+00	4.427E+00	1.227E+01
TH-234	1.313E+01	30.6	4.019E+00	4.077E+00	2.226E+01
PA-231	2.977E+00	291.2	8.671E+00	8.672E+00	4.004E+01
PA-233	3.831E-01	304.1	1.165E+00	1.165E+00	3.529E+00
PA-234	4.610E-01	90.4	4.169E-01	4.175E-01	5.259E+00
PA-234M	2.696E+01	124.4	3.353E+01	3.356E+01	2.474E+02
AM-241	-3.534E-01	252.7	8.932E-01	8.934E-01	2.582E+00
Np-237	-1.996E+00	168.0	3.354E+00	3.355E+00	1.123E+01
Ir-192	-3.045E-01	103.3	3.144E-01	3.149E-01	1.065E+00
Cs-136	1.008E-01	154.0	1.553E-01	1.554E-01	1.322E+00
Np-239	7.500E-01	116.5	8.740E-01	8.751E-01	2.951E+00
Nd-147	4.781E-01	158.2	7.564E-01	7.569E-01	5.826E+00
TL-210	2.057E-01	79.9	1.644E-01	1.648E-01	1.385E+00
Total	2.756E+02				

Analyst: kody Saulters

TestAmerica Inc Spectrum name: 14_Gamma_20182994.An1

Sample description
376740_Gamma_160-29479-B-6-B

Spectrum Filename: C:\User\SPC\Det14\14_Gamma_20182994.An1

Acquisition information
Start time:	8/9/2018 6:36:39 AM
Live time:	1800
Real time:	1802
Dead time:	0.13 %
Detector ID:	14

Detector system
Ge14 SN/11080670

Calibration
Filename: 14_Soil_TunaCan.Clb
14_TunaCan_90099_042312

Energy Calibration
Created:	2/28/2012 10:48:23 AM
Zero offset:	0.130 keV
Gain:	0.250 keV/channel
Quadratic:	-2.050E-08 keV/channel^2

Efficiency Calibration
Created:	4/23/2012 11:29:47 AM
Knee Energy:	165.85 keV
Above the Knee:	Quadratic Uncertainty = 1.02 %
Log(Eff):	2.101260E-01 + (-5.951973E-01*Log(E)) + (-1.605331E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 1.28 %
Log(Eff):	-2.391492E+01 + (8.828985E+00*Log(E)) + (-9.371496E-01*Log(E)^2)

Library Files
Main analysis library:	Client_Long_Rev14.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters
Analysis engine:	Env32 G800W064
Start channel:	100 (25.14keV)
Stop channel:	8000 (1999.51keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: 3
Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	8/9/2018 6:36:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	14_2018-07-14_1759.PBC 7/14/2018 5:59:49 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 15 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1882

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.54	15.	103.21	0.75	2.171E-02	46.54	4.250	PBC<MDA	PB210
63.25	32.	58.35	0.94	3.278E-02	63.29	3.810	PBC<MDA	TH234
64.28	16.	128.06	0.77	3.334E-02	64.28	9.700	PBC<MDA	Sn126
77.20	107.	17.53	0.73	3.899E-02				
80.99	6.	298.38	0.78	4.020E-02	80.99	34.060	PBC<MDA	BA133
88.04	15.	154.59	0.79	4.196E-02	88.04	3.790	PBC<MDA	Cd109
91.10	15.	158.21	0.79	4.255E-02	91.10	28.300	PBC<MDA	Nd147
92.39	54.	30.62	0.80	4.279E-02	92.59	5.584	1.247E+01	TH234
93.15	14.	153.48	0.80	4.291E-02	93.35	5.561	PBC<MDA	AC228
97.50	13.	118.69	0.80	4.345E-02	97.50	30.000	PBC<MDA	Gd153
99.50	13.	120.30	0.80	4.365E-02	99.50	15.000	PBC<MDA	Np239
106.13	14.	116.53	0.81	4.406E-02	106.13	22.700	PBC<MDA	Np239
133.54	15.	130.43	0.84	4.277E-02	133.54	11.090	PBC<MDA	CE144
143.85	19.	42.38	0.55	4.148E-02	143.79	10.960	PBC<MDA	U235
163.12	12.	84.36	1.31	3.841E-02	162.66	6.220	PBC<MDA	Ba140
					163.38	5.080	PBC<MDA	U235
165.85	14.	114.50	0.87	3.872E-02	165.85	79.900	PBC<MDA	CE139
185.31	55.	27.68	0.38	3.553E-02	185.72	54.000	1.585E+00	U235
193.51	7.	160.96	0.90	3.443E-02	193.51	4.400	PBC<MDA	TH229
205.50	8.	155.85	0.91	3.290E-02	205.33	5.010	PBC<MDA	U235
227.00	11.	104.70	0.93	3.046E-02	227.00	6.300	PBC<MDA	Cf251
238.17	126.	10.83	0.67	2.936E-02	238.63	43.300	5.189E+00	PB212

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
241.57	28.	35.60	0.95	2.900E-02	242.00	7.430	PBC<MDA	PB214
244.69	8.	241.92	0.95	2.875E-02	244.69	7.580	PBC<MDA	EU152
256.24	4.	323.72	0.96	2.775E-02	256.24	7.000	PBC<MDA	TH227
265.83	11.	106.41	0.97	2.697E-02	265.83	50.000	PBC<MDA	BI210M
279.20	9.	100.58	0.99	2.596E-02	279.20	81.460	PBC<MDA	Hg203
284.30	6.	134.61	0.99	2.560E-02	284.30	6.140	PBC<MDA	I131
294.87	54.	23.20	0.68	2.487E-02	295.09	19.300	6.261E+00	PB214
296.00	16.	79.91	1.00	2.481E-02	296.00	79.000	PBC<MDA	TL210
300.07	3.	405.43	1.01	2.455E-02				
300.18	3.	412.33	1.01	2.454E-02				
301.20	8.	183.36	1.01	2.455E-02	300.03	3.280	PBC<MDA	PB212
302.65	4.	418.19	1.01	2.438E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	4.359E-01	BA133
302.85	4.	424.86	1.01	2.437E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	4.360E-01	BA133
304.85	4.	430.68	1.01	2.425E-02	304.85	4.290	PBC<MDA	Ba140
					304.90	28.000	2.875E-01	BI210M
304.90	4.	437.24	1.01	2.424E-02	304.85	4.290	PBC<MDA	Ba140
					304.90	28.000	2.875E-01	BI210M
308.44	4.	442.21	1.01	2.403E-02	308.44	31.750	PBC<MDA	Ir192
312.01	4.	447.08	1.02	2.381E-02	312.01	36.000	PBC<MDA	PA233
320.08	3.	371.85	1.03	2.334E-02	320.08	9.940	PBC<MDA	CR51
328.76	11.	104.91	1.03	2.286E-02	328.76	20.300	PBC<MDA	La140
333.44	17.	53.94	1.04	2.261E-02	333.44	15.510	PBC<MDA	Cf249
338.28	24.	41.01	1.04	2.235E-02	338.32	12.010	PBC<MDA	AC228
340.57	7.	154.03	1.05	2.224E-02	340.57	46.900	PBC<MDA	Cs136
344.29	7.	167.65	1.05	2.205E-02	344.29	26.500	PBC<MDA	EU152
345.83	7.	177.05	1.05	2.197E-02	345.83	15.070	PBC<MDA	HF181
351.58	97.	12.15	1.57	2.167E-02	351.93	37.600	6.636E+00	PB214
356.00	6.	251.94	1.06	2.148E-02	356.00	62.050	PBC<MDA	BA133
387.95	7.	150.82	1.09	2.008E-02	387.95	66.000	PBC<MDA	Cf249
453.88	3.	293.69	1.15	1.774E-02	453.88	65.000	PBC<MDA	pm146
482.00	6.	165.77	1.18	1.691E-02	482.00	80.500	PBC<MDA	HF181
497.05	7.	101.44	1.19	1.650E-02	497.05	90.900	PBC<MDA	RU103
511.86	41.	39.62	2.46	1.612E-02	511.86	20.000	7.023E+00	RH106
537.26	3.	233.33	1.23	1.551E-02	537.26	24.390	PBC<MDA	Ba140
569.47	4.	206.16	1.26	1.481E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	1.830E+00	PA234
					569.70	97.740	1.536E-01	BI207
569.70	4.	169.06	1.26	1.481E-02	569.32	15.380	1.057E+00	CS134
					569.47	8.200	1.982E+00	PA234
					569.70	97.740	1.664E-01	BI207
583.03	38.	17.84	0.89	1.453E-02	583.02	84.500	1.702E+00	TL208
600.50	7.	218.06	1.29	1.419E-02	600.50	17.860	PBC<MDA	SB125
602.73	8.	215.68	1.29	1.415E-02	602.73	98.260	PBC<MDA	SB124
604.71	8.	225.45	1.29	1.412E-02	604.71	97.620	PBC<MDA	CS134
609.21	66.	15.47	1.92	1.403E-02	609.31	46.090	5.673E+00	BI214
621.92	5.	337.54	1.31	1.380E-02	621.92	9.930	PBC<MDA	RH106

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
635.89	6.	75.19	1.32	1.356E-02	635.89	11.310	PBC<MDA	SB125
636.97	5.	114.33	1.32	1.354E-02	636.97	7.170	PBC<MDA	I131
657.76	3.	166.67	1.34	1.319E-02	657.76	94.640	PBC<MDA	AG110M
696.54	4.	190.67	1.37	1.260E-02	696.54	99.000	PBC<MDA	PM144
702.63	1.	785.71	1.38	1.251E-02	702.63	97.900	PBC<MDA	NB94
722.79	2.	380.79	1.40	1.223E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	1.000E-01	AG108M
					723.36	20.220	4.496E-01	EU154
724.20	7.	92.41	1.40	1.221E-02	724.20	44.150	PBC<MDA	ZR95
735.72	4.	190.67	1.41	1.206E-02	735.72	22.500	PBC<MDA	pm146
747.16	5.	100.57	1.42	1.191E-02	747.16	34.000	PBC<MDA	pm146
763.94	2.	423.09	1.43	1.170E-02	763.94	22.280	PBC<MDA	AG110M
766.41	6.	124.36	1.43	1.167E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
795.87	4.	162.54	1.46	1.131E-02	795.87	85.530	PBC<MDA	CS134
810.78	6.	110.55	1.47	1.115E-02	810.78	99.460	PBC<MDA	CO58
846.77	3.	303.29	1.50	1.076E-02	846.77	99.935	PBC<MDA	Co56
860.94	7.	95.70	1.51	1.062E-02	860.56	12.420	PBC<MDA	TL208
873.23	5.	111.36	1.52	1.049E-02	873.23	12.270	PBC<MDA	EU154
889.05	6.	199.46	1.54	1.034E-02	889.28	99.984	PBC<MDA	Sc46
898.04	1.	564.94	1.54	1.026E-02	898.04	93.700	PBC<MDA	y88
911.11	42.	15.43	1.53	1.014E-02	911.07	29.000	7.936E+00	AC228
937.49	12.	28.87	1.58	9.905E-03	937.49	34.360	1.959E+00	AG110M
946.02	4.	116.15	1.58	9.832E-03	946.02	13.400	PBC<MDA	PA234
968.67	38.	16.22	1.60	9.642E-03	968.97	17.460	1.254E+01	AC228
1050.36	6.	86.01	1.66	9.027E-03	1050.36	1.560	PBC<MDA	RH106
1063.66	5.	106.16	1.67	8.934E-03	1063.66	74.500	PBC<MDA	BI207
1077.40	6.	122.85	1.69	8.841E-03	1077.40	3.300	PBC<MDA	Ga68
1099.25	3.	238.82	1.70	8.697E-03	1099.25	56.500	PBC<MDA	FE59
1120.32	0.	663.32	1.72	8.562E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	PBC<MDA	Sc46
1120.61	1.	523.13	1.72	8.561E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	8.112E-02	Sc46
					1121.30	34.900	2.325E-01	Ta182
1121.30	8.	96.92	1.72	8.556E-03	1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	1.573E+00	Ta182
1173.24	18.	24.02	1.76	8.244E-03	1173.24	99.900	1.201E+00	CO60
1189.05	6.	89.49	1.77	8.153E-03	1189.05	16.200	PBC<MDA	Ta182
1238.28	12.	88.72	1.80	7.886E-03	1238.28	66.070	PBC<MDA	Co56
1291.60	6.	100.80	1.84	7.616E-03	1291.60	43.200	PBC<MDA	FE59
1461.00	193.	7.33	1.90	6.879E-03	1460.83	10.670	1.464E+02	K40
1764.60	6.	58.75	2.14	5.878E-03	1764.49	15.400	PBC<MDA	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
308.17	77.20	82.	107.	2.738E+03	17.53	0.733	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev14.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.58	46.54	80.	15.	0.008	103.21	0.750
TH-227	199.98	50.14	99.	-15.	-0.008	99.73	0.751s
AM-241	237.55	59.54	108.	-7.	-0.004	252.74	0.761
TH-234	252.38	63.25	103.	32.	0.018	58.35	0.939s
Sn-126	256.52	64.28	190.	16.	0.009	128.06	0.766s
BA-133	323.33	80.99	111.	6.	0.003	298.38	0.784
Np-237	345.33	86.49	532.	-20.	-0.011	168.01	0.789s
EU-155	345.54	86.54	512.	-20.	-0.011	164.89	0.790s
Sn-126	347.13	86.94	493.	-20.	-0.011	161.71	0.790s
Sn-126	349.65	87.57	473.	-20.	-0.011	158.37	0.791s
Cd-109	351.53	88.04	264.	15.	0.008	154.59	0.791s
Nd-147	363.77	91.10	279.	15.	0.008	158.21	0.794s
TH-234	369.72	92.59	107.	54.	0.030	30.62	0.796D
AC-228	372.76	93.35	219.	14.	0.008	153.48	0.797
Gd-153	389.36	97.50	119.	13.	0.007	118.69	0.801s
Np-239	397.36	99.50	122.	13.	0.007	120.30	0.803s
Gd-153	412.15	103.20	153.	-2.	-0.001	877.50	0.807s
Np-239	414.15	103.70	155.	0.	0.000	1000.00	0.807s
EU-155	420.60	105.31	155.	0.	0.000	1000.00	0.809s
Np-239	423.87	106.13	117.	14.	0.008	116.53	0.810s
EU-152	486.43	121.78	107.	-2.	-0.001	631.33	0.826s
CO-57	487.58	122.06	110.	0.	0.000	1000.00	0.826s
EU-154	491.73	123.10	124.	-15.	-0.008	106.47	0.828s
PA-234	524.50	131.29	229.	-16.	-0.009	132.60	0.836s
HF-181	531.42	133.02	246.	-16.	-0.009	136.87	0.838s
CE-144	533.47	133.54	180.	15.	0.008	130.43	0.838s
HF-181	544.52	136.30	225.	-16.	-0.009	132.57	0.841s
CO-57	545.21	136.47	241.	-2.	-0.001	942.18	0.841s
Tc-99m	561.35	140.51	191.	-16.	-0.009	123.99	0.845

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
U-235	574.71	143.85	20.	19.	0.011	42.38	0.554s
CE-141	581.07	145.44	198.	-16.	-0.009	127.58	0.850s
Ba-140	649.93	162.66	192.	-17.	-0.009	121.20	0.868s
U-235	651.75	163.12	32.	12.	0.007	84.36	1.307s
CE-139	662.70	165.85	125.	14.	0.008	114.50	0.871s
Cf-251	705.68	176.60	77.	-5.	-0.003	337.08	0.882
U-235	740.52	185.31	53.	55.	0.030	27.68	0.384s
TH-229	773.30	193.51	44.	7.	0.004	160.96	0.899s
U-235	820.58	205.33	41.	8.	0.004	155.85	0.912s
TH-229	842.65	210.85	73.	-10.	-0.006	113.39	0.917s
Cf-251	907.23	227.00	37.	11.	0.006	104.70	0.933s
PB-212	953.75	238.63	38.	106.	0.059	12.77	0.944D
PB-214	967.21	242.00	37.	28.	0.016	35.60	0.948D
EU-152	977.99	244.69	188.	8.	0.004	241.92	0.951s
TH-227	1024.17	256.24	43.	4.	0.002	323.72	0.962s
Cd-113m	1054.01	263.70	72.	-12.	-0.007	101.59	0.970s
BI-210M	1062.53	265.83	66.	11.	0.006	106.41	0.972s
TL-208	1108.33	277.28	76.	-3.	-0.002	423.39	0.983
Hg-203	1115.99	279.20	37.	9.	0.005	100.58	0.985s
I-131	1136.39	284.30	15.	6.	0.003	134.61	0.990s
PB-214	1178.66	294.87	24.	54.	0.030	23.20	0.678s
TL-210	1183.18	296.00	77.	16.	0.009	79.91	1.002s
PB-212	1199.30	300.03	91.	8.	0.004	183.36	1.006
PA-231	1199.46	300.07	99.	3.	0.002	405.43	1.006s
PA-233	1199.90	300.18	102.	3.	0.002	412.33	1.006s
PA-231	1209.78	302.65	106.	4.	0.002	418.19	1.008s
BA-133	1210.59	302.85	109.	4.	0.002	424.86	1.009s
Ba-140	1218.57	304.85	113.	4.	0.002	430.68	1.011s
BI-210M	1218.76	304.90	116.	4.	0.002	437.24	1.011s
Ir-192	1232.94	308.44	120.	4.	0.002	442.21	1.014s
PA-233	1247.22	312.01	123.	4.	0.002	447.08	1.018s
Ir-192	1265.13	316.49	62.	-11.	-0.006	103.27	1.022s
CR-51	1279.51	320.08	73.	3.	0.002	371.85	1.026
La-140	1314.21	328.76	37.	11.	0.006	104.91	1.034s
Cf-249	1332.92	333.44	18.	17.	0.009	53.94	1.039s
AC-228	1352.44	338.32	35.	24.	0.013	41.01	1.043
Cs-136	1361.44	340.57	59.	7.	0.004	154.03	1.045s
EU-152	1376.30	344.29	67.	7.	0.004	167.65	1.049s
HF-181	1382.47	345.83	73.	7.	0.004	177.05	1.050s
PB-214	1405.49	351.58	14.	97.	0.054	12.15	1.565s
BA-133	1423.15	356.00	126.	6.	0.004	251.94	1.060s
I-131	1457.08	364.48	26.	-2.	-0.001	519.48	1.069s
BA-133	1534.50	383.84	72.	0.	0.000	1000.00	1.087s
Cf-249	1550.94	387.95	55.	7.	0.004	150.82	1.091s
SN-113	1565.90	391.69	104.	-13.	-0.007	117.86	1.095s
SB-125	1710.63	427.88	23.	-3.	-0.001	448.37	1.129s
AG-108M	1734.87	433.94	41.	-13.	-0.007	93.89	1.135
pm-146	1814.64	453.88	16.	3.	0.002	293.69	1.154s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
SB-125	1852.59	463.37	59.	-10.	-0.005	116.58	1.163s
Ir-192	1871.36	468.06	73.	-5.	-0.003	230.15	1.167s
BE-7	1909.50	477.60	50.	-7.	-0.004	144.67	1.176s
HF-181	1927.10	482.00	49.	6.	0.003	165.77	1.180s
RU-103	1987.33	497.05	12.	7.	0.004	101.44	1.194s
RH-106	2046.57	511.86	34.	41.	0.023	39.62	2.458
Nd-147	2123.11	531.00	16.	0.	0.000	1000.00	1.225s
Ba-140	2148.15	537.26	12.	3.	0.002	233.33	1.231s
CS-134	2252.06	563.24	36.	-13.	-0.007	121.73	1.255s
CS-134	2276.40	569.32	28.	-7.	-0.004	113.39	1.260s
PA-234	2276.99	569.47	32.	4.	0.002	206.16	1.261s
BI-207	2277.92	569.70	25.	4.	0.002	169.06	1.261s
TL-208	2331.24	583.03	3.	38.	0.021	17.84	0.887s
SB-125	2401.12	600.50	129.	7.	0.004	218.06	1.289s
SB-124	2410.04	602.73	137.	8.	0.004	215.68	1.291s
CS-134	2417.96	604.71	144.	8.	0.004	225.45	1.292s
BI-214	2435.96	609.21	12.	66.	0.037	15.47	1.923s
AG-108M	2456.25	614.28	152.	0.	0.000	1000.00	1.301s
PM-144	2471.37	618.06	152.	0.	0.000	1000.00	1.304s
RH-106	2486.79	621.92	116.	5.	0.003	337.54	1.308s
SB-125	2542.69	635.89	9.	6.	0.004	75.19	1.320s
I-131	2547.03	636.97	11.	5.	0.003	114.33	1.321s
AG-110M	2630.18	657.76	11.	3.	0.002	166.67	1.339s
CS-137	2645.77	661.66	38.	-10.	-0.006	89.04	1.343s
PM-144	2785.32	696.54	13.	4.	0.002	190.67	1.374s
NB-94	2809.67	702.63	13.	1.	0.001	785.71	1.379s
SB-124	2890.31	722.79	28.	2.	0.001	380.79	1.396s
AG-108M	2890.91	722.94	30.	0.	0.000	1000.00	1.397s
EU-154	2892.59	723.36	30.	0.	0.000	1000.00	1.397s
ZR-95	2895.96	724.20	16.	7.	0.004	92.41	1.398s
BI-212	2907.84	727.17	31.	-1.	-0.001	498.49	1.400s
pm-146	2942.05	735.72	13.	4.	0.002	190.67	1.408s
pm-146	2987.81	747.16	4.	5.	0.003	100.57	1.417s
ZR-95	3026.09	756.73	22.	-7.	-0.004	147.69	1.426s
AG-110M	3054.96	763.94	29.	2.	0.001	423.09	1.432
NB-95	3062.34	765.79	31.	0.	0.000	1000.00	1.433s
PA-234M	3064.83	766.41	26.	6.	0.003	124.36	1.434s
EU-152	3114.87	778.92	39.	-15.	-0.008	88.44	1.444s
BI-212	3140.88	785.42	22.	-2.	-0.001	441.17	1.450s
CS-134	3182.67	795.87	24.	4.	0.002	162.54	1.459s
TL-210	3197.61	799.60	29.	0.	0.000	1000.00	1.462s
CS-134	3207.01	801.95	30.	0.	0.000	1000.00	1.464s
CO-58	3242.31	810.77	19.	6.	0.003	110.55	1.471s
La-140	3262.30	815.77	25.	0.	0.000	1000.00	1.475s
MN-54	3338.63	834.85	19.	-6.	-0.003	167.10	1.492s
Co-56	3386.32	846.77	19.	3.	0.002	303.29	1.501s
TL-208	3441.51	860.56	9.	7.	0.004	95.70	1.513s
NB-94	3483.65	871.10	17.	-1.	-0.001	656.61	1.522s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
EU-154	3492.19	873.23	13.	5.	0.003	111.36	1.523s
PA-234	3521.39	880.53	32.	-4.	-0.002	236.47	1.529s
PA-234	3532.24	883.24	32.	0.	0.000	1000.00	1.531s
AG-110M	3538.01	884.68	64.	-14.	-0.008	84.84	1.533s
Sc-46	3556.40	889.28	60.	6.	0.003	199.46	1.536s
y-88	3591.45	898.04	10.	1.	0.001	564.94	1.543s
AC-228	3643.74	911.11	0.	42.	0.023	15.43	1.531s
AG-110M	3749.30	937.49	0.	12.	0.007	28.87	1.576s
PA-234	3783.42	946.02	5.	4.	0.002	116.15	1.582s
EU-152	3855.80	964.11	28.	0.	0.000	1000.00	1.597s
AC-228	3875.25	968.97	0.	38.	0.021	16.22	1.601s
EU-154	3984.71	996.33	51.	-13.	-0.007	84.73	1.622s
EU-154	4018.51	1004.77	31.	-14.	-0.008	92.13	1.629s
Co-56	4150.81	1037.84	15.	-4.	-0.002	218.66	1.655s
Cs-136	4191.74	1048.07	18.	-3.	-0.002	208.17	1.663
RH-106	4200.91	1050.36	10.	6.	0.003	86.01	1.665s
BI-207	4254.12	1063.66	6.	5.	0.003	106.16	1.675s
Ga-68	4309.10	1077.40	10.	6.	0.003	122.85	1.685s
FE-59	4396.54	1099.25	10.	3.	0.002	238.82	1.702s
EU-152	4447.85	1112.07	47.	-8.	-0.004	129.65	1.712s
ZN-65	4461.74	1115.55	39.	0.	0.000	1000.00	1.714s
BI-214	4480.72	1120.29	40.	0.	0.000	663.32	1.718D
Sc-46	4481.77	1120.55	35.	1.	0.001	523.13	1.718D
Ta-182	4484.77	1121.30	29.	8.	0.005	96.92	1.719s
CO-60	4692.60	1173.24	0.	18.	0.010	24.02	1.757s
Ta-182	4755.88	1189.05	5.	6.	0.003	89.49	1.769s
Ta-182	4885.38	1221.41	21.	-4.	-0.002	246.99	1.792s
Co-56	4952.89	1238.28	21.	12.	0.007	88.72	1.805s
NA-22	5097.96	1274.53	11.	-1.	0.000	703.56	1.831s
EU-154	5098.01	1274.54	11.	0.	0.000	1000.00	1.831s
FE-59	5166.25	1291.60	6.	6.	0.003	100.80	1.843s
TL-210	5251.92	1313.00	16.	-5.	-0.003	187.26	1.858s
AG-110M	5537.26	1384.30	16.	-7.	-0.004	135.27	1.907s
EU-152	5632.13	1408.00	11.	-3.	-0.001	285.04	1.923s
K-40	5844.26	1461.00	4.	193.	0.107	7.33	1.900
La-140	6385.44	1596.21	6.	-1.	0.000	846.32	2.044s
SB-124	6764.81	1690.98	6.	-2.	-0.001	343.80	2.102s
BI-214	7059.07	1764.49	2.	6.	0.003	58.75	2.145s
Co-56	7086.53	1771.35	19.	-7.	-0.004	89.54	2.149s
y-88	7345.59	1836.06	12.	-7.	-0.004	125.36	2.185s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
BE-7	C	-2.2215E+00				5.31E+01	
			477.60	-2.222E+00	?(	1.107E+01	1.45E+02 1.05E+01 G
NA-22	C	-4.8127E-02				9.50E+02	
			1274.53	-4.813E-02	(	1.294E+00	7.04E+02 9.99E+01 G
K-40	N	1.4641E+02				4.66E+11	
			1460.83	1.464E+02	(P	8.720E+00	7.33E+00 1.07E+01 G
Sc-46	F	3.0097E-01				8.38E+01	
			889.28	3.010E-01	?(	2.079E+00	1.99E+02 1.00E+02 G
			1120.55	8.112E-02	}	1.955E+00	5.23E+02 1.00E+02 G
CR-51	F	7.8818E-01				2.77E+01	
			320.08	7.882E-01	?(P	1.019E+01	3.72E+02 9.94E+00 G
MN-54	C	-2.8929E-01				3.12E+02	
			834.85	-2.893E-01	?(	1.166E+00	1.67E+02 1.00E+02 G
FE-59	F	6.1916E-01				4.45E+01	
			1099.25	3.392E-01	?(	1.973E+00	2.39E+02 5.65E+01 G
			1291.60	9.853E-01	?(P	2.370E+00	1.01E+02 4.32E+01 G
Co-56	C	6.2636E-01				7.73E+01	
			846.77	1.595E-01	&(P	1.187E+00	3.03E+02 9.99E+01 G
			1238.28	1.333E+00	&(P	2.587E+00	8.87E+01 6.61E+01 G
			1037.84	-1.725E+00	+	8.953E+00	2.19E+02 1.41E+01 G
			1771.35	-4.579E+00	+	1.399E+01	8.95E+01 1.55E+01 A
CO-58	C	3.0069E-01				7.09E+01	
			810.78	3.007E-01	?(	1.154E+00	1.11E+02 9.95E+01 G
CO-60	F	5.9232E-01				1.93E+03	
			1332.50	-1.554E-02	%(P	1.607E+00	2.85E+03 1.00E+02 G
			1173.24	1.201E+00	?(P	4.972E-01	2.40E+01 9.99E+01 G
NB-94	I	4.2949E-02				7.41E+06	
			702.63	4.295E-02	&(P	8.865E-01	7.86E+02 9.79E+01 G
			871.10	-5.690E-02	& P	1.162E+00	6.57E+02 9.99E+01 G

Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
ZR-95	I	-1.1461E-02						6.40E+01	
			756.73	-5.770E-01	?(	2.112E+00	1.48E+02	5.45E+01	G
			724.20	6.862E-01	?(P	2.173E+00	9.24E+01	4.42E+01	G
RU-103	I	2.6623E-01						3.93E+01	
			497.05	2.662E-01	&(	6.981E-01	1.01E+02	9.09E+01	G
			610.30	-5.261E-06	%	4.149E+01	2.29E+08	5.75E+00	GA
RH-106	I	4.6936E+00						3.74E+02	
			621.92	1.843E+00	?(	2.140E+01	3.38E+02	9.93E+00	G
			1050.36	2.284E+01	?(	6.736E+01	8.60E+01	1.56E+00	G
			511.86	7.023E+00	& P	5.164E+00	3.96E+01	2.00E+01	GA
AG-108M	C	-4.2688E-01						1.53E+05	
			433.94	-4.269E-01	?(P	1.085E+00	9.39E+01	9.05E+01	G
			722.94	0.000E+00	+	1.412E+00	1.00E+03	9.08E+01	G
			614.28	0.000E+00	+	2.669E+00	1.00E+03	8.98E+01	G
AG-110M	F	4.4187E-03						2.50E+02	
			884.68	-1.038E+00	?(	2.954E+00	8.48E+01	7.27E+01	G
			657.76	1.335E-01	+	8.082E-01	1.67E+02	9.46E+01	G
			937.49	1.959E+00	?(	1.203E+00	2.89E+01	3.44E+01	G
			1384.30	-2.226E+00	+	6.789E+00	1.35E+02	2.43E+01	G
			763.94	3.909E-01	?(	5.943E+00	4.23E+02	2.23E+01	G
SN-113	F	-5.4986E-01						1.15E+02	
			391.69	-5.499E-01	&(	2.192E+00	1.18E+02	6.40E+01	G
SB-124	F	3.6299E-01						6.02E+01	
			602.73	3.105E-01	?(	2.284E+00	2.16E+02	9.83E+01	G
			1690.98	-3.181E-01	+	2.634E+00	3.44E+02	4.78E+01	G
			722.79	8.404E-01	&(	1.150E+01	3.81E+02	1.08E+01	G
SB-125	I	8.1507E-01						1.01E+03	
			427.88	-2.692E-01	?(P	2.514E+00	4.48E+02	2.96E+01	G
			600.50	1.639E+00	&(P	1.220E+01	2.18E+02	1.79E+01	G
			635.89	2.352E+00	?(	5.952E+00	7.52E+01	1.13E+01	G
			463.37	-2.939E+00	+	1.168E+01	1.17E+02	1.05E+01	G
I-131	I	2.6322E-01						8.02E+00	
			364.48	-7.379E-02	?(P	8.579E-01	5.19E+02	8.17E+01	G
			284.30	1.985E+00	(P	7.267E+00	1.35E+02	6.14E+00	G
			636.97	2.629E+00	?(	1.059E+01	1.14E+02	7.17E+00	G
Gd-153	F	5.6896E-01						2.42E+02	
			97.50	5.690E-01	?(	2.281E+00	1.19E+02	3.00E+01	G
			103.20	-1.160E-01	-	3.502E+00	8.77E+02	2.18E+01	G

Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
Ga-68	C	1.3358E+01						4.71E-02	
			1077.40	1.336E+01	?(	3.884E+01	1.23E+02	3.30E+00	G
Tc-99m	I	-2.4604E-01						2.51E-01	
			140.51	-2.460E-01	?(	1.026E+00	1.24E+02	8.93E+01	G
BA-133	F	3.0488E-01						3.85E+03	
			356.00	2.661E-01	?(	2.295E+00	2.52E+02	6.20E+01	G
			302.85	4.360E-01	?(	6.393E+00	4.25E+02	1.83E+01	G
			383.84	0.000E+00	-	1.297E+01	1.00E+03	8.94E+00	GA
			80.99	2.435E-01		2.102E+00	2.98E+02	3.41E+01	GA
CS-134	I	2.8473E-01						7.54E+02	
			604.71	3.079E-01	?(	2.367E+00	2.25E+02	9.76E+01	G
			795.87	2.583E-01	?(	1.480E+00	1.63E+02	8.55E+01	G
			569.32	-1.707E+00	+	6.674E+00	1.13E+02	1.54E+01	G
			801.95	0.000E+00	-	1.605E+01	1.00E+03	8.69E+00	G
			563.24	-5.917E+00	& P	1.369E+01	1.22E+02	8.35E+00	G
CS-137	I	-5.1840E-01						1.10E+04	
			661.66	-5.184E-01	?(	1.561E+00	8.90E+01	8.52E+01	G
CE-139	F	2.5510E-01						1.38E+02	
			165.85	2.551E-01	?(	9.849E-01	1.14E+02	7.99E+01	G
Ba-140	I	6.5526E-01						1.28E+01	
			537.26	4.405E-01	?(	2.768E+00	2.33E+02	2.44E+01	G
			162.66	-3.831E+00	+	1.561E+01	1.21E+02	6.22E+00	G
			304.85	1.876E+00	*(	2.787E+01	4.31E+02	4.29E+00	G
La-140	I	1.8677E-01						1.28E+01	
			1596.21	-6.075E-02	?(	1.258E+00	8.46E+02	9.54E+01	G
			487.02	5.774E-02	& P	1.866E+00	1.22E+03	4.55E+01	G
			328.76	1.350E+00	?(P	3.707E+00	1.05E+02	2.03E+01	G
			815.77	0.000E+00	-	5.597E+00	1.00E+03	2.33E+01	G
CE-141	I	-4.4479E-01						3.25E+01	
			145.44	-4.448E-01	?(	1.909E+00	1.28E+02	4.82E+01	G
CE-144	I	1.7397E+00						2.85E+02	
			133.54	1.740E+00	&(	7.645E+00	1.30E+02	1.11E+01	G
PM-144	C	1.7814E-01						3.63E+02	
			696.54	1.781E-01	?(	8.690E-01	1.91E+02	9.90E+01	G
			618.06	0.000E+00	-	2.432E+00	1.00E+03	9.91E+01	G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
EU-152	F	9.8136E-01					4.94E+03	
			344.29	6.717E-01	?(P	3.871E+00	1.68E+02	2.65E+01 G
			1112.07	-3.669E+00	+	1.634E+01	1.30E+02	1.36E+01 G
			121.78	-1.036E-01	-	2.263E+00	6.31E+02	2.86E+01 G
			778.92	-5.619E+00	+	1.186E+01	8.84E+01	1.29E+01 G
			964.11	0.000E+00	-	1.075E+01	1.00E+03	1.46E+01 G
			244.69	2.064E+00	?(	1.697E+01	2.42E+02	7.58E+00 G
			1408.00	-9.945E-01	+	6.687E+00	2.85E+02	2.10E+01 GA
EU-154	I	2.1572E+00					3.14E+03	
			873.23	2.157E+00	?(	8.418E+00	1.11E+02	1.23E+01 G
			123.10	-4.742E-01	-	1.699E+00	1.06E+02	4.08E+01 G
			1274.54	0.000E+00	-	3.772E+00	1.00E+03	3.52E+01 G
			723.36	0.000E+00	-	6.347E+00	1.00E+03	2.02E+01 G
			1004.77	-4.573E+00	+	9.436E+00	9.21E+01	1.80E+01 G
			996.33	-7.016E+00	+	1.998E+01	8.47E+01	1.06E+01 G
HF-181	F	3.9715E-01					4.24E+01	
			482.00	2.516E-01	?(	1.444E+00	1.66E+02	8.05E+01 G
			133.02	-4.934E-01	&	2.270E+00	1.37E+02	4.33E+01 G
			345.83	1.174E+00	?(P	7.145E+00	1.77E+02	1.51E+01 G
			136.30	-3.641E+00	+	1.623E+01	1.33E+02	5.85E+00 G
Ta-182	F	1.8945E+00					1.14E+02	
			1121.30	1.573E+00	?(	5.200E+00	9.69E+01	3.49E+01 G
			1221.41	-1.118E+00	-	6.252E+00	2.47E+02	2.70E+01 G
			1189.05	2.588E+00	?(	5.523E+00	8.95E+01	1.62E+01 G
Hg-203	F	2.3804E-01					4.66E+01	
			279.20	2.380E-01	&(	8.159E-01	1.01E+02	8.15E+01 G
TL-208	N	1.7020E+00					6.98E+02	
			583.02	1.702E+00	(P	5.099E-01	1.78E+01	8.45E+01 G
			277.28	-1.082E+00	- P	1.464E+01	4.23E+02	6.31E+00 G
			860.56	3.100E+00	+ P	7.164E+00	9.57E+01	1.24E+01 G
pm-146	C	7.2192E-01					2.02E+03	
			747.16	6.575E-01	(P	1.724E+00	1.01E+02	3.40E+01 G
			735.72	8.192E-01	?(	3.996E+00	1.91E+02	2.25E+01 G
			453.88	1.320E-01	& P	1.036E+00	2.94E+02	6.50E+01 G
y-88	F	6.8068E-02					1.07E+02	
			898.04	6.807E-02	?(P	1.001E+00	5.65E+02	9.37E+01 G
			1836.06	-6.894E-01	+	1.857E+00	1.25E+02	9.92E+01 G

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Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
Cd-113m		-4.2084E+03						5.33E+03	
			263.70	-4.208E+03	?(	1.445E+04	1.02E+02	6.00E-03	K
Cd-109	F	5.2614E+00						4.53E+02	
			88.04	5.261E+00	?(	2.737E+01	1.55E+02	3.79E+00	G
Cf-251	T	-4.1311E-01						3.28E+05	
			176.60	-4.131E-01	(	3.852E+00	3.37E+02	1.70E+01	G
			227.00	3.114E+00	?	8.953E+00	1.05E+02	6.30E+00	GA
Cf-249	T	7.4576E-01						1.28E+05	
			387.95	3.005E-01	?(	1.560E+00	1.51E+02	6.60E+01	G
			333.44	2.641E+00	?(	3.591E+00	5.39E+01	1.55E+01	G
Sn-126		2.6677E+00						3.65E+07	
			87.57	-6.945E-01	-	3.683E+00	1.58E+02	3.75E+01	GA
			64.28	2.668E+00	?(	1.150E+01	1.28E+02	9.70E+00	G
			86.94	-2.888E+00	+	1.563E+01	1.62E+02	9.04E+00	GA
PB-210	N	8.8460E+00						8.14E+03	
			46.54	8.846E+00	(P	2.678E+01	1.03E+02	4.25E+00	G
PB-212	N	4.6181E+00						6.98E+02	
			238.63	4.618E+00	(P	1.368E+00	1.28E+01	4.33E+01	G
			300.03	5.188E+00	& P	3.257E+01	1.83E+02	3.28E+00	GA
PB-214	N	6.5086E+00						5.84E+05	
			351.93	6.636E+00	@(P	1.359E+00	1.21E+01	3.76E+01	G
			295.09	6.261E+00	*(P	2.951E+00	2.32E+01	1.93E+01	G
			242.00	7.303E+00		7.976E+00	3.56E+01	7.43E+00	GA
BI-207	C	2.8278E-01						1.18E+04	
			569.70	1.664E-01	?(	9.926E-01	1.69E+02	9.77E+01	G
			1063.66	4.355E-01	?(P	1.147E+00	1.06E+02	7.45E+01	G
BI-212	N	-7.5617E-01						6.98E+02	
			727.17	-7.562E-01	?(P	1.739E+01	4.98E+02	7.55E+00	G
			785.42	-6.569E+00	+ P	9.273E+01	4.41E+02	1.28E+00	GA
U-235	N	2.6465E+00						2.57E+11	
			143.79	2.377E+00	(P	2.849E+00	4.24E+01	1.10E+01	G
			205.33	2.535E+00	?(P	1.103E+01	1.56E+02	5.01E+00	G
			163.38	3.337E+00	(P	8.310E+00	8.44E+01	5.08E+00	G
			185.72	1.585E+00	P	1.063E+00	2.77E+01	5.40E+01	GA

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
BI-214	N	5.6732E+00					5.84E+05	
			609.31	5.673E+00	(P	1.618E+00	1.55E+01	4.61E+01 G
			1120.29	0.000E+00	} P	1.390E+01	6.63E+02	1.51E+01 G
			1764.49	3.409E+00	- P	6.136E+00	5.87E+01	1.54E+01 G
BI-210M	T	3.9921E-01					1.10E+09	
			265.83	4.618E-01	?(	1.666E+00	1.06E+02	5.00E+01 G
			304.90	2.875E-01	*(	4.333E+00	4.37E+02	2.80E+01 G
AC-228	N	7.9361E+00					2.10E+03	
			911.07	7.936E+00	(	1.393E+00	1.54E+01	2.90E+01 G
			968.97	1.254E+01	+	2.432E+00	1.62E+01	1.75E+01 G
			338.32	4.902E+00	-	6.293E+00	4.10E+01	1.20E+01 G
			93.35	3.223E+00	-	1.668E+01	1.53E+02	5.56E+00 XA
TH-227	N	-4.3368E+00					7.95E+03	
			50.14	-4.337E+00	?(P	1.399E+01	9.97E+01	8.00E+00 G
			256.24	1.049E+00	+	9.550E+00	3.24E+02	7.00E+00 G
TH-229	N	2.7469E+00					2.68E+06	
			193.51	2.747E+00	(P	1.227E+01	1.61E+02	4.40E+00 G
			210.85	-5.971E+00	+ P	2.456E+01	1.13E+02	2.99E+00 G
TH-234	N	1.3126E+01					1.63E+12	
			63.29	1.409E+01	(P	2.226E+01	5.83E+01	3.81E+00 G
			92.59	1.247E+01	(P	1.182E+01	3.06E+01	5.58E+00 G
PA-231	N	2.9774E+00					1.20E+07	
			302.65	2.773E+00	?(	4.004E+01	4.18E+02	2.88E+00 G
			300.07	3.216E+00	&(	4.509E+01	4.05E+02	2.46E+00 G
PA-233	C	3.8315E-01					7.82E+08	
			312.01	2.292E-01	?(	3.529E+00	4.47E+02	3.60E+01 G
			300.18	1.277E+00	&(	1.819E+01	4.12E+02	6.20E+00 G
PA-234	N	4.6105E-01					1.63E+12	
			131.29	-1.180E+00	?(	5.259E+00	1.33E+02	1.80E+01 G
			946.02	1.827E+00	?(	5.388E+00	1.16E+02	1.34E+01 G
			569.47	1.830E+00	?(	1.330E+01	2.06E+02	8.20E+00 G
			883.24	0.000E+00	-	1.618E+01	1.00E+03	9.60E+00 G
			880.53	-3.109E+00	&	2.601E+01	2.36E+02	6.00E+00 GA
PA-234M	N	2.6964E+01					1.63E+12	
			1001.00	1.598E+00	&(P	2.474E+02	4.34E+03	8.37E-01 G
			766.41	9.918E+01	?(P	4.279E+02	1.24E+02	2.94E-01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AM-241	T -3.5341E-01					1.58E+05	
		59.54	-3.534E-01	?(	2.582E+00	2.53E+02	3.59E+01 G
Np-237	F -1.9961E+00					2.14E+06	
		86.49	-1.996E+00	(	1.123E+01	1.68E+02	1.31E+01 G
Ir-192	F -3.0448E-01					7.40E+01	
		316.49	-3.045E-01	?(	1.065E+00	1.03E+02	8.70E+01 G
		468.06	-3.307E-01	+	2.632E+00	2.30E+02	5.18E+01 G
		308.44	2.567E-01	+	3.911E+00	4.42E+02	3.18E+01 G
Cs-136	F 1.0080E-01					1.30E+01	
		818.50	-3.349E-02	%(	1.322E+00	1.08E+03	1.00E+02 G
		1048.07	-2.304E-01	+	1.726E+00	2.08E+02	8.00E+01 G
		340.57	3.871E-01	?(	2.051E+00	1.54E+02	4.69E+01 G
Np-239	T 7.4997E-01					2.36E+00	
		103.70	0.000E+00	-	3.199E+00	1.00E+03	2.40E+01 X
		106.13	7.500E-01	&(	2.951E+00	1.17E+02	2.27E+01 G
		99.50	1.130E+00	&	4.593E+00	1.20E+02	1.50E+01 X
Nd-147	4.7810E-01					1.11E+01	
		531.00	0.000E+00	?(	5.826E+00	1.00E+03	1.30E+01 G
		91.10	6.977E-01	?(	3.714E+00	1.58E+02	2.83E+01 G
TL-210	N 2.0573E-01					5.84E+05	
		799.60	0.000E+00	?(	1.385E+00	1.00E+03	9.90E+01 G
		296.00	4.634E-01	?(	1.237E+00	7.99E+01	7.90E+01 G
		1313.00	-1.760E+00	+	7.517E+00	1.87E+02	2.10E+01 GA

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went
negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide
failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the
library energy centroid for positive identification.
P - Peakbackground subtraction

} - Peak is too close to another for the activity
to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
PB-210	46.54	80.	15.	0.008	103.21	8.846E+00	P
TH-227	50.14	99.	-15.	-0.008	99.73	-4.337E+00	P
AM-241	59.54	108.	-7.	-0.004	252.74	-3.534E-01	
Sn-126	64.28	190.	16.	0.009	128.06	2.668E+00	
BA-133	80.99	111.	6.	0.003	298.38	2.435E-01	
Np-237	86.49	532.	-20.	-0.011	168.01	-1.996E+00	
EU-155	86.54	512.	-20.	-0.011	164.89	-8.518E-01	
Sn-126	86.94	493.	-20.	-0.011	161.71	-2.888E+00	
Sn-126	87.57	473.	-20.	-0.011	158.37	-6.945E-01	
Cd-109	88.04	264.	15.	0.008	154.59	5.261E+00	
Nd-147	91.10	279.	15.	0.008	158.21	6.977E-01	
Gd-153	97.50	119.	13.	0.007	118.69	5.690E-01	
Np-239	99.50	122.	13.	0.007	120.30	1.130E+00	
Gd-153	103.20	153.	-2.	-0.001	877.50	-1.160E-01	
Np-239	106.13	117.	14.	0.008	116.53	7.500E-01	
EU-152	121.78	107.	-2.	-0.001	631.33	-1.036E-01	
EU-154	123.10	124.	-15.	-0.008	106.47	-4.742E-01	
PA-234	131.29	229.	-16.	-0.009	132.60	-1.180E+00	
HF-181	133.02	246.	-16.	-0.009	136.87	-4.934E-01	
CE-144	133.54	180.	15.	0.008	130.43	1.740E+00	
HF-181	136.30	225.	-16.	-0.009	132.57	-3.641E+00	
CO-57	136.47	241.	-2.	-0.001	942.18	-2.863E-01	
Tc-99m	140.51	191.	-16.	-0.009	123.99	-2.460E-01	
CE-141	145.44	198.	-16.	-0.009	127.58	-4.448E-01	
Ba-140	162.66	192.	-17.	-0.009	121.20	-3.831E+00	
CE-139	165.85	125.	14.	0.008	114.50	2.551E-01	
Cf-251	176.60	77.	-5.	-0.003	337.08	-4.131E-01	
TH-229	193.51	44.	7.	0.004	160.96	2.747E+00	P
TH-229	210.85	73.	-10.	-0.006	113.39	-5.971E+00	P
Cf-251	227.00	37.	11.	0.006	104.70	3.114E+00	
EU-152	244.69	188.	8.	0.004	241.92	2.064E+00	
TH-227	256.24	43.	4.	0.002	323.72	1.049E+00	
Cd-113m	263.70	72.	-12.	-0.007	101.59	-4.208E+03	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
BI-210M	265.83	66.	11.	0.006	106.41	4.618E-01		
Hg-203	279.20	37.	9.	0.005	100.58	2.380E-01		
I-131	284.30	15.	6.	0.003	134.61	1.985E+00		P
TL-210	296.00	77.	16.	0.009	79.91	4.634E-01		
PA-231	300.07	99.	3.	0.002	405.43	3.216E+00		
PA-233	300.18	102.	3.	0.002	412.33	1.277E+00		
PA-231	302.65	106.	4.	0.002	418.19	2.773E+00		
BA-133	302.85	109.	4.	0.002	424.86	4.360E-01		
Ba-140	304.85	113.	4.	0.002	430.68	1.876E+00		
BI-210M	304.90	116.	4.	0.002	437.24	2.875E-01		
Ir-192	308.44	120.	4.	0.002	442.21	2.567E-01		
PA-233	312.01	123.	4.	0.002	447.08	2.292E-01		
Ir-192	316.49	62.	-11.	-0.006	103.27	-3.045E-01		
CR-51	320.08	73.	3.	0.002	371.85	7.882E-01		P
La-140	328.76	37.	11.	0.006	104.91	1.350E+00		P
Cf-249	333.44	18.	17.	0.009	53.94	2.641E+00		
Cs-136	340.57	59.	7.	0.004	154.03	3.871E-01		
EU-152	344.29	67.	7.	0.004	167.65	6.717E-01		P
HF-181	345.83	73.	7.	0.004	177.05	1.174E+00		P
BA-133	356.00	126.	6.	0.004	251.94	2.661E-01		
I-131	364.48	26.	-2.	-0.001	519.48	-7.379E-02		P
Cf-249	387.95	55.	7.	0.004	150.82	3.005E-01		
SN-113	391.69	104.	-13.	-0.007	117.86	-5.499E-01		
SB-125	427.88	23.	-3.	-0.001	448.37	-2.692E-01		P
AG-108M	433.94	41.	-13.	-0.007	93.89	-4.269E-01		P
pm-146	453.88	16.	3.	0.002	293.69	1.320E-01		P
SB-125	463.37	59.	-10.	-0.005	116.58	-2.939E+00		
Ir-192	468.06	73.	-5.	-0.003	230.15	-3.307E-01		
BE-7	477.60	50.	-7.	-0.004	144.67	-2.222E+00		
HF-181	482.00	49.	6.	0.003	165.77	2.516E-01		
RU-103	497.05	12.	7.	0.004	101.44	2.662E-01		
RH-106	511.86	34.	41.	0.023	39.62	7.023E+00		P
Ba-140	537.26	12.	3.	0.002	233.33	4.405E-01		
CS-134	563.24	36.	-13.	-0.007	121.73	-5.917E+00		P
CS-134	569.32	28.	-7.	-0.004	113.39	-1.707E+00		
PA-234	569.47	32.	4.	0.002	206.16	1.830E+00		
BI-207	569.70	25.	4.	0.002	169.06	1.664E-01		
SB-125	600.50	129.	7.	0.004	218.06	1.639E+00		P
SB-124	602.73	137.	8.	0.004	215.68	3.105E-01		
CS-134	604.71	144.	8.	0.004	225.45	3.079E-01		
RH-106	621.92	116.	5.	0.003	337.54	1.843E+00		
SB-125	635.89	9.	6.	0.004	75.19	2.352E+00		
I-131	636.97	11.	5.	0.003	114.33	2.629E+00		
AG-110M	657.76	11.	3.	0.002	166.67	1.335E-01		
CS-137	661.66	38.	-10.	-0.006	89.04	-5.184E-01		
PM-144	696.54	13.	4.	0.002	190.67	1.781E-01		
NB-94	702.63	13.	1.	0.001	785.71	4.295E-02		P
SB-124	722.79	28.	2.	0.001	380.79	8.404E-01		

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
ZR-95	724.20	16.	7.	0.004	92.41	6.862E-01		P
BI-212	727.17	31.	-1.	-0.001	498.49	-7.562E-01		P
pm-146	735.72	13.	4.	0.002	190.67	8.192E-01		
pm-146	747.16	4.	5.	0.003	100.57	6.575E-01		P
ZR-95	756.73	22.	-7.	-0.004	147.69	-5.770E-01		
AG-110M	763.94	29.	2.	0.001	423.09	3.909E-01		
PA-234M	766.41	26.	6.	0.003	124.36	9.918E+01		P
EU-152	778.92	39.	-15.	-0.008	88.44	-5.619E+00		
BI-212	785.42	22.	-2.	-0.001	441.17	-6.569E+00		P
CS-134	795.87	24.	4.	0.002	162.54	2.583E-01		
CO-58	810.77	19.	6.	0.003	110.55	3.007E-01		
MN-54	834.85	19.	-6.	-0.003	167.10	-2.893E-01		
Co-56	846.77	19.	3.	0.002	303.29	1.595E-01		P
NB-94	871.10	17.	-1.	-0.001	656.61	-5.690E-02		P
EU-154	873.23	13.	5.	0.003	111.36	2.157E+00		
PA-234	880.53	32.	-4.	-0.002	236.47	-3.109E+00		
AG-110M	884.68	64.	-14.	-0.008	84.84	-1.038E+00		
y-88	898.04	10.	1.	0.001	564.94	6.807E-02		P
AG-110M	937.49	0.	12.	0.007	28.87	1.959E+00		
PA-234	946.02	5.	4.	0.002	116.15	1.827E+00		
EU-154	996.33	51.	-13.	-0.007	84.73	-7.016E+00		
EU-154	1004.77	31.	-14.	-0.008	92.13	-4.573E+00		
Co-56	1037.84	15.	-4.	-0.002	218.66	-1.725E+00		
Cs-136	1048.07	18.	-3.	-0.002	208.17	-2.304E-01		
RH-106	1050.36	10.	6.	0.003	86.01	2.284E+01		
BI-207	1063.66	6.	5.	0.003	106.16	4.355E-01		P
Ga-68	1077.40	10.	6.	0.003	122.85	1.336E+01		
FE-59	1099.25	10.	3.	0.002	238.82	3.392E-01		
EU-152	1112.07	47.	-8.	-0.004	129.65	-3.669E+00		
Ta-182	1121.30	29.	8.	0.005	96.92	1.573E+00		
CO-60	1173.24	0.	18.	0.010	24.02	1.201E+00		P
Ta-182	1189.05	5.	6.	0.003	89.49	2.588E+00		
Ta-182	1221.41	21.	-4.	-0.002	246.99	-1.118E+00		
Co-56	1238.28	21.	12.	0.007	88.72	1.333E+00		P
NA-22	1274.53	11.	-1.	0.000	703.56	-4.813E-02		
FE-59	1291.60	6.	6.	0.003	100.80	9.853E-01		P
TL-210	1313.00	16.	-5.	-0.003	187.26	-1.760E+00		
AG-110M	1384.30	16.	-7.	-0.004	135.27	-2.226E+00		
EU-152	1408.00	11.	-3.	-0.001	285.04	-9.945E-01		
La-140	1596.21	6.	-1.	0.000	846.32	-6.075E-02		
SB-124	1690.98	6.	-2.	-0.001	343.80	-3.181E-01		
Co-56	1771.35	19.	-7.	-0.004	89.54	-4.579E+00		
y-88	1836.06	12.	-7.	-0.004	125.36	-6.894E-01		

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

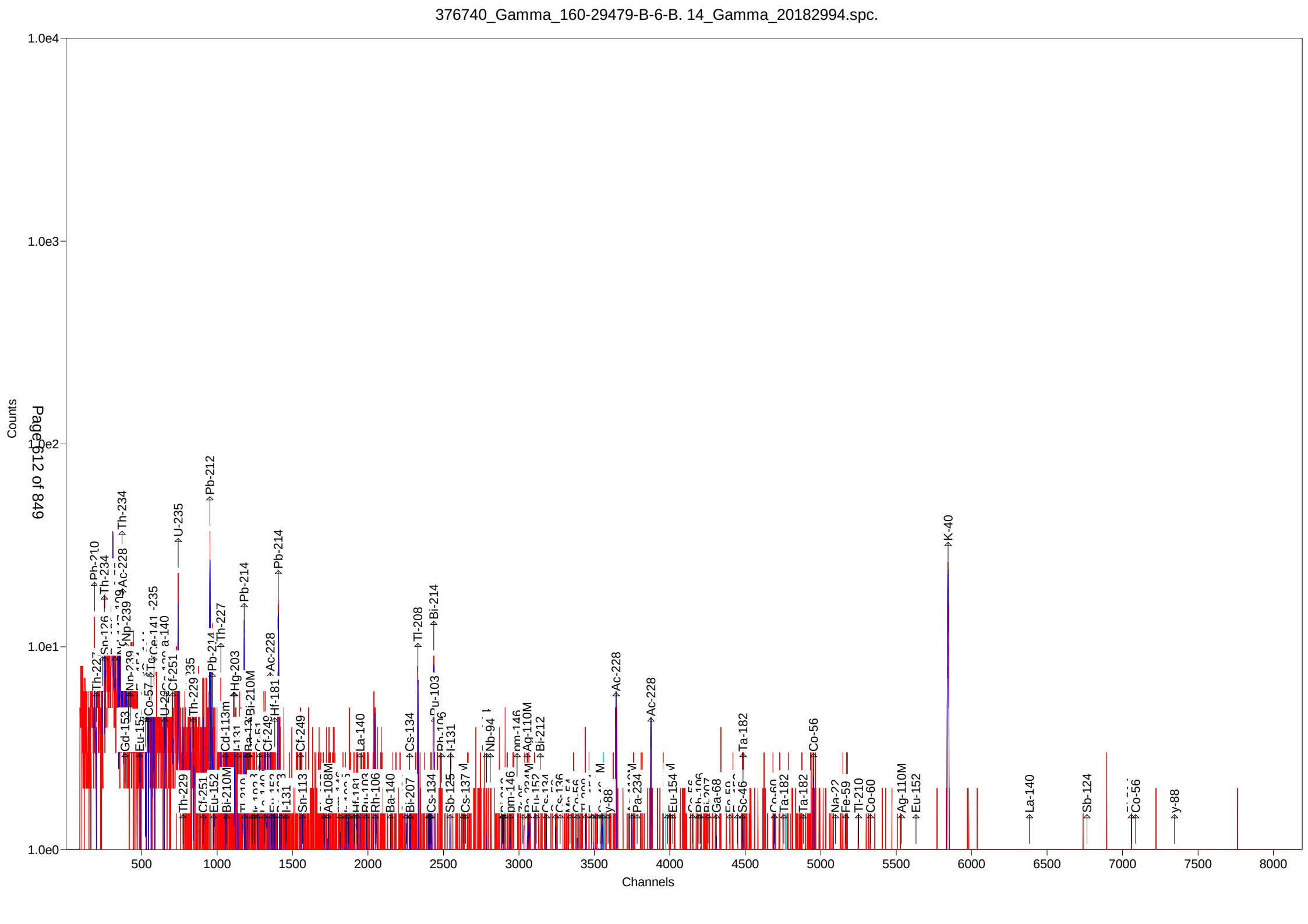
Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
BE-7	#A	-2.2215E+00	-2.2215E+00	1.447E+02%	1.11E+01
NA-22	#A	-4.8127E-02	-4.8127E-02	7.036E+02%	1.29E+00
K-40		1.4641E+02	1.4641E+02	7.328E+00%	8.72E+00
Sc-46	#A	3.0097E-01	3.0097E-01	1.995E+02%	2.08E+00
CR-51	#A	7.8817E-01	7.8818E-01	3.719E+02%	1.02E+01
MN-54	#A	-2.8929E-01	-2.8929E-01	1.671E+02%	1.17E+00
FE-59	#A	6.1916E-01	6.1916E-01	1.008E+02%	1.97E+00
Co-56	#A	6.2636E-01	6.2636E-01	8.872E+01%	1.19E+00
CO-57	#A	0.0000E+00	0.0000E+00	1.000E+03%	7.64E-01
CO-58	#A	3.0069E-01	3.0069E-01	1.106E+02%	1.15E+00
CO-60	#A	5.9232E-01	5.9232E-01	2.402E+01%	1.61E+00
ZN-65	#A	0.0000E+00	0.0000E+00	1.000E+03%	4.06E+00
NB-94	#A	4.2949E-02	4.2949E-02	7.857E+02%	8.86E-01
ZR-95	#A	-1.1461E-02	-1.1461E-02	8.711E+01%	2.11E+00
NB-95	#A	0.0000E+00	0.0000E+00	1.000E+03%	1.37E+00
RU-103	#A	2.6623E-01	2.6623E-01	1.014E+02%	6.98E-01
RH-106	#A	4.6936E+00	4.6936E+00	8.601E+01%	2.14E+01
AG-108M	#A	-4.2688E-01	-4.2688E-01	9.389E+01%	1.08E+00
AG-110M	#A	4.4187E-03	4.4187E-03	2.887E+01%	2.95E+00
SN-113	#A	-5.4986E-01	-5.4986E-01	1.179E+02%	2.19E+00
SB-124	#A	3.6299E-01	3.6299E-01	2.157E+02%	2.28E+00
SB-125	#A	8.1507E-01	8.1507E-01	7.519E+01%	2.51E+00
I-131	#A	2.6321E-01	2.6322E-01	1.143E+02%	8.58E-01
Gd-153	#A	5.6896E-01	5.6896E-01	1.187E+02%	2.28E+00
Ga-68	#A	1.3269E+01	1.3358E+01	1.229E+02%	3.88E+01
Tc-99m	#A	-2.4573E-01	-2.4604E-01	1.240E+02%	1.03E+00
BA-133	#A	3.0488E-01	3.0488E-01	2.470E+02%	2.29E+00
CS-134	#A	2.8473E-01	2.8473E-01	1.390E+02%	2.37E+00
CS-137	#A	-5.1840E-01	-5.1840E-01	8.904E+01%	1.56E+00
CE-139	#A	2.5510E-01	2.5510E-01	1.145E+02%	9.85E-01
Ba-140	#A	6.5524E-01	6.5526E-01	2.333E+02%	2.77E+00
La-140	#A	1.8677E-01	1.8677E-01	1.049E+02%	1.26E+00
CE-141	#A	-4.4479E-01	-4.4479E-01	1.276E+02%	1.91E+00
CE-144	#A	1.7397E+00	1.7397E+00	1.304E+02%	7.64E+00
PM-144	#A	1.7814E-01	1.7814E-01	1.907E+02%	8.69E-01
EU-152	#A	9.8136E-01	9.8136E-01	1.472E+02%	3.87E+00
EU-154	#A	2.1572E+00	2.1572E+00	1.114E+02%	8.42E+00
EU-155	#A	0.0000E+00	0.0000E+00	1.000E+03%	3.61E+00
HF-181	#A	3.9714E-01	3.9715E-01	1.213E+02%	1.44E+00
Ta-182	#A	1.8945E+00	1.8945E+00	6.596E+01%	5.20E+00
Hg-203	#A	2.3804E-01	2.3804E-01	1.006E+02%	8.16E-01
TL-208		1.7020E+00	1.7020E+00	1.784E+01%	5.10E-01
pm-146	#A	7.2192E-01	7.2192E-01	1.006E+02%	1.72E+00

y-88	#A	6.8068E-02	6.8068E-02	5.649E+02%	1.00E+00
Cd-113m	#A	-4.2084E+03	-4.2084E+03	1.016E+02%	1.44E+04
Cd-109	#A	5.2614E+00	5.2614E+00	1.546E+02%	2.74E+01
Cf-251	#A	-4.1311E-01	-4.1311E-01	3.371E+02%	3.85E+00
Cf-249	#A	7.4576E-01	7.4576E-01	5.394E+01%	1.56E+00
Sn-126	#A	2.6677E+00	2.6677E+00	1.281E+02%	1.15E+01
PB-210	#A	8.8460E+00	8.8460E+00	1.032E+02%	2.68E+01
PB-212		4.6181E+00	4.6181E+00	1.277E+01%	1.37E+00
PB-214	#	6.5086E+00	6.5086E+00	1.215E+01%	1.36E+00
BI-207	#A	2.8278E-01	2.8278E-01	9.981E+01%	9.93E-01
BI-212	#A	-7.5617E-01	-7.5617E-01	4.985E+02%	1.74E+01
U-235	A	2.6465E+00	2.6465E+00	4.238E+01%	2.85E+00
BI-214		5.6732E+00	5.6732E+00	1.547E+01%	1.62E+00
BI-210M	#A	3.9921E-01	3.9921E-01	1.064E+02%	1.67E+00
AC-228	#	7.9361E+00	7.9361E+00	1.543E+01%	1.39E+00
TH-227	#A	-4.3368E+00	-4.3368E+00	9.973E+01%	1.40E+01
TH-229	#A	2.7469E+00	2.7469E+00	1.610E+02%	1.23E+01
TH-234	A	1.3126E+01	1.3126E+01	3.062E+01%	2.23E+01
PA-231	#A	2.9774E+00	2.9774E+00	2.912E+02%	4.00E+01
PA-233	#A	3.8315E-01	3.8315E-01	3.041E+02%	3.53E+00
PA-234	#A	4.6105E-01	4.6105E-01	9.042E+01%	5.26E+00
PA-234M	#A	2.6964E+01	2.6964E+01	1.244E+02%	2.47E+02
AM-241	#A	-3.5341E-01	-3.5341E-01	2.527E+02%	2.58E+00
Np-237	#A	-1.9961E+00	-1.9961E+00	1.680E+02%	1.12E+01
Ir-192	#A	-3.0448E-01	-3.0448E-01	1.033E+02%	1.07E+00
Cs-136	#A	1.0080E-01	1.0080E-01	1.540E+02%	1.32E+00
Np-239	#A	7.4988E-01	7.4997E-01	1.165E+02%	2.95E+00
Nd-147	#A	4.7809E-01	4.7810E-01	1.582E+02%	5.83E+00
TL-210	#A	2.0573E-01	2.0573E-01	7.991E+01%	1.38E+00

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (25.1 to 1999.5 keV) 1.886E+02 Bq/Sample
Total Decayed Activity (25.1 to 1999.5 keV) 1.8861829E+02 Bq/Sample


376740_Gamma_160-29479-B-6-B. 14_Gamma_20182994.spc.
Counts
Channels
1.0e4
1.0e3
1.0e2
1.0e1
1.0e0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
7500
8000
Pb-210
Th-234
Ac-228
Th-234
U-235
Pb-212
Pb-214
Th-227
Pb-214
Ac-228
Tl-208
Bi-214
Ac-228
Ac-228
Ta-182
Co-56
K-40
La-140
Sb-124
Co-56
y-88

Test America St. Louis Spectrum ID: 15_Gamma_20182596

Sample Description: 376740_Gamma_160-29479-A-7-B
Detector: Detector #15
Batch ID: 376740
Work Order Number: Gamma
Lot Number: 160-29479-A-7-B

Decay to Time: 8/9/2018 06:37 Live Time: 1800 sec
Acquisition Time: 8/9/2018 06:37:22 Real Time: 1801 sec
Analysis Time: 8/9/2018 07:07 Dead Time: 0.07 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 15_Soil_TunaCan.Clb
Efficiency Cal Desc: 15_TunaCan_90099_032212
Efficiency Cal Date: 3/22/2012 13:03
Energy Cal Date: 2/28/2012 16:29
Library: Client_Long_Rev14.lib
Bkgd Correction File: 15_2018-07-21_1011.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	-1.442E+00	241.9	3.488E+00	3.489E+00	1.422E+01
NA-22	7.605E-01	33.3	2.535E-01	2.563E-01	6.227E-01
K-40	1.746E+02	7.3	1.266E+01	1.550E+01	9.037E+00
Sc-46	-2.613E-02	1501.3	3.922E-01	3.922E-01	1.806E+00
CR-51	-4.178E+00	42.5	1.776E+00	1.790E+00	1.615E+01
MN-54	3.261E-01	92.5	3.017E-01	3.022E-01	7.478E-01
FE-59	7.438E-01	101.7	7.566E-01	7.575E-01	1.768E+00
Co-56	5.927E-01	31.6	1.874E-01	1.899E-01	4.368E-01
CO-57	4.500E-02	426.5	1.919E-01	1.919E-01	6.715E-01
CO-58	3.873E-01	38.5	1.491E-01	1.504E-01	4.230E-01
CO-60	9.624E-01	30.4	2.928E-01	2.968E-01	6.475E-01
ZN-65	0.000E+00	1.#INF	2.100E-01	2.100E-01	5.580E+00
NB-94	6.135E-01	41.1	2.524E-01	2.544E-01	6.897E-01
ZR-95	-2.232E-01	295.1	6.587E-01	6.588E-01	2.290E+00
NB-95	2.998E-01	129.2	3.873E-01	3.876E-01	1.353E+00
RU-103	-2.372E-01	172.9	4.099E-01	4.101E-01	1.021E+00
RH-106	3.230E+00	169.9	5.489E+00	5.491E+00	1.904E+01
AG-108M	3.773E-01	93.0	3.509E-01	3.514E-01	8.876E-01
AG-110M	2.186E-01	248.1	5.423E-01	5.425E-01	2.459E+00
SN-113	3.573E-01	136.5	4.879E-01	4.883E-01	1.679E+00
SB-124	1.754E-01	131.7	2.311E-01	2.313E-01	2.514E+00
SB-125	-1.915E-01	68.7	1.316E-01	1.320E-01	3.494E+00
I-131	0.000E+00	1.#INF	1.028E-01	1.028E-01	9.949E-01
Gd-153	-3.014E-01	175.3	5.282E-01	5.285E-01	5.948E+00
Ga-68	-1.287E+01	201.7	2.596E+01	2.597E+01	6.062E+01
Tc-99m	8.087E-02	470.6	3.806E-01	3.806E-01	1.295E+00
BA-133	-5.987E-01	130.5	7.811E-01	7.818E-01	2.641E+00
CS-134	2.894E-01	87.9	2.544E-01	2.549E-01	2.517E+00
CS-137	-5.647E-02	834.7	4.713E-01	4.714E-01	1.695E+00
CE-139	-3.445E-01	99.9	3.441E-01	3.457E-01	1.155E+00
Ba-140	6.110E-01	147.6	9.021E-01	9.026E-01	3.684E+00
La-140	1.094E+00	24.2	2.654E-01	2.716E-01	7.974E-01
CE-141	-4.248E-01	131.7	5.596E-01	5.600E-01	1.450E+00

CE-144	1.843E+00	161.3	2.972E+00	2.974E+00	1.002E+01
PM-144	-7.082E-01	65.0	4.605E-01	4.620E-01	1.492E+00
EU-152	1.068E+00	37.8	4.037E-01	4.075E-01	6.204E+00
EU-154	2.810E+00	102.8	2.890E+00	2.893E+00	1.003E+01
EU-155	1.409E+00	177.2	2.496E+00	2.497E+00	8.344E+00
HF-181	1.648E-01	156.8	2.584E-01	2.585E-01	1.922E+00
Ta-182	1.600E+00	111.6	1.785E+00	1.786E+00	6.330E+00
Hg-203	-2.905E-01	148.4	4.312E-01	4.315E-01	1.468E+00
TL-208	1.744E+00	17.1	2.990E-01	3.124E-01	3.780E-01
pm-146	8.879E-01	121.8	1.082E+00	1.083E+00	2.655E+00
y-88	3.491E-01	105.1	3.669E-01	3.674E-01	9.052E-01
Cd-113m	-6.118E+03	96.4	5.897E+03	5.910E+03	1.980E+04
Cd-109	0.000E+00	1.#INF	1.491E+01	1.491E+01	4.983E+01
Cf-251	9.749E-01	127.0	1.239E+00	1.242E+00	3.258E+00
Cf-249	4.105E-01	117.1	4.805E-01	4.809E-01	1.643E+00
Sn-126	-3.747E-01	1115.6	4.180E+00	4.180E+00	1.427E+01
PB-210	3.430E+01	28.3	9.723E+00	9.929E+00	2.284E+01
PB-212	2.256E+00	22.5	5.066E-01	5.272E-01	1.364E+00
PB-214	6.125E+00	12.6	7.719E-01	8.350E-01	1.670E+00
BI-207	-2.900E-02	972.1	2.819E-01	2.819E-01	1.039E+00
BI-212	4.483E+00	106.0	4.753E+00	4.759E+00	1.642E+01
U-235	-2.178E-01	1163.8	2.534E+00	2.534E+00	1.049E+01
BI-214	3.816E+00	23.1	8.814E-01	9.034E-01	1.956E+00
BI-210M	5.147E-01	107.2	5.519E-01	5.528E-01	1.870E+00
AC-228	4.566E+00	32.0	1.461E+00	1.480E+00	2.855E+00
TH-227	-1.795E+00	329.7	5.919E+00	5.920E+00	2.020E+01
TH-229	-7.335E+00	98.4	7.217E+00	7.240E+00	1.857E+01
TH-234	1.883E+01	21.8	4.115E+00	4.231E+00	2.180E+01
PA-231	-1.153E+01	172.6	1.990E+01	1.991E+01	6.714E+01
PA-233	7.450E-01	199.5	1.486E+00	1.487E+00	5.035E+00
PA-234	1.451E+00	126.7	1.839E+00	1.841E+00	5.789E+00
PA-234M	-6.015E+01	172.1	1.035E+02	1.036E+02	3.554E+02
AM-241	-1.014E+00	126.0	1.277E+00	1.278E+00	4.287E+00
Np-237	0.000E+00	1.#INF	3.919E+00	3.919E+00	1.314E+01
Ir-192	-7.064E-03	103.2	7.288E-03	7.300E-03	1.646E+00
Cs-136	1.253E-01	74.0	9.275E-02	9.303E-02	2.102E+00
Np-239	7.995E-01	283.7	2.268E+00	2.269E+00	7.608E+00
Nd-147	-2.059E-01	1430.5	2.945E+00	2.945E+00	7.535E+00
TL-210	3.125E-01	106.5	3.329E-01	3.333E-01	1.159E+00
Total	2.774E+02				

Analyst: kody Saulters

TestAmerica Inc Spectrum name: 15_Gamma_20182596.An1

Sample description
376740_Gamma_160-29479-A-7-B

Spectrum Filename: C:\User\SPC\Det15\15_Gamma_20182596.An1

Acquisition information
Start time: 8/9/2018 6:37:22 AM
Live time: 1800
Real time: 1801
Dead time: 0.07 %
Detector ID: 15

Detector system
Ge15 SN/11012216

Calibration
Filename: 15_Soil_TunaCan.Clb
15_TunaCan_90099_032212

Energy Calibration
Created: 2/28/2012 4:29:17 PM
Zero offset: 0.044 keV
Gain: 0.250 keV/channel
Quadratic: -3.267E-08 keV/channel^2

Efficiency Calibration
Created: 3/22/2012 1:03:01 PM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.00 %
Log(Eff): -6.894897E-01 + (-3.290613E-01*Log(E)) + (-3.875629E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.13 %
Log(Eff): -2.362677E+01 + (8.666669E+00*Log(E)) + (-9.214638E-01*Log(E)^2)

Library Files
Main analysis library: Client_Long_Rev14.lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G800W064
Start channel: 100 (25.06keV)
Stop channel: 8000 (1999.52keV)
Peak rejection level: 1000.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00 +/- 0.000E+00%
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	8/9/2018 6:37:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	15_2018-07-21_1011.PBC 7/21/2018 10:11:36 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 18 cutoff: 5.00E+01 %

Energy Calibration

Normalized diff: 0.2066

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.35	51.	28.34	1.64	1.957E-02	46.54	4.250	3.430E+01	PB210
63.11	41.	34.45	0.96	2.924E-02	63.29	3.810	PBC<MDA	TH234
74.52	31.	46.86	0.44	3.371E-02				
80.99	14.	125.51	0.98	3.557E-02	80.99	34.060	PBC<MDA	BA133
92.60	67.	26.88	0.91	3.776E-02	92.59	5.584	1.773E+01	TH234
					93.35	5.561	1.776E+01	AC228
103.38	10.	366.00	1.00	3.867E-02	103.20	21.800	PBC<MDA	Gd153
					103.70	24.000	6.182E-01	Np239
105.31	21.	177.18	1.00	3.876E-02	105.31	21.200	PBC<MDA	EU155
106.13	13.	283.70	1.00	3.878E-02	106.13	22.700	PBC<MDA	Np239
122.38	3.	426.47	1.02	3.846E-02	122.06	85.600	PBC<MDA	CO57
131.29	14.	152.35	1.02	3.775E-02	131.29	18.000	PBC<MDA	PA234
133.02	14.	156.80	1.03	3.759E-02	133.02	43.300	PBC<MDA	HF181
133.54	14.	161.29	1.03	3.754E-02	133.54	11.090	PBC<MDA	CE144
140.51	5.	470.59	1.03	3.678E-02	140.51	89.300	PBC<MDA	Tc99m
162.66	10.	147.65	1.05	3.378E-02	162.66	6.220	PBC<MDA	Ba140
176.60	10.	127.05	1.07	3.240E-02	176.60	17.000	PBC<MDA	Cf251
185.72	43.	36.39	1.07	3.123E-02	185.72	54.000	1.427E+00	U235
210.85	11.	129.68	1.10	2.844E-02	210.85	2.990	PBC<MDA	TH229
227.00	1.	972.59	1.11	2.691E-02	227.00	6.300	PBC<MDA	Cf251
238.62	46.	22.46	1.12	2.592E-02	238.63	43.300	2.256E+00	PB212
241.99	21.	42.53	1.12	2.565E-02	242.00	7.430	PBC<MDA	PB214

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
265.92	11.	107.23	1.14	2.388E-02	265.83	50.000	PBC<MDA	BI210M
294.63	58.	18.63	0.75	2.207E-02	295.09	19.300	7.529E+00	PB214
300.03	8.	84.49	1.17	2.177E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	PBC<MDA	PA231
					300.18	6.200	PBC<MDA	PA233
308.44	12.	161.45	1.18	2.131E-02	308.44	31.750	PBC<MDA	Ir192
312.01	10.	199.53	1.18	2.112E-02	312.01	36.000	PBC<MDA	PA233
340.57	13.	141.55	1.21	1.973E-02	340.57	46.900	PBC<MDA	Cs136
344.29	3.	521.43	1.21	1.956E-02	344.29	26.500	PBC<MDA	EU152
351.99	70.	16.98	0.78	1.923E-02	351.93	37.600	5.404E+00	PB214
383.84	9.	107.10	1.25	1.796E-02	383.84	8.940	PBC<MDA	BA133
387.95	9.	117.06	1.25	1.781E-02	387.95	66.000	PBC<MDA	Cf249
391.69	7.	136.55	1.25	1.767E-02	391.69	64.000	PBC<MDA	SN113
433.94	10.	93.01	1.29	1.629E-02	433.94	90.480	PBC<MDA	AG108M
463.37	9.	92.02	1.31	1.545E-02	463.37	10.470	PBC<MDA	SB125
487.02	8.	111.56	1.33	1.485E-02	487.02	45.500	PBC<MDA	La140
511.86	35.	51.27	2.60	1.426E-02	511.86	20.000	6.818E+00	RH106
569.47	4.	178.84	1.40	1.307E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	1.901E+00	PA234
					569.70	97.740	1.595E-01	BI207
583.02	34.	17.15	1.41	1.282E-02	583.02	84.500	1.744E+00	TL208
609.32	39.	23.10	1.37	1.236E-02	609.31	46.090	3.816E+00	BI214
621.92	7.	169.91	1.44	1.215E-02	621.92	9.930	PBC<MDA	RH106
635.89	3.	181.14	1.45	1.193E-02	635.89	11.310	PBC<MDA	SB125
702.63	15.	41.13	1.50	1.098E-02	702.63	97.900	7.644E-01	NB94
722.79	6.	131.74	1.52	1.072E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	3.137E-01	AG108M
					723.36	20.220	1.410E+00	EU154
727.17	6.	106.03	1.52	1.067E-02	727.17	7.550	PBC<MDA	BI212
747.16	6.	121.84	1.54	1.043E-02	747.16	34.000	PBC<MDA	pm146
765.79	6.	129.21	1.55	1.021E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	1.018E+02	PA234M
778.92	7.	37.80	1.56	1.007E-02	778.92	12.940	PBC<MDA	EU152
785.42	3.	250.62	1.57	9.998E-03	785.42	1.280	PBC<MDA	BI212
795.87	5.	87.91	1.57	9.887E-03	795.87	85.530	PBC<MDA	CS134
799.60	5.	106.52	1.58	9.848E-03	799.60	98.960	PBC<MDA	TL210
801.95	4.	150.78	1.58	9.823E-03	801.95	8.690	PBC<MDA	CS134
810.78	7.	38.49	1.59	9.733E-03	810.78	99.460	PBC<MDA	CO58
815.77	26.	24.25	1.59	9.682E-03	815.77	23.280	6.430E+00	La140
834.85	6.	92.51	1.60	9.494E-03	834.85	99.980	PBC<MDA	MN54
846.77	10.	31.62	1.61	9.380E-03	846.77	99.935	5.927E-01	Co56
871.10	8.	74.17	1.63	9.156E-03	871.10	99.890	PBC<MDA	NB94
873.23	6.	102.84	1.63	9.137E-03	873.23	12.270	PBC<MDA	EU154
880.53	8.	88.52	1.64	9.072E-03	880.53	6.000	PBC<MDA	PA234
883.24	3.	298.85	1.64	9.048E-03	883.24	9.600	PBC<MDA	PA234
898.04	5.	105.11	1.65	8.921E-03	898.04	93.700	PBC<MDA	y88
911.07	21.	32.00	1.66	8.811E-03	911.07	29.000	4.566E+00	AC228
964.11	2.	424.26	1.70	8.393E-03	964.11	14.605	PBC<MDA	EU152

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
968.97	6.	85.59	1.70	8.357E-03	968.97	17.460	PBC<MDA	AC228
1048.07	5.	103.83	1.75	7.808E-03	1048.07	80.000	PBC<MDA	Cs136
1050.36	1.	916.51	1.76	7.793E-03	1050.36	1.560	PBC<MDA	RH106
1099.25	6.	101.72	1.79	7.491E-03	1099.25	56.500	PBC<MDA	FE59
1121.08	25.	27.17	3.35	7.368E-03	1120.29	15.100	1.225E+01	BI214
					1120.55	99.987	PBC<MDA	Sc46
					1121.30	34.900	PBC<MDA	Ta182
1121.30	6.	134.60	1.80	7.362E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	4.731E-01	Sc46
					1121.30	34.900	1.356E+00	Ta182
1173.24	7.	107.76	1.84	7.076E-03	1173.24	99.900	PBC<MDA	CO60
1189.05	4.	177.92	1.85	6.994E-03	1189.05	16.200	PBC<MDA	Ta182
1274.53	9.	33.33	1.90	6.579E-03	1274.53	99.940	7.605E-01	NA22
					1274.54	35.190	2.160E+00	EU154
1313.00	6.	101.72	1.93	6.408E-03	1313.00	21.000	PBC<MDA	TL210
1332.50	11.	30.43	1.94	6.325E-03	1332.50	99.980	9.624E-01	CO60
1384.30	2.	248.05	1.97	6.114E-03	1384.30	24.290	PBC<MDA	AG110M
1408.00	5.	44.72	1.98	6.023E-03	1408.00	21.005	PBC<MDA	EU152
1460.95	195.	7.25	1.78	5.828E-03	1460.83	10.670	1.746E+02	K40
1763.72	1.	389.38	2.18	4.916E-03	1764.49	15.400	PBC<MDA	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
297.70	74.52	60.	31.	9.195E+02	46.86	0.437	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev14.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV	
PB-210	185.06	46.35	46.	51.	0.029	28.34	1.636	s
TH-227	200.23	50.14	172.	-6.	-0.003	329.67	0.950	s
AM-241	237.79	59.54	246.	-18.	-0.010	126.00	0.958	s
TH-234	252.78	63.29	77.	41.	0.023	34.45	0.962	D
BA-133	323.54	80.99	85.	14.	0.008	125.51	0.978	s
Np-237	345.53	86.49	570.	0.	0.000	236.57	0.983	A
EU-155	345.74	86.54	763.	-21.	-0.012	189.25	0.983	s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Sn-126	347.33	86.94	721.	-21.	-0.012	183.97	0.984
Sn-126	349.84	87.57	675.	-21.	-0.012	178.00	0.984s
Cd-109	351.72	88.04	700.	0.	0.000	181.12	0.985A
Nd-147	363.95	91.10	654.	-21.	-0.012	174.71	0.987s
TH-234	369.94	92.60	81.	67.	0.037	26.88	0.906s
AC-228	372.95	93.35	633.	-21.	-0.012	171.59	0.990s
Gd-153	389.54	97.50	666.	-21.	-0.012	175.25	0.993s
Np-239	397.53	99.50	687.	-12.	-0.007	301.35	0.995s
Gd-153	412.32	103.20	710.	10.	0.006	366.00	0.998s
Np-239	414.32	103.70	700.	0.	0.000	1000.00	0.999s
EU-155	420.77	105.31	671.	21.	0.012	177.18	1.001s
Np-239	424.03	106.13	639.	13.	0.007	283.70	1.001s
CO-57	487.72	122.06	63.	3.	0.001	426.47	1.016s
PA-234	524.63	131.29	214.	14.	0.008	152.35	1.024s
HF-181	531.54	133.02	227.	14.	0.008	156.80	1.026s
CE-144	533.60	133.54	241.	14.	0.008	161.29	1.026s
HF-181	544.63	136.30	269.	-15.	-0.008	155.08	1.029s
CO-57	545.33	136.47	250.	-9.	-0.005	254.16	1.029s
Tc-99m	561.46	140.51	236.	5.	0.003	470.59	1.032s
CE-141	581.17	145.44	84.	-13.	-0.007	131.73	1.037s
Ba-140	650.01	162.66	104.	10.	0.006	147.65	1.053s
U-235	652.88	163.38	114.	0.	0.000	1000.00	1.053s
CE-139	662.77	165.85	132.	-17.	-0.009	99.89	1.055s
Cf-251	705.73	176.60	40.	10.	0.005	127.05	1.065s
U-235	742.19	185.72	59.	43.	0.024	36.39	1.073s
TH-229	773.33	193.51	81.	-18.	-0.010	98.38	1.080s
U-235	820.60	205.33	59.	-3.	-0.001	540.83	1.091
TH-229	842.65	210.85	55.	11.	0.006	129.68	1.096s
Cf-251	907.22	227.00	48.	1.	0.001	972.59	1.110s
PB-212	953.72	238.63	28.	46.	0.025	22.46	1.120D
PB-214	967.17	242.00	30.	21.	0.012	42.53	1.123D
EU-152	977.95	244.69	214.	-18.	-0.010	58.61	1.126s
TH-227	1024.12	256.24	59.	-14.	-0.008	108.28	1.136s
Cd-113m	1053.94	263.70	109.	-16.	-0.009	96.39	1.142s
BI-210M	1062.46	265.83	65.	11.	0.006	107.23	1.144s
TL-208	1108.25	277.28	85.	-16.	-0.009	87.69	1.154s
Hg-203	1115.91	279.20	101.	-10.	-0.005	148.40	1.156s
I-131	1136.30	284.30	52.	-15.	-0.008	80.28	1.160s
PB-214	1177.59	294.63	13.	58.	0.032	18.63	0.751s
TL-210	1183.08	296.00	281.	-13.	-0.007	186.42	1.170s
PB-212	1199.19	300.03	16.	8.	0.004	84.49	1.174D
PA-231	1199.35	300.07	268.	-13.	-0.007	181.67	1.174s
PA-233	1199.79	300.18	255.	-13.	-0.007	177.32	1.174s
PA-231	1209.66	302.65	242.	-13.	-0.007	172.58	1.176s
BA-133	1210.47	302.85	229.	-13.	-0.007	168.03	1.176s
Ir-192	1232.81	308.44	192.	12.	0.007	161.45	1.181
PA-233	1247.09	312.01	202.	10.	0.006	199.53	1.184s
Ir-192	1265.00	316.49	120.	-12.	-0.007	128.50	1.188s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CR-51	1279.37	320.08	150.	-15.	-0.009	42.50	1.191s
La-140	1314.06	328.76	149.	-13.	-0.007	49.59	1.199s
Cf-249	1332.77	333.44	162.	-9.	-0.005	198.98	1.203s
AC-228	1352.28	338.32	171.	0.	0.000	1000.00	1.207s
Cs-136	1361.28	340.57	153.	13.	0.007	141.55	1.209s
EU-152	1376.13	344.29	140.	3.	0.002	521.43	1.212
PB-214	1406.94	351.99	17.	70.	0.039	16.98	0.785s
BA-133	1422.97	356.00	132.	-13.	-0.007	130.48	1.222
I-131	1456.89	364.48	28.	0.	0.000	1000.00	1.229s
BA-133	1534.29	383.84	39.	9.	0.005	107.10	1.246s
Cf-249	1550.72	387.95	47.	9.	0.005	117.06	1.249s
SN-113	1565.67	391.69	46.	7.	0.004	136.55	1.253s
SB-125	1710.36	427.88	36.	-12.	-0.007	102.06	1.283s
AG-108M	1734.60	433.94	20.	10.	0.006	93.01	1.288s
pm-146	1814.35	453.88	26.	-8.	-0.004	134.82	1.304s
SB-125	1852.29	463.37	31.	9.	0.005	92.02	1.312s
Ir-192	1871.05	468.06	47.	-5.	-0.003	214.03	1.316s
BE-7	1909.18	477.60	66.	-4.	-0.002	241.92	1.324s
HF-181	1926.79	482.00	70.	0.	0.000	1000.00	1.328s
La-140	1946.87	487.02	36.	8.	0.004	111.56	1.332s
RU-103	1987.00	497.05	22.	-6.	-0.003	172.86	1.340s
RH-106	2046.22	511.86	42.	35.	0.019	51.27	2.602s
CS-134	2251.67	563.24	35.	-14.	-0.008	92.01	1.394s
CS-134	2276.00	569.32	22.	-2.	-0.001	402.49	1.399s
PA-234	2276.59	569.47	20.	4.	0.002	178.84	1.399s
BI-207	2277.52	569.70	21.	-1.	0.000	972.11	1.399s
TL-208	2330.79	583.02	0.	34.	0.019	17.15	1.410s
SB-125	2400.69	600.50	139.	-11.	-0.006	153.74	1.424s
SB-124	2409.62	602.73	128.	-2.	-0.001	764.70	1.425s
CS-134	2417.53	604.71	126.	0.	0.000	1000.00	1.427s
BI-214	2435.97	609.32	14.	39.	0.022	23.10	1.373
RU-103	2439.88	610.30	126.	0.	0.000	1000.00	1.431s
AG-108M	2455.81	614.28	126.	0.	0.000	1000.00	1.435s
PM-144	2470.93	618.06	126.	0.	0.000	1000.00	1.437s
RH-106	2486.35	621.92	69.	7.	0.004	169.91	1.440s
SB-125	2542.23	635.89	10.	3.	0.001	181.14	1.451s
I-131	2546.57	636.97	28.	-11.	-0.006	73.20	1.452s
AG-110M	2629.71	657.76	29.	-6.	-0.003	140.07	1.469s
CS-137	2645.30	661.66	34.	-1.	-0.001	834.67	1.472s
PM-144	2784.82	696.54	33.	-14.	-0.008	65.02	1.499s
NB-94	2809.17	702.63	5.	15.	0.008	41.13	1.503s
SB-124	2889.79	722.79	24.	6.	0.003	131.74	1.519s
AG-108M	2890.40	722.94	29.	0.	0.000	1000.00	1.519s
EU-154	2892.07	723.36	29.	0.	0.000	1000.00	1.519s
ZR-95	2895.44	724.20	29.	0.	0.000	1000.00	1.520s
BI-212	2907.33	727.17	20.	6.	0.004	106.03	1.522s
pm-146	2987.29	747.16	9.	6.	0.003	121.84	1.537s
ZR-95	3025.56	756.73	19.	-2.	-0.001	295.08	1.544s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
AG-110M	3054.42	763.94	25.	-5.	-0.003	145.27	1.550s
NB-95	3061.80	765.79	22.	6.	0.003	129.21	1.551s
PA-234M	3064.30	766.41	27.	-6.	-0.003	132.23	1.552s
EU-152	3114.33	778.92	0.	7.	0.004	37.80	1.561s
BI-212	3140.33	785.42	9.	3.	0.001	250.62	1.566s
CS-134	3182.12	795.87	9.	5.	0.003	87.91	1.574
TL-210	3197.05	799.60	14.	5.	0.003	106.52	1.577s
CS-134	3206.46	801.95	20.	4.	0.002	150.78	1.578s
CO-58	3241.75	810.78	0.	7.	0.004	38.49	1.585s
La-140	3261.74	815.77	7.	26.	0.014	24.25	1.589s
Cs-136	3272.66	818.50	53.	-8.	-0.004	136.00	1.591s
MN-54	3338.05	834.85	5.	6.	0.003	92.51	1.603s
Co-56	3385.75	846.77	0.	10.	0.006	31.62	1.612s
TL-208	3440.93	860.56	14.	-2.	-0.001	403.11	1.622
NB-94	3483.06	871.10	12.	8.	0.004	74.17	1.629s
EU-154	3491.60	873.23	14.	6.	0.003	102.84	1.631s
PA-234	3520.80	880.53	21.	8.	0.004	88.52	1.636s
PA-234	3531.64	883.24	29.	3.	0.001	298.85	1.638
AG-110M	3537.42	884.68	32.	0.	0.000	1000.00	1.639s
y-88	3590.85	898.04	5.	5.	0.003	105.11	1.649s
AC-228	3642.98	911.07	5.	21.	0.012	32.00	1.658s
AG-110M	3748.69	937.49	25.	-9.	-0.005	126.60	1.677s
PA-234	3782.81	946.02	25.	-9.	-0.005	126.60	1.683s
EU-152	3855.18	964.11	20.	2.	0.001	424.26	1.696s
AC-228	3874.63	968.97	10.	6.	0.003	85.59	1.699s
EU-154	3984.09	996.33	62.	-15.	-0.008	80.45	1.718s
PA-234M	4002.77	1001.00	77.	-7.	-0.004	172.12	1.722s
Cs-136	4191.11	1048.07	13.	5.	0.003	103.83	1.754s
RH-106	4200.27	1050.36	18.	1.	0.000	916.51	1.755s
BI-207	4253.49	1063.66	15.	-6.	-0.003	147.67	1.765s
Ga-68	4308.47	1077.40	20.	-5.	-0.003	201.66	1.774s
FE-59	4395.90	1099.25	5.	6.	0.003	101.72	1.789s
EU-152	4447.22	1112.07	60.	-4.	-0.002	267.79	1.797s
ZN-65	4461.11	1115.55	56.	0.	0.000	1000.00	1.800s
BI-214	4483.25	1121.08	4.	25.	0.014	27.17	3.353s
Sc-46	4481.13	1120.55	56.	0.	0.000	1000.00	1.803s
Ta-182	4484.13	1121.30	32.	6.	0.003	134.60	1.803s
CO-60	4691.97	1173.24	11.	7.	0.004	107.76	1.838s
Ta-182	4755.25	1189.05	11.	4.	0.002	177.92	1.848s
Ta-182	4884.75	1221.41	21.	-2.	-0.001	454.68	1.869s
NA-22	5097.34	1274.53	0.	9.	0.005	33.33	1.902s
EU-154	5097.40	1274.54	9.	0.	0.000	1000.00	1.902s
FE-59	5165.64	1291.60	16.	-3.	-0.002	308.52	1.913s
TL-210	5251.31	1313.00	5.	6.	0.003	101.72	1.926s
CO-60	5329.36	1332.50	0.	11.	0.006	30.43	1.938s
AG-110M	5536.68	1384.30	6.	2.	0.001	248.05	1.970s
EU-152	5631.56	1408.00	0.	5.	0.003	44.72	1.984s
K-40	5843.52	1460.95	3.	195.	0.109	7.25	1.782

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
La-140	6384.98	1596.21	0.	0.	0.000	1000.00	2.092s
SB-124	6764.43	1690.98	0.	0.	0.000	1000.00	2.142s
BI-214	7058.76	1764.49	13.	1.	0.001	389.38	2.181s
Co-56	7086.23	1771.35	4.	0.	0.000	1000.00	2.184s
y-88	7345.35	1836.06	0.	0.	0.000	1000.00	2.216s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
BE-7	C	-1.4420E+00				5.31E+01	
			477.60	-1.442E+00 ?	(P	1.422E+01	2.42E+02 1.05E+01 G
NA-22	C	7.6046E-01				9.50E+02	
			1274.53	7.605E-01 ?	(	6.227E-01	3.33E+01 9.99E+01 G
K-40	N	1.7464E+02				4.66E+11	
			1460.83	1.746E+02	(P	9.037E+00	7.25E+00 1.07E+01 G
Sc-46	F	-2.6125E-02				8.38E+01	
			889.28	-2.613E-02 %	(P	1.806E+00	1.50E+03 1.00E+02 G
			1120.55	0.000E+00 +		2.835E+00	1.00E+03 1.00E+02 G
CR-51	F	-4.1782E+00				2.77E+01	
			320.08	-4.178E+00 ?	(P	1.615E+01	4.25E+01 9.94E+00 G
MN-54	C	3.2615E-01				3.12E+02	
			834.85	3.261E-01 ?	(	7.478E-01	9.25E+01 1.00E+02 G
FE-59	F	7.4382E-01				4.45E+01	
			1099.25	7.438E-01 ?	(	1.768E+00	1.02E+02 5.65E+01 G
			1291.60	-5.934E-01 -		4.223E+00	3.09E+02 4.32E+01 G
Co-56	C	5.9267E-01				7.73E+01	
			846.77	5.927E-01 ?	(	4.368E-01	3.16E+01 9.99E+01 G
			1238.28	2.857E-02 %	P	3.342E+00	5.13E+03 6.61E+01 G
			1037.84	3.057E-01 %	P	8.852E+00	1.15E+03 1.41E+01 G
			1771.35	0.000E+00 -		8.814E+00	1.00E+03 1.55E+01 A
CO-57	C	4.4999E-02				2.72E+02	
			122.06	4.500E-02 ?	(	6.715E-01	4.26E+02 8.56E+01 G
			136.47	-1.240E+00 &		1.067E+01	2.54E+02 1.07E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CO-58	C	3.8734E-01					7.09E+01	
			810.78	3.873E-01	?(	4.230E-01	3.85E+01	9.95E+01 G
CO-60	F	9.6241E-01					1.93E+03	
			1332.50	9.624E-01	&(P	6.475E-01	3.04E+01	1.00E+02 G
			1173.24	5.763E-01	-	1.409E+00	1.08E+02	9.99E+01 G
NB-94	I	6.1354E-01					7.41E+06	
			702.63	7.644E-01	?(P	6.897E-01	4.11E+01	9.79E+01 G
			871.10	4.657E-01	?(	1.159E+00	7.42E+01	9.99E+01 G
ZR-95	I	-2.2323E-01					6.40E+01	
			756.73	-2.232E-01	?(P	2.290E+00	2.95E+02	5.45E+01 G
			724.20	0.000E+00	+	3.268E+00	1.00E+03	4.42E+01 G
NB-95	I	2.9978E-01					6.40E+01	
			765.79	2.998E-01	?(	1.353E+00	1.29E+02	9.98E+01 G
RU-103	I	-2.3716E-01					3.93E+01	
			497.05	-2.372E-01	?(	1.021E+00	1.73E+02	9.09E+01 G
			610.30	0.000E+00	+	4.306E+01	1.00E+03	5.75E+00 GA
RH-106	I	3.2304E+00					3.74E+02	
			621.92	3.259E+00	?(	1.904E+01	1.70E+02	9.93E+00 G
			1050.36	3.046E+00	?(	1.036E+02	9.17E+02	1.56E+00 G
			511.86	6.818E+00	?	6.411E+00	5.13E+01	2.00E+01 GA
AG-108M	C	3.7728E-01					1.53E+05	
			433.94	3.773E-01	?(	8.876E-01	9.30E+01	9.05E+01 G
			722.94	0.000E+00	-	1.586E+00	1.00E+03	9.08E+01 G
			614.28	0.000E+00	-	2.770E+00	1.00E+03	8.98E+01 G
AG-110M	F	2.1864E-01					2.50E+02	
			884.68	0.000E+00	?(	2.459E+00	1.00E+03	7.27E+01 G
			657.76	-2.867E-01	+	1.399E+00	1.40E+02	9.46E+01 G
			937.49	-1.693E+00	+	4.891E+00	1.27E+02	3.44E+01 G
			1384.30	8.728E-01	?(	5.163E+00	2.48E+02	2.43E+01 G
			763.94	-1.136E+00	+ P	6.298E+00	1.45E+02	2.23E+01 G
SN-113	F	3.5735E-01					1.15E+02	
			391.69	3.573E-01	?(P	1.679E+00	1.37E+02	6.40E+01 G
SB-124	F	1.7542E-01					6.02E+01	
			602.73	-9.527E-02	?(	2.514E+00	7.65E+02	9.83E+01 G
			1690.98	0.000E+00	+	1.677E+00	1.00E+03	4.78E+01 G
			722.79	2.636E+00	?(	1.213E+01	1.32E+02	1.08E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
SB-125	I	-1.9154E-01					1.01E+03	
			427.88	-1.367E+00	?(	3.494E+00	1.02E+02	2.96E+01 G
			600.50	-2.751E+00	+	1.434E+01	1.54E+02	1.79E+01 G
			635.89	1.098E+00	+	7.282E+00	1.81E+02	1.13E+01 G
			463.37	3.132E+00	?(	9.790E+00	9.20E+01	1.05E+01 G
Gd-153	F	-3.0140E-01					2.42E+02	
			97.50	-1.015E+00	&(	5.948E+00	1.75E+02	3.00E+01 G
			103.20	6.809E-01	?(	8.361E+00	3.66E+02	2.18E+01 G
Ga-68	C	-1.2871E+01					4.71E-02	
			1077.40	-1.287E+01	?(	6.062E+01	2.02E+02	3.30E+00 G
Tc-99m	I	8.0872E-02					2.51E-01	
			140.51	8.087E-02	&(	1.295E+00	4.71E+02	8.93E+01 G
BA-133	F	-5.9866E-01					3.85E+03	
			356.00	-5.987E-01	&(	2.641E+00	1.30E+02	6.20E+01 G
			302.85	-1.813E+00	+	1.028E+01	1.68E+02	1.83E+01 G
			383.84	2.996E+00	&	1.096E+01	1.07E+02	8.94E+00 GA
			80.99	6.441E-01	& P	2.094E+00	1.26E+02	3.41E+01 GA
CS-134	I	2.8940E-01					7.54E+02	
			604.71	0.000E+00	?(	2.517E+00	1.00E+03	9.76E+01 G
			795.87	3.595E-01	?(	1.088E+00	8.79E+01	8.55E+01 G
			569.32	-4.605E-01	+	6.742E+00	4.02E+02	1.54E+01 G
			801.95	2.851E+00	?(	1.520E+01	1.51E+02	8.69E+00 G
			563.24	-6.895E+00	+	1.521E+01	9.20E+01	8.35E+00 G
CS-137	I	-5.6471E-02					1.10E+04	
			661.66	-5.647E-02	?(	1.695E+00	8.35E+02	8.52E+01 G
CE-139	F	-3.4450E-01					1.38E+02	
			165.85	-3.445E-01	?(	1.155E+00	9.99E+01	7.99E+01 G
Ba-140	I	6.1098E-01					1.28E+01	
			537.26	9.240E-02	%(P	3.684E+00	1.54E+03	2.44E+01 G
			162.66	2.644E+00	?(	1.328E+01	1.48E+02	6.22E+00 G
			304.85	-9.095E-01	&	4.293E+01	1.38E+03	4.29E+00 G
La-140	I	1.0944E+00					1.28E+01	
			1596.21	0.000E+00	?(	7.974E-01	1.00E+03	9.54E+01 G
			487.02	6.594E-01	?(	2.522E+00	1.12E+02	4.55E+01 G
			328.76	-1.806E+00	& P	8.031E+00	4.96E+01	2.03E+01 G
			815.77	6.430E+00	?(P	3.688E+00	2.42E+01	2.33E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CE-141	I	-4.2480E-01					3.25E+01	
			145.44	-4.248E-01	?(	1.450E+00	1.32E+02	4.82E+01 G
CE-144	I	1.8430E+00					2.85E+02	
			133.54	1.843E+00	?(	1.002E+01	1.61E+02	1.11E+01 G
PM-144	C	-7.0822E-01					3.63E+02	
			696.54	-7.082E-01	?(P	1.492E+00	6.50E+01	9.90E+01 G
			618.06	0.000E+00	&	2.525E+00	1.00E+03	9.91E+01 G
EU-152	F	1.0681E+00					4.94E+03	
			344.29	3.462E-01	?(	6.204E+00	5.21E+02	2.65E+01 G
			1112.07	-2.288E+00	+	2.134E+01	2.68E+02	1.36E+01 G
			121.78	-5.052E-02	%	2.049E+00	1.15E+03	2.86E+01 G
			778.92	2.985E+00	?(	3.143E+00	3.78E+01	1.29E+01 G
			964.11	6.798E-01	?(	1.055E+01	4.24E+02	1.46E+01 G
			244.69	-5.095E+00	+ P	2.041E+01	5.86E+01	7.58E+00 G
			1408.00	2.196E+00	?	3.237E+00	4.47E+01	2.10E+01 GA
EU-154	I	2.8099E+00					3.14E+03	
			873.23	2.810E+00	?(	1.003E+01	1.03E+02	1.23E+01 G
			123.10	2.365E-02	%	1.531E+00	1.85E+03	4.08E+01 G
			1274.54	0.000E+00	-	4.005E+00	1.00E+03	3.52E+01 G
			723.36	0.000E+00	-	7.129E+00	1.00E+03	2.02E+01 G
			1004.77	-3.809E-01	%	1.749E+01	1.32E+03	1.80E+01 G
			996.33	-9.403E+00	+	2.531E+01	8.04E+01	1.06E+01 G
EU-155	I	1.4087E+00					1.81E+03	
			105.31	1.409E+00	?(	8.344E+00	1.77E+02	2.12E+01 G
			86.54	-1.022E+00	+	6.464E+00	1.89E+02	3.07E+01 G
HF-181	F	1.6480E-01					4.24E+01	
			482.00	0.000E+00	?(	1.922E+00	1.00E+03	8.05E+01 G
			133.02	4.712E-01	?(	2.491E+00	1.57E+02	4.33E+01 G
			345.83	-2.837E-01	%	1.111E+01	1.14E+03	1.51E+01 G
			136.30	-3.866E+00	+	2.017E+01	1.55E+02	5.85E+00 G
Ta-182	F	1.5998E+00					1.14E+02	
			1121.30	1.356E+00	(	6.330E+00	1.35E+02	3.49E+01 G
			1221.41	-7.029E-01	-	7.300E+00	4.55E+02	2.70E+01 G
			1189.05	2.125E+00	?(	8.792E+00	1.78E+02	1.62E+01 G
Hg-203	F	-2.9054E-01					4.66E+01	
			279.20	-2.905E-01	&(	1.468E+00	1.48E+02	8.15E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
TL-208	N	1.7437E+00					6.98E+02	
			583.02	1.744E+00	?(	3.780E-01	1.71E+01	8.45E+01 G
			277.28	-5.913E+00	&	1.739E+01	8.77E+01	6.31E+00 G
			860.56	-9.670E-01	-	9.740E+00	4.03E+02	1.24E+01 G
pm-146	C	8.8788E-01					2.02E+03	
			747.16	8.879E-01	?(	2.655E+00	1.22E+02	3.40E+01 G
			735.72	1.037E-01	% P	4.000E+00	1.48E+03	2.25E+01 G
			453.88	-4.351E-01	-	1.440E+00	1.35E+02	6.50E+01 G
y-88	F	3.4907E-01					1.07E+02	
			898.04	3.491E-01	&(P	9.052E-01	1.05E+02	9.37E+01 G
			1836.06	0.000E+00	-	8.706E-01	1.00E+03	9.92E+01 G
Cd-113m		-6.1179E+03					5.33E+03	
			263.70	-6.118E+03	?(	1.980E+04	9.64E+01	6.00E-03 K
Cf-251	T	9.7491E-01					3.28E+05	
			176.60	9.749E-01	(	3.258E+00	1.27E+02	1.70E+01 G
			227.00	4.369E-01	?	1.143E+01	9.73E+02	6.30E+00 GA
Cf-249	T	4.1045E-01					1.28E+05	
			387.95	4.105E-01	?(	1.643E+00	1.17E+02	6.60E+01 G
			333.44	-1.636E+00	+	1.106E+01	1.99E+02	1.55E+01 G
Sn-126		-3.7470E-01					3.65E+07	
			87.57	-8.333E-01	}	4.959E+00	1.78E+02	3.75E+01 GA
			64.28	-3.747E-01	%(	1.427E+01	1.12E+03	9.70E+00 G
			86.94	-3.465E+00	}	2.131E+01	1.84E+02	9.04E+00 GA
PB-210	N	3.4305E+01					8.14E+03	
			46.54	3.430E+01	*(P	2.284E+01	2.83E+01	4.25E+00 G
PB-212	N	2.2558E+00					6.98E+02	
			238.63	2.256E+00	(P	1.364E+00	2.25E+01	4.33E+01 G
			300.03	5.871E+00	+ P	1.682E+01	8.45E+01	3.28E+00 GA
PB-214	N	6.1250E+00					5.84E+05	
			351.93	5.404E+00	(	1.670E+00	1.70E+01	3.76E+01 G
			295.09	7.529E+00	(	2.575E+00	1.86E+01	1.93E+01 G
			242.00	6.164E+00		8.214E+00	4.25E+01	7.43E+00 GA
BI-207	C	-2.9002E-02					1.18E+04	
			569.70	-2.900E-02	?(	1.039E+00	9.72E+02	9.77E+01 G
			1063.66	-5.804E-01	+	2.008E+00	1.48E+02	7.45E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
BI-212	N	4.4830E+00					6.98E+02	
			727.17	4.483E+00	?(	1.642E+01	1.06E+02	7.55E+00 G
			785.42	1.158E+01	?	7.357E+01	2.51E+02	1.28E+00 GA
U-235	N	-2.1775E-01					2.57E+11	
			143.79	-2.178E-01	&(P	1.049E+01	1.16E+03	1.10E+01 G
			205.33	-1.020E+00	+	1.468E+01	5.41E+02	5.01E+00 G
			163.38	0.000E+00	&	1.704E+01	1.00E+03	5.08E+00 G
			185.72	1.427E+00	*	1.265E+00	3.64E+01	5.40E+01 GA
BI-214	N	3.8157E+00					5.84E+05	
			609.31	3.816E+00	(P	1.956E+00	2.31E+01	4.61E+01 G
			1120.29	1.225E+01	+ P	6.267E+00	2.72E+01	1.51E+01 G
			1764.49	9.785E-01	- P	1.416E+01	3.89E+02	1.54E+01 G
BI-210M	T	5.1472E-01					1.10E+09	
			265.83	5.147E-01	?(P	1.870E+00	1.07E+02	5.00E+01 G
			304.90	4.614E-02	&	6.563E+00	4.15E+03	2.80E+01 G
AC-228	N	4.5657E+00					2.10E+03	
			911.07	4.566E+00	(	2.855E+00	3.20E+01	2.90E+01 G
			968.97	2.250E+00	-	6.596E+00	8.56E+01	1.75E+01 G
			338.32	0.000E+00	-	1.483E+01	1.00E+03	1.20E+01 G
			93.35	-5.519E+00	-	3.166E+01	1.72E+02	5.56E+00 XA
TH-227	N	-1.7955E+00					7.95E+03	
			50.14	-1.795E+00	&(	2.020E+01	3.30E+02	8.00E+00 G
			256.24	-4.416E+00	+	1.241E+01	1.08E+02	7.00E+00 G
TH-229	N	-7.3351E+00					2.68E+06	
			193.51	-7.335E+00	?(	1.857E+01	9.84E+01	4.40E+00 G
			210.85	7.188E+00	&	2.435E+01	1.30E+02	2.99E+00 G
TH-234	N	1.8832E+01					1.63E+12	
			63.29	2.045E+01	(P	2.180E+01	3.45E+01	3.81E+00 G
			92.59	1.773E+01	@(P	1.175E+01	2.69E+01	5.58E+00 G
PA-231	N	-1.1532E+01					1.20E+07	
			302.65	-1.153E+01	?(	6.714E+01	1.73E+02	2.88E+00 G
			300.07	-1.339E+01	+	8.199E+01	1.82E+02	2.46E+00 G
PA-233	C	7.4496E-01					7.82E+08	
			312.01	7.450E-01	?(	5.035E+00	2.00E+02	3.60E+01 G
			300.18	-5.313E+00	+	3.178E+01	1.77E+02	6.20E+00 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
PA-234	N	1.4515E+00					1.63E+12	
			131.29	1.127E+00	&(	5.789E+00	1.52E+02	1.80E+01 G
			946.02	-4.374E+00	+	1.264E+01	1.27E+02	1.34E+01 G
			569.47	1.901E+00	?(	1.212E+01	1.79E+02	8.20E+00 G
			883.24	1.677E+00	?(	1.789E+01	2.99E+02	9.60E+00 G
			880.53	8.211E+00	?	2.473E+01	8.85E+01	6.00E+00 GA
PA-234M	N	-6.0152E+01					1.63E+12	
			1001.00	-6.015E+01	?(	3.554E+02	1.72E+02	8.37E-01 G
			766.41	-1.080E+02	+	4.971E+02	1.32E+02	2.94E-01 G
AM-241	T	-1.0137E+00					1.58E+05	
			59.54	-1.014E+00	?(	4.287E+00	1.26E+02	3.59E+01 G
Ir-192	F	-7.0638E-03					7.40E+01	
			316.49	-3.785E-01	?(	1.646E+00	1.29E+02	8.70E+01 G
			468.06	-3.237E-01	+	2.418E+00	2.14E+02	5.18E+01 G
			308.44	1.011E+00	&(	5.518E+00	1.61E+02	3.18E+01 G
Cs-136	F	1.2530E-01					1.30E+01	
			818.50	-4.501E-01	?(	2.102E+00	1.36E+02	1.00E+02 G
			1048.07	4.743E-01	?(	1.716E+00	1.04E+02	8.00E+01 G
			340.57	7.567E-01	?(	3.622E+00	1.42E+02	4.69E+01 G
Np-239	T	7.9947E-01					2.36E+00	
			103.70	0.000E+00	-	7.536E+00	1.00E+03	2.40E+01 X
			106.13	7.995E-01	&(	7.608E+00	2.84E+02	2.27E+01 G
			99.50	-1.190E+00	&	1.203E+01	3.01E+02	1.50E+01 X
Nd-147		-2.0586E-01					1.11E+01	
			531.00	-2.059E-01	%(	7.535E+00	1.43E+03	1.30E+01 G
			91.10	-1.091E+00	+	6.373E+00	1.75E+02	2.83E+01 G
TL-210	N	3.1248E-01					5.84E+05	
			799.60	3.125E-01	?(	1.159E+00	1.07E+02	9.90E+01 G
			296.00	-4.112E-01	+	2.584E+00	1.86E+02	7.90E+01 G
			1313.00	2.339E+00	?	5.562E+00	1.02E+02	2.10E+01 GA

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went
negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide

failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

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********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
TH-227	50.14	172.	-6.	-0.003	329.67	-1.795E+00	
AM-241	59.54	246.	-18.	-0.010	126.00	-1.014E+00	
BA-133	80.99	85.	14.	0.008	125.51	6.441E-01	P
EU-155	86.54	763.	-21.	-0.012	189.25	-1.022E+00	
Sn-126	86.94	721.	-21.	-0.012	183.97	-3.465E+00	
Sn-126	87.57	675.	-21.	-0.012	178.00	-8.333E-01	
Nd-147	91.10	654.	-21.	-0.012	174.71	-1.091E+00	
Np-239	99.50	687.	-12.	-0.007	301.35	-1.190E+00	
EU-155	105.31	671.	21.	0.012	177.18	1.409E+00	
Np-239	106.13	639.	13.	0.007	283.70	7.995E-01	
PA-234	131.29	214.	14.	0.008	152.35	1.127E+00	
HF-181	133.02	227.	14.	0.008	156.80	4.712E-01	
CE-144	133.54	241.	14.	0.008	161.29	1.843E+00	
HF-181	136.30	269.	-15.	-0.008	155.08	-3.866E+00	
CE-141	145.44	84.	-13.	-0.007	131.73	-4.248E-01	
Ba-140	162.66	104.	10.	0.006	147.65	2.644E+00	
CE-139	165.85	132.	-17.	-0.009	99.89	-3.445E-01	
Cf-251	176.60	40.	10.	0.005	127.05	9.749E-01	
U-235	185.72	59.	43.	0.024	36.39	1.427E+00	
TH-229	193.51	81.	-18.	-0.010	98.38	-7.335E+00	
U-235	205.33	59.	-3.	-0.001	540.83	-1.020E+00	
TH-229	210.85	55.	11.	0.006	129.68	7.188E+00	
Cf-251	227.00	48.	1.	0.001	972.59	4.369E-01	
EU-152	244.69	214.	-18.	-0.010	58.61	-5.095E+00	P
TH-227	256.24	59.	-14.	-0.008	108.28	-4.416E+00	
Cd-113m	263.70	109.	-16.	-0.009	96.39	-6.118E+03	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
Hg-203	279.20	101.	-10.	-0.005	148.40	-2.905E-01		
I-131	284.30	52.	-15.	-0.008	80.28	-5.914E+00		P
TL-210	296.00	281.	-13.	-0.007	186.42	-4.112E-01		
PA-231	300.07	268.	-13.	-0.007	181.67	-1.339E+01		
PA-233	300.18	255.	-13.	-0.007	177.32	-5.313E+00		
PA-231	302.65	242.	-13.	-0.007	172.58	-1.153E+01		
BA-133	302.85	229.	-13.	-0.007	168.03	-1.813E+00		
Ir-192	308.44	192.	12.	0.007	161.45	1.011E+00		
PA-233	312.01	202.	10.	0.006	199.53	7.450E-01		
Ir-192	316.49	120.	-12.	-0.007	128.50	-3.785E-01		
CR-51	320.08	150.	-15.	-0.009	42.50	-4.178E+00		P
Cf-249	333.44	162.	-9.	-0.005	198.98	-1.636E+00		
Cs-136	340.57	153.	13.	0.007	141.55	7.567E-01		
EU-152	344.29	140.	3.	0.002	521.43	3.462E-01		
BA-133	356.00	132.	-13.	-0.007	130.48	-5.987E-01		
BA-133	383.84	39.	9.	0.005	107.10	2.996E+00		
Cf-249	387.95	47.	9.	0.005	117.06	4.105E-01		
SN-113	391.69	46.	7.	0.004	136.55	3.573E-01		P
SB-125	427.88	36.	-12.	-0.007	102.06	-1.367E+00		
AG-108M	433.94	20.	10.	0.006	93.01	3.773E-01		
pm-146	453.88	26.	-8.	-0.004	134.82	-4.351E-01		
SB-125	463.37	31.	9.	0.005	92.02	3.132E+00		
Ir-192	468.06	47.	-5.	-0.003	214.03	-3.237E-01		
BE-7	477.60	66.	-4.	-0.002	241.92	-1.442E+00		P
RU-103	497.05	22.	-6.	-0.003	172.86	-2.372E-01		
RH-106	511.86	42.	35.	0.019	51.27	6.818E+00		
CS-134	563.24	35.	-14.	-0.008	92.01	-6.895E+00		
CS-134	569.32	22.	-2.	-0.001	402.49	-4.605E-01		
PA-234	569.47	20.	4.	0.002	178.84	1.901E+00		
BI-207	569.70	21.	-1.	0.000	972.11	-2.900E-02		
SB-125	600.50	139.	-11.	-0.006	153.74	-2.751E+00		
SB-124	602.73	128.	-2.	-0.001	764.70	-9.527E-02		
RH-106	621.92	69.	7.	0.004	169.91	3.259E+00		
SB-125	635.89	10.	3.	0.001	181.14	1.098E+00		
I-131	636.97	28.	-11.	-0.006	73.20	-7.341E+00		
AG-110M	657.76	29.	-6.	-0.003	140.07	-2.867E-01		
CS-137	661.66	34.	-1.	-0.001	834.67	-5.647E-02		
PM-144	696.54	33.	-14.	-0.008	65.02	-7.082E-01		P
NB-94	702.63	5.	15.	0.008	41.13	7.644E-01		P
SB-124	722.79	24.	6.	0.003	131.74	2.636E+00		
BI-212	727.17	20.	6.	0.004	106.03	4.483E+00		
pm-146	747.16	9.	6.	0.003	121.84	8.879E-01		
ZR-95	756.73	19.	-2.	-0.001	295.08	-2.232E-01		P
AG-110M	763.94	25.	-5.	-0.003	145.27	-1.136E+00		P
NB-95	765.79	22.	6.	0.003	129.21	2.998E-01		
PA-234M	766.41	27.	-6.	-0.003	132.23	-1.080E+02		
EU-152	778.92	0.	7.	0.004	37.80	2.985E+00		
BI-212	785.42	9.	3.	0.001	250.62	1.158E+01		

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Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
CS-134	795.87	9.	5.	0.003	87.91	3.595E-01		
TL-210	799.60	14.	5.	0.003	106.52	3.125E-01		
CS-134	801.95	20.	4.	0.002	150.78	2.851E+00		
CO-58	810.78	0.	7.	0.004	38.49	3.873E-01		
Cs-136	818.50	53.	-8.	-0.004	136.00	-4.501E-01		
MN-54	834.85	5.	6.	0.003	92.51	3.261E-01		
NB-94	871.10	12.	8.	0.004	74.17	4.657E-01		
EU-154	873.23	14.	6.	0.003	102.84	2.810E+00		
PA-234	880.53	21.	8.	0.004	88.52	8.211E+00		
PA-234	883.24	29.	3.	0.001	298.85	1.677E+00		
y-88	898.04	5.	5.	0.003	105.11	3.491E-01	P	
AG-110M	937.49	25.	-9.	-0.005	126.60	-1.693E+00		
PA-234	946.02	25.	-9.	-0.005	126.60	-4.374E+00		
EU-152	964.11	20.	2.	0.001	424.26	6.798E-01		
EU-154	996.33	62.	-15.	-0.008	80.45	-9.403E+00		
PA-234M	1001.00	77.	-7.	-0.004	172.12	-6.015E+01		
Cs-136	1048.07	13.	5.	0.003	103.83	4.743E-01		
RH-106	1050.36	18.	1.	0.000	916.51	3.046E+00		
BI-207	1063.66	15.	-6.	-0.003	147.67	-5.804E-01		
Ga-68	1077.40	20.	-5.	-0.003	201.66	-1.287E+01		
FE-59	1099.25	5.	6.	0.003	101.72	7.438E-01		
EU-152	1112.07	60.	-4.	-0.002	267.79	-2.288E+00		
Ta-182	1121.30	32.	6.	0.003	134.60	1.356E+00		
Ta-182	1189.05	11.	4.	0.002	177.92	2.125E+00		
Ta-182	1221.41	21.	-2.	-0.001	454.68	-7.029E-01		
FE-59	1291.60	16.	-3.	-0.002	308.52	-5.934E-01		
TL-210	1313.00	5.	6.	0.003	101.72	2.339E+00		
AG-110M	1384.30	6.	2.	0.001	248.05	8.728E-01		
EU-152	1408.00	0.	5.	0.003	44.72	2.196E+00		

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
BE-7	#A	-1.4420E+00	-1.4420E+00	2.419E+02%	1.42E+01
NA-22	#	7.6046E-01	7.6046E-01	3.333E+01%	6.23E-01
K-40		1.7464E+02	1.7464E+02	7.252E+00%	9.04E+00
Sc-46	#A	-2.6125E-02	-2.6125E-02	1.501E+03%	1.81E+00
CR-51	#A	-4.1782E+00	-4.1782E+00	4.250E+01%	1.62E+01
MN-54	#A	3.2615E-01	3.2615E-01	9.251E+01%	7.48E-01
FE-59	#A	7.4382E-01	7.4382E-01	1.017E+02%	1.77E+00
Co-56	#	5.9267E-01	5.9267E-01	3.162E+01%	4.37E-01
CO-57	#A	4.4999E-02	4.4999E-02	4.265E+02%	6.72E-01
CO-58	#A	3.8734E-01	3.8734E-01	3.849E+01%	4.23E-01
CO-60	#	9.6241E-01	9.6241E-01	3.043E+01%	6.47E-01

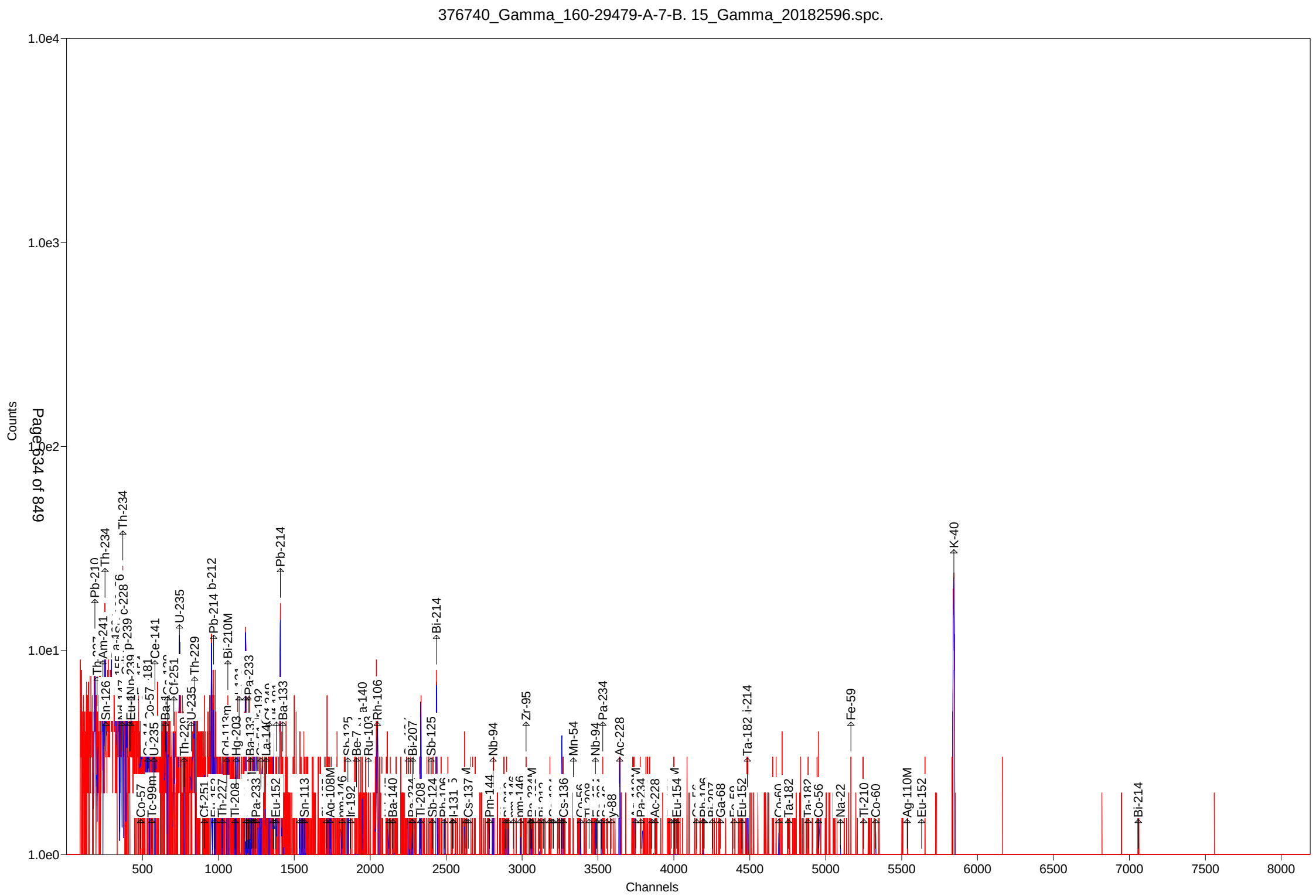
ZN-65	#A	0.0000E+00	0.0000E+00	1.000E+03%	5.58E+00
NB-94	#A	6.1354E-01	6.1354E-01	4.113E+01%	6.90E-01
ZR-95	#A	-2.2323E-01	-2.2323E-01	2.951E+02%	2.29E+00
NB-95	#A	2.9978E-01	2.9978E-01	1.292E+02%	1.35E+00
RU-103	#A	-2.3716E-01	-2.3716E-01	1.729E+02%	1.02E+00
RH-106	#A	3.2304E+00	3.2304E+00	1.699E+02%	1.90E+01
AG-108M	#A	3.7728E-01	3.7728E-01	9.301E+01%	8.88E-01
AG-110M	#A	2.1864E-01	2.1864E-01	2.481E+02%	2.46E+00
SN-113	#A	3.5734E-01	3.5735E-01	1.365E+02%	1.68E+00
SB-124	#A	1.7542E-01	1.7542E-01	1.317E+02%	2.51E+00
SB-125	#A	-1.9154E-01	-1.9154E-01	6.871E+01%	3.49E+00
I-131	#A	0.0000E+00	0.0000E+00	1.000E+03%	9.95E-01
Gd-153	#A	-3.0140E-01	-3.0140E-01	1.753E+02%	5.95E+00
Ga-68	#A	-1.2823E+01	-1.2871E+01	2.017E+02%	6.06E+01
Tc-99m	#A	8.0815E-02	8.0872E-02	4.706E+02%	1.30E+00
BA-133	#A	-5.9866E-01	-5.9866E-01	1.305E+02%	2.64E+00
CS-134	#A	2.8940E-01	2.8940E-01	8.791E+01%	2.52E+00
CS-137	#A	-5.6471E-02	-5.6471E-02	8.347E+02%	1.69E+00
CE-139	#A	-3.4450E-01	-3.4450E-01	9.989E+01%	1.16E+00
Ba-140	#A	6.1097E-01	6.1098E-01	1.476E+02%	3.68E+00
La-140	#C	1.0944E+00	1.0944E+00	2.425E+01%	7.97E-01
CE-141	#A	-4.2479E-01	-4.2480E-01	1.317E+02%	1.45E+00
CE-144	#A	1.8430E+00	1.8430E+00	1.613E+02%	1.00E+01
PM-144	#A	-7.0822E-01	-7.0822E-01	6.502E+01%	1.49E+00
EU-152	#A	1.0681E+00	1.0681E+00	3.780E+01%	6.20E+00
EU-154	#A	2.8099E+00	2.8099E+00	1.028E+02%	1.00E+01
EU-155	#A	1.4087E+00	1.4087E+00	1.772E+02%	8.34E+00
HF-181	#A	1.6480E-01	1.6480E-01	1.568E+02%	1.92E+00
Ta-182	#A	1.5998E+00	1.5998E+00	1.116E+02%	6.33E+00
Hg-203	#A	-2.9054E-01	-2.9054E-01	1.484E+02%	1.47E+00
TL-208	#	1.7437E+00	1.7437E+00	1.715E+01%	3.78E-01
pm-146	#A	8.8788E-01	8.8788E-01	1.218E+02%	2.66E+00
y-88	#A	3.4907E-01	3.4907E-01	1.051E+02%	9.05E-01
Cd-113m	#A	-6.1179E+03	-6.1179E+03	9.639E+01%	1.98E+04
Cd-109	#A	0.0000E+00	0.0000E+00	1.000E+03%	4.98E+01
Cf-251	#A	9.7491E-01	9.7491E-01	1.270E+02%	3.26E+00
Cf-249	#A	4.1045E-01	4.1045E-01	1.171E+02%	1.64E+00
Sn-126	#A	-3.7470E-01	-3.7470E-01	1.116E+03%	1.43E+01
PB-210	#	3.4305E+01	3.4305E+01	2.834E+01%	2.28E+01
PB-212		2.2558E+00	2.2558E+00	2.246E+01%	1.36E+00
PB-214		6.1250E+00	6.1250E+00	1.260E+01%	1.67E+00
BI-207	#A	-2.9002E-02	-2.9002E-02	9.721E+02%	1.04E+00
BI-212	#A	4.4830E+00	4.4830E+00	1.060E+02%	1.64E+01
U-235	#A	-2.1775E-01	-2.1775E-01	1.164E+03%	1.05E+01
BI-214		3.8157E+00	3.8157E+00	2.310E+01%	1.96E+00
BI-210M	#A	5.1472E-01	5.1472E-01	1.072E+02%	1.87E+00
AC-228	#	4.5657E+00	4.5657E+00	3.200E+01%	2.85E+00
TH-227	#A	-1.7955E+00	-1.7955E+00	3.297E+02%	2.02E+01
TH-229	#A	-7.3351E+00	-7.3351E+00	9.838E+01%	1.86E+01

TH-234 A	1.8832E+01	1.8832E+01	2.185E+01%	2.18E+01
PA-231 #A	-1.1532E+01	-1.1532E+01	1.726E+02%	6.71E+01
PA-233 #A	7.4496E-01	7.4496E-01	1.995E+02%	5.04E+00
PA-234 #A	1.4515E+00	1.4515E+00	1.267E+02%	5.79E+00
PA-234M#A	-6.0152E+01	-6.0152E+01	1.721E+02%	3.55E+02
AM-241 #A	-1.0137E+00	-1.0137E+00	1.260E+02%	4.29E+00
Np-237 #A	0.0000E+00	0.0000E+00	1.000E+03%	1.31E+01
Ir-192 #A	-7.0638E-03	-7.0638E-03	1.032E+02%	1.65E+00
Cs-136 #A	1.2530E-01	1.2530E-01	7.402E+01%	2.10E+00
Np-239 #A	7.9941E-01	7.9947E-01	2.837E+02%	7.61E+00
Nd-147 #A	-2.0586E-01	-2.0586E-01	1.430E+03%	7.53E+00
TL-210 #A	3.1248E-01	3.1248E-01	1.065E+02%	1.16E+00

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (25.1 to 1999.5 keV) 2.400E+02 Bq/Sample
Total Decayed Activity (25.1 to 1999.5 keV) 2.3997699E+02 Bq/Sample


376740_Gamma_160-29479-A-7-B. 15_Gamma_20182596.spc.
Counts
Channels
1.0e4
1.0e3
1.0e2
1.0e1
1.0e0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
7500
8000
Pb-210
Th-234
Th-234
Am-241
Th-234
U-235
Th-229
Pb-214
Pb-214
Bi-210M
Bi-214
Pa-233
Ba-133
Pb-214
Ba-133
Sn-113
Ba-140
Rh-106
Zr-95
Nb-94
Mn-54
Nb-94
Pa-234
Ac-228
Ta-182
Fe-59
K-40
Ag-110M
Eu-152
Bi-214

Test America St. Louis Spectrum ID: 17_Gamma_20182703

Sample Description: 376740_Gamma_160-29479-B-8-B
Detector: Detector #17
Batch ID: 376740
Work Order Number: Gamma
Lot Number: 160-29479-B-8-B

Decay to Time: 8/9/2018 06:41 Live Time: 1800 sec
Acquisition Time: 8/9/2018 06:42:00 Real Time: 1823 sec
Analysis Time: 8/9/2018 07:12 Dead Time: 1.25 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 17_Soil_TunaCan.Clb
Efficiency Cal Desc: 17_TunaCan_90099_032612
Efficiency Cal Date: 4/12/2012 09:28
Energy Cal Date: 2/29/2012 10:33
Library: Client_Long_Rev14.lib
Bkgd Correction File: 17_2018-07-14_1832.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	-3.711E+00	96.0	3.565E+00	3.570E+00	1.202E+01
NA-22	-2.322E-01	136.4	3.166E-01	3.168E-01	1.135E+00
K-40	1.728E+02	6.4	1.101E+01	1.412E+01	1.046E+01
Sc-46	-6.250E-01	97.0	6.062E-01	6.070E-01	2.044E+00
CR-51	-1.338E+00	175.0	2.341E+00	2.342E+00	8.116E+00
MN-54	-6.109E-02	773.4	4.725E-01	4.725E-01	1.156E+00
FE-59	4.126E-01	121.6	5.018E-01	5.022E-01	2.074E+00
Co-56	5.146E-01	94.5	4.861E-01	4.868E-01	9.334E-01
CO-57	0.000E+00	1.#INF	9.108E-02	9.108E-02	7.953E-01
CO-58	2.336E-01	94.2	2.200E-01	2.204E-01	7.635E-01
CO-60	5.356E-01	31.6	1.694E-01	1.715E-01	4.829E-01
ZN-65	0.000E+00	1.#INF	2.257E-01	2.257E-01	3.632E+00
NB-94	2.117E-01	73.8	1.562E-01	1.566E-01	9.094E-01
ZR-95	5.265E-01	97.8	5.148E-01	5.155E-01	1.297E+00
NB-95	1.628E-01	227.6	3.706E-01	3.707E-01	1.306E+00
RU-103	-1.717E-01	212.0	3.640E-01	3.641E-01	9.400E-01
RH-106	-1.921E+00	72.4	1.391E+00	1.395E+00	2.777E+01
AG-108M	1.432E-01	181.5	2.600E-01	2.601E-01	7.104E-01
AG-110M	7.003E-01	44.7	3.132E-01	3.152E-01	2.488E+00
SN-113	-3.498E-01	128.9	4.507E-01	4.511E-01	1.169E+00
SB-124	1.543E-01	430.5	6.643E-01	6.644E-01	2.274E+00
SB-125	3.775E-01	131.0	4.946E-01	4.949E-01	3.058E+00
I-131	3.391E-01	102.4	3.473E-01	3.477E-01	6.932E-01
Gd-153	5.129E-01	129.0	6.613E-01	6.621E-01	2.241E+00
Ga-68	0.000E+00	1.#INF	3.960E+00	3.960E+00	4.110E+01
Tc-99m	-2.428E-01	133.9	3.253E-01	3.256E-01	1.095E+00
BA-133	-3.564E-01	197.2	7.029E-01	7.032E-01	2.390E+00
CS-134	5.274E-01	91.0	4.798E-01	4.806E-01	2.323E+00
CS-137	-3.175E-02	1594.6	5.062E-01	5.062E-01	6.677E-01
CE-139	2.443E-01	112.7	2.754E-01	2.764E-01	9.297E-01
Ba-140	9.475E-01	141.7	1.343E+00	1.344E+00	2.892E+00
La-140	2.374E-02	114.7	2.722E-02	2.725E-02	1.092E+00
CE-141	4.196E-01	129.8	5.446E-01	5.450E-01	1.835E+00

CE-144	-2.074E+00	131.9	2.736E+00	2.738E+00	9.187E+00
PM-144	3.317E-01	96.2	3.191E-01	3.196E-01	7.884E-01
EU-152	2.768E+00	29.7	8.212E-01	8.338E-01	4.084E+00
EU-154	4.340E-01	69.2	3.005E-01	3.013E-01	1.124E+01
EU-155	-1.504E-02	6377.1	9.592E-01	9.592E-01	4.209E+00
HF-181	1.111E-01	292.5	3.250E-01	3.251E-01	1.570E+00
Ta-182	2.233E-01	113.3	2.530E-01	2.533E-01	5.712E+00
Hg-203	-3.281E-01	98.4	3.226E-01	3.232E-01	1.089E+00
TL-208	1.053E+00	44.0	4.632E-01	4.664E-01	1.015E+00
pm-146	8.575E-01	94.8	8.132E-01	8.144E-01	2.037E+00
y-88	-2.697E-01	134.4	3.625E-01	3.628E-01	1.195E+00
Cd-113m	2.489E+03	125.4	3.122E+03	3.127E+03	1.074E+04
Cd-109	0.000E+00	1.#INF	2.105E+00	2.105E+00	3.369E+01
Cf-251	6.237E-01	230.5	1.438E+00	1.439E+00	3.955E+00
Cf-249	3.958E-02	1072.4	4.244E-01	4.245E-01	1.500E+00
Sn-126	-3.250E+00	119.5	3.885E+00	3.889E+00	1.304E+01
PB-210	7.699E+00	102.1	7.859E+00	7.872E+00	2.389E+01
PB-212	3.231E+00	15.3	4.943E-01	5.367E-01	1.170E+00
PB-214	5.844E+00	13.7	8.001E-01	8.558E-01	1.565E+00
BI-207	1.795E-02	1437.6	2.581E-01	2.581E-01	9.419E-01
BI-212	2.918E+00	170.5	4.974E+00	4.977E+00	1.734E+01
U-235	-1.321E-01	133.0	1.757E-01	1.758E-01	8.629E+00
BI-214	4.229E+00	20.4	8.629E-01	8.904E-01	1.819E+00
BI-210M	-5.613E-01	81.4	4.570E-01	4.582E-01	1.812E+00
AC-228	4.565E+00	16.9	7.732E-01	8.075E-01	4.468E+00
TH-227	3.399E+00	76.5	2.599E+00	2.606E+00	1.195E+01
TH-229	3.852E+00	107.0	4.121E+00	4.132E+00	1.132E+01
TH-234	1.833E+01	38.9	7.122E+00	7.186E+00	2.012E+01
PA-231	2.722E-07	5811798111.4	1.582E+01	1.582E+01	5.419E+01
PA-233	-8.108E-01	96.9	7.858E-01	7.870E-01	3.583E+00
PA-234	-8.454E-03	81.8	6.914E-03	6.927E-03	5.205E+00
PA-234M	-9.810E+01	42.5	4.167E+01	4.196E+01	1.843E+02
AM-241	2.617E-01	347.9	9.102E-01	9.103E-01	2.641E+00
Np-237	1.400E+00	205.1	2.871E+00	2.872E+00	9.660E+00
Ir-192	1.529E-01	155.6	2.379E-01	2.381E-01	8.660E-01
Cs-136	1.683E-01	131.9	2.220E-01	2.222E-01	1.066E+00
Np-239	8.891E-01	124.4	1.106E+00	1.107E+00	3.722E+00
Nd-147	-3.376E+00	96.4	3.254E+00	3.260E+00	8.110E+00
TL-210	0.000E+00	1.#INF	4.481E-02	4.481E-02	1.485E+00
Total	2.733E+03				

Analyst: kody Saulters

TestAmerica Inc Spectrum name: 17_Gamma_20182703.An1

Sample description
376740_Gamma_160-29479-B-8-B

Spectrum Filename: C:\User\SPC\Det17\17_Gamma_20182703.An1

Acquisition information
Start time:	8/9/2018 6:42:00 AM
Live time:	1800
Real time:	1823
Dead time:	1.25 %
Detector ID:	17

Detector system
Ge17 SN/11080671

Calibration
Filename: 17_Soil_TunaCan.Clb
17_TunaCan_90099_032612

Energy Calibration
Created:	2/29/2012 10:33:23 AM
Zero offset:	0.108 keV
Gain:	0.250 keV/channel
Quadratic:	-2.584E-08 keV/channel^2

Efficiency Calibration
Created:	4/12/2012 9:28:42 AM
Knee Energy:	165.85 keV
Above the Knee:	Quadratic Uncertainty = 0.91 %
Log(Eff):	-5.264190E-01 + (-4.024164E-01*Log(E)) + (-2.604461E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 1.00 %
Log(Eff):	-2.343889E+01 + (8.582715E+00*Log(E)) + (-9.075430E-01*Log(E)^2)

Library Files
Main analysis library:	Client_Long_Rev14.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters
Analysis engine:	Env32 G800W064
Start channel:	100 (25.12keV)
Stop channel:	8000 (1999.54keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	8/9/2018 6:41:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	17_2018-07-14_1832.PBC 7/14/2018 6:32:39 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 17 cutoff: 5.00E+01 %

Energy Calibration

Normalized diff: 0.1315

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.53	12.	102.07	0.97	2.100E-02	46.54	4.250	PBC<MDA	PB210
50.14	13.	111.40	0.78	2.357E-02	50.14	8.000	PBC<MDA	TH227
59.54	5.	347.85	0.79	2.957E-02	59.54	35.900	PBC<MDA	AM241
63.36	40.	38.86	0.93	3.168E-02	63.29	3.810	PBC<MDA	TH234
74.79	52.	24.00	0.80	3.678E-02				
77.06	72.	17.97	0.80	3.758E-02				
86.49	13.	205.05	0.81	4.026E-02	86.49	13.100	PBC<MDA	Np237
					86.54	30.700	5.972E-01	EU155
92.72	47.	39.95	0.75	4.146E-02	92.59	5.584	PBC<MDA	TH234
					93.35	5.561	1.126E+01	AC228
97.50	12.	128.95	0.82	4.213E-02	97.50	30.000	PBC<MDA	Gd153
106.13	16.	124.38	0.83	4.282E-02	106.13	22.700	PBC<MDA	Np239
145.44	15.	129.79	0.87	4.059E-02	145.44	48.200	PBC<MDA	CE141
163.35	4.	213.43	0.88	3.802E-02	163.38	5.080	PBC<MDA	U235
165.82	13.	112.75	0.89	3.825E-02	165.85	79.900	PBC<MDA	CE139
176.60	7.	230.50	0.90	3.667E-02	176.60	17.000	PBC<MDA	Cf251
185.65	34.	37.62	0.61	3.546E-02	185.72	54.000	PBC<MDA	U235
193.51	11.	106.98	0.91	3.448E-02	193.51	4.400	PBC<MDA	TH229
227.00	11.	103.60	0.94	3.093E-02	227.00	6.300	PBC<MDA	Cf251
238.24	90.	17.48	0.68	2.992E-02	238.63	43.300	3.370E+00	PB212
241.77	31.	30.54	0.96	2.960E-02	242.00	7.430	7.807E+00	PB214
244.69	3.	625.93	0.96	2.938E-02	244.69	7.580	PBC<MDA	EU152

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
256.24	11.	104.74	0.97	2.846E-02	256.24	7.000	PBC<MDA	TH227
263.70	8.	125.43	0.98	2.790E-02	263.70	0.006	PBC<MDA	Cd113m
277.28	2.	487.82	0.99	2.694E-02	277.28	6.310	PBC<MDA	TL208
295.05	47.	26.62	0.70	2.580E-02	295.09	19.300	5.250E+00	PB214
304.85	9.	141.72	1.02	2.522E-02	304.85	4.290	PBC<MDA	Ba140
					304.90	28.000	7.346E-01	BI210M
304.90	9.	149.05	1.02	2.521E-02	304.85	4.290	4.795E+00	Ba140
					304.90	28.000	7.347E-01	BI210M
308.44	9.	155.59	1.02	2.501E-02	308.44	31.750	PBC<MDA	Ir192
338.13	2.	555.69	1.05	2.344E-02	338.32	12.010	PBC<MDA	AC228
345.83	3.	292.54	1.05	2.308E-02	345.83	15.070	PBC<MDA	HF181
351.81	103.	13.46	1.09	2.280E-02	351.93	37.600	6.646E+00	PB214
364.48	8.	102.42	1.07	2.223E-02	364.48	81.700	PBC<MDA	I131
374.71	12.	28.87	0.69	2.180E-02				
383.84	7.	165.53	1.09	2.143E-02	383.84	8.940	PBC<MDA	BA133
433.94	5.	181.52	1.13	1.963E-02	433.94	90.480	PBC<MDA	AG108M
511.86	58.	28.72	2.45	1.742E-02	511.86	20.000	9.196E+00	RH106
537.26	2.	397.91	1.22	1.682E-02	537.26	24.390	PBC<MDA	Ba140
569.32	7.	97.06	1.25	1.612E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	3.083E+00	PA234
					569.70	97.740	2.588E-01	BI207
569.47	6.	99.43	1.25	1.611E-02	569.32	15.380	PBC<MDA	CS134
					569.47	8.200	2.589E+00	PA234
					569.70	97.740	2.173E-01	BI207
583.02	22.	44.01	1.26	1.584E-02	583.02	84.500	PBC<MDA	TL208
600.50	10.	178.58	1.28	1.550E-02	600.50	17.860	PBC<MDA	SB125
602.73	4.	430.49	1.28	1.546E-02	602.73	98.260	PBC<MDA	SB124
609.41	54.	20.41	0.78	1.533E-02	609.31	46.090	4.229E+00	BI214
					610.30	5.750	3.394E+01	RU103
636.97	2.	366.97	1.31	1.484E-02	636.97	7.170	PBC<MDA	I131
657.76	6.	117.85	1.33	1.449E-02	657.76	94.640	PBC<MDA	AG110M
696.54	8.	96.21	1.36	1.389E-02	696.54	99.000	PBC<MDA	PM144
702.63	2.	515.75	1.37	1.380E-02	702.63	97.900	PBC<MDA	NB94
727.17	5.	170.48	1.39	1.345E-02	727.17	7.550	PBC<MDA	BI212
747.16	7.	94.83	1.41	1.318E-02	747.16	34.000	PBC<MDA	pm146
756.73	7.	97.77	1.41	1.306E-02	756.73	54.460	PBC<MDA	ZR95
763.94	10.	78.74	1.42	1.296E-02	763.94	22.280	PBC<MDA	AG110M
765.79	4.	227.64	1.42	1.294E-02	765.79	99.790	PBC<MDA	NB95
					766.41	0.294	PBC<MDA	PA234M
778.92	5.	100.34	1.43	1.278E-02	778.92	12.940	PBC<MDA	EU152
785.42	12.	56.93	1.44	1.270E-02	785.42	1.280	PBC<MDA	BI212
801.95	9.	90.98	1.45	1.250E-02	801.95	8.690	PBC<MDA	CS134
810.78	5.	94.20	1.46	1.240E-02	810.78	99.460	PBC<MDA	CO58
815.77	5.	114.68	1.47	1.234E-02	815.77	23.280	PBC<MDA	La140
818.50	5.	131.94	1.47	1.231E-02	818.50	100.000	PBC<MDA	Cs136
846.77	9.	94.46	1.49	1.200E-02	846.77	99.935	PBC<MDA	Co56
860.56	6.	124.57	1.50	1.185E-02	860.56	12.420	PBC<MDA	TL208
871.10	7.	73.80	1.51	1.175E-02	871.10	99.890	PBC<MDA	NB94

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
884.68	11.	105.08	1.52	1.161E-02	884.68	72.680	PBC<MDA	AG110M
911.02	6.	180.60	1.55	1.135E-02	911.07	29.000	PBC<MDA	AC228
968.88	36.	16.94	1.59	1.083E-02	968.97	17.460	1.047E+01	AC228
1004.77	10.	90.33	1.62	1.054E-02	1004.77	18.010	PBC<MDA	EU154
1048.07	1.	533.85	1.66	1.021E-02	1048.07	80.000	PBC<MDA	Cs136
1050.36	6.	122.69	1.66	1.019E-02	1050.36	1.560	PBC<MDA	RH106
1099.25	2.	431.57	1.70	9.840E-03	1099.25	56.500	PBC<MDA	FE59
1112.07	25.	29.66	1.71	9.752E-03	1112.07	13.644	1.044E+01	EU152
1120.26	-3.	158.16	1.72	9.697E-03	1120.29	15.100	PBC<MDA	BI214
					1120.55	99.987	PBC<MDA	Sc46
1173.24	7.	106.27	1.76	9.359E-03	1173.24	99.900	PBC<MDA	CO60
1189.05	7.	127.38	1.77	9.263E-03	1189.05	16.200	PBC<MDA	Ta182
1238.28	7.	170.24	1.81	8.977E-03	1238.28	66.070	PBC<MDA	Co56
1291.60	5.	121.64	1.85	8.689E-03	1291.60	43.200	PBC<MDA	FE59
1332.50	10.	31.62	1.89	8.481E-03	1332.50	99.980	6.552E-01	CO60
1384.30	5.	44.72	1.93	8.233E-03	1384.30	24.290	PBC<MDA	AG110M
1460.62	262.	6.37	2.00	7.894E-03	1460.83	10.670	1.728E+02	K40
1764.73	4.	135.68	2.21	6.804E-03	1764.49	15.400	PBC<MDA	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
298.59	74.75	52.	52.	1.415E+03	24.00	0.802	-	sD
307.66	77.01	47.	72.	1.909E+03	17.97	0.804	-	D
1497.83	374.71	0.	12.	5.505E+02	28.87	0.688	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev14.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV	
PB-210	185.59	46.53	59.	12.	0.007	102.07	0.968	s
TH-227	200.03	50.14	66.	13.	0.007	111.40	0.778	s
AM-241	237.59	59.54	105.	5.	0.003	347.85	0.787	s
TH-234	252.87	63.36	77.	40.	0.022	38.86	0.931	s
Sn-126	256.56	64.28	229.	-18.	-0.010	119.54	0.792	s
BA-133	323.36	80.99	97.	-14.	-0.008	111.64	0.807	s
Np-237	345.35	86.49	365.	13.	0.007	205.05	0.813	s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
EU-155	345.56	86.54	378.	0.	0.000	1000.00	0.813s
Sn-126	347.15	86.94	378.	0.	0.000	1000.00	0.813s
Sn-126	349.67	87.57	378.	0.	0.000	1000.00	0.814s
Cd-109	351.55	88.04	378.	0.	0.000	1000.00	0.814s
Nd-147	363.79	91.10	428.	-19.	-0.011	155.24	0.817s
TH-234	369.74	92.59	108.	24.	0.013	64.73	0.818D
AC-228	372.78	93.35	347.	17.	0.009	156.15	0.819s
Gd-153	389.37	97.50	107.	12.	0.006	128.95	0.823s
Np-239	397.37	99.50	119.	0.	0.000	1000.00	0.825
Gd-153	412.16	103.20	176.	-16.	-0.009	119.60	0.828s
Np-239	414.16	103.70	192.	-9.	-0.005	229.13	0.829s
Np-239	423.88	106.13	179.	16.	0.009	124.38	0.831s
EU-152	486.43	121.78	107.	-6.	-0.004	234.73	0.846s
CO-57	487.57	122.06	114.	0.	0.000	1000.00	0.846s
EU-154	491.73	123.10	119.	-11.	-0.006	139.33	0.847s
PA-234	524.49	131.29	215.	-16.	-0.009	129.88	0.855s
HF-181	531.41	133.02	231.	-5.	-0.003	456.58	0.856s
CE-144	533.46	133.54	253.	-17.	-0.010	131.87	0.857s
HF-181	544.50	136.30	271.	-6.	-0.003	391.59	0.859s
CO-57	545.20	136.47	277.	0.	0.000	1000.00	0.859s
Tc-99m	561.34	140.51	210.	-16.	-0.009	133.95	0.863s
U-235	574.43	143.79	205.	-6.	-0.003	158.88	0.866
CE-141	581.05	145.44	176.	15.	0.008	129.79	0.868s
Ba-140	649.90	162.66	128.	-14.	-0.008	114.05	0.884s
U-235	652.78	163.38	35.	4.	0.002	213.43	0.885D
CE-139	662.67	165.85	108.	13.	0.007	112.75	0.887
Cf-251	705.64	176.60	80.	7.	0.004	230.50	0.897
U-235	741.81	185.65	49.	34.	0.019	37.62	0.613s
TH-229	773.25	193.51	37.	11.	0.006	106.98	0.913s
U-235	820.52	205.33	78.	-16.	-0.009	44.19	0.924s
TH-229	842.58	210.85	90.	-17.	-0.009	103.57	0.929s
Cf-251	907.16	227.00	37.	11.	0.006	103.60	0.944
PB-212	953.67	238.63	28.	75.	0.042	15.30	0.954D
PB-214	967.13	242.00	29.	31.	0.017	30.54	0.957D
EU-152	977.91	244.69	218.	3.	0.002	625.93	0.960s
TH-227	1024.08	256.24	37.	11.	0.006	104.74	0.971
Cd-113m	1053.91	263.70	40.	8.	0.004	125.43	0.978s
BI-210M	1062.44	265.83	83.	-14.	-0.008	81.41	0.979
TL-208	1108.23	277.28	57.	2.	0.001	487.82	0.990s
Hg-203	1115.89	279.20	74.	-13.	-0.007	98.35	0.992s
I-131	1136.28	284.30	59.	-14.	-0.008	106.88	0.996
PB-214	1179.26	295.05	27.	47.	0.026	26.62	0.698s
TL-210	1183.07	296.00	265.	-13.	-0.007	178.05	1.007s
PB-212	1199.19	300.03	253.	-14.	-0.008	91.20	1.011
PA-231	1199.35	300.07	239.	-13.	-0.007	168.63	1.011
PA-233	1199.79	300.18	226.	-10.	-0.006	216.05	1.011
Ba-140	1218.46	304.85	83.	9.	0.005	141.72	1.015s
BI-210M	1218.64	304.90	92.	9.	0.005	149.05	1.015s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ir-192	1232.82	308.44	102.	9.	0.005	155.59	1.019s
PA-233	1247.10	312.01	139.	-13.	-0.007	96.92	1.022s
Ir-192	1265.01	316.49	43.	-1.	-0.001	801.78	1.026s
CR-51	1279.38	320.08	49.	-6.	-0.003	174.96	1.029s
La-140	1314.07	328.76	51.	-8.	-0.005	149.80	1.037s
Cf-249	1332.79	333.44	51.	-12.	-0.007	112.35	1.041
AC-228	1352.30	338.32	80.	2.	0.001	555.69	1.046s
Cs-136	1361.30	340.57	82.	0.	0.000	1000.00	1.048s
HF-181	1382.33	345.83	26.	3.	0.002	292.54	1.053
PB-214	1406.51	351.87	21.	95.	0.053	13.69	1.086
BA-133	1423.00	356.00	153.	-9.	-0.005	197.20	1.062s
I-131	1456.93	364.48	18.	8.	0.005	102.42	1.070s
BA-133	1534.34	383.84	56.	7.	0.004	165.53	1.087s
SN-113	1565.73	391.69	31.	-9.	-0.005	128.86	1.094s
SB-125	1710.44	427.88	40.	-6.	-0.004	191.76	1.127s
AG-108M	1734.69	433.94	18.	5.	0.003	181.52	1.132s
pm-146	1814.44	453.88	32.	-6.	-0.004	132.11	1.150s
SB-125	1852.38	463.37	59.	-11.	-0.006	99.62	1.158
BE-7	1909.29	477.59	70.	-13.	-0.007	96.05	1.171s
La-140	1946.98	487.02	40.	-13.	-0.007	62.95	1.180s
RU-103	1987.11	497.05	28.	-5.	-0.003	211.97	1.188s
RH-106	2046.35	511.86	33.	58.	0.032	28.72	2.452s
Nd-147	2122.88	531.00	40.	-13.	-0.007	96.39	1.219s
Ba-140	2147.92	537.26	16.	2.	0.001	397.91	1.224s
CS-134	2251.82	563.24	28.	-7.	-0.004	117.59	1.247s
CS-134	2276.15	569.32	22.	7.	0.004	97.06	1.252
PA-234	2276.75	569.47	16.	6.	0.003	99.43	1.253
TL-208	2330.95	583.02	22.	22.	0.012	44.01	1.264s
SB-125	2400.86	600.50	153.	10.	0.006	178.58	1.280s
SB-124	2409.78	602.73	163.	4.	0.002	430.49	1.282s
CS-134	2417.70	604.71	167.	0.	0.000	1000.00	1.284s
BI-214	2436.51	609.41	19.	54.	0.030	20.41	0.775s
RU-103	2440.05	610.30	167.	0.	0.000	1000.00	1.288s
AG-108M	2455.98	614.28	167.	0.	0.000	1000.00	1.292s
PM-144	2471.11	618.06	167.	0.	0.000	1000.00	1.295s
RH-106	2486.52	621.92	240.	-14.	-0.008	76.88	1.299s
SB-125	2542.41	635.89	35.	-5.	-0.003	218.33	1.311s
I-131	2546.75	636.97	41.	2.	0.001	366.97	1.312s
AG-110M	2629.90	657.76	22.	6.	0.003	117.85	1.330s
PM-144	2785.03	696.54	13.	8.	0.005	96.21	1.363s
NB-94	2809.38	702.63	17.	2.	0.001	515.75	1.368s
SB-124	2890.01	722.79	42.	-2.	-0.001	463.68	1.386s
AG-108M	2890.61	722.94	44.	0.	0.000	1000.00	1.386s
EU-154	2892.29	723.36	44.	0.	0.000	1000.00	1.386s
ZR-95	2895.66	724.20	44.	0.	0.000	1000.00	1.387s
BI-212	2907.54	727.17	39.	5.	0.003	170.48	1.390s
pm-146	2941.74	735.72	17.	-2.	-0.001	370.05	1.397s
pm-146	2987.51	747.16	9.	7.	0.004	94.83	1.407s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
ZR-95	3025.79	756.73	9.	7.	0.004	97.77	1.415s
AG-110M	3054.64	763.94	25.	10.	0.005	78.74	1.421s
NB-95	3062.03	765.79	35.	4.	0.002	227.64	1.423s
PA-234M	3064.52	766.41	44.	-5.	-0.003	127.76	1.423s
EU-152	3114.56	778.92	5.	5.	0.003	100.34	1.434s
BI-212	3140.56	785.42	10.	12.	0.007	56.93	1.440s
CS-134	3182.35	795.87	41.	-2.	-0.001	316.00	1.448s
TL-210	3197.29	799.60	43.	0.	0.000	1000.00	1.451s
CS-134	3206.69	801.95	27.	9.	0.005	90.98	1.454
CO-58	3241.99	810.78	9.	5.	0.003	94.20	1.461s
La-140	3261.97	815.77	15.	5.	0.003	114.68	1.465s
Cs-136	3272.90	818.50	20.	5.	0.003	131.94	1.467s
MN-54	3338.30	834.85	23.	-1.	-0.001	773.39	1.481s
Co-56	3385.99	846.77	14.	9.	0.005	94.46	1.491s
TL-208	3441.18	860.56	9.	6.	0.003	124.57	1.503s
NB-94	3483.32	871.10	11.	7.	0.004	73.80	1.512s
EU-154	3491.85	873.23	32.	-8.	-0.005	104.97	1.514s
PA-234	3521.06	880.53	52.	-12.	-0.007	90.81	1.520s
PA-234	3531.90	883.24	63.	-9.	-0.005	131.68	1.522s
AG-110M	3537.67	884.68	57.	11.	0.006	105.08	1.523s
Sc-46	3556.06	889.28	73.	-13.	-0.007	96.99	1.527s
y-88	3591.11	898.04	19.	-5.	-0.003	134.43	1.534
AC-228	3643.24	911.07	26.	6.	0.003	180.60	1.545s
AG-110M	3748.95	937.49	14.	0.	0.000	1000.00	1.567s
PA-234	3783.07	946.02	19.	-3.	-0.001	349.11	1.574s
EU-152	3855.45	964.11	22.	0.	0.000	1000.00	1.589s
AC-228	3874.90	968.97	0.	36.	0.020	16.94	1.593s
PA-234M	4003.04	1001.00	33.	-16.	-0.009	42.48	1.620s
EU-154	4018.15	1004.77	34.	10.	0.005	90.33	1.623s
Co-56	4150.45	1037.84	25.	-8.	-0.004	141.88	1.650s
Cs-136	4191.39	1048.07	25.	1.	0.001	533.85	1.658s
RH-106	4200.55	1050.36	21.	6.	0.003	122.69	1.661s
BI-207	4253.77	1063.66	21.	-4.	-0.002	177.00	1.671s
Ga-68	4308.74	1077.40	15.	0.	0.000	1000.00	1.683s
FE-59	4396.18	1099.25	15.	2.	0.001	431.57	1.700s
EU-152	4447.49	1112.07	15.	25.	0.014	29.66	1.711s
ZN-65	4461.38	1115.55	40.	0.	0.000	1000.00	1.713s
BI-214	4480.35	1120.29	28.	-3.	-0.002	158.16	1.717s
Sc-46	4481.41	1120.55	25.	0.	0.000	1000.00	1.717s
Ta-182	4484.41	1121.30	47.	-5.	-0.003	187.50	1.718s
CO-60	4692.24	1173.24	10.	7.	0.004	106.27	1.760s
Ta-182	4755.52	1189.05	15.	7.	0.004	127.38	1.772s
Ta-182	4885.02	1221.41	27.	-5.	-0.003	255.75	1.798s
Co-56	4952.53	1238.28	27.	7.	0.004	170.24	1.812s
NA-22	5097.60	1274.53	11.	-4.	-0.002	136.36	1.840s
EU-154	5097.66	1274.54	14.	0.	0.000	1000.00	1.840s
FE-59	5165.90	1291.60	5.	5.	0.003	121.64	1.854s
TL-210	5251.56	1313.00	27.	-10.	-0.005	125.61	1.870s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CO-60	5329.61	1332.50	0.	10.	0.006	31.62	1.886s
AG-110M	5536.92	1384.30	0.	5.	0.003	44.72	1.926s
K-40	5842.39	1460.62	8.	262.	0.146	6.37	1.999
La-140	6385.15	1596.21	6.	-3.	-0.001	218.12	2.087s
SB-124	6764.55	1690.98	0.	0.	0.000	1000.00	2.157s
BI-214	7058.84	1764.49	11.	4.	0.002	135.68	2.211s
Co-56	7086.31	1771.35	28.	-11.	-0.006	75.27	2.216s
y-88	7345.39	1836.06	0.	0.	0.000	1000.00	2.262s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
BE-7	C	-3.7114E+00				5.31E+01	
			477.60	-3.711E+00	?(	1.202E+01	9.60E+01 1.05E+01 G
NA-22	C	-2.3218E-01				9.50E+02	
			1274.53	-2.322E-01	?(	1.135E+00	1.36E+02 9.99E+01 G
K-40	N	1.7283E+02				4.66E+11	
			1460.83	1.728E+02	(P	1.046E+01	6.37E+00 1.07E+01 G
Sc-46	F	-6.2501E-01				8.38E+01	
			889.28	-6.250E-01	?(	2.044E+00	9.70E+01 1.00E+02 G
			1120.55	0.000E+00	+	1.491E+00	1.00E+03 1.00E+02 G
CR-51	F	-1.3379E+00				2.77E+01	
			320.08	-1.338E+00	?(	8.116E+00	1.75E+02 9.94E+00 G
MN-54	C	-6.1090E-02				3.12E+02	
			834.85	-6.109E-02	?(	1.156E+00	7.73E+02 1.00E+02 G
FE-59	F	4.1255E-01				4.45E+01	
			1099.25	1.999E-01	?(	2.074E+00	4.32E+02 5.65E+01 G
			1291.60	6.907E-01	?(	1.994E+00	1.22E+02 4.32E+01 G
Co-56	C	5.1465E-01				7.73E+01	
			846.77	4.161E-01	?(	9.334E-01	9.45E+01 9.99E+01 G
			1238.28	6.637E-01	?(P	2.518E+00	1.70E+02 6.61E+01 G
			1037.84	-3.059E+00	+	9.946E+00	1.42E+02 1.41E+01 G
			1771.35	-5.732E+00	+	1.444E+01	7.53E+01 1.55E+01 A

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CO-58	C	2.3358E-01					7.09E+01	
			810.78	2.336E-01	?(	7.635E-01	9.42E+01	9.95E+01 G
CO-60	F	5.3562E-01					1.93E+03	
			1332.50	6.552E-01	?(	4.829E-01	3.16E+01	1.00E+02 G
			1173.24	4.159E-01	?(	1.037E+00	1.06E+02	9.99E+01 G
NB-94	I	2.1171E-01					7.41E+06	
			702.63	6.854E-02	?(	9.094E-01	5.16E+02	9.79E+01 G
			871.10	3.520E-01	?(	8.712E-01	7.38E+01	9.99E+01 G
ZR-95	I	5.2648E-01					6.40E+01	
			756.73	5.265E-01	?(P	1.297E+00	9.78E+01	5.45E+01 G
			724.20	0.000E+00	-	3.136E+00	1.00E+03	4.42E+01 G
NB-95	I	1.6282E-01					6.40E+01	
			765.79	1.628E-01	(	1.306E+00	2.28E+02	9.98E+01 G
RU-103	I	-1.7173E-01					3.93E+01	
			497.05	-1.717E-01	?(	9.400E-01	2.12E+02	9.09E+01 G
			610.30	0.000E+00	+	3.970E+01	1.00E+03	5.75E+00 GA
RH-106	I	-1.9215E+00					3.74E+02	
			621.92	-5.335E+00	?(P	2.777E+01	7.69E+01	9.93E+00 G
			1050.36	1.981E+01	?(	8.471E+01	1.23E+02	1.56E+00 G
			511.86	9.196E+00	?	4.723E+00	2.87E+01	2.00E+01 GA
AG-108M	C	1.4323E-01					1.53E+05	
			433.94	1.432E-01	&(P	7.104E-01	1.82E+02	9.05E+01 G
			722.94	0.000E+00	-	1.522E+00	1.00E+03	9.08E+01 G
			614.28	0.000E+00	-	2.553E+00	1.00E+03	8.98E+01 G
AG-110M	F	7.0033E-01					2.50E+02	
			884.68	6.976E-01	?(	2.488E+00	1.05E+02	7.27E+01 G
			657.76	2.431E-01	?(	9.952E-01	1.18E+02	9.46E+01 G
			937.49	0.000E+00	-	2.932E+00	1.00E+03	3.44E+01 G
			1384.30	1.389E+00	?(	2.047E+00	4.47E+01	2.43E+01 G
			763.94	1.901E+00	?(	5.033E+00	7.87E+01	2.23E+01 G
SN-113	F	-3.4977E-01					1.15E+02	
			391.69	-3.498E-01	?(P	1.169E+00	1.29E+02	6.40E+01 G
SB-124	F	1.5431E-01					6.02E+01	
			602.73	1.543E-01	?(	2.274E+00	4.30E+02	9.83E+01 G
			1690.98	0.000E+00	-	1.218E+00	1.00E+03	4.78E+01 G
			722.79	-7.608E-01	+	1.252E+01	4.64E+02	1.08E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
SB-125	I	3.7748E-01					1.01E+03	
			427.88	-5.995E-01	(	3.058E+00	1.92E+02	2.96E+01 G
			600.50	1.997E+00	?(	1.211E+01	1.79E+02	1.79E+01 G
			635.89	-1.685E+00	+ P	1.002E+01	2.18E+02	1.13E+01 G
			463.37	-3.228E+00	+	1.088E+01	9.96E+01	1.05E+01 G
I-131	I	3.3907E-01					8.02E+00	
			364.48	2.543E-01	*(	6.932E-01	1.02E+02	8.17E+01 G
			284.30	-4.734E+00	&	1.312E+01	1.07E+02	6.14E+00 G
			636.97	1.305E+00	?(	1.696E+01	3.67E+02	7.17E+00 G
Gd-153	F	5.1286E-01					2.42E+02	
			97.50	5.129E-01	?(	2.241E+00	1.29E+02	3.00E+01 G
			103.20	-9.575E-01	&	3.852E+00	1.20E+02	2.18E+01 G
Tc-99m	I	-2.4284E-01					2.51E-01	
			140.51	-2.428E-01	&(	1.095E+00	1.34E+02	8.93E+01 G
BA-133	F	-3.5644E-01					3.85E+03	
			356.00	-3.564E-01	&(	2.390E+00	1.97E+02	6.20E+01 G
			302.85	4.279E-08	%	8.518E+00	5.81E+09	1.83E+01 G
			383.84	1.916E+00	? P	1.093E+01	1.66E+02	8.94E+00 GA
			80.99	-5.843E-01	+ P	2.041E+00	1.12E+02	3.41E+01 GA
CS-134	I	5.2742E-01					7.54E+02	
			604.71	0.000E+00	?(	2.323E+00	1.00E+03	9.76E+01 G
			795.87	-1.174E-01	+ P	1.687E+00	3.16E+02	8.55E+01 G
			569.32	1.644E+00	&(	5.469E+00	9.71E+01	1.54E+01 G
			801.95	4.477E+00	&(	1.385E+01	9.10E+01	8.69E+00 G
			563.24	-2.952E+00	+ P	1.125E+01	1.18E+02	8.35E+00 G
CS-137	I	-3.1746E-02					1.10E+04	
			661.66	-3.175E-02	&(P	6.677E-01	1.59E+03	8.52E+01 G
CE-139	F	2.4425E-01					1.38E+02	
			165.85	2.443E-01	?(	9.297E-01	1.13E+02	7.99E+01 G
Ba-140	I	9.4750E-01					1.28E+01	
			537.26	2.709E-01	?(	2.892E+00	3.98E+02	2.44E+01 G
			162.66	-3.375E+00	+	1.298E+01	1.14E+02	6.22E+00 G
			304.85	4.794E+00	&(	2.317E+01	1.42E+02	4.29E+00 G
La-140	I	2.3736E-02					1.28E+01	
			1596.21	-2.109E-01	?(	1.092E+00	2.18E+02	9.54E+01 G
			487.02	-9.060E-01	+ P	2.187E+00	6.30E+01	4.55E+01 G
			328.76	-9.673E-01	+ P	4.136E+00	1.50E+02	2.03E+01 G
			815.77	9.852E-01	?(	3.958E+00	1.15E+02	2.33E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CE-141	I	4.1960E-01					3.25E+01	
			145.44	4.196E-01	&(	1.835E+00	1.30E+02	4.82E+01 G
CE-144	I	-2.0744E+00					2.85E+02	
			133.54	-2.074E+00	(	9.187E+00	1.32E+02	1.11E+01 G
PM-144	C	3.3170E-01					3.63E+02	
			696.54	3.317E-01	?(	7.884E-01	9.62E+01	9.90E+01 G
			618.06	0.000E+00	-	2.325E+00	1.00E+03	9.91E+01 G
EU-152	F	2.7681E+00					4.94E+03	
			344.29	-6.615E-02	%(P	4.084E+00	1.75E+03	2.65E+01 G
			1112.07	1.044E+01	?(	8.667E+00	2.97E+01	1.36E+01 G
			121.78	-2.878E-01	+	2.317E+00	2.35E+02	2.86E+01 G
			778.92	1.618E+00	&(P	4.234E+00	1.00E+02	1.29E+01 G
			964.11	0.000E+00	-	8.592E+00	1.00E+03	1.46E+01 G
			244.69	8.348E-01	?(	1.783E+01	6.26E+02	7.58E+00 G
			1408.00	6.421E-02	% P	5.868E+00	3.78E+03	2.10E+01 GA
EU-154	I	4.3400E-01					3.14E+03	
			873.23	-3.129E+00	?(	1.124E+01	1.05E+02	1.23E+01 G
			123.10	-3.615E-01	+	1.708E+00	1.39E+02	4.08E+01 G
			1274.54	0.000E+00	+	3.660E+00	1.00E+03	3.52E+01 G
			723.36	0.000E+00	+	6.841E+00	1.00E+03	2.02E+01 G
			1004.77	2.861E+00	?(	8.757E+00	9.03E+01	1.80E+01 G
			996.33	2.470E-01	%	1.405E+01	1.57E+03	1.06E+01 G
EU-155	I	-1.5042E-02					1.81E+03	
			105.31	-1.504E-02	%(P	4.209E+00	6.38E+03	2.12E+01 G
			86.54	0.000E+00	+	4.193E+00	1.00E+03	3.07E+01 G
HF-181	F	1.1111E-01					4.24E+01	
			482.00	3.311E-02	%(	1.570E+00	1.35E+03	8.05E+01 G
			133.02	-1.447E-01	+	2.249E+00	4.57E+02	4.33E+01 G
			345.83	5.278E-01	?(P	4.207E+00	2.93E+02	1.51E+01 G
			136.30	-1.362E+00	+	1.810E+01	3.92E+02	5.85E+00 G
Ta-182	F	2.2326E-01					1.14E+02	
			1121.30	-8.761E-01	?(	5.712E+00	1.87E+02	3.49E+01 G
			1221.41	-1.058E+00	+	6.072E+00	2.56E+02	2.70E+01 G
			1189.05	2.592E+00	?(	7.685E+00	1.27E+02	1.62E+01 G
Hg-203	F	-3.2806E-01					4.66E+01	
			279.20	-3.281E-01	*(	1.089E+00	9.84E+01	8.15E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
TL-208	N	1.0526E+00					6.98E+02	
			583.02	9.238E-01	(P	1.015E+00	4.40E+01	8.45E+01 G
			277.28	7.218E-01	?(P	1.236E+01	4.88E+02	6.31E+00 G
			860.56	2.097E+00	?(P	6.427E+00	1.25E+02	1.24E+01 G
pm-146	C	8.5755E-01					2.02E+03	
			747.16	8.575E-01	&(	2.037E+00	9.48E+01	3.40E+01 G
			735.72	-4.321E-01	&	4.095E+00	3.70E+02	2.25E+01 G
			453.88	-2.849E-01	- P	1.314E+00	1.32E+02	6.50E+01 G
y-88	F	-2.6965E-01					1.07E+02	
			898.04	-2.697E-01	?(P	1.195E+00	1.34E+02	9.37E+01 G
			1836.06	0.000E+00	+	6.260E-01	1.00E+03	9.92E+01 G
Cd-113m		2.4893E+03					5.33E+03	
			263.70	2.489E+03	?(	1.074E+04	1.25E+02	6.00E-03 K
Cf-251	T	6.2375E-01					3.28E+05	
			176.60	6.237E-01	(	3.955E+00	2.30E+02	1.70E+01 G
			227.00	3.101E+00		8.817E+00	1.04E+02	6.30E+00 GA
Cf-249	T	3.9580E-02					1.28E+05	
			387.95	3.958E-02	%(	1.500E+00	1.07E+03	6.60E+01 G
			333.44	-1.866E+00	+	5.461E+00	1.12E+02	1.55E+01 G
Sn-126		-3.2500E+00					3.65E+07	
			87.57	0.000E+00	&	3.414E+00	1.00E+03	3.75E+01 GA
			64.28	-3.250E+00	?(	1.304E+01	1.20E+02	9.70E+00 G
			86.94	0.000E+00	+	1.421E+01	1.00E+03	9.04E+00 GA
PB-210	N	7.6991E+00					8.14E+03	
			46.54	7.699E+00	*(P	2.389E+01	1.02E+02	4.25E+00 G
PB-212	N	3.2308E+00					6.98E+02	
			238.63	3.231E+00	(P	1.170E+00	1.53E+01	4.33E+01 G
			300.03	-9.175E+00	- P	5.103E+01	9.12E+01	3.28E+00 GA
PB-214	N	5.8439E+00					5.84E+05	
			351.93	6.148E+00	(P	1.565E+00	1.37E+01	3.76E+01 G
			295.09	5.250E+00	*(P	3.002E+00	2.66E+01	1.93E+01 G
			242.00	7.807E+00		7.034E+00	3.05E+01	7.43E+00 GA
BI-207	C	1.7950E-02					1.18E+04	
			569.70	1.795E-02	%(	9.419E-01	1.44E+03	9.77E+01 G
			1063.66	-2.831E-01	+ P	1.772E+00	1.77E+02	7.45E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
BI-212	N	2.9178E+00					6.98E+02	
			727.17	2.918E+00	?(	1.734E+01	1.70E+02	7.55E+00 G
			785.42	4.264E+01	? P	5.843E+01	5.69E+01	1.28E+00 GA
U-235	N	-1.3206E-01					2.57E+11	
			143.79	-7.378E-01	?(P	8.629E+00	1.59E+02	1.10E+01 G
			205.33	-5.259E+00	+ P	1.466E+01	4.42E+01	5.01E+00 G
			163.38	1.175E+00	(P	8.700E+00	2.13E+02	5.08E+00 G
			185.72	9.944E-01	P	1.023E+00	3.76E+01	5.40E+01 GA
BI-214	N	4.2287E+00					5.84E+05	
			609.31	4.229E+00	(P	1.819E+00	2.04E+01	4.61E+01 G
			1120.29	-1.129E+00	- P	1.038E+01	1.58E+02	1.51E+01 G
			1764.49	2.010E+00	- P	9.708E+00	1.36E+02	1.54E+01 G
BI-210M	T	-5.6130E-01					1.10E+09	
			265.83	-5.613E-01	&(P	1.812E+00	8.14E+01	5.00E+01 G
			304.90	7.347E-01	+	3.734E+00	1.49E+02	2.80E+01 G
AC-228	N	4.5649E+00					2.10E+03	
			911.07	1.010E+00	?(P	4.468E+00	1.81E+02	2.90E+01 G
			968.97	1.047E+01	?(P	2.164E+00	1.69E+01	1.75E+01 G
			338.32	4.521E-01	- P	8.747E+00	5.56E+02	1.20E+01 G
			93.35	4.105E+00	?	2.152E+01	1.56E+02	5.56E+00 XA
TH-227	N	3.3992E+00					7.95E+03	
			50.14	3.738E+00	*(	1.195E+01	1.11E+02	8.00E+00 G
			256.24	3.012E+00	&(P	8.667E+00	1.05E+02	7.00E+00 G
TH-229	N	3.8518E+00					2.68E+06	
			193.51	3.852E+00	&(	1.132E+01	1.07E+02	4.40E+00 G
			210.85	-9.581E+00	+	2.680E+01	1.04E+02	2.99E+00 G
TH-234	N	1.8328E+01					1.63E+12	
			63.29	1.833E+01	*(P	2.012E+01	3.89E+01	3.81E+00 G
			92.59	5.796E+00	- P	1.229E+01	6.47E+01	5.58E+00 G
PA-231	N	2.7219E-07					1.20E+07	
			302.65	2.722E-07	%(	5.419E+01	5.81E+09	2.88E+00 G
			300.07	-1.164E+01	+	6.622E+01	1.69E+02	2.46E+00 G
PA-233	C	-8.1077E-01					7.82E+08	
			312.01	-8.108E-01	*(P	3.583E+00	9.69E+01	3.60E+01 G
			300.18	-3.497E+00	+	2.558E+01	2.16E+02	6.20E+00 G

(Page 15 of 21)

Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
PA-234	N	-8.4536E-03						1.63E+12	
			131.29	-1.192E+00	?(	5.205E+00	1.30E+02	1.80E+01	G
			946.02	-1.002E+00	+	8.583E+00	3.49E+02	1.34E+01	G
			569.47	2.589E+00	&(	8.894E+00	9.94E+01	8.20E+00	G
			883.24	-4.406E+00	+	1.984E+01	1.32E+02	9.60E+00	G
			880.53	-9.391E+00	+	2.878E+01	9.08E+01	6.00E+00	GA
PA-234M	N	-9.8096E+01						1.63E+12	
			1001.00	-9.810E+01	?(P	1.843E+02	4.25E+01	8.37E-01	G
			766.41	-7.662E+01	+ P	4.925E+02	1.28E+02	2.94E-01	G
AM-241	T	2.6167E-01						1.58E+05	
			59.54	2.617E-01	?(	2.641E+00	3.48E+02	3.59E+01	G
Np-237	F	1.4001E+00						2.14E+06	
			86.49	1.400E+00	(	9.660E+00	2.05E+02	1.31E+01	G
Ir-192	F	1.5293E-01						7.40E+01	
			316.49	-3.032E-02	?(	8.660E-01	8.02E+02	8.70E+01	G
			468.06	-5.456E-02	%	2.388E+00	1.25E+03	5.18E+01	G
			308.44	6.553E-01	&(	3.474E+00	1.56E+02	3.18E+01	G
Cs-136	F	1.6827E-01						1.30E+01	
			818.50	2.303E-01	?(	1.066E+00	1.32E+02	1.00E+02	G
			1048.07	9.073E-02	?(	1.759E+00	5.34E+02	8.00E+01	G
			340.57	0.000E+00	-	2.281E+00	1.00E+03	4.69E+01	G
Np-239	T	8.8907E-01						2.36E+00	
			103.70	-4.687E-01	&	3.647E+00	2.29E+02	2.40E+01	X
			106.13	8.891E-01	?(	3.722E+00	1.24E+02	2.27E+01	G
			99.50	0.000E+00	-	4.685E+00	1.00E+03	1.50E+01	X
Nd-147		-3.3757E+00						1.11E+01	
			531.00	-3.376E+00	?(	8.110E+00	9.64E+01	1.30E+01	G
			91.10	-9.077E-01	+	4.721E+00	1.55E+02	2.83E+01	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went
negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide
failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.

- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- - - -

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
PA-231	300.07	239.	-13.	-0.007	168.63	-1.164E+01		
PA-233	300.18	226.	-10.	-0.006	216.05	-3.497E+00		
Ba-140	304.85	83.	9.	0.005	141.72	4.794E+00		
BI-210M	304.90	92.	9.	0.005	149.05	7.347E-01		
Ir-192	308.44	102.	9.	0.005	155.59	6.553E-01		
PA-233	312.01	139.	-13.	-0.007	96.92	-8.108E-01	P	
Ir-192	316.49	43.	-1.	-0.001	801.78	-3.032E-02		
CR-51	320.08	49.	-6.	-0.003	174.96	-1.338E+00		
La-140	328.76	51.	-8.	-0.005	149.80	-9.673E-01	P	
Cf-249	333.44	51.	-12.	-0.007	112.35	-1.866E+00		
HF-181	345.83	26.	3.	0.002	292.54	5.278E-01	P	
BA-133	356.00	153.	-9.	-0.005	197.20	-3.564E-01		
I-131	364.48	18.	8.	0.005	102.42	2.543E-01		
BA-133	383.84	56.	7.	0.004	165.53	1.916E+00	P	
SN-113	391.69	31.	-9.	-0.005	128.86	-3.498E-01	P	
SB-125	427.88	40.	-6.	-0.004	191.76	-5.995E-01		
AG-108M	433.94	18.	5.	0.003	181.52	1.432E-01	P	
pm-146	453.88	32.	-6.	-0.004	132.11	-2.849E-01	P	
SB-125	463.37	59.	-11.	-0.006	99.62	-3.228E+00		
BE-7	477.59	70.	-13.	-0.007	96.05	-3.711E+00		
La-140	487.02	40.	-13.	-0.007	62.95	-9.060E-01	P	
RU-103	497.05	28.	-5.	-0.003	211.97	-1.717E-01		
RH-106	511.86	33.	58.	0.032	28.72	9.196E+00		
Nd-147	531.00	40.	-13.	-0.007	96.39	-3.376E+00		
Ba-140	537.26	16.	2.	0.001	397.91	2.709E-01		
CS-134	563.24	28.	-7.	-0.004	117.59	-2.952E+00	P	
CS-134	569.32	22.	7.	0.004	97.06	1.644E+00		
PA-234	569.47	16.	6.	0.003	99.43	2.589E+00		
SB-125	600.50	153.	10.	0.006	178.58	1.997E+00		
SB-124	602.73	163.	4.	0.002	430.49	1.543E-01		
RH-106	621.92	240.	-14.	-0.008	76.88	-5.335E+00	P	
SB-125	635.89	35.	-5.	-0.003	218.33	-1.685E+00	P	
I-131	636.97	41.	2.	0.001	366.97	1.305E+00		
AG-110M	657.76	22.	6.	0.003	117.85	2.431E-01		
PM-144	696.54	13.	8.	0.005	96.21	3.317E-01		
NB-94	702.63	17.	2.	0.001	515.75	6.854E-02		
SB-124	722.79	42.	-2.	-0.001	463.68	-7.608E-01		
BI-212	727.17	39.	5.	0.003	170.48	2.918E+00		
pm-146	735.72	17.	-2.	-0.001	370.05	-4.321E-01		
pm-146	747.16	9.	7.	0.004	94.83	8.575E-01		
ZR-95	756.73	9.	7.	0.004	97.77	5.265E-01	P	
AG-110M	763.94	25.	10.	0.005	78.74	1.901E+00		
NB-95	765.79	35.	4.	0.002	227.64	1.628E-01		
PA-234M	766.41	44.	-5.	-0.003	127.76	-7.662E+01	P	
EU-152	778.92	5.	5.	0.003	100.34	1.618E+00	P	
BI-212	785.42	10.	12.	0.007	56.93	4.264E+01	P	
CS-134	795.87	41.	-2.	-0.001	316.00	-1.174E-01	P	
CS-134	801.95	27.	9.	0.005	90.98	4.477E+00		

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
CO-58	810.78	9.	5.	0.003	94.20	2.336E-01		
La-140	815.77	15.	5.	0.003	114.68	9.852E-01		
Cs-136	818.50	20.	5.	0.003	131.94	2.303E-01		
MN-54	834.85	23.	-1.	-0.001	773.39	-6.109E-02		
Co-56	846.77	14.	9.	0.005	94.46	4.161E-01		
NB-94	871.10	11.	7.	0.004	73.80	3.520E-01		
EU-154	873.23	32.	-8.	-0.005	104.97	-3.129E+00		
PA-234	880.53	52.	-12.	-0.007	90.81	-9.391E+00		
PA-234	883.24	63.	-9.	-0.005	131.68	-4.406E+00		
AG-110M	884.68	57.	11.	0.006	105.08	6.976E-01		
Sc-46	889.28	73.	-13.	-0.007	96.99	-6.250E-01		
y-88	898.04	19.	-5.	-0.003	134.43	-2.697E-01	P	
PA-234	946.02	19.	-3.	-0.001	349.11	-1.002E+00		
PA-234M	1001.00	33.	-16.	-0.009	42.48	-9.810E+01	P	
EU-154	1004.77	34.	10.	0.005	90.33	2.861E+00		
Co-56	1037.84	25.	-8.	-0.004	141.88	-3.059E+00		
Cs-136	1048.07	25.	1.	0.001	533.85	9.073E-02		
RH-106	1050.36	21.	6.	0.003	122.69	1.981E+01		
BI-207	1063.66	21.	-4.	-0.002	177.00	-2.831E-01	P	
FE-59	1099.25	15.	2.	0.001	431.57	1.999E-01		
EU-152	1112.07	15.	25.	0.014	29.66	1.044E+01		
Ta-182	1121.30	47.	-5.	-0.003	187.50	-8.761E-01		
Ta-182	1189.05	15.	7.	0.004	127.38	2.592E+00		
Ta-182	1221.41	27.	-5.	-0.003	255.75	-1.058E+00		
Co-56	1238.28	27.	7.	0.004	170.24	6.637E-01	P	
NA-22	1274.53	11.	-4.	-0.002	136.36	-2.322E-01		
FE-59	1291.60	5.	5.	0.003	121.64	6.907E-01		
TL-210	1313.00	27.	-10.	-0.005	125.61	-2.981E+00		
AG-110M	1384.30	0.	5.	0.003	44.72	1.389E+00		
La-140	1596.21	6.	-3.	-0.001	218.12	-2.109E-01		
Co-56	1771.35	28.	-11.	-0.006	75.27	-5.732E+00		

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
BE-7	#A	-3.7114E+00	-3.7114E+00	9.605E+01%	1.20E+01
NA-22	#A	-2.3218E-01	-2.3218E-01	1.364E+02%	1.14E+00
K-40		1.7283E+02	1.7283E+02	6.368E+00%	1.05E+01
Sc-46	#A	-6.2500E-01	-6.2501E-01	9.699E+01%	2.04E+00
CR-51	#A	-1.3379E+00	-1.3379E+00	1.750E+02%	8.12E+00
MN-54	#A	-6.1090E-02	-6.1090E-02	7.734E+02%	1.16E+00
FE-59	#A	4.1255E-01	4.1255E-01	1.216E+02%	2.07E+00
Co-56	#A	5.1464E-01	5.1465E-01	9.446E+01%	9.33E-01
CO-57	#A	0.0000E+00	0.0000E+00	7.071E+02%	7.95E-01

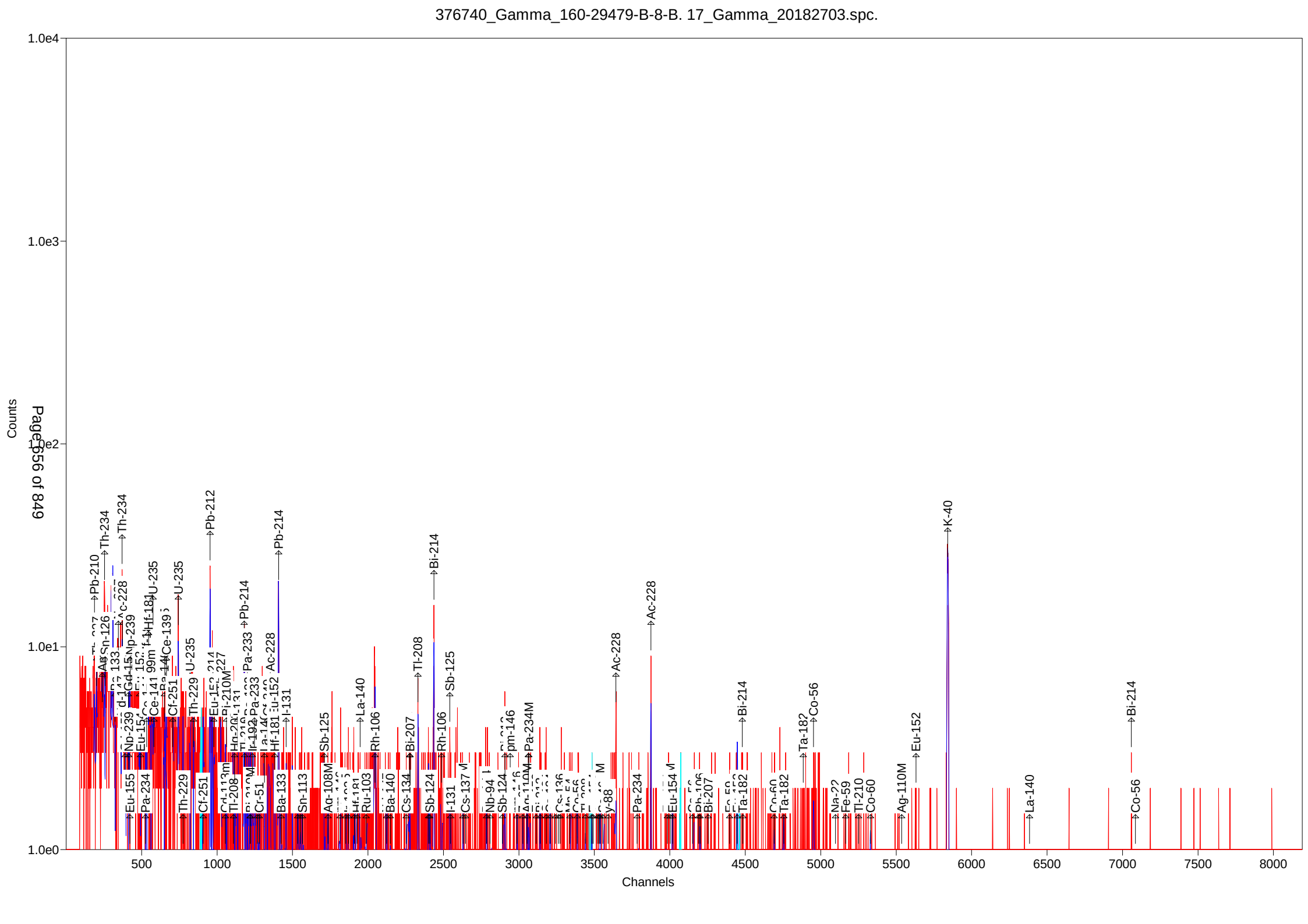
CO-58	#A	2.3358E-01	2.3358E-01	9.420E+01%	7.64E-01
CO-60	#	5.3562E-01	5.3562E-01	3.162E+01%	4.83E-01
ZN-65	#A	0.0000E+00	0.0000E+00	1.000E+03%	3.63E+00
NB-94	#A	2.1171E-01	2.1171E-01	7.380E+01%	9.09E-01
ZR-95	#A	5.2648E-01	5.2648E-01	9.777E+01%	1.30E+00
NB-95	#A	1.6282E-01	1.6282E-01	2.276E+02%	1.31E+00
RU-103	#A	-1.7173E-01	-1.7173E-01	2.120E+02%	9.40E-01
RH-106	#A	-1.9215E+00	-1.9215E+00	7.239E+01%	2.78E+01
AG-108M	#A	1.4323E-01	1.4323E-01	1.815E+02%	7.10E-01
AG-110M	#A	7.0033E-01	7.0033E-01	4.472E+01%	2.49E+00
SN-113	#A	-3.4977E-01	-3.4977E-01	1.289E+02%	1.17E+00
SB-124	#A	1.5431E-01	1.5431E-01	4.305E+02%	2.27E+00
SB-125	#A	3.7748E-01	3.7748E-01	1.310E+02%	3.06E+00
I-131	#A	3.3905E-01	3.3907E-01	1.024E+02%	6.93E-01
Gd-153	#A	5.1286E-01	5.1286E-01	1.290E+02%	2.24E+00
Ga-68	#A	0.0000E+00	0.0000E+00	1.000E+03%	4.11E+01
Tc-99m	#A	-2.4238E-01	-2.4284E-01	1.339E+02%	1.09E+00
BA-133	#A	-3.5644E-01	-3.5644E-01	1.972E+02%	2.39E+00
CS-134	#A	5.2742E-01	5.2742E-01	9.098E+01%	2.32E+00
CS-137	#A	-3.1746E-02	-3.1746E-02	1.595E+03%	6.68E-01
CE-139	#A	2.4425E-01	2.4425E-01	1.127E+02%	9.30E-01
Ba-140	#A	9.4747E-01	9.4750E-01	1.417E+02%	2.89E+00
La-140	#A	2.3736E-02	2.3736E-02	1.147E+02%	1.09E+00
CE-141	#A	4.1960E-01	4.1960E-01	1.298E+02%	1.84E+00
CE-144	#A	-2.0744E+00	-2.0744E+00	1.319E+02%	9.19E+00
PM-144	#A	3.3170E-01	3.3170E-01	9.621E+01%	7.88E-01
EU-152	#A	2.7681E+00	2.7681E+00	2.966E+01%	4.08E+00
EU-154	#A	4.3400E-01	4.3400E-01	6.924E+01%	1.12E+01
EU-155	#A	-1.5042E-02	-1.5042E-02	6.377E+03%	4.21E+00
HF-181	#A	1.1111E-01	1.1111E-01	2.925E+02%	1.57E+00
Ta-182	#A	2.2326E-01	2.2326E-01	1.133E+02%	5.71E+00
Hg-203	#A	-3.2806E-01	-3.2806E-01	9.835E+01%	1.09E+00
TL-208	#	1.0526E+00	1.0526E+00	4.401E+01%	1.01E+00
pm-146	#A	8.5755E-01	8.5755E-01	9.483E+01%	2.04E+00
y-88	#A	-2.6965E-01	-2.6965E-01	1.344E+02%	1.20E+00
Cd-113m	#A	2.4893E+03	2.4893E+03	1.254E+02%	1.07E+04
Cd-109	#A	0.0000E+00	0.0000E+00	1.000E+03%	3.37E+01
Cf-251	A	6.2375E-01	6.2375E-01	2.305E+02%	3.96E+00
Cf-249	#A	3.9580E-02	3.9580E-02	1.072E+03%	1.50E+00
Sn-126	#A	-3.2500E+00	-3.2500E+00	1.195E+02%	1.30E+01
PB-210	#A	7.6991E+00	7.6991E+00	1.021E+02%	2.39E+01
PB-212	#	3.2308E+00	3.2308E+00	1.530E+01%	1.17E+00
PB-214		5.8439E+00	5.8439E+00	1.369E+01%	1.57E+00
BI-207	#A	1.7950E-02	1.7950E-02	1.438E+03%	9.42E-01
BI-212	#A	2.9178E+00	2.9178E+00	1.705E+02%	1.73E+01
U-235	A	-1.3206E-01	-1.3206E-01	1.330E+02%	8.63E+00
BI-214		4.2287E+00	4.2287E+00	2.041E+01%	1.82E+00
BI-210M	#A	-5.6130E-01	-5.6130E-01	8.141E+01%	1.81E+00
AC-228	#C	4.5649E+00	4.5649E+00	1.694E+01%	4.47E+00

TH-227 #A	3.3992E+00	3.3992E+00	7.645E+01%	1.20E+01
TH-229 #A	3.8518E+00	3.8518E+00	1.070E+02%	1.13E+01
TH-234 #A	1.8328E+01	1.8328E+01	3.886E+01%	2.01E+01
PA-231 #A	2.7219E-07	2.7219E-07	5.812E+09%	5.42E+01
PA-233 #A	-8.1077E-01	-8.1077E-01	9.692E+01%	3.58E+00
PA-234 #A	-8.4536E-03	-8.4536E-03	8.178E+01%	5.20E+00
PA-234M#A	-9.8096E+01	-9.8096E+01	4.248E+01%	1.84E+02
AM-241 #A	2.6167E-01	2.6167E-01	3.479E+02%	2.64E+00
Np-237 #A	1.4001E+00	1.4001E+00	2.051E+02%	9.66E+00
Ir-192 #A	1.5293E-01	1.5293E-01	1.556E+02%	8.66E-01
Cs-136 #A	1.6826E-01	1.6827E-01	1.319E+02%	1.07E+00
Np-239 #A	8.8889E-01	8.8907E-01	1.244E+02%	3.72E+00
Nd-147 #A	-3.3755E+00	-3.3757E+00	9.639E+01%	8.11E+00
TL-210 #A	0.0000E+00	0.0000E+00	1.000E+03%	1.49E+00

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (25.1 to 1999.5 keV) 2.045E+02 Bq/Sample
Total Decayed Activity (25.1 to 1999.5 keV) 2.0446564E+02 Bq/Sample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1.0e4
1.0e3
1.0e2
1.0e1
1.0e0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
7500
8000
Channels
Pb-210
Th-234
Sn-126
Th-234
Ac-228
Np-239
Eu-155
Pa-234
Th-229
Cf-251
Th-229
U-235
Ce-141
Hf-181
U-235
U-235
Pb-212
Tl-208
Pb-214
Ac-228
Hf-181
Eu-152
I-131
Ba-133
Sn-113
Sb-125
La-140
Rh-106
Ba-140
Cs-134
Bi-207
Tl-208
Bi-214
Rh-106
Sb-125
I-131
Cs-137
Sb-124
Pa-234M
Ac-228
Ac-228
Bi-214
Ta-182
Co-56
Pa-234
Eu-154
Ta-182
Co-60
Na-22
Fe-59
Tl-210
Co-60
Ag-110M
Eu-152
K-40
La-140
Bi-214
Co-56

Test America St. Louis Spectrum ID: 19_Gamma_20181431

Sample Description: 376740_Gamma_160-29479-B-9-B
Detector: Detector #19
Batch ID: 376740
Work Order Number: Gamma
Lot Number: 160-29479-B-9-B

Decay to Time: 8/9/2018 06:36 Live Time: 1800 sec
Acquisition Time: 8/9/2018 06:37:00 Real Time: 1802 sec
Analysis Time: 8/9/2018 07:07 Dead Time: 0.10 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 19_Soil_TunaCan.Clb
Efficiency Cal Desc: 19_TunaCan_108513
Efficiency Cal Date: 4/16/2018 12:11
Energy Cal Date: 4/16/2018 11:22
Library: Client_Long_Rev14.lib
Bkgd Correction File: 19_2018-07-14_1824.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
BE-7	3.153E+00	101.0	3.184E+00	3.188E+00	1.088E+01
NA-22	5.518E-01	62.6	3.455E-01	3.465E-01	1.118E+00
K-40	1.528E+02	8.4	1.285E+01	1.499E+01	1.679E+01
Sc-46	7.193E-01	110.6	7.952E-01	7.960E-01	2.696E+00
CR-51	2.950E+00	108.9	3.212E+00	3.216E+00	1.091E+01
MN-54	4.413E-01	97.2	4.290E-01	4.296E-01	1.047E+00
FE-59	9.328E-01	111.3	1.039E+00	1.040E+00	2.371E+00
Co-56	7.879E-01	42.3	3.336E-01	3.360E-01	1.542E+00
CO-57	-1.671E-01	208.8	3.490E-01	3.491E-01	1.187E+00
CO-58	-8.101E-01	70.1	5.681E-01	5.696E-01	2.309E+00
CO-60	-5.157E-01	166.2	8.573E-01	8.577E-01	1.884E+00
ZN-65	-7.427E-01	238.3	1.770E+00	1.770E+00	6.130E+00
NB-94	3.800E-01	119.5	4.541E-01	4.545E-01	1.094E+00
ZR-95	-4.467E-01	241.3	1.078E+00	1.078E+00	2.600E+00
NB-95	-2.743E-01	158.2	4.341E-01	4.343E-01	1.524E+00
RU-103	-7.042E-01	71.0	5.002E-01	5.015E-01	1.475E+00
RH-106	2.400E+00	180.7	4.338E+00	4.339E+00	1.101E+01
AG-108M	2.847E-01	142.1	4.046E-01	4.049E-01	1.039E+00
AG-110M	2.209E-01	82.8	1.830E-01	1.833E-01	4.104E+00
SN-113	-7.231E-01	121.5	8.783E-01	8.791E-01	2.965E+00
SB-124	5.141E-01	81.9	4.212E-01	4.220E-01	3.120E+00
SB-125	-9.835E-01	151.0	1.485E+00	1.486E+00	3.771E+00
I-131	3.838E-01	156.1	5.991E-01	5.994E-01	1.084E+00
Gd-153	0.000E+00	1.#INF	4.287E-01	4.287E-01	7.466E+00
Ga-68	5.188E+00	255.8	1.327E+01	1.327E+01	3.406E+01
Tc-99m	-4.212E-01	148.9	6.271E-01	6.276E-01	2.098E+00
BA-133	-2.683E-01	125.3	3.361E-01	3.364E-01	3.618E+00
CS-134	2.447E-01	85.9	2.103E-01	2.107E-01	3.149E+00
CS-137	-6.765E-01	86.2	5.833E-01	5.843E-01	1.966E+00
CE-139	-6.833E-02	607.7	4.152E-01	4.152E-01	1.424E+00
Ba-140	1.972E+00	125.9	2.481E+00	2.483E+00	4.743E+00
La-140	8.927E-02	128.3	1.145E-01	1.146E-01	1.495E+00
CE-141	1.330E-02	8389.2	1.116E+00	1.116E+00	3.773E+00

CE-144	-3.039E+00	152.1	4.622E+00	4.624E+00	1.547E+01
PM-144	-1.955E-01	255.4	4.993E-01	4.994E-01	1.218E+00
EU-152	8.597E-01	59.6	5.125E-01	5.144E-01	9.184E+00
EU-154	-3.729E+00	102.7	3.828E+00	3.833E+00	1.315E+01
EU-155	1.587E+00	190.9	3.030E+00	3.031E+00	1.012E+01
HF-181	3.923E-01	118.4	4.645E-01	4.649E-01	1.594E+00
Ta-182	-2.370E+00	124.3	2.946E+00	2.948E+00	1.000E+01
Hg-203	3.610E-01	101.6	3.669E-01	3.674E-01	1.242E+00
TL-208	2.316E+00	38.4	8.896E-01	8.973E-01	1.334E+00
pm-146	-1.862E-01	156.2	2.908E-01	2.909E-01	3.754E+00
y-88	3.881E-01	95.7	3.716E-01	3.721E-01	8.927E-01
Cd-113m	2.482E+03	161.6	4.011E+03	4.014E+03	1.391E+04
Cd-109	-3.510E+00	516.9	1.814E+01	1.814E+01	6.083E+01
Cf-251	1.668E+00	101.4	1.692E+00	1.694E+00	4.375E+00
Cf-249	-3.116E-01	102.5	3.194E-01	3.198E-01	2.627E+00
Sn-126	3.639E+00	149.2	5.429E+00	5.433E+00	1.822E+01
PB-210	1.993E+01	65.8	1.311E+01	1.317E+01	3.550E+01
PB-212	4.363E+00	15.7	6.852E-01	7.220E-01	1.729E+00
PB-214	8.305E+00	10.2	8.483E-01	9.471E-01	9.299E-01
BI-207	-7.743E-03	5644.4	4.370E-01	4.370E-01	1.565E+00
BI-212	0.000E+00	1.#INF	5.206E+00	5.206E+00	2.350E+01
U-235	6.887E+00	27.5	1.891E+00	1.924E+00	5.226E+00
BI-214	8.061E+00	15.3	1.232E+00	1.299E+00	2.166E+00
BI-210M	5.745E-01	93.9	5.392E-01	5.400E-01	1.822E+00
AC-228	6.873E+00	17.9	1.228E+00	1.277E+00	2.915E+00
TH-227	-3.276E+00	230.2	7.540E+00	7.543E+00	2.552E+01
TH-229	7.538E-01	889.6	6.706E+00	6.706E+00	1.787E+01
TH-234	5.157E+01	12.5	6.452E+00	7.078E+00	2.950E+01
PA-231	1.101E+01	145.0	1.597E+01	1.598E+01	7.259E+01
PA-233	6.818E-01	205.3	1.400E+00	1.400E+00	6.272E+00
PA-234	-2.229E-01	103.5	2.306E-01	2.309E-01	9.884E+00
PA-234M	-3.998E+00	1290.1	5.158E+01	5.158E+01	2.513E+02
AM-241	1.152E+00	145.7	1.678E+00	1.680E+00	5.623E+00
Np-237	-3.243E+00	192.2	6.232E+00	6.235E+00	2.077E+01
Ir-192	1.152E-01	280.7	3.233E-01	3.233E-01	1.135E+00
Cs-136	5.421E-01	81.3	4.408E-01	4.419E-01	2.416E+00
Np-239	-1.698E+00	184.2	3.127E+00	3.129E+00	1.043E+01
Nd-147	-6.621E-01	525.2	3.477E+00	3.478E+00	8.763E+00
TL-210	4.154E-01	99.8	4.144E-01	4.151E-01	1.556E+00
Total	2.789E+03				

Analyst: kody Saulters

TestAmerica Inc Spectrum name: 19_Gamma_20181431.An1

Sample description
376740_Gamma_160-29479-B-9-B

Spectrum Filename: C:\User\SPC\Det19\19_Gamma_20181431.An1

Acquisition information

Start time:	8/9/2018 6:37:00 AM
Live time:	1800
Real time:	1802
Dead time:	0.10 %
Detector ID:	19

Detector system
Ge19 SN/11146715

Calibration
Filename: 19_Soil_TunaCan.Clb
19_TunaCan_108513

Energy Calibration

Created:	4/16/2018 11:22:57 AM
Zero offset:	0.177 keV
Gain:	0.250 keV/channel
Quadratic:	-3.735E-08 keV/channel^2

Efficiency Calibration

Created:	4/16/2018 12:11:21 PM
Type:	Polynomial
Uncertainty:	0.841 %
Coefficients:	-0.371612 -4.869309 0.466742
	-0.049787 0.002234 -0.000039

Library Files

Main analysis library:	Client_Long_Rev14.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	150 (37.71keV)
Stop channel:	8000 (1999.42keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000

Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	8/9/2018 6:36:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	19_2018-07-14_1824.PBC 7/14/2018 6:24:20 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 16 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1824

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.27	61.	26.39	0.45	1.690E-02	46.54	4.250	PBC<MDA	PB210
59.54	19.	145.73	0.95	2.613E-02	59.54	35.900	PBC<MDA	AM241
63.58	135.	18.08	1.01	2.774E-02	63.29	3.810	6.106E+01	TH234
					64.28	9.700	2.766E+01	Sn126
77.49	110.	19.01	1.00	3.153E-02				
86.94	23.	139.55	0.97	3.306E-02	86.49	13.100	PBC<MDA	Np237
					86.54	30.700	1.241E+00	EU155
					86.94	9.040	4.207E+00	Sn126
92.78	167.	13.71	1.12	3.368E-02	92.59	5.584	4.950E+01	TH234
					93.35	5.561	4.961E+01	AC228
105.31	21.	190.90	0.99	3.429E-02	105.31	21.200	PBC<MDA	EU155
121.78	19.	93.69	1.00	3.401E-02	121.78	28.580	PBC<MDA	EU152
					122.06	85.600	3.580E-01	CO57
143.41	51.	27.46	0.86	3.254E-02	143.79	10.960	7.979E+00	U235
163.47	16.	111.98	1.04	3.076E-02	163.38	5.080	PBC<MDA	U235
176.60	15.	101.40	1.05	2.950E-02	176.60	17.000	PBC<MDA	Cf251
185.86	120.	14.62	1.03	2.863E-02	185.72	54.000	4.304E+00	U235
193.51	2.	889.61	1.07	2.792E-02	193.51	4.400	PBC<MDA	TH229
203.83	14.	108.72	1.08	2.685E-02	205.33	5.010	PBC<MDA	U235
227.00	5.	290.93	1.10	2.503E-02	227.00	6.300	PBC<MDA	Cf251
238.64	71.	21.82	1.04	2.413E-02	238.63	43.300	3.790E+00	PB212
241.97	25.	41.37	1.11	2.388E-02	242.00	7.430	PBC<MDA	PB214
244.69	13.	158.80	1.11	2.369E-02	244.69	7.580	PBC<MDA	EU152
263.70	6.	161.59	1.13	2.238E-02	263.70	0.006	PBC<MDA	Cd113m
265.83	12.	93.86	1.13	2.224E-02	265.83	50.000	PBC<MDA	BI210M
277.28	9.	135.63	1.14	2.153E-02	277.28	6.310	PBC<MDA	TL208
279.20	11.	101.63	1.14	2.141E-02	279.20	81.460	PBC<MDA	Hg203

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
284.30	5.	263.57	1.15	2.111E-02	284.30	6.140	PBC<MDA	I131
294.98	54.	17.57	0.75	2.051E-02	295.09	19.300	7.582E+00	PB214
					296.00	79.000	1.857E+00	TL210
300.07	10.	203.15	1.16	2.023E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	PBC<MDA	PA231
					300.18	6.200	PBC<MDA	PA233
300.18	11.	205.29	1.16	2.023E-02	300.03	3.280	PBC<MDA	PB212
					300.07	2.460	1.190E+01	PA231
					300.18	6.200	4.723E+00	PA233
302.65	11.	209.42	1.16	2.010E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	1.612E+00	BA133
302.85	11.	213.80	1.16	2.009E-02	302.65	2.880	PBC<MDA	PA231
					302.85	18.330	1.612E+00	BA133
304.85	7.	338.32	1.16	1.998E-02	304.85	4.290	PBC<MDA	Ba140
					304.90	28.000	6.816E-01	BI210M
316.49	4.	280.67	1.17	1.940E-02	316.49	87.040	PBC<MDA	Ir192
320.08	10.	108.89	1.18	1.922E-02	320.08	9.940	PBC<MDA	CR51
328.76	8.	170.92	1.18	1.882E-02	328.76	20.300	PBC<MDA	La140
333.44	8.	177.32	1.19	1.861E-02	333.44	15.510	PBC<MDA	Cf249
337.99	32.	25.41	1.08	1.839E-02	338.32	12.010	7.922E+00	AC228
340.57	8.	183.08	1.19	1.830E-02	340.57	46.900	PBC<MDA	Cs136
351.71	105.	10.43	1.22	1.782E-02	351.93	37.600	8.676E+00	PB214
364.48	6.	167.29	1.21	1.733E-02	364.48	81.700	PBC<MDA	I131
433.94	7.	142.14	1.27	1.510E-02	433.94	90.480	PBC<MDA	AG108M
477.60	8.	101.01	1.31	1.401E-02	477.60	10.520	PBC<MDA	BE7
482.00	8.	118.40	1.31	1.391E-02	482.00	80.500	PBC<MDA	HF181
487.02	8.	128.25	1.32	1.380E-02	487.02	45.500	PBC<MDA	La140
511.86	67.	26.99	2.59	1.328E-02	511.86	20.000	1.402E+01	RH106
537.26	9.	125.85	1.36	1.279E-02	537.26	24.390	PBC<MDA	Ba140
582.39	25.	42.44	1.40	1.202E-02	583.02	84.500	1.385E+00	TL208
609.16	78.	15.28	0.90	1.163E-02	609.31	46.090	8.061E+00	BI214
621.92	5.	180.72	1.43	1.145E-02	621.92	9.930	PBC<MDA	RH106
635.89	1.	632.37	1.44	1.126E-02	635.89	11.310	PBC<MDA	SB125
657.76	7.	82.83	1.46	1.098E-02	657.76	94.640	PBC<MDA	AG110M
702.63	7.	119.52	1.49	1.045E-02	702.63	97.900	PBC<MDA	NB94
722.79	10.	81.93	1.51	1.024E-02	722.79	10.810	PBC<MDA	SB124
					722.94	90.840	6.174E-01	AG108M
					723.36	20.220	2.775E+00	EU154
735.72	2.	403.11	1.52	1.010E-02	735.72	22.500	PBC<MDA	pm146
763.94	4.	172.61	1.54	9.827E-03	763.94	22.280	PBC<MDA	AG110M
778.92	5.	146.39	1.55	9.687E-03	778.92	12.940	PBC<MDA	EU152
785.42	6.	159.77	1.56	9.628E-03	785.42	1.280	PBC<MDA	BI212
795.87	8.	85.94	1.56	9.534E-03	795.87	85.530	PBC<MDA	CS134
799.60	8.	99.76	1.57	9.501E-03	799.60	98.960	PBC<MDA	TL210
818.50	9.	134.51	1.58	9.339E-03	818.50	100.000	PBC<MDA	Cs136
834.85	7.	97.20	1.59	9.204E-03	834.85	99.980	PBC<MDA	MN54
860.94	16.	38.41	1.61	9.000E-03	860.56	12.420	7.954E+00	TL208
889.28	11.	110.56	1.63	8.785E-03	889.28	99.984	PBC<MDA	Sc46

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
898.04	6.	95.75	1.64	8.721E-03	898.04	93.700	PBC<MDA	y88
910.80	29.	25.14	1.65	8.629E-03	911.07	29.000	6.438E+00	AC228
946.02	4.	132.68	1.68	8.392E-03	946.02	13.400	PBC<MDA	PA234
964.11	6.	109.18	1.69	8.274E-03	964.11	14.605	PBC<MDA	EU152
968.91	8.	87.17	1.69	8.244E-03	968.97	17.460	PBC<MDA	AC228
1037.84	9.	87.92	1.74	7.832E-03	1037.84	14.130	PBC<MDA	Co56
1048.07	6.	88.85	1.75	7.775E-03	1048.07	80.000	PBC<MDA	Cs136
1077.40	2.	255.77	1.77	7.615E-03	1077.40	3.300	PBC<MDA	Ga68
1099.25	7.	111.35	1.79	7.501E-03	1099.25	56.500	PBC<MDA	FE59
1238.28	16.	42.34	1.89	6.848E-03	1238.28	66.070	1.911E+00	Co56
1274.53	7.	62.61	1.91	6.696E-03	1274.53	99.940	PBC<MDA	NA22
					1274.54	35.190	1.567E+00	EU154
1274.54	4.	131.56	1.91	6.695E-03	1274.53	99.940	PBC<MDA	NA22
					1274.54	35.190	9.481E-01	EU154
1313.00	4.	152.39	1.94	6.541E-03	1313.00	21.000	PBC<MDA	TL210
1460.83	176.	8.41	1.10	6.004E-03	1460.83	10.670	1.528E+02	K40
1763.76	1.	877.31	2.22	5.112E-03	1764.49	15.400	PBC<MDA	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
309.01	77.49	92.	110.	3.473E+03	19.01	0.998	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: Client_Long_Rev14.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV	
PB-210	184.21	46.27	88.	26.	0.014	65.80	0.452	s
TH-227	199.70	50.14	243.	-10.	-0.005	230.16	0.938	
AM-241	237.25	59.54	392.	19.	0.011	145.73	0.946	
TH-234	253.41	63.58	130.	116.	0.064	21.51	1.012	s
Sn-126	256.21	64.28	343.	18.	0.010	149.21	0.951	s
BA-133	323.00	80.99	495.	-28.	-0.016	88.26	0.966	s
Np-237	344.99	86.49	1164.	-25.	-0.014	192.20	0.971	s
EU-155	345.20	86.54	1138.	-25.	-0.014	190.12	0.971	s
Sn-126	346.79	86.94	487.	23.	0.013	139.55	0.971	s
Sn-126	349.31	87.57	863.	-23.	-0.013	184.64	0.972	s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Cd-109	351.19	88.04	840.	-8.	-0.004	516.91	0.972s
Nd-147	363.42	91.10	832.	0.	0.000	1000.00	0.975s
TH-234	369.37	92.59	111.	153.	0.085	12.78	0.976D
AC-228	372.41	93.35	820.	12.	0.007	343.62	0.977s
Gd-153	389.00	97.50	832.	0.	0.000	1000.00	0.981s
Np-239	396.99	99.50	832.	0.	0.000	1000.00	0.982s
Gd-153	411.78	103.20	832.	0.	0.000	1000.00	0.986
Np-239	413.78	103.70	832.	0.	0.000	1000.00	0.986
EU-155	420.23	105.31	775.	21.	0.012	190.90	0.988s
Np-239	423.49	106.13	948.	-24.	-0.013	184.21	0.988s
EU-152	486.04	121.78	145.	19.	0.010	93.69	1.002s
CO-57	487.18	122.06	163.	-9.	-0.005	208.82	1.003s
EU-154	491.33	123.10	154.	0.	0.000	1000.00	1.004s
PA-234	524.09	131.29	503.	-20.	-0.011	158.76	1.011s
HF-181	531.00	133.02	483.	-20.	-0.011	155.37	1.013s
CE-144	533.06	133.54	463.	-20.	-0.011	152.09	1.013s
HF-181	544.09	136.30	449.	-19.	-0.011	156.09	1.015s
CO-57	544.79	136.47	468.	0.	0.000	1000.00	1.016s
Tc-99m	560.92	140.51	504.	-22.	-0.012	148.89	1.019
U-235	572.50	143.41	44.	51.	0.028	27.46	0.865s
Ba-140	649.47	162.66	153.	-19.	-0.010	96.43	1.039s
U-235	652.34	163.38	155.	16.	0.009	111.98	1.040s
CE-139	662.23	165.85	165.	-3.	-0.002	607.67	1.042s
Cf-251	705.19	176.60	62.	15.	0.008	101.40	1.051s
U-235	742.22	185.86	48.	120.	0.067	14.52	1.031s
TH-229	772.79	193.51	62.	2.	0.001	889.61	1.066s
U-235	820.06	205.33	60.	14.	0.008	108.72	1.077s
TH-229	842.11	210.85	74.	-18.	-0.010	85.34	1.082
Cf-251	906.68	227.00	51.	5.	0.003	290.93	1.096s
PB-212	953.18	238.63	41.	82.	0.046	15.70	1.106D
PB-214	966.63	242.00	43.	25.	0.014	41.37	1.109D
EU-152	977.41	244.69	200.	13.	0.007	158.80	1.111s
TH-227	1023.58	256.24	59.	-12.	-0.006	126.27	1.122s
Cd-113m	1053.40	263.70	44.	6.	0.003	161.59	1.128s
BI-210M	1061.92	265.83	52.	12.	0.006	93.86	1.130s
TL-208	1107.70	277.28	70.	9.	0.005	135.63	1.140
Hg-203	1115.37	279.20	61.	11.	0.006	101.63	1.141s
I-131	1135.76	284.30	44.	5.	0.003	263.57	1.146s
PB-214	1178.47	294.98	12.	54.	0.030	17.57	0.747s
TL-210	1182.54	296.00	204.	11.	0.006	192.51	1.156s
PB-212	1198.65	300.03	213.	10.	0.006	203.15	1.159
PA-231	1198.81	300.07	223.	11.	0.006	200.66	1.159
PA-233	1199.25	300.18	234.	11.	0.006	205.29	1.159
PA-231	1209.13	302.65	245.	11.	0.006	209.42	1.162s
BA-133	1209.93	302.85	255.	11.	0.006	213.80	1.162s
Ba-140	1217.92	304.85	266.	7.	0.004	338.32	1.164s
BI-210M	1218.11	304.90	273.	0.	0.000	1000.00	1.164s
Ir-192	1232.27	308.44	273.	0.	0.000	1000.00	1.167

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ir-192	1264.46	316.49	46.	4.	0.002	280.67	1.173s
CR-51	1278.83	320.08	56.	10.	0.006	108.89	1.177s
La-140	1313.52	328.76	95.	8.	0.005	170.92	1.184s
Cf-249	1332.23	333.44	103.	8.	0.005	177.32	1.188s
AC-228	1350.43	337.99	8.	32.	0.018	25.41	1.084
Cs-136	1360.74	340.57	111.	8.	0.005	183.08	1.194s
EU-152	1375.60	344.29	271.	-16.	-0.009	146.65	1.197s
HF-181	1381.77	345.83	194.	-13.	-0.007	151.85	1.199s
PB-214	1405.29	351.71	3.	105.	0.058	10.43	1.216
BA-133	1422.43	356.00	217.	-16.	-0.009	130.63	1.207
I-131	1456.35	364.48	29.	6.	0.004	167.29	1.215
BA-133	1533.76	383.84	88.	-6.	-0.003	245.62	1.231s
Cf-249	1550.19	387.95	110.	-15.	-0.008	102.89	1.235s
SN-113	1565.14	391.69	130.	-14.	-0.008	121.46	1.238s
SB-125	1709.84	427.88	36.	-8.	-0.004	151.04	1.268s
AG-108M	1734.08	433.94	24.	7.	0.004	142.14	1.273s
pm-146	1813.83	453.88	24.	-3.	-0.002	316.18	1.290s
SB-125	1851.76	463.37	62.	-9.	-0.005	127.25	1.298
Ir-192	1870.53	468.06	74.	-9.	-0.005	144.73	1.302s
BE-7	1908.66	477.60	32.	8.	0.005	101.01	1.310s
HF-181	1926.26	482.00	40.	8.	0.004	118.40	1.313s
La-140	1946.35	487.02	48.	8.	0.004	128.25	1.317s
RU-103	1986.48	497.05	42.	-16.	-0.009	71.03	1.326s
RH-106	2045.71	511.86	40.	67.	0.037	26.99	2.588
Nd-147	2122.23	531.00	26.	-2.	-0.001	525.20	1.354s
Ba-140	2147.27	537.26	26.	9.	0.005	125.85	1.359s
CS-134	2251.16	563.24	30.	-6.	-0.004	181.90	1.380s
CS-134	2275.49	569.32	22.	-4.	-0.002	186.97	1.385
PA-234	2276.09	569.47	35.	-8.	-0.004	112.87	1.385s
TL-208	2330.29	583.02	22.	25.	0.014	42.44	1.396s
SB-124	2409.12	602.73	177.	0.	0.000	1000.00	1.412s
CS-134	2417.03	604.71	177.	0.	0.000	1000.00	1.414s
BI-214	2434.85	609.16	15.	78.	0.043	15.28	0.896s
RU-103	2439.39	610.30	177.	0.	0.000	1000.00	1.418s
AG-108M	2455.31	614.28	177.	0.	0.000	1000.00	1.421s
RH-106	2485.86	621.92	18.	5.	0.003	180.72	1.427s
SB-125	2541.74	635.89	17.	1.	0.001	632.37	1.439s
I-131	2546.08	636.97	17.	-1.	-0.001	521.84	1.440s
AG-110M	2629.23	657.76	14.	7.	0.004	82.83	1.456s
CS-137	2644.82	661.66	42.	-11.	-0.006	86.22	1.459s
PM-144	2784.35	696.54	19.	-4.	-0.002	255.36	1.487s
NB-94	2808.70	702.63	14.	7.	0.004	119.52	1.492s
SB-124	2889.33	722.79	31.	10.	0.006	81.93	1.507s
AG-108M	2889.93	722.94	41.	0.	0.000	1000.00	1.507s
EU-154	2891.61	723.36	41.	0.	0.000	1000.00	1.508s
ZR-95	2894.98	724.20	41.	0.	0.000	1000.00	1.508s
BI-212	2906.86	727.17	41.	0.	0.000	1000.00	1.511
pm-146	2941.07	735.72	14.	2.	0.001	403.11	1.518s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
pm-146	2986.83	747.16	19.	-4.	-0.002	156.15	1.526s
ZR-95	3025.11	756.73	23.	-4.	-0.002	241.30	1.534s
AG-110M	3053.97	763.94	16.	4.	0.002	172.61	1.539s
NB-95	3061.35	765.79	27.	-5.	-0.003	158.25	1.541s
PA-234M	3063.85	766.41	1.	0.	0.000	1000.00	1.541s
EU-152	3113.88	778.92	9.	5.	0.003	146.39	1.551s
BI-212	3139.88	785.42	19.	6.	0.003	159.77	1.556s
CS-134	3181.68	795.87	18.	8.	0.004	85.94	1.564
TL-210	3196.61	799.60	26.	8.	0.004	99.76	1.567s
CO-58	3241.32	810.78	60.	-14.	-0.008	70.12	1.575s
La-140	3261.30	815.77	73.	-4.	-0.002	262.29	1.579s
Cs-136	3272.22	818.50	66.	9.	0.005	134.51	1.581s
MN-54	3337.63	834.85	10.	7.	0.004	97.20	1.594s
Co-56	3385.32	846.77	23.	-7.	-0.004	96.23	1.603s
TL-208	3440.51	860.56	5.	16.	0.009	38.41	1.614s
NB-94	3482.65	871.10	10.	-1.	0.000	670.82	1.621s
EU-154	3491.19	873.23	25.	-7.	-0.004	102.65	1.623s
PA-234	3520.39	880.53	64.	-14.	-0.008	85.87	1.628s
PA-234	3531.23	883.24	78.	-14.	-0.008	93.78	1.630s
AG-110M	3537.01	884.68	92.	-2.	-0.001	608.08	1.632s
Sc-46	3555.40	889.28	73.	11.	0.006	110.56	1.635s
y-88	3590.45	898.04	5.	6.	0.003	95.75	1.642s
AC-228	3642.58	911.07	5.	29.	0.016	25.14	1.651
PA-234	3782.42	946.02	5.	4.	0.002	132.68	1.677s
EU-152	3854.81	964.11	18.	6.	0.003	109.18	1.691s
AC-228	3874.26	968.97	22.	8.	0.005	87.17	1.694s
EU-154	3983.73	996.33	32.	-4.	-0.002	232.99	1.714s
EU-154	4017.53	1004.77	15.	-1.	-0.001	857.32	1.721s
Co-56	4149.84	1037.84	10.	9.	0.005	87.92	1.745
Cs-136	4190.78	1048.07	13.	6.	0.004	88.85	1.752s
RH-106	4199.94	1050.36	26.	-6.	-0.003	129.99	1.754s
BI-207	4253.17	1063.66	20.	-8.	-0.004	127.88	1.763s
Ga-68	4308.15	1077.40	5.	2.	0.001	255.77	1.773s
FE-59	4395.60	1099.25	11.	7.	0.004	111.35	1.789s
EU-152	4446.92	1112.07	55.	-14.	-0.008	79.64	1.798s
ZN-65	4460.81	1115.55	69.	-5.	-0.003	238.30	1.800s
BI-214	4479.78	1120.29	75.	-1.	-0.001	877.61	1.803s
Sc-46	4480.84	1120.55	74.	0.	0.000	1000.00	1.804s
Ta-182	4483.84	1121.30	88.	-11.	-0.006	124.32	1.804
CO-60	4691.70	1173.24	16.	-1.	-0.001	914.69	1.841s
Ta-182	4754.99	1189.05	21.	-6.	-0.004	126.56	1.852s
Co-56	4952.04	1238.28	5.	16.	0.009	42.34	1.886s
NA-22	5097.14	1274.53	5.	7.	0.004	62.61	1.910s
EU-154	5097.19	1274.54	12.	4.	0.002	131.56	1.910s
FE-59	5165.45	1291.60	16.	-2.	-0.001	460.07	1.922s
TL-210	5251.13	1313.00	5.	4.	0.002	152.39	1.936s
CO-60	5329.19	1332.50	17.	-6.	-0.003	166.25	1.949s
AG-110M	5536.55	1384.30	6.	-1.	0.000	846.32	1.984s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
EU-152	5631.44	1408.00	34.	-17.	-0.009	83.84	1.999
K-40	5842.96	1460.83	13.	176.	0.098	8.41	1.103s
La-140	6385.01	1596.21	6.	-4.	-0.002	353.26	2.119s
SB-124	6764.54	1690.98	12.	-6.	-0.003	245.26	2.176s
BI-214	7058.94	1764.49	13.	1.	0.000	877.31	2.219s
Co-56	7086.41	1771.35	4.	0.	0.000	1000.00	2.223s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	Peak MDA Value Bq/Sample	COMMENTS
BE-7	C	3.1526E+00				5.31E+01	
			477.60	3.153E+00	?(	1.088E+01 1.01E+02	1.05E+01 G
NA-22	C	5.5177E-01				9.50E+02	
			1274.53	5.518E-01	?(	1.118E+00 6.26E+01	9.99E+01 G
K-40	N	1.5282E+02				4.66E+11	
			1460.83	1.528E+02	(P	1.679E+01 8.41E+00	1.07E+01 G
Sc-46	F	7.1926E-01				8.38E+01	
			889.28	7.193E-01	?(	2.696E+00 1.11E+02	1.00E+02 G
			1120.55	0.000E+00	-	3.217E+00 1.00E+03	1.00E+02 G
CR-51	F	2.9501E+00				2.77E+01	
			320.08	2.950E+00	?(P	1.091E+01 1.09E+02	9.94E+00 G
MN-54	C	4.4131E-01				3.12E+02	
			834.85	4.413E-01	?(P	1.047E+00 9.72E+01	1.00E+02 G
FE-59	F	9.3281E-01				4.45E+01	
			1099.25	9.328E-01	?(P	2.371E+00 1.11E+02	5.65E+01 G
			1291.60	-3.882E-01	-	4.144E+00 4.60E+02	4.32E+01 G
Co-56	C	7.8786E-01				7.73E+01	
			846.77	-4.524E-01	?(P	1.542E+00 9.62E+01	9.99E+01 G
			1238.28	1.911E+00	?(P	1.667E+00 4.23E+01	6.61E+01 G
			1037.84	4.308E+00	?(	8.758E+00 8.79E+01	1.41E+01 G
			1771.35	0.000E+00	-	8.474E+00 1.00E+03	1.55E+01 A
CO-57	C	-1.6713E-01				2.72E+02	
			122.06	-1.671E-01	?(	1.187E+00 2.09E+02	8.56E+01 G
			136.47	0.000E+00	+	1.626E+01 1.00E+03	1.07E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CO-58	C -8.1012E-01					7.09E+01	
		810.78-8.101E-01	?(P		2.309E+00	7.01E+01	9.95E+01 G
CO-60	F -5.1568E-01					1.93E+03	
		1332.50-5.157E-01	?(		1.884E+00	1.66E+02	1.00E+02 G
		1173.24-7.791E-02	+		1.663E+00	9.15E+02	9.99E+01 G
ZN-65	F -7.4272E-01					2.44E+02	
		1115.55-7.427E-01	?(		6.130E+00	2.38E+02	5.06E+01 G
NB-94	I 3.7995E-01					7.41E+06	
		702.63 3.800E-01	?(		1.094E+00	1.20E+02	9.79E+01 G
		871.10-4.157E-02	-		1.072E+00	6.71E+02	9.99E+01 G
ZR-95	I -4.4671E-01					6.40E+01	
		756.73-4.467E-01	?(		2.600E+00	2.41E+02	5.45E+01 G
		724.20 0.000E+00	+		4.006E+00	1.00E+03	4.42E+01 G
NB-95	I -2.7432E-01					6.40E+01	
		765.79-2.743E-01	?(		1.524E+00	1.58E+02	9.98E+01 G
RU-103	I -7.0421E-01					3.93E+01	
		497.05-7.042E-01	?(P		1.475E+00	7.10E+01	9.09E+01 G
		610.30 0.000E+00	+		5.383E+01	1.00E+03	5.75E+00 GA
RH-106	I 2.4002E+00					3.74E+02	
		621.92 2.400E+00	(P		1.101E+01	1.81E+02	9.93E+00 G
		1050.36-2.676E+01	+		1.211E+02	1.30E+02	1.56E+00 G
		511.86 1.402E+01	?		6.732E+00	2.70E+01	2.00E+01 GA
AG-108M	C 2.8466E-01					1.53E+05	
		433.94 2.847E-01	?(		1.039E+00	1.42E+02	9.05E+01 G
		722.94 0.000E+00	-		1.945E+00	1.00E+03	9.08E+01 G
		614.28 0.000E+00	&		3.462E+00	1.00E+03	8.98E+01 G
AG-110M	F 2.2090E-01					2.50E+02	
		884.68-1.943E-01	?(		4.104E+00	6.08E+02	7.27E+01 G
		657.76 3.827E-01	?(		1.077E+00	8.28E+01	9.46E+01 G
		937.49 1.914E-01	%		4.978E+00	1.10E+03	3.44E+01 G
		1384.30-2.431E-01	+		5.034E+00	8.46E+02	2.43E+01 G
		763.94 8.881E-01	?(		5.491E+00	1.73E+02	2.23E+01 G
SN-113	F -7.2314E-01					1.15E+02	
		391.69-7.231E-01	?(		2.965E+00	1.21E+02	6.40E+01 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
SB-124	F 5.1412E-01					6.02E+01	
		602.73	0.000E+00	?(	3.120E+00	1.00E+03	9.83E+01 G
		1690.98	-1.326E+00	+ P	4.137E+00	2.45E+02	4.78E+01 G
		722.79	5.187E+00	?(	1.431E+01	8.19E+01	1.08E+01 G
SB-125	I -9.8351E-01					1.01E+03	
		427.88	-9.835E-01	?(	3.771E+00	1.51E+02	2.96E+01 G
		600.50	-1.255E-01	% P	1.714E+01	2.30E+03	1.79E+01 G
		635.89	4.094E-01	+ P	9.577E+00	6.32E+02	1.13E+01 G
		463.37	-3.147E+00	+ P	1.452E+01	1.27E+02	1.05E+01 G
I-131	I 3.8383E-01					8.02E+00	
		364.48	2.516E-01	&(P	1.084E+00	1.67E+02	8.17E+01 G
		284.30	2.143E+00	(	1.441E+01	2.64E+02	6.14E+00 G
		636.97	-7.905E-01	+ P	1.516E+01	5.22E+02	7.17E+00 G
Ga-68	C 5.1876E+00					4.71E-02	
		1077.40	5.188E+00	?(	3.406E+01	2.56E+02	3.30E+00 G
Tc-99m	I -4.2121E-01					2.51E-01	
		140.51	-4.212E-01	?(	2.098E+00	1.49E+02	8.93E+01 G
BA-133	F -2.6830E-01					3.85E+03	
		356.00	-8.237E-01	?(	3.618E+00	1.31E+02	6.20E+01 G
		302.85	1.612E+00	?(	1.165E+01	2.14E+02	1.83E+01 G
		383.84	-2.055E+00	+	1.739E+01	2.46E+02	8.94E+00 GA
		80.99	-1.432E+00	+ P	5.395E+00	8.83E+01	3.41E+01 GA
CS-134	I 2.4470E-01					7.54E+02	
		604.71	0.000E+00	?(	3.149E+00	1.00E+03	9.76E+01 G
		795.87	5.240E-01	?(	1.532E+00	8.59E+01	8.55E+01 G
		569.32	-1.082E+00	+	7.200E+00	1.87E+02	1.54E+01 G
		801.95	4.068E-01	%	2.205E+01	1.51E+03	8.69E+00 G
		563.24	-3.414E+00	+	1.530E+01	1.82E+02	8.35E+00 G
CS-137	I -6.7647E-01					1.10E+04	
		661.66	-6.765E-01	?(	1.966E+00	8.62E+01	8.52E+01 G
CE-139	F -6.8326E-02					1.38E+02	
		165.85	-6.833E-02	?(	1.424E+00	6.08E+02	7.99E+01 G
Ba-140	I 1.9715E+00					1.28E+01	
		537.26	1.536E+00	?(P	4.743E+00	1.26E+02	2.44E+01 G
		162.66	-5.408E+00	+	1.747E+01	9.64E+01	6.22E+00 G
		304.85	4.448E+00	?(	5.103E+01	3.38E+02	4.29E+00 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
La-140	I 8.9267E-02					1.28E+01	
		1596.21	-4.386E-01	?(P	1.495E+00	3.53E+02	9.54E+01 G
		487.02	7.018E-01	?(	3.090E+00	1.28E+02	4.55E+01 G
		328.76	1.197E+00	?(	6.994E+00	1.71E+02	2.03E+01 G
		815.77	-9.314E-01	+ P	1.087E+01	2.62E+02	2.33E+01 G
CE-141	I 1.3302E-02					3.25E+01	
		145.44	1.330E-02	&(	3.773E+00	8.39E+03	4.82E+01 G
CE-144	I -3.0389E+00					2.85E+02	
		133.54	-3.039E+00	&(	1.547E+01	1.52E+02	1.11E+01 G
PM-144	C -1.9555E-01					3.63E+02	
		696.54	-1.955E-01	?(	1.218E+00	2.55E+02	9.90E+01 G
		618.06	-4.504E-02	% P	3.161E+00	1.30E+03	9.91E+01 G
EU-152	F 8.5973E-01					4.94E+03	
		344.29	-1.863E+00	?(	9.184E+00	1.47E+02	2.65E+01 G
		1112.07	-7.657E+00	+	2.041E+01	7.96E+01	1.36E+01 G
		121.78	1.072E+00	?(	3.362E+00	9.37E+01	2.86E+01 G
		778.92	2.068E+00	&(	7.511E+00	1.46E+02	1.29E+01 G
		964.11	2.703E+00	?(	1.025E+01	1.09E+02	1.46E+01 G
		244.69	3.962E+00	?(	2.125E+01	1.59E+02	7.58E+00 G
		1408.00	-7.284E+00	+	1.278E+01	8.38E+01	2.10E+01 GA
EU-154	I -3.7293E+00					3.14E+03	
		873.23	-3.729E+00	?(	1.315E+01	1.03E+02	1.23E+01 G
		123.10	0.000E+00	+	2.429E+00	1.00E+03	4.08E+01 G
		1274.54	9.481E-01	+	4.442E+00	1.32E+02	3.52E+01 G
		723.36	0.000E+00	+	8.740E+00	1.00E+03	2.02E+01 G
		1004.77	-3.844E-01	+	7.980E+00	8.57E+02	1.80E+01 G
		996.33	-2.272E+00	+	1.874E+01	2.33E+02	1.06E+01 G
EU-155	I 1.5873E+00					1.81E+03	
		105.31	1.587E+00	&(P	1.012E+01	1.91E+02	2.12E+01 G
		86.54	-1.383E+00	+	8.767E+00	1.90E+02	3.07E+01 G
HF-181	F 3.9227E-01					4.24E+01	
		482.00	3.923E-01	?(	1.594E+00	1.18E+02	8.05E+01 G
		133.02	-7.772E-01	&	4.042E+00	1.55E+02	4.33E+01 G
		345.83	-2.687E+00	+	1.377E+01	1.52E+02	1.51E+01 G
		136.30	-5.560E+00	+	2.907E+01	1.56E+02	5.85E+00 G
Ta-182	F -2.3699E+00					1.14E+02	
		1121.30	-2.370E+00	?(	1.000E+01	1.24E+02	3.49E+01 G
		1221.41	7.907E-02	% P	7.265E+00	3.97E+03	2.70E+01 G
		1189.05	-3.096E+00	& P	1.177E+01	1.27E+02	1.62E+01 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Hg-203	F	3.6101E-01					4.66E+01	
			279.20	3.610E-01	?(	1.242E+00	1.02E+02	8.15E+01 G
TL-208	N	2.3160E+00					6.98E+02	
			583.02	1.385E+00	?(	1.334E+00	4.24E+01	8.45E+01 G
			277.28	3.681E+00	(	1.706E+01	1.36E+02	6.31E+00 G
			860.56	7.954E+00	?(P	6.523E+00	3.84E+01	1.24E+01 G
pm-146	C	-1.8623E-01					2.02E+03	
			747.16	-6.329E-01	(P	3.754E+00	1.56E+02	3.40E+01 G
			735.72	4.887E-01	&(	4.923E+00	4.03E+02	2.25E+01 G
			453.88	-2.001E-01	+ P	1.509E+00	3.16E+02	6.50E+01 G
y-88	F	3.8809E-01					1.07E+02	
			898.04	3.881E-01	&(	8.927E-01	9.57E+01	9.37E+01 G
			1836.06	-2.289E-02	% P	8.367E-01	2.64E+03	9.92E+01 G
Cd-113m		2.4824E+03					5.33E+03	
			263.70	2.482E+03	(	1.391E+04	1.62E+02	6.00E-03 K
Cd-109	F	-3.5096E+00					4.53E+02	
			88.04	-3.510E+00	?(	6.083E+01	5.17E+02	3.79E+00 G
Cf-251	T	1.6682E+00					3.28E+05	
			176.60	1.668E+00	?(	4.375E+00	1.01E+02	1.70E+01 G
			227.00	1.644E+00		1.272E+01	2.91E+02	6.30E+00 GA
Cf-249	T	-3.1164E-01					1.28E+05	
			387.95	-7.584E-01	?(	2.627E+00	1.03E+02	6.60E+01 G
			333.44	1.590E+00	?(	9.628E+00	1.77E+02	1.55E+01 G
Sn-126		3.6387E+00					3.65E+07	
			87.57	-1.012E+00	-	6.240E+00	1.85E+02	3.75E+01 GA
			64.28	3.639E+00	?(	1.822E+01	1.49E+02	9.70E+00 G
			86.94	4.207E+00		1.963E+01	1.40E+02	9.04E+00 GA
PB-210	N	1.9932E+01					8.14E+03	
			46.54	1.993E+01	(P	3.550E+01	6.58E+01	4.25E+00 G
PB-212	N	4.3634E+00					6.98E+02	
			238.63	4.363E+00	(P	1.729E+00	1.57E+01	4.33E+01 G
			300.03	8.612E+00	+ P	5.922E+01	2.03E+02	3.28E+00 GA
PB-214	N	8.3049E+00					5.84E+05	
			351.93	8.676E+00	(	9.299E-01	1.04E+01	3.76E+01 G
			295.09	7.582E+00	(	2.647E+00	1.76E+01	1.93E+01 G
			242.00	7.957E+00		1.037E+01	4.14E+01	7.43E+00 GA

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
BI-207	C -7.7427E-03					1.18E+04	
		569.70	-7.743E-03	%(	1.565E+00	5.64E+03	9.77E+01 G
		1063.66	-7.759E-01	+	2.284E+00	1.28E+02	7.45E+01 G
U-235	N 6.8868E+00					2.57E+11	
		143.79	7.979E+00	*(P	5.226E+00	2.75E+01	1.10E+01 G
		205.33	5.659E+00	&(P	1.602E+01	1.09E+02	5.01E+00 G
		163.38	5.740E+00	?(P	2.160E+01	1.12E+02	5.08E+00 G
		185.72	4.319E+00	- P	1.254E+00	1.45E+01	5.40E+01 GA
BI-214	N 8.0614E+00					5.84E+05	
		609.31	8.061E+00	(P	2.166E+00	1.53E+01	4.61E+01 G
		1120.29	-4.567E-01	- P	2.142E+01	8.78E+02	1.51E+01 G
		1764.49	4.234E-01	- P	1.395E+01	8.77E+02	1.54E+01 G
BI-210M	T 5.7451E-01					1.10E+09	
		265.83	5.745E-01	?(	1.822E+00	9.39E+01	5.00E+01 G
		304.90	0.000E+00	-	7.916E+00	1.00E+03	2.80E+01 G
AC-228	N 6.8728E+00					2.10E+03	
		911.07	6.438E+00	?(	2.915E+00	2.51E+01	2.90E+01 G
		968.97	3.216E+00	-	9.523E+00	8.72E+01	1.75E+01 G
		338.32	7.922E+00	(	4.098E+00	2.54E+01	1.20E+01 G
		93.35	3.504E+00	-	4.034E+01	3.44E+02	5.56E+00 XA
TH-227	N -3.2762E+00					7.95E+03	
		50.14	-3.276E+00	(	2.552E+01	2.30E+02	8.00E+00 G
		256.24	-4.048E+00	+	1.332E+01	1.26E+02	7.00E+00 G
TH-229	N 7.5385E-01					2.68E+06	
		193.51	7.538E-01	?(	1.787E+01	8.90E+02	4.40E+00 G
		210.85	-1.236E+01	+ P	3.017E+01	8.53E+01	2.99E+00 G
TH-234	N 5.1570E+01					1.63E+12	
		63.29	6.106E+01	@(P	2.950E+01	2.15E+01	3.81E+00 G
		92.59	4.510E+01	(P	1.533E+01	1.28E+01	5.58E+00 G
PA-231	N 1.1011E+01					1.20E+07	
		302.65	1.025E+01	?(	7.259E+01	2.09E+02	2.88E+00 G
		300.07	1.190E+01	?(	8.078E+01	2.01E+02	2.46E+00 G
PA-233	C 6.8183E-01					7.82E+08	
		312.01	-1.407E-02	%(P	6.272E+00	1.17E+04	3.60E+01 G
		300.18	4.723E+00	?(	3.279E+01	2.05E+02	6.20E+00 G

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Nuclide		Ave activity	Energy		Activity	Code	Peak	MDA	Comments
PA-234	N	-2.2291E-01						1.63E+12	
			131.29	-1.860E+00	&(	9.884E+00	1.59E+02	1.80E+01	G
			946.02	1.976E+00	?(	6.487E+00	1.33E+02	1.34E+01	G
			569.47	-4.336E+00	+	1.680E+01	1.13E+02	8.20E+00	G
			883.24	-9.103E+00	+	2.873E+01	9.38E+01	9.60E+00	G
			880.53	-1.451E+01	+	4.184E+01	8.59E+01	6.00E+00	GA
PA-234M	N	-3.9982E+00						1.63E+12	
			1001.00	-3.998E+00	%(P	2.513E+02	1.29E+03	8.37E-01	G
			766.41	0.000E+00	+	1.560E+02	1.00E+03	2.94E-01	G
AM-241	T	1.1516E+00						1.58E+05	
			59.54	1.152E+00	(	5.623E+00	1.46E+02	3.59E+01	G
Np-237	F	-3.2426E+00						2.14E+06	
			86.49	-3.243E+00	?(	2.077E+01	1.92E+02	1.31E+01	G
Ir-192	F	1.1518E-01						7.40E+01	
			316.49	1.152E-01	?(	1.135E+00	2.81E+02	8.70E+01	G
			468.06	-6.538E-01	+	3.235E+00	1.45E+02	5.18E+01	G
			308.44	0.000E+00	-	7.045E+00	1.00E+03	3.18E+01	G
Cs-136	F	5.4214E-01						1.30E+01	
			818.50	5.255E-01	?(	2.416E+00	1.35E+02	1.00E+02	G
			1048.07	5.657E-01	?(	1.723E+00	8.89E+01	8.00E+01	G
			340.57	5.374E-01	?(	3.359E+00	1.83E+02	4.69E+01	G
Np-239	T	-1.6976E+00						2.36E+00	
			103.70	0.000E+00	+	9.268E+00	1.00E+03	2.40E+01	X
			106.13	-1.698E+00	?(	1.043E+01	1.84E+02	2.27E+01	G
			99.50	0.000E+00	&	1.489E+01	1.00E+03	1.50E+01	X
Nd-147		-6.6210E-01						1.11E+01	
			531.00	-6.621E-01	?(	8.763E+00	5.25E+02	1.30E+01	G
			91.10	0.000E+00	+	8.030E+00	1.00E+03	2.83E+01	G
TL-210	N	4.1541E-01						5.84E+05	
			799.60	4.553E-01	&(	1.556E+00	9.98E+01	9.90E+01	G
			296.00	3.655E-01	?(	2.382E+00	1.93E+02	7.90E+01	G
			1313.00	1.483E+00	?	5.449E+00	1.52E+02	2.10E+01	GA

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.

@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide
    failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the
    library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity
    to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

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********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
TH-227	50.14	243.	-10.	-0.005	230.16	-3.276E+00	
Sn-126	64.28	343.	18.	0.010	149.21	3.639E+00	
BA-133	80.99	495.	-28.	-0.016	88.26	-1.432E+00	P
Np-237	86.49	1164.	-25.	-0.014	192.20	-3.243E+00	
EU-155	86.54	1138.	-25.	-0.014	190.12	-1.383E+00	
Sn-126	86.94	487.	23.	0.013	139.55	4.207E+00	
Sn-126	87.57	863.	-23.	-0.013	184.64	-1.012E+00	
Cd-109	88.04	840.	-8.	-0.004	516.91	-3.510E+00	
EU-155	105.31	775.	21.	0.012	190.90	1.587E+00	P
Np-239	106.13	948.	-24.	-0.013	184.21	-1.698E+00	
EU-152	121.78	145.	19.	0.010	93.69	1.072E+00	
CO-57	122.06	163.	-9.	-0.005	208.82	-1.671E-01	
PA-234	131.29	503.	-20.	-0.011	158.76	-1.860E+00	
HF-181	133.02	483.	-20.	-0.011	155.37	-7.772E-01	
CE-144	133.54	463.	-20.	-0.011	152.09	-3.039E+00	
HF-181	136.30	449.	-19.	-0.011	156.09	-5.560E+00	
Tc-99m	140.51	504.	-22.	-0.012	148.89	-4.212E-01	
Ba-140	162.66	153.	-19.	-0.010	96.43	-5.408E+00	
CE-139	165.85	165.	-3.	-0.002	607.67	-6.833E-02	
Cf-251	176.60	62.	15.	0.008	101.40	1.668E+00	
TH-229	193.51	62.	2.	0.001	889.61	7.538E-01	
TH-229	210.85	74.	-18.	-0.010	85.34	-1.236E+01	P
Cf-251	227.00	51.	5.	0.003	290.93	1.644E+00	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
EU-152	244.69	200.	13.	0.007	158.80	3.962E+00	
TH-227	256.24	59.	-12.	-0.006	126.27	-4.048E+00	
Cd-113m	263.70	44.	6.	0.003	161.59	2.482E+03	
BI-210M	265.83	52.	12.	0.006	93.86	5.745E-01	
Hg-203	279.20	61.	11.	0.006	101.63	3.610E-01	
I-131	284.30	44.	5.	0.003	263.57	2.143E+00	
TL-210	296.00	204.	11.	0.006	192.51	3.655E-01	
PA-231	300.07	223.	11.	0.006	200.66	1.190E+01	
PA-233	300.18	234.	11.	0.006	205.29	4.723E+00	
PA-231	302.65	245.	11.	0.006	209.42	1.025E+01	
BA-133	302.85	255.	11.	0.006	213.80	1.612E+00	
Ba-140	304.85	266.	7.	0.004	338.32	4.448E+00	
Ir-192	316.49	46.	4.	0.002	280.67	1.152E-01	
CR-51	320.08	56.	10.	0.006	108.89	2.950E+00	P
La-140	328.76	95.	8.	0.005	170.92	1.197E+00	
Cf-249	333.44	103.	8.	0.005	177.32	1.590E+00	
Cs-136	340.57	111.	8.	0.005	183.08	5.374E-01	
EU-152	344.29	271.	-16.	-0.009	146.65	-1.863E+00	
HF-181	345.83	194.	-13.	-0.007	151.85	-2.687E+00	
BA-133	356.00	217.	-16.	-0.009	130.63	-8.237E-01	
I-131	364.48	29.	6.	0.004	167.29	2.516E-01	P
BA-133	383.84	88.	-6.	-0.003	245.62	-2.055E+00	
Cf-249	387.95	110.	-15.	-0.008	102.89	-7.584E-01	
SN-113	391.69	130.	-14.	-0.008	121.46	-7.231E-01	
SB-125	427.88	36.	-8.	-0.004	151.04	-9.835E-01	
AG-108M	433.94	24.	7.	0.004	142.14	2.847E-01	
pm-146	453.88	24.	-3.	-0.002	316.18	-2.001E-01	P
SB-125	463.37	62.	-9.	-0.005	127.25	-3.147E+00	P
Ir-192	468.06	74.	-9.	-0.005	144.73	-6.538E-01	
BE-7	477.60	32.	8.	0.005	101.01	3.153E+00	
HF-181	482.00	40.	8.	0.004	118.40	3.923E-01	
La-140	487.02	48.	8.	0.004	128.25	7.018E-01	
RU-103	497.05	42.	-16.	-0.009	71.03	-7.042E-01	P
RH-106	511.86	40.	67.	0.037	26.99	1.402E+01	
Nd-147	531.00	26.	-2.	-0.001	525.20	-6.621E-01	
Ba-140	537.26	26.	9.	0.005	125.85	1.536E+00	P
CS-134	563.24	30.	-6.	-0.004	181.90	-3.414E+00	
CS-134	569.32	22.	-4.	-0.002	186.97	-1.082E+00	
PA-234	569.47	35.	-8.	-0.004	112.87	-4.336E+00	
RH-106	621.92	18.	5.	0.003	180.72	2.400E+00	P
SB-125	635.89	17.	1.	0.001	632.37	4.094E-01	P
I-131	636.97	17.	-1.	-0.001	521.84	-7.905E-01	P
AG-110M	657.76	14.	7.	0.004	82.83	3.827E-01	
CS-137	661.66	42.	-11.	-0.006	86.22	-6.765E-01	
PM-144	696.54	19.	-4.	-0.002	255.36	-1.955E-01	
NB-94	702.63	14.	7.	0.004	119.52	3.800E-01	
SB-124	722.79	31.	10.	0.006	81.93	5.187E+00	
pm-146	735.72	14.	2.	0.001	403.11	4.887E-01	

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
pm-146	747.16	19.	-4.	-0.002	156.15	-6.329E-01		P
ZR-95	756.73	23.	-4.	-0.002	241.30	-4.467E-01		
AG-110M	763.94	16.	4.	0.002	172.61	8.881E-01		
NB-95	765.79	27.	-5.	-0.003	158.25	-2.743E-01		
EU-152	778.92	9.	5.	0.003	146.39	2.068E+00		
BI-212	785.42	19.	6.	0.003	159.77	2.689E+01		P
CS-134	795.87	18.	8.	0.004	85.94	5.240E-01		
TL-210	799.60	26.	8.	0.004	99.76	4.553E-01		
CO-58	810.78	60.	-14.	-0.008	70.12	-8.101E-01		P
La-140	815.77	73.	-4.	-0.002	262.29	-9.314E-01		P
Cs-136	818.50	66.	9.	0.005	134.51	5.255E-01		
MN-54	834.85	10.	7.	0.004	97.20	4.413E-01		P
Co-56	846.77	23.	-7.	-0.004	96.23	-4.524E-01		P
NB-94	871.10	10.	-1.	0.000	670.82	-4.157E-02		
EU-154	873.23	25.	-7.	-0.004	102.65	-3.729E+00		
PA-234	880.53	64.	-14.	-0.008	85.87	-1.451E+01		
PA-234	883.24	78.	-14.	-0.008	93.78	-9.103E+00		
AG-110M	884.68	92.	-2.	-0.001	608.08	-1.943E-01		
Sc-46	889.28	73.	11.	0.006	110.56	7.193E-01		
y-88	898.04	5.	6.	0.003	95.75	3.881E-01		
PA-234	946.02	5.	4.	0.002	132.68	1.976E+00		
EU-152	964.11	18.	6.	0.003	109.18	2.703E+00		
EU-154	996.33	32.	-4.	-0.002	232.99	-2.272E+00		
EU-154	1004.77	15.	-1.	-0.001	857.32	-3.844E-01		
Co-56	1037.84	10.	9.	0.005	87.92	4.308E+00		
Cs-136	1048.07	13.	6.	0.004	88.85	5.657E-01		
RH-106	1050.36	26.	-6.	-0.003	129.99	-2.676E+01		
BI-207	1063.66	20.	-8.	-0.004	127.88	-7.759E-01		
Ga-68	1077.40	5.	2.	0.001	255.77	5.188E+00		
FE-59	1099.25	11.	7.	0.004	111.35	9.328E-01		P
EU-152	1112.07	55.	-14.	-0.008	79.64	-7.657E+00		
ZN-65	1115.55	69.	-5.	-0.003	238.30	-7.427E-01		
Ta-182	1121.30	88.	-11.	-0.006	124.32	-2.370E+00		
CO-60	1173.24	16.	-1.	-0.001	914.69	-7.791E-02		
Ta-182	1189.05	21.	-6.	-0.004	126.56	-3.096E+00		P
Co-56	1238.28	5.	16.	0.009	42.34	1.911E+00		P
NA-22	1274.53	5.	7.	0.004	62.61	5.518E-01		
EU-154	1274.54	12.	4.	0.002	131.56	9.481E-01		
FE-59	1291.60	16.	-2.	-0.001	460.07	-3.882E-01		
TL-210	1313.00	5.	4.	0.002	152.39	1.483E+00		
CO-60	1332.50	17.	-6.	-0.003	166.25	-5.157E-01		
AG-110M	1384.30	6.	-1.	0.000	846.32	-2.431E-01		
EU-152	1408.00	34.	-17.	-0.009	83.84	-7.284E+00		
La-140	1596.21	6.	-4.	-0.002	353.26	-4.386E-01		P
SB-124	1690.98	12.	-6.	-0.003	245.26	-1.326E+00		P

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
BE-7	#A	3.1526E+00	3.1526E+00	1.010E+02%	1.09E+01
NA-22	#A	5.5177E-01	5.5177E-01	6.261E+01%	1.12E+00
K-40		1.5282E+02	1.5282E+02	8.410E+00%	1.68E+01
Sc-46	#A	7.1925E-01	7.1926E-01	1.106E+02%	2.70E+00
CR-51	#A	2.9500E+00	2.9501E+00	1.089E+02%	1.09E+01
MN-54	#A	4.4131E-01	4.4131E-01	9.720E+01%	1.05E+00
FE-59	#A	9.3280E-01	9.3281E-01	1.113E+02%	2.37E+00
Co-56	#A	7.8786E-01	7.8786E-01	4.234E+01%	1.54E+00
CO-57	#A	-1.6713E-01	-1.6713E-01	2.088E+02%	1.19E+00
CO-58	#A	-8.1012E-01	-8.1012E-01	7.012E+01%	2.31E+00
CO-60	#A	-5.1568E-01	-5.1568E-01	1.662E+02%	1.88E+00
ZN-65	#A	-7.4272E-01	-7.4272E-01	2.383E+02%	6.13E+00
NB-94	#A	3.7995E-01	3.7995E-01	1.195E+02%	1.09E+00
ZR-95	#A	-4.4670E-01	-4.4671E-01	2.413E+02%	2.60E+00
NB-95	#A	-2.7432E-01	-2.7432E-01	1.582E+02%	1.52E+00
RU-103	#A	-7.0420E-01	-7.0421E-01	7.103E+01%	1.48E+00
RH-106	#A	2.4002E+00	2.4002E+00	1.807E+02%	1.10E+01
AG-108M	#A	2.8466E-01	2.8466E-01	1.421E+02%	1.04E+00
AG-110M	#A	2.2090E-01	2.2090E-01	8.283E+01%	4.10E+00
SN-113	#A	-7.2314E-01	-7.2314E-01	1.215E+02%	2.96E+00
SB-124	#A	5.1412E-01	5.1412E-01	8.193E+01%	3.12E+00
SB-125	#A	-9.8351E-01	-9.8351E-01	1.510E+02%	3.77E+00
I-131	#A	3.8381E-01	3.8383E-01	1.561E+02%	1.08E+00
Gd-153	#A	0.0000E+00	0.0000E+00	7.071E+02%	7.47E+00
Ga-68	#A	5.1348E+00	5.1876E+00	2.558E+02%	3.41E+01
Tc-99m	#A	-4.2040E-01	-4.2121E-01	1.489E+02%	2.10E+00
BA-133	#A	-2.6830E-01	-2.6830E-01	1.253E+02%	3.62E+00
CS-134	#A	2.4470E-01	2.4470E-01	8.594E+01%	3.15E+00
CS-137	#A	-6.7647E-01	-6.7647E-01	8.622E+01%	1.97E+00
CE-139	#A	-6.8326E-02	-6.8326E-02	6.077E+02%	1.42E+00
Ba-140	#A	1.9715E+00	1.9715E+00	1.259E+02%	4.74E+00
La-140	#A	8.9263E-02	8.9267E-02	1.283E+02%	1.49E+00
CE-141	#A	1.3302E-02	1.3302E-02	8.389E+03%	3.77E+00
CE-144	#A	-3.0389E+00	-3.0389E+00	1.521E+02%	1.55E+01
PM-144	#A	-1.9555E-01	-1.9555E-01	2.554E+02%	1.22E+00
EU-152	#A	8.5973E-01	8.5973E-01	5.962E+01%	9.18E+00
EU-154	#A	-3.7293E+00	-3.7293E+00	1.027E+02%	1.31E+01
EU-155	#A	1.5873E+00	1.5873E+00	1.909E+02%	1.01E+01
HF-181	#A	3.9226E-01	3.9227E-01	1.184E+02%	1.59E+00
Ta-182	#A	-2.3698E+00	-2.3699E+00	1.243E+02%	1.00E+01
Hg-203	#A	3.6100E-01	3.6101E-01	1.016E+02%	1.24E+00
TL-208		2.3160E+00	2.3160E+00	3.841E+01%	1.33E+00
pm-146	#A	-1.8622E-01	-1.8623E-01	1.562E+02%	3.75E+00

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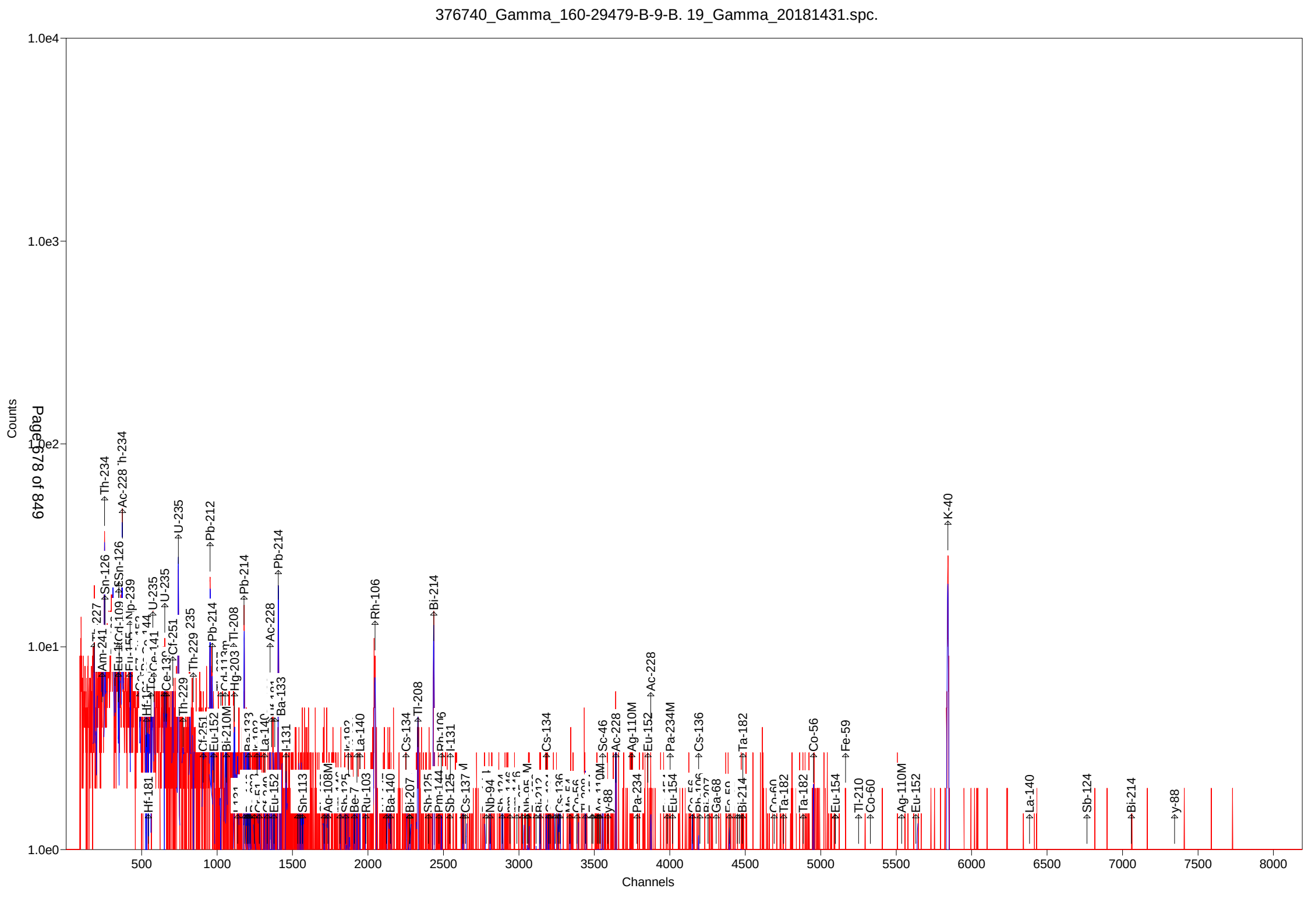
y-88 #A	3.8809E-01	3.8809E-01	9.575E+01%		8.93E-01
Cd-113m#A	2.4824E+03	2.4824E+03	1.616E+02%		1.39E+04
Cd-109 #A	-3.5096E+00	-3.5096E+00	5.169E+02%		6.08E+01
Cf-251 #A	1.6682E+00	1.6682E+00	1.014E+02%		4.38E+00
Cf-249 #A	-3.1164E-01	-3.1164E-01	1.025E+02%		2.63E+00
Sn-126 #A	3.6387E+00	3.6387E+00	1.492E+02%		1.82E+01
PB-210 A	1.9932E+01	1.9932E+01	6.580E+01%		3.55E+01
PB-212	4.3634E+00	4.3634E+00	1.570E+01%		1.73E+00
PB-214	8.3049E+00	8.3049E+00	1.021E+01%		9.30E-01
BI-207 #A	-7.7427E-03	-7.7427E-03	5.644E+03%		1.56E+00
BI-212 #A	0.0000E+00	0.0000E+00	1.000E+03%		2.35E+01
U-235 #	6.8868E+00	6.8868E+00	2.746E+01%		5.23E+00
BI-214	8.0614E+00	8.0614E+00	1.528E+01%		2.17E+00
BI-210M#A	5.7451E-01	5.7451E-01	9.386E+01%		1.82E+00
AC-228	6.8728E+00	6.8728E+00	1.787E+01%		2.92E+00
TH-227 #A	-3.2762E+00	-3.2762E+00	2.302E+02%		2.55E+01
TH-229 #A	7.5385E-01	7.5385E-01	8.896E+02%		1.79E+01
TH-234	5.1570E+01	5.1570E+01	1.251E+01%		2.95E+01
PA-231 #A	1.1011E+01	1.1011E+01	1.450E+02%		7.26E+01
PA-233 #A	6.8183E-01	6.8183E-01	2.053E+02%		6.27E+00
PA-234 #A	-2.2291E-01	-2.2291E-01	1.035E+02%		9.88E+00
PA-234M#A	-3.9982E+00	-3.9982E+00	1.290E+03%		2.51E+02
AM-241 A	1.1516E+00	1.1516E+00	1.457E+02%		5.62E+00
Np-237 #A	-3.2426E+00	-3.2426E+00	1.922E+02%		2.08E+01
Ir-192 #A	1.1518E-01	1.1518E-01	2.807E+02%		1.13E+00
Cs-136 #A	5.4212E-01	5.4214E-01	8.131E+01%		2.42E+00
Np-239 #A	-1.6973E+00	-1.6976E+00	1.842E+02%		1.04E+01
Nd-147 #A	-6.6208E-01	-6.6210E-01	5.252E+02%		8.76E+00
TL-210 #A	4.1541E-01	4.1541E-01	9.976E+01%		1.56E+00

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.7 to 1999.4 keV) 2.611E+02 Bq/Sample
Total Decayed Activity (37.7 to 1999.4 keV) 2.6113239E+02 Bq/Sample


376740_Gamma_160-29479-B-9-B. 19_Gamma_20181431.spc.
Counts
Channels
1.0e4
1.0e3
1.0e2
1.0e1
1.0e0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
7500
8000
Th-234
Sn-126
Ac-228
Sn-126
Np-239
U-235
U-235
U-235
Cf-251
Th-229
Th-229
Pb-212
Pb-214
Tl-208
Pb-214
Ac-228
Pb-214
Rh-106
Bi-214
Tl-208
Cs-134
Ac-228
Ag-110M
Eu-152
Pa-234M
Ac-228
Cs-136
Ta-182
Co-56
Fe-59
K-40
Hf-181
Sn-113
Ru-103
Ba-140
Bi-207
Sb-125
Pm-144
Sb-125
Cs-137
Nb-94
Cs-134
Sc-46
Ac-228
Pa-234
Eu-154
Ga-68
Bi-214
Co-60
Ta-182
Ta-182
Eu-154
Tl-210
Co-60
Ag-110M
Eu-152
La-140
Sb-124
Bi-214
y-88

Daily Checks

Test America
St. Louis
Quality Control Check

Spectrum: 8_20180808025_QCAsLeft
Description: Quality control Check (QC Source 'D') Post Stabilization
Acquired: 8/9/2018 12:23:22 AM
Detector: Detector # 8
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	238.00	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.55	59.79	60.04	PASS
FWHM	1.10	0.00	0.00	0.92	2.20	2.30	PASS
ActivityDiff	650.60	-5.00	-4.00	-3.43	4.00	5.00	PASS
QA-662							
FWHM	1.53	0.00	0.00	1.41	3.23	3.33	PASS
ActivityDiff	609.90	-5.00	-4.00	1.01	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5329.70	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.42	1333.01	1333.26	PASS
FWHM	1.90	0.00	0.00	1.87	4.10	4.20	PASS
ActivityDiff	1189.70	-5.00	-4.00	-1.60	4.00	5.00	PASS

Analyst: Morgan Reichert Reviewer: Morgan Reichert

Test America
St. Louis
Background Check

Spectrum: 8_20180809001_BG
Description: Background Contamination Check
Acquired: 8/9/2018 12:43:47 AM
Detector: Detector # 8
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.56	1.39	1.45	1.56	1.68	1.74	PASS

Analyst: Morgan Reichert Reviewer: Morgan Reichert

(Page 1 of 1)

Test America
St. Louis
Quality Control Check

Spectrum: 9_20180808026_QCAsLeft
Description: Quality control Check (QC Source 'E') Post Stabilization
Acquired: 8/9/2018 12:21:08 AM
Detector: Detector # 9
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	237.80	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.55	59.79	60.04	PASS
FWHM	1.08	0.00	0.00	0.96	2.18	2.28	PASS
ActivityDiff	649.44	-5.00	-4.00	-2.38	4.00	5.00	PASS
QA-662							
FWHM	1.62	0.00	0.00	1.47	3.32	3.42	PASS
ActivityDiff	607.56	-5.00	-4.00	-1.33	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5329.70	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.35	1333.01	1333.26	PASS
FWHM	2.12	0.00	0.00	1.96	4.32	4.42	PASS
ActivityDiff	1191.31	-5.00	-4.00	-0.61	4.00	5.00	PASS

Analyst: Morgan Reichert Reviewer: Morgan Reichert

Test America
St. Louis
Background Check

Spectrum: 9_20180809001_BG
Description: Background Contamination Check
Acquired: 8/9/2018 12:42:48 AM
Detector: Detector # 9
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.89	1.53	1.65	1.77	2.14	2.26	PASS

Analyst: Morgan Reichert Reviewer: Morgan Reichert

Test America
St. Louis
Quality Control Check

Spectrum: 12_20180809001_QCAsLeft
Description: Quality control Check (QC Source 'H') Post Stabilization
Acquired: 8/9/2018 12:22:02 AM
Detector: Detector #12
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	237.90	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.59	59.79	60.04	PASS
FWHM	0.90	0.00	0.00	0.84	2.00	2.10	PASS
ActivityDiff	691.00	-5.00	-4.00	0.70	4.00	5.00	PASS
QA-662							
FWHM	1.48	0.00	0.00	1.42	3.18	3.28	PASS
ActivityDiff	659.00	-5.00	-4.00	-0.35	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5330.30	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.55	1333.01	1333.26	PASS
FWHM	2.00	0.00	0.00	2.05	4.20	4.30	PASS
ActivityDiff	1274.00	-5.00	-4.00	0.09	4.00	5.00	PASS

Analyst: Morgan Reichert Reviewer: Morgan Reichert

Test America
St. Louis
Background Check

Spectrum: 12_20180809002_BG
Description: Background Contamination Check
Acquired: 8/9/2018 12:41:53 AM
Detector: Detector #12
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.00	1.89	1.93	1.95	2.07	2.10	PASS

Analyst: Morgan Reichert Reviewer: Morgan Reichert

Test America
St. Louis
Background Check

Spectrum: 14_20180808029_BG
Description: Background Contamination Check
Acquired: 8/9/2018 12:00:40 AM
Detector: Detector #14
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.80	1.66	1.71	1.77	1.90	1.94	PASS

Analyst: Morgan Reichert Reviewer: Morgan Reichert

Test America
St. Louis
Quality Control Check

Spectrum: 14_20180809001_QCAsLeft
Description: Quality control Check (QC Source 'E') Post Stabilization
Acquired: 8/9/2018 1:02:56 AM
Detector: Detector #14
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	237.90	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.64	59.79	60.04	PASS
FWHM	0.76	0.00	0.00	0.89	1.86	1.96	PASS
ActivityDiff	671.90	-5.00	-4.00	0.88	4.00	5.00	PASS
QA-662							
FWHM	1.35	0.00	0.00	1.42	3.05	3.15	PASS
ActivityDiff	628.85	-5.00	-4.00	-0.28	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5330.70	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.71	1333.01	1333.26	PASS
FWHM	1.91	0.00	0.00	1.90	4.11	4.21	PASS
ActivityDiff	1224.59	-5.00	-4.00	3.17	4.00	5.00	PASS

Analyst: Morgan Reichert Reviewer: Morgan Reichert

Test America
St. Louis
Background Check

Spectrum: 15_20180809001_BG
Description: Background Contamination Check
Acquired: 8/9/2018 12:01:37 AM
Detector: Detector #15
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.68	1.59	1.62	1.70	1.74	1.77	PASS

Analyst: Morgan Reichert Reviewer: Morgan Reichert

Test America
St. Louis
Quality Control Check

Spectrum: 15_20180809002_QCAsLeft
Description: Quality control Check (QC Source 'F') Post Stabilization
Acquired: 8/9/2018 1:36:32 AM
Detector: Detector #15
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	238.10	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.62	59.79	60.04	PASS
FWHM	0.95	0.00	0.00	0.95	2.05	2.15	PASS
ActivityDiff	670.56	-5.00	-4.00	0.49	4.00	5.00	PASS
QA-662							
FWHM	1.51	0.00	0.00	1.46	3.21	3.31	PASS
ActivityDiff	668.76	-5.00	-4.00	-0.65	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5330.20	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.72	1333.01	1333.26	PASS
FWHM	1.99	0.00	0.00	1.85	4.19	4.29	PASS
ActivityDiff	1277.79	-5.00	-4.00	1.17	4.00	5.00	PASS

Analyst: Morgan Reichert Reviewer: Morgan Reichert

Test America
St. Louis
Background Check

Spectrum: 17_20180809001_BG
Description: Background Contamination Check
Acquired: 8/9/2018 12:03:08 AM
Detector: Detector #17
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.32	2.18	2.23	2.29	2.42	2.46	PASS

Analyst: Morgan Reichert Reviewer: Morgan Reichert

Test America
St. Louis
Quality Control Check

Spectrum: 17_20180809002_QCAsLeft
Description: Quality control Check (QC Source 'H') Post Stabilization
Acquired: 8/9/2018 1:02:29 AM
Detector: Detector #17
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	237.90	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.63	59.79	60.04	PASS
FWHM	0.77	0.00	0.00	0.77	1.87	1.97	PASS
ActivityDiff	691.00	-5.00	-4.00	-0.78	4.00	5.00	PASS
QA-662							
FWHM	1.37	0.00	0.00	1.36	3.07	3.17	PASS
ActivityDiff	659.00	-5.00	-4.00	-2.83	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5329.90	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.58	1333.01	1333.26	PASS
FWHM	1.88	0.00	0.00	1.81	4.08	4.18	PASS
ActivityDiff	1274.00	-5.00	-4.00	-3.20	4.00	5.00	PASS

Analyst: Morgan Reichert Reviewer: Morgan Reichert

Test America
St. Louis
Quality Control Check

Spectrum: 19_20180808026_QCAsLeft
Description: Quality control Check (QC Source 'F') Post Stabilization
Acquired: 8/9/2018 12:21:10 AM
Detector: Detector #19
Quality Control Evaluation Criteria:
1) Notify Supervisor if 'AS FOUND' parameters exceed Tolerance or Control Limits.
2) Place out of service if 'AS LEFT' parameters exceed Tolerance or Control Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
QA-60							
Channel	238.00	236.00	237.00	238.00	239.00	240.00	PASS
Energy	59.54	59.04	59.29	59.73	59.79	60.04	PASS
FWHM	0.89	0.00	0.00	0.90	1.99	2.09	PASS
ActivityDiff	663.00	-5.00	-4.00	-0.95	4.00	5.00	PASS
QA-662							
FWHM	1.47	0.00	0.00	1.45	3.17	3.27	PASS
ActivityDiff	633.00	-5.00	-4.00	-1.00	4.00	5.00	PASS
QA-1332							
Channel	5330.00	5327.00	5328.00	5329.90	5332.00	5333.00	PASS
Energy	1332.51	1331.76	1332.01	1332.70	1333.01	1333.26	PASS
FWHM	1.92	0.00	0.00	1.89	4.12	4.22	PASS
ActivityDiff	1222.00	-5.00	-4.00	-1.41	4.00	5.00	PASS

Analyst: Morgan Reichert Reviewer: Morgan Reichert

Test America
St. Louis
Background Check

Spectrum: 19_20180809001_BG
Description: Background Contamination Check
Acquired: 8/9/2018 12:40:22 AM
Detector: Detector #19
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.30	2.15	2.20	2.26	2.39	2.44	PASS

Analyst: Morgan Reichert Reviewer: Morgan Reichert

Initial Calibrations

Gamma Verification per Geometry

Detector: Ge 8

Geometry: 100 mL D=1

Reference date 7/1/2011

Calibration Standard: 85520-334

Standard volume g / vial 5.32298

Standard volume transferred in g / geometry 0.7524

lab ID# of cal standard Rad11-0101

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	abundance	Activity Bq/sample	Count results	%recovery
Am-241	3368	476	0.359	**1326.1**	1333.8	100.6
Cd-109	4780	676	0.0361	**18716.1**	18108	96.8
Co-57	2554	361	0.856	**421.7**	423.11	100.3
Ce-139	3552	502	0.799	**628.4**	605.34	96.3
Hg-203	7851	1110	0.8155	**1360.8**	1438.5	105.7
Sn-113	4932	697	0.64	**1089.3**	1105.7	101.5
Cs-137	3188	451	0.851	**529.5**	522.65	98.7
Y-88	11970	1692	0.937	**1805.7**	1716.5	95.1
Co-60	5897	834	0.99974	**833.8**	828.38	99.4
Co-60	5897	834	0.99986	**833.7**	835.35	100.2
Y-88	12680	1792	0.992	**1806.8**	1855.6	102.7

Reviewed By: Jody Watson

Date: 9/8/2011

Calibration Data from file: 8_Liquid_D=1 100ml.Clb
Energy Calibration Date: 9/8/2011 Time: 11:01:54 AM
Efficiency Calibration Date: 9/8/2011 Time: 11:02:09 AM

Calibration Description:
8_100mLD=1_85520-334_090811

Energy Calibration Fit
Energy = 0.0266 +0.250010*Channel -2.33206e-010*Channel**2
FWHM (ch) = 4.2016 +0.000740*Channel -1.77385e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
237.88	59.54	59.50	0.07%	1.09	1.09	-0.36%
352.00	88.03	88.03	-0.00%	1.12	1.12	0.02%
488.08	122.06	122.05	0.01%	1.14	1.14	-0.15%
663.35	165.85	165.87	-0.01%	1.17	1.17	-0.29%
1116.76	279.17	279.23	-0.02%	1.26	1.25	0.72%
1566.59	391.69	391.69	-0.00%	1.34	1.33	0.71%
2646.23	661.66	661.61	0.01%	1.50	1.51	-0.77%
3591.94	898.02	898.04	-0.00%	1.66	1.66	0.38%
4692.66	1173.24	1173.24	0.00%	1.80	1.82	-1.31%
5329.67	1332.50	1332.49	0.00%	1.93	1.91	1.11%
7343.70	1836.01	1836.01	-0.00%	2.17	2.17	-0.11%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 2.0148 %
Ln(Eff) = -0.1433 -0.335874*Ln(Eng) -0.0419755*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 0.2567 %
Ln(Eff) = -11.1043 +3.982559*Ln(Eng) -0.467268*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
59.54	7.1909E-002	7.1884E-002	0.03%
88.03	7.0955E-002	7.1344E-002	-0.55%
122.06	6.3747E-002	6.3534E-002	0.33%
165.85	========== Knee ==========		
165.85	5.0110E-002	5.1998E-002	-3.77%
279.17	3.6486E-002	3.4518E-002	5.39%
391.69	2.6526E-002	2.6123E-002	1.52%
661.66	1.6441E-002	1.6650E-002	-1.27%
898.02	1.2047E-002	1.2672E-002	-5.18%
1173.24	9.8375E-003	9.9141E-003	-0.78%
1332.50	8.8149E-003	8.8022E-003	0.14%
1836.01	6.6617E-003	6.4845E-003	2.66%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Am-241	59.54	35.90	1.58E+005	1325.90	476.00	1.80%	7/1/2011 11:00:00 AM
Cd-109	88.03	3.61	4.63E+002	18726.00	676.00	3.80%	7/1/2011 11:00:00 AM
Co-57	122.07	85.59	2.72E+002	421.78	361.00	2.80%	7/1/2011 11:00:00 AM
Ce-139	165.85	80.00	1.38E+002	627.50	502.00	2.40%	7/1/2011 11:00:00 AM
Hg-203	279.19	81.55	4.66E+001	1361.10	1110.00	2.30%	7/1/2011 11:00:00 AM
Sn-113	391.71	64.17	1.15E+002	1086.20	697.00	2.40%	7/1/2011 11:00:00 AM
Cs-137	661.66	85.21	1.10E+004	529.28	451.00	2.80%	7/1/2011 11:00:00 AM
Y-88	898.02	93.70	1.07E+002	1805.80	1692.00	2.40%	7/1/2011 11:00:00 AM
Co-60	1173.24	99.90	1.93E+003	834.83	834.00	2.50%	7/1/2011 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	834.15	834.00	2.50%	7/1/2011 11:00:00 AM
Y-88	1836.01	99.20	1.07E+002	1806.50	1792.00	2.40%	7/1/2011 11:00:00 AM

```
     ORTEC g v - i (1087) Env32  G53W4.25  9/13/2011 1:41:22 PM
TestAmerica                      Spectrum name: 8_100mLD=1_20112396.An1

Sample description
     8_100mLD=1_85520-334 -090811


Spectrum Filename: C:\User\SPC\Det8\8_100mLD=1_20112396.An1

Acquisition information
       Start time:                 9/8/2011 9:52:37 AM
       Live time:                3600
       Real time:                3826
       Dead time:                   5.91 %
       Detector ID:                    8

Detector system
     Ge 8 SN/174


Calibration
       Filename:                   8_Liquid_D=1  100ml.Clb
     8_100mLD=1_85520-334_090811


       Energy Calibration
            Created:               9/8/2011 11:01:54 AM
            Zero offset:           0.027 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -2.332E-10 keV/channel^2

       Efficiency Calibration
            Created:               9/8/2011 11:02:09 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   2.01 %
            Log(Eff):             -1.433327E-01 + (-3.358738E-01*Log(E) ) +
                                   ( -4.197546E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.26 %
            Log(Eff):             -1.110432E+01 + ( 3.982559E+00*Log(E) ) +
                                   ( -4.672682E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.53keV )
       Stop channel:            8000 (  2000.09keV )
       Peak rejection level:      10.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method
```

ORTEC g v - i (1087) Env32 G53W4.25 9/13/2011 1:41:22 PM
TestAmerica Spectrum name: 8_100mLD=1_20112396.An1

Random error:	1.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	average of three points.
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	7/1/2011 11:00:00 AM
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 11 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 0.0153

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq	Nuc
37.79	15524.	2.06	1.29	6.059E-02				
49.52	4756.	7.17	2.04	6.866E-02				
59.50	123185.	0.42	1.09	7.188E-02	59.54	35.700	1.334E+03	AM241
66.82	2978.	6.42	1.10	7.280E-02				
70.85	6161.	3.40	1.10	7.292E-02				
72.85	8326.	2.61	1.10	7.289E-02				
82.56	3758.	5.21	1.11	7.214E-02				
84.76	3750.	5.26	1.11	7.185E-02				
88.04	155236.	0.28	1.12	7.134E-02	88.03	3.610	1.857E+04	CD109
122.05	69481.	0.56	1.14	6.354E-02	122.06	85.600	4.231E+02	CO57
136.48	8862.	3.07	1.16	5.968E-02				
165.87	63978.	0.56	1.17	5.199E-02	165.85	79.900	6.053E+02	Ce139
199.09	3303.	6.01	1.32	4.515E-02				
255.24	2070.	8.02	1.10	3.710E-02				
279.23	52274.	0.53	1.26	3.451E-02	279.17	81.500	1.439E+03	Hg203
391.69	43935.	0.62	1.34	2.612E-02	391.69	64.000	1.106E+03	SN113
661.61	26578.	0.90	1.50	1.665E-02	661.66	85.210	5.226E+02	CS137
898.04	46860.	0.54	1.66	1.267E-02	898.02	93.700	1.717E+03	Y898
1173.23	28812.	0.71	1.80	9.914E-03	1173.24	99.900	8.284E+02	Co1173
1332.49	25817.	0.69	1.93	8.802E-03	1332.50	99.982	8.353E+02	Co1332
1836.02	27444.	0.63	2.17	6.485E-03	1836.01	99.200	1.856E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV		Suspected Nuclide
151.04	37.79	19198.	15524.	2.562E+05	2.06	1.290	-	s
197.98	49.52	26752.	4756.	6.927E+04	7.17	2.043	-	s
283.40	70.80	19041.	4508.	6.182E+04	4.58	1.103	-	D
291.43	72.81	20350.	7479.	1.026E+05	2.93	1.104	-	D
330.11	82.55	17252.	3758.	2.840E+04	5.21	1.111	-	lD

ORTEC g v - i (1087) Env32 G53W4.25 9/13/2011 1:41:22 PM
TestAmerica Spectrum name: 8_100mLD=1_20112396.An1

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
338.90	84.74	17617.	3750.	6.152E+03	5.26	1.113	- lD
545.80	136.48	13490.	8862.	1.485E+05	3.07	1.157	-
796.23	199.09	8340.	3303.	7.315E+04	6.01	1.323	- s
1020.82	255.24	5887.	2070.	5.580E+04	8.02	1.099	-

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
AM-241	237.88	59.50	30342.	123185.	34.218	0.42	1.090
CD-109	352.00	88.03	23885.	151417.	42.060	0.34	1.115
CO-57	488.08	122.05	15871.	69481.	19.300	0.56	1.138
Ce-139	663.35	165.87	12194.	63978.	17.772	0.56	1.168
Hg-203	1116.76	279.23	5268.	52274.	14.521	0.53	1.261
SN-113	1566.59	391.69	5195.	43935.	12.204	0.62	1.339
CS-137	2646.25	661.61	4893.	26578.	7.383	0.90	1.498
Y-898	3591.94	898.04	2823.	46860.	13.017	0.54	1.664
Co-1173	4692.64	1173.23	1811.	28812.	8.003	0.71	1.798
Co-1332	5329.67	1332.49	1002.	25817.	7.171	0.69	1.932
Y-1836	7343.71	1836.02	280.	27444.	7.623	0.63	2.168

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq	Peak Energy keV	Peak Activity Bq	Code	MDA Value Bq	COMMENTS
AM-241		1.3338E+03				1.58E+05	
			59.54	1.334E+03	(	8.818E+00 4.18E-01 3.57E+01	G
CD-109		1.8108E+04				4.63E+02	
			88.03	1.811E+04	(	8.645E+01 3.39E-01 3.61E+00	G
CO-57		4.2311E+02				2.72E+02	
			122.06	4.231E+02	(	3.591E+00 5.60E-01 8.56E+01	G

ORTEC g v - i (1087) Env32 G53W4.25 9/13/2011 1:41:22 PM
TestAmerica Spectrum name: 8_100mLD=1_20112396.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Ce-139	6.0534E+02				1.38E+02	
		165.85	6.053E+02	(	4.894E+00 5.61E-01 7.99E+01	G
Hg-203	1.4385E+03				4.66E+01	
		279.17	1.439E+03	(	9.382E+00 5.27E-01 8.15E+01	G
SN-113	1.1057E+03				1.15E+02	
		391.69	1.106E+03	(	8.521E+00 6.24E-01 6.40E+01	G
CS-137	5.2265E+02				1.10E+04	
		661.66	5.226E+02	(	6.463E+00 8.96E-01 8.52E+01	G
Y-898	1.7165E+03				1.07E+02	
		898.02	1.717E+03	(	9.169E+00 5.35E-01 9.37E+01	G
Co-1173	8.2838E+02				1.93E+03	
		1173.24	8.284E+02	(	5.780E+00 7.12E-01 9.99E+01	G
Co-1332	8.3535E+02				1.93E+03	
		1332.50	8.353E+02	(	4.861E+00 6.93E-01 1.00E+02	G
Y-1836	1.8556E+03				1.07E+02	
		1836.01	1.856E+03	(	5.455E+00 6.31E-01 9.92E+01	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape

ORTEC g v - i (1087) Env32 G53W4.25 9/13/2011 1:41:22 PM
TestAmerica Spectrum name: 8_100mLD=1_20112396.An1

P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq	Time Corrected Activity Bq	Uncertainty 1 Sigma Counting	MDA
AM-241	1.3334E+03	1.3338E+03	4.177E-01%	8.82E+00
CD-109	1.6331E+04	1.8108E+04	3.386E-01%	8.65E+01
CO-57	3.5488E+02	4.2311E+02	5.602E-01%	3.59E+00
Ce-139	4.2775E+02	6.0534E+02	5.614E-01%	4.89E+00
Hg-203	5.1616E+02	1.4385E+03	5.273E-01%	9.38E+00
SN-113	7.2997E+02	1.1057E+03	6.238E-01%	8.52E+00
CS-137	5.2038E+02	5.2265E+02	8.963E-01%	6.46E+00
Y-898	1.0963E+03	1.7165E+03	5.350E-01%	9.17E+00
Co-1173	8.0807E+02	8.2838E+02	7.121E-01%	5.78E+00
Co-1332	8.1486E+02	8.3535E+02	6.929E-01%	4.86E+00
Y-1836	1.1851E+03	1.8556E+03	6.307E-01%	5.46E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (82.5 to 2000.1 keV) 2.412E+04 Bq
Total Decayed Activity (82.5 to 2000.1 keV) 2.8773303E+04 Bq

Analyzed by: _____
Admin

Reviewed by: _____
Supervisor

Laboratory: TestAmerica

Gamma Verification per Geometry

Detector: Ge9

Geometry: Tunacan

Reference date 1/1/2012

Calibration Standard: 90099

Standard volume g / vial 1550

Standard volume transferred in g / geometry 317.8

lab ID# of cal standard 6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14240	95.4
Am-241	2037	418	0.3590	1163	1244.5	107.0
Cd-109	2881	591	0.0361	16363	15902	97.2
Co-57	1511	310	0.8560	362	347.48	96.0
Ce-139	2139	439	0.7990	549	535.87	97.6
Hg-203	4651	954	0.8146	1171	1216.7	103.9
Sn-113	3015	618	0.6400	966	970.65	100.5
Cs-137	1938	397	0.8510	467	466.58	99.9
Y-88	7264	1489	0.9370	1589	1552.5	97.7
Co-60	3580	734	0.9997	734	727.12	99.0
Co-60	3581	734	0.9999	734	719.75	98.0
Y-88	7690	1577	0.9920	1589	1638.8	103.1

Reviewed By: Jody Watson

Date: 6/14/2012

Calibration Data from file: 9_Soil_TunaCan.Clb
Energy Calibration Date: 6/14/2012 Time: 10:19:40 AM
Efficiency Calibration Date: 6/14/2012 Time: 10:19:51 AM

Calibration Description:
9_Soil_TunaCan_90099_050312

Energy Calibration Fit
Energy = 0.0875 +0.250109*Channel -2.0385e-008*Channel**2
FWHM (ch) = 4.1690 +0.000934*Channel -2.36522e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.85	46.54	46.57	-0.06%	1.07	1.09	-1.37%
237.85	59.54	59.58	-0.06%	1.08	1.10	-1.96%
351.79	88.03	88.07	-0.05%	1.12	1.12	-0.18%
487.79	122.06	122.08	-0.02%	1.14	1.16	-1.17%
662.64	165.85	165.81	0.02%	1.23	1.19	2.51%
1115.53	279.17	279.07	0.04%	1.30	1.30	0.44%
1565.74	391.69	391.64	0.01%	1.43	1.39	2.81%
2645.81	661.66	661.69	-0.00%	1.60	1.62	-0.83%
3591.21	898.02	898.02	0.00%	1.80	1.80	-0.02%
4692.44	1173.24	1173.26	-0.00%	2.01	2.01	0.18%
5329.80	1332.50	1332.54	-0.00%	2.09	2.12	-1.38%
7344.77	1836.01	1835.98	0.00%	2.45	2.44	0.55%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.3038 %
Ln(Eff) = -0.8080 -0.236727*Ln(Eng) -0.0395064*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 1.4241 %
Ln(Eff) = -23.8792 +8.875647*Ln(Eng) -0.94011*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	2.4596E-002	2.5767E-002	-4.76%
59.54	3.8891E-002	3.6589E-002	5.92%
88.03	4.9059E-002	5.0504E-002	-2.95%
122.06	5.0886E-002	5.3031E-002	-4.22%
165.85	========== Knee ==========		
165.85	4.6197E-002	4.7361E-002	-2.52%
279.17	3.4900E-002	3.3566E-002	3.82%
391.69	2.6668E-002	2.6526E-002	0.53%
661.66	1.8125E-002	1.8099E-002	0.14%
898.02	1.4012E-002	1.4341E-002	-2.34%
1173.24	1.1507E-002	1.1627E-002	-1.05%
1332.50	1.0296E-002	1.0501E-002	-2.00%
1836.01	8.3305E-003	8.0796E-003	3.01%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	14918.00	634.00	4.10%	1/1/2012 11:00:00 AM
Am-241	59.54	35.70	1.58E+005	1170.90	418.00	3.50%	1/1/2012 11:00:00 AM
Cd-109	88.03	3.61	4.63E+002	16371.00	591.00	4.70%	1/1/2012 11:00:00 AM
Co-57	122.06	85.60	2.72E+002	362.15	310.00	4.10%	1/1/2012 11:00:00 AM
Ce-139	165.85	79.90	1.38E+002	549.44	439.00	3.90%	1/1/2012 11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	1170.60	954.00	3.80%	1/1/2012 11:00:00 AM
Sn-113	391.69	64.00	1.15E+002	965.63	618.00	3.90%	1/1/2012 11:00:00 AM
Cs-137	661.66	85.21	1.10E+004	465.91	397.00	4.00%	1/1/2012 11:00:00 AM
Y-88	898.02	93.70	1.07E+002	1589.10	1489.00	3.90%	1/1/2012 11:00:00 AM
Co-60	1173.24	99.90	1.93E+003	734.73	734.00	4.00%	1/1/2012 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	734.15	734.00	4.00%	1/1/2012 11:00:00 AM
Y-88	1836.01	99.20	1.07E+002	1589.70	1577.00	4.00%	1/1/2012 11:00:00 AM

```
     ORTEC g v - i (1087) Env32  G53W4.25  6/14/2012 10:20:07 AM
TestAmerica, Inc                Spectrum name: 9_TunaCan_20120147.An1

Sample description
     9_TunaCan_90099_050312


Spectrum Filename: C:\User\SPC\Det9\9_TunaCan_20120147.An1

Acquisition information
       Start time:                5/3/2012 1:37:42 PM
       Live time:               3600
       Real time:               3661
       Dead time:                 1.65 %
       Detector ID:                  9

Detector system
     Ge 9 SN/100113


Calibration
       Filename:                  9_Soil_TunaCan.Clb
     9_Soil_TunaCan_90099_050312


       Energy Calibration
            Created:              6/14/2012 10:19:40 AM
            Zero offset:          0.088 keV
            Gain:                 0.250 keV/channel
            Quadratic:           -2.039E-08 keV/channel^2

       Efficiency Calibration
            Created:              6/14/2012 10:19:51 AM
            Knee Energy:        165.85 keV
            Above the Knee:       Quadratic        Uncertainty =   1.30 %
            Log(Eff):            -8.079856E-01 + (-2.367265E-01*Log(E) ) +
                                  ( -3.950640E-02*Log(E)^2 )
            Below the Knee:       Quadratic        Uncertainty =   1.42 %
            Log(Eff):            -2.387916E+01 + ( 8.875647E+00*Log(E) ) +
                                  ( -9.401100E-01*Log(E)^2 )

Library Files
       Main analysis library:     DET_EnergyStandardMix & Pb.Lib
       Library Match Width:       0.500
       Peak stripping:            Library based

Analysis parameters
       Analysis engine:           Env32   G53W4.25
       Start channel:           150 (    37.60keV )
       Stop channel:           8000 (  1999.66keV )
       Peak rejection level:     10.000%
       Peak search sensitivity:   3
       Sample Size:               1.0000E+00
       Activity scaling factor:   1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                  1.0000E+00
       Detection limit method:    Reg. Guide 4.16 Method
```

Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	average of three points.
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2012 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff: 5.00E+01%

Energy Calibration

Normalized diff: 0.0265

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq	Nuc
46.57	55553.	0.67	1.07	2.579E-02	46.54	4.250	1.424E+04	Pb210
59.56	58492.	0.66	1.08	3.660E-02	59.54	35.700	1.245E+03	AM241
88.07	86792.	0.48	1.12	5.052E-02	88.03	3.610	1.590E+04	CD109
122.08	41484.	0.73	1.14	5.303E-02	122.06	85.600	3.475E+02	CO57
136.48	5266.	4.55	1.22	5.150E-02				
165.81	39272.	0.74	1.23	4.626E-02	165.85	79.900	5.359E+02	Ce139
279.06	19221.	1.24	1.30	3.358E-02	279.17	81.500	1.217E+03	Hg203
391.64	28263.	0.86	1.43	2.653E-02	391.69	64.000	9.707E+02	SN113
661.69	25703.	0.90	1.61	1.810E-02	661.66	85.210	4.666E+02	CS137
898.02	33728.	0.69	1.80	1.434E-02	898.02	93.700	1.552E+03	Y898
1173.24	29087.	0.72	2.01	1.163E-02	1173.24	99.900	7.271E+02	Co1173
1332.54	26026.	0.70	2.09	1.050E-02	1332.50	99.982	7.198E+02	Co1332
1835.94	21237.	0.73	2.46	8.080E-03	1836.01	99.200	1.639E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
545.34	136.48	10776.	5266.	1.023E+05	4.55	1.225	-

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.85	46.57	18837.	55553.	15.431	0.67	1.071
AM-241	237.79	59.56	19448.	58492.	16.248	0.66	1.078
CD-109	351.79	88.07	19261.	86792.	24.109	0.48	1.122
CO-57	487.79	122.08	11232.	41484.	11.523	0.73	1.142
Ce-139	662.64	165.81	9084.	39272.	10.909	0.74	1.225
Hg-203	1115.51	279.06	6250.	19221.	5.339	1.24	1.302
SN-113	1565.73	391.64	4864.	28263.	7.851	0.86	1.434
CS-137	2645.81	661.69	4037.	25703.	7.140	0.90	1.605
Y-898	3591.21	898.02	2958.	33728.	9.369	0.69	1.803
Co-1173	4692.36	1173.24	1710.	29087.	8.080	0.72	2.014
Co-1332	5329.80	1332.54	1048.	26026.	7.229	0.70	2.088
Y-1836	7344.62	1835.94	304.	21237.	5.899	0.73	2.457

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq	Peak Energy keV	Peak Activity Bq	Code	MDA Value Bq		COMMENTS
Pb-210	N	1.4240E+04				8.15E+03		
			46.54	1.424E+04	(	1.646E+02	6.67E-01	4.25E+00 G
AM-241		1.2445E+03				1.58E+05		
			59.54	1.245E+03	(	1.388E+01	6.60E-01	3.57E+01 G
CD-109		1.5902E+04				4.63E+02		
			88.03	1.590E+04	(	1.190E+02	4.84E-01	3.61E+00 G
CO-57		3.4748E+02				2.72E+02		
			122.06	3.475E+02	(	4.159E+00	7.31E-01	8.56E+01 G

ORTEC g v - i (1087) Env32 G53W4.25 6/14/2012 10:20:07 AM
TestAmerica, Inc Spectrum name: 9_TunaCan_20120147.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA		Comments
Ce-139	5.3587E+02						1.38E+02	
		165.85	5.359E+02	(	6.097E+00	7.41E-01	7.99E+01	G
Hg-203	1.2167E+03						4.66E+01	
		279.17	1.217E+03	(	2.349E+01	1.24E+00	8.15E+01	G
SN-113	9.7065E+02						1.15E+02	
		391.69	9.707E+02	(	1.125E+01	8.60E-01	6.40E+01	G
CS-137	4.6658E+02						1.10E+04	
		661.66	4.666E+02	(	5.424E+00	8.98E-01	8.52E+01	G
Y-898	1.5525E+03						1.07E+02	
		898.02	1.552E+03	(	1.179E+01	6.92E-01	9.37E+01	G
Co-1173	7.2712E+02						1.93E+03	
		1173.24	7.271E+02	(	4.884E+00	7.20E-01	9.99E+01	G
Co-1332	7.1975E+02						1.93E+03	
		1332.50	7.198E+02	(	4.248E+00	6.98E-01	1.00E+02	G
Y-1836	1.6388E+03						1.07E+02	
		1836.01	1.639E+03	(	6.479E+00	7.29E-01	9.92E+01	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape

ORTEC g v - i (1087) Env32 G53W4.25 6/14/2012 10:20:07 AM
TestAmerica, Inc Spectrum name: 9_TunaCan_20120147.An1

P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq	Time Corrected Activity Bq	Uncertainty 1 Sigma Counting	MDA
Pb-210	1.4091E+04	1.4240E+04	6.667E-01%	1.65E+02
AM-241	1.2439E+03	1.2445E+03	6.605E-01%	1.39E+01
CD-109	1.3223E+04	1.5902E+04	4.843E-01%	1.19E+02
CO-57	2.5385E+02	3.4748E+02	7.313E-01%	4.16E+00
Ce-139	2.8828E+02	5.3587E+02	7.410E-01%	6.10E+00
Hg-203	1.9517E+02	1.2167E+03	1.239E+00%	2.35E+01
SN-113	4.6244E+02	9.7065E+02	8.599E-01%	1.13E+01
CS-137	4.6297E+02	4.6658E+02	8.981E-01%	5.42E+00
Y-898	6.9723E+02	1.5525E+03	6.917E-01%	1.18E+01
Co-1173	6.9559E+02	7.2712E+02	7.204E-01%	4.88E+00
Co-1332	6.8854E+02	7.1975E+02	6.982E-01%	4.25E+00
Y-1836	7.3602E+02	1.6388E+03	7.291E-01%	6.48E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.7 keV) 3.304E+04 Bq
Total Decayed Activity (37.6 to 1999.7 keV) 3.9561668E+04 Bq

Analyzed by: _____
admin

Reviewed by: _____
Supervisor

Laboratory: TestAmerica, Inc

Gamma Verification per Geometry

Detector: Ge12
Geometry: Tuna Can
Reference date: 1/1/2018
Calibration Standard: 108513
Standard volume g / vial: 1550
Standard volume transferred in g / geometry: 342.2
lab ID# of cal standard: #1402359 / Tuna Can_2018_00001

Isotope	Certified Activity - Bq	Geometry Activity - Bq	Count Results	%recovery
Pb-210	72410	15986	16000	100.1
Am-241	5770	1274	1261	99.0
Cd-109	79700	17596	18250	103.7
Co-57	1809	399	393.1	98.4
Ce-139	2723	601	585.9	97.5
Hg-203	5868	1296	1312	101.3
Sn-113	4658	1028	1059	103.0
Cs-137	2283	504	509.8	101.1
Y-88	7810	1724	1705	98.9
Co-60	3574	789	776.5	98.4
Co-60	3574	789	765.4	97.0
Y-88	7810	1724	1769	102.6

Reviewed By: Jody Watson

Date: 4/23/2018

Calibration Data from file: 12_Soil_TunaCan.Clb
Energy Calibration Date: 4/20/2018 Time: 11:53:01 AM
Efficiency Calibration Date: 4/20/2018 Time: 11:53:09 AM

Calibration Description:
12_TunaCan_108513

Energy Calibration Fit
Energy = 0.0591 +0.250183*Channel -3.73476e-008*Channel**2
FWHM (ch) = 3.2115 +0.001032*Channel -1.75096e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.95	46.54	46.58	-0.09%	0.84	0.85	-1.23%
237.82	59.54	59.56	-0.03%	0.86	0.86	-0.65%
351.66	88.03	88.03	-0.01%	0.89	0.89	-0.96%
487.75	122.06	122.08	-0.01%	0.92	0.93	-0.62%
662.97	165.85	165.91	-0.03%	0.97	0.97	0.22%
1115.42	279.17	279.07	0.04%	1.11	1.09	2.13%
1565.35	391.69	391.59	0.02%	1.20	1.20	0.60%
2645.53	661.66	661.66	-0.00%	1.49	1.45	2.30%
3591.22	898.02	898.04	-0.00%	1.66	1.67	-0.91%
4692.62	1173.24	1173.25	-0.00%	1.85	1.92	-3.60%
5330.40	1332.50	1332.57	-0.01%	2.09	2.05	1.92%
7346.34	1836.01	1835.97	0.00%	2.46	2.46	0.18%

Efficiency Calibration Fit
Polynomial Uncertainty = 1.0201 %
Coefficients:
-0.363508 -4.707999 0.462125 -0.051256 0.002384 -0.000043

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	1.8052E-002	1.7999E-002	0.29%
59.54	2.7878E-002	2.8172E-002	-1.06%
88.03	3.7143E-002	3.5814E-002	3.58%
122.06	3.6658E-002	3.7240E-002	-1.59%
165.85	3.3189E-002	3.4052E-002	-2.60%
279.17	2.4853E-002	2.4494E-002	1.45%
391.69	1.9499E-002	1.8934E-002	2.90%
661.66	1.2936E-002	1.2789E-002	1.13%
898.02	1.0139E-002	1.0253E-002	-1.13%
1173.24	8.2922E-003	8.4265E-003	-1.62%
1332.50	7.4182E-003	7.6470E-003	-3.08%
1836.01	6.0193E-003	5.8663E-003	2.54%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.50	4.25	8.11E+003	15986.00	679.41	4.20%	1/1/2018 11:00:00 AM
Am-241	59.50	35.70	1.58E+005	1273.90	454.78	3.60%	1/1/2018 11:00:00 AM
Cd-109	88.00	3.61	4.61E+002	17596.00	635.22	4.10%	1/1/2018 11:00:00 AM
Co-57	122.10	85.60	2.72E+002	399.38	341.87	3.40%	1/1/2018 11:00:00 AM
Ce-139	165.90	79.90	1.38E+002	601.20	480.36	3.60%	1/1/2018 11:00:00 AM
Hg-203	279.20	81.50	4.66E+001	1295.50	1055.83	3.50%	1/1/2018 11:00:00 AM
Sn-113	391.70	64.00	1.15E+002	1028.40	658.18	3.90%	1/1/2018 11:00:00 AM
Cs-137	661.70	85.21	1.10E+004	504.03	429.48	4.10%	1/1/2018 11:00:00 AM
Y-88	898.00	93.70	1.07E+002	1724.30	1615.67	3.70%	1/1/2018 11:00:00 AM
Co-60	1173.20	99.90	1.93E+003	789.05	788.26	3.90%	1/1/2018 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	789.05	788.89	3.90%	1/1/2018 11:00:00 AM
Y-88	1836.10	99.20	1.07E+002	1724.30	1710.51	3.70%	1/1/2018 11:00:00 AM

Test America St. Louis Spectrum ID: 12_TunaCan_20180005

Sample Description: 12_TunaCan_108513
Detector: Detector #12
Batch ID: 12
Work Order Number: TunaCan
Lot Number: 108513

Decay to Time: 1/1/2018 11:00 Live Time: 3600 sec
Acquisition Time: 4/18/2018 13:54:19 Real Time: 3652 sec
Analysis Time: 4/20/2018 11:55 Dead Time: 1.41 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 12_Soil_TunaCan.Clb
Efficiency Cal Desc: 12_TunaCan_108513
Efficiency Cal Date: 4/20/2018 11:53
Energy Cal Date: 4/20/2018 11:13
Library: DET_EnergyStandardMix & Pb.lib
Bkgd Correction File: 12_2017-05-07_0806.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
Pb-210	1.600E+04	0.6	9.485E+01	1.031E+03	1.853E+02
AM-241	1.261E+03	0.7	9.223E+00	8.039E+01	1.659E+01
CD-109	1.825E+04	0.4	7.598E+01	1.135E+03	1.134E+02
CO-57	3.931E+02	0.8	3.042E+00	2.279E+01	5.110E+00
Ce-139	5.859E+02	0.7	4.357E+00	3.335E+01	6.791E+00
Hg-203	1.312E+03	1.1	1.414E+01	7.659E+01	2.206E+01
SN-113	1.059E+03	0.9	9.013E+00	6.310E+01	1.205E+01
CS-137	5.098E+02	0.9	4.734E+00	2.665E+01	6.233E+00
Y-898	1.705E+03	0.8	1.331E+01	8.765E+01	1.505E+01
Co-1173	7.765E+02	0.9	6.740E+00	3.922E+01	6.891E+00
Co-1332	7.654E+02	0.8	6.419E+00	3.866E+01	6.071E+00
Y-1836	1.769E+03	0.8	1.413E+01	1.018E+02	8.211E+00
Total	4.438E+04				

Analyst: Jody Watson

TestAmerica Inc Spectrum name: 12_TunaCan_20180005.An1

Sample description
12_TunaCan_108513

Spectrum Filename: C:\User\SPC\Det12\12_TunaCan_20180005.An1

Acquisition information

Start time:	4/18/2018 1:54:19 PM
Live time:	3600
Real time:	3652
Dead time:	1.41 %
Detector ID:	12

Detector system
Ge12 S/N10034336

Calibration

Filename:	12_Soil_TunaCan.Clb

12_TunaCan_108513

Energy Calibration

Created:	4/20/2018 11:13:27 AM
Zero offset:	0.059 keV
Gain:	0.250 keV/channel
Quadratic:	-3.735E-08 keV/channel^2

Efficiency Calibration

Created:	4/20/2018 11:53:09 AM
Type:	Polynomial
Uncertainty:	1.020 %
Coefficients:	-0.363508 -4.707999 0.462125
	-0.051256 0.002384 -0.000043

Library Files

Main analysis library:	DET_EnergyStandardMix & Pb.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	100 (25.08keV)
Stop channel:	8000 (1999.13keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000

Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2018 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	12_2017-05-07_0806.PBC 5/7/2017 8:06:54 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff: 5.00E+01 %

Energy Calibration

Normalized diff: 0.0332

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
27.87	601.	9.86	0.70	3.939E-03				
33.44	3191.	3.58	0.84	8.062E-03				
36.78	534.	21.42	0.84	1.059E-02				
38.00	764.	15.14	0.84	1.151E-02				
46.62	43669.	0.59	0.85	1.805E-02	46.54	4.250	1.600E+04	Pb210
49.75	200.	71.91	0.85	2.153E-02				
59.56	45621.	0.73	0.86	2.818E-02	59.54	35.700	1.261E+03	AM241
70.78	903.	16.81	0.88	3.227E-02				
72.97	1715.	8.94	0.88	3.286E-02				
74.88	161.	95.77	0.88	3.334E-02				
77.23	29.	497.10	0.88	3.389E-02				
82.47	1429.	10.54	0.89	3.493E-02				
84.79	2014.	7.84	0.89	3.532E-02				
88.06	72330.	0.42	0.89	3.581E-02	88.03	3.610	1.825E+04	CD109
90.37	144.	87.05	0.90	3.612E-02				
122.08	34326.	0.77	0.92	3.724E-02	122.06	85.600	3.931E+02	CO57
136.51	4200.	4.35	0.96	3.651E-02				
165.91	33460.	0.74	0.97	3.405E-02	165.85	79.900	5.859E+02	Ce139
206.00	117.	63.94	0.45	3.024E-02				
238.46	443.	25.54	0.90	2.744E-02				
255.00	1168.	12.03	0.88	2.617E-02				
279.07	19187.	1.08	1.11	2.450E-02	279.17	81.500	1.312E+03	Hg203
286.67	107.	74.95	0.64	2.401E-02				
351.85	322.	30.50	1.33	2.056E-02				
391.59	24235.	0.85	1.20	1.894E-02	391.69	64.000	1.059E+03	SN113
500.18	113.	56.68	0.53	1.573E-02				
583.01	248.	32.33	0.89	1.403E-02				

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
601.08	176.	44.64	0.64	1.372E-02				
643.04	164.	48.09	0.69	1.306E-02				
661.66	19866.	0.93	1.49	1.279E-02	661.66	85.210	5.098E+02	CS137
695.58	154.	52.24	0.30	1.233E-02				
712.59	169.	39.74	0.69	1.212E-02				
814.18	641.	15.80	1.86	1.101E-02				
890.80	44.	76.23	0.45	1.031E-02				
898.03	29383.	0.78	1.66	1.025E-02	898.02	93.700	1.705E+03	Y898
924.59	170.	51.69	2.08	1.004E-02				
1059.91	148.	40.90	0.51	9.087E-03				
1173.24	22640.	0.87	1.85	8.426E-03	1173.24	99.900	7.765E+02	Co1173
1217.40	45.	61.22	0.33	8.195E-03				
1271.51	36.	60.60	1.04	7.928E-03				
1301.67	34.	60.56	0.43	7.787E-03				
1332.57	20270.	0.84	2.09	7.647E-03	1332.50	99.982	7.654E+02	Co1332
1491.52	180.	28.09	0.33	6.994E-03				
1835.92	18468.	0.80	2.47	5.867E-03	1836.01	99.200	1.769E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV		Suspected Nuclide
111.16	27.87	1248.	601.	1.526E+05	9.86	0.703	-	s
133.41	33.32	4927.	3191.	3.959E+05	3.58	0.838	-	sD
146.77	36.66	6263.	534.	5.040E+04	21.42	0.841	-	sD
151.64	37.88	6317.	764.	6.642E+04	15.14	0.842	-	sD
198.79	49.71	10292.	213.	9.912E+03	67.59	0.855	-	sc
282.69	70.80	11078.	903.	2.799E+04	16.81	0.876	-	D
291.44	72.99	10900.	1715.	5.219E+04	8.94	0.878	-	D
299.07	74.90	11841.	161.	4.837E+03	95.77	0.880	-	c
308.48	77.26	10683.	29.	8.685E+02	497.10	0.883	-	c
329.43	82.44	10620.	1431.	4.097E+04	10.52	0.888	-	D
338.70	84.76	11438.	2016.	5.707E+04	7.83	0.890	-	sD
361.04	90.35	7839.	145.	4.014E+03	86.78	0.896	-	sc
545.45	136.51	7622.	4200.	1.150E+05	4.35	0.964	-	
823.26	206.00	2348.	117.	3.869E+03	63.94	0.454	-	s
953.03	238.46	3718.	443.	1.615E+04	25.54	0.897	-	s
1019.19	255.00	4459.	1168.	4.464E+04	12.03	0.878	-	
1145.82	286.67	2108.	107.	4.456E+03	74.95	0.636	-	s
1406.43	351.85	2440.	322.	1.569E+04	30.50	1.334	-	
1999.63	500.18	1252.	113.	7.164E+03	56.68	0.530	-	s
2330.90	583.01	1545.	248.	1.767E+04	32.33	0.894	-	s
2403.19	601.08	1564.	176.	1.283E+04	44.64	0.638	-	s
2571.03	643.04	1587.	164.	1.258E+04	48.09	0.694	-	s
2781.20	695.58	1652.	154.	1.250E+04	52.24	0.304	-	s
2849.27	712.59	1184.	169.	1.395E+04	39.74	0.695	-	s

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
3255.67	814.18	1648.	641.	5.823E+04	15.80	1.859	- s
3562.26	890.80	503.	44.	4.283E+03	76.23	0.452	- sc
3697.47	924.59	1556.	170.	1.690E+04	51.69	2.082	- s
4239.01	1059.91	879.	148.	1.629E+04	40.90	0.508	- s
4869.35	1217.40	238.	45.	5.491E+03	61.22	0.330	- s
5085.97	1271.51	165.	36.	4.541E+03	60.60	1.043	- s
5206.71	1301.67	156.	34.	4.366E+03	60.56	0.434	- s
5966.81	1491.52	462.	180.	2.581E+04	28.09	0.329	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.79	46.54	11653.	43669.	12.130	0.59	0.851D
AM-241	237.82	59.56	16449.	45621.	12.672	0.73	0.859
CD-109	351.65	88.03	9195.	72330.	20.092	0.42	0.894D
CO-57	487.75	122.08	9060.	34326.	9.535	0.77	0.923
Ce-139	662.97	165.91	6830.	33460.	9.295	0.74	0.975
Hg-203	1115.42	279.07	4712.	19187.	5.330	1.08	1.109
SN-113	1565.35	391.59	3432.	24235.	6.732	0.85	1.204
CS-137	2645.53	661.66	2656.	19866.	5.518	0.93	1.489
Y-898	3591.19	898.03	3033.	29383.	8.162	0.78	1.658
Co-1173	4692.59	1173.24	1810.	22640.	6.289	0.87	1.852
Co-1332	5330.41	1332.57	1150.	20270.	5.631	0.84	2.092
Y-1836	7346.14	1835.92	317.	18468.	5.130	0.80	2.475

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Peak Code	Peak MDA Value Bq/Sample	COMMENTS
Pb-210	N	1.6003E+04				8.15E+03	
			46.54	1.600E+04	(P	1.853E+02 5.93E-01 4.25E+00 G	

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AM-241	1.2606E+03					1.58E+05	
		59.54	1.261E+03	(	1.659E+01	7.32E-01	3.57E+01 G
CD-109	1.8246E+04					4.63E+02	
		88.03	1.825E+04	(	1.134E+02	4.16E-01	3.61E+00 G
CO-57	3.9307E+02					2.72E+02	
		122.06	3.931E+02	(	5.110E+00	7.74E-01	8.56E+01 G
Ce-139	5.8589E+02					1.38E+02	
		165.85	5.859E+02	(	6.791E+00	7.44E-01	7.99E+01 G
Hg-203	1.3123E+03					4.66E+01	
		279.17	1.312E+03	(	2.206E+01	1.08E+00	8.15E+01 G
SN-113	1.0590E+03					1.15E+02	
		391.69	1.059E+03	(	1.205E+01	8.51E-01	6.40E+01 G
CS-137	5.0981E+02					1.10E+04	
		661.66	5.098E+02	(	6.233E+00	9.29E-01	8.52E+01 G
Y-898	1.7049E+03					1.07E+02	
		898.02	1.705E+03	(	1.505E+01	7.81E-01	9.37E+01 G
Co-1173	7.7646E+02					1.93E+03	
		1173.24	7.765E+02	(	6.891E+00	8.68E-01	9.99E+01 G
Co-1332	7.6541E+02					1.93E+03	
		1332.50	7.654E+02	(	6.071E+00	8.39E-01	1.00E+02 G
Y-1836	1.7690E+03					1.07E+02	
		1836.01	1.769E+03	(	8.211E+00	7.99E-01	9.92E+01 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the

library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
Pb-210	1.5857E+04	1.6003E+04	5.927E-01%	1.85E+02
AM-241	1.2600E+03	1.2606E+03	7.317E-01%	1.66E+01
CD-109	1.5540E+04	1.8246E+04	4.164E-01%	1.13E+02
CO-57	2.9911E+02	3.9307E+02	7.739E-01%	5.11E+00
Ce-139	3.4161E+02	5.8589E+02	7.437E-01%	6.79E+00
Hg-203	2.6699E+02	1.3123E+03	1.078E+00%	2.21E+01
SN-113	5.5555E+02	1.0590E+03	8.510E-01%	1.20E+01
CS-137	5.0637E+02	5.0981E+02	9.286E-01%	6.23E+00
Y-898	8.4955E+02	1.7049E+03	7.808E-01%	1.50E+01
Co-1173	7.4709E+02	7.7646E+02	8.681E-01%	6.89E+00
Co-1332	7.3646E+02	7.6541E+02	8.386E-01%	6.07E+00
Y-1836	8.8152E+02	1.7690E+03	7.985E-01%	8.21E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (25.1 to 1999.1 keV) 3.784E+04 Bq/Sample
Total Decayed Activity (25.1 to 1999.1 keV) 4.4384840E+04 Bq/Sample

Gamma Verification per Geometry

Detector: Ge14

Geometry: Tunacan

Reference date 1/1/2012

Calibration Standard: 90099

Standard volume g / vial 1550

Standard volume transferred in g / geometry 317.8

lab ID# of cal standard 6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14422	96.6
Am-241	2037	418	0.3590	1163	1222.5	105.1
Cd-109	2881	591	0.0361	16363	16145	98.7
Co-57	1511	310	0.8560	362	349.28	96.5
Ce-139	2139	439	0.7990	549	538.52	98.1
Hg-203	4651	954	0.8146	1171	1205.9	103.0
Sn-113	3015	618	0.6400	966	971.36	100.6
Cs-137	1938	397	0.8510	467	465.65	99.7
Y-88	7264	1489	0.9370	1589	1570	98.8
Co-60	3580	734	0.9997	734	724.16	98.6
Co-60	3581	734	0.9999	734	720.6	98.1
Y-88	7690	1577	0.9920	1589	1634	102.8

Reviewed By: Jody Watson

Date: 4/23/2012

Calibration Data from file: 14_Soil_TunaCan.Clb
Energy Calibration Date: 4/23/2012 Time: 11:29:29 AM
Efficiency Calibration Date: 4/23/2012 Time: 11:29:47 AM

Calibration Description:
14_TunaCan_90099_042312

Energy Calibration Fit
Energy = 0.1578 +0.250077*Channel -1.95882e-008*Channel**2
FWHM (ch) = 2.7879 +0.000947*Channel -1.45727e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
186.01	46.54	46.67	-0.29%	0.73	0.74	-2.18%
237.82	59.54	59.63	-0.15%	0.74	0.75	-1.99%
351.26	88.03	88.00	0.04%	0.78	0.78	-0.25%
487.04	122.06	121.95	0.09%	0.82	0.81	0.58%
662.28	165.85	165.77	0.05%	0.86	0.85	1.23%
1115.71	279.17	279.15	0.01%	0.98	0.96	2.15%
1565.69	391.69	391.65	0.01%	1.09	1.06	2.42%
2645.83	661.66	661.68	-0.00%	1.30	1.30	0.28%
3591.53	898.02	898.06	-0.00%	1.42	1.50	-5.87%
4692.63	1173.24	1173.24	-0.00%	1.76	1.73	2.11%
5329.97	1332.50	1332.50	-0.00%	1.88	1.86	1.08%
7345.32	1836.01	1836.00	0.00%	2.23	2.24	-0.37%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.0212 %
Ln(Eff) = 0.2101 -0.595197*Ln(Eng) -0.0160533*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 1.2797 %
Ln(Eff) = -23.9149 +8.828985*Ln(Eng) -0.93715*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	2.0990E-002	2.1711E-002	-3.44%
59.54	3.2006E-002	3.0654E-002	4.23%
88.03	4.1381E-002	4.1960E-002	-1.40%
122.06	4.2230E-002	4.3784E-002	-3.68%
165.85	========== Knee ==========		
165.85	3.7957E-002	3.8722E-002	-2.02%
279.17	2.6754E-002	2.5963E-002	2.96%
391.69	2.0047E-002	1.9926E-002	0.60%
661.66	1.3125E-002	1.3132E-002	-0.05%
898.02	1.0136E-002	1.0258E-002	-1.20%
1173.24	8.1251E-003	8.2437E-003	-1.46%
1332.50	7.2859E-003	7.4227E-003	-1.88%
1836.01	5.8454E-003	5.6863E-003	2.72%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	14918.00	634.00	4.10%	1/1/2012 11:00:00 AM
Am-241	59.54	35.70	1.58E+005	1170.90	418.00	3.50%	1/1/2012 11:00:00 AM
Cd-109	88.03	3.61	4.63E+002	16371.00	591.00	4.70%	1/1/2012 11:00:00 AM
Co-57	122.06	85.60	2.72E+002	362.15	310.00	4.10%	1/1/2012 11:00:00 AM
Ce-139	165.85	79.90	1.38E+002	549.44	439.00	3.90%	1/1/2012 11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	1170.60	954.00	3.80%	1/1/2012 11:00:00 AM
Sn-113	391.69	64.00	1.15E+002	965.63	618.00	3.90%	1/1/2012 11:00:00 AM
Cs-137	661.66	85.21	1.10E+004	465.91	397.00	4.00%	1/1/2012 11:00:00 AM
Y-88	898.02	93.70	1.07E+002	1589.10	1489.00	3.90%	1/1/2012 11:00:00 AM
Co-60	1173.24	99.90	1.93E+003	734.73	734.00	4.00%	1/1/2012 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	734.15	734.00	4.00%	1/1/2012 11:00:00 AM
Y-88	1836.01	99.20	1.07E+002	1589.70	1577.00	4.00%	1/1/2012 11:00:00 AM

ORTEC g v - i (1087) Env32 G53W4.25 7/6/2012 11:13:09 AM Page 1
TestAmerica, Inc. Spectrum name: 14_TunaCan_20120385.An1

Sample description
17_TunaCan_90099_032612

Spectrum Filename: C:\User\Cal\Spectra\Det14\14_TunaCan_20120385.An1

Acquisition information
Start time: 4/23/2012 9:56:44 AM
Live time: 3600
Real time: 3665
Dead time: 1.77 %
Detector ID: 14

Detector system
Ge17 SN/11080671

Calibration
Filename: 14_Soil_TunaCan.Clb
14_TunaCan_90099_042312

Energy Calibration
Created: 4/23/2012 11:29:29 AM
Zero offset: 0.158 keV
Gain: 0.250 keV/channel
Quadratic: -1.959E-08 keV/channel^2

Efficiency Calibration
Created: 4/23/2012 11:29:47 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.02 %
Log(Eff): 2.101260E-01 + (-5.951973E-01*Log(E)) + (-1.605331E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.28 %
Log(Eff): -2.391492E+01 + (8.828985E+00*Log(E)) + (-9.371496E-01*Log(E)^2)

Library Files
Main analysis library: DET_EnergyStandardMix & Pb.Lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G53W4.25
Start channel: 150 (37.67keV)
Stop channel: 8000 (1999.52keV)
Peak rejection level: 10.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

ORTEC g v - i (1087) Env32 G53W4.25 7/6/2012 11:13:09 AM Page 2
TestAmerica, Inc. Spectrum name: 14_TunaCan_20120385.An1
Page 1

```
       Random error:                4.0000000E+00
       Systematic error:            4.0000000E+00
       Fraction Limit:              0.000%
       Background width:            average of three points.

       Half lives decay limit:     12.000
       Activity range factor:       2.000
       Min. step backg. energy      0.000
       Multiplet shift channel      2.000

Corrections                           Status          Comments
       Decay correct to date:          YES       1/1/2012 11:00:00 AM
       Decay during acquisition:       YES
       Decay during collection:        NO
       True coincidence correction:    NO
       Peaked background correction:   NO
       Absorption (Internal):          NO
       Geometry correction:            NO
       Random summing:                 NO


total peaks alloc.   12 cutoff: 5.00E+01%
       Energy Calibration
            Normalized diff:       0.0575

*****   S U M M A R Y   O F   P E A K S   I N   R A N G E   *****
 Peak       Area   Uncert  FWHM    Corrctn   Nuclide  Brnch.     Act.    Nuc
 Energy                             Factor    Energy   Ratio    Bq
_____________________________________________________________________________
   46.67    47449.   0.64   0.73  2.181E-02    46.54   4.250  1.442E+04 Pb210
   59.63    48139.   0.67   0.74  3.071E-02    59.54  35.700  1.223E+03 AM241
   72.88     1815.   8.13   0.77  3.737E-02
   88.00    74331.   0.47   0.79  4.195E-02    88.03   3.610  1.614E+04 CD109
  121.95    35331.   0.76   0.82  4.379E-02   122.06  85.600  3.493E+02 CO57
  136.39     4314.   3.84   0.82  4.244E-02
  165.77    33960.   0.70   0.89  3.800E-02   165.85  79.900  5.385E+02 Ce139
  279.15    17136.   1.05   1.00  2.596E-02   279.17  81.500  1.206E+03 Hg203
  391.65    22586.   0.85   1.13  1.993E-02   391.69  64.000  9.714E+02 SN113
  661.68    18625.   0.92   1.36  1.313E-02   661.66  85.210  4.657E+02 CS137
  898.06    26064.   0.74   1.56  1.026E-02   898.02  93.700  1.570E+03 Y898
 1173.24    20614.   0.80   1.76  8.244E-03  1173.24  99.900  7.242E+02 Co1173
 1332.50    18485.   0.81   1.88  7.423E-03  1332.50  99.982  7.206E+02 Co1332
 1835.98    15919.   0.83   2.23  5.686E-03  1836.01  99.200  1.634E+03 Y1836


************ U N I D E N T I F I E D     P E A K    S U M M A R Y ************
  Peak Centroid  Background Net Area  Efficiency  Uncert   FWHM  Suspected
Channel   Energy   Counts     Counts   * Area    1 Sigma %  keV   Nuclide
_____________________________________________________________________________
  290.81    72.88      9094.      1708. 4.569E+04    9.16   0.857  -
  544.77   136.39      6618.      4314. 1.017E+05    3.84   0.819  -
```



```
  s - Peak fails shape tests.
  D - Peak area deconvoluted.
  L - Peak written from unknown list.
  C - Area < Critical level.
```

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	186.01	46.67	13580.	47449.	13.180	0.64	0.728
AM-241	237.82	59.63	14856.	48139.	13.372	0.67	0.736
CD-109	351.26	88.00	13424.	74331.	20.647	0.47	0.793
CO-57	487.04	121.95	9138.	35331.	9.814	0.76	0.820
Ce-139	662.28	165.77	5743.	33960.	9.433	0.70	0.887
Hg-203	1115.71	279.15	3658.	17136.	4.760	1.05	0.998
SN-113	1565.69	391.65	3032.	22586.	6.274	0.85	1.125
CS-137	2645.83	661.68	2231.	18625.	5.174	0.92	1.364
Y-898	3591.53	898.06	1967.	26064.	7.240	0.74	1.562
Co-1173	4692.63	1173.24	1001.	20614.	5.726	0.80	1.765
Co-1332	5329.97	1332.50	650.	18485.	5.135	0.81	1.875
Y-1836	7345.28	1835.98	147.	15919.	4.422	0.83	2.232

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity Bq	Peak Energy keV	Peak Activity Bq	Code	MDA Value Bq	COMMENTS
Pb-210	N	1.4422E+04				8.15E+03	
			46.54	1.442E+04	(	1.659E+02 6.42E-01 4.25E+00	G
AM-241		1.2225E+03				1.58E+05	
			59.54	1.223E+03	(	1.449E+01 6.65E-01 3.57E+01	G
CD-109		1.6145E+04				4.63E+02	
			88.03	1.614E+04	(	1.179E+02 4.73E-01 3.61E+00	G
CO-57		3.4928E+02				2.72E+02	
			122.06	3.493E+02	(	4.431E+00 7.59E-01 8.56E+01	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Ce-139	5.3852E+02				1.38E+02	
		165.85	5.385E+02	(	5.643E+00 6.97E-01 7.99E+01	G
Hg-203	1.2059E+03				4.66E+01	
		279.17	1.206E+03	(	2.002E+01 1.05E+00 8.15E+01	G
SN-113	9.7136E+02				1.15E+02	
		391.69	9.714E+02	(	1.115E+01 8.54E-01 6.40E+01	G
CS-137	4.6565E+02				1.10E+04	
		661.66	4.657E+02	(	5.571E+00 9.21E-01 8.52E+01	G
Y-898	1.5700E+03				1.07E+02	

898.02 1.570E+03 (1.261E+01 7.43E-01 9.37E+01 G

Co-1173 7.2416E+02 1.93E+03
1173.24 7.242E+02 (5.275E+00 7.99E-01 9.99E+01 G

Co-1332 7.2060E+02 1.93E+03
1332.50 7.206E+02 (4.737E+00 8.09E-01 1.00E+02 G

Y-1836 1.6340E+03 1.07E+02
1836.01 1.634E+03 (6.084E+00 8.27E-01 9.92E+01 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape

P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq	Time Corrected Activity Bq	Uncertainty 1 Sigma Counting	MDA
Pb-210	1.4284E+04	1.4422E+04	6.417E-01%	1.66E+02
AM-241	1.2219E+03	1.2225E+03	6.654E-01%	1.45E+01
CD-109	1.3631E+04	1.6145E+04	4.729E-01%	1.18E+02

CO-57	2.6186E+02	3.4928E+02	7.589E-01%	4.43E+00
Ce-139	3.0490E+02	5.3852E+02	6.967E-01%	5.64E+00
Hg-203	2.2495E+02	1.2059E+03	1.050E+00%	2.00E+01
SN-113	4.9196E+02	9.7136E+02	8.544E-01%	1.12E+01
CS-137	4.6235E+02	4.6565E+02	9.207E-01%	5.57E+00
Y-898	7.5323E+02	1.5700E+03	7.434E-01%	1.26E+01
Co-1173	6.9530E+02	7.2416E+02	7.989E-01%	5.27E+00
Co-1332	6.9188E+02	7.2060E+02	8.094E-01%	4.74E+00
Y-1836	7.8390E+02	1.6340E+03	8.273E-01%	6.08E+00

  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.7 to 1999.5 keV) 3.381E+04 Bq
Total Decayed Activity (37.7 to 1999.5 keV) 3.9968746E+04 Bq

Gamma Verification per Geometry

Detector: Ge15

Geometry: Tunacan

Reference date 1/1/2012

Calibration Standard: 90099

Standard volume g / vial 1550

Standard volume transferred in g / geometry 317.8

lab ID# of cal standard 6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14410	96.5
Am-241	2037	418	0.3590	1163	1206.9	103.7
Cd-109	2881	591	0.0361	16363	16069	98.2
Co-57	1511	310	0.8560	362	356.06	98.4
Ce-139	2139	439	0.7990	549	538.81	98.2
Hg-203	4651	954	0.8146	1171	1202.4	102.7
Sn-113	3015	618	0.6400	966	974.62	100.9
Cs-137	1938	397	0.8510	467	465.43	99.7
Y-88	7264	1489	0.9370	1589	1573.7	99.0
Co-60	3580	734	0.9997	734	716.44	97.6
Co-60	3581	734	0.9999	734	726.55	98.9
Y-88	7690	1577	0.9920	1589	1633.2	102.8

Reviewed By: Jody Watson

Date: 3/22/2012

Calibration Data from file: 15_Soil_TunaCan.Clb
Energy Calibration Date: 3/22/2012 Time: 1:02:46 PM
Efficiency Calibration Date: 3/22/2012 Time: 1:03:01 PM

Calibration Description:
15_TunaCan_90099_032212

Energy Calibration Fit
Energy = 0.0042 +0.250192*Channel -3.10425e-008*Channel**2
FWHM (ch) = 3.5032 +0.001000*Channel -3.73783e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.91	46.54	46.52	0.05%	0.90	0.92	-2.54%
237.99	59.54	59.55	-0.01%	0.91	0.94	-2.43%
352.01	88.03	88.07	-0.05%	0.95	0.96	-1.92%
487.92	122.06	122.07	-0.01%	1.00	1.00	0.30%
663.08	165.85	165.89	-0.02%	1.05	1.04	1.34%
1115.99	279.17	279.18	-0.00%	1.18	1.14	3.23%
1565.41	391.69	391.58	0.03%	1.26	1.24	1.14%
2645.35	661.66	661.63	0.00%	1.50	1.47	2.11%
3590.98	898.02	898.04	-0.00%	1.67	1.65	0.79%
4692.06	1173.24	1173.24	-0.00%	1.80	1.84	-2.06%
5329.66	1332.50	1332.56	-0.00%	1.90	1.94	-2.28%
7344.95	1836.01	1835.98	0.00%	2.23	2.21	1.30%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.9975 %
Ln(Eff) = -0.6895 -0.329061*Ln(Eng) -0.0387563*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 1.1273 %
Ln(Eff) = -23.6268 +8.666669*Ln(Eng) -0.921464*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	1.8904E-002	1.9569E-002	-3.52%
59.54	2.8630E-002	2.7372E-002	4.39%
88.03	3.6378E-002	3.7061E-002	-1.88%
122.06	3.7201E-002	3.8461E-002	-3.39%
165.85	========== Knee ==========		
165.85	3.3266E-002	3.3919E-002	-1.96%
279.17	2.3641E-002	2.3007E-002	2.68%
391.69	1.7841E-002	1.7674E-002	0.94%
661.66	1.1534E-002	1.1545E-002	-0.10%
898.02	8.8355E-003	8.9209E-003	-0.97%
1173.24	6.9001E-003	7.0763E-003	-2.55%
1332.50	6.2597E-003	6.3249E-003	-1.04%
1836.01	4.8716E-003	4.7412E-003	2.68%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	14918.00	634.00	4.10%	1/1/2012 11:00:00 AM
Am-241	59.54	35.70	1.58E+005	1170.90	418.00	3.50%	1/1/2012 11:00:00 AM
Cd-109	88.03	3.61	4.63E+002	16371.00	591.00	4.70%	1/1/2012 11:00:00 AM
Co-57	122.06	85.60	2.72E+002	362.15	310.00	4.10%	1/1/2012 11:00:00 AM
Ce-139	165.85	79.90	1.38E+002	549.44	439.00	3.90%	1/1/2012 11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	1170.60	954.00	3.80%	1/1/2012 11:00:00 AM
Sn-113	391.69	64.00	1.15E+002	965.63	618.00	3.90%	1/1/2012 11:00:00 AM
Cs-137	661.66	85.21	1.10E+004	465.91	397.00	4.00%	1/1/2012 11:00:00 AM
Y-88	898.02	93.70	1.07E+002	1589.10	1489.00	3.90%	1/1/2012 11:00:00 AM
Co-60	1173.24	99.90	1.93E+003	734.73	734.00	4.00%	1/1/2012 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	734.15	734.00	4.00%	1/1/2012 11:00:00 AM
Y-88	1836.01	99.20	1.07E+002	1589.70	1577.00	4.00%	1/1/2012 11:00:00 AM

ORTEC g v - i (1087) Env32 G53W4.25 3/22/2012 1:04:51 PM Page 1
TestAmerica, Inc. Spectrum name: 15_TunaCan_20120283.An1

Sample description
15_TunaCan_90099_032212

Spectrum Filename: C:\User\SPC\Det15\15_TunaCan_20120283.An1

Acquisition information
Start time:	3/22/2012 11:06:02 AM
Live time:	3600
Real time:	3653
Dead time:	1.44 %
Detector ID:	15

Detector system
Ge15 SN/1102216

Calibration
Filename: 15_TunaCan.Clb
15_TunaCan_90099_032212

Energy Calibration
Created:	3/22/2012 1:02:46 PM
Zero offset:	0.004 keV
Gain:	0.250 keV/channel
Quadratic:	-3.104E-08 keV/channel^2

Efficiency Calibration
Created:	3/22/2012 1:03:01 PM
Knee Energy:	165.85 keV
Above the Knee:	Quadratic Uncertainty = 1.00 %
Log(Eff):	-6.894897E-01 + (-3.290613E-01*Log(E)) + (-3.875629E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 1.13 %
Log(Eff):	-2.362677E+01 + (8.666669E+00*Log(E)) + (-9.214638E-01*Log(E)^2)

Library Files
Main analysis library:	DET_EnergyStandardMix & Pb.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters
Analysis engine:	Env32 G53W4.25
Start channel:	150 (37.53keV)
Stop channel:	8000 (1999.56keV)
Peak rejection level:	10.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2012 11:00:00 AM
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 0.0249

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq	Nuc
46.52	42849.	0.75	0.90	1.955E-02	46.54	4.250	1.441E+04	Pb210
59.55	42443.	0.72	0.91	2.738E-02	59.54	35.700	1.207E+03	AM241
72.95	2606.	6.34	0.95	3.318E-02				
88.07	68550.	0.54	0.95	3.707E-02	88.03	3.610	1.607E+04	CD109
122.10	33756.	0.64	1.00	3.846E-02	122.06	85.600	3.502E+02	CO57
136.52	4295.	2.96	1.01	3.724E-02				
165.89	34959.	0.78	1.05	3.391E-02	165.85	79.900	5.388E+02	Ce139
279.18	24347.	0.88	1.18	2.301E-02	279.17	81.500	1.202E+03	Hg203
391.58	24366.	0.82	1.26	1.768E-02	391.69	64.000	9.746E+02	SN113
661.63	16400.	1.16	1.50	1.155E-02	661.66	85.210	4.654E+02	CS137
898.03	27965.	0.74	1.67	8.921E-03	898.02	93.700	1.574E+03	Y898
1173.23	17709.	0.94	1.81	7.076E-03	1173.24	99.900	7.164E+02	Co1173
1332.55	16065.	0.98	1.90	6.325E-03	1332.50	99.982	7.266E+02	Co1332
1835.95	16330.	0.85	2.24	4.741E-03	1836.01	99.200	1.633E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
291.58	72.93	12341.	2606.	7.854E+04	6.34	0.949	-	D
545.42	136.45	8010.	4524.	1.215E+05	4.23	1.054	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.91	46.52	15447.	42849.	11.903	0.75	0.900
AM-241	237.99	59.55	14029.	42443.	11.790	0.72	0.913
CD-109	352.01	88.07	16260.	68550.	19.042	0.54	0.945
CO-57	487.92	122.07	9130.	34324.	9.535	0.78	0.999
Ce-139	663.08	165.89	8215.	34959.	9.711	0.78	1.052
Hg-203	1115.99	279.18	4252.	24347.	6.763	0.88	1.182
SN-113	1565.41	391.58	3012.	24366.	6.768	0.82	1.259
CS-137	2645.35	661.63	3077.	16400.	4.555	1.16	1.503
Y-898	3590.94	898.03	2252.	27965.	7.768	0.74	1.667
Co-1173	4692.02	1173.23	1355.	17709.	4.919	0.94	1.807
Co-1332	5329.60	1332.55	1160.	16065.	4.463	0.98	1.900
Y-1836	7344.81	1835.95	345.	16330.	4.536	0.85	2.240

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq	Peak Energy keV	Peak Activity Bq	Code	MDA Value Bq		COMMENTS
Pb-210	N	1.4410E+04				8.15E+03		
			46.54	1.441E+04	(	1.957E+02	7.55E-01 4.25E+00	G
AM-241		1.2069E+03				1.58E+05		
			59.54	1.207E+03	(	1.577E+01	7.22E-01 3.57E+01	G
CD-109		1.6069E+04				4.63E+02		
			88.03	1.607E+04	(	1.399E+02	5.44E-01 3.61E+00	G
CO-57		3.5606E+02				2.72E+02		
			122.06	3.561E+02	(	4.647E+00	7.84E-01 8.56E+01	G

ORTEC g v - i (1087) Env32 G53W4.25 3/22/2012 1:04:51 PM Page 4
TestAmerica, Inc. Spectrum name: 15_TunaCan_20120283.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA		Comments
Ce-139	5.3881E+02				1.38E+02		
		165.85	5.388E+02	(	6.551E+00	7.82E-01 7.99E+01	G
Hg-203	1.2024E+03				4.66E+01		
		279.17	1.202E+03	(	1.514E+01	8.77E-01 8.15E+01	G
SN-113	9.7462E+02				1.15E+02		
		391.69	9.746E+02	(	1.034E+01	8.20E-01 6.40E+01	G
CS-137	4.6543E+02				1.10E+04		
		661.66	4.654E+02	(	7.413E+00	1.16E+00 8.52E+01	G
Y-898	1.5737E+03				1.07E+02		

898.02 1.574E+03 (1.260E+01 7.45E-01 9.37E+01 G

Co-1173 7.1644E+02 1.93E+03
1173.24 7.164E+02 (7.050E+00 9.39E-01 9.99E+01 G

Co-1332 7.2655E+02 1.93E+03
1332.50 7.266E+02 (7.301E+00 9.83E-01 1.00E+02 G

Y-1836 1.6332E+03 1.07E+02
1836.01 1.633E+03 (8.923E+00 8.49E-01 9.92E+01 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape

P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq	Time Corrected Activity Bq	Uncertainty 1 Sigma Counting	MDA
Pb-210	1.4311E+04	1.4410E+04	7.549E-01%	1.96E+02
AM-241	1.2065E+03	1.2069E+03	7.219E-01%	1.58E+01
CD-109	1.4233E+04	1.6069E+04	5.439E-01%	1.40E+02

CO-57	2.8961E+02	3.5606E+02	7.837E-01%	4.65E+00
Ce-139	3.5832E+02	5.3881E+02	7.816E-01%	6.55E+00
Hg-203	3.6068E+02	1.2024E+03	8.771E-01%	1.51E+01
SN-113	5.9836E+02	9.7462E+02	8.201E-01%	1.03E+01
CS-137	4.6306E+02	4.6543E+02	1.155E+00%	7.41E+00
Y-898	9.2933E+02	1.5737E+03	7.445E-01%	1.26E+01
Co-1173	6.9585E+02	7.1644E+02	9.390E-01%	7.05E+00
Co-1332	7.0567E+02	7.2655E+02	9.834E-01%	7.30E+00
Y-1836	9.6449E+02	1.6332E+03	8.486E-01%	8.92E+00

  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (82.3 to 1999.6 keV) 3.512E+04 Bq
Total Decayed Activity (82.3 to 1999.6 keV) 3.9873703E+04 Bq

Gamma Verification per Geometry

Detector: Ge17

Geometry: Tunacan

Reference date 1/1/2012

Calibration Standard: 90099

Standard volume g / vial 1550

Standard volume transferred in g / geometry 317.8

lab ID# of cal standard 6699

Isotope	Certified Activity gammas/sec	Geometry Activity gammas/sec	γ abundance	Bq/sample	Count Results	%recovery
Pb-210	3094	634	0.0425	14926	14476	97.0
Am-241	2037	418	0.3590	1163	1217.3	104.6
Cd-109	2881	591	0.0361	16363	16121	98.5
Co-57	1511	310	0.8560	362	351.58	97.1
Ce-139	2139	439	0.7990	549	540.43	98.5
Hg-203	4651	954	0.8146	1171	1200.7	102.6
Sn-113	3015	618	0.6400	966	969.38	100.4
Cs-137	1938	397	0.8510	467	466.08	99.8
Y-88	7264	1489	0.9370	1589	1562.4	98.3
Co-60	3580	734	0.9997	734	724.88	98.7
Co-60	3581	734	0.9999	734	733.12	99.8
Y-88	7690	1577	0.9920	1589	1616.3	101.7

Reviewed By: Megan McAfee

Date: 4/13/2012

Calibration Data from file: 17_Soil_TunaCan.Clb
Energy Calibration Date: 4/12/2012 Time: 9:28:30 AM
Efficiency Calibration Date: 4/12/2012 Time: 9:28:42 AM

Calibration Description:
17_TunaCan_90099_032612

Energy Calibration Fit
Energy = 0.1178 +0.250077*Channel -2.37566e-008*Channel**2
FWHM (ch) = 2.9772 +0.000994*Channel -3.22638e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.96	46.54	46.62	-0.17%	0.77	0.79	-3.16%
237.92	59.54	59.61	-0.12%	0.78	0.80	-3.33%
351.79	88.03	88.09	-0.07%	0.82	0.83	-1.16%
487.44	122.06	122.01	0.04%	0.89	0.86	3.09%
662.32	165.85	165.74	0.07%	0.93	0.91	2.22%
1115.65	279.17	279.09	0.03%	1.03	1.01	2.15%
1565.90	391.69	391.66	0.01%	1.10	1.11	-0.78%
2646.02	661.66	661.66	-0.00%	1.37	1.35	1.74%
3591.93	898.02	898.07	-0.01%	1.52	1.53	-0.67%
4693.19	1173.24	1173.25	-0.00%	1.72	1.73	-0.81%
5330.69	1332.50	1332.53	-0.00%	1.82	1.84	-0.74%
7346.32	1836.01	1835.98	0.00%	2.14	2.13	0.55%

Efficiency Calibration Fit
Knee Energy = 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.9072 %
Ln(Eff) = -0.5264 -0.402416*Ln(Eng) -0.0260446*(Ln(Eng))**2
Below the Knee: Quadratic Uncertainty = 1.0020 %
Ln(Eff) = -23.4389 +8.582715*Ln(Eng) -0.907543*(Ln(Eng))**2

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	2.0383E-002	2.1004E-002	-3.05%
59.54	3.0743E-002	2.9571E-002	3.81%
88.03	3.9976E-002	4.0594E-002	-1.55%
122.06	4.1510E-002	4.2756E-002	-3.00%
165.85	========== Knee ==========		
165.85	3.7629E-002	3.8252E-002	-1.65%
279.17	2.7514E-002	2.6814E-002	2.54%
391.69	2.1207E-002	2.1122E-002	0.40%
661.66	1.4433E-002	1.4427E-002	0.04%
898.02	1.1287E-002	1.1478E-002	-1.69%
1173.24	9.2333E-003	9.3589E-003	-1.36%
1332.50	8.4692E-003	8.4809E-003	-0.14%
1836.01	6.7041E-003	6.5931E-003	1.66%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.54	4.25	8.15E+003	14918.00	634.00	4.10%	1/1/2012 11:00:00 AM
Am-241	59.54	35.70	1.58E+005	1170.90	418.00	3.50%	1/1/2012 11:00:00 AM
Cd-109	88.03	3.61	4.63E+002	16371.00	591.00	4.70%	1/1/2012 11:00:00 AM
Co-57	122.06	85.60	2.72E+002	362.15	310.00	4.10%	1/1/2012 11:00:00 AM
Ce-139	165.85	79.90	1.38E+002	549.44	439.00	3.90%	1/1/2012 11:00:00 AM
Hg-203	279.17	81.50	4.66E+001	1170.60	954.00	3.80%	1/1/2012 11:00:00 AM
Sn-113	391.69	64.00	1.15E+002	965.63	618.00	3.90%	1/1/2012 11:00:00 AM
Cs-137	661.66	85.21	1.10E+004	465.91	397.00	4.00%	1/1/2012 11:00:00 AM
Y-88	898.02	93.70	1.07E+002	1589.10	1489.00	3.90%	1/1/2012 11:00:00 AM
Co-60	1173.24	99.90	1.93E+003	734.73	734.00	4.00%	1/1/2012 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	734.15	734.00	4.00%	1/1/2012 11:00:00 AM
Y-88	1836.01	99.20	1.07E+002	1589.70	1577.00	4.00%	1/1/2012 11:00:00 AM

ORTEC g v - i (1087) Env32 G53W4.25 7/6/2012 10:31:21 AM Page 1
TestAmerica, Inc. Spectrum name: 17_TunaCan_20120263.An1

Sample description
17_TunaCan_90099_032612

Spectrum Filename: C:\User\SPC\Det17\17_TunaCan_20120263.An1

Acquisition information
Start time: 3/26/2012 6:29:58 AM
Live time: 3600
Real time: 3672
Dead time: 1.95 %
Detector ID: 17

Detector system
Ge17 SN/11080671

Calibration
Filename: 17_Soil_TunaCan.Clb
17_TunaCan_90099_032612

Energy Calibration
Created: 4/12/2012 9:28:30 AM
Zero offset: 0.118 keV
Gain: 0.250 keV/channel
Quadratic: -2.376E-08 keV/channel^2

Efficiency Calibration
Created: 4/12/2012 9:28:42 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.91 %
Log(Eff): -5.264190E-01 + (-4.024164E-01*Log(E)) + (-2.604461E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.00 %
Log(Eff): -2.343889E+01 + (8.582715E+00*Log(E)) + (-9.075430E-01*Log(E)^2)

Library Files
Main analysis library: DET_EnergyStandardMix & Pb.Lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G53W4.25
Start channel: 150 (37.63keV)
Stop channel: 8000 (1999.21keV)
Peak rejection level: 10.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

ORTEC g v - i (1087) Env32 G53W4.25 7/6/2012 10:31:21 AM Page 2
TestAmerica, Inc. Spectrum name: 17_TunaCan_20120263.An1
Page 1

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2012 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 0.0522

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq	Nuc
46.62	46187.	0.69	0.77	2.106E-02	46.54	4.250	1.448E+04	Pb210
59.61	46245.	0.74	0.78	2.961E-02	59.54	35.700	1.217E+03	AM241
72.97	2852.	5.64	0.82	3.610E-02				
88.09	74900.	0.46	0.82	4.061E-02	88.03	3.610	1.612E+04	CD109
122.01	37313.	0.73	0.89	4.276E-02	122.06	85.600	3.516E+02	CO57
136.40	4536.	4.09	0.81	4.164E-02				
165.74	38793.	0.66	0.93	3.765E-02	165.85	79.900	5.404E+02	Ce139
255.04	1259.	9.59	1.07	2.855E-02				
279.09	26776.	0.82	1.03	2.682E-02	279.17	81.500	1.201E+03	Hg203
391.66	28306.	0.76	1.11	2.112E-02	391.69	64.000	9.694E+02	SN113
661.66	20517.	0.91	1.37	1.443E-02	661.66	85.210	4.661E+02	CS137
898.07	34851.	0.63	1.52	1.148E-02	898.02	93.700	1.562E+03	Y898
1173.25	23664.	0.80	1.72	9.359E-03	1173.24	99.900	7.249E+02	Co1173
1332.52	21706.	0.78	1.83	8.481E-03	1332.50	99.982	7.331E+02	Co1332
1835.97	21924.	0.70	2.15	6.593E-03	1836.01	99.200	1.616E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
291.30	72.97	10374.	2884.	7.989E+04	5.33	0.816	-	D
544.98	136.40	8136.	4536.	1.089E+05	4.09	0.813	-	
1019.46	255.04	3805.	1259.	4.410E+04	9.59	1.072	-	

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.

C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.96	46.62	15035.	46187.	12.830	0.69	0.766
AM-241	237.92	59.61	17361.	46245.	12.846	0.74	0.777
CD-109	351.79	88.09	12661.	74900.	20.806	0.46	0.821
CO-57	487.44	122.01	9755.	37313.	10.365	0.73	0.891
Ce-139	662.32	165.74	6828.	38793.	10.776	0.66	0.926
Hg-203	1115.65	279.09	4528.	26776.	7.438	0.82	1.034
SN-113	1565.90	391.66	3496.	28306.	7.863	0.76	1.105
CS-137	2646.02	661.66	2816.	20517.	5.699	0.91	1.369
Y-898	3591.91	898.07	2257.	34851.	9.681	0.63	1.523
Co-1173	4693.17	1173.25	1531.	23664.	6.573	0.80	1.720
Co-1332	5330.69	1332.52	1002.	21706.	6.029	0.78	1.825
Y-1836	7346.26	1835.97	205.	21924.	6.090	0.70	2.146

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq	Peak Energy keV	Peak Activity Bq	Code	MDA Value Bq		COMMENTS
Pb-210	N	1.4476E+04				8.15E+03		
			46.54	1.448E+04	(	1.799E+02	6.89E-01 4.25E+00 G	
AM-241		1.2173E+03				1.58E+05		
			59.54	1.217E+03	(	1.623E+01	7.35E-01 3.57E+01 G	
CD-109		1.6121E+04				4.63E+02		
			88.03	1.612E+04	(	1.134E+02	4.57E-01 3.61E+00 G	
CO-57		3.5158E+02				2.72E+02		
			122.06	3.516E+02	(	4.362E+00	7.33E-01 8.56E+01 G	

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Ce-139	5.4043E+02				1.38E+02	
		165.85	5.404E+02	(	5.402E+00	6.57E-01 7.99E+01 G
Hg-203	1.2007E+03				4.66E+01	
		279.17	1.201E+03	(	1.418E+01	8.17E-01 8.15E+01 G
SN-113	9.6938E+02				1.15E+02	
		391.69	9.694E+02	(	9.529E+00	7.56E-01 6.40E+01 G
CS-137	4.6608E+02				1.10E+04	
		661.66	4.661E+02	(	5.679E+00	9.07E-01 8.52E+01 G

```
Y-898        1.5624E+03                                          1.07E+02
                          898.02 1.562E+03  (  1.005E+01 6.29E-01 9.37E+01 G

Co-1173      7.2488E+02                                          1.93E+03
                         1173.24 7.249E+02  (  5.668E+00 7.98E-01 9.99E+01 G

Co-1332      7.3312E+02                                          1.93E+03
                         1332.50 7.331E+02  (  5.074E+00 7.81E-01 1.00E+02 G

Y-1836       1.6163E+03                                          1.07E+02
                         1836.01 1.616E+03  (  5.123E+00 7.01E-01 9.92E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
   I - Fission Product                 P - Positron Decay
   N - Naturally Occurring Isotope     S - Single-Escape
```



```
   P - Photon Reaction                 D - Double-Escape
   C - Charged Particle Reaction       K - Key Line
   M - No MDA Calculation              A - Not in Average
   R - Coincidence Corrected           C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


 *************** D I S C A R D E D  I S O T O P E  P E A K S ***************
 Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
           Energy   Counts     Counts     Cts/Sec  1 Sigma %
 ____________________________________________________________________________
   P - Peakbackground subtraction

 *****   S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E   *****
         Time of Count  Time Corrected  Uncertainty  1 Sigma
 Nuclide     Activity       Activity       Counting                    MDA
                Bq             Bq

 ____________________________________________________________________________
 Pb-210       1.4372E+04    1.4476E+04    6.891E-01%                 1.80E+02
```

AM-241	1.2168E+03	1.2173E+03	7.355E-01%	1.62E+01
CD-109	1.4197E+04	1.6121E+04	4.569E-01%	1.13E+02
CO-57	2.8320E+02	3.5158E+02	7.325E-01%	4.36E+00
Ce-139	3.5257E+02	5.4043E+02	6.571E-01%	5.40E+00
Hg-203	3.4034E+02	1.2007E+03	8.175E-01%	1.42E+01
SN-113	5.8164E+02	9.6938E+02	7.559E-01%	9.53E+00
CS-137	4.6359E+02	4.6608E+02	9.066E-01%	5.68E+00
Y-898	9.0011E+02	1.5624E+03	6.288E-01%	1.00E+01
Co-1173	7.0308E+02	7.2488E+02	7.979E-01%	5.67E+00
Co-1332	7.1107E+02	7.3312E+02	7.808E-01%	5.07E+00
Y-1836	9.3113E+02	1.6163E+03	7.012E-01%	5.12E+00

  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (77.1 to 1999.2 keV) 3.505E+04 Bq
Total Decayed Activity (77.1 to 1999.2 keV) 3.9979633E+04 Bq

Gamma Verification per Geometry

Detector: **Ge19**
Geometry: **Tuna Can**
Reference date: **1/1/2018**
Calibration Standard: **108513**
Standard volume g / vial: **1550**
Standard volume transferred in g / geometry: **342.2**
lab ID# of cal standard: #1402359 / Tuna Can_2018_00001

Isotope	Certified Activity - Bq	Geometry Activity - Bq	Count Results	%recovery
Pb-210	72410	15986	16000	100.1
Am-241	5770	1274	1262	99.1
Cd-109	79700	17596	18110	102.9
Co-57	1809	399	392.1	98.2
Ce-139	2723	601	592.2	98.5
Hg-203	5868	1296	1308	101.0
Sn-113	4658	1028	1045	101.6
Cs-137	2283	504	518.1	102.8
Y-88	7810	1724	1691	98.1
Co-60	3574	789	778.3	98.6
Co-60	3574	789	770.3	97.6
Y-88	7810	1724	1762	102.2

Reviewed By: Jody Watson

Date: 4/17/2018

Calibration Data from file: 19_Soil_TunaCan.Clb
Energy Calibration Date: 4/16/2018 Time: 12:11:10 PM
Efficiency Calibration Date: 4/16/2018 Time: 12:11:21 PM

Calibration Description:
19_TunaCan_108513

Energy Calibration Fit
Energy = 0.1766 +0.250204*Channel -3.73478e-008*Channel**2
FWHM (ch) = 3.5649 +0.000922*Channel -2.36904e-008*Channel**2

Energy/FWHM Table

Channel	Energy(keV)	Fit(keV)	Delta	FWHM(keV)	Fit(keV)	Delta
185.55	46.54	46.60	-0.13%	0.89	0.93	-4.67%
237.43	59.54	59.58	-0.07%	0.92	0.95	-2.49%
351.31	88.03	88.07	-0.05%	0.99	0.97	1.45%
487.25	122.06	122.08	-0.02%	1.02	1.00	1.42%
662.37	165.85	165.89	-0.02%	1.07	1.04	2.92%
1114.62	279.17	279.01	0.06%	1.17	1.14	2.29%
1564.53	391.69	391.54	0.04%	1.23	1.24	-0.87%
2644.90	661.66	661.68	-0.00%	1.46	1.46	0.15%
3590.43	898.02	898.04	-0.00%	1.63	1.64	-0.77%
4691.85	1173.24	1173.27	-0.00%	1.84	1.84	-0.05%
5329.60	1332.50	1332.60	-0.01%	1.94	1.95	-0.29%
7345.15	1836.01	1835.95	0.00%	2.27	2.26	0.25%

Efficiency Calibration Fit
Polynomial Uncertainty = 0.8405 %
Coefficients:
-0.371612 -4.869309 0.466742 -0.049787 0.002234 -0.000039

Efficiency Table

Energy	Efficiency	Fit	Delta
46.54	1.7090E-002	1.7048E-002	0.25%
59.54	2.5898E-002	2.6134E-002	-0.91%
88.03	3.4294E-002	3.3195E-002	3.21%
122.06	3.3380E-002	3.3999E-002	-1.85%
165.85	3.0076E-002	3.0529E-002	-1.51%
279.17	2.1644E-002	2.1412E-002	1.07%
391.69	1.6644E-002	1.6371E-002	1.64%
661.66	1.1237E-002	1.0933E-002	2.71%
898.02	8.5558E-003	8.7213E-003	-1.93%
1173.24	7.0410E-003	7.1383E-003	-1.38%
1332.50	6.3120E-003	6.4652E-003	-2.43%
1836.01	5.0415E-003	4.9331E-003	2.15%

Calibration Certificate Table

Isotope	Energy	Pct	Halflife	Activity	GPS	Error	Date & Time
Pb-210	46.50	4.25	8.11E+003	15986.00	679.41	4.20%	1/1/2018 11:00:00 AM
Am-241	59.50	35.70	1.58E+005	1273.90	454.78	3.60%	1/1/2018 11:00:00 AM
Cd-109	88.00	3.61	4.61E+002	17596.00	635.22	4.10%	1/1/2018 11:00:00 AM
Co-57	122.10	85.60	2.72E+002	399.38	341.87	3.40%	1/1/2018 11:00:00 AM
Ce-139	165.90	79.90	1.38E+002	601.20	480.36	3.60%	1/1/2018 11:00:00 AM
Hg-203	279.20	81.50	4.66E+001	1295.50	1055.83	3.50%	1/1/2018 11:00:00 AM
Sn-113	391.70	64.00	1.15E+002	1028.40	658.18	3.90%	1/1/2018 11:00:00 AM
Cs-137	661.70	85.21	1.10E+004	504.03	429.48	4.10%	1/1/2018 11:00:00 AM
Y-88	898.00	93.70	1.07E+002	1724.30	1615.67	3.70%	1/1/2018 11:00:00 AM
Co-60	1173.20	99.90	1.93E+003	789.05	788.26	3.90%	1/1/2018 11:00:00 AM
Co-60	1332.50	99.98	1.93E+003	789.05	788.89	3.90%	1/1/2018 11:00:00 AM
Y-88	1836.10	99.20	1.07E+002	1724.30	1710.51	3.70%	1/1/2018 11:00:00 AM

Test America St. Louis Spectrum ID: 19_TunaCan_20180020

Sample Description: 19_TunaCan_108513
Detector: Detector #19
Batch ID: 19
Work Order Number: TunaCan
Lot Number: 108513

Decay to Time: 1/1/2018 11:00 Live Time: 3600 sec
Acquisition Time: 3/14/2018 15:23:10 Real Time: 3652 sec
Analysis Time: 4/16/2018 13:51 Dead Time: 1.43 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 19_Soil_TunaCan.Clb
Efficiency Cal Desc: 19_TunaCan_108513
Efficiency Cal Date: 4/16/2018 12:11
Energy Cal Date: 4/16/2018 11:22
Library: DET_EnergyStandardMix & Pb.lib
Bkgd Correction File: 19_2017-05-03_0244.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
Pb-210	1.600E+04	0.6	9.827E+01	1.032E+03	1.956E+02
AM-241	1.262E+03	0.8	9.764E+00	8.057E+01	1.778E+01
CD-109	1.811E+04	0.4	7.707E+01	1.127E+03	1.177E+02
CO-57	3.921E+02	0.9	3.334E+00	2.277E+01	5.681E+00
Ce-139	5.922E+02	0.7	4.306E+00	3.370E+01	6.700E+00
Hg-203	1.308E+03	0.8	1.088E+01	7.580E+01	1.542E+01
SN-113	1.045E+03	0.8	8.323E+00	6.221E+01	1.083E+01
CS-137	5.181E+02	1.1	5.945E+00	2.731E+01	8.219E+00
Y-898	1.691E+03	0.7	1.196E+01	8.678E+01	1.289E+01
Co-1173	7.783E+02	0.9	6.815E+00	3.933E+01	6.923E+00
Co-1332	7.703E+02	1.0	7.560E+00	3.911E+01	7.892E+00
Y-1836	1.762E+03	0.8	1.428E+01	1.014E+02	1.026E+01
Total	4.424E+04				

Analyst: Jody Watson

TestAmerica Inc Spectrum name: 19_TunaCan_20180020.An1

Sample description
19_TunaCan_108513

Spectrum Filename: C:\User\SPC\Det19\19_TunaCan_20180020.An1

Acquisition information

Start time:	3/14/2018 3:23:10 PM
Live time:	3600
Real time:	3652
Dead time:	1.43 %
Detector ID:	19

Detector system
Ge19 SN/11146715

Calibration
Filename: 19_Soil_TunaCan.Clb
19_TunaCan_108513

Energy Calibration

Created:	4/16/2018 11:22:57 AM
Zero offset:	0.177 keV
Gain:	0.250 keV/channel
Quadratic:	-3.735E-08 keV/channel^2

Efficiency Calibration

Created:	4/16/2018 12:11:21 PM
Type:	Polynomial
Uncertainty:	0.841 %
Coefficients:	-0.371612 -4.869309 0.466742
	-0.049787 0.002234 -0.000039

Library Files

Main analysis library:	DET_EnergyStandardMix & Pb.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	150 (37.71keV)
Stop channel:	8000 (1999.42keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000

Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2018 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	19_2017-05-03_0244.PBC 5/3/2017 2:44:56 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff: 5.00E+01 %

Energy Calibration

Normalized diff: 0.0474

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
46.64	41485.	0.61	0.93	1.711E-02	46.54	4.250	1.600E+04	Pb210
49.66	185.	79.61	0.94	2.004E-02				
59.58	42387.	0.77	0.92	2.615E-02	59.54	35.700	1.262E+03	AM241
70.77	1497.	10.76	0.96	2.996E-02				
72.98	2850.	5.71	0.96	3.053E-02				
77.04	130.	105.86	0.96	3.144E-02				
82.61	1804.	9.10	0.97	3.245E-02				
84.89	1999.	8.21	0.97	3.279E-02				
88.09	70129.	0.43	0.97	3.320E-02	88.03	3.610	1.811E+04	CD109
109.95	270.	55.08	0.90	3.432E-02				
122.08	34171.	0.85	1.02	3.400E-02	122.06	85.600	3.921E+02	CO57
136.52	4531.	4.35	1.04	3.311E-02				
156.45	191.	70.26	0.48	3.141E-02				
165.89	36156.	0.73	1.07	3.053E-02	165.85	79.900	5.922E+02	Ce139
255.00	1262.	10.74	1.03	2.296E-02				
279.01	28100.	0.83	1.17	2.142E-02	279.17	81.500	1.308E+03	Hg203
374.53	40.	110.13	0.47	1.696E-02				
391.54	25531.	0.80	1.23	1.638E-02	391.69	64.000	1.045E+03	SN113
438.33	68.	61.86	0.55	1.498E-02				
450.42	51.	90.94	0.45	1.466E-02				
579.11	37.	118.27	1.39	1.208E-02				
583.45	143.	40.12	1.40	1.201E-02				
590.49	120.	62.06	0.55	1.191E-02				
602.94	89.	61.09	0.46	1.172E-02				
608.99	230.	39.38	0.89	1.163E-02				
634.72	58.	97.26	0.36	1.128E-02				
661.68	17295.	1.15	1.46	1.093E-02	661.66	85.210	5.181E+02	CS137

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
680.83	293.	36.47	0.98	1.070E-02				
701.88	76.	74.94	0.28	1.046E-02				
813.88	662.	13.53	1.81	9.378E-03				
898.02	31118.	0.71	1.63	8.721E-03	898.02	93.700	1.691E+03	Y898
919.02	96.	39.05	0.43	8.573E-03				
973.55	110.	43.13	1.47	8.215E-03				
1173.23	19468.	0.88	1.84	7.138E-03	1173.24	99.900	7.783E+02	Co1173
1311.47	54.	70.42	0.52	6.547E-03				
1332.58	17466.	0.98	1.95	6.465E-03	1332.50	99.982	7.703E+02	Co1332
1426.68	175.	38.25	0.53	6.121E-03				
1515.29	59.	39.89	1.20	5.826E-03				
1553.02	72.	48.79	0.62	5.708E-03				
1619.47	59.	52.31	0.50	5.509E-03				
1835.90	19413.	0.81	2.27	4.933E-03	1836.01	99.200	1.762E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV		Suspected Nuclide
197.98	49.61	10751.	205.	1.023E+04	71.88	0.937	-	c
282.14	70.75	12228.	1497.	4.997E+04	10.76	0.956	-	D
290.98	72.96	11800.	2850.	9.335E+04	5.71	0.958	-	D
307.22	77.02	9412.	130.	4.137E+03	105.86	0.962	-	c
329.65	82.59	12567.	1809.	5.576E+04	9.07	0.967	-	sD
338.75	84.87	12449.	2015.	6.145E+04	8.14	0.969	-	sD
438.78	109.95	7282.	270.	7.868E+03	55.08	0.905	-	s
544.98	136.52	8574.	4531.	1.368E+05	4.35	1.039	-	s
624.64	156.45	5607.	191.	6.070E+03	70.26	0.482	-	s
1018.60	255.00	4278.	1262.	5.496E+04	10.74	1.030	-	
1496.54	374.53	900.	40.	2.387E+03	110.13	0.471	-	c
1751.63	438.33	774.	68.	4.506E+03	61.86	0.545	-	s
1800.00	450.42	900.	51.	3.478E+03	90.94	0.447	-	sc
2314.63	579.33	954.	37.	3.086E+03	118.27	1.393	-	sc
2331.99	583.67	1569.	143.	1.188E+04	40.12	1.396	-	sD
2360.15	590.49	1480.	120.	1.008E+04	62.06	0.550	-	s
2409.97	602.94	1012.	89.	7.593E+03	61.09	0.464	-	s
2434.16	608.99	1840.	230.	1.977E+04	39.38	0.887	-	s
2537.07	634.72	1084.	58.	5.099E+03	97.26	0.355	-	sc
2721.49	680.83	2304.	293.	2.739E+04	36.47	0.976	-	s
2805.71	701.88	1056.	76.	7.264E+03	74.94	0.285	-	s
3253.74	813.88	1425.	662.	7.059E+04	13.53	1.808	-	s
3674.40	919.02	530.	96.	1.126E+04	39.05	0.432	-	s
3892.57	973.55	682.	110.	1.345E+04	43.13	1.468	-	s
5245.01	1311.47	348.	54.	8.248E+03	70.42	0.522	-	s
5706.21	1426.68	646.	175.	2.859E+04	38.25	0.525	-	s
6061.00	1515.29	198.	59.	1.013E+04	39.89	1.199	-	s

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
6212.08	1553.02	345.	72.	1.256E+04	48.79	0.621	- s
6478.17	1619.47	284.	59.	1.074E+04	52.31	0.497	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.31	46.54	11710.	41485.	11.524	0.61	0.935D
AM-241	237.43	59.58	16272.	42387.	11.774	0.77	0.923
CD-109	351.15	88.03	9451.	70129.	19.480	0.43	0.972D
CO-57	487.25	122.08	11165.	34171.	9.492	0.85	1.017
Ce-139	662.37	165.89	7603.	36156.	10.043	0.73	1.073
Hg-203	1114.62	279.01	4975.	28100.	7.806	0.83	1.168
SN-113	1564.53	391.54	3156.	25531.	7.092	0.80	1.227
CS-137	2644.90	661.68	3399.	17295.	4.804	1.15	1.461
Y-898	3590.36	898.02	2532.	31118.	8.644	0.71	1.632
Co-1173	4691.69	1173.23	1338.	19468.	5.408	0.88	1.845
Co-1332	5329.52	1332.58	1430.	17466.	4.852	0.98	1.948
Y-1836	7344.98	1835.90	561.	19413.	5.392	0.81	2.273

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Peak Code	Peak MDA Value Bq/Sample	COMMENTS
Pb-210	N	1.6003E+04				8.15E+03	
			46.54	1.600E+04	(	1.956E+02 6.14E-01 4.25E+00	G
AM-241		1.2624E+03				1.58E+05	
			59.54	1.262E+03	(	1.778E+01 7.73E-01 3.57E+01	G
CD-109		1.8113E+04				4.63E+02	
			88.03	1.811E+04	(	1.177E+02 4.25E-01 3.61E+00	G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CO-57	3.9206E+02					2.72E+02	
		122.06	3.921E+02	(	5.681E+00	8.50E-01	8.56E+01 G
Ce-139	5.9221E+02					1.38E+02	
		165.85	5.922E+02	(	6.700E+00	7.27E-01	7.99E+01 G
Hg-203	1.3079E+03					4.66E+01	
		279.17	1.308E+03	(	1.542E+01	8.32E-01	8.15E+01 G
SN-113	1.0455E+03					1.15E+02	
		391.69	1.045E+03	(	1.083E+01	7.96E-01	6.40E+01 G
CS-137	5.1806E+02					1.10E+04	
		661.66	5.181E+02	(	8.219E+00	1.15E+00	8.52E+01 G
Y-898	1.6914E+03					1.07E+02	
		898.02	1.691E+03	(	1.289E+01	7.07E-01	9.37E+01 G
Co-1173	7.7829E+02					1.93E+03	
		1173.24	7.783E+02	(	6.923E+00	8.76E-01	9.99E+01 G
Co-1332	7.7032E+02					1.93E+03	
		1332.50	7.703E+02	(	7.892E+00	9.81E-01	1.00E+02 G
Y-1836	1.7620E+03					1.07E+02	
		1836.01	1.762E+03	(	1.026E+01	8.10E-01	9.92E+01 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation

Peak Codes:
G - Gamma Ray

F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
Pb-210	1.5905E+04	1.6003E+04	6.141E-01%	1.96E+02
AM-241	1.2620E+03	1.2624E+03	7.734E-01%	1.78E+01
CD-109	1.6256E+04	1.8113E+04	4.255E-01%	1.18E+02
CO-57	3.2615E+02	3.9206E+02	8.503E-01%	5.68E+00
Ce-139	4.1173E+02	5.9221E+02	7.271E-01%	6.70E+00
Hg-203	4.4729E+02	1.3079E+03	8.318E-01%	1.54E+01
SN-113	6.7689E+02	1.0455E+03	7.961E-01%	1.08E+01
CS-137	5.1570E+02	5.1806E+02	1.148E+00%	8.22E+00
Y-898	1.0578E+03	1.6914E+03	7.071E-01%	1.29E+01
Co-1173	7.5832E+02	7.7829E+02	8.756E-01%	6.92E+00
Co-1332	7.5056E+02	7.7032E+02	9.814E-01%	7.89E+00
Y-1836	1.1019E+03	1.7620E+03	8.103E-01%	1.03E+01

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.7 to 1999.4 keV) 3.947E+04 Bq/Sample
Total Decayed Activity (37.7 to 1999.4 keV) 4.4235852E+04 Bq/Sample

Initial Calibration Verifications

2nd Source Verification

Detector: Ge 8

Geometry: 100mL D=1

Reference date 1/1/2010

Source: 81593-334

Standard volume g / vial 5.31128

Standard volume transferred in g / geometry 0.7524

lab ID# of cal standard Rad10-0044

Isotope	Certified Activity gammas/sec	Geometry Activity	abundance	Activity Bq/sample	Count Results	%recovery
Am-241	3474	492	0.359	**1370.8**	1382.2	100.8
Cs-137	3289	466	0.851	**547.5**	553.5	101.1
Co-60	6166	873	0.99974	**873.7**	869.17	99.5
Co-60	6169	874	0.99986	**874.0**	884.44	101.2

Reviewed By: Jody Watson

Date: 9/9/2011

ORTEC g v - i (3263) Env32 G53W4.25 9/9/2011 7:30:13 AM
TestAmerica Spectrum name: 8_100mLD=12nd_20112398.An1

Sample description
8_100mLD=12nd_rad10_090811

Spectrum Filename: C:\User\SPC\Det8\8_100mLD=12nd_20112398.An1

Acquisition information
Start time: 9/8/2011 12:09:45 PM
Live time: 7200
Real time: 7392
Dead time: 2.60 %
Detector ID: 8

Detector system
Ge 8 SN/174

Calibration
Filename: 8_100mLD=12nd_20112398.An1
8_25mLD=1_85520-334_090811

Energy Calibration
Created: 9/8/2011 11:01:54 AM
Zero offset: 0.027 keV
Gain: 0.250 keV/channel
Quadratic: -2.332E-10 keV/channel^2

Efficiency Calibration
Created: 9/8/2011 11:02:09 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 2.01 %
Log(Eff): -1.433327E-01 + (-3.358738E-01*Log(E)) +
(-4.197546E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.26 %
Log(Eff): -1.110432E+01 + (3.982559E+00*Log(E)) +
(-4.672682E-01*Log(E)^2)

Library Files
Main analysis library: DET_EnergyStandardMix.Lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G53W4.25
Start channel: 150 (37.53keV)
Stop channel: 8000 (2000.09keV)
Peak rejection level: 1000.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) =
1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

ORTEC g v - i (3263) Env32 G53W4.25 9/9/2011 7:30:13 AM
TestAmerica Spectrum name: 8_100mLD=12nd_20112398.An1

Random error:	1.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	average of three points.
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2010 11:00:00 AM
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	8_2011-08-29_0021.PBC 8/29/2011 12:21:43 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 10 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 0.0182

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
36.34	2371.	6.03	1.08	5.913E-02				
37.80	1853.	8.52	1.08	6.056E-02				
49.55	9557.	4.29	1.84	6.867E-02				
59.50	254697.	0.26	1.08	7.188E-02	59.54	35.700	1.382E+03	AM241
88.02	138900.	0.35	1.10	7.135E-02	88.03	3.610	1.883E+04	CD109
122.06	34872.	0.75	1.14	6.353E-02	122.06	85.600	4.274E+02	CO57
136.50	4285.	3.43	1.10	5.968E-02				
165.86	8614.	2.01	1.17	5.200E-02	165.85	79.900	6.375E+02	Ce139
185.34	338.	33.78	1.04	4.774E-02				
237.29	250.	42.74	0.55	3.932E-02				
247.41	125.	62.20	0.43	3.804E-02				
255.32	289.	28.48	1.06	3.709E-02				
269.15	93.	59.57	0.82	3.555E-02				
279.11	67.	152.37	1.25	3.452E-02	279.17	81.500	HL>Cutoff	Hg203
357.70	169.	56.16	0.59	2.818E-02				
391.67	4116.	3.40	1.36	2.612E-02	391.69	64.000	1.389E+03	SN113
433.58	96.	61.24	0.34	2.398E-02				
461.06	109.	61.83	0.47	2.276E-02				
512.61	74.	54.59	0.62	2.079E-02				
616.14	86.	56.34	1.48	1.773E-02				
619.31	158.	36.06	1.48	1.765E-02				
661.60	54387.	0.49	1.46	1.665E-02	661.66	85.210	5.535E+02	CS137
682.22	228.	32.54	0.57	1.621E-02				
774.15	85.	58.33	0.46	1.448E-02				
898.08	2827.	5.09	1.50	1.267E-02	898.02	93.700	1.804E+03	Y898
976.89	79.	51.23	0.30	1.174E-02				
1173.23	49669.	0.50	1.83	9.914E-03	1173.24	99.900	8.692E+02	Co1173
1228.83	40.	79.94	0.27	9.496E-03				
1332.47	44910.	0.49	1.87	8.802E-03	1332.50	99.982	8.844E+02	Co1332
1374.16	16.	53.32	0.40	8.551E-03				
1835.98	1679.	2.83	2.04	6.485E-03	1836.01	99.200	1.978E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
145.25	36.30	9025.	2371.	4.009E+04	6.03	1.077	-	D
151.09	37.76	11526.	1853.	3.059E+04	8.52	1.078	-	D
198.10	49.55	38006.	9557.	1.392E+05	4.29	1.836	-	s
545.89	136.50	4314.	4285.	7.180E+04	3.43	1.102	-	

ORTEC g v - i (3263) Env32 G53W4.25 9/9/2011 7:30:13 AM
TestAmerica Spectrum name: 8_100mLD=12nd_20112398.An1

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
741.21	185.34	3618.	338.	7.070E+03	33.78	1.036	- s
949.01	237.29	3341.	250.	6.349E+03	42.74	0.551	- s
989.48	247.41	2208.	125.	3.278E+03	62.20	0.428	- s
1021.14	255.32	2284.	289.	7.783E+03	28.48	1.063	- s
1076.44	269.15	1384.	93.	2.625E+03	59.57	0.824	- s
1430.63	357.70	2525.	169.	5.998E+03	56.16	0.593	- s
1734.16	433.58	1440.	96.	4.003E+03	61.24	0.339	- s
1844.08	461.06	1773.	109.	4.788E+03	61.83	0.468	- s
2050.24	512.61	779.	74.	3.559E+03	54.59	0.623	- s
2464.35	615.93	1140.	86.	4.869E+03	56.34	1.479	- D
2477.06	619.10	1544.	158.	8.952E+03	36.06	1.482	- D
2728.68	682.22	1374.	228.	1.406E+04	32.54	0.569	- s
3096.36	774.15	890.	85.	5.869E+03	58.33	0.458	- s
3907.30	976.89	726.	79.	6.759E+03	51.23	0.303	- s
4915.02	1228.83	261.	40.	4.247E+03	79.94	0.274	- s
5496.35	1374.16	27.	16.	1.891E+03	53.32	0.395	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
AM-241	237.88	59.50	37172.	254697.	35.375	0.26	1.078
CD-109	351.96	88.02	18626.	138900.	19.292	0.35	1.102
CO-57	488.10	122.06	6758.	34872.	4.843	0.75	1.138
Ce-139	663.32	165.86	4728.	8614.	1.196	2.01	1.165
Hg-203	1116.29	279.11	5127.	67.	0.009	152.37	1.251s
SN-113	1566.53	391.67	3448.	4116.	0.572	3.40	1.363s
CS-137	2646.18	661.60	2690.	54387.	7.554	0.49	1.462
Y-898	3592.06	898.08	3345.	2827.	0.393	5.09	1.501
Co-1173	4692.64	1173.23	1577.	49669.	6.898	0.50	1.826
Co-1332	5329.60	1332.47	403.	44910.	6.238	0.49	1.872
Y-1836	7343.57	1835.98	80.	1679.	0.233	2.83	2.037

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

ORTEC g v - i (3263) Env32 G53W4.25 9/9/2011 7:30:13 AM
TestAmerica Spectrum name: 8_100mLD=12nd_20112398.An1

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
AM-241		1.3822E+03				1.58E+05	
			59.54	1.382E+03	(	4.890E+00 2.59E-01 3.57E+01	G
CD-109		1.8825E+04				4.63E+02	
			88.03	1.883E+04	(	8.656E+01 3.54E-01 3.61E+00	G
CO-57		4.2742E+02				2.72E+02	
			122.06	4.274E+02	(	4.729E+00 7.45E-01 8.56E+01	G
Ce-139		6.3749E+02				1.38E+02	
			165.85	6.375E+02	(	2.392E+01 2.01E+00 7.99E+01	G
Hg-203		3.2915E-01				4.66E+01	
			279.17	3.291E-01	&(	1.661E+00 1.52E+02 8.15E+01	G
SN-113		1.3887E+03				1.15E+02	
			391.69	1.389E+03	@(	9.324E+01 3.40E+00 6.40E+01	G
CS-137		5.5350E+02				1.10E+04	
			661.66	5.535E+02	(	2.487E+00 4.88E-01 8.52E+01	G
Y-898		1.8039E+03				1.07E+02	
			898.02	1.804E+03	(	1.737E+02 5.09E+00 9.37E+01	G
Co-1173		8.6917E+02				1.93E+03	
			1173.24	8.692E+02	(	3.286E+00 4.98E-01 9.99E+01	G
Co-1332		8.8444E+02				1.93E+03	
			1332.50	8.844E+02	(	1.896E+00 4.87E-01 1.00E+02	G
Y-1836		1.9776E+03				1.07E+02	
			1836.01	1.978E+03	(	5.234E+01 2.83E+00 9.92E+01	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide

failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity
Hg-203	279.11	5127.	67.	0.009	152.37	0.000E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting		MDA Bq/Sample
AM-241	1.3785E+03	1.3822E+03	2.588E-01%		4.89E+00
CD-109	7.4904E+03	1.8825E+04	3.537E-01%		8.66E+01
CO-57	8.9055E+01	4.2742E+02	7.452E-01%		4.73E+00
Ce-139	2.8795E+01	6.3749E+02	2.007E+00%		2.39E+01
Hg-203 #A	3.2915E-01	>12 Halflives	1.5237E+02%	1.6607E+00	
SN-113 #	3.4189E+01	1.3887E+03	3.404E+00%		9.32E+01
CS-137	5.3243E+02	5.5350E+02	4.883E-01%		2.49E+00
Y-898	3.3065E+01	1.8039E+03	5.086E+00%		1.74E+02
Co-1173	6.9652E+02	8.6917E+02	4.982E-01%		3.29E+00
Co-1332	7.0876E+02	8.8444E+02	4.875E-01%		1.90E+00
Y-1836	3.6248E+01	1.9776E+03	2.828E+00%		5.23E+01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

ORTEC g v - i (3263) Env32 G53W4.25 9/9/2011 7:30:13 AM
TestAmerica Spectrum name: 8_100mLD=12nd_20112398.An1

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (661.6 to 2000.1 keV) 1.103E+04 Bq/Sample
Total Decayed Activity (661.6 to 2000.1 keV) 2.8749490E+04 Bq/Sample

Analyzed by: _____
Admin

Reviewed by: _____
Supervisor

Laboratory: TestAmerica

2nd Source Verification

Detector: Ge9

Geometry: Tunacan

Reference date 1/1/2010

Source: 81427-334

Standard volume g / vial 1550

Standard volume transferred in g / geometry 318.5

lab ID# of cal standard 6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1169.4	100.4
Cs-137	1926	396	0.851	465	444.52	95.6
Co-60	3611	742	0.99974	742	687.72	92.7
Co-60	3612	742	0.999856	742	692.56	93.3

Reviewed By: Jody Watson

Date: 6/14/2012

ORTEC g v - i (3263) Env32 G53W4.25 6/14/2012 1:20:45 PM Page 1
TestAmerica, Inc Spectrum name: 9_TunaCan_20120371.An1

Sample description
9_TunaCan_90099_061412

Spectrum Filename: C:\User\SPC\Det9\9_TunaCan_20120371.An1

Acquisition information
Start time: 6/14/2012 10:54:15 AM
Live time: 3600
Real time: 3629
Dead time: 0.81 %
Detector ID: 9

Detector system
Ge 9 SN/100113

Calibration
Filename: 9_Soil_TunaCan.Clb
9_Soil_TunaCan_90099_050312

Energy Calibration
Created: 6/14/2012 10:19:40 AM
Zero offset: 0.088 keV
Gain: 0.250 keV/channel
Quadratic: -2.039E-08 keV/channel^2

Efficiency Calibration
Created: 6/14/2012 10:19:51 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 1.30 %
Log(Eff): -8.079856E-01 + (-2.367265E-01*Log(E)) +
(-3.950640E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.42 %
Log(Eff): -2.387916E+01 + (8.875647E+00*Log(E)) +
(-9.401100E-01*Log(E)^2)

Library Files
Main analysis library: DET_EnergyStandardMix & Pb.Lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G53W4.25
Start channel: 150 (37.60keV)
Stop channel: 8000 (1999.66keV)
Peak rejection level: 1000.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) =
1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

ORTEC g v - i (3263) Env32 G53W4.25 6/14/2012 1:20:45 PM Page 2
TestAmerica, Inc Spectrum name: 9_TunaCan_20120371.An1
Page 1

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2010 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	9_2012-05-27_0502.PBC 5/27/2012 5:02:59 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 11 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 0.0390

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
36.54	860.	12.66	1.34	1.634E-02				
46.62	48876.	0.54	1.09	2.580E-02	46.54	4.250	1.338E+04	Pb210
50.03	116.	122.12	1.09	2.886E-02				
59.57	54776.	0.62	1.11	3.661E-02	59.54	35.700	1.169E+03	AM241
63.90	47.	193.18	0.35	3.962E-02				
88.09	26880.	0.87	1.14	5.052E-02	88.03	3.610	1.566E+04	CD109
122.10	5522.	2.86	1.15	5.303E-02	122.06	85.600	3.312E+02	CO57
136.38	729.	11.64	1.25	5.151E-02				
165.67	814.	10.74	1.30	4.629E-02	165.85	79.900	5.417E+02	Ce139
295.46	252.	33.13	0.56	3.229E-02				
316.16	66.	75.82	0.25	3.082E-02				
356.41	45.	97.50	1.36	2.835E-02				
358.68	42.	110.02	1.37	2.822E-02				
379.76	37.	75.05	0.46	2.711E-02				
391.75	310.	24.80	1.08	2.652E-02	391.69	64.000	1.113E+03	SN113
454.98	83.	53.05	0.37	2.383E-02				
568.66	103.	37.41	0.47	2.026E-02				
626.42	84.	49.00	0.45	1.885E-02				
661.66	23324.	0.76	1.61	1.810E-02	661.66	85.210	4.445E+02	CS137
821.54	239.	27.43	0.39	1.536E-02				
876.16	66.	52.19	0.61	1.462E-02				
898.25	346.	23.61	1.52	1.434E-02	898.02	93.700	2.406E+03	Y898
937.90	34.	79.64	0.44	1.387E-02				
1071.41	38.	61.01	0.57	1.249E-02				
1085.31	68.	35.74	1.00	1.237E-02				
1098.64	14.	140.33	0.47	1.225E-02				
1173.23	20836.	0.81	2.05	1.163E-02	1173.24	99.900	6.877E+02	Co1173
1332.49	18966.	0.75	2.11	1.050E-02	1332.50	99.982	6.926E+02	Co1332
1835.90	150.	10.23	1.72	8.080E-03	1836.01	99.200	1.745E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
145.76	36.54	3297.	860.	5.262E+04	12.66	1.336	- s
199.48	49.98	8660.	956.	3.313E+04	18.50	0.958	- sM
255.13	63.90	2893.	47.	1.186E+03	193.18	0.347	- sc
544.97	136.38	1941.	729.	1.415E+04	11.64	1.247	-

TestAmerica, Inc Spectrum name: 9_TunaCan_20120371.An1

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
1181.07	295.46	1550.	252.	7.804E+03	33.13	0.562	- s
1263.87	316.16	856.	66.	2.136E+03	75.82	0.245	- sc
1424.84	356.47	930.	45.	1.579E+03	97.50	1.363	- sc
1433.89	358.73	1025.	42.	1.473E+03	110.02	1.365	- sc
1518.22	379.76	367.	37.	1.365E+03	75.05	0.460	- sc
1819.03	454.98	702.	83.	3.496E+03	53.05	0.375	- s
2273.73	568.66	433.	103.	5.068E+03	37.41	0.468	- s
2504.73	626.42	460.	84.	4.455E+03	49.00	0.451	- s
3285.25	821.54	812.	239.	1.556E+04	27.43	0.391	- s
3503.76	876.16	400.	66.	4.538E+03	52.19	0.608	- s
3750.76	937.90	332.	34.	2.488E+03	79.64	0.436	- sc
4284.91	1071.41	226.	38.	3.015E+03	61.01	0.571	- s
4340.51	1085.31	224.	68.	5.498E+03	35.74	1.000	- s
4393.86	1098.64	186.	14.	1.143E+03	140.33	0.472	- sc

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.86	46.57	13300.	51041.	14.178	0.65	1.116
AM-241	237.82	59.57	11784.	54776.	15.216	0.62	1.111
CD-109	351.87	88.09	5995.	26880.	7.467	0.87	1.137
CO-57	487.85	122.10	3767.	5522.	1.534	2.86	1.155
Ce-139	662.09	165.67	1864.	814.	0.226	10.74	1.299
Hg-203	1120.44	280.29	2362.	-52.	-0.014	133.84	1.296s
SN-113	1565.85	391.67	1962.	266.	0.074	24.38	1.393
CS-137	2645.72	661.66	1258.	23324.	6.479	0.76	1.614
Y-898	3592.12	898.25	1148.	346.	0.096	23.61	1.524s
Co-1173	4692.30	1173.23	840.	20836.	5.788	0.81	2.049
Co-1332	5329.58	1332.49	131.	18966.	5.268	0.75	2.109
Y-1836	7344.43	1835.90	14.	150.	0.042	10.23	1.719s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample		Peak Code	MDA Value Bq/Sample		COMMENTS
Pb-210	N	1.3971E+04					8.15E+03		
			46.54	1.397E+04	(	1.478E+02	6.46E-01	4.25E+00	G
AM-241		1.1694E+03					1.58E+05		
			59.54	1.169E+03	(	1.086E+01	6.16E-01	3.57E+01	G
CD-109		1.5657E+04					4.63E+02		
			88.03	1.566E+04	(	2.117E+02	8.71E-01	3.61E+00	G
CO-57		3.3118E+02					2.72E+02		
			122.06	3.312E+02	(	1.731E+01	2.86E+00	8.56E+01	G
Ce-139		5.4173E+02					1.38E+02		
			165.85	5.417E+02	(	1.357E+02	1.07E+01	7.99E+01	G
Hg-203		-5.2429E-01					4.66E+01		
			279.17	-5.243E-01	?(	2.327E+00	1.34E+02	8.15E+01	G
SN-113		9.5260E+02					1.15E+02		
			391.69	9.526E+02	?(	7.503E+02	2.44E+01	6.40E+01	G
CS-137		4.4452E+02					1.10E+04		
			661.66	4.445E+02	(	3.202E+00	7.63E-01	8.52E+01	G
Y-898		2.4057E+03					1.07E+02		
			898.02	2.406E+03	@(	1.118E+03	2.36E+01	9.37E+01	G
Co-1173		6.8772E+02					1.93E+03		
			1173.24	6.877E+02	(	4.547E+00	8.09E-01	9.99E+01	G
Co-1332		6.9256E+02					1.93E+03		
			1332.50	6.926E+02	(	2.044E+00	7.49E-01	1.00E+02	G
Y-1836		1.7452E+03					1.07E+02		
			1836.01	1.745E+03	(	2.388E+02	1.02E+01	9.92E+01	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.

@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the

library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity
to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity
Hg-203	280.29	2362.	-52.	-0.014	133.84	0.000E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting		MDA Bq/Sample
Pb-210	1.2947E+04	1.3971E+04	6.459E-01%		1.48E+02
AM-241	1.1648E+03	1.1694E+03	6.156E-01%		1.09E+01
CD-109	4.0954E+03	1.5657E+04	8.713E-01%		2.12E+02
CO-57	3.3792E+01	3.3118E+02	2.862E+00%		1.73E+01
Ce-139	5.9752E+00	5.4173E+02	1.074E+01%		1.36E+02
Hg-203 #A	-5.2429E-01	>12 Halflives	1.3384E+02%	2.3272E+00	
SN-113 #	4.3447E+00	9.5260E+02	2.438E+01%		7.50E+02
CS-137	4.2011E+02	4.4452E+02	7.635E-01%		3.20E+00
Y-898 #	7.1422E+00	2.4057E+03	2.361E+01%		1.12E+03
Co-1173	4.9827E+02	6.8772E+02	8.087E-01%		4.55E+00
Co-1332	5.0178E+02	6.9256E+02	7.487E-01%		2.04E+00
Y-1836	5.1813E+00	1.7452E+03	1.023E+01%		2.39E+02

ORTEC g v - i (3263) Env32 G53W4.25 6/14/2012 1:20:45 PM Page 6
TestAmerica, Inc Spectrum name: 9_TunaCan_20120371.An1

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (379.7 to 1999.7 keV)	1.968E+04	Bq/Sample
Total Decayed Activity (379.7 to 1999.7 keV)	3.8598309E+04	Bq/Sample

2nd Source Verification

Detector: **Ge12**
Geometry: **Tunacan**
Reference date: **10/1/2006**
Calibration Standard: **74139-334**
Standard volume g / vial: **1550**
Standard volume transferred in g / geometry: **341.9**
lab ID# of cal standard: **1282974**

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	449	0.359	1250	1288	103.1
Cs-137	1926	425	0.851	499	509.9	102.1
Co-60	3612	797	0.999856	797	833.8	104.6

Reviewed By: Jody Watson

Date: 4/24/2018

Test America St. Louis Spectrum ID: 12_TunaCan_20180012

Sample Description: 12_TunaCan_ICV
Detector: Detector #12
Batch ID: 12
Work Order Number: TunaCan
Lot Number: ICV

Decay to Time: 10/1/2006 11:00 Live Time: 5000 sec
Acquisition Time: 4/24/2018 09:26:18 Real Time: 5018 sec
Analysis Time: 4/24/2018 10:50 Dead Time: 0.36 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 12_Soil_TunaCan.Clb
Efficiency Cal Desc: 12_TunaCan_108513
Efficiency Cal Date: 4/20/2018 11:53
Energy Cal Date: 4/20/2018 11:13
Library: DET_EnergyStandardMix & Pb.lib
Bkgd Correction File: 12_2017-05-07_0806.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
Pb-210	1.634E+04	0.6	9.464E+01	1.053E+03	1.764E+02
AM-241	1.288E+03	0.4	5.772E+00	8.177E+01	8.914E+00
CD-109	2.726E+04	25.0	6.823E+03	7.030E+03	1.764E+04
CO-57	1.000E+100	153.6	5.398E-01	5.402E-01	1.425E+00
Ce-139	1.000E+100	106.9	5.267E-01	5.274E-01	1.390E+00
Hg-203	1.000E+100	297.5	6.855E-01	6.856E-01	1.730E+00
SN-113	1.000E+100	692.4	1.143E+00	1.143E+00	2.762E+00
CS-137	5.099E+02	0.8	3.904E+00	2.652E+01	3.285E+00
Y-898	1.000E+100	140.9	1.086E+00	1.086E+00	2.342E+00
Co-1173	8.106E+02	1.3	1.069E+01	4.173E+01	9.187E+00
Co-1332	8.338E+02	1.3	1.078E+01	4.290E+01	6.803E+00
Y-1836	1.000E+100	127.2	4.662E-01	4.667E-01	9.202E-01
Total	6.000E+100				

Analyst: Jody Watson

TestAmerica Inc Spectrum name: 12_TunaCan_20180012.An1

Sample description
12_TunaCan_ICV

Spectrum Filename: C:\User\SPC\Det12\12_TunaCan_20180012.An1

Acquisition information

Start time:	4/24/2018 9:26:18 AM
Live time:	5000
Real time:	5018
Dead time:	0.36 %
Detector ID:	12

Detector system
Ge12 S/N10034336

Calibration

Filename:	12_Soil_TunaCan.Clb

12_TunaCan_108513

Energy Calibration

Created:	4/20/2018 11:13:27 AM
Zero offset:	0.059 keV
Gain:	0.250 keV/channel
Quadratic:	-3.735E-08 keV/channel^2

Efficiency Calibration

Created:	4/20/2018 11:53:09 AM
Type:	Polynomial
Uncertainty:	1.020 %
Coefficients:	-0.363508 -4.707999 0.462125
	-0.051256 0.002384 -0.000043

Library Files

Main analysis library:	DET_EnergyStandardMix & Pb.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	100 (25.08keV)
Stop channel:	8000 (1999.13keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000

Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	10/1/2006 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	12_2017-05-07_0806.PBC 5/7/2017 8:06:54 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 7 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 25.3541

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
28.13	58.	46.71	0.75	4.137E-03				
32.13	394.	18.65	0.81	7.163E-03				
36.69	330.	25.31	0.84	1.059E-02				
46.66	43625.	0.58	0.85	1.811E-02	46.54	4.250	1.634E+04	Pb210
49.83	321.	44.33	0.85	2.160E-02				
59.65	63562.	0.45	0.86	2.820E-02	59.54	35.700	1.288E+03	AM241
70.53	127.	49.58	1.39	3.219E-02				
74.86	220.	28.10	0.88	3.333E-02				
77.21	369.	16.72	0.88	3.387E-02				
87.68	350.	23.71	0.81	3.578E-02	88.03	3.610	3.034E+04	CD109
93.18	213.	27.98	1.16	3.644E-02				
165.85	67.	106.94	0.97	3.405E-02	165.85	79.900	HL>Cutoff	Ce139
238.54	388.	19.10	0.88	2.744E-02				
279.17	23.	297.48	1.09	2.449E-02	279.17	81.500	HL>Cutoff	Hg203
307.48	44.	92.73	0.49	2.278E-02				
312.92	63.	62.15	0.30	2.248E-02				
320.20	50.	55.24	0.61	2.209E-02				
355.42	79.	51.62	0.51	2.040E-02				
384.05	22.	98.42	0.50	1.922E-02				
428.92	42.	63.02	0.59	1.766E-02				
454.01	126.	41.89	2.09	1.692E-02				
493.21	76.	56.00	0.64	1.589E-02				
583.05	231.	19.93	1.19	1.403E-02				
609.57	255.	15.76	1.66	1.358E-02				
661.72	21282.	0.77	1.42	1.279E-02	661.66	85.210	5.099E+02	CS137
898.02	37.	140.94	1.67	1.025E-02	898.02	93.700	HL>Cutoff	Y898
1173.31	7459.	1.32	1.92	8.426E-03	1173.24	99.900	8.106E+02	Co1173

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
1332.58	6951.	1.30	1.98	7.647E-03	1332.50	99.982	8.318E+02	Co1332

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV		Suspected Nuclide
112.21	28.13	314.	58.	1.406E+04	46.71	0.750	-	s
128.21	32.13	1577.	394.	5.496E+04	18.65	0.810	-	
146.44	36.67	3332.	330.	3.120E+04	25.31	0.841	-	sD
199.29	49.79	9113.	333.	1.539E+04	40.96	0.855	-	sD
281.70	70.53	1447.	127.	3.956E+03	49.58	1.387	-	s
299.02	74.84	1784.	220.	6.587E+03	28.10	0.880	-	D
308.40	77.19	1706.	369.	1.088E+04	16.72	0.883	-	sD
372.24	93.18	1248.	213.	5.837E+03	27.98	1.163	-	sM
953.35	238.54	1339.	388.	1.414E+04	19.10	0.882	-	s
1229.01	307.48	572.	44.	1.931E+03	92.73	0.491	-	sc
1250.75	312.92	513.	63.	2.788E+03	62.15	0.295	-	s
1279.88	320.20	329.	50.	2.263E+03	55.24	0.611	-	s
1420.71	355.42	528.	79.	3.873E+03	51.62	0.511	-	s
1535.20	384.00	232.	22.	1.118E+03	98.42	0.497	-	sc
1714.62	428.92	312.	42.	2.406E+03	63.02	0.590	-	s
1814.96	454.01	760.	126.	7.448E+03	41.89	2.094	-	s
1971.76	493.21	502.	76.	4.813E+03	56.00	0.640	-	s
2331.07	583.05	403.	231.	1.644E+04	19.93	1.194	-	
2437.14	609.57	326.	255.	1.877E+04	15.76	1.660	-	

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_EnergyStandardMix & Pb.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.79	46.54	10103.	43625.	8.725	0.58	0.851D
AM-241	237.76	59.54	8808.	63562.	12.712	0.45	0.865D
CD-109	350.62	87.77	1861.	315.	0.063	25.03	0.760s
CO-57	487.68	122.06	2320.	-56.	-0.011	153.64	0.928
Ce-139	662.74	165.85	1600.	67.	0.013	106.94	0.973s
Hg-203	1115.81	279.17	1331.	23.	0.005	297.48	1.086s
SN-113	1565.74	391.69	1248.	-10.	-0.002	692.39	1.196s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CS-137	2645.75	661.72	832.	21282.	4.256	0.77	1.422
Y-898	3591.15	898.02	555.	37.	0.007	140.94	1.672s
Co-1173	4692.85	1173.31	308.	7459.	1.492	1.32	1.921
Co-1332	5330.42	1332.58	135.	6968.	1.394	1.29	1.978
Y-1836	7346.49	1836.01	27.	-11.	-0.002	127.17	2.459s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	Peak MDA Value Bq/Sample		COMMENTS
Pb-210	N	1.6338E+04				8.15E+03		
			46.54	1.634E+04	(P	1.764E+02	5.79E-01	4.25E+00 G
AM-241		1.2876E+03				1.58E+05		
			59.54	1.288E+03	(	8.914E+00	4.48E-01	3.57E+01 G
CD-109		2.7262E+04				4.63E+02		
			88.03	2.726E+04	*(	1.764E+04	2.50E+01	3.61E+00 G
CO-57		-3.5134E-01				2.72E+02		
			122.06	-3.513E-01	(	1.425E+00	1.54E+02	8.56E+01 G
Ce-139		4.9250E-01				1.38E+02		
			165.85	4.925E-01	?(	1.390E+00	1.07E+02	7.99E+01 G
Hg-203		2.3043E-01				4.66E+01		
			279.17	2.304E-01	&(	1.730E+00	2.97E+02	8.15E+01 G
SN-113		-1.6505E-01				1.15E+02		
			391.69	-1.650E-01	&(	2.762E+00	6.92E+02	6.40E+01 G
CS-137		5.0987E+02				1.10E+04		
			661.66	5.099E+02	(	3.285E+00	7.66E-01	8.52E+01 G
Y-898		7.7025E-01				1.07E+02		
			898.02	7.703E-01	&(	2.342E+00	1.41E+02	9.37E+01 G
Co-1173		8.1058E+02				1.93E+03		
			1173.24	8.106E+02	(	9.187E+00	1.32E+00	9.99E+01 G
Co-1332		8.3376E+02				1.93E+03		
			1332.50	8.338E+02	(	6.803E+00	1.29E+00	1.00E+02 G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Y-1836	-3.6659E-01				1.07E+02	
		1836.01	-3.666E-01	?(	9.202E-01	1.27E+02 9.92E+01 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity
CO-57	122.06	2320.	-56.	-0.011	153.64	0.000E+00
Ce-139	165.85	1600.	67.	0.013	106.94	0.000E+00
Hg-203	279.17	1331.	23.	0.005	297.48	0.000E+00
SN-113	391.69	1248.	-10.	-0.002	692.39	0.000E+00
Y-898	898.02	555.	37.	0.007	140.94	0.000E+00
Y-1836	1836.01	27.	-11.	-0.002	127.17	0.000E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
Pb-210	1.1406E+04	1.6338E+04	5.793E-01%	1.76E+02
AM-241	1.2640E+03	1.2876E+03	4.483E-01%	8.91E+00
CD-109 #	4.8702E+01	2.7262E+04	2.503E+01%	1.76E+04
CO-57 #A	-3.5134E-01	>12 Halflives	1.536E+02%	1.43E+00
Ce-139 #A	4.9250E-01	>12 Halflives	1.069E+02%	1.39E+00
Hg-203 #A	2.3043E-01	>12 Halflives	2.975E+02%	1.73E+00
SN-113 #A	-1.6505E-01	>12 Halflives	6.924E+02%	2.76E+00
CS-137	3.9058E+02	5.0987E+02	7.657E-01%	3.29E+00
Y-898 #A	7.7025E-01	>12 Halflives	1.409E+02%	2.34E+00
Co-1173	1.7721E+02	8.1058E+02	1.318E+00%	9.19E+00
Co-1332	1.8227E+02	8.3376E+02	1.293E+00%	6.80E+00
Y-1836 #A	-3.6659E-01	>12 Halflives	1.272E+02%	9.20E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (25.1 to 1999.1 keV) 1.347E+04 Bq/Sample
Total Decayed Activity (25.1 to 1999.1 keV) 4.7041629E+04 Bq/Sample

2nd Source Verification

Detector:	Ge14
Geometry:	Tunacan
Reference date	1/1/2010
Source:	81427-334
Standard volume g / vial	1550
Standard volume transferred in g / geometry	318.5
lab ID# of cal standard	6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1140.8	98.0
Cs-137	1926	396	0.851	465	447.55	96.2
Co-60	3611	742	0.99974	742	690.01	93.0
Co-60	3612	742	0.999856	742	699.61	94.2

Reviewed By: Jody Watson

Date: 4/24/2012

```
     ORTEC g v - i (3263) Env32  G53W4.25  7/6/2012 9:20:28 AM     Page  1
TestAmerica, Inc.               Spectrum name: 14_TunaCan2nd_20120390.An1

Sample description
     14_TunaCan2nd_rad10_042412


Spectrum Filename: C:\User\SPC\Det14\14_TunaCan2nd_20120390.An1

Acquisition information
       Start time:                 4/24/2012 8:12:45 AM
       Live time:                3600
       Real time:                3635
       Dead time:                   0.95 %
       Detector ID:                   14

Detector system
     Ge14 SN/11080670


Calibration
       Filename:                   14_Soil_TunaCan.Clb
     14_TunaCan_90099_042312


       Energy Calibration
            Created:               4/23/2012 11:29:29 AM
            Zero offset:           0.158 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -1.959E-08 keV/channel^2

       Efficiency Calibration
            Created:               4/23/2012 11:29:47 AM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.02 %
            Log(Eff):              2.101260E-01 + (-5.951973E-01*Log(E) ) +
                                   ( -1.605331E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.28 %
            Log(Eff):             -2.391492E+01 + ( 8.828985E+00*Log(E) ) +
                                   ( -9.371496E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.67keV )
       Stop channel:            8000 (  1999.52keV )
       Peak rejection level:    1000.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

□

     ORTEC g v - i (3263) Env32  G53W4.25  7/6/2012 9:20:28 AM     Page  2
TestAmerica, Inc.               Spectrum name: 14_TunaCan2nd_20120390.An1
                                      Page 1
```

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2010 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	14_2012-04-01_0328.PBC 4/1/2012 3:28:19 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 11 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 0.0804

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
36.65	636.	14.35	0.68	1.394E-02				
46.70	42844.	0.65	0.73	2.183E-02	46.54	4.250	1.384E+04	Pb210
49.57	579.	23.20	1.08	2.397E-02				
59.66	44776.	0.62	0.73	3.072E-02	59.54	35.700	1.141E+03	AM241
88.02	24143.	0.88	0.79	4.196E-02	88.03	3.610	1.568E+04	CD109
121.97	5150.	2.07	0.81	4.379E-02	122.06	85.600	3.284E+02	CO57
136.39	594.	12.74	0.84	4.244E-02				
165.76	922.	8.50	0.93	3.800E-02	165.85	79.900	5.802E+02	Ce139
238.43	269.	23.37	0.71	2.933E-02				
315.48	114.	42.70	0.42	2.361E-02				
327.51	51.	61.93	0.45	2.293E-02				
351.90	216.	23.90	0.91	2.167E-02				
364.95	52.	64.29	0.48	2.106E-02				
374.52	129.	45.68	0.49	2.064E-02				
391.67	297.	17.91	1.16	1.993E-02	391.69	64.000	1.044E+03	SN113
510.55	153.	33.44	0.60	1.616E-02				
661.74	16713.	0.81	1.30	1.313E-02	661.66	85.210	4.376E+02	CS137
665.93	55.	47.01	1.30	1.306E-02				
682.98	51.	73.33	0.31	1.280E-02				
802.77	123.	33.88	0.65	1.124E-02				
897.96	328.	20.32	1.77	1.026E-02	898.02	93.700	2.290E+03	Y898
978.13	53.	59.31	0.31	9.568E-03				
1173.32	15097.	0.91	1.81	8.243E-03	1173.24	99.900	6.900E+02	Co1173
1332.58	13794.	0.88	1.91	7.422E-03	1332.50	99.982	6.996E+02	Co1332
1836.21	153.	8.94	1.16	5.686E-03	1836.01	99.200	1.816E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide

145.93	36.65	2712.	636.	4.559E+04	14.35	0.681	-	s
197.59	49.57	6158.	579.	2.414E+04	23.20	1.078	-	s
544.79	136.39	1623.	594.	1.400E+04	12.74	0.836	-	
952.87	238.43	1166.	269.	9.182E+03	23.37	0.709	-	

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
1261.02	315.48	752.	114.	4.829E+03	42.70	0.415	- s
1309.15	327.51	440.	51.	2.232E+03	61.93	0.449	- s
1406.69	351.90	776.	216.	9.981E+03	23.90	0.914	-
1458.89	364.95	463.	52.	2.484E+03	64.29	0.475	- s
1497.18	374.52	912.	129.	6.250E+03	45.68	0.487	- s
2041.26	510.55	669.	153.	9.449E+03	33.44	0.603	- s
2662.75	665.91	160.	40.	3.074E+03	48.94	0.586	- sM
2731.03	682.98	385.	51.	3.984E+03	73.33	0.306	- s
3210.25	802.77	443.	123.	1.098E+04	33.88	0.654	- s
3911.87	978.13	330.	53.	5.539E+03	59.31	0.307	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	186.10	46.70	10276.	42803.	11.890	0.65	0.733
AM-241	237.93	59.66	8589.	44776.	12.438	0.62	0.733
CD-109	351.36	88.02	4956.	24143.	6.706	0.88	0.785
CO-57	487.12	121.97	1860.	5150.	1.431	2.07	0.805
Ce-139	662.24	165.76	1490.	922.	0.256	8.50	0.930s
Hg-203	1114.33	278.80	1377.	-40.	-0.011	133.76	0.957s
SN-113	1565.78	391.67	802.	297.	0.083	17.91	1.165
CS-137	2645.99	661.72	749.	17094.	4.748	0.86	1.367
Y-898	3591.10	897.96	851.	328.	0.091	20.32	1.769s
Co-1173	4692.93	1173.32	513.	15097.	4.194	0.91	1.810
Co-1332	5330.26	1332.58	105.	13794.	3.832	0.88	1.907
Y-1836	7346.17	1836.21	5.	153.	0.042	8.94	1.165s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS

```
Pb-210    N   1.3845E+04                                          8.15E+03
                          46.54 1.384E+04  (P 1.537E+02 6.55E-01 4.25E+00 G

AM-241        1.1408E+03                                          1.58E+05
                          59.54 1.141E+03  (  1.107E+01 6.17E-01 3.57E+01 G

CD-109        1.5678E+04                                          4.63E+02
                          88.03 1.568E+04  (  2.148E+02 8.77E-01 3.61E+00 G

CO-57         3.2838E+02                                          2.72E+02
                         122.06 3.284E+02  (  1.299E+01 2.07E+00 8.56E+01 G

Ce-139        5.8018E+02                                          1.38E+02
                         165.85 5.802E+02 *(  1.149E+02 8.50E+00 7.99E+01 G

Hg-203       -5.1862E-01                                          4.66E+01
                         279.17-5.186E-01 ?(  2.305E+00 1.34E+02 8.15E+01 G

SN-113        1.0438E+03                                          1.15E+02
                         391.69 1.044E+03  (  4.727E+02 1.79E+01 6.40E+01 G

CS-137        4.4755E+02                                          1.10E+04
                         661.66 4.475E+02  (  3.410E+00 8.57E-01 8.52E+01 G

Y-898         2.2899E+03                                          1.07E+02
                         898.02 2.290E+03 *(  9.680E+02 2.03E+01 9.37E+01 G

Co-1173       6.9001E+02                                          1.93E+03
                        1173.24 6.900E+02  (  4.948E+00 9.10E-01 9.99E+01 G

Co-1332       6.9961E+02                                          1.93E+03
                        1332.50 6.996E+02  (  2.559E+00 8.77E-01 1.00E+02 G

Y-1836        1.8162E+03                                          1.07E+02
                        1836.01 1.816E+03  (  1.603E+02 8.94E+00 9.92E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
```



```
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
                                       Page 4
```

I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity
Hg-203	278.80	1377.	-40.	-0.011	133.76	0.000E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting		MDA Bq/Sample
Pb-210	1.2885E+04	1.3845E+04	6.553E-01%		1.54E+02
AM-241	1.1366E+03	1.1408E+03	6.168E-01%		1.11E+01
CD-109	4.4274E+03	1.5678E+04	8.766E-01%		2.15E+02
CO-57	3.8172E+01	3.2838E+02	2.068E+00%		1.30E+01
Ce-139 #	8.2779E+00	5.8018E+02	8.497E+00%		1.15E+02
Hg-203 #A	-5.1862E-01	>12 Halflives	1.3376E+02%	2.3053E+00	
SN-113	6.4765E+00	1.0438E+03	1.791E+01%		4.73E+02
CS-137	4.2434E+02	4.4755E+02	8.571E-01%		3.41E+00
Y-898 #	9.4790E+00	2.2899E+03	2.032E+01%		9.68E+02
Co-1173	5.0921E+02	6.9001E+02	9.096E-01%		4.95E+00
Co-1332	5.1630E+02	6.9961E+02	8.770E-01%		2.56E+00
Y-1836	7.5179E+00	1.8162E+03	8.944E+00%		1.60E+02

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

S U M M A R Y

Total Activity (37.7 to 1999.5 keV) 1.997E+04 Bq/Sample
Total Decayed Activity (37.7 to 1999.5 keV) 3.8559289E+04 Bq/Sample

2nd Source Verification

Detector: Ge 15

Geometry: Tunacan

Reference date 1/1/2010

Source: 81427-334

Standard volume g / vial 1550

Standard volume transferred in g / geometry 318.5

lab ID# of cal standard 6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1151	98.9
Cs-137	1926	396	0.851	465	435.18	93.6
Co-60	3611	742	0.99974	742	687.16	92.6
Co-60	3612	742	0.999856	742	696.46	93.8

Reviewed By: Jody Watson

Date: 3/23/2012

```
     ORTEC g v - i (3263) Env32  G53W4.25  7/5/2012 1:14:04 PM     Page  1
TestAmerica, Inc.               Spectrum name: 15_TunaCan2nd_20120288.An1

Sample description
     15_TunaCan2nd_rad10_032312


Spectrum Filename: C:\User\SPC\Det15\15_TunaCan2nd_20120288.An1

Acquisition information
       Start time:                 3/23/2012 6:10:28 AM
       Live time:                7200
       Real time:                7248
       Dead time:                   0.66 %
       Detector ID:                    15

Detector system
     Ge15 SN/1102216


Calibration
       Filename:                   15_Soil_TunaCan.Clb
     15_TunaCan_90099_032212


       Energy Calibration
            Created:               3/22/2012 1:02:46 PM
            Zero offset:           0.004 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -3.104E-08 keV/channel^2

       Efficiency Calibration
            Created:               3/22/2012 1:03:01 PM
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.00 %
            Log(Eff):             -6.894897E-01 + (-3.290613E-01*Log(E) ) +
                                   ( -3.875629E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   1.13 %
            Log(Eff):             -2.362677E+01 + ( 8.666669E+00*Log(E) ) +
                                   ( -9.214638E-01*Log(E)^2 )

Library Files
       Main analysis library:      DET_EnergyStandardMix & Pb.Lib
       Library Match Width:        0.500
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.25
       Start channel:            150 (    37.53keV )
       Stop channel:            8000 (  1999.56keV )
       Peak rejection level:    1000.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

□

     ORTEC g v - i (3263) Env32  G53W4.25  7/5/2012 1:14:04 PM     Page  2
TestAmerica, Inc.               Spectrum name: 15_TunaCan2nd_20120288.An1
                                      Page 1
```

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2010 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	15_2012-02-26_0425.PBC 2/26/2012 4:25:10 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 26.5953

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
36.48	1231.	11.17	1.20	1.258E-02				
46.44	76440.	0.51	0.91	1.950E-02	46.54	4.250	1.366E+04	Pb210
49.65	1514.	14.37	1.25	2.160E-02				
59.44	80694.	0.48	0.94	2.732E-02	59.54	35.700	1.151E+03	AM241
87.99	43578.	0.68	0.97	3.705E-02	88.03	3.610	1.527E+04	CD109
92.63	219.	44.56	0.42	3.776E-02				
122.00	10133.	1.58	1.01	3.846E-02	122.06	85.600	3.389E+02	CO57
136.33	1390.	8.77	1.13	3.725E-02				
165.85	1699.	7.29	1.05	3.392E-02	165.85	79.900	5.192E+02	Ce139
238.39	480.	20.10	1.42	2.594E-02				
260.67	81.	57.86	0.33	2.424E-02				
279.32	56.	141.32	1.14	2.301E-02	279.17	81.500	HL>Cutoff	Hg203
352.13	110.	54.66	0.68	1.922E-02				
368.26	125.	49.84	0.46	1.856E-02				
391.56	581.	13.59	1.28	1.768E-02	391.69	64.000	9.477E+02	SN113
400.57	73.	61.58	0.54	1.736E-02				
661.57	29285.	0.71	1.46	1.155E-02	661.66	85.210	4.352E+02	CS137
754.74	100.	52.53	0.39	1.034E-02				
898.10	516.	14.74	1.96	8.921E-03	898.02	93.700	1.681E+03	Y898
904.89	86.	54.53	0.36	8.863E-03				
1000.75	82.	43.22	0.58	8.127E-03				
1096.51	181.	26.16	0.80	7.507E-03				
1173.15	26111.	0.71	1.80	7.077E-03	1173.24	99.900	6.872E+02	Co1173
1226.66	98.	36.87	0.74	6.805E-03				
1332.45	23674.	0.68	1.95	6.325E-03	1332.50	99.982	6.965E+02	Co1332
1835.96	284.	9.76	1.20	4.741E-03	1836.01	99.200	1.642E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide

145.78	36.48	5577.	1231.	9.786E+04	11.17	1.202	-	s
198.43	49.65	13746.	1514.	7.010E+04	14.37	1.248	-	sM
370.24	92.63	3274.	219.	5.791E+03	44.56	0.421	-	s

ORTEC g v - i (3263) Env32 G53W4.25 7/5/2012 1:14:04 PM Page 3
TestAmerica, Inc. Spectrum name: 15_TunaCan2nd_20120288.An1

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
544.93	136.33	3516.	1390.	3.731E+04	8.77	1.130	- s
952.92	238.39	2518.	480.	1.849E+04	20.10	1.422	- sM
1042.01	260.67	968.	81.	3.328E+03	57.86	0.332	- sM
1407.66	352.13	1248.	110.	5.749E+03	54.66	0.679	- s
1472.16	368.26	1252.	125.	6.736E+03	49.84	0.459	- s
1601.36	400.57	843.	73.	4.224E+03	61.58	0.543	- s
3017.75	754.74	768.	100.	9.719E+03	52.53	0.393	- s
3618.39	904.89	752.	86.	9.741E+03	54.53	0.363	- s
4001.87	1000.75	476.	82.	1.015E+04	43.22	0.582	- s
4385.05	1096.51	621.	181.	2.415E+04	26.16	0.796	- s
4905.82	1226.66	215.	98.	1.445E+04	36.87	0.740	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.62	46.44	19930.	76355.	10.605	0.51	0.907
AM-241	237.58	59.44	16824.	80694.	11.208	0.48	0.935
CD-109	351.67	87.99	9695.	43578.	6.052	0.68	0.972
CO-57	487.63	122.00	4069.	10133.	1.407	1.58	1.014
Ce-139	662.95	165.85	3411.	1699.	0.236	7.29	1.054
Hg-203	1116.56	279.32	3139.	56.	0.008	141.32	1.144
SN-113	1565.32	391.56	1615.	581.	0.081	13.59	1.282
CS-137	2645.11	661.57	2071.	29285.	4.067	0.71	1.459
Y-898	3591.24	898.10	1317.	516.	0.072	14.74	1.959
Co-1173	4691.69	1173.15	1159.	26111.	3.627	0.71	1.803
Co-1332	5329.20	1332.45	323.	23674.	3.288	0.68	1.945
Y-1836	7345.58	1836.14	48.	260.	0.036	8.96	1.181s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

ORTEC g v - i (3263) Env32 G53W4.25 7/5/2012 1:14:04 PM Page 4
TestAmerica, Inc. Spectrum name: 15_TunaCan2nd_20120288.An1

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide -		Average	Peak			
Name	Code	Activity Bq/Sample	Energy keV	Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS

```
Pb-210    N   1.3663E+04                                          8.15E+03
                          46.54 1.366E+04  (P 1.182E+02 5.11E-01 4.25E+00 G

AM-241        1.1510E+03                                          1.58E+05
                          59.54 1.151E+03  (  8.660E+00 4.81E-01 3.57E+01 G

CD-109        1.5268E+04                                          4.63E+02
                          88.03 1.527E+04  (  1.617E+02 6.78E-01 3.61E+00 G

CO-57         3.3887E+02                                          2.72E+02
                         122.06 3.389E+02  (  1.003E+01 1.58E+00 8.56E+01 G

Ce-139        5.1921E+02                                          1.38E+02
                         165.85 5.192E+02  (  8.400E+01 7.29E+00 7.99E+01 G

Hg-203        4.1717E-01                                          4.66E+01
                         279.17 4.172E-01  (  1.954E+00 1.41E+02 8.15E+01 G

SN-113        9.4771E+02                                          1.15E+02
                         391.69 9.477E+02  (  3.099E+02 1.36E+01 6.40E+01 G

CS-137        4.3518E+02                                          1.10E+04
                         661.66 4.352E+02  (  3.191E+00 7.12E-01 8.52E+01 G

Y-898         1.6812E+03                                          1.07E+02
                         898.02 1.681E+03  (  5.598E+02 1.47E+01 9.37E+01 G

Co-1173       6.8716E+02                                          1.93E+03
                        1173.24 6.872E+02  (  4.246E+00 7.12E-01 9.99E+01 G

Co-1332       6.9646E+02                                          1.93E+03
                        1332.50 6.965E+02  (  2.544E+00 6.82E-01 1.00E+02 G

Y-1836        1.5036E+03                                          1.07E+02
                        1836.01 1.504E+03  (  2.033E+02 8.96E+00 9.92E+01 G
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
```



```
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
                                       Page 4
```

F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity
P - Peakbackground subtraction						

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Activity Bq/Sample	Time of Count Activity Bq/Sample	Time Corrected Uncertainty Counting	1 Sigma	MDA Bq/Sample
Pb-210		1.2751E+04	1.3663E+04	5.115E-01%		1.18E+02
AM-241		1.1469E+03	1.1510E+03	4.812E-01%		8.66E+00
CD-109		4.5239E+03	1.5268E+04	6.776E-01%		1.62E+02
CO-57		4.2749E+01	3.3887E+02	1.583E+00%		1.00E+01
Ce-139		8.7071E+00	5.1921E+02	7.291E+00%		8.40E+01
Hg-203	A	4.1717E-01	>12 Halflives	1.4132E+02%	1.9540E+00	
SN-113		7.1340E+00	9.4771E+02	1.359E+01%		3.10E+02
CS-137		4.1344E+02	4.3518E+02	7.117E-01%		3.19E+00
Y-898		8.5738E+00	1.6812E+03	1.474E+01%		5.60E+02
Co-1173		5.1301E+02	6.8716E+02	7.125E-01%		4.25E+00
Co-1332		5.1995E+02	6.9646E+02	6.817E-01%		2.54E+00
Y-1836		7.6681E+00	1.5036E+03	8.962E+00%		2.03E+02

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.5 to 1999.6 keV) 1.994E+04 Bq/Sample
Total Decayed Activity (37.5 to 1999.6 keV) 3.6891324E+04 Bq/Sample

2nd Source Verification

Detector: Ge17

Geometry: Tunacan

Reference date 1/1/2010

Source: 81427-334

Standard volume g / vial 1550

Standard volume transferred in g / geometry 318.5

lab ID# of cal standard 6665

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	418	0.359	1164	1140.2	97.9
Cs-137	1926	396	0.851	465	440.98	94.8
Co-60	3611	742	0.99974	742	682.05	91.9
Co-60	3612	742	0.999856	742	689.63	92.9

Reviewed By: Megan McAfee

Date: 4/13/2012

ORTEC g v - i (3263) Env32 G53W4.25 7/6/2012 9:25:36 AM Page 1
TestAmerica, Inc. Spectrum name: 17_Tuna2nd_20120265.An1

Sample description
17_Tuna2nd_81427_032612

Spectrum Filename: C:\User\SPC\Det17\17_Tuna2nd_20120265.An1

Acquisition information
Start time: 3/26/2012 9:29:21 AM
Live time: 3600
Real time: 3637
Dead time: 1.02 %
Detector ID: 17

Detector system
Ge17 SN/11080671

Calibration
Filename: 17_Soil_TunaCan.Clb
17_TunaCan_90099_032612

Energy Calibration
Created: 4/12/2012 9:28:30 AM
Zero offset: 0.118 keV
Gain: 0.250 keV/channel
Quadratic: -2.376E-08 keV/channel^2

Efficiency Calibration
Created: 4/12/2012 9:28:42 AM
Knee Energy: 165.85 keV
Above the Knee: Quadratic Uncertainty = 0.91 %
Log(Eff): -5.264190E-01 + (-4.024164E-01*Log(E)) + (-2.604461E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 1.00 %
Log(Eff): -2.343889E+01 + (8.582715E+00*Log(E)) + (-9.075430E-01*Log(E)^2)

Library Files
Main analysis library: DET_EnergyStandardMix & Pb.Lib
Library Match Width: 0.500
Peak stripping: Library based

Analysis parameters
Analysis engine: Env32 G53W4.25
Start channel: 150 (37.63keV)
Stop channel: 8000 (1999.21keV)
Peak rejection level: 1000.000%
Peak search sensitivity: 3
Sample Size: 1.0000E+00
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method: Reg. Guide 4.16 Method

Random error: 4.0000000E+00
Systematic error: 4.0000000E+00
Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	YES	1/1/2010 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	17_2012-02-26_0520.PBC 2/26/2012 5:20:29 AM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 11 cutoff: 5.00E+01%
Energy Calibration
Normalized diff: 0.0590

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
36.64	681.	13.12	0.69	1.356E-02				
40.87	116.	86.09	0.16	1.677E-02				
46.62	41004.	0.69	0.76	2.106E-02	46.54	4.250	1.365E+04	Pb210
49.59	775.	17.97	0.63	2.318E-02				
59.61	43179.	0.65	0.77	2.961E-02	59.54	35.700	1.140E+03	AM241
77.20	214.	40.60	1.02	3.765E-02				
88.08	23344.	0.86	0.81	4.060E-02	88.03	3.610	1.500E+04	CD109
121.99	5536.	2.31	0.89	4.276E-02	122.06	85.600	3.357E+02	CO57
136.39	771.	11.84	0.71	4.164E-02				
162.22	87.	50.79	0.72	3.820E-02				
165.73	964.	7.35	1.09	3.765E-02	165.85	79.900	5.310E+02	Ce139
216.43	116.	39.82	0.95	3.196E-02				
217.94	83.	57.15	0.95	3.181E-02				
238.21	247.	27.84	0.94	2.992E-02				
265.99	94.	61.67	0.61	2.773E-02				
301.12	44.	67.34	0.41	2.544E-02				
340.53	91.	61.26	0.55	2.333E-02				
351.73	148.	32.96	0.62	2.280E-02				
391.54	336.	18.56	0.91	2.113E-02	391.69	64.000	9.356E+02	SN113
464.58	72.	65.99	1.18	1.868E-02				
466.04	44.	93.25	1.18	1.864E-02				
582.96	167.	29.62	0.45	1.584E-02				
661.66	18538.	0.82	1.37	1.443E-02	661.66	85.210	4.410E+02	CS137
738.88	57.	57.41	0.44	1.329E-02				
833.91	110.	41.26	0.51	1.214E-02				
856.69	111.	46.51	0.75	1.189E-02				
898.10	352.	17.10	1.23	1.148E-02	898.02	93.700	1.818E+03	Y898
1026.09	89.	47.19	0.52	1.037E-02				
1173.27	17119.	0.83	1.74	9.359E-03	1173.24	99.900	6.820E+02	Co1173
1332.53	15698.	0.82	1.79	8.481E-03	1332.50	99.982	6.896E+02	Co1332
1835.81	220.	7.55	1.96	6.593E-03	1836.01	99.200	1.873E+03	Y1836

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
146.04	36.64	2578.	681.	5.025E+04	13.12	0.695	-
162.95	40.87	4224.	116.	6.916E+03	86.09	0.161	- c
197.82	49.59	6204.	775.	3.343E+04	17.97	0.635	- sM
308.25	77.20	2934.	214.	5.685E+03	40.60	1.020	- s

Channel	Energy	Background	Net area	Eff*Area	Uncert	FWHM	Suspected
544.96	136.39	1975.	771.	1.852E+04	11.84	0.713	-
648.26	162.22	793.	87.	2.269E+03	50.79	0.719	- s
865.04	216.40	1003.	116.	3.620E+03	39.82	0.953	- D
871.09	217.91	1078.	83.	2.603E+03	57.15	0.955	- D
952.16	238.21	1349.	247.	8.265E+03	27.84	0.937	- s
1063.26	265.99	1020.	94.	3.372E+03	61.67	0.615	- s
1203.77	301.12	417.	44.	1.730E+03	67.34	0.412	- sc
1361.41	340.53	898.	91.	3.887E+03	61.26	0.553	- s
1406.20	351.73	744.	148.	6.491E+03	32.96	0.618	- s
1857.60	464.69	1086.	72.	3.842E+03	65.99	1.178	- sc
1863.46	466.15	839.	44.	2.387E+03	93.25	1.179	- sc
2331.15	582.96	570.	167.	1.054E+04	29.62	0.448	- s
2954.96	738.88	338.	57.	4.289E+03	57.41	0.442	- s
3335.20	833.91	507.	110.	9.049E+03	41.26	0.506	- s
3426.35	856.69	611.	111.	9.318E+03	46.51	0.755	- s
4104.24	1026.09	453.	89.	8.549E+03	47.19	0.517	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_EnergyStandardMix & Pb.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.95	46.62	10512.	40927.	11.369	0.69	0.761
AM-241	237.89	59.61	9192.	43179.	11.994	0.65	0.771
CD-109	351.75	88.08	4394.	23344.	6.484	0.86	0.812
CO-57	487.38	121.99	2606.	5536.	1.538	2.31	0.891
Ce-139	662.30	165.73	1283.	964.	0.268	7.35	1.085
Hg-203	1119.82	280.13	1632.	-52.	-0.015	109.81	1.012s
SN-113	1565.42	391.54	971.	336.	0.093	18.56	0.910s
CS-137	2646.04	661.66	840.	18538.	5.149	0.82	1.373
Y-898	3592.05	898.10	753.	352.	0.098	17.10	1.228
Co-1173	4693.24	1173.27	496.	17119.	4.755	0.83	1.743
Co-1332	5330.69	1332.53	136.	15698.	4.361	0.82	1.789
Y-1836	7345.64	1835.81	10.	220.	0.061	7.55	1.956s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample		COMMENTS
Pb-210	N	1.365OE+04				8.15E+03		
			46.54	1.365E+04	(P	1.603E+02	6.87E-01 4.25E+00	G
AM-241		1.1402E+03				1.58E+05		
			59.54	1.140E+03	(	1.187E+01	6.55E-01 3.57E+01	G
CD-109		1.5004E+04				4.63E+02		
			88.03	1.500E+04	(	2.003E+02	8.59E-01 3.61E+00	G
CO-57		3.3573E+02				2.72E+02		
			122.06	3.357E+02	(	1.459E+01	2.31E+00 8.56E+01	G
Ce-139		5.3096E+02				1.38E+02		
			165.85	5.310E+02	(	9.338E+01	7.35E+00 7.99E+01	G
Hg-203		-6.6653E-01				4.66E+01		
			279.17	-6.665E-01	?(	2.427E+00	1.10E+02 8.15E+01	G
SN-113		9.3563E+02				1.15E+02		
			391.69	9.356E+02	@(	4.114E+02	1.86E+01 6.40E+01	G
CS-137		4.4098E+02				1.10E+04		
			661.66	4.410E+02	(	3.277E+00	8.23E-01 8.52E+01	G
Y-898		1.8177E+03				1.07E+02		
			898.02	1.818E+03	(	6.751E+02	1.71E+01 9.37E+01	G
Co-1173		6.8205E+02				1.93E+03		
			1173.24	6.820E+02	(	4.243E+00	8.31E-01 9.99E+01	G
Co-1332		6.8963E+02				1.93E+03		
			1332.50	6.896E+02	(	2.503E+00	8.22E-01 1.00E+02	G
Y-1836		1.8728E+03				1.07E+02		
			1836.01	1.873E+03	(	1.462E+02	7.55E+00 9.92E+01	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.

@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.

+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the
library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity
to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity
Hg-203	280.13	1632.	-52.	-0.015	109.81	0.000E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting		MDA Bq/Sample
Pb-210	1.2735E+04	1.3650E+04	6.879E-01%		1.60E+02
AM-241	1.1361E+03	1.1402E+03	6.548E-01%		1.19E+01
CD-109	4.4248E+03	1.5004E+04	8.588E-01%		2.00E+02
CO-57	4.2016E+01	3.3573E+02	2.313E+00%		1.46E+01
Ce-139	8.7645E+00	5.3096E+02	7.352E+00%		9.34E+01
Hg-203 #A	-6.6653E-01	>12 Halflives	1.0981E+02%	2.4271E+00	
SN-113 #	6.9111E+00	9.3563E+02	1.856E+01%		4.11E+02
CS-137	4.1887E+02	4.4098E+02	8.234E-01%		3.28E+00
Y-898	9.0827E+00	1.8177E+03	1.710E+01%		6.75E+02
Co-1173	5.0861E+02	6.8205E+02	8.315E-01%		4.24E+00
Co-1332	5.1427E+02	6.8963E+02	8.225E-01%		2.50E+00
Y-1836 #	9.3579E+00	1.8728E+03	7.550E+00%		1.46E+02

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

17_Tuna2nd_20120265

---------- S U M M A R Y ----------

Total Activity (582.9 to 1999.2 keV)   1.981E+04 Bq/Sample
Total Decayed Activity (582.9 to 1999.2 keV) 3.7099195E+04 Bq/Sample

2nd Source Verification

Detector: **Ge19**
Geometry: **Tunacan**
Reference date: **10/1/2006**
Calibration Standard: **74139-334**
Standard volume g / vial: **1550**
Standard volume transferred in g / geometry: **341.9**
lab ID# of cal standard: **1282974**

Isotope	Certified Activity gammas/sec	Geometry Activity	γ abundance	Bq/sample	Count Results	%recovery
Am-241	2034	449	0.359	1250	1313	105.1
Cs-137	1926	425	0.851	499	520	104.2
Co-60	3612	797	0.999856	797	852.3	107.0

Reviewed By: Jody Watson

Date: 4/20/2018

TestAmerica Inc Spectrum name: 19_TunaCan_20180077.An1

Sample description
19_TunaCan_ICV

Spectrum Filename: C:\User\SPC\Det19\19_TunaCan_20180077.An1

Acquisition information

Start time:	4/20/2018 11:09:29 AM
Live time:	5000
Real time:	5017
Dead time:	0.33 %
Detector ID:	19

Detector system
Ge19 SN/11146715

Calibration

Filename:	19_Soil_TunaCan.Clb

19_TunaCan_108513

Energy Calibration

Created:	4/16/2018 11:22:57 AM
Zero offset:	0.177 keV
Gain:	0.250 keV/channel
Quadratic:	-3.735E-08 keV/channel^2

Efficiency Calibration

Created:	4/16/2018 12:11:21 PM
Type:	Polynomial
Uncertainty:	0.841 %
Coefficients:	-0.371612 -4.869309 0.466742
	-0.049787 0.002234 -0.000039

Library Files

Main analysis library:	DET_EnergyStandardMix & Pb.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G800W064
Start channel:	150 (37.71keV)
Stop channel:	8000 (1999.42keV)
Peak rejection level:	1000.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3
Half lives decay limit:	12.000

Test America St. Louis Spectrum ID: 19_TunaCan_20180077

Sample Description: 19_TunaCan_ICV
Detector: Detector #19
Batch ID: 19
Work Order Number: TunaCan
Lot Number: ICV

Decay to Time: 10/1/2006 11:00 Live Time: 5000 sec
Acquisition Time: 4/20/2018 11:09:29 Real Time: 5017 sec
Analysis Time: 4/20/2018 14:51 Dead Time: 0.33 %
Analysis Quantity: 1.000E+00 Sample

Efficiency Cal File: 19_Soil_TunaCan.Clb
Efficiency Cal Desc: 19_TunaCan_108513
Efficiency Cal Date: 4/16/2018 12:11
Energy Cal Date: 4/16/2018 11:22
Library: DET_EnergyStandardMix & Pb.lib
Bkgd Correction File: 19_2018-04-08_1846.PBC

Nuclide	Activity Bq/Sample	1-Sigma Counting Uncert %	1-Sigma Counting Uncert Bq/Sample	1-Sigma Total Uncert Bq/Sample	Minimum Detectable Activity Bq/Sample
Pb-210	1.650E+04	0.6	9.640E+01	1.063E+03	1.744E+02
AM-241	1.313E+03	0.5	6.894E+00	8.344E+01	9.974E+00
CD-109	3.738E+04	20.7	7.737E+03	8.077E+03	1.896E+04
CO-57	1.000E+100	211.0	6.331E-01	6.334E-01	1.592E+00
Ce-139	1.000E+100	99.6	6.348E-01	6.358E-01	1.593E+00
Hg-203	1.000E+100	373.3	7.558E-01	7.559E-01	2.516E+00
SN-113	1.000E+100	155.7	8.400E-01	8.406E-01	3.066E+00
CS-137	5.203E+02	0.8	4.133E+00	2.709E+01	3.044E+00
Y-898	1.000E+100	101.0	1.285E+00	1.287E+00	2.765E+00
Co-1173	8.308E+02	1.4	1.173E+01	4.298E+01	9.972E+00
Co-1332	8.523E+02	1.3	1.136E+01	4.394E+01	5.252E+00
Y-1836	1.000E+100	870.9	3.744E+00	3.744E+00	1.054E+00
Total	6.000E+100				

Analyst: Jody Watson

Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	YES	10/1/2006 11:00:00 AM
Decay during acquisition:	YES	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	19_2018-04-08_1846.PBC 4/8/2018 6:46:00 PM
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 6 cutoff: 5.00E+01 %

Energy Calibration

Normalized diff: 0.0720

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/Sampl	Nuc
44.25	824.	17.08	0.93	1.551E-02				
46.68	41733.	0.58	0.93	1.715E-02	46.54	4.250	1.650E+04	Pb210
49.79	341.	39.16	0.94	2.016E-02				
59.62	60109.	0.53	0.90	2.617E-02	59.54	35.700	1.313E+03	AM241
74.97	186.	31.71	0.96	3.099E-02				
77.20	287.	21.92	0.96	3.147E-02				
87.56	402.	20.70	1.81	3.319E-02	88.03	3.610	3.738E+04	CD109
165.85	78.	99.62	1.04	3.053E-02	165.85	79.900	HL>Cutoff	Ce139
182.09	60.	62.86	0.35	2.898E-02				
238.45	394.	15.79	1.44	2.415E-02				
274.68	114.	32.95	1.42	2.168E-02				
302.83	39.	62.96	0.34	2.009E-02				
352.06	200.	22.00	1.15	1.782E-02				
438.49	43.	83.30	0.29	1.498E-02				
533.21	81.	44.24	0.90	1.287E-02				
661.74	18571.	0.79	1.47	1.093E-02	661.66	85.210	5.203E+02	CS137
862.76	25.	64.29	0.63	8.983E-03				
878.66	89.	46.18	0.42	8.863E-03				
1173.34	6485.	1.41	1.82	7.138E-03	1173.24	99.900	8.308E+02	Co1173
1332.62	6030.	1.33	1.85	6.465E-03	1332.50	99.982	8.523E+02	Co1332

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV		Suspected Nuclide
176.55	44.21	10886.	853.	5.501E+04	17.63	0.932	-	sD
198.69	49.75	8765.	357.	1.770E+04	37.47	0.937	-	sD
298.95	74.97	1637.	186.	5.997E+03	31.71	0.960	-	sD
307.87	77.19	1825.	287.	9.107E+03	21.92	0.962	-	sD
727.12	182.09	591.	60.	2.082E+03	62.86	0.346	-	s
952.44	238.45	1002.	394.	1.631E+04	15.79	1.438	-	s
1097.28	274.68	483.	114.	5.242E+03	32.95	1.420	-	s
1209.83	302.83	282.	39.	1.942E+03	62.96	0.340	-	sc
1406.67	352.06	549.	200.	1.122E+04	22.00	1.153	-	
1752.27	438.49	465.	43.	2.871E+03	83.30	0.289	-	c
2131.09	533.21	325.	81.	6.269E+03	44.24	0.897	-	s
3449.28	862.76	100.	25.	2.783E+03	64.29	0.628	-	s
3512.90	878.66	320.	89.	1.004E+04	46.18	0.424	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_EnergyStandardMix & Pb.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
Pb-210	185.31	46.54	8855.	41733.	8.347	0.58	0.935D
AM-241	237.59	59.62	9494.	60109.	12.022	0.53	0.904
CD-109	349.28	87.56	1868.	402.	0.080	20.70	1.808s
CO-57	487.17	122.06	2413.	-44.	-0.009	210.99	1.003s
Ce-139	662.22	165.85	1690.	78.	0.016	99.62	1.042
Hg-203	1115.25	279.17	2166.	-18.	-0.004	373.28	1.141s
SN-113	1565.13	391.69	1148.	-28.	-0.006	155.72	1.238s
CS-137	2645.14	661.74	517.	18571.	3.714	0.79	1.469
Y-898	3590.37	898.02	560.	-52.	-0.010	101.01	1.642s
Co-1173	4692.11	1173.34	260.	6485.	1.297	1.41	1.816
Co-1332	5329.67	1332.62	55.	6030.	1.206	1.33	1.853
Y-1836	7345.40	1836.01	25.	-11.	-0.002	870.90	2.261s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/Sample	Peak Energy keV	Peak Activity Bq/Sample	Code	MDA Value Bq/Sample	COMMENTS
Pb-210	N	1.6496E+04				8.15E+03	
			46.54	1.650E+04	(P	1.744E+02 5.84E-01 4.25E+00	G
AM-241		1.3126E+03				1.58E+05	
			59.54	1.313E+03	(	9.974E+00 5.25E-01 3.57E+01	G
CD-109		3.7383E+04				4.63E+02	
			88.03	3.738E+04	*(	1.896E+04 2.07E+01 3.61E+00	G
CO-57		-3.0008E-01				2.72E+02	
			122.06	-3.001E-01	?(	1.592E+00 2.11E+02 8.56E+01	G
Ce-139		6.3720E-01				1.38E+02	
			165.85	6.372E-01	&(	1.593E+00 9.96E+01 7.99E+01	G
Hg-203		-2.0247E-01				4.66E+01	
			279.17	-2.025E-01	?(	2.516E+00 3.73E+02 8.15E+01	G
SN-113		-5.3940E-01				1.15E+02	
			391.69	-5.394E-01	&(P	3.066E+00 1.56E+02 6.40E+01	G
CS-137		5.2035E+02				1.10E+04	
			661.66	5.203E+02	(	3.044E+00 7.94E-01 8.52E+01	G
Y-898		-1.2727E+00				1.07E+02	
			898.02	-1.273E+00	?(	2.765E+00 1.01E+02 9.37E+01	G
Co-1173		8.3078E+02				1.93E+03	
			1173.24	8.308E+02	(P	9.972E+00 1.41E+00 9.99E+01	G
Co-1332		8.5225E+02				1.93E+03	
			1332.50	8.523E+02	(	5.252E+00 1.33E+00 1.00E+02	G
Y-1836		-4.2991E-01				1.07E+02	
			1836.01	-4.299E-01	?(P	1.054E+00 8.71E+02 9.92E+01	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.

@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity	
CO-57	122.06	2413.	-44.	-0.009	210.99	0.000E+00	
Ce-139	165.85	1690.	78.	0.016	99.62	0.000E+00	
Hg-203	279.17	2166.	-18.	-0.004	373.28	0.000E+00	
SN-113	391.69	1148.	-28.	-0.006	155.72	0.000E+00	P
Y-898	898.02	560.	-52.	-0.010	101.01	0.000E+00	
Y-1836	1836.01	25.	-11.	-0.002	870.90	0.000E+00	P

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/Sample	Time Corrected Activity Bq/Sample	Uncertainty 1 Sigma Counting	MDA Bq/Sample
Pb-210	1.1520E+04	1.6496E+04	5.844E-01%	1.74E+02
AM-241	1.2885E+03	1.3126E+03	5.252E-01%	9.97E+00
CD-109 #	6.7177E+01	3.7383E+04	2.070E+01%	1.90E+04
CO-57 #A	-3.0008E-01	>12 Halflives	2.110E+02%	1.59E+00
Ce-139 #A	6.3720E-01	>12 Halflives	9.962E+01%	1.59E+00
Hg-203 #A	-2.0247E-01	>12 Halflives	3.733E+02%	2.52E+00
SN-113 #A	-5.3940E-01	>12 Halflives	1.557E+02%	3.07E+00
CS-137	3.9871E+02	5.2035E+02	7.943E-01%	3.04E+00
Y-898 #A	-1.2727E+00	>12 Halflives	1.010E+02%	2.77E+00

Co-1173	1.8188E+02	8.3078E+02	1.412E+00%	9.97E+00
Co-1332	1.8658E+02	8.5225E+02	1.333E+00%	5.25E+00
Y-1836 #A	-4.2991E-01	>12 Halflives	8.709E+02%	1.05E+00

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.7 to 1999.4 keV) 1.364E+04 Bq/Sample
Total Decayed Activity (37.7 to 1999.4 keV) 5.7394852E+04 Bq/Sample

Monthly Backgrounds

Test America
St. Louis
Background Check

Spectrum: 8_20180713018_BGLong
Description: Background Long PBC Count
Acquired: 7/13/2018 10:24:35 PM
Detector: Detector # 8
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.56	1.39	1.45	1.58	1.68	1.74	PASS

Analyst: Mike Aldridge Reviewer:

TestAmerica Inc Spectrum name: 8_20180713018_BGLong.An1

Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det8\8_20180713018_BGLong.An1

Acquisition information
Start time:	7/13/2018 10:24:35 PM
Live time:	72000
Real time:	73793
Dead time:	2.43 %
Detector ID:	8

Detector system
Ge 8 SN/174

Calibration
Filename: 8_QC.Clb
Ge8_QC

Energy Calibration
Created:	2/28/2012 10:34:41 AM
Zero offset:	0.052 keV
Gain:	0.250 keV/channel
Quadratic:	5.282E-10 keV/channel^2

Efficiency Calibration
Created:	1/6/2011 8:07:20 AM		
Knee Energy:	0.00 keV		
Above the Knee:	Interpolative	Uncertainty =	0.00 %
Below the Knee:	Interpolative	Uncertainty =	0.00 %

Library Files
Main analysis library:	DET_Long Background PBC.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters
Analysis engine:	Env32 G800W064
Start channel:	150 (37.55keV)
Stop channel:	8000 (1999.97keV)
Peak rejection level:	30.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 22 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1071

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. DPS	Nuc
59.50	467.	9.06	1.02	8.675E-02	59.54	35.900	2.077E-01	AM241
63.31	1105.	4.50	1.03	9.237E-02	63.29	3.810	4.358E+00	TH234
92.65	2002.	3.92	1.14	1.295E-01	92.59	5.584	3.845E+00	TH234
					93.35	5.561	3.858E+00	AC228
143.82	240.	18.77	1.09	1.248E-01	143.79	10.960	2.434E-01	U235
163.30	169.	24.41	1.20	1.171E-01	163.38	5.080	3.941E-01	U235
					162.66	6.220	3.211E-01	Ba140
185.76	1169.	6.49	1.05	1.108E-01	185.72	54.000	2.714E-01	U235
					185.99	3.280	4.472E+00	Ra226
238.71	377.	16.39	1.07	9.637E-02	238.63	43.300	1.255E-01	PB212
351.78	154.	28.04	1.69	6.558E-02	351.93	37.600	8.693E-02	PB214
510.86	1473.	6.03	2.70	4.531E-02	511.86	20.000	2.262E+00	RH106
582.93	134.	25.65	1.27	3.958E-02	583.02	84.500	5.585E-02	TL208
609.39	138.	27.03	1.97	3.750E-02	609.31	46.090	1.105E-01	BI214
					610.30	5.750	8.876E-01	RU103
661.63	235.	16.24	1.57	3.334E-02	661.66	85.210	1.150E-01	CS137
1001.15	108.	20.31	0.97	2.158E-02	1001.00	0.837	8.331E+00	PA234M
1120.35	66.	25.17	0.67	1.933E-02	1120.29	15.100	3.140E-01	BI214
					1120.55	99.987	4.743E-02	Sc46
1173.12	140.	17.73	1.50	1.834E-02	1173.24	99.900	1.061E-01	CO60
1333.17	108.	22.25	1.63	1.637E-02	1332.50	99.980	9.191E-02	CO60
1461.11	136.	17.85	1.59	1.543E-02	1460.83	10.670	1.148E+00	K40
1764.87	74.	20.20	3.17	1.319E-02	1764.49	15.400	5.084E-01	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide
2043.35	510.86	654.	1473.	3.252E+04	6.03	2.701	-

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_Long Background PBC.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
AM-241	237.95	59.54	703.	467.	0.006	9.26	1.022D
TH-234	252.96	63.29	683.	1105.	0.015	4.50	1.025D
TH-234	370.40	92.65	994.	2002.	0.028	3.92	1.139
U-235	575.11	143.82	563.	240.	0.003	18.77	1.091
U-235	653.05	163.30	483.	169.	0.002	24.41	1.198s
U-235	742.71	185.72	1007.	1048.	0.015	4.57	1.119D
PB-212	954.69	238.71	737.	377.	0.005	16.39	1.066
PB-214	1407.01	351.78	397.	154.	0.002	28.04	1.693s
TL-208	2331.63	582.93	234.	134.	0.002	25.65	1.272
BI-214	2437.50	609.39	276.	138.	0.002	27.03	1.969s
CS-137	2646.45	661.63	230.	235.	0.003	16.24	1.570s
PA-234M	4004.60	1001.15	87.	108.	0.002	20.31	0.967s
BI-214	4481.41	1120.35	60.	66.	0.001	25.17	0.667s
CO-60	4692.52	1173.12	84.	140.	0.002	17.73	1.500
CO-60	5332.74	1333.17	75.	108.	0.002	22.25	1.628
K-40	5844.50	1461.11	68.	136.	0.002	17.85	1.594
BI-214	7059.59	1764.87	23.	74.	0.001	20.20	3.166s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity DPS	Peak Energy keV	Peak Activity DPS		Peak MDA Value DPS			COMMENTS
K-40	N	1.1475E+00					4.66E+11		
			1460.83	1.148E+00	(	3.471E-01	1.79E+01	1.07E+01	G
CO-60	F	9.9028E-02					1.93E+03		
			1332.50	9.191E-02	(	3.646E-02	2.23E+01	1.00E+02	G
			1173.24	1.061E-01	?(	3.444E-02	1.77E+01	9.99E+01	G
CS-137	I	1.1505E-01					1.10E+04		
			661.66	1.150E-01	*(	3.585E-02	1.62E+01	8.52E+01	G
TL-208	N	5.5851E-02					6.98E+02		
			583.02	5.585E-02	(	3.076E-02	2.56E+01	8.45E+01	G
			277.28	0.000E+00	&	1.572E-01	2.39E+02	6.31E+00	G
			860.56	0.000E+00	%	1.593E-01	6.54E+01	1.24E+01	G
PB-212	N	1.2546E-01					6.98E+02		
			238.63	1.255E-01	(	4.300E-02	1.64E+01	4.33E+01	G
			300.03	0.000E+00	&	5.172E-01	0.00E+00	3.28E+00	GA
PB-214	N	8.6932E-02					5.84E+05		
			351.93	8.693E-02	@(	5.380E-02	2.80E+01	3.76E+01	G
			295.09	0.000E+00	!	8.482E-02	0.00E+00	1.93E+01	G
			242.00	0.000E+00	?	2.145E-01	0.00E+00	7.43E+00	GA
BI-214	N	1.1050E-01					5.84E+05		
			609.31	1.105E-01	(	6.445E-02	2.70E+01	4.61E+01	G
			1120.29	3.140E-01	+	1.846E-01	2.52E+01	1.51E+01	G
			1764.49	5.084E-01	+	1.703E-01	2.02E+01	1.54E+01	G
TH-234	N	4.3587E+00					1.63E+12		
			63.29	4.359E+00	(	4.908E-01	4.50E+00	3.81E+00	G
			92.59	3.845E+00	-	2.874E-01	3.92E+00	5.58E+00	G
PA-234M	N	8.3312E+00					1.63E+12		
			1001.00	8.331E+00	(	3.545E+00	2.03E+01	8.37E-01	G
			766.41	0.000E+00	%	7.256E+00	1.00E+03	2.94E-01	G
U-235	N	2.4342E-01					2.57E+11		
			185.72	2.434E-01	}	3.497E-02	4.57E+00	5.40E+01	GA
			143.79	2.434E-01	(	1.151E-01	1.88E+01	1.10E+01	G
			205.33	0.000E+00	%	1.800E-01	3.11E+01	5.01E+00	G
			163.38	3.941E-01	+	2.454E-01	2.44E+01	5.08E+00	G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AM-241	T	2.0804E-01					1.58E+05	
			59.54	2.080E-01	(	5.619E-02	9.26E+00	3.59E+01 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Activity	Time of Count Uncertainty 1 Sigma Counting	MDA
		DPS		
BE-7	<	1.3967E-01		
NA-22	<	2.4943E-02		
K-40		1.1475E+00	1.7850E+01%	3.471E-01
Sc-46	<	3.0900E-02		

CR-51	<	1.0669E-01			
MN-54	<	2.1634E-02			
FE-59	<	4.6045E-02			
Co-56	<	2.4290E-02			
CO-57	<	1.4977E-02			
CO-58	<	1.5978E-02			
CO-60		9.9028E-02	1.4226E+01%		3.646E-02
ZN-65	<	7.5066E-02			
NB-94	<	2.0891E-02			
ZR-95	<	3.4150E-02			
NB-95	<	2.7846E-02			
RU-103	<	1.6527E-02			
RH-106	<	1.7293E-01			
AG-108M	<	1.6570E-02			
AG-110M	<	2.6129E-02			
SN-113	<	2.3372E-02			
SB-124	<	2.1076E-02			
SB-125	<	4.5142E-02			
I-131	<	1.6911E-02			
BA-133	<	3.0017E-02			
CS-134	<	2.2465E-02			
CS-137	#	1.1505E-01	1.6238E+01%		3.585E-02
CE-139	<	1.7837E-02			
Ba-140	<	6.4360E-02			
La-140	<	2.7168E-02			
CE-141	<	2.2826E-02			
CE-144	<	1.0884E-01			
PM-144	<	2.2660E-02			
EU-152	<	4.3126E-02			
EU-154	<	1.6293E-01			
EU-155	<	3.6604E-02			
HF-181	<	1.8097E-02			
Ta-182	<	1.1337E-01			
Hg-203	<	2.0764E-02			
TL-208		5.5851E-02	2.5645E+01%		3.076E-02
pm-146	<	6.0218E-02			
y-88	<	2.4589E-02			
PB-210	<	4.0405E-01			
PB-212		1.2546E-01	1.6386E+01%		4.300E-02
PB-214	#	8.6932E-02	2.8044E+01%		5.380E-02
BI-207	<	3.3249E-02			
BI-212	<	2.5248E-01			
BI-214		1.1050E-01	2.7034E+01%		6.445E-02
BI-210M	<	1.7747E-02			
RA-224	<	3.4868E-01			
AC-228	<	1.1975E-01			
TH-227	<	5.5686E-02			
TH-229	<	2.0012E-01			
TH-234		4.3587E+00	4.4971E+00%		4.908E-01

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PA-231	<	4.5367E-01		
PA-233	<	3.2111E-02		
PA-234	<	4.6511E-02		
PA-234M#		8.3312E+00	2.0305E+01%	3.545E+00
U-235		2.4342E-01	1.8769E+01%	1.151E-01
AM-241		2.0804E-01	9.2594E+00%	5.619E-02
Np-237	<	9.3752E-02		

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.5 to 2000.0 keV) 1.488E+01 DPS

Test America
St. Louis
Background Check

Spectrum: 9_20180713016_BGLong
Description: Background Long PBC Count
Acquired: 7/13/2018 10:07:09 PM
Detector: Detector # 9
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.89	1.53	1.65	1.78	2.14	2.26	PASS

Analyst: Mike Aldridge Reviewer: Rachel Mueller

Test America
St. Louis
Background Check

Spectrum: 12_20180713018_BGLong
Description: Background Long PBC Count
Acquired: 7/13/2018 10:08:10 PM
Detector: Detector #12
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.00	1.89	1.93	1.98	2.07	2.10	PASS

Analyst: Mike Aldridge Reviewer: Rachel Mueller

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Test America
St. Louis
Background Check

Spectrum: 14_20180713019_BGLong
Description: Background Long PBC Count
Acquired: 7/13/2018 9:57:39 PM
Detector: Detector #14
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.80	1.66	1.71	1.76	1.90	1.94	PASS

Analyst: Mike Aldridge Reviewer:

TestAmerica Inc Spectrum name: 14_20180713019_BGLong.An1

Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det14\14_20180713019_BGLong.An1

Acquisition information
Start time:	7/13/2018 9:57:39 PM
Live time:	72000
Real time:	72116
Dead time:	0.16 %
Detector ID:	14

Detector system
Ge14 SN/11080670

Calibration
Filename: 14_QC.Clb
14_QC_79670-334_SOURCE E_042211

Energy Calibration
Created:	2/28/2012 10:48:23 AM
Zero offset:	0.130 keV
Gain:	0.250 keV/channel
Quadratic:	-2.050E-08 keV/channel^2

Efficiency Calibration
Created:	5/1/2011 8:43:09 AM		
Knee Energy:	0.00 keV		
Above the Knee:	Interpolative	Uncertainty =	0.00 %
Below the Knee:	Interpolative	Uncertainty =	0.00 %

Library Files
Main analysis library:	DET_Long Background PBC.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters
Analysis engine:	Env32 G800W064
Start channel:	150 (37.64keV)
Stop channel:	8000 (1999.51keV)
Peak rejection level:	30.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 16 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1812

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. DPS	Nuc
46.56	692.	8.37	0.88	6.125E-02	46.54	4.250	3.696E+00	PB210
63.32	666.	9.73	0.87	8.542E-02	63.29	3.810	2.842E+00	TH234
74.98	224.	19.10	0.78	1.022E-01				
77.22	170.	23.82	0.78	1.055E-01				
92.66	871.	7.36	1.09	1.215E-01	92.59	5.584	1.784E+00	TH234
					93.35	5.561	1.790E+00	AC228
185.42	530.	9.80	1.05	1.072E-01	185.72	54.000	1.272E-01	U235
238.26	318.	13.49	1.27	9.399E-02	238.63	43.300	1.086E-01	PB212
294.65	199.	24.16	0.62	7.984E-02	295.09	19.300	1.796E-01	PB214
351.47	293.	15.87	1.53	6.546E-02	351.93	37.600	1.655E-01	PB214
510.68	1731.	4.67	2.66	4.542E-02	511.86	20.000	2.653E+00	RH106
583.08	135.	24.65	1.57	3.930E-02	583.02	84.500	5.645E-02	TL208
608.97	312.	13.79	1.40	3.708E-02	609.31	46.090	2.535E-01	BI214
					610.30	5.750	2.037E+00	RU103
1460.44	143.	15.64	0.90	1.557E-02	1460.83	10.670	1.195E+00	K40
1764.28	98.	18.31	2.17	1.327E-02	1764.49	15.400	6.649E-01	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV		Suspected Nuclide
299.30	74.97	800.	224.	2.188E+03	19.10	0.777	-	sD
308.27	77.21	731.	170.	1.608E+03	23.82	0.780	-	D
2041.85	510.68	588.	1731.	3.811E+04	4.67	2.665	-	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: DET_Long Background PBC.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.68	46.56	841.	692.	0.010	8.37	0.877s
TH-234	252.69	63.32	1008.	666.	0.009	9.73	0.874s
TH-234	369.98	92.66	973.	871.	0.012	7.36	1.087s
U-235	740.96	185.42	651.	530.	0.007	9.80	1.052s
PB-212	952.25	238.26	481.	318.	0.004	13.49	1.269s
PB-214	1177.95	294.69	504.	190.	0.003	24.29	0.617s
PB-214	1405.05	351.47	450.	293.	0.004	15.87	1.535s
TL-208	2331.44	583.08	243.	135.	0.002	24.65	1.565s
BI-214	2435.01	608.97	308.	312.	0.004	13.79	1.395s
K-40	5841.99	1460.44	55.	143.	0.002	15.64	0.902s
BI-214	7058.22	1764.28	36.	98.	0.001	18.31	2.165

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity DPS	Peak Energy keV	Peak Activity DPS	Code	Peak MDA Value DPS		COMMENTS
K-40	N	1.1952E+00				4.66E+11		
			1460.83	1.195E+00	*(	3.115E-01	1.56E+01 1.07E+01	G
TL-208	N	5.6453E-02				6.98E+02		
			583.02	5.645E-02	(	3.151E-02	2.46E+01 8.45E+01	G
			277.28	0.000E+00	%	1.608E-01	3.82E+01 6.31E+00	G
			860.56	0.000E+00	%	1.612E-01	3.53E+02 1.24E+01	G
PB-210	N	3.6963E+00				8.14E+03		
			46.54	3.696E+00	*(	7.358E-01	8.37E+00 4.25E+00	G
PB-212	N	1.0864E-01				6.98E+02		
			238.63	1.086E-01	(	3.584E-02	1.35E+01 4.33E+01	G
			300.03	0.000E+00	%	3.440E-01	1.37E+02 3.28E+00	GA

Nuclide		Ave activity	Energy		Activity	Code	Peak MDA		Comments
PB-214	N	1.6744E-01					5.84E+05		
			351.93	1.655E-01	*(5.729E-02		1.59E+01	3.76E+01	G
			295.09	1.712E-01	*(9.691E-02		2.43E+01	1.93E+01	G
			242.00	0.000E+00	& 2.153E-01		0.00E+00	7.43E+00	GA
BI-214	N	2.5354E-01					5.84E+05		
			609.31	2.535E-01	*(6.866E-02		1.38E+01	4.61E+01	G
			1120.29	0.000E+00	% 1.766E-01		4.72E+01	1.51E+01	G
			1764.49	6.649E-01	+ 2.089E-01		1.83E+01	1.54E+01	G
TH-234	N	2.8419E+00					1.63E+12		
			63.29	2.842E+00	(6.432E-01		9.73E+00	3.81E+00	G
			92.59	1.784E+00	- 3.032E-01		7.36E+00	5.58E+00	G
U-235	N	1.2720E-01					2.57E+11		
			185.72	1.272E-01	2.919E-02		9.80E+00	5.40E+01	GA
			143.79	0.000E+00	% 9.481E-02		4.23E+01	1.10E+01	G
			205.33	0.000E+00	% 1.944E-01		3.63E+01	5.01E+00	G
			163.38	0.000E+00	% 1.978E-01		9.55E+01	5.08E+00	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went
    negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide
    failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the
    library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity
    to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average

R - Coincidence Corrected C - Coincidence Peak
H - Halflife limit exceeded

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity DPS	Uncertainty 1 Sigma Counting	MDA
BE-7	<	2.3349E-01		
NA-22	<	4.4957E-02		
K-40	#	1.1952E+00	1.5645E+01%	3.115E-01
Sc-46	<	2.1465E-02		
CR-51	<	1.1251E-01		
MN-54	<	2.1825E-02		
FE-59	<	4.8141E-02		
Co-56	<	2.1303E-02		
CO-57	<	1.5666E-02		
CO-58	<	2.9048E-02		
CO-60	<	2.4747E-02		
ZN-65	<	8.6204E-02		
NB-94	<	2.2918E-02		
ZR-95	<	3.4617E-02		
NB-95	<	1.9161E-02		
RU-103	<	1.5789E-02		
RH-106	<	1.9903E-01		
AG-108M	<	1.3628E-02		
AG-110M	<	2.7804E-02		
SN-113	<	2.0174E-02		
SB-124	<	2.9127E-02		
SB-125	<	4.2537E-02		
I-131	<	1.3971E-02		
BA-133	<	3.3069E-02		
CS-134	<	2.2986E-02		
CS-137	<	2.3684E-02		
CE-139	<	2.0721E-02		
Ba-140	<	6.1065E-02		
La-140	<	2.6263E-02		
CE-141	<	2.4340E-02		
CE-144	<	1.3250E-01		
PM-144	<	2.5794E-02		
EU-152	<	4.5502E-02		
EU-154	<	1.7311E-01		
EU-155	<	3.7399E-02		

HF-181	<	2.9392E-02		
Ta-182	<	1.2940E-01		
Hg-203	<	1.9175E-02		
TL-208		5.6453E-02	2.4646E+01%	3.151E-02
pm-146	<	5.7583E-02		
y-88	<	2.4313E-02		
PB-210	#	3.6963E+00	8.3656E+00%	7.358E-01
PB-212		1.0864E-01	1.3493E+01%	3.584E-02
PB-214	#	1.6744E-01	1.4508E+01%	5.729E-02
BI-207	<	3.0478E-02		
BI-212	<	2.7260E-01		
BI-214		2.5354E-01	1.3793E+01%	6.866E-02
BI-210M	<	2.0249E-02		
RA-224	<	4.1625E-01		
AC-228	<	9.3638E-02		
TH-227	<	9.3651E-02		
TH-229	<	2.2992E-01		
TH-234	#	2.8419E+00	9.7286E+00%	6.432E-01
PA-231	<	5.3008E-01		
PA-233	<	3.1903E-02		
PA-234	<	6.3030E-02		
PA-234M	<	2.7232E+00		
Ra-226	<	5.9538E-01		
U-235	#	1.2720E-01	9.8041E+00%	2.919E-02
AM-241	<	5.7681E-02		
Np-237	<	6.5199E-02		

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.5 keV) 8.447E+00 DPS

Test America
St. Louis
Background Check

Spectrum: 15_20180720002_BGLong
Description: Background Long PBC Count
Acquired: 7/20/2018 2:08:23 PM
Detector: Detector #15
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	1.68	1.59	1.62	1.71	1.74	1.77	PASS

Analyst: Jody Watson Reviewer: Rachel Mueller

TestAmerica Inc Spectrum name: 15_20180720002_BGLong.An1

Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det15\15_20180720002_BGLong.An1

Acquisition information
Start time:	7/20/2018 2:08:23 PM
Live time:	72000
Real time:	72185
Dead time:	0.26 %
Detector ID:	15

Detector system
Ge15 SN/11012216

Calibration
Filename: 15_QC.Clb
15_QC_83725-334_SOURCE F_2011

Energy Calibration
Created:	2/28/2012 4:29:17 PM
Zero offset:	0.044 keV
Gain:	0.250 keV/channel
Quadratic:	-3.267E-08 keV/channel^2

Efficiency Calibration
Created:	8/2/2011 8:55:45 AM	
Knee Energy:	0.00 keV	
Above the Knee:	Interpolative	Uncertainty = 0.00 %
Below the Knee:	Interpolative	Uncertainty = 0.00 %

Library Files
Main analysis library:	DET_Long Background PBC.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters
Analysis engine:	Env32 G800W064
Start channel:	150 (37.57keV)
Stop channel:	8000 (1999.52keV)
Peak rejection level:	30.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 15 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 1.0000

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. DPS	Nuc
46.60	506.	14.15	2.34	6.063E-02	46.54	4.250	2.730E+00	PB210
63.48	411.	18.68	1.60	8.225E-02	63.29	3.810	1.828E+00	TH234
92.78	729.	11.72	2.10	1.142E-01	92.59	5.584	1.588E+00	TH234
					93.35	5.561	1.594E+00	AC228
186.13	430.	14.74	2.27	9.774E-02	185.72	54.000	PBC<MDA	U235
					185.99	3.280	1.863E+00	Ra226
238.74	315.	19.35	1.70	8.501E-02	238.63	43.300	1.187E-01	PB212
609.94	235.	20.91	1.52	3.215E-02	609.31	46.090	2.196E-01	BI214
					610.30	5.750	1.764E+00	RU103
1462.43	101.	25.69	3.91	1.314E-02	1460.83	10.670	1.001E+00	K40
1765.72	107.	20.11	3.42	1.107E-02	1764.49	15.400	8.693E-01	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
370.66	92.78	1577.	729.	6.385E+03	11.72	2.099	-	sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_Long Background PBC.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	186.07	46.60	1204.	506.	0.007	14.15	2.337s
TH-234	253.15	63.38	1456.	375.	0.005	20.60	1.598s
Ra-226	743.83	186.13	897.	430.	0.006	14.74	2.270s
PB-212	954.15	238.74	783.	315.	0.004	19.35	1.702s
BI-214	2438.43	609.94	407.	235.	0.003	20.91	1.520s
K-40	5849.41	1462.43	88.	101.	0.001	25.69	3.911s
BI-214	7063.67	1765.72	49.	107.	0.001	20.11	3.422s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity DPS	Peak Energy keV	Peak Activity DPS	Code	MDA Value DPS		COMMENTS
K-40	N	1.0006E+00				4.66E+11		
			1460.83	1.001E+00	&(	4.599E-01	2.57E+01 1.07E+01	G
PB-210	N	2.7300E+00				8.14E+03		
			46.54	2.730E+00	*(	8.874E-01	1.41E+01 4.25E+00	G
PB-212	N	1.1873E-01				6.98E+02		
			238.63	1.187E-01	*(	5.023E-02	1.94E+01 4.33E+01	G
			300.03	0.000E+00	%	3.665E-01	1.36E+02 3.28E+00	GA
BI-214	N	2.1962E-01				5.84E+05		
			609.31	2.196E-01	*(	9.056E-02	2.09E+01 4.61E+01	G
			1120.29	0.000E+00	&	2.273E-01	5.66E+01 1.51E+01	G
			1764.49	8.693E-01	&	2.888E-01	2.01E+01 1.54E+01	G
TH-234	N	1.6656E+00				1.63E+12		
			63.29	1.666E+00	*(	8.026E-01	2.06E+01 3.81E+00	G
			92.59	0.000E+00	%	4.252E-01	0.00E+00 5.58E+00	G
Ra-226		1.8629E+00				5.84E+05		
			185.99	1.863E+00	*(	6.164E-01	1.47E+01 3.28E+00	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went
    negative during deconvolution.

? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide
failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the
library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity
to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity DPS	Uncertainty 1 Sigma Counting	MDA
BE-7	<	1.6847E-01		
NA-22	<	5.2591E-02		
K-40		1.0006E+00	2.5685E+01%	4.599E-01
Sc-46	<	2.3727E-02		
CR-51	<	1.2090E-01		
MN-54	<	2.6492E-02		
FE-59	<	5.8316E-02		
Co-56	<	2.7163E-02		
CO-57	<	1.6794E-02		
CO-58	<	2.4199E-02		
CO-60	<	3.2082E-02		
ZN-65	<	5.4251E-02		
NB-94	<	2.4736E-02		
ZR-95	<	4.1421E-02		

NB-95	<	2.0772E-02		
RU-103	<	2.1106E-02		
RH-106	<	2.5239E-01		
AG-108M	<	2.0530E-02		
AG-110M	<	3.6635E-02		
SN-113	<	2.7069E-02		
SB-124	<	4.4546E-02		
SB-125	<	5.9818E-02		
I-131	<	1.6521E-02		
BA-133	<	1.6259E-02		
CS-134	<	1.8357E-02		
CS-137	<	4.4933E-02		
CE-139	<	9.8331E-03		
Ba-140	<	7.9537E-02		
La-140	<	3.6861E-02		
CE-141	<	2.8964E-02		
CE-144	<	1.7087E-01		
PM-144	<	2.7695E-02		
EU-152	<	5.0840E-02		
EU-154	<	2.9700E-01		
EU-155	<	5.1870E-02		
HF-181	<	2.4272E-02		
Ta-182	<	1.3587E-01		
Hg-203	<	2.0632E-02		
TL-208	<	2.6629E-02		
pm-146	<	7.3925E-02		
y-88	<	2.8286E-02		
PB-210	#	2.7300E+00	1.4148E+01%	8.874E-01
PB-212	#	1.1873E-01	1.9355E+01%	5.023E-02
PB-214	<	6.9994E-02		
BI-207	<	4.1057E-02		
BI-212	<	5.0131E-01		
BI-214		2.1962E-01	2.0907E+01%	9.056E-02
BI-210M	<	2.2051E-02		
RA-224	<	4.4286E-01		
AC-228	<	1.2946E-01		
TH-227	<	1.1381E-01		
TH-229	<	2.5339E-01		
TH-234	#	1.6656E+00	2.0601E+01%	8.026E-01
PA-231	<	5.6918E-01		
PA-233	<	3.4917E-02		
PA-234	<	5.9315E-02		
PA-234M	<	3.5594E+00		
Ra-226	#	1.8629E+00	1.4741E+01%	6.164E-01
U-235	<	9.5998E-02		
AM-241	<	6.7949E-02		
Np-237	<	1.2199E-01		

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.5 keV) 7.597E+00 DPS

Test America
St. Louis
Background Check

Spectrum: 17_20180713006_BGLong
Description: Background Long PBC Count
Acquired: 7/13/2018 10:01:27 PM
Detector: Detector #17
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.32	2.18	2.23	2.29	2.42	2.46	PASS

Analyst: Mike Aldridge Reviewer:

TestAmerica Inc Spectrum name: 17_20180713006_BGLong.An1

Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det17\17_20180713006_BGLong.An1

Acquisition information
Start time:	7/13/2018 10:01:27 PM
Live time:	72000
Real time:	73862
Dead time:	2.52 %
Detector ID:	17

Detector system
Ge17 SN/11080671

Calibration
Filename: 17_QC.Clb
17_QC_83725-334_SOURCE H_042211

Energy Calibration
Created:	2/29/2012 10:33:23 AM
Zero offset:	0.108 keV
Gain:	0.250 keV/channel
Quadratic:	-2.584E-08 keV/channel^2

Efficiency Calibration
Created:	5/1/2011 11:17:56 AM		
Knee Energy:	0.00 keV		
Above the Knee:	Interpolative	Uncertainty =	0.00 %
Below the Knee:	Interpolative	Uncertainty =	0.00 %

Library Files
Main analysis library:	DET_Long Background PBC.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters
Analysis engine:	Env32 G800W064
Start channel:	150 (37.63keV)
Stop channel:	8000 (1999.54keV)
Peak rejection level:	30.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 23 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1855

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. DPS	Nuc
46.67	1098.	7.14	0.69	5.957E-02	46.54	4.250	6.043E+00	PB210
63.37	1109.	6.63	0.77	8.046E-02	63.29	3.810	5.030E+00	TH234
75.01	311.	14.92	0.80	9.504E-02				
77.28	191.	24.05	0.80	9.788E-02				
84.73	254.	22.10	1.58	1.072E-01				
92.65	1625.	4.71	0.98	1.119E-01	92.59	5.584	3.613E+00	TH234
					93.35	5.561	3.625E+00	AC228
143.89	201.	26.32	0.84	1.093E-01	143.79	10.960	2.330E-01	U235
163.38	272.	21.18	2.44	1.038E-01	163.38	5.080	7.153E-01	U235
					162.66	6.220	5.830E-01	Ba140
185.61	889.	7.99	1.07	9.859E-02	185.72	54.000	2.319E-01	U235
					185.99	3.280	3.820E+00	Ra226
198.24	213.	25.30	0.80	9.572E-02				
238.64	460.	11.79	1.06	8.654E-02	238.63	43.300	1.703E-01	PB212
351.90	246.	19.51	0.76	6.081E-02	351.93	37.600	1.496E-01	PB214
511.16	2273.	4.13	2.35	4.372E-02	511.86	20.000	3.615E+00	RH106
583.56	230.	15.99	1.45	3.887E-02	583.02	84.500	9.718E-02	TL208
609.46	262.	13.88	1.24	3.709E-02	609.31	46.090	2.125E-01	BI214
					610.30	5.750	1.707E+00	RU103
803.52	124.	22.72	1.49	2.769E-02				
911.76	107.	24.20	1.89	2.355E-02	911.16	29.000	2.183E-01	AC228
1001.47	121.	28.75	1.26	2.198E-02	1001.00	0.837	9.136E+00	PA234M
1120.79	119.	25.91	1.73	1.989E-02	1120.29	15.100	5.503E-01	BI214
					1120.55	99.987	8.312E-02	Sc46
					1121.30	34.900	2.383E-01	Ta182
1461.40	318.	9.09	1.89	1.608E-02	1460.83	10.670	2.575E+00	K40
1765.06	122.	16.69	1.47	1.381E-02	1764.49	15.400	7.947E-01	BI214

pk energy area uncert fwhm corr nuclide brnch. act. nuc

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
299.46	75.02	919.	311.	3.269E+03	14.92	0.802	-	D
308.53	77.28	956.	191.	1.948E+03	24.05	0.804	-	sD
338.34	84.73	1019.	254.	2.366E+03	22.10	1.584	-	s
792.18	198.24	810.	213.	2.229E+03	25.30	0.804	-	s
2043.52	511.16	785.	2273.	5.200E+04	4.13	2.353	-	
3212.99	803.52	176.	124.	4.490E+03	22.72	1.488	-	M

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_Long Background PBC.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV	
PB-210	186.14	46.67	1318.	1098.	0.015	7.14	0.693	
TH-234	252.90	63.37	1230.	1109.	0.015	6.63	0.774	
TH-234	369.98	92.65	1272.	1625.	0.023	4.71	0.976s	
U-235	574.84	143.89	866.	201.	0.003	26.32	0.838s	
U-235	652.79	163.38	868.	272.	0.004	21.18	2.438s	
U-235	742.10	185.72	1082.	823.	0.011	6.03	1.075D	
PB-212	953.69	238.64	708.	460.	0.006	11.79	1.057	
PB-214	1406.62	351.90	563.	246.	0.003	19.51	0.756s	
TL-208	2333.09	583.56	269.	230.	0.003	15.99	1.451s	
BI-214	2436.70	609.46	317.	262.	0.004	13.88	1.238	
AC-228	3645.99	911.76	155.	107.	0.001	24.20	1.893s	
PA-234M	4004.94	1001.47	198.	121.	0.002	28.75	1.257	
BI-214	4482.37	1120.79	156.	119.	0.002	25.91	1.725	
K-40	5845.51	1461.40	76.	318.	0.004	9.09	1.889	
BI-214	7061.13	1765.06	51.	122.	0.002	16.69	1.469s	

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity DPS	Peak Energy keV	Peak Activity DPS		Peak Code	MDA Value DPS		COMMENTS
K-40	N	2.5748E+00					4.66E+11		
			1460.83	2.575E+00	(	3.503E-01	9.09E+00	1.07E+01	G
TL-208	N	9.7184E-02					6.98E+02		
			583.02	9.718E-02	*(	3.347E-02	1.60E+01	8.45E+01	G
			277.28	0.000E+00	%	2.074E-01	3.10E+01	6.31E+00	G
			860.56	0.000E+00	%	2.107E-01	3.25E+02	1.24E+01	G
PB-210	N	6.0430E+00					8.14E+03		
			46.54	6.043E+00	(	9.454E-01	7.14E+00	4.25E+00	G
PB-212	N	1.7031E-01					6.98E+02		
			238.63	1.703E-01	(	4.695E-02	1.18E+01	4.33E+01	G
			300.03	0.000E+00	%	4.089E-01	7.58E+01	3.28E+00	GA
PB-214	N	1.4965E-01					5.84E+05		
			351.93	1.496E-01	(	6.880E-02	1.95E+01	3.76E+01	G
			295.09	0.000E+00	%	7.063E-02	3.34E+01	1.93E+01	G
			242.00	0.000E+00		2.582E-01	0.00E+00	7.43E+00	GA
BI-214	N	2.1254E-01					5.84E+05		
			609.31	2.125E-01	(	6.963E-02	1.39E+01	4.61E+01	G
			1120.29	5.503E-01	+	2.817E-01	2.59E+01	1.51E+01	G
			1764.49	7.947E-01	+	2.358E-01	1.67E+01	1.54E+01	G
AC-228	N	2.1829E-01					2.10E+03		
			911.16	2.183E-01	(	1.234E-01	2.42E+01	2.90E+01	G
			968.97	0.000E+00	%	1.593E-01	1.00E+02	1.75E+01	G
			338.32	0.000E+00	%	1.219E-01	3.00E+01	1.20E+01	G
			93.35	0.000E+00	?	5.227E-01	0.00E+00	5.56E+00	XA
TH-234	N	5.0305E+00					1.63E+12		
			63.29	5.030E+00	(	7.536E-01	6.63E+00	3.81E+00	G
			92.59	3.613E+00	-	3.754E-01	4.71E+00	5.58E+00	G
PA-234M	N	9.1359E+00					1.63E+12		
			1001.00	9.136E+00	(	5.155E+00	2.87E+01	8.37E-01	G
			766.41	0.000E+00	%	8.241E+00	6.93E+01	2.94E-01	G
U-235	N	2.3297E-01					2.57E+11		
			185.72	2.147E-01	}	4.071E-02	6.03E+00	5.40E+01	GA
			143.79	2.330E-01	(	1.621E-01	2.63E+01	1.10E+01	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		205.33	0.000E+00 %	2.497E-01	5.93E+01	5.01E+00 G
		163.38	7.153E-01 +	3.687E-01	2.12E+01	5.08E+00 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Activity DPS	Time of Count Uncertainty Counting 1 Sigma	MDA
BE-7	<	2.8909E-01		
NA-22	<	4.0049E-02		
K-40		2.5748E+00	9.0895E+00%	3.503E-01
Sc-46	<	3.2830E-02		
CR-51	<	1.3977E-01		

MN-54	<	2.6557E-02		
FE-59	<	5.1268E-02		
Co-56	<	2.7217E-02		
CO-57	<	2.1329E-02		
CO-58	<	2.1257E-02		
CO-60	<	2.9327E-02		
ZN-65	<	6.8083E-02		
NB-94	<	2.5232E-02		
ZR-95	<	3.8318E-02		
NB-95	<	3.5562E-02		
RU-103	<	1.6667E-02		
RH-106	<	2.1508E-01		
AG-108M	<	1.8099E-02		
AG-110M	<	2.5276E-02		
SN-113	<	2.5389E-02		
SB-124	<	2.4884E-02		
SB-125	<	5.9079E-02		
I-131	<	1.9513E-02		
BA-133	<	2.9952E-02		
CS-134	<	4.6320E-02		
CS-137	<	2.3980E-02		
CE-139	<	1.6311E-02		
Ba-140	<	7.2236E-02		
La-140	<	3.8681E-02		
CE-141	<	1.8291E-02		
CE-144	<	1.1219E-01		
PM-144	<	2.7285E-02		
EU-152	<	5.2813E-02		
EU-154	<	2.2162E-01		
EU-155	<	4.3944E-02		
HF-181	<	2.5975E-02		
Ta-182	<	1.2198E-01		
Hg-203	<	1.6180E-02		
TL-208	#	9.7184E-02	1.5995E+01%	3.347E-02
pm-146	<	6.8647E-02		
y-88	<	2.6986E-02		
PB-210		6.0430E+00	7.1384E+00%	9.454E-01
PB-212		1.7031E-01	1.1792E+01%	4.695E-02
PB-214		1.4965E-01	1.9509E+01%	6.880E-02
BI-207	<	3.5696E-02		
BI-212	<	3.9911E-01		
BI-214		2.1254E-01	1.3882E+01%	6.963E-02
BI-210M	<	2.4509E-02		
RA-224	<	2.8291E-01		
AC-228		2.1829E-01	2.4196E+01%	1.234E-01
TH-227	<	1.3160E-01		
TH-229	<	2.9009E-01		
TH-234		5.0305E+00	6.6348E+00%	7.536E-01
PA-231	<	6.7288E-01		

PA-233	<	3.6885E-02			
PA-234	<	6.9363E-02			
PA-234M		9.1359E+00	2.8748E+01%		5.155E+00
U-235	#	2.3297E-01	2.6321E+01%		1.621E-01
AM-241	<	4.0280E-02			
Np-237	<	8.8788E-02			

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.6 to 1999.5 keV) 2.387E+01 DPS

Test America
St. Louis
Background Check

Spectrum: 19_20180713018_BGLong
Description: Background Long PBC Count
Acquired: 7/13/2018 10:22:52 PM
Detector: Detector #19
Background Evaluation Criteria:
1) Place instrument out of service if Countrate exceeds Control Limits.
2) Investigate high countrate and take corrective action as necessary if Countrate exceeds Tolerance Limits.

	Target	L_Ctrl	L_Tol	Measured	H_Tol	H_Ctrl	Results
Bkgd Countrate	2.30	2.15	2.20	2.26	2.39	2.44	PASS

Analyst: Mike Aldridge Reviewer:

TestAmerica Inc Spectrum name: 19_20180713018_BGLong.An1

Sample description
Background Long PBC Count

Spectrum Filename: C:\User\SPC\Det19\19_20180713018_BGLong.An1

Acquisition information
Start time:	7/13/2018 10:22:52 PM
Live time:	72000
Real time:	72080
Dead time:	0.11 %
Detector ID:	19

Detector system
Ge19 SN/11146715

Calibration
Filename: 19_QC.Clb
19_QC_Source F_83725-334

Energy Calibration
Created:	4/16/2018 11:22:57 AM
Zero offset:	0.177 keV
Gain:	0.250 keV/channel
Quadratic:	-3.735E-08 keV/channel^2

Efficiency Calibration
Created:	4/17/2018 2:50:57 PM		
Knee Energy:	0.00 keV		
Above the Knee:	Interpolative	Uncertainty =	0.00 %
Below the Knee:	Interpolative	Uncertainty =	0.00 %

Library Files
Main analysis library:	DET_Long Background PBC.lib
Library Match Width:	0.500
Peak stripping:	Library based

Analysis parameters
Analysis engine:	Env32 G800W064
Start channel:	150 (37.71keV)
Stop channel:	8000 (1999.42keV)
Peak rejection level:	30.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00 +/- 0.000E+00%
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	4.0000000E+00
Systematic error:	4.0000000E+00
Fraction Limit:	0.000%
Background width:	3

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 17 cutoff: 5.00E+01 %
Energy Calibration
Normalized diff: 0.1221

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. DPS	Nuc
46.64	1384.	5.12	1.01	5.743E-02	46.54	4.250	7.894E+00	PB210
63.35	778.	9.40	1.04	7.727E-02	63.29	3.810	3.674E+00	TH234
74.98	236.	22.00	1.01	9.107E-02				
87.26	225.	22.73	0.93	1.057E-01	86.49	13.100	2.274E-01	Np237
					86.54	30.700	9.699E-02	EU155
92.76	1141.	7.85	1.12	1.128E-01	92.59	5.584	2.521E+00	TH234
					93.35	5.561	2.509E+00	AC228
144.27	251.	26.73	1.06	1.466E-01	143.79	10.960	2.173E-01	U235
185.67	541.	11.86	0.96	1.371E-01	185.72	54.000	1.014E-01	U235
					185.99	3.280	1.670E+00	Ra226
238.41	489.	12.16	1.24	1.252E-01	238.63	43.300	1.252E-01	PB212
497.44	106.	27.92	0.79	6.689E-02	497.05	90.900	2.421E-02	RU103
609.12	249.	19.97	0.95	4.161E-02	609.31	46.090	1.805E-01	BI214
					610.30	5.750	1.455E+00	RU103
1461.14	324.	10.87	2.03	1.343E-02	1460.83	10.670	3.140E+00	K40
1764.62	136.	16.33	1.76	9.848E-03	1764.49	15.400	1.245E+00	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Efficiency * Area	Uncert 1 Sigma %	FWHM keV	Suspected Nuclide	
298.98	74.98	984.	236.	2.591E+03	22.00	1.005	-	M
348.08	87.26	893.	225.	2.126E+03	22.73	0.933	-	M

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: DET_Long Background PBC.lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	FWHM keV
PB-210	185.70	46.64	1090.	1384.	0.019	5.12	1.005
TH-234	252.52	63.35	1305.	778.	0.011	9.40	1.038
TH-234	370.06	92.76	1650.	1141.	0.016	7.85	1.121s
U-235	575.97	144.27	1163.	251.	0.003	26.73	1.056s
U-235	741.65	185.72	973.	511.	0.007	9.09	0.965D
PB-212	952.30	238.41	793.	489.	0.007	12.16	1.236
RU-103	1988.04	497.44	220.	106.	0.001	27.92	0.788s
BI-214	2434.67	609.12	460.	249.	0.003	19.97	0.948s
K-40	5844.20	1461.14	110.	324.	0.004	10.87	2.027s
BI-214	7059.46	1764.62	55.	136.	0.002	16.33	1.757

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity DPS	Peak Energy keV	Peak Activity DPS	Code	MDA Value DPS	COMMENTS
K-40	N	3.1402E+00				4.66E+11	
			1460.83	3.140E+00	@(	5.000E-01 1.09E+01	1.07E+01 G
RU-103	I	2.4212E-02				3.93E+01	
			497.05	2.421E-02	(	1.641E-02 2.79E+01	9.09E+01 G
			610.30	0.000E+00	%	6.126E-01 0.00E+00	5.75E+00 GA
PB-210	N	7.8938E+00				8.14E+03	
			46.54	7.894E+00	(	8.926E-01 5.12E+00	4.25E+00 G
PB-212	N	1.2520E-01				6.98E+02	
			238.63	1.252E-01	(	3.432E-02 1.22E+01	4.33E+01 G
			300.03	0.000E+00	%	2.604E-01 1.31E+02	3.28E+00 GA

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
BI-214	N 1.8052E-01					5.84E+05	
		609.31	1.805E-01	(	7.442E-02	2.00E+01 4.61E+01	G
		1120.29	0.000E+00	%	2.202E-01	4.11E+01 1.51E+01	G
		1764.49	1.245E+00	+	3.413E-01	1.63E+01 1.54E+01	G
TH-234	N 3.6740E+00					1.63E+12	
		63.29	3.674E+00	(	8.078E-01	9.40E+00 3.81E+00	G
		92.59	2.521E+00	-	4.242E-01	7.85E+00 5.58E+00	G
U-235	N 2.1726E-01					2.57E+11	
		185.72	9.589E-02	}	2.778E-02	9.09E+00 5.40E+01	GA
		143.79	2.173E-01	*(	1.397E-01	2.67E+01 1.10E+01	G
		205.33	0.000E+00	%	1.754E-01	4.88E+01 5.01E+00	G
		163.38	0.000E+00	%	1.752E-01	5.61E+01 5.08E+00	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went
    negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide
    failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the
    library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity
    to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 1 Sigma %	Activity

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Time of Count Uncertainty 1 Sigma

Nuclide		Activity DPS	Counting	MDA
BE-7	<	9.0460E-02		
NA-22	<	2.5852E-02		
K-40	#	3.1402E+00	1.0871E+01%	5.000E-01
Sc-46	<	3.3022E-02		
CR-51	<	8.5514E-02		
MN-54	<	2.3868E-02		
FE-59	<	5.3911E-02		
Co-56	<	2.4675E-02		
CO-57	<	1.9380E-02		
CO-58	<	2.3264E-02		
CO-60	<	3.3455E-02		
ZN-65	<	9.6629E-02		
NB-94	<	2.8576E-02		
ZR-95	<	4.0654E-02		
NB-95	<	4.7014E-02		
RU-103	#	2.4212E-02	2.7922E+01%	1.641E-02
RH-106	<	1.9520E-01		
AG-108M	<	1.2708E-02		
AG-110M	<	5.6915E-02		
SN-113	<	1.4610E-02		
SB-124	<	3.9018E-02		
SB-125	<	3.8202E-02		
I-131	<	1.0692E-02		
BA-133	<	1.6881E-02		
CS-134	<	2.4248E-02		
CS-137	<	1.5466E-02		
CE-139	<	1.7378E-02		
Ba-140	<	5.2733E-02		
La-140	<	3.6269E-02		
CE-141	<	1.7115E-02		
CE-144	<	6.0279E-02		
PM-144	<	3.0460E-02		
EU-152	<	5.2117E-02		
EU-154	<	1.1845E-01		
EU-155	<	5.1194E-02		
HF-181	<	8.5069E-03		

Ta-182	<	1.6795E-01			
Hg-203	<	1.1115E-02			
TL-208	<	1.9939E-02			
pm-146	<	6.8112E-02			
y-88	<	3.3839E-02			
PB-210		7.8938E+00	5.1164E+00%		8.926E-01
PB-212		1.2520E-01	1.2158E+01%		3.432E-02
PB-214	<	3.8459E-02			
BI-207	<	2.9037E-02			
BI-212	<	5.2915E-01			
BI-214		1.8052E-01	1.9969E+01%		7.442E-02
BI-210M	<	1.7121E-02			
RA-224	<	3.0161E-01			
AC-228	<	1.2780E-01			
TH-227	<	8.3217E-02			
TH-229	<	2.0618E-01			
TH-234		3.6740E+00	9.3975E+00%		8.078E-01
PA-231	<	2.1873E-01			
PA-233	<	2.3369E-02			
PA-234	<	7.3394E-02			
PA-234M	<	3.9002E+00			
U-235	#	2.1726E-01	2.6733E+01%		1.397E-01
AM-241	<	8.3830E-02			
Np-237	<	1.3807E-01			

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
  & - Activity omitted from total and all peaks had bad shape.
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
  F - Failed fraction or key line test.
  H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (37.7 to 1999.4 keV) 1.526E+01 DPS

Run Logs

Gamma Spectroscopy Run Log

Detector: GV8

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
09/08/11 09:52		IC 160-45552/1		45552			JLW
09/08/11 12:09		ICV 160-45552/2		45552			JLW
12/06/16 10:28		ACVTOP 160-282755/1		282755			PS
07/13/18 22:24		ICB 160-375692/1		375692			RTM
08/09/18 00:01		CCV 160-381210/1		381210			
08/09/18 00:23		CCV 160-381210/2		381210			CDR
08/09/18 00:43		CCB 160-381210/3		381210			CDR
08/09/18 01:23	60	160-29479-1	CRC-B1-0002	381210	376740	901.1	CDR
08/09/18 06:37	30	ZZZZZ		381210			
08/09/18 07:17	30	ZZZZZ		381210			
08/09/18 08:33	30	ZZZZZ		381210			
08/09/18 09:14	30	ZZZZZ		381210			
08/09/18 10:01	30	ZZZZZ		381210			
08/09/18 10:48	30	ZZZZZ		381210			
08/09/18 11:40	30	ZZZZZ		381210			
08/09/18 12:44	30	ZZZZZ		381210			
08/09/18 13:26	30	ZZZZZ		381210			
08/09/18 14:15	30	ZZZZZ		381210			
08/09/18 14:56	30	ZZZZZ		381210			
08/09/18 15:34	30	ZZZZZ		381210			
08/09/18 16:30	30	ZZZZZ		381210			
08/09/18 17:15	30	ZZZZZ		381210			
08/09/18 18:12	30	ZZZZZ		381210			
08/09/18 18:46	30	ZZZZZ		381210			
08/09/18 19:21	30	ZZZZZ		381210			
08/09/18 20:02	30	ZZZZZ		381210			
08/09/18 20:35	30	ZZZZZ		381210			
08/09/18 21:19		ZZZZZ		381210			
08/09/18 21:59	30	ZZZZZ		381210			
08/09/18 22:48	30	ZZZZZ		381210			

Detector: GV9

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
05/03/12 13:37		IC 160-12326/1		12326			JLW
06/14/12 10:54		ICV 160-12326/2		12326			JLW
12/05/16 11:08		ACVTOP 160-282744/1		282744			PS
07/13/18 22:07		ICB 160-375695/1		375695			RTM
08/09/18 00:00		CCV 160-381204/1		381204			
08/09/18 00:21		CCV 160-381204/2		381204			KLS
08/09/18 00:42		CCB 160-381204/3		381204			KLS
08/09/18 01:18	30	ZZZZZ		381204			
08/09/18 06:35	30	160-29479-2 DU	CRC-B1-1820 DU	381204	376740	901.1	KLS
08/09/18 07:15	30	ZZZZZ		381204			
08/09/18 08:24	30	ZZZZZ		381204			
08/09/18 09:09	30	ZZZZZ		381204			
08/09/18 09:59	30	ZZZZZ		381204			
08/09/18 10:42	30	ZZZZZ		381204			
08/09/18 11:31		ZZZZZ		381204			
08/09/18 11:43	30	ZZZZZ		381204			
08/09/18 12:43	30	ZZZZZ		381204			
08/09/18 13:22		TCCLBA		381204			
		160-381336/1-A					

Gamma Spectroscopy Run Log

Detector: GV9 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/09/18 13:36		TCCLBC 160-381336/3-A		381204			
08/09/18 13:51		TCCLBB 160-381336/2-A		381204			
08/09/18 14:14	30	ZZZZZ		381204			
08/09/18 14:54	30	ZZZZZ		381204			
08/09/18 15:32	30	ZZZZZ		381204			
08/09/18 16:28	30	ZZZZZ		381204			
08/09/18 17:13	30	ZZZZZ		381204			
08/09/18 18:09	30	ZZZZZ		381204			
08/09/18 18:43	30	ZZZZZ		381204			
08/09/18 19:16	30	ZZZZZ		381204			
08/09/18 19:56		ZZZZZ		381204			
08/09/18 20:08		ZZZZZ		381204			
08/09/18 20:21		ZZZZZ		381204			
08/09/18 20:36	30	ZZZZZ		381204			
08/09/18 21:19		ZZZZZ		381204			
08/09/18 21:57	30	ZZZZZ		381204			
08/09/18 22:28	30	ZZZZZ		381204			
08/09/18 23:04	30	ZZZZZ		381204			

Detector: GV12

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
04/18/18 13:54		IC 160-364854/1		364854			JLW
04/24/18 09:26		ICV 160-364854/2		364854			JLW
07/13/18 22:08		ICB 160-375694/1		375694			RTM
08/09/18 00:01		CCV 160-381202/1		381202			
08/09/18 00:22		CCV 160-381202/2		381202			CDR
08/09/18 00:41		CCB 160-381202/3		381202			CDR
08/09/18 01:24	30	MB 160-376740/1-A		381202	376740	901.1	CDR
08/09/18 06:36	30	160-29479-5	CRC-B7-2224	381202	376740	901.1	CDR
08/09/18 07:17	30	ZZZZZ		381202			
08/09/18 08:25	30	ZZZZZ		381202			
08/09/18 09:14	30	ZZZZZ		381202			
08/09/18 10:00	30	ZZZZZ		381202			
08/09/18 10:43	30	ZZZZZ		381202			
08/09/18 11:32		ZZZZZ		381202			
08/09/18 11:44	30	ZZZZZ		381202			
08/09/18 12:45	30	ZZZZZ		381202			
08/09/18 13:23		TCCLBB 160-381336/2-A		381202			
08/09/18 13:38		TCCLBA 160-381336/1-A		381202			
08/09/18 13:52		TCCLBC 160-381336/3-A		381202			
08/09/18 14:15	30	ZZZZZ		381202			
08/09/18 14:56	30	ZZZZZ		381202			
08/09/18 15:33	30	ZZZZZ		381202			
08/09/18 16:30	30	ZZZZZ		381202			
08/09/18 17:15	30	ZZZZZ		381202			
08/09/18 18:07	30	ZZZZZ		381202			
08/09/18 18:41	60	ZZZZZ		381202			

Gamma Spectroscopy Run Log

Detector: GV12 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/09/18 19:42		ZZZZZ		381202			
08/09/18 19:54		ZZZZZ		381202			
08/09/18 20:10		ZZZZZ		381202			
08/09/18 20:23		ZZZZZ		381202			
08/09/18 20:40	60	ZZZZZ		381202			
08/09/18 21:47	60	ZZZZZ		381202			
08/09/18 22:50	60	ZZZZZ		381202			

Detector: GV14

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
04/23/12 09:56		IC 160-12359/1		12359			JLW
04/24/12 08:12		ICV 160-12359/2		12359			JLW
12/06/16 19:00		ACVTOP 160-282843/1		282843			PS
07/13/18 21:57		ICB 160-375697/1		375697			RTM
08/09/18 00:00		CCB 160-381203/1		381203			KLS
08/09/18 00:42		CCV 160-381203/2		381203			
08/09/18 01:02		CCV 160-381203/3		381203			KLS
08/09/18 01:26	60	ZZZZZ		381203			
08/09/18 06:36	30	160-29479-6	CRC-B7-2628	381203	376740	901.1	KLS
08/09/18 07:09	30	ZZZZZ		381203			
08/09/18 08:23	30	ZZZZZ		381203			
08/09/18 09:15	30	ZZZZZ		381203			
08/09/18 09:59	30	ZZZZZ		381203			
08/09/18 10:47	30	ZZZZZ		381203			
08/09/18 11:39	30	ZZZZZ		381203			
08/09/18 12:42	30	ZZZZZ		381203			
08/09/18 13:24	30	ZZZZZ		381203			
08/09/18 14:13	30	ZZZZZ		381203			
08/09/18 14:54	30	ZZZZZ		381203			
08/09/18 15:32	30	ZZZZZ		381203			
08/09/18 16:28	30	ZZZZZ		381203			
08/09/18 17:13	30	ZZZZZ		381203			
08/09/18 18:09	30	ZZZZZ		381203			
08/09/18 18:42	60	ZZZZZ		381203			
08/09/18 19:44	120	ZZZZZ		381203			
08/09/18 21:49	60	ZZZZZ		381203			
08/09/18 22:51	60	ZZZZZ		381203			

Detector: GV15

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/22/12 11:06		IC 160-12362/1		12362			JLW
03/23/12 06:10		ICV 160-12362/2		12362			JLW
12/02/16 13:12		ACVTOP 160-282704/1		282704			PS
07/20/18 14:08		ICB 160-377268/1		377268			JLW
08/09/18 00:01		CCB 160-381205/1		381205			CDR
08/09/18 01:15		CCV 160-381205/2		381205			
08/09/18 01:36		CCV 160-381205/3		381205			CDR
08/09/18 02:03	30	160-29479-4	CRC-B7-1416	381205	376740	901.1	CDR
08/09/18 06:37	30	160-29479-7	CRC-B20-1214	381205	376740	901.1	CDR
08/09/18 07:16	30	ZZZZZ		381205			
08/09/18 08:24	30	ZZZZZ		381205			

Gamma Spectroscopy Run Log

Detector: GV15 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
08/09/18 09:17	30	ZZZZZ		381205			
08/09/18 10:00	30	ZZZZZ		381205			
08/09/18 10:48	30	ZZZZZ		381205			
08/09/18 11:39	30	ZZZZZ		381205			
08/09/18 12:43	30	ZZZZZ		381205			
08/09/18 13:25	30	ZZZZZ		381205			
08/09/18 14:14	30	ZZZZZ		381205			
08/09/18 14:55	30	ZZZZZ		381205			
08/09/18 15:33	30	ZZZZZ		381205			
08/09/18 16:29	30	ZZZZZ		381205			
08/09/18 17:14	30	ZZZZZ		381205			
08/09/18 18:11	30	ZZZZZ		381205			
08/09/18 18:42	30	ZZZZZ		381205			
08/09/18 19:17	30	ZZZZZ		381205			
08/09/18 19:58		ZZZZZ		381205			
08/09/18 21:16	120	ZZZZZ		381205			

Detector: GV17

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/26/12 06:29		IC 160-12390/1		12390			JLW
03/26/12 09:29		ICV 160-12390/2		12390			JLW
11/30/16 17:05		ACVTOP 160-282698/1		282698			PS
07/13/18 22:01		ICB 160-375698/1		375698			RTM
08/09/18 00:03		CCB 160-381206/1		381206			CDR
08/09/18 00:41		CCV 160-381206/2		381206			
08/09/18 01:02		CCV 160-381206/3		381206			CDR
08/09/18 01:27	30	160-29479-3	CRC-B1-1214	381206	376740	901.1	CDR
08/09/18 06:42	30	160-29479-8	CRC-B20-1820	381206	376740	901.1	CDR
08/09/18 07:16	30	ZZZZZ		381206			
08/09/18 08:27	30	ZZZZZ		381206			
08/09/18 09:20	30	ZZZZZ		381206			
08/09/18 10:03	30	ZZZZZ		381206			
08/09/18 10:52	30	ZZZZZ		381206			
08/09/18 11:42	30	ZZZZZ		381206			
08/09/18 12:45	30	ZZZZZ		381206			
08/09/18 13:26	30	ZZZZZ		381206			
08/09/18 14:15	30	ZZZZZ		381206			
08/09/18 14:57	30	ZZZZZ		381206			
08/09/18 15:34	30	ZZZZZ		381206			
08/09/18 16:30	30	ZZZZZ		381206			
08/09/18 17:16	30	ZZZZZ		381206			
08/09/18 18:08	30	ZZZZZ		381206			
08/09/18 18:44	30	160-29479-2	CRC-B1-1820	381206	376740	901.1	CDR
08/09/18 19:17	60	ZZZZZ		381206			
08/09/18 20:24	30	ZZZZZ		381206			
08/09/18 21:14	120	ZZZZZ		381206			

Detector: GV19

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
03/14/18 10:55		ZZZZZ		364044			
03/14/18 15:23		IC 160-364044/1		364044			JLW

Gamma Spectroscopy Run Log

Detector: GV19 (Continued)

Analysis Date	Count Minutes	Lab Sample ID	Client Sample ID	Analysis Batch	Prep Batch	Method	Analyst Initials
04/20/18 09:45		ICV 160-364044/3		364044			JLW
07/13/18 22:22		ICB 160-375699/1		375699			RTM
08/09/18 00:00		CCV 160-381207/1		381207			
08/09/18 00:21		CCV 160-381207/2		381207			CDR
08/09/18 00:40		CCB 160-381207/3		381207			CDR
08/09/18 01:24	30	LCS 160-376740/2-A		381207	376740	901.1	CDR
08/09/18 06:37	30	160-29479-9	CRC-B20-2628	381207	376740	901.1	CDR
08/09/18 07:16	30	ZZZZZ		381207			
08/09/18 08:27	30	ZZZZZ		381207			
08/09/18 09:21	30	ZZZZZ		381207			
08/09/18 09:59	30	ZZZZZ		381207			
08/09/18 10:48	30	ZZZZZ		381207			
08/09/18 11:39	30	ZZZZZ		381207			
08/09/18 12:45	30	ZZZZZ		381207			
08/09/18 13:23		TCCLBC 160-381336/3-A		381207			
08/09/18 13:37		TCCLBB 160-381336/2-A		381207			
08/09/18 14:06		TCCLBA 160-381336/1-A		381207			
08/09/18 14:17	30	ZZZZZ		381207			
08/09/18 14:57	30	ZZZZZ		381207			
08/09/18 15:33	30	ZZZZZ		381207			
08/09/18 16:31	30	ZZZZZ		381207			
08/09/18 17:15	30	ZZZZZ		381207			
08/09/18 18:06		TCCLBA 160-381336/1-A		381207			
08/09/18 18:17	30	ZZZZZ		381207			
08/09/18 18:53	60	ZZZZZ		381207			
08/09/18 19:56		ZZZZZ		381207			
08/09/18 20:09		ZZZZZ		381207			
08/09/18 20:22		ZZZZZ		381207			
08/09/18 20:39	60	ZZZZZ		381207			
08/09/18 21:53	60	ZZZZZ		381207			
08/09/18 22:57	60	ZZZZZ		381207			

Radiological
Pre-Preparation Data

Radiological
Pre-Preparation Data

Shipping and Receiving Documents

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Phone: 314.298.8566 Fax: 314.298.8757

Chain of Custody Record

215029

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TestAmerica Laboratories, Inc.
TAL-8210 (0713)

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Kristine Schnoes	Site Contact: Kris Schnoes	Date:	COC No:
Company Name: Tetra Tech	Tel/Fax: 7737598058	Lab Contact:	Carrier:	of COCs
Address: 15 Wacker St 3700	Analysis Turnaround Time			Sampler:
City/State/Zip: Chicago, IL 60606	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
Phone: 773-759-8058	TAT if different from Below:			Walk-in Client:
Fax:	☒ 2 weeks			Lab Sampling:
Project Name: Cannonball Reduction Co	☐ 1 week			
Site: Chicago, IL	☐ 2 days			Job / SDG No.:
PO #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	Ra-226, -228	Uranium U5	Th-230	Sample Specific Notes:
CRC-B1-0002	7/10/18	1000	G	Soil	1			~~X~~	X	X	
CRC-B1-1820	7/10/18	1040	G	Soil	2			X	X	X	
CRC-B1-1214	7/10/18	1045	G	Soil	2			X	X	X	
CRC-B7-1416	7/11/18	1155	G	"	2			X	X	X	Centrifuge + analyze ~~soil~~ water ~~first~~
CRC-B7-2224	7/11/18	1200	G	"	"			X	X	X	Centrifuge + analyze soil + water
CRC-B7-2628	7/11/18	1230	G	"	1 ~~+1~~			X	X	X	
CRC-B20-1214	7/11/18	1340	G	"	2			X	X	X	Centrifuge + analyze soil + water
CRC-B20-1820	7/11/18	1430	G	"	2			X	X	X	
CRC-B20-2628	7/11/18	1505	G	"	2			X	X	X	

160-29479 Chain of Custody

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd: _____ Corr'd: _____ | Therm ID No.: _____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Kristine Schnoes	Tetra Tech	7/11/18 1600	C McK	TA STL	071218 0930
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Login Sample Receipt Checklist

Client: Tetra Tech, Inc.

Job Number: 160-29479-1

Login Number: 29479
List Number: 1
Creator: McKinney, Gerrod E

List Source: TestAmerica St. Louis

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	2.6, 20.0, 20.0
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

Job Number: 160-29498-1

Job Description: Former Carnotite Site - Non-Rad Analysis

For:
Tetra Tech, Inc.
1 South Wacker Dr.
Suite 3700
Chicago, IL 60606

Attention: Ms. Kristine Schnoes

Approved for release.
Chenise Y Lambert-Sykes
Project Manager I
8/31/2018 4:24 PM

Chenise Y Lambert-Sykes, Project Manager I
13715 Rider Trail North, Earth City, MO, 63045
(314)298-8566
chenise.lambert-sykes@testamericainc.com
08/31/2018
Revision: 1

The test results in this report meet NELAP requirements for parameters for which accreditation is required or available. Any exceptions to the NELAP requirements are noted. Results pertain only to samples listed in this report. Pursuant to NELAP, this report shall not be reproduced, except in full, without the written approval of the laboratory. This report is confidential and is intended for the sole use of TestAmerica and its client. All questions regarding this report should be directed to the TestAmerica Project Manager.

Louisiana Lab Certification ID (Non-Potable, Solid/Haz. Material): 106151
Florida Lab Certification ID (Drinking Water): E87689.

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Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

GC/MS Semi VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

GC Semi VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
*	LCS or LCSD is outside acceptance limits.
F1	MS and/or MSD Recovery is outside acceptance limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
V	Serial Dilution exceeds the control limits

General Chemistry

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance limits.
F2	MS/MSD RPD exceeds control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
H	Sample was prepped or analyzed beyond the specified holding time
U	Indicates the analyte was analyzed for but not detected.

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit

Glossary (Continued)

Abbreviation	These commonly used abbreviations may or may not be present in this report.
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

CASE NARRATIVE

Client: Tetra Tech, Inc.

Project: Former Carnotite Site - Non-Rad Analysis

Report Number: 160-29498-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

Rev1: The report has been revised to include method A-01-R for Thorium, which was initially missed at login.

RECEIPT

The samples were received on 07/13/2018; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 0.4 C.

TCLP VOLATILE ORGANIC COMPOUNDS (GC-MS)

Sample CRC-B21-0205 (160-29498-2) was analyzed for TCLP volatile organic compounds (GC-MS) in accordance with EPA SW-846 Methods 1311/8260B. The samples were leached on 07/23/2018 and analyzed on 08/06/2018.

Organic Prep

Method 1311
Prep Batch: 280-423316
Headspace was present in the container received for the following sample to be analyzed for TCLP volatiles: CRC-B21-0205 (160-29498-2). The presence of headspace may have led to the loss of volatile compounds prior to the extraction procedure.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TCLP SEMIVOLATILE ORGANIC COMPOUNDS (GC-MS)

Sample CRC-B22-0105 (160-29498-3) was analyzed for TCLP semivolatile organic compounds (GC-MS) in accordance with EPA SW-846 Methods 1311/8270C. The samples were leached on 07/23/2018, prepared on 07/25/2018 and analyzed on 07/28/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TCLP CHLORINATED PESTICIDES
Sample CRC-B22-0105 (160-29498-3) was analyzed for TCLP chlorinated pesticides in accordance with EPA SW-846 Methods 1311/ 8081B. The samples were leached on 07/23/2018, prepared on 07/25/2018 and analyzed on 07/31/2018.

Analytical batch: 280-424154
The laboratory control sample (LCS) for preparation batch 280-423271 and 280-423606 and analytical batch 280-424154 recovered outside control limits for the following analytes: gamma-BHC (Lindane), Heptachlor, Heptachlor epoxide and Methoxychlor. These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported. LCS 280-423271/2-F.

gamma-BHC (Lindane), Heptachlor, Heptachlor epoxide and Methoxychlor failed the recovery criteria high for the MS of sample CRC-B22-0105MS (160-29498-3) and MSD of sample CRC-B22-0105MSD (160-29498-3) in batch 280-424154.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

POLYCHLORINATED BIPHENYLS (PCBS) BY GAS CHROMATOGRAPHY
Sample CRC-B21-0205 (160-29498-2) was analyzed for Polychlorinated Biphenyls (PCBs) by Gas Chromatography in accordance with SW 846. The samples were prepared on 07/24/2018 and analyzed on 08/03/2018.

Analytical Batch: 280-424773
The following samples underwent a sulfuric acid clean-up, via EPA Method 3665A, to reduce matrix interferences: CRC-B21-0205 (160-29498-2), (LCS 280-423389/2-A), (MB 280-423389/1-A), (160-29498-B-2-B MS) and (160-29498-B-2-C MSD)
Prep Batches: 424190 / 424496 / 423389 / 423734 / 423648
Acid Lot: 186983

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TCLP CHLORINATED HERBICIDES
Sample CRC-B22-0105 (160-29498-3) was analyzed for TCLP chlorinated herbicides in accordance with SW- 846 Method 9315. The samples were leached on 07/23/2018, prepared on 07/25/2018 and analyzed on 08/09/2018.

Analytical Batch: 280-425378
The continuing calibration verification (CCV) associated with batch 280-425378 recovered above the upper control limit for 2,4,5-T, 2,4-D and Silvex (2,4,5-TP) on the front column. The samples associated with this CCV were non-detects for the affected analytes; therefore, the all of the data have been reported from the back, in control, column. The following sample is impacted: CRC-B22-0105 (160-29498-3).
CCV In control
CCV (front column) 2,4,5-T +18%, 2,4-D +16% and Silvex (2,4,5-TP) +17%; (back column) In control

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TCLP METALS (ICP)
Sample CRC-B22-0105 (160-29498-3) was analyzed for TCLP metals (ICP) in accordance with EPA SW-846 Methods 1311/ 6010B. The samples were leached on 07/23/2018, prepared on 07/25/2018 and analyzed on 07/26/2018.

Barium and Lead were detected in method blank LB 280-423271/1-B at levels that were above the method detection limit but below the reporting limit. The values should be considered estimates, and have been flagged. If the associated sample reported a result above the MDL and/or RL, the result has been flagged. Refer to the QC report for details.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TCLP MERCURY
Sample CRC-B22-0105 (160-29498-3) was analyzed for TCLP mercury in accordance with EPA SW-846 Methods 1311/7470A. The samples were leached on 07/23/2018, and prepared and analyzed on 07/25/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

IGNITABILITY,PENSKY-MARTENS CLOSED CUP METHOD
Sample CRC-B23-0104 (160-29498-4) was analyzed for Ignitability, Pensky-Martens Closed Cup Method in accordance with EPA SW-846 Method 1010. The samples were analyzed on 07/27/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TOTAL AND AMENABLE CYANIDE
Sample CRC-B21-0205 (160-29498-2) was analyzed for total and amenable cyanide in accordance with EPA SW-846 Method 9012A. The samples were prepared and analyzed on 07/24/2018.

Cyanide, Total failed the recovery criteria high for the MS of sample 280-111993-1 in batch 280-423433. Refer to the QC report for details.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ORGANIC HALIDES, EXTRACTABLE (EOX)
Sample CRC-B23-0104 (160-29498-4) was analyzed for Organic Halides, Extractable (EOX) in accordance with EPA SW-846 Method 9023. The samples were prepared on 07/24/2018 and analyzed on 07/25/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TOTAL SULFIDE
Sample CRC-B23-0104 (160-29498-4) was analyzed for total sulfide in accordance with EPA SW-846 Method 9034. The samples were prepared and analyzed on 07/24/2018.

Analytical Batch: 280-423463
The following sample was received outside of holding time: CRC-B23-0104 (160-29498-4). Samples were received on Friday, and rad screens were required prior to shipping. Samples were shipped 7/17/2018, and received on 7/21/2018, two days beyond holding time.

The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 280-423448 and analytical batch 280-423463 were outside control limits. Sample matrix interference is suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

PH
Sample CRC-B21-0205 (160-29498-2) was analyzed for pH in accordance with EPA SW-846 Method 9045D. The samples were prepared and analyzed on 07/19/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

PHENOLICS, TOTAL RECOVERABLE
Sample CRC-B21-0205 (160-29498-2) was analyzed for phenolics, total recoverable in accordance with EPA SW-846 Method 9066. The samples were prepared on 08/06/2018 and analyzed on 08/07/2018.

Analytical Batch: 490-534505
The matrix spike duplicate (MSD) recovery for preparation batch 490-534142 and analytical batch 490-534505 was outside control limits. Non-homogeneity is suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits. Phenols, Total exceeded the RPD limit.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

PAINT FILTER
Sample CRC-B21-0205 (160-29498-2) was analyzed for Paint Filter in accordance with EPA SW-846 Method 9095B. The samples were analyzed on 08/09/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

PERCENT SOLIDS
Samples CRC-B20-0206 (160-29498-1), CRC-B21-0205 (160-29498-2), CRC-B22-0105 (160-29498-3) and CRC-B23-0104 (160-29498-4) were analyzed for percent solids in accordance with EPA Method 160.3 MOD. The samples were analyzed on 07/17/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)
Sample CRC-B20-0206 (160-29498-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA 901.1. The samples were leached on 07/18/2018, prepared on 07/19/2018 and analyzed on 08/09/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GROSS ALPHA AND GROSS BETA RADIOACTIVITY
Sample CRC-B20-0206 (160-29498-1) was analyzed for Gross Alpha and Gross Beta Radioactivity in accordance with SW-846 Method 9310. The samples were leached on 07/18/2018, and prepared and analyzed on 08/02/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)
Sample CRC-B20-0206 (160-29498-1) was analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with DOE A01R_Th. The samples were leached on 07/18/2018, prepared on 08/22/2018 and analyzed on 08/29/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Sample CRC-B20-0206 (160-29498-1) was analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were leached on 07/18/2018, prepared on 07/29/2018 and analyzed on 08/09/2018.

Prep Batch: 160-378568

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: CRC-B20-0206 (160-29498-1) and (160-29498-A-1-B DU). The samples contain rocks.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Client Sample ID: CRC-B20-0206 — Lab Sample ID: 160-29498-1

Date Collected: 07/11/18 15:08 — **Matrix: Solid**
Date Received: 07/13/18 09:30

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**8.7**		0.1	0.1	%			07/17/18 16:08	1
Percent Solids	**91.3**		0.1	0.1	%			07/17/18 16:08	1

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	1.07	U	2.68	2.68		4.46	pCi/g	07/19/18 15:00	08/09/18 07:19	1
Actinium-228	**1.37**		0.544	0.562		0.626	pCi/g	07/19/18 15:00	08/09/18 07:19	1
Bismuth-212	-1.07	U	2.55	2.55		4.30	pCi/g	07/19/18 15:00	08/09/18 07:19	1
Bismuth-214	**17.6**		0.896	2.03		0.365	pCi/g	07/19/18 15:00	08/09/18 07:19	1
Lead-210	**19.5**		4.38	4.94		5.40	pCi/g	07/19/18 15:00	08/09/18 07:19	1
Lead-212	**1.09**		0.234	0.273		0.312	pCi/g	07/19/18 15:00	08/09/18 07:19	1
Lead-214	**19.3**		0.754	2.15		0.500	pCi/g	07/19/18 15:00	08/09/18 07:19	1
Potassium-40	**12.8**		2.93	3.21		2.16	pCi/g	07/19/18 15:00	08/09/18 07:19	1
Protactinium-231	0.000	U	2.75	2.75		21.1	pCi/g	07/19/18 15:00	08/09/18 07:19	1
Radium-226	**17.6**		0.896	2.03	1.00	0.365	pCi/g	07/19/18 15:00	08/09/18 07:19	1
Radium-228	**1.37**		0.544	0.562		0.626	pCi/g	07/19/18 15:00	08/09/18 07:19	1
Thallium-208	**0.458**		0.186	0.192		0.199	pCi/g	07/19/18 15:00	08/09/18 07:19	1
Thorium-232	**1.37**		0.544	0.562		0.626	pCi/g	07/19/18 15:00	08/09/18 07:19	1
Thorium-234	**16.2**		3.39	3.79		4.90	pCi/g	07/19/18 15:00	08/09/18 07:19	1
Uranium-235	**2.18**		1.00	1.03		1.20	pCi/g	07/19/18 15:00	08/09/18 07:19	1
Uranium-238	**16.2**		3.39	3.79		4.90	pCi/g	07/19/18 15:00	08/09/18 07:19	1

Method: 9310 - Gross Alpha / Beta (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	**365**		20.7	46.4	10.0	5.74	pCi/g	08/02/18 14:49	08/02/18 21:07	1
Gross Beta	**154**		8.28	17.5	10.0	6.25	pCi/g	08/02/18 14:49	08/02/18 21:07	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	**35.0**		1.17	3.16	1.00	0.136	pCi/g	08/22/18 16:06	08/29/18 18:13	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*71.2*		*30 - 110*	*08/22/18 16:06*	*08/29/18 18:13*	*1*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	**19.2**		0.879	1.84	1.00	0.0833	pCi/g	07/29/18 15:19	08/09/18 14:21	1
Uranium-235	**1.09**		0.235	0.252	1.00	0.0793	pCi/g	07/29/18 15:19	08/09/18 14:21	1
Uranium-238	**19.9**		0.894	1.89	1.00	0.0928	pCi/g	07/29/18 15:19	08/09/18 14:21	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*51.0*		*30 - 110*	*07/29/18 15:19*	*08/09/18 14:21*	*1*

Client Sample ID: CRC-B21-0205 — Lab Sample ID: 160-29498-2

Date Collected: 07/12/18 11:40 **Matrix: Solid**
Date Received: 07/13/18 09:30

Method: 8260B - Volatile Organic Compounds (GC/MS) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1.6	U	10	1.6	ug/L			08/06/18 09:48	1
2-Butanone (MEK)	18	U	100	18	ug/L			08/06/18 09:48	1
Carbon tetrachloride	1.9	U	10	1.9	ug/L			08/06/18 09:48	1
Chlorobenzene	1.7	U	10	1.7	ug/L			08/06/18 09:48	1
Chloroform	1.6	U	10	1.6	ug/L			08/06/18 09:48	1
1,2-Dichloroethane	1.3	U	10	1.3	ug/L			08/06/18 09:48	1
1,1-Dichloroethene	2.3	U	10	2.3	ug/L			08/06/18 09:48	1
Tetrachloroethene	2.0	U	10	2.0	ug/L			08/06/18 09:48	1
Trichloroethene	1.6	U	10	1.6	ug/L			08/06/18 09:48	1
Vinyl chloride	1.0	U	10	1.0	ug/L			08/06/18 09:48	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*103*		*64 - 129*		*08/06/18 09:48*	*1*
Toluene-d8 (Surr)	*107*		*78 - 120*		*08/06/18 09:48*	*1*
4-Bromofluorobenzene (Surr)	*97*		*78 - 121*		*08/06/18 09:48*	*1*
Dibromofluoromethane (Surr)	*105*		*79 - 119*		*08/06/18 09:48*	*1*

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1221	33	U	98	33	ug/Kg	☼	07/24/18 08:50	08/03/18 12:23	1
PCB-1016	11	U	69	11	ug/Kg	☼	07/24/18 08:50	08/03/18 12:23	1
PCB-1232	11	U	69	11	ug/Kg	☼	07/24/18 08:50	08/03/18 12:23	1
PCB-1242	19	U	69	19	ug/Kg	☼	07/24/18 08:50	08/03/18 12:23	1
PCB-1248	12	U	69	12	ug/Kg	☼	07/24/18 08:50	08/03/18 12:23	1
PCB-1254	12	U	69	12	ug/Kg	☼	07/24/18 08:50	08/03/18 12:23	1
PCB-1260	5.6	U	69	5.6	ug/Kg	☼	07/24/18 08:50	08/03/18 12:23	1
PCB-1262	24	U	69	24	ug/Kg	☼	07/24/18 08:50	08/03/18 12:23	1
PCB-1268	8.3	U	69	8.3	ug/Kg	☼	07/24/18 08:50	08/03/18 12:23	1
Polychlorinated biphenyls, Total	5.6	U	69	5.6	ug/Kg	☼	07/24/18 08:50	08/03/18 12:23	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*84*		*53 - 128*	*07/24/18 08:50*	*08/03/18 12:23*	*1*
DCB Decachlorobiphenyl	*85*		*59 - 130*	*07/24/18 08:50*	*08/03/18 12:23*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	**1.0**		0.45	0.092	mg/Kg		07/24/18 06:50	07/24/18 11:28	1
pH adj. to 25 deg C	**8.0**		0.1	0.1	SU		07/19/18 20:42	07/19/18 23:27	1
Phenols, Total	**1.7**	**J F1 F2**	2.7	1.1	mg/Kg	☼	08/06/18 12:57	08/07/18 18:25	1
Free Liquid	**Pass**		0.10	0.10	NONE			08/09/18 18:34	1
Percent Moisture	**5.8**		0.1	0.1	%			07/17/18 16:08	1
Percent Solids	**94.2**		0.1	0.1	%			07/17/18 16:08	1

Client Sample ID: CRC-B22-0105 — Lab Sample ID: 160-29498-3

Date Collected: 07/12/18 11:50 **Matrix: Solid**
Date Received: 07/13/18 09:30

Method: 8270C - Semivolatile Organic Compounds (GC/MS) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Methylphenol	0.0049	U	0.050	0.0049	mg/L		07/25/18 10:50	07/28/18 01:03	1
3 & 4 Methylphenol	0.0013	U	0.050	0.0013	mg/L		07/25/18 10:50	07/28/18 01:03	1

Client Sample ID: CRC-B22-0105 **Lab Sample ID: 160-29498-3**
Date Collected: 07/12/18 11:50 **Matrix: Solid**
Date Received: 07/13/18 09:30

Method: 8270C - Semivolatile Organic Compounds (GC/MS) - TCLP (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Cresols	0.0013	U	0.050	0.0013	mg/L		07/25/18 10:50	07/28/18 01:03	1
1,4-Dichlorobenzene	0.0016	U	0.020	0.0016	mg/L		07/25/18 10:50	07/28/18 01:03	1
2,4-Dinitrotoluene	0.0083	U	0.050	0.0083	mg/L		07/25/18 10:50	07/28/18 01:03	1
Hexachlorobenzene	0.0033	U	0.050	0.0033	mg/L		07/25/18 10:50	07/28/18 01:03	1
Hexachlorobutadiene	0.017	U	0.050	0.017	mg/L		07/25/18 10:50	07/28/18 01:03	1
Hexachloroethane	0.011	U	0.050	0.011	mg/L		07/25/18 10:50	07/28/18 01:03	1
Nitrobenzene	0.0041	U	0.050	0.0041	mg/L		07/25/18 10:50	07/28/18 01:03	1
Pentachlorophenol	0.10	U	0.25	0.10	mg/L		07/25/18 10:50	07/28/18 01:03	1
Pyridine	0.0057	U	0.10	0.0057	mg/L		07/25/18 10:50	07/28/18 01:03	1
2,4,6-Trichlorophenol	0.0014	U	0.025	0.0014	mg/L		07/25/18 10:50	07/28/18 01:03	1
2,4,5-Trichlorophenol	0.0022	U	0.050	0.0022	mg/L		07/25/18 10:50	07/28/18 01:03	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*79*		*50 - 135*	*07/25/18 10:50*	*07/28/18 01:03*	*1*
2-Fluorophenol	*87*		*46 - 135*	*07/25/18 10:50*	*07/28/18 01:03*	*1*
Phenol-d5	*73*		*40 - 135*	*07/25/18 10:50*	*07/28/18 01:03*	*1*
2,4,6-Tribromophenol	*82*		*50 - 135*	*07/25/18 10:50*	*07/28/18 01:03*	*1*
Terphenyl-d14	*84*		*52 - 135*	*07/25/18 10:50*	*07/28/18 01:03*	*1*
Nitrobenzene-d5	*79*		*49 - 135*	*07/25/18 10:50*	*07/28/18 01:03*	*1*

Method: 8081B - Organochlorine Pesticides (GC) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Endrin	0.000079	U	0.00050	0.000079	mg/L		07/25/18 11:45	07/31/18 02:57	1
Heptachlor	0.000077	U * F1	0.00050	0.000077	mg/L		07/25/18 11:45	07/31/18 02:57	1
Heptachlor epoxide	0.000075	U * F1	0.00050	0.000075	mg/L		07/25/18 11:45	07/31/18 02:57	1
gamma-BHC (Lindane)	0.000069	U * F1	0.00050	0.000069	mg/L		07/25/18 11:45	07/31/18 02:57	1
Methoxychlor	0.00013	U * F1	0.0010	0.00013	mg/L		07/25/18 11:45	07/31/18 02:57	1
Toxaphene	0.0037	U	0.020	0.0037	mg/L		07/25/18 11:45	07/31/18 02:57	1
Technical Chlordane	0.0014	U	0.0050	0.0014	mg/L		07/25/18 11:45	07/31/18 02:57	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*91*		*28 - 115*	*07/25/18 11:45*	*07/31/18 02:57*	*1*
DCB Decachlorobiphenyl	*100*		*34 - 122*	*07/25/18 11:45*	*07/31/18 02:57*	*1*

Method: 8151A - Herbicides (GC) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.0021	U	0.040	0.0021	mg/L		07/25/18 09:20	08/09/18 01:13	1
Silvex (2,4,5-TP)	0.0017	U	0.010	0.0017	mg/L		07/25/18 09:20	08/09/18 01:13	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4-Dichlorophenylacetic acid	*33*		*10 - 131*	*07/25/18 09:20*	*08/09/18 01:13*	*1*

Method: 6010B - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.022	U	0.50	0.022	mg/L		07/25/18 16:00	07/26/18 13:14	1
Barium	**0.19**	**J B**	1.0	0.0040	mg/L		07/25/18 16:00	07/26/18 13:14	1
Cadmium	**0.0041**	**J**	0.10	0.0020	mg/L		07/25/18 16:00	07/26/18 13:14	1
Chromium	0.0030	U	0.50	0.0030	mg/L		07/25/18 16:00	07/26/18 13:14	1
Lead	**0.023**	**J B**	0.50	0.014	mg/L		07/25/18 16:00	07/26/18 13:14	1
Selenium	0.032	U	0.10	0.032	mg/L		07/25/18 16:00	07/26/18 13:14	1
Silver	0.0050	U	0.50	0.0050	mg/L		07/25/18 16:00	07/26/18 13:14	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.000030	U	0.0020	0.000030	mg/L		07/25/18 10:54	07/25/18 17:32	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**7.3**		0.1	0.1	%			07/17/18 16:08	1
Percent Solids	**92.7**		0.1	0.1	%			07/17/18 16:08	1

Client Sample ID: CRC-B23-0104 — Lab Sample ID: 160-29498-4

Date Collected: 07/12/18 12:10 — **Matrix: Solid**
Date Received: 07/13/18 09:30

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Flashpoint	**>60**		1.00	1.00	Degrees C			07/27/18 20:35	1
Halogens, Extractable Organic	27	U	54	27	mg/Kg	☼	07/24/18 15:27	07/25/18 12:03	1
Sulfide	**76**	**H F1**	10	2.4	mg/Kg		07/24/18 13:20	07/24/18 14:58	1
Percent Moisture	**11.3**		0.1	0.1	%			07/17/18 16:08	1
Percent Solids	**88.7**		0.1	0.1	%			07/17/18 16:08	1

Default Detection Limits

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29498-1

Method: 8260B - Volatile Organic Compounds (GC/MS) - TCLP

Leach: 1311

Analyte	RL	MDL	Units	Method
1,1-Dichloroethene	10	2.3	ug/L	8260B
1,2-Dichloroethane	10	1.3	ug/L	8260B
2-Butanone (MEK)	100	18	ug/L	8260B
Benzene	10	1.6	ug/L	8260B
Carbon tetrachloride	10	1.9	ug/L	8260B
Chlorobenzene	10	1.7	ug/L	8260B
Chloroform	10	1.6	ug/L	8260B
Tetrachloroethene	10	2.0	ug/L	8260B
Trichloroethene	10	1.6	ug/L	8260B
Vinyl chloride	10	1.0	ug/L	8260B

Method: 8270C - Semivolatile Organic Compounds (GC/MS) - TCLP

Prep: 3510C

Leach: 1311

Analyte	RL	MDL	Units	Method
1,4-Dichlorobenzene	0.020	0.0016	mg/L	8270C
2,4,5-Trichlorophenol	0.050	0.0022	mg/L	8270C
2,4,6-Trichlorophenol	0.025	0.0014	mg/L	8270C
2,4-Dinitrotoluene	0.050	0.0083	mg/L	8270C
2-Methylphenol	0.050	0.0049	mg/L	8270C
3 & 4 Methylphenol	0.050	0.0013	mg/L	8270C
Hexachlorobenzene	0.050	0.0033	mg/L	8270C
Hexachlorobutadiene	0.050	0.017	mg/L	8270C
Hexachloroethane	0.050	0.011	mg/L	8270C
Nitrobenzene	0.050	0.0041	mg/L	8270C
Pentachlorophenol	0.25	0.10	mg/L	8270C
Pyridine	0.10	0.0057	mg/L	8270C
Total Cresols	0.050	0.0013	mg/L	8270C

Method: 8081B - Organochlorine Pesticides (GC) - TCLP

Prep: 3510C

Leach: 1311

Analyte	RL	MDL	Units	Method
Endrin	0.00050	0.000079	mg/L	8081B
gamma-BHC (Lindane)	0.00050	0.000069	mg/L	8081B
Heptachlor	0.00050	0.000077	mg/L	8081B
Heptachlor epoxide	0.00050	0.000075	mg/L	8081B
Methoxychlor	0.0010	0.00013	mg/L	8081B
Technical Chlordane	0.0050	0.0014	mg/L	8081B
Toxaphene	0.020	0.0037	mg/L	8081B

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Prep: 3546

Analyte	RL	MDL	Units	Method
PCB-1016	66	10	ug/Kg	8082A
PCB-1221	94	31	ug/Kg	8082A
PCB-1232	66	10	ug/Kg	8082A
PCB-1242	66	18	ug/Kg	8082A
PCB-1248	66	11	ug/Kg	8082A

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography (Continued)

Prep: 3546

Analyte	RL	MDL	Units	Method
PCB-1254	66	11	ug/Kg	8082A
PCB-1260	66	5.3	ug/Kg	8082A
PCB-1262	66	23	ug/Kg	8082A
PCB-1268	66	7.9	ug/Kg	8082A
Polychlorinated biphenyls, Total	66	5.3	ug/Kg	8082A

Method: 8151A - Herbicides (GC) - TCLP

Prep: 8151A
Leach: 1311

Analyte	RL	MDL	Units	Method
2,4-D	0.040	0.0021	mg/L	8151A
Silvex (2,4,5-TP)	0.010	0.0017	mg/L	8151A

Method: 6010B - Metals (ICP) - TCLP

Prep: 3010A
Leach: 1311

Analyte	RL	MDL	Units	Method
Arsenic	0.50	0.022	mg/L	6010B
Barium	1.0	0.0040	mg/L	6010B
Cadmium	0.10	0.0020	mg/L	6010B
Chromium	0.50	0.0030	mg/L	6010B
Lead	0.50	0.014	mg/L	6010B
Selenium	0.10	0.032	mg/L	6010B
Silver	0.50	0.0050	mg/L	6010B

Method: 7470A - Mercury (CVAA) - TCLP

Prep: 7470A
Leach: 1311

Analyte	RL	MDL	Units	Method
Mercury	0.0020	0.000030	mg/L	7470A

General Chemistry

Analyte	RL	MDL	Units	Method
Flashpoint	1.00	1.00	Degrees C	1010A
Free Liquid	0.10	0.10	NONE	9095B
Percent Moisture	0.1	0.1	%	Moisture
Percent Solids	0.1	0.1	%	Moisture

General Chemistry

Prep: 9012A

Analyte	RL	MDL	Units	Method
Cyanide, Total	0.50	0.10	mg/Kg	9012A

General Chemistry

Prep: 9023

Analyte	RL	MDL	Units	Method
Halogens, Extractable Organic	50	25	mg/Kg	9023

Default Detection Limits

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29498-1

General Chemistry
Prep: 9030B

Analyte	RL	MDL	Units	Method
Sulfide	10	2.4	mg/Kg	9034

General Chemistry
Prep: DILeach_Prep

Analyte	RL	MDL	Units	Method
pH adj. to 25 deg C	0.1	0.1	SU	9045D

General Chemistry
Prep: Distill/Phenol

Analyte	RL	MDL	Units	Method
Phenols, Total	2.5	1.0	mg/Kg	9066

Surrogate Summary

Client: Tetra Tech, Inc. TestAmerica Job ID: 160-29498-1
Project/Site: Former Carnotite Site - Non-Rad Analysis

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: TCLP**

		Percent Surrogate Recovery (Acceptance Limits)			
		DCA	TOL	BFB	DBFM
Lab Sample ID	Client Sample ID	(64-129)	(78-120)	(78-121)	(79-119)
160-29498-2	CRC-B21-0205	103	107	97	105
160-29498-2 MS	CRC-B21-0205	101	106	98	106
160-29498-2 MSD	CRC-B21-0205	109	106	98	109
LB 280-423316/1-A	Method Blank	103	107	99	105
LCS 280-423316/2-A	Lab Control Sample	103	101	94	103

Surrogate Legend

DCA = 1,2-Dichloroethane-d4 (Surr)
TOL = Toluene-d8 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane (Surr)

Method: 8270C - Semivolatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: TCLP**

		Percent Surrogate Recovery (Acceptance Limits)					
		FBP	2FP	PHL	TBP	TPHL	NBZ
Lab Sample ID	Client Sample ID	(50-135)	(46-135)	(40-135)	(50-135)	(52-135)	(49-135)
160-29498-3	CRC-B22-0105	79	87	73	82	84	79
160-29498-3 MS	CRC-B22-0105	72	77	70	80	80	81
160-29498-3 MSD	CRC-B22-0105	71	75	66	77	75	78
LB 280-423271/1-F	Method Blank	75	70	62	80	73	74
LCS 280-423271/3-B	Lab Control Sample	74	72	66	82	78	77

Surrogate Legend

FBP = 2-Fluorobiphenyl
2FP = 2-Fluorophenol
PHL = Phenol-d5
TBP = 2,4,6-Tribromophenol
TPHL = Terphenyl-d14
NBZ = Nitrobenzene-d5

Method: 8081B - Organochlorine Pesticides (GC)

Matrix: Solid **Prep Type: TCLP**

		Percent Surrogate Recovery (Acceptance Limits)	
		TCX1	DCBP1
Lab Sample ID	Client Sample ID	(28-115)	(34-122)
160-29498-3	CRC-B22-0105	91	100
160-29498-3 MS	CRC-B22-0105	86	91
160-29498-3 MSD	CRC-B22-0105	87	91
LB 280-423271/1-G	Method Blank	83	94
LCS 280-423271/2-F	Lab Control Sample	79	91
LCS 280-423271/3-C	Lab Control Sample	77	91

Surrogate Legend

TCX = Tetrachloro-m-xylene
DCBP = DCB Decachlorobiphenyl

Surrogate Summary

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29498-1

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)	
Lab Sample ID	Client Sample ID	TCX2 (53-128)	DCBP2 (59-130)
160-29498-2	CRC-B21-0205	84	85
160-29498-2 MS	CRC-B21-0205	76	78
160-29498-2 MSD	CRC-B21-0205	77	79
LCS 280-423389/2-A	Lab Control Sample	83	87
MB 280-423389/1-A	Method Blank	78	82

Surrogate Legend

TCX = Tetrachloro-m-xylene

DCBP = DCB Decachlorobiphenyl

Method: 8151A - Herbicides (GC)

Matrix: Solid **Prep Type: TCLP**

		Percent Surrogate Recovery (Acceptance Limits)
Lab Sample ID	Client Sample ID	DCPAA2 (10-131)
160-29498-3	CRC-B22-0105	33
280-112289-A-1-E MS	Matrix Spike	38
280-112289-A-1-F MSD	Matrix Spike Duplicate	45
LB 280-423271/1-D	Method Blank	39
LCS 280-423271/2-D	Lab Control Sample	36

Surrogate Legend

DCPAA = 2,4-Dichlorophenylacetic acid

Tracer/Carrier Summary

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29498-1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	horium-22 (30-110)
160-29498-1	CRC-B20-0206	71.2
160-29498-1 DU	CRC-B20-0206	77.7
LCS 160-384585/2-A	Lab Control Sample	90.0
MB 160-384585/1-A	Method Blank	86.7

Tracer/Carrier Legend

Thorium-229 = Thorium-229

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	ranium-23 (30-110)
160-29498-1	CRC-B20-0206	51.0
160-29498-1 DU	CRC-B20-0206	51.3
LCS 160-378568/2-A	Lab Control Sample	79.4
MB 160-378568/1-A	Method Blank	88.3

Tracer/Carrier Legend

Uranium-232 = Uranium-232

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: LB 280-423316/1-A **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 424938

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1.6	U	10	1.6	ug/L			08/06/18 09:28	1
2-Butanone (MEK)	18	U	100	18	ug/L			08/06/18 09:28	1
Carbon tetrachloride	1.9	U	10	1.9	ug/L			08/06/18 09:28	1
Chlorobenzene	1.7	U	10	1.7	ug/L			08/06/18 09:28	1
Chloroform	1.6	U	10	1.6	ug/L			08/06/18 09:28	1
1,2-Dichloroethane	1.3	U	10	1.3	ug/L			08/06/18 09:28	1
1,1-Dichloroethene	2.3	U	10	2.3	ug/L			08/06/18 09:28	1
Tetrachloroethene	2.0	U	10	2.0	ug/L			08/06/18 09:28	1
Trichloroethene	1.6	U	10	1.6	ug/L			08/06/18 09:28	1
Vinyl chloride	1.0	U	10	1.0	ug/L			08/06/18 09:28	1

Surrogate	*LB %Recovery*	*LB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*103*		*64 - 129*		*08/06/18 09:28*	*1*
Toluene-d8 (Surr)	*107*		*78 - 120*		*08/06/18 09:28*	*1*
4-Bromofluorobenzene (Surr)	*99*		*78 - 121*		*08/06/18 09:28*	*1*
Dibromofluoromethane (Surr)	*105*		*79 - 119*		*08/06/18 09:28*	*1*

Lab Sample ID: LCS 280-423316/2-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 424938

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	50.0	48.4		ug/L		97	74 - 135
2-Butanone (MEK)	200	173		ug/L		87	44 - 150
Carbon tetrachloride	50.0	44.7		ug/L		89	67 - 135
Chlorobenzene	50.0	45.6		ug/L		91	76 - 135
Chloroform	50.0	49.1		ug/L		98	76 - 120
1,2-Dichloroethane	50.0	49.3		ug/L		99	70 - 135
1,1-Dichloroethene	50.0	45.9		ug/L		92	71 - 136
Tetrachloroethene	50.0	44.0		ug/L		88	70 - 135
Trichloroethene	50.0	46.7		ug/L		93	73 - 135
Vinyl chloride	50.0	50.0		ug/L		100	40 - 144

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*103*		*64 - 129*
Toluene-d8 (Surr)	*101*		*78 - 120*
4-Bromofluorobenzene (Surr)	*94*		*78 - 121*
Dibromofluoromethane (Surr)	*103*		*79 - 119*

Lab Sample ID: 160-29498-2 MS **Client Sample ID: CRC-B21-0205**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 424938

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	1.6	U	50.0	50.9		ug/L		102	74 - 135
2-Butanone (MEK)	18	U	200	192		ug/L		96	44 - 150
Carbon tetrachloride	1.9	U	50.0	51.5		ug/L		103	67 - 135

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 160-29498-2 MS **Client Sample ID: CRC-B21-0205**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 424938

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chlorobenzene	1.7	U	50.0	48.2		ug/L		96	76 - 135
Chloroform	1.6	U	50.0	52.1		ug/L		104	76 - 120
1,2-Dichloroethane	1.3	U	50.0	51.6		ug/L		103	70 - 135
1,1-Dichloroethene	2.3	U	50.0	51.3		ug/L		103	71 - 136
Tetrachloroethene	2.0	U	50.0	49.3		ug/L		99	70 - 135
Trichloroethene	1.6	U	50.0	50.9		ug/L		102	73 - 135
Vinyl chloride	1.0	U	50.0	56.4		ug/L		113	40 - 144

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*101*		*64 - 129*
Toluene-d8 (Surr)	*106*		*78 - 120*
4-Bromofluorobenzene (Surr)	*98*		*78 - 121*
Dibromofluoromethane (Surr)	*106*		*79 - 119*

Lab Sample ID: 160-29498-2 MSD **Client Sample ID: CRC-B21-0205**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 424938

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	1.6	U	50.0	50.7		ug/L		101	74 - 135	0	20
2-Butanone (MEK)	18	U	200	209		ug/L		105	44 - 150	8	32
Carbon tetrachloride	1.9	U	50.0	50.5		ug/L		101	67 - 135	2	21
Chlorobenzene	1.7	U	50.0	47.9		ug/L		96	76 - 135	1	20
Chloroform	1.6	U	50.0	51.5		ug/L		103	76 - 120	1	20
1,2-Dichloroethane	1.3	U	50.0	52.9		ug/L		106	70 - 135	3	20
1,1-Dichloroethene	2.3	U	50.0	51.3		ug/L		103	71 - 136	0	20
Tetrachloroethene	2.0	U	50.0	47.7		ug/L		95	70 - 135	3	20
Trichloroethene	1.6	U	50.0	49.6		ug/L		99	73 - 135	3	20
Vinyl chloride	1.0	U	50.0	57.5		ug/L		115	40 - 144	2	24

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*109*		*64 - 129*
Toluene-d8 (Surr)	*106*		*78 - 120*
4-Bromofluorobenzene (Surr)	*98*		*78 - 121*
Dibromofluoromethane (Surr)	*109*		*79 - 119*

Method: 8270C - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: LB 280-423271/1-F **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 423979 **Prep Batch: 423590**

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Methylphenol	0.0049	U	0.050	0.0049	mg/L		07/25/18 10:50	07/27/18 18:23	1
3 & 4 Methylphenol	0.0013	U	0.050	0.0013	mg/L		07/25/18 10:50	07/27/18 18:23	1
Total Cresols	0.0013	U	0.050	0.0013	mg/L		07/25/18 10:50	07/27/18 18:23	1
1,4-Dichlorobenzene	0.0016	U	0.020	0.0016	mg/L		07/25/18 10:50	07/27/18 18:23	1

Method: 8270C - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LB 280-423271/1-F **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 423979 **Prep Batch: 423590**

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-Dinitrotoluene	0.0083	U	0.050	0.0083	mg/L		07/25/18 10:50	07/27/18 18:23	1
Hexachlorobenzene	0.0033	U	0.050	0.0033	mg/L		07/25/18 10:50	07/27/18 18:23	1
Hexachlorobutadiene	0.017	U	0.050	0.017	mg/L		07/25/18 10:50	07/27/18 18:23	1
Hexachloroethane	0.011	U	0.050	0.011	mg/L		07/25/18 10:50	07/27/18 18:23	1
Nitrobenzene	0.0041	U	0.050	0.0041	mg/L		07/25/18 10:50	07/27/18 18:23	1
Pentachlorophenol	0.10	U	0.25	0.10	mg/L		07/25/18 10:50	07/27/18 18:23	1
Pyridine	0.0057	U	0.10	0.0057	mg/L		07/25/18 10:50	07/27/18 18:23	1
2,4,6-Trichlorophenol	0.0014	U	0.025	0.0014	mg/L		07/25/18 10:50	07/27/18 18:23	1
2,4,5-Trichlorophenol	0.0022	U	0.050	0.0022	mg/L		07/25/18 10:50	07/27/18 18:23	1

Surrogate	*LB %Recovery*	*LB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*75*		*50 - 135*	*07/25/18 10:50*	*07/27/18 18:23*	*1*
2-Fluorophenol	*70*		*46 - 135*	*07/25/18 10:50*	*07/27/18 18:23*	*1*
Phenol-d5	*62*		*40 - 135*	*07/25/18 10:50*	*07/27/18 18:23*	*1*
2,4,6-Tribromophenol	*80*		*50 - 135*	*07/25/18 10:50*	*07/27/18 18:23*	*1*
Terphenyl-d14	*73*		*52 - 135*	*07/25/18 10:50*	*07/27/18 18:23*	*1*
Nitrobenzene-d5	*74*		*49 - 135*	*07/25/18 10:50*	*07/27/18 18:23*	*1*

Lab Sample ID: LCS 280-423271/3-B **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 423979 **Prep Batch: 423590**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
2-Methylphenol	0.250	0.196		mg/L		78	51 - 135
3 & 4 Methylphenol	0.500	0.395		mg/L		79	50 - 135
1,4-Dichlorobenzene	0.250	0.186		mg/L		74	44 - 135
2,4-Dinitrotoluene	0.100	0.0667		mg/L		67	37 - 135
Hexachlorobenzene	0.100	0.0761		mg/L		76	60 - 135
Hexachlorobutadiene	0.250	0.189		mg/L		76	41 - 135
Hexachloroethane	0.250	0.184		mg/L		74	41 - 135
Nitrobenzene	0.250	0.200		mg/L		80	50 - 135
Pentachlorophenol	0.500	0.370		mg/L		74	33 - 135
Pyridine	0.250	0.167		mg/L		67	10 - 135
2,4,6-Trichlorophenol	0.250	0.194		mg/L		78	53 - 135
2,4,5-Trichlorophenol	0.250	0.197		mg/L		79	56 - 135

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2-Fluorobiphenyl	*74*		*50 - 135*
2-Fluorophenol	*72*		*46 - 135*
Phenol-d5	*66*		*40 - 135*
2,4,6-Tribromophenol	*82*		*50 - 135*
Terphenyl-d14	*78*		*52 - 135*
Nitrobenzene-d5	*77*		*49 - 135*

Method: 8270C - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 160-29498-3 MS **Client Sample ID: CRC-B22-0105**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 423979 **Prep Batch: 423590**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
2-Methylphenol	0.0049	U	0.250	0.198		mg/L		79	51 - 135
3 & 4 Methylphenol	0.0013	U	0.500	0.398		mg/L		80	50 - 135
1,4-Dichlorobenzene	0.0016	U	0.250	0.186		mg/L		74	44 - 135
2,4-Dinitrotoluene	0.0083	U	0.100	0.0680		mg/L		68	37 - 135
Hexachlorobenzene	0.0033	U	0.100	0.0758		mg/L		76	60 - 135
Hexachlorobutadiene	0.017	U	0.250	0.187		mg/L		75	41 - 135
Hexachloroethane	0.011	U	0.250	0.181		mg/L		72	41 - 135
Nitrobenzene	0.0041	U	0.250	0.211		mg/L		85	50 - 135
Pentachlorophenol	0.10	U	0.500	0.377		mg/L		75	33 - 135
Pyridine	0.0057	U	0.250	0.165		mg/L		66	10 - 135
2,4,6-Trichlorophenol	0.0014	U	0.250	0.189		mg/L		76	53 - 135
2,4,5-Trichlorophenol	0.0022	U	0.250	0.202		mg/L		81	56 - 135

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
2-Fluorobiphenyl	*72*		*50 - 135*
2-Fluorophenol	*77*		*46 - 135*
Phenol-d5	*70*		*40 - 135*
2,4,6-Tribromophenol	*80*		*50 - 135*
Terphenyl-d14	*80*		*52 - 135*
Nitrobenzene-d5	*81*		*49 - 135*

Lab Sample ID: 160-29498-3 MSD **Client Sample ID: CRC-B22-0105**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 423979 **Prep Batch: 423590**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
2-Methylphenol	0.0049	U	0.250	0.192		mg/L		77	51 - 135	3	30
3 & 4 Methylphenol	0.0013	U	0.500	0.379		mg/L		76	50 - 135	5	30
1,4-Dichlorobenzene	0.0016	U	0.250	0.156		mg/L		63	44 - 135	17	30
2,4-Dinitrotoluene	0.0083	U	0.100	0.0641		mg/L		64	37 - 135	6	30
Hexachlorobenzene	0.0033	U	0.100	0.0728		mg/L		73	60 - 135	4	30
Hexachlorobutadiene	0.017	U	0.250	0.145		mg/L		58	41 - 135	26	30
Hexachloroethane	0.011	U	0.250	0.140		mg/L		56	41 - 135	25	30
Nitrobenzene	0.0041	U	0.250	0.204		mg/L		82	50 - 135	3	30
Pentachlorophenol	0.10	U	0.500	0.365		mg/L		73	33 - 135	3	30
Pyridine	0.0057	U	0.250	0.178		mg/L		71	10 - 135	8	30
2,4,6-Trichlorophenol	0.0014	U	0.250	0.187		mg/L		75	53 - 135	1	30
2,4,5-Trichlorophenol	0.0022	U	0.250	0.198		mg/L		79	56 - 135	2	30

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
2-Fluorobiphenyl	*71*		*50 - 135*
2-Fluorophenol	*75*		*46 - 135*
Phenol-d5	*66*		*40 - 135*
2,4,6-Tribromophenol	*77*		*50 - 135*
Terphenyl-d14	*75*		*52 - 135*
Nitrobenzene-d5	*78*		*49 - 135*

Method: 8081B - Organochlorine Pesticides (GC)

Lab Sample ID: LB 280-423271/1-G **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 424154 **Prep Batch: 423606**

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Endrin	0.000079	U	0.00050	0.000079	mg/L		07/25/18 11:45	07/30/18 23:47	1
Heptachlor	0.000077	U	0.00050	0.000077	mg/L		07/25/18 11:45	07/30/18 23:47	1
Heptachlor epoxide	0.000075	U	0.00050	0.000075	mg/L		07/25/18 11:45	07/30/18 23:47	1
gamma-BHC (Lindane)	0.000069	U	0.00050	0.000069	mg/L		07/25/18 11:45	07/30/18 23:47	1
Methoxychlor	0.00013	U	0.0010	0.00013	mg/L		07/25/18 11:45	07/30/18 23:47	1
Toxaphene	0.0037	U	0.020	0.0037	mg/L		07/25/18 11:45	07/30/18 23:47	1
Technical Chlordane	0.0014	U	0.0050	0.0014	mg/L		07/25/18 11:45	07/30/18 23:47	1

Surrogate	*LB %Recovery*	*LB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*83*		*28 - 115*	*07/25/18 11:45*	*07/30/18 23:47*	*1*
DCB Decachlorobiphenyl	*94*		*34 - 122*	*07/25/18 11:45*	*07/30/18 23:47*	*1*

Lab Sample ID: LCS 280-423271/2-F **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 424154 **Prep Batch: 423606**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Endrin	0.00500	0.00614		mg/L		123	72 - 126
Heptachlor	0.00500	0.00653	*	mg/L		131	65 - 122
Heptachlor epoxide	0.00500	0.00638	*	mg/L		128	69 - 121
gamma-BHC (Lindane)	0.00500	0.00609	*	mg/L		122	68 - 119
Methoxychlor	0.00500	0.00676	*	mg/L		135	67 - 127

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Tetrachloro-m-xylene	*79*		*28 - 115*
DCB Decachlorobiphenyl	*91*		*34 - 122*

Lab Sample ID: LCS 280-423271/3-C **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 424154 **Prep Batch: 423606**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Toxaphene	0.0200	0.0219		mg/L		109	63 - 142

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Tetrachloro-m-xylene	*77*		*28 - 115*
DCB Decachlorobiphenyl	*91*		*34 - 122*

Lab Sample ID: 160-29498-3 MS **Client Sample ID: CRC-B22-0105**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 424154 **Prep Batch: 423606**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Endrin	0.000079	U	0.00500	0.00618		mg/L		124	72 - 126
Heptachlor	0.000077	U * F1	0.00500	0.00660	F1	mg/L		132	65 - 122
Heptachlor epoxide	0.000075	U * F1	0.00500	0.00646	F1	mg/L		129	69 - 121
gamma-BHC (Lindane)	0.000069	U * F1	0.00500	0.00632	F1	mg/L		126	68 - 119

Method: 8081B - Organochlorine Pesticides (GC) (Continued)

Lab Sample ID: 160-29498-3 MS **Client Sample ID: CRC-B22-0105**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 424154 **Prep Batch: 423606**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Methoxychlor	0.00013	U * F1	0.00500	0.00648	F1	mg/L		130	67 - 127

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
Tetrachloro-m-xylene	*86*		*28 - 115*
DCB Decachlorobiphenyl	*91*		*34 - 122*

Lab Sample ID: 160-29498-3 MSD **Client Sample ID: CRC-B22-0105**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 424154 **Prep Batch: 423606**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Endrin	0.000079	U	0.00500	0.00622		mg/L		124	72 - 126	1	30
Heptachlor	0.000077	U * F1	0.00500	0.00680	F1	mg/L		136	65 - 122	3	30
Heptachlor epoxide	0.000075	U * F1	0.00500	0.00659	F1	mg/L		132	69 - 121	2	30
gamma-BHC (Lindane)	0.000069	U * F1	0.00500	0.00650	F1	mg/L		130	68 - 119	3	30
Methoxychlor	0.00013	U * F1	0.00500	0.00687	F1	mg/L		137	67 - 127	6	30

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
Tetrachloro-m-xylene	*87*		*28 - 115*
DCB Decachlorobiphenyl	*91*		*34 - 122*

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Lab Sample ID: MB 280-423389/1-A **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 424773 **Prep Batch: 423389**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1221	29	U	87	29	ug/Kg		07/24/18 08:50	08/03/18 11:39	1
PCB-1016	9.4	U	61	9.4	ug/Kg		07/24/18 08:50	08/03/18 11:39	1
PCB-1232	9.4	U	61	9.4	ug/Kg		07/24/18 08:50	08/03/18 11:39	1
PCB-1242	17	U	61	17	ug/Kg		07/24/18 08:50	08/03/18 11:39	1
PCB-1248	10	U	61	10	ug/Kg		07/24/18 08:50	08/03/18 11:39	1
PCB-1254	10	U	61	10	ug/Kg		07/24/18 08:50	08/03/18 11:39	1
PCB-1260	4.9	U	61	4.9	ug/Kg		07/24/18 08:50	08/03/18 11:39	1
PCB-1262	21	U	61	21	ug/Kg		07/24/18 08:50	08/03/18 11:39	1
PCB-1268	7.3	U	61	7.3	ug/Kg		07/24/18 08:50	08/03/18 11:39	1
Polychlorinated biphenyls, Total	4.9	U	61	4.9	ug/Kg		07/24/18 08:50	08/03/18 11:39	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*78*		*53 - 128*	*07/24/18 08:50*	*08/03/18 11:39*	*1*
DCB Decachlorobiphenyl	*82*		*59 - 130*	*07/24/18 08:50*	*08/03/18 11:39*	*1*

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography (Continued)

Lab Sample ID: LCS 280-423389/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 424773 — **Prep Batch: 423389**

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
PCB-1016			120	104		ug/Kg		87	54 - 132		
PCB-1260			120	109		ug/Kg		91	62 - 129		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Tetrachloro-m-xylene	*83*		*53 - 128*
DCB Decachlorobiphenyl	*87*		*59 - 130*

Lab Sample ID: 160-29498-2 MS — **Client Sample ID: CRC-B21-0205**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 424773 — **Prep Batch: 423389**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
PCB-1016	11	U	134	102		ug/Kg	☼	76	54 - 132		
PCB-1260	5.6	U	134	103		ug/Kg	☼	77	62 - 129		

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
Tetrachloro-m-xylene	*76*		*53 - 128*
DCB Decachlorobiphenyl	*78*		*59 - 130*

Lab Sample ID: 160-29498-2 MSD — **Client Sample ID: CRC-B21-0205**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 424773 — **Prep Batch: 423389**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
PCB-1016	11	U	136	109		ug/Kg	☼	80	54 - 132	7	36
PCB-1260	5.6	U	136	111		ug/Kg	☼	82	62 - 129	8	44

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
Tetrachloro-m-xylene	*77*		*53 - 128*
DCB Decachlorobiphenyl	*79*		*59 - 130*

Method: 8151A - Herbicides (GC)

Lab Sample ID: LB 280-423271/1-D — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 425378 — **Prep Batch: 423557**

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.0021	U	0.040	0.0021	mg/L		07/25/18 09:20	08/09/18 00:42	1
Silvex (2,4,5-TP)	0.0017	U	0.010	0.0017	mg/L		07/25/18 09:20	08/09/18 00:42	1

Surrogate	*LB %Recovery*	*LB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4-Dichlorophenylacetic acid	*39*		*10 - 131*	*07/25/18 09:20*	*08/09/18 00:42*	*1*

Method: 8151A - Herbicides (GC) (Continued)

Lab Sample ID: LCS 280-423271/2-D — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 425378 — **Prep Batch: 423557**

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
2,4-D			0.0500	0.0239	J	mg/L		48	13 - 115		
Silvex (2,4,5-TP)			0.0500	0.0274		mg/L		55	10 - 158		
2,4,5-T			0.0500	0.0282		mg/L		56	10 - 122		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2,4-Dichlorophenylacetic acid	*36*		*10 - 131*

Lab Sample ID: 280-112289-A-1-E MS — **Client Sample ID: Matrix Spike**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 425378 — **Prep Batch: 423557**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
2,4-D	0.0021	U	0.0500	0.0279	J	mg/L		56	13 - 115		
Silvex (2,4,5-TP)	0.0017	U	0.0500	0.0331		mg/L		66	10 - 158		
2,4,5-T	0.0019	U	0.0500	0.0344		mg/L		69	10 - 122		

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
2,4-Dichlorophenylacetic acid	*38*		*10 - 131*

Lab Sample ID: 280-112289-A-1-F MSD — **Client Sample ID: Matrix Spike Duplicate**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 425378 — **Prep Batch: 423557**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
2,4-D	0.0021	U	0.0500	0.0340	J	mg/L		68	13 - 115	20	30
Silvex (2,4,5-TP)	0.0017	U	0.0500	0.0362		mg/L		72	10 - 158	9	30
2,4,5-T	0.0019	U	0.0500	0.0380		mg/L		76	10 - 122	10	30

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
2,4-Dichlorophenylacetic acid	*45*		*10 - 131*

Method: 6010B - Metals (ICP)

Lab Sample ID: LB 280-423271/1-B — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 423884 — **Prep Batch: 423503**

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.022	U	0.50	0.022	mg/L		07/25/18 16:00	07/26/18 13:04	1
Barium	0.00698	J	1.0	0.0040	mg/L		07/25/18 16:00	07/26/18 13:04	1
Cadmium	0.0020	U	0.10	0.0020	mg/L		07/25/18 16:00	07/26/18 13:04	1
Chromium	0.0030	U	0.50	0.0030	mg/L		07/25/18 16:00	07/26/18 13:04	1
Lead	0.0259	J	0.50	0.014	mg/L		07/25/18 16:00	07/26/18 13:04	1
Selenium	0.032	U	0.10	0.032	mg/L		07/25/18 16:00	07/26/18 13:04	1
Silver	0.0050	U	0.50	0.0050	mg/L		07/25/18 16:00	07/26/18 13:04	1

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: LCS 280-423271/2-B **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 423884 **Prep Batch: 423503**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	4.00	3.84		mg/L		96	80 - 120
Barium	12.0	11.4		mg/L		95	80 - 120
Cadmium	1.10	1.03		mg/L		94	80 - 120
Chromium	5.20	4.85		mg/L		93	80 - 120
Lead	5.50	5.35		mg/L		97	80 - 120
Selenium	3.00	2.79		mg/L		93	80 - 120
Silver	1.05	1.01		mg/L		97	80 - 120

Lab Sample ID: LCSD 280-423271/19-B **Client Sample ID: Lab Control Sample Dup**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 423884 **Prep Batch: 423503**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	4.00	3.85		mg/L		96	80 - 120	0	20
Barium	12.0	11.4		mg/L		95	80 - 120	1	20
Cadmium	1.10	1.03		mg/L		94	80 - 120	0	20
Chromium	5.20	4.88		mg/L		94	80 - 120	1	20
Lead	5.50	5.37		mg/L		98	80 - 120	0	20
Selenium	3.00	2.81		mg/L		94	80 - 120	1	20
Silver	1.05	1.02		mg/L		97	80 - 120	1	20

Lab Sample ID: 280-112230-G-1-C MS **Client Sample ID: Matrix Spike**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 423884 **Prep Batch: 423503**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.022	U	4.00	3.90		mg/L		97	80 - 120
Barium	0.35	J B	12.0	11.8		mg/L		95	80 - 120
Cadmium	0.0020	U	1.10	1.02		mg/L		92	80 - 120
Chromium	0.0030	U	5.20	4.81		mg/L		92	80 - 120
Lead	0.014	U	5.50	5.32		mg/L		97	80 - 120
Selenium	0.032	U	3.00	2.86		mg/L		95	80 - 120
Silver	0.0050	U	1.05	1.03		mg/L		98	80 - 120

Lab Sample ID: 280-112230-G-1-D MSD **Client Sample ID: Matrix Spike Duplicate**
Matrix: Solid **Prep Type: TCLP**
Analysis Batch: 423884 **Prep Batch: 423503**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.022	U	4.00	3.72		mg/L		93	80 - 120	5	20
Barium	0.35	J B	12.0	11.2		mg/L		91	80 - 120	5	20
Cadmium	0.0020	U	1.10	0.966		mg/L		88	80 - 120	5	20
Chromium	0.0030	U	5.20	4.61		mg/L		89	80 - 120	4	20
Lead	0.014	U	5.50	5.10		mg/L		93	80 - 120	4	20
Selenium	0.032	U	3.00	2.72		mg/L		91	80 - 120	5	20
Silver	0.0050	U	1.05	0.985		mg/L		94	80 - 120	5	20

Method: 7470A - Mercury (CVAA)

Lab Sample ID: LB 280-423271/1-C — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 423711 — **Prep Batch: 423539**

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.000030	U	0.0020	0.000030	mg/L		07/25/18 10:54	07/25/18 17:26	1

Lab Sample ID: LCS 280-423271/2-C — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 423711 — **Prep Batch: 423539**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00500	0.00525		mg/L		105	90 - 116

Lab Sample ID: LCSD 280-423271/19-C — **Client Sample ID: Lab Control Sample Dup**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 423711 — **Prep Batch: 423539**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.00500	0.00518		mg/L		104	90 - 116	1	10

Lab Sample ID: 280-112230-G-1-F MS — **Client Sample ID: Matrix Spike**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 423711 — **Prep Batch: 423539**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.000030	U	0.00500	0.00512		mg/L		102	90 - 116

Lab Sample ID: 280-112230-G-1-G MSD — **Client Sample ID: Matrix Spike Duplicate**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 423711 — **Prep Batch: 423539**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.000030	U	0.00500	0.00496		mg/L		99	90 - 116	3	10

Method: 1010A - Ignitability, Pensky-Martens Closed-Cup Method

Lab Sample ID: MB 160-378201/1 — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 378201

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Flashpoint	>60		1.00	1.00	Degrees C			07/27/18 19:26	1

Lab Sample ID: LCS 160-378201/2 — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 378201

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Flashpoint	25.0	27.50		Degrees C		110	90 - 110

Method: 1010A - Ignitability, Pensky-Martens Closed-Cup Method (Continued)

Lab Sample ID: 160-29498-4 DU **Client Sample ID: CRC-B23-0104**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 378201

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Flashpoint	>60		>60		Degrees C		NC	20

Method: 9012A - Cyanide, Total and/or Amenable

Lab Sample ID: MB 280-423359/4-A **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 423433 **Prep Batch: 423359**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.10	U	0.50	0.10	mg/Kg		07/24/18 06:50	07/24/18 10:41	1

Lab Sample ID: HLCS 280-423359/1-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 423433 **Prep Batch: 423359**

Analyte	Spike Added	HLCS Result	HLCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	17.5	18.3		mg/Kg		105	90 - 110

Lab Sample ID: LCS 280-423359/3-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 423433 **Prep Batch: 423359**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	5.00	5.12		mg/Kg		102	90 - 110

Lab Sample ID: LLCS 280-423359/2-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 423433 **Prep Batch: 423359**

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	5.00	5.55		mg/Kg		111	51 - 150

Lab Sample ID: 280-111993-A-1-L MS **Client Sample ID: Matrix Spike**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 423433 **Prep Batch: 423359**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	0.78	F1 F2	4.94	6.75	F1	mg/Kg		121	90 - 110

Method: 9023 - Organic Halides, Extractable (EOX)

Lab Sample ID: MB 490-530110/1-A **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 530916 **Prep Batch: 530110**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Halogens, Extractable Organic	25	U	50	25	mg/Kg		07/19/18 14:45	07/19/18 15:56	1

Method: 9023 - Organic Halides, Extractable (EOX) (Continued)

Lab Sample ID: LCS 490-530110/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 530916 — **Prep Batch: 530110**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Halogens, Extractable Organic	995	932		mg/Kg		94	80 - 120

Lab Sample ID: LCSD 490-530110/3-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 530916 — **Prep Batch: 530110**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Halogens, Extractable Organic	995	961		mg/Kg		97	80 - 120	3	20

Lab Sample ID: 560-74639-A-14-B MS — **Client Sample ID: Matrix Spike**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 530916 — **Prep Batch: 530110**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Halogens, Extractable Organic	30	U	1190	1030		mg/Kg	☼	87	70 - 130

Lab Sample ID: 560-74639-A-14-C MSD — **Client Sample ID: Matrix Spike Duplicate**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 530916 — **Prep Batch: 530110**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Halogens, Extractable Organic	30	U	1190	1170		mg/Kg	☼	98	70 - 130	12	20

Method: 9034 - Sulfide, Acid Soluble and Insoluble (Titrimetric)

Lab Sample ID: MB 280-423448/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 423463 — **Prep Batch: 423448**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	2.4	U	10	2.4	mg/Kg		07/24/18 13:20	07/24/18 14:58	1

Lab Sample ID: LCS 280-423448/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 423463 — **Prep Batch: 423448**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfide	114	100		mg/Kg		88	38 - 104

Lab Sample ID: 160-29498-4 MS — **Client Sample ID: CRC-B23-0104**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 423463 — **Prep Batch: 423448**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfide	76	H F1	114	79.8	F1	mg/Kg		4	38 - 104

Method: 9034 - Sulfide, Acid Soluble and Insoluble (Titrimetric) (Continued)

Lab Sample ID: 160-29498-4 MSD — **Client Sample ID: CRC-B23-0104**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 423463 — **Prep Batch: 423448**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfide	76	H F1	113	79.4	F1	mg/Kg		3	38 - 104	1	35

Method: 9045D - pH

Lab Sample ID: 160-29498-2 DU — **Client Sample ID: CRC-B21-0205**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 376775 — **Prep Batch: 376770**

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
pH adj. to 25 deg C	8.0			8.0		SU				0.9	5

Lab Sample ID: LCS 160-376775/5 — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 376775

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
pH adj. to 25 deg C			7.00	7.0		SU		100	99.0 - 101.0		

Method: 9066 - Phenolics, Total Recoverable

Lab Sample ID: MB 490-534142/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 534505 — **Prep Batch: 534142**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenols, Total	1.0	U	2.5	1.0	mg/Kg		08/06/18 12:57	08/07/18 18:23	1

Lab Sample ID: LCS 490-534142/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 534505 — **Prep Batch: 534142**

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Phenols, Total			38.0	35.2		mg/Kg		93	80 - 120		

Lab Sample ID: 160-29498-2 MS — **Client Sample ID: CRC-B21-0205**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 534505 — **Prep Batch: 534142**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Phenols, Total	1.7	J F1 F2	41.2	43.3		mg/Kg	☼	101	70 - 130		

Lab Sample ID: 160-29498-2 MSD — **Client Sample ID: CRC-B21-0205**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 534505 — **Prep Batch: 534142**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Phenols, Total	1.7	J F1 F2	41.2	17.9	F1 F2	mg/Kg	☼	39	70 - 130	83	23

Method: 9095B - Paint Filter

Lab Sample ID: 160-29498-2 DU **Client Sample ID: CRC-B21-0205**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 381470

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Free Liquid	Pass			Pass		NONE				NC	

Method: Moisture - Percent Moisture

Lab Sample ID: 160-29498-4 DU **Client Sample ID: CRC-B23-0104**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 376332

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture	11.3			10.2		%				10	30
Percent Solids	88.7			89.8		%				1	30

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-376740/1-A **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 381202 **Prep Batch: 376740**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.1402	U	0.289	0.289		1.43	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Actinium-228	-0.01752	U	0.246	0.246		0.306	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Bismuth-212	-0.4385	U	1.02	1.02		1.75	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Bismuth-214	-0.1323	U	0.149	0.149		0.490	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Lead-210	0.9041	U	1.49	1.49		2.30	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Lead-212	-0.05787	U	0.0648	0.0651		0.179	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Lead-214	0.009031	U	0.128	0.128		0.186	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Potassium-40	0.5436		0.384	0.388		0.501	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Protactinium-231	0.3578	U	1.36	1.36		4.55	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Radium-226	-0.1323	U	0.149	0.149	1.00	0.490	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Radium-228	-0.01752	U	0.246	0.246		0.306	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Thallium-208	-0.004696	U	0.00383	0.00386		0.131	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Thorium-232	-0.01752	U	0.246	0.246		0.306	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Thorium-234	0.5011	U	0.905	0.907		1.38	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Uranium-235	0.07006	U	0.107	0.107		0.669	pCi/g	07/19/18 15:00	08/09/18 01:24	1
Uranium-238	0.5011	U	0.905	0.907		1.38	pCi/g	07/19/18 15:00	08/09/18 01:24	1

Lab Sample ID: LCS 160-376740/2-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 381207 **Prep Batch: 376740**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Americium-241	96.8	99.26		11.7		1.22	pCi/g	103	87 - 116
Cesium-137	28.2	31.67		3.34		0.273	pCi/g	112	87 - 120
Cobalt-60	12.9	13.89		1.45		0.137	pCi/g	108	87 - 115

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-29479-A-2-E DU — **Client Sample ID: Duplicate**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 381204 — **Prep Batch: 376740**

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Actinium-227	-0.325	U	0.0000	U	0.338		1.08	pCi/g	0.31	1
Actinium-228	0.272	U	0.1903		0.166		0.176	pCi/g	0.19	1
Bismuth-212	0.341	U	0.1810	U	0.390		0.678	pCi/g	0.16	1
Bismuth-214	0.329		0.2690		0.103		0.111	pCi/g	0.25	1
Lead-210	0.349	U	-0.4156	U	1.31		2.22	pCi/g	0.29	1
Lead-212	0.212		0.1927		0.0649		0.0731	pCi/g	0.13	1
Lead-214	0.371		0.4207		0.108		0.0790	pCi/g	0.22	1
Potassium-40	13.1		13.23		2.01		0.611	pCi/g	0.04	1
Protactinium-231	-0.0000000405	U	0.5503	U	1.97		3.33	pCi/g	0.13	1
Radium-226	0.329		0.2690		0.103	1.00	0.111	pCi/g	0.25	1
Radium-228	0.272	U	0.1903		0.166		0.176	pCi/g	0.19	1
Thallium-208	0.0719		0.07889		0.0737		0.0607	pCi/g	0.05	1
Thorium-232	0.272	U	0.1903		0.166		0.176	pCi/g	0.19	1
Thorium-234	0.667	U	0.4880	U	1.07		1.79	pCi/g	0.11	1
Uranium-235	-0.0465	U	-0.1655	U	0.282		0.893	pCi/g	0.20	1
Uranium-238	0.667	U	0.4880	U	1.07		1.79	pCi/g	0.11	1

Method: 9310 - Gross Alpha / Beta (GFPC)

Lab Sample ID: MB 160-379964/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 379949 — **Prep Batch: 379964**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	3.495	U	3.09	3.12	10.0	4.76	pCi/g	08/02/18 14:49	08/02/18 21:07	1
Gross Beta	1.110	U	1.84	1.84	10.0	3.05	pCi/g	08/02/18 14:49	08/02/18 21:07	1

Lab Sample ID: LCS 160-379964/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 379949 — **Prep Batch: 379964**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Gross Alpha	27.1	21.97		6.37	10.0	5.29	pCi/g	81	44 - 140
Gross Beta	26.8	22.44		4.22	10.0	3.65	pCi/g	84	38 - 130

Lab Sample ID: 160-29498-1 DU — **Client Sample ID: CRC-B20-0206**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 379949 — **Prep Batch: 379964**

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Gross Alpha	365		432.0		54.5	10.0	5.11	pCi/g	0.67	1
Gross Beta	154		157.7		18.1	10.0	7.09	pCi/g	0.10	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-384585/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 385767 — **Prep Batch: 384585**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-230	-0.02404	U	0.0796	0.0796	1.00	0.128	pCi/g	08/22/18 16:06	08/28/18 19:45	1

Tracer	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*86.7*		*30 - 110*	*08/22/18 16:06*	*08/28/18 19:45*	*1*

Lab Sample ID: LCS 160-384585/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 385811 — **Prep Batch: 384585**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Thorium-230			24.5	25.56		2.52	1.00	0.229	pCi/g	104	81 - 118		

Tracer	*LCS %Yield*	*LCS Qualifier*	*Limits*
Thorium-229	*90.0*		*30 - 110*

Lab Sample ID: 160-29498-1 DU — **Client Sample ID: CRC-B20-0206**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 385829 — **Prep Batch: 384585**

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Thorium-230	35.0			37.95		3.43	1.00	0.146	pCi/g			0.45	1

Tracer	*DU %Yield*	*DU Qualifier*	*Limits*
Thorium-229	*77.7*		*30 - 110*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-378568/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 381472 — **Prep Batch: 378568**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	0.01077	U	0.0267	0.0267	1.00	0.0522	pCi/g	07/29/18 15:19	08/09/18 14:21	1
Uranium-235	0.004190	U	0.0143	0.0143	1.00	0.0359	pCi/g	07/29/18 15:19	08/09/18 14:21	1
Uranium-238	0.02487	U	0.0244	0.0245	1.00	0.0288	pCi/g	07/29/18 15:19	08/09/18 14:21	1

Tracer	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*88.3*		*30 - 110*	*07/29/18 15:19*	*08/09/18 14:21*	*1*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Lab Sample ID: LCS 160-378568/2-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 381474 **Prep Batch: 378568**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Uranium-234			6.37	5.951		0.633	1.00	0.0489	pCi/g	93	84 - 120		
Uranium-238			6.51	6.322		0.665	1.00	0.0190	pCi/g	97	82 - 122		

Tracer	*LCS %Yield*	*LCS Qualifier*	*Limits*
Uranium-232	*79.4*		*30 - 110*

Lab Sample ID: 160-29498-1 DU **Client Sample ID: CRC-B20-0206**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 381477 **Prep Batch: 378568**

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Uranium-234	19.2			19.61		1.87	1.00	0.0708	pCi/g			0.11	1
Uranium-235	1.09			0.9671		0.236	1.00	0.0881	pCi/g			0.26	1
Uranium-238	19.9			19.02		1.82	1.00	0.0825	pCi/g			0.23	1

Tracer	*DU %Yield*	*DU Qualifier*	*Limits*
Uranium-232	*51.3*		*30 - 110*

GC/MS VOA

Leach Batch: 423316

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-2	CRC-B21-0205	TCLP	Solid	1311	
LB 280-423316/1-A	Method Blank	TCLP	Solid	1311	
LCS 280-423316/2-A	Lab Control Sample	TCLP	Solid	1311	
160-29498-2 MS	CRC-B21-0205	TCLP	Solid	1311	
160-29498-2 MSD	CRC-B21-0205	TCLP	Solid	1311	

Analysis Batch: 424938

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-2	CRC-B21-0205	TCLP	Solid	8260B	423316
LB 280-423316/1-A	Method Blank	TCLP	Solid	8260B	423316
LCS 280-423316/2-A	Lab Control Sample	TCLP	Solid	8260B	423316
160-29498-2 MS	CRC-B21-0205	TCLP	Solid	8260B	423316
160-29498-2 MSD	CRC-B21-0205	TCLP	Solid	8260B	423316

GC/MS Semi VOA

Leach Batch: 423271

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-3	CRC-B22-0105	TCLP	Solid	1311	
LB 280-423271/1-F	Method Blank	TCLP	Solid	1311	
LCS 280-423271/3-B	Lab Control Sample	TCLP	Solid	1311	
160-29498-3 MS	CRC-B22-0105	TCLP	Solid	1311	
160-29498-3 MSD	CRC-B22-0105	TCLP	Solid	1311	

Prep Batch: 423590

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-3	CRC-B22-0105	TCLP	Solid	3510C	423271
LB 280-423271/1-F	Method Blank	TCLP	Solid	3510C	423271
LCS 280-423271/3-B	Lab Control Sample	TCLP	Solid	3510C	423271
160-29498-3 MS	CRC-B22-0105	TCLP	Solid	3510C	423271
160-29498-3 MSD	CRC-B22-0105	TCLP	Solid	3510C	423271

Analysis Batch: 423979

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-3	CRC-B22-0105	TCLP	Solid	8270C	423590
LB 280-423271/1-F	Method Blank	TCLP	Solid	8270C	423590
LCS 280-423271/3-B	Lab Control Sample	TCLP	Solid	8270C	423590
160-29498-3 MS	CRC-B22-0105	TCLP	Solid	8270C	423590
160-29498-3 MSD	CRC-B22-0105	TCLP	Solid	8270C	423590

GC Semi VOA

Leach Batch: 423271

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-3	CRC-B22-0105	TCLP	Solid	1311	
LB 280-423271/1-D	Method Blank	TCLP	Solid	1311	
LB 280-423271/1-G	Method Blank	TCLP	Solid	1311	
LCS 280-423271/2-D	Lab Control Sample	TCLP	Solid	1311	
LCS 280-423271/2-F	Lab Control Sample	TCLP	Solid	1311	
LCS 280-423271/3-C	Lab Control Sample	TCLP	Solid	1311	

GC Semi VOA (Continued)

Leach Batch: 423271 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-3 MS	CRC-B22-0105	TCLP	Solid	1311	
160-29498-3 MSD	CRC-B22-0105	TCLP	Solid	1311	
280-112289-A-1-E MS	Matrix Spike	TCLP	Solid	1311	
280-112289-A-1-F MSD	Matrix Spike Duplicate	TCLP	Solid	1311	

Prep Batch: 423389

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-2	CRC-B21-0205	Total/NA	Solid	3546	
MB 280-423389/1-A	Method Blank	Total/NA	Solid	3546	
LCS 280-423389/2-A	Lab Control Sample	Total/NA	Solid	3546	
160-29498-2 MS	CRC-B21-0205	Total/NA	Solid	3546	
160-29498-2 MSD	CRC-B21-0205	Total/NA	Solid	3546	

Prep Batch: 423557

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-3	CRC-B22-0105	TCLP	Solid	8151A	423271
LB 280-423271/1-D	Method Blank	TCLP	Solid	8151A	423271
LCS 280-423271/2-D	Lab Control Sample	TCLP	Solid	8151A	423271
280-112289-A-1-E MS	Matrix Spike	TCLP	Solid	8151A	423271
280-112289-A-1-F MSD	Matrix Spike Duplicate	TCLP	Solid	8151A	423271

Prep Batch: 423606

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-3	CRC-B22-0105	TCLP	Solid	3510C	423271
LB 280-423271/1-G	Method Blank	TCLP	Solid	3510C	423271
LCS 280-423271/2-F	Lab Control Sample	TCLP	Solid	3510C	423271
LCS 280-423271/3-C	Lab Control Sample	TCLP	Solid	3510C	423271
160-29498-3 MS	CRC-B22-0105	TCLP	Solid	3510C	423271
160-29498-3 MSD	CRC-B22-0105	TCLP	Solid	3510C	423271

Analysis Batch: 424154

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-3	CRC-B22-0105	TCLP	Solid	8081B	423606
LB 280-423271/1-G	Method Blank	TCLP	Solid	8081B	423606
LCS 280-423271/2-F	Lab Control Sample	TCLP	Solid	8081B	423606
LCS 280-423271/3-C	Lab Control Sample	TCLP	Solid	8081B	423606
160-29498-3 MS	CRC-B22-0105	TCLP	Solid	8081B	423606
160-29498-3 MSD	CRC-B22-0105	TCLP	Solid	8081B	423606

Analysis Batch: 424773

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-2	CRC-B21-0205	Total/NA	Solid	8082A	423389
MB 280-423389/1-A	Method Blank	Total/NA	Solid	8082A	423389
LCS 280-423389/2-A	Lab Control Sample	Total/NA	Solid	8082A	423389
160-29498-2 MS	CRC-B21-0205	Total/NA	Solid	8082A	423389
160-29498-2 MSD	CRC-B21-0205	Total/NA	Solid	8082A	423389

Analysis Batch: 425378

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-3	CRC-B22-0105	TCLP	Solid	8151A	423557
LB 280-423271/1-D	Method Blank	TCLP	Solid	8151A	423557

GC Semi VOA (Continued)

Analysis Batch: 425378 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 280-423271/2-D	Lab Control Sample	TCLP	Solid	8151A	423557
280-112289-A-1-E MS	Matrix Spike	TCLP	Solid	8151A	423557
280-112289-A-1-F MSD	Matrix Spike Duplicate	TCLP	Solid	8151A	423557

Metals

Leach Batch: 423271

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-3	CRC-B22-0105	TCLP	Solid	1311	
LB 280-423271/1-B	Method Blank	TCLP	Solid	1311	
LB 280-423271/1-C	Method Blank	TCLP	Solid	1311	
LCS 280-423271/2-B	Lab Control Sample	TCLP	Solid	1311	
LCS 280-423271/2-C	Lab Control Sample	TCLP	Solid	1311	
LCSD 280-423271/19-B	Lab Control Sample Dup	TCLP	Solid	1311	
LCSD 280-423271/19-C	Lab Control Sample Dup	TCLP	Solid	1311	
280-112230-G-1-C MS	Matrix Spike	TCLP	Solid	1311	
280-112230-G-1-D MSD	Matrix Spike Duplicate	TCLP	Solid	1311	
280-112230-G-1-F MS	Matrix Spike	TCLP	Solid	1311	
280-112230-G-1-G MSD	Matrix Spike Duplicate	TCLP	Solid	1311	

Prep Batch: 423503

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-3	CRC-B22-0105	TCLP	Solid	3010A	423271
LB 280-423271/1-B	Method Blank	TCLP	Solid	3010A	423271
LCS 280-423271/2-B	Lab Control Sample	TCLP	Solid	3010A	423271
LCSD 280-423271/19-B	Lab Control Sample Dup	TCLP	Solid	3010A	423271
280-112230-G-1-C MS	Matrix Spike	TCLP	Solid	3010A	423271
280-112230-G-1-D MSD	Matrix Spike Duplicate	TCLP	Solid	3010A	423271

Prep Batch: 423539

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-3	CRC-B22-0105	TCLP	Solid	7470A	423271
LB 280-423271/1-C	Method Blank	TCLP	Solid	7470A	423271
LCS 280-423271/2-C	Lab Control Sample	TCLP	Solid	7470A	423271
LCSD 280-423271/19-C	Lab Control Sample Dup	TCLP	Solid	7470A	423271
280-112230-G-1-F MS	Matrix Spike	TCLP	Solid	7470A	423271
280-112230-G-1-G MSD	Matrix Spike Duplicate	TCLP	Solid	7470A	423271

Analysis Batch: 423711

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-3	CRC-B22-0105	TCLP	Solid	7470A	423539
LB 280-423271/1-C	Method Blank	TCLP	Solid	7470A	423539
LCS 280-423271/2-C	Lab Control Sample	TCLP	Solid	7470A	423539
LCSD 280-423271/19-C	Lab Control Sample Dup	TCLP	Solid	7470A	423539
280-112230-G-1-F MS	Matrix Spike	TCLP	Solid	7470A	423539
280-112230-G-1-G MSD	Matrix Spike Duplicate	TCLP	Solid	7470A	423539

Analysis Batch: 423884

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-3	CRC-B22-0105	TCLP	Solid	6010B	423503

Metals (Continued)

Analysis Batch: 423884 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LB 280-423271/1-B	Method Blank	TCLP	Solid	6010B	423503
LCS 280-423271/2-B	Lab Control Sample	TCLP	Solid	6010B	423503
LCSD 280-423271/19-B	Lab Control Sample Dup	TCLP	Solid	6010B	423503
280-112230-G-1-C MS	Matrix Spike	TCLP	Solid	6010B	423503
280-112230-G-1-D MSD	Matrix Spike Duplicate	TCLP	Solid	6010B	423503

General Chemistry

Analysis Batch: 376332

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-1	CRC-B20-0206	Total/NA	Solid	Moisture	
160-29498-2	CRC-B21-0205	Total/NA	Solid	Moisture	
160-29498-3	CRC-B22-0105	Total/NA	Solid	Moisture	
160-29498-4	CRC-B23-0104	Total/NA	Solid	Moisture	
160-29498-4 DU	CRC-B23-0104	Total/NA	Solid	Moisture	

Prep Batch: 376770

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-2	CRC-B21-0205	Total/NA	Solid	DILeach_Prep	
160-29498-2 DU	CRC-B21-0205	Total/NA	Solid	DILeach_Prep	

Analysis Batch: 376775

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-2	CRC-B21-0205	Total/NA	Solid	9045D	376770
LCS 160-376775/5	Lab Control Sample	Total/NA	Solid	9045D	
160-29498-2 DU	CRC-B21-0205	Total/NA	Solid	9045D	376770

Analysis Batch: 378201

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-4	CRC-B23-0104	Total/NA	Solid	1010A	
MB 160-378201/1	Method Blank	Total/NA	Solid	1010A	
LCS 160-378201/2	Lab Control Sample	Total/NA	Solid	1010A	
160-29498-4 DU	CRC-B23-0104	Total/NA	Solid	1010A	

Analysis Batch: 381470

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-2	CRC-B21-0205	Total/NA	Solid	9095B	
160-29498-2 DU	CRC-B21-0205	Total/NA	Solid	9095B	

ISM Prep Batch: 422745

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-111993-A-1-L MS	Matrix Spike	Total/NA	Solid	Increment, prep	

Prep Batch: 423359

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-2	CRC-B21-0205	Total/NA	Solid	9012A	
MB 280-423359/4-A	Method Blank	Total/NA	Solid	9012A	
HLCS 280-423359/1-A	Lab Control Sample	Total/NA	Solid	9012A	
LCS 280-423359/3-A	Lab Control Sample	Total/NA	Solid	9012A	
LLCS 280-423359/2-A	Lab Control Sample	Total/NA	Solid	9012A	

General Chemistry (Continued)

Prep Batch: 423359 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-111993-A-1-L MS	Matrix Spike	Total/NA	Solid	9012A	422745

Analysis Batch: 423433

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-2	CRC-B21-0205	Total/NA	Solid	9012A	423359
MB 280-423359/4-A	Method Blank	Total/NA	Solid	9012A	423359
HLCS 280-423359/1-A	Lab Control Sample	Total/NA	Solid	9012A	423359
LCS 280-423359/3-A	Lab Control Sample	Total/NA	Solid	9012A	423359
LLCS 280-423359/2-A	Lab Control Sample	Total/NA	Solid	9012A	423359
280-111993-A-1-L MS	Matrix Spike	Total/NA	Solid	9012A	423359

Prep Batch: 423448

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-4	CRC-B23-0104	Total/NA	Solid	9030B	
MB 280-423448/1-A	Method Blank	Total/NA	Solid	9030B	
LCS 280-423448/2-A	Lab Control Sample	Total/NA	Solid	9030B	
160-29498-4 MS	CRC-B23-0104	Total/NA	Solid	9030B	
160-29498-4 MSD	CRC-B23-0104	Total/NA	Solid	9030B	

Analysis Batch: 423463

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-4	CRC-B23-0104	Total/NA	Solid	9034	423448
MB 280-423448/1-A	Method Blank	Total/NA	Solid	9034	423448
LCS 280-423448/2-A	Lab Control Sample	Total/NA	Solid	9034	423448
160-29498-4 MS	CRC-B23-0104	Total/NA	Solid	9034	423448
160-29498-4 MSD	CRC-B23-0104	Total/NA	Solid	9034	423448

Prep Batch: 530110

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-4	CRC-B23-0104	Total/NA	Solid	9023	
MB 490-530110/1-A	Method Blank	Total/NA	Solid	9023	
LCS 490-530110/2-A	Lab Control Sample	Total/NA	Solid	9023	
LCSD 490-530110/3-A	Lab Control Sample Dup	Total/NA	Solid	9023	
560-74639-A-14-B MS	Matrix Spike	Total/NA	Solid	9023	
560-74639-A-14-C MSD	Matrix Spike Duplicate	Total/NA	Solid	9023	

Analysis Batch: 530916

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-4	CRC-B23-0104	Total/NA	Solid	9023	530110
MB 490-530110/1-A	Method Blank	Total/NA	Solid	9023	530110
LCS 490-530110/2-A	Lab Control Sample	Total/NA	Solid	9023	530110
LCSD 490-530110/3-A	Lab Control Sample Dup	Total/NA	Solid	9023	530110
560-74639-A-14-B MS	Matrix Spike	Total/NA	Solid	9023	530110
560-74639-A-14-C MSD	Matrix Spike Duplicate	Total/NA	Solid	9023	530110

Prep Batch: 534142

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-2	CRC-B21-0205	Total/NA	Solid	Distill/Phenol	
MB 490-534142/1-A	Method Blank	Total/NA	Solid	Distill/Phenol	
LCS 490-534142/2-A	Lab Control Sample	Total/NA	Solid	Distill/Phenol	
160-29498-2 MS	CRC-B21-0205	Total/NA	Solid	Distill/Phenol	

General Chemistry (Continued)

Prep Batch: 534142 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-2 MSD	CRC-B21-0205	Total/NA	Solid	Distill/Phenol	

Analysis Batch: 534505

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-2	CRC-B21-0205	Total/NA	Solid	9066	534142
MB 490-534142/1-A	Method Blank	Total/NA	Solid	9066	534142
LCS 490-534142/2-A	Lab Control Sample	Total/NA	Solid	9066	534142
160-29498-2 MS	CRC-B21-0205	Total/NA	Solid	9066	534142
160-29498-2 MSD	CRC-B21-0205	Total/NA	Solid	9066	534142

Rad

Leach Batch: 376403

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29479-A-2-E DU	Duplicate	Total/NA	Solid	Dry and Grind	

Leach Batch: 376415

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-1	CRC-B20-0206	Total/NA	Solid	Dry and Grind	
160-29498-1 DU	CRC-B20-0206	Total/NA	Solid	Dry and Grind	

Prep Batch: 376740

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-1	CRC-B20-0206	Total/NA	Solid	Fill_Geo-21	376415
MB 160-376740/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-376740/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-29479-A-2-E DU	Duplicate	Total/NA	Solid	Fill_Geo-21	376403

Prep Batch: 378568

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-1	CRC-B20-0206	Total/NA	Solid	ExtChrom	376415
MB 160-378568/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-378568/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-29498-1 DU	CRC-B20-0206	Total/NA	Solid	ExtChrom	376415

Prep Batch: 379964

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-1	CRC-B20-0206	Total/NA	Solid	Thin_Layer	376415
MB 160-379964/1-A	Method Blank	Total/NA	Solid	Thin_Layer	
LCS 160-379964/2-A	Lab Control Sample	Total/NA	Solid	Thin_Layer	
160-29498-1 DU	CRC-B20-0206	Total/NA	Solid	Thin_Layer	376415

Prep Batch: 384585

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29498-1	CRC-B20-0206	Total/NA	Solid	ExtChrom	376415
MB 160-384585/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-384585/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-29498-1 DU	CRC-B20-0206	Total/NA	Solid	ExtChrom	376415

Lab Chronicle

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29498-1

Client Sample ID: CRC-B20-0206
Date Collected: 07/11/18 15:08
Date Received: 07/13/18 09:30

Lab Sample ID: 160-29498-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	376332	07/17/18 16:08	SLG	TAL SL
Total/NA	Leach	Dry and Grind			376415	07/18/18 10:10	DRO	TAL SL
Total/NA	Prep	Fill_Geo-21			376740	07/19/18 15:00	SJS	TAL SL
Total/NA	Analysis	901.1		1	381208	08/09/18 07:19	KLS	TAL SL
Total/NA	Leach	Dry and Grind			376415	07/18/18 10:10	DRO	TAL SL
Total/NA	Prep	Thin_Layer			379964	08/02/18 14:49	MRB	TAL SL
Total/NA	Analysis	9310		1	379949	08/02/18 21:07	CDR	TAL SL
Total/NA	Leach	Dry and Grind			376415	07/18/18 10:10	DRO	TAL SL
Total/NA	Prep	ExtChrom			378568	07/29/18 15:19	KNF	TAL SL
Total/NA	Analysis	A-01-R		1	381476	08/09/18 14:21	ALS	TAL SL
Total/NA	Leach	Dry and Grind			376415	07/18/18 10:10	DRO	TAL SL
Total/NA	Prep	ExtChrom			384585	08/22/18 16:06	JLC	TAL SL
Total/NA	Analysis	A-01-R		1	386035	08/29/18 18:13	ALS	TAL SL

Client Sample ID: CRC-B21-0205
Date Collected: 07/12/18 11:40
Date Received: 07/13/18 09:30

Lab Sample ID: 160-29498-2
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			423316	07/23/18 17:36	DFB1	TAL DEN
TCLP	Analysis	8260B		1	424938	08/06/18 09:48	TAW	TAL DEN
Total/NA	Prep	9012A			423359	07/24/18 06:50	PAH	TAL DEN
Total/NA	Analysis	9012A		1	423433	07/24/18 11:28	PAH	TAL DEN
Total/NA	Prep	DILeach_Prep			376770	07/19/18 20:42	JCB	TAL SL
Total/NA	Analysis	9045D		1	376775	07/19/18 23:27	JCB	TAL SL
Total/NA	Analysis	9095B		1	381470	08/09/18 18:34	JCB	TAL SL
Total/NA	Analysis	Moisture		1	376332	07/17/18 16:08	SLG	TAL SL

Client Sample ID: CRC-B21-0205
Date Collected: 07/12/18 11:40
Date Received: 07/13/18 09:30

Lab Sample ID: 160-29498-2
Matrix: Solid
Percent Solids: 94.2

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3546			423389	07/24/18 08:50	DWC	TAL DEN
Total/NA	Analysis	8082A		1	424773	08/03/18 12:23	TDJ	TAL DEN
Total/NA	Prep	Distill/Phenol			534142	08/06/18 12:57	LDT	TAL NSH
Total/NA	Analysis	9066		1	534505	08/07/18 18:25	SDL	TAL NSH

Lab Chronicle

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29498-1

Client Sample ID: CRC-B22-0105
Date Collected: 07/12/18 11:50
Date Received: 07/13/18 09:30

Lab Sample ID: 160-29498-3
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			423271	07/23/18 14:57	DFB1	TAL DEN
TCLP	Prep	3510C			423590	07/25/18 10:50	AAG	TAL DEN
TCLP	Analysis	8270C		1	423979	07/28/18 01:03	DCK	TAL DEN
TCLP	Leach	1311			423271	07/23/18 14:57	DFB1	TAL DEN
TCLP	Prep	3510C			423606	07/25/18 11:45	AAG	TAL DEN
TCLP	Analysis	8081B		1	424154	07/31/18 02:57	TEM	TAL DEN
TCLP	Leach	1311			423271	07/23/18 14:57	DFB1	TAL DEN
TCLP	Prep	8151A			423557	07/25/18 09:20	KJS	TAL DEN
TCLP	Analysis	8151A		1	425378	08/09/18 01:13	TEM	TAL DEN
TCLP	Leach	1311			423271	07/23/18 14:57	DFB1	TAL DEN
TCLP	Prep	3010A			423503	07/25/18 16:00	MRJ	TAL DEN
TCLP	Analysis	6010B		1	423884	07/26/18 13:14	CML	TAL DEN
TCLP	Leach	1311			423271	07/23/18 14:57	DFB1	TAL DEN
TCLP	Prep	7470A			423539	07/25/18 10:54	TEB	TAL DEN
TCLP	Analysis	7470A		1	423711	07/25/18 17:32	TEB	TAL DEN
Total/NA	Analysis	Moisture		1	376332	07/17/18 16:08	SLG	TAL SL

Client Sample ID: CRC-B23-0104
Date Collected: 07/12/18 12:10
Date Received: 07/13/18 09:30

Lab Sample ID: 160-29498-4
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1010A		1	378201	07/27/18 20:35	JCB	TAL SL
Total/NA	Prep	9030B			423448	07/24/18 13:20	AWW	TAL DEN
Total/NA	Analysis	9034		1	423463	07/24/18 14:58	AWW	TAL DEN
Total/NA	Analysis	Moisture		1	376332	07/17/18 16:08	SLG	TAL SL

Client Sample ID: CRC-B23-0104
Date Collected: 07/12/18 12:10
Date Received: 07/13/18 09:30

Lab Sample ID: 160-29498-4
Matrix: Solid
Percent Solids: 88.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	9023			530110	07/24/18 15:27	VRP	TAL NSH
Total/NA	Analysis	9023		1	530916	07/25/18 12:03	VRP	TAL NSH

Laboratory References:

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: Tetra Tech, Inc. TestAmerica Job ID: 160-29498-1
Project/Site: Former Carnotite Site - Non-Rad Analysis

Laboratory: TestAmerica St. Louis

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Louisiana	NELAP	6	04080	06-30-19

The following analytes are included in this report, but accreditation/certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
901.1	Fill_Geo-21	Solid	Actinium-227
901.1	Fill_Geo-21	Solid	Actinium-228
901.1	Fill_Geo-21	Solid	Bismuth-212
901.1	Fill_Geo-21	Solid	Bismuth-214
901.1	Fill_Geo-21	Solid	Lead-210
901.1	Fill_Geo-21	Solid	Lead-212
901.1	Fill_Geo-21	Solid	Lead-214
901.1	Fill_Geo-21	Solid	Potassium-40
901.1	Fill_Geo-21	Solid	Protactinium-231
901.1	Fill_Geo-21	Solid	Radium-226
901.1	Fill_Geo-21	Solid	Radium-228
901.1	Fill_Geo-21	Solid	Thallium-208
901.1	Fill_Geo-21	Solid	Thorium-232
901.1	Fill_Geo-21	Solid	Thorium-234
901.1	Fill_Geo-21	Solid	Uranium-235
901.1	Fill_Geo-21	Solid	Uranium-238
A-01-R	ExtChrom	Solid	Uranium-235
Moisture		Solid	Percent Moisture
Moisture		Solid	Percent Solids

Laboratory: TestAmerica Denver

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
A2LA	DoD ELAP		2907.01	10-31-19
A2LA	ISO/IEC 17025		2907.01	10-31-19
Alabama	State Program	4	40730	09-30-12 *
Alaska (UST)	State Program	10	UST-30	01-08-19
Arizona	State Program	9	AZ0713	12-20-18
California	State Program	9	2513	01-18-19
Connecticut	State Program	1	PH-0686	09-30-18
Florida	NELAP	4	E87667	06-30-19
Georgia	State Program	4	N/A	01-08-19 *
Illinois	NELAP	5	200017	04-30-19
Iowa	State Program	7	370	12-01-18
Kansas	NELAP	7	E-10166	04-30-19
Louisiana	NELAP	6	02096	06-30-19
Maine	State Program	1	CO0002	03-03-19
Minnesota	NELAP	5	8-999-405	12-31-18
Nevada	State Program	9	CO0026	07-31-19
New Hampshire	NELAP	1	205310	04-28-19
New Jersey	NELAP	2	CO004	06-30-19
New York	NELAP	2	11964	04-01-19
North Carolina (WW/SW)	State Program	4	358	12-31-18
North Dakota	State Program	8	R-034	01-08-19
Oklahoma	State Program	6	8614	08-31-18
Oregon	NELAP	10	4025	01-08-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Laboratory: TestAmerica Denver (Continued)

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Pennsylvania	NELAP	3	68-00664	07-31-19
South Carolina	State Program	4	72002001	01-08-19
Texas	NELAP	6	T104704183-17-14	09-30-18
US Fish & Wildlife	Federal			07-31-19
USDA	Federal			03-26-21
Utah	NELAP	8	CO00026	07-31-19
Virginia	NELAP	3	460232	06-14-19
Washington	State Program	10	C583	08-03-19
West Virginia DEP	State Program	3	354	12-31-18
Wisconsin	State Program	5	999615430	08-31-18
Wyoming (UST)	A2LA	8	2907.01	10-31-19

Laboratory: TestAmerica Nashville

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
A2LA	ISO/IEC 17025		0453.07	12-31-19
Alaska (UST)	State Program	10	UST-087	06-30-19
Arizona	State Program	9	AZ0473	05-05-19
Arkansas DEQ	State Program	6	88-0737	04-25-19
California	State Program	9	2938	10-31-18
Connecticut	State Program	1	PH-0220	12-31-19
Florida	NELAP	4	E87358	06-30-19
Georgia	State Program	4	NA: NELAP & A2LA	12-31-19
Illinois	NELAP	5	200010	12-09-18
Iowa	State Program	7	131	04-01-20
Kansas	NELAP	7	E-10229	10-31-18
Kentucky (UST)	State Program	4	19	06-30-19
Kentucky (WW)	State Program	4	90038	12-31-18
Louisiana	NELAP	6	30613	06-30-19
Maine	State Program	1	TN00032	11-03-19
Maryland	State Program	3	316	03-31-19
Massachusetts	State Program	1	M-TN032	06-30-19
Minnesota	NELAP	5	047-999-345	12-31-18
Mississippi	State Program	4	N/A	06-30-19
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-19
New Hampshire	NELAP	1	2963	10-09-18
New Jersey	NELAP	2	TN965	06-30-19
New York	NELAP	2	11342	03-31-19
North Carolina (WW/SW)	State Program	4	387	12-31-18
North Dakota	State Program	8	R-146	06-30-19
Ohio VAP	State Program	5	CL0033	07-06-19
Oklahoma	State Program	6	9412	08-31-19
Oregon	NELAP	10	TN200001	04-26-19
Pennsylvania	NELAP	3	68-00585	07-31-19
Rhode Island	State Program	1	LAO00268	12-30-18
South Carolina	State Program	4	84009 (001)	02-28-19
Tennessee	State Program	4	2008	02-23-20
Texas	NELAP	6	T104704077	08-31-19

Accreditation/Certification Summary

Client: Tetra Tech, Inc. TestAmerica Job ID: 160-29498-1
Project/Site: Former Carnotite Site - Non-Rad Analysis

Laboratory: TestAmerica Nashville (Continued)

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
USDA	Federal		P330-13-00306	12-01-19
Utah	NELAP	8	TN00032	07-31-19
Virginia	NELAP	3	460152	06-14-19
Washington	State Program	10	C789	07-19-19
West Virginia DEP	State Program	3	219	02-28-19
Wisconsin	State Program	5	998020430	08-31-19
Wyoming (UST)	A2LA	8	453.07	12-31-19

Method Summary

Client: Tetra Tech, Inc. TestAmerica Job ID: 160-29498-1
Project/Site: Former Carnotite Site - Non-Rad Analysis

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL DEN
8270C	Semivolatile Organic Compounds (GC/MS)	SW846	TAL DEN
8081B	Organochlorine Pesticides (GC)	SW846	TAL DEN
8082A	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	SW846	TAL DEN
8151A	Herbicides (GC)	SW846	TAL DEN
6010B	Metals (ICP)	SW846	TAL DEN
7470A	Mercury (CVAA)	SW846	TAL DEN
1010A	Ignitability, Pensky-Martens Closed-Cup Method	SW846	TAL SL
9012A	Cyanide, Total and/or Amenable	SW846	TAL DEN
9023	Organic Halides, Extractable (EOX)	SW846	TAL NSH
9034	Sulfide, Acid Soluble and Insoluble (Titrimetric)	SW846	TAL DEN
9045D	pH	SW846	TAL SL
9066	Phenolics, Total Recoverable	SW846	TAL NSH
9095B	Paint Filter	SW846	TAL SL
Moisture	Percent Moisture	EPA	TAL SL
901.1	Radium-226 & Other Gamma Emitters (GS)	EPA	TAL SL
9310	Gross Alpha / Beta (GFPC)	SW846	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
1311	TCLP Extraction	SW846	TAL DEN
3010A	Preparation, Total Metals	SW846	TAL DEN
3510C	Liquid-Liquid Extraction (Separatory Funnel)	SW846	TAL DEN
3546	Microwave Extraction	SW846	TAL DEN
5030B	Purge and Trap	SW846	TAL DEN
7470A	Preparation, Mercury	SW846	TAL DEN
8151A	Extraction (Herbicides)	SW846	TAL DEN
9012A	Cyanide, Total and/or Amenable, Distillation	SW846	TAL DEN
9023	Preparation, EOX	SW846	TAL NSH
9030B	Sulfide, Distillation (Acid Soluble and Insoluble)	SW846	TAL DEN
DILeach_Prep	Deionized Water Leach Preparation	None	TAL SL
Distill/Phenol	Distillation, Phenolics	None	TAL NSH
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL
Thin_Layer	Preparation, Thin Layer Technique	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
EPA = US Environmental Protection Agency
None = None
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100
TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177
TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Tetra Tech, Inc.
Project/Site: Former Carnotite Site - Non-Rad Analysis

TestAmerica Job ID: 160-29498-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-29498-1	CRC-B20-0206	Solid	07/11/18 15:08	07/13/18 09:30
160-29498-2	CRC-B21-0205	Solid	07/12/18 11:40	07/13/18 09:30
160-29498-3	CRC-B22-0105	Solid	07/12/18 11:50	07/13/18 09:30
160-29498-4	CRC-B23-0104	Solid	07/12/18 12:10	07/13/18 09:30

GC/MS VOA MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: VMS_MS1 Analysis Batch Number: 424541

Lab Sample ID: STD003 280-424541/12 IC Client Sample ID:

Date Analyzed: 08/02/18 08:53 Lab File ID: MS1_5075.D GC Column: DB-624 (60.25 ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
2-Butanone (MEK)		Invalid Compound ID	wickhamt	08/02/18 11:48
2-Chloroethyl vinyl ether		Invalid Compound ID	wickhamt	08/02/18 11:34

Lab Sample ID: STD02 280-424541/14 IC Client Sample ID:

Date Analyzed: 08/02/18 09:33 Lab File ID: MS1_5077.D GC Column: DB-624 (60.25 ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
2-Butanone (MEK)	6.59	Shouldering	wickhamt	08/02/18 11:48

Lab Sample ID: STD05 280-424541/15 IC Client Sample ID:

Date Analyzed: 08/02/18 09:53 Lab File ID: MS1_5078.D GC Column: DB-624 (60.25 ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
2-Butanone (MEK)	6.59	Shouldering	wickhamt	08/02/18 11:47

Lab Sample ID: STD10 280-424541/16 IC Client Sample ID:

Date Analyzed: 08/02/18 10:14 Lab File ID: MS1_5079.D GC Column: DB-624 (60.25 ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
2-Butanone (MEK)	6.59	Shouldering	wickhamt	08/02/18 11:47

Lab Sample ID: STD30 280-424541/17 IC Client Sample ID:

Date Analyzed: 08/02/18 10:34 Lab File ID: MS1_5080.D GC Column: DB-624 (60.25 ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
2-Butanone (MEK)	6.59	Shouldering	wickhamt	08/02/18 11:46

GC/MS VOA MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: VMS_MS1 Analysis Batch Number: 424541

Lab Sample ID: STD60 280-424541/18 IC Client Sample ID:

Date Analyzed: 08/02/18 10:54 Lab File ID: MS1_5081.D GC Column: DB-624 (60.25 ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
TBA-d9 (IS)	5.59	Assign Peak	wickhamt	08/02/18 11:40
2-Butanone (MEK)	6.59	Shouldering	wickhamt	08/02/18 11:45
m-Xylene & p-Xylene	9.93	Wrong peak	wickhamt	08/02/18 11:42

Lab Sample ID: ICV 280-424541/19 Client Sample ID:

Date Analyzed: 08/02/18 11:35 Lab File ID: MS1_5083.D GC Column: DB-624 (60.25 ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
2-Butanone (MEK)	6.59	Shouldering	wickhamt	08/02/18 12:31

GC/MS VOA MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: VMS_MS1 Analysis Batch Number: 424938

Lab Sample ID: CCV 280-424938/2 Client Sample ID:

Date Analyzed: 08/06/18 07:47 Lab File ID: MS1_5228.D GC Column: DB-624 (60.25 ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
2-Butanone (MEK)	6.59	Shouldering	wickhamt	08/06/18 08:08

Lab Sample ID: LCS 280-423316/2-A Client Sample ID:

Date Analyzed: 08/06/18 09:08 Lab File ID: MS1_5232.D GC Column: DB-624 (60.25 ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
2-Butanone (MEK)	6.59	Shouldering	wickhamt	08/06/18 09:27

Lab Sample ID: 160-29498-2 MS Client Sample ID: CRC-B21-0205 MS

Date Analyzed: 08/06/18 10:09 Lab File ID: MS1_5235.D GC Column: DB-624 (60.25 ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
2-Butanone (MEK)	6.59	Shouldering	wickhamt	08/06/18 11:48

Lab Sample ID: 160-29498-2 MSD Client Sample ID: CRC-B21-0205 MSD

Date Analyzed: 08/06/18 10:29 Lab File ID: MS1_5236.D GC Column: DB-624 (60.25 ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
2-Butanone (MEK)	6.59	Shouldering	wickhamt	08/06/18 12:01

GC/MS SEMI VOA MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SMS_G6 Analysis Batch Number: 420416

Lab Sample ID: ICIS 280-420416/3 Client Sample ID:

Date Analyzed: 06/28/18 12:16 Lab File ID: G6_34332.D GC Column: Rxi-5Sil MS ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Caprolactam	6.16	Split Peak	kiekeld	06/28/18 13:18
2,4,6 - Tribromophenol	8.31	Peak assignment corrected	kiekeld	06/28/18 13:17

Lab Sample ID: STD004 280-420416/4 IC Client Sample ID:

Date Analyzed: 06/28/18 12:43 Lab File ID: G6_34333.D GC Column: Rxi-5Sil MS ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
2,4,6 - Tribromophenol	8.30	Assign Peak	kiekeld	06/28/18 13:20

Lab Sample ID: STD010 280-420416/5 IC Client Sample ID:

Date Analyzed: 06/28/18 13:10 Lab File ID: G6_34334.D GC Column: Rxi-5Sil MS ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Benzoic acid	5.46	Wrong peak	kiekeld	06/28/18 14:43
2,4,6 - Tribromophenol	8.30	Assign Peak	kiekeld	06/28/18 14:42

Lab Sample ID: STD020 280-420416/6 IC Client Sample ID:

Date Analyzed: 06/28/18 13:37 Lab File ID: G6_34335.D GC Column: Rxi-5Sil MS ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Benzoic acid	5.48	Wrong peak	kiekeld	06/28/18 14:43
2,4,6 - Tribromophenol	8.30	Assign Peak	kiekeld	06/28/18 14:44

GC/MS SEMI VOA MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SMS_G6 Analysis Batch Number: 420416

Lab Sample ID: STD050 280-420416/7 IC Client Sample ID:

Date Analyzed: 06/28/18 14:05 Lab File ID: G6_34336.D GC Column: Rxi-5Sil MS ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Benzoic acid	5.50	Wrong peak	kiekeld	06/28/18 14:45
Caprolactam	6.15	Split Peak	kiekeld	06/28/18 14:45
2,4,6 - Tribromophenol	8.30	Assign Peak	kiekeld	06/28/18 14:45

Lab Sample ID: STD120 280-420416/8 IC Client Sample ID:

Date Analyzed: 06/28/18 14:32 Lab File ID: G6_34337.D GC Column: Rxi-5Sil MS ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Caprolactam	6.17	Split Peak	kiekeld	06/29/18 07:35

Lab Sample ID: STD160 280-420416/9 IC Client Sample ID:

Date Analyzed: 06/28/18 14:59 Lab File ID: G6_34338.D GC Column: Rxi-5Sil MS ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Caprolactam	6.18	Split Peak	kiekeld	06/29/18 07:37

Lab Sample ID: STD200 280-420416/10 IC Client Sample ID:

Date Analyzed: 06/28/18 15:26 Lab File ID: G6_34339.D GC Column: Rxi-5Sil MS ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
1,4-Dichlorobenzene-d4	4.58	Wrong peak	kiekeld	06/29/18 07:38
Caprolactam	6.18	Split Peak	kiekeld	06/29/18 07:39

GC/MS SEMI VOA MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SMS_G6 Analysis Batch Number: 423979

Lab Sample ID: CCV 280-423979/3 Client Sample ID:

Date Analyzed: 07/27/18 15:39 Lab File ID: G6_34933.D GC Column: Rxi-5Sil MS ID: 0.25(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Caprolactam	6.18	Split Peak	kiekeld	07/27/18 16:01
Benzo[a]pyrene	16.66	Wrong peak	kiekeld	07/27/18 16:01
Dibenz(a,h)anthracene	19.97	Wrong peak	kiekeld	07/27/18 16:01

PESTICIDES MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SGC_P2 Analysis Batch Number: 424154

Lab Sample ID: STD6 280-424154/16 IC Client Sample ID:

Date Analyzed: 07/30/18 17:26 Lab File ID: 07300016.D GC Column: CLP1 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Toxaphene Peak 1	6.24	Baseline Smoothing	mooret	08/01/18 15:08
Toxaphene Peak 2	6.76	Baseline Smoothing	mooret	08/01/18 15:08
Toxaphene Peak 3	7.01	Baseline Smoothing	mooret	08/01/18 15:08
Toxaphene Peak 4	7.73	Baseline Smoothing	mooret	08/01/18 15:08
Toxaphene Peak 5	8.05	Baseline Smoothing	mooret	08/01/18 15:08

Lab Sample ID: STD6 280-424154/16 IC Client Sample ID:

Date Analyzed: 07/30/18 17:26 Lab File ID: 07300016.D GC Column: CLP2 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Toxaphene Peak 1	5.65	Baseline Smoothing	mooret	08/01/18 15:09
Toxaphene Peak 2	7.02	Baseline Smoothing	mooret	08/01/18 15:09
Toxaphene Peak 3	7.20	Baseline Smoothing	mooret	08/01/18 15:09
Toxaphene Peak 4	7.40	Baseline Smoothing	mooret	08/01/18 15:09
Toxaphene Peak 5	7.93	Baseline Smoothing	mooret	08/01/18 15:09

Lab Sample ID: STD5 280-424154/17 IC Client Sample ID:

Date Analyzed: 07/30/18 17:43 Lab File ID: 07300017.D GC Column: CLP2 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Toxaphene Peak 1	5.65	Baseline Smoothing	mooret	08/01/18 15:26
Toxaphene Peak 2	7.02	Baseline Smoothing	mooret	08/01/18 15:26
Toxaphene Peak 3	7.20	Baseline Smoothing	mooret	08/01/18 15:26
Toxaphene Peak 4	7.40	Baseline Smoothing	mooret	08/01/18 15:26
Toxaphene Peak 5	7.93	Baseline Smoothing	mooret	08/01/18 15:26

PESTICIDES MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SGC_P2 Analysis Batch Number: 424154

Lab Sample ID: STD4 280-424154/18 IC Client Sample ID:

Date Analyzed: 07/30/18 18:01 Lab File ID: 07300018.D GC Column: CLP1 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Toxaphene Peak 1	6.24	Baseline Smoothing	mooret	08/01/18 15:26
Toxaphene Peak 2	6.76	Baseline Smoothing	mooret	08/01/18 15:26
Toxaphene Peak 3	7.01	Baseline Smoothing	mooret	08/01/18 15:26
Toxaphene Peak 4	7.73	Baseline Smoothing	mooret	08/01/18 15:26
Toxaphene Peak 5	8.05	Baseline Smoothing	mooret	08/01/18 15:26

Lab Sample ID: STD3 280-424154/19 IC Client Sample ID:

Date Analyzed: 07/30/18 18:18 Lab File ID: 07300019.D GC Column: CLP1 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Toxaphene Peak 1	6.24	Baseline Smoothing	mooret	08/01/18 15:26
Toxaphene Peak 2	6.76	Baseline Smoothing	mooret	08/01/18 15:26
Toxaphene Peak 3	7.01	Baseline Smoothing	mooret	08/01/18 15:26
Toxaphene Peak 4	7.73	Baseline Smoothing	mooret	08/01/18 15:26
Toxaphene Peak 5	8.04	Baseline Smoothing	mooret	08/01/18 15:26

Lab Sample ID: STD3 280-424154/19 IC Client Sample ID:

Date Analyzed: 07/30/18 18:18 Lab File ID: 07300019.D GC Column: CLP2 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Toxaphene Peak 1	5.65	Baseline Smoothing	mooret	08/01/18 15:26
Toxaphene Peak 2	7.02	Baseline Smoothing	mooret	08/01/18 15:26
Toxaphene Peak 3	7.20	Baseline Smoothing	mooret	08/01/18 15:26
Toxaphene Peak 4	7.40	Baseline Smoothing	mooret	08/01/18 15:26
Toxaphene Peak 5	7.93	Baseline Smoothing	mooret	08/01/18 15:26

PESTICIDES MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SGC_P2 Analysis Batch Number: 424154

Lab Sample ID: STD2 280-424154/20 IC Client Sample ID:

Date Analyzed: 07/30/18 18:35 Lab File ID: 07300020.D GC Column: CLP2 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Toxaphene Peak 1	5.65	Baseline Smoothing	mooret	08/01/18 15:27
Toxaphene Peak 2	7.02	Baseline Smoothing	mooret	08/01/18 15:27
Toxaphene Peak 3	7.20	Baseline Smoothing	mooret	08/01/18 15:27
Toxaphene Peak 4	7.40	Baseline Smoothing	mooret	08/01/18 15:27
Toxaphene Peak 5	7.93	Baseline Smoothing	mooret	08/01/18 15:27

Lab Sample ID: STD1 280-424154/21 IC Client Sample ID:

Date Analyzed: 07/30/18 18:53 Lab File ID: 07300021.D GC Column: CLP1 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Toxaphene Peak 1	6.24	Baseline Smoothing	mooret	08/01/18 15:27
Toxaphene Peak 2	6.76	Baseline Smoothing	mooret	08/01/18 15:27
Toxaphene Peak 3	7.01	Baseline Smoothing	mooret	08/01/18 15:27
Toxaphene Peak 4	7.73	Baseline Smoothing	mooret	08/01/18 15:27
Toxaphene Peak 5	8.05	Baseline Smoothing	mooret	08/01/18 15:27

Lab Sample ID: STD1 280-424154/21 IC Client Sample ID:

Date Analyzed: 07/30/18 18:53 Lab File ID: 07300021.D GC Column: CLP2 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Toxaphene Peak 1	5.65	Baseline Smoothing	mooret	08/01/18 15:27
Toxaphene Peak 2	7.02	Baseline Smoothing	mooret	08/01/18 15:27
Toxaphene Peak 3	7.20	Baseline Smoothing	mooret	08/01/18 15:27
Toxaphene Peak 4	7.40	Baseline Smoothing	mooret	08/01/18 15:27
Toxaphene Peak 5	7.93	Baseline Smoothing	mooret	08/01/18 15:27

PESTICIDES MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SGC_P2 Analysis Batch Number: 424154

Lab Sample ID: ICV 280-424154/34 Client Sample ID:

Date Analyzed: 07/30/18 22:38 Lab File ID: 07300034.D GC Column: CLP1 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Toxaphene Peak 1	6.24	Baseline Smoothing	mooret	08/01/18 15:29
Toxaphene Peak 2	6.76	Baseline Smoothing	mooret	08/01/18 15:29
Toxaphene Peak 3	7.01	Baseline Smoothing	mooret	08/01/18 15:29
Toxaphene Peak 4	7.74	Baseline Smoothing	mooret	08/01/18 15:29
Toxaphene Peak 5	8.05	Baseline Smoothing	mooret	08/01/18 15:29

Lab Sample ID: LCS 280-423271/3-C Client Sample ID:

Date Analyzed: 07/31/18 00:21 Lab File ID: 07300040.D GC Column: CLP1 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Tetrachloro-m-xylene	3.85	Baseline Smoothing	mooret	08/08/18 01:51
Toxaphene Peak 1	6.24	Baseline Smoothing	mooret	08/08/18 01:51
Toxaphene Peak 2	6.76	Baseline Smoothing	mooret	08/08/18 01:51
Toxaphene Peak 3	7.01	Baseline Smoothing	mooret	08/08/18 01:51
Toxaphene Peak 4	7.74	Baseline Smoothing	mooret	08/08/18 01:51
Toxaphene Peak 5	8.05	Baseline Smoothing	mooret	08/08/18 01:51
DCB Decachlorobiphenyl	9.38	Baseline Smoothing	mooret	08/08/18 01:51

Lab Sample ID: LCS 280-423271/3-C Client Sample ID:

Date Analyzed: 07/31/18 00:21 Lab File ID: 07300040.D GC Column: CLP2 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Tetrachloro-m-xylene	3.72	Baseline Smoothing	mooret	08/08/18 01:51
Toxaphene Peak 1	5.65	Baseline Smoothing	mooret	08/08/18 01:51
Toxaphene Peak 2	7.02	Baseline Smoothing	mooret	08/08/18 01:51
Toxaphene Peak 3	7.20	Baseline Smoothing	mooret	08/08/18 01:51
Toxaphene Peak 4	7.40	Baseline Smoothing	mooret	08/08/18 01:51
Toxaphene Peak 5	7.94	Baseline Smoothing	mooret	08/08/18 01:51

PCBS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SGC_P3 Analysis Batch Number: 423815

Lab Sample ID: STDL42154 280-423815/11 Client Sample ID:

Date Analyzed: 07/26/18 18:09 Lab File ID: 07261811.D GC Column: CLP2 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
PCB-1221 Peak 1	3.09	Instrument noise	jacksonto	07/27/18 06:57
PCB-1221 Peak 2	3.22	Instrument noise	jacksonto	07/27/18 06:57
PCB-1221 Peak 3	3.27	Instrument noise	jacksonto	07/27/18 06:57

Lab Sample ID: STDL22154 280-423815/13 Client Sample ID:

Date Analyzed: 07/26/18 18:53 Lab File ID: 07261813.D GC Column: CLP1 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
PCB-1221		Unspecified		
PCB-1221 Peak 1	2.96	Baseline Smoothing	jacksonto	07/27/18 06:58
PCB-1221 Peak 2	3.10	Baseline Smoothing	jacksonto	07/27/18 06:58
PCB-1221 Peak 3	3.14	Baseline Smoothing	jacksonto	07/27/18 06:59

Lab Sample ID: STDL22154 280-423815/13 Client Sample ID:

Date Analyzed: 07/26/18 18:53 Lab File ID: 07261813.D GC Column: CLP2 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
PCB-1221		Unspecified		
PCB-1221 Peak 1	3.09	Baseline Smoothing	jacksonto	07/27/18 06:59
PCB-1221 Peak 2	3.22	Baseline Smoothing	jacksonto	07/27/18 06:59
PCB-1221 Peak 3	3.27	Baseline Smoothing	jacksonto	07/27/18 06:59

Lab Sample ID: STDL21660 280-423815/20 Client Sample ID:

Date Analyzed: 07/26/18 21:26 Lab File ID: 07261820.D GC Column: CLP1 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
DCB Decachlorobiphenyl	9.61	Split Peak	jacksonto	07/27/18 10:12

PCBS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SGC_P3 Analysis Batch Number: 423815

Lab Sample ID: ICV 280-423815/37 Client Sample ID:

Date Analyzed: 07/27/18 03:38 Lab File ID: 07261837.D GC Column: CLP2 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
PCB-1221 Peak 1	3.09	Instrument noise	jacksonto	07/27/18 07:13
PCB-1221 Peak 2	3.22	Instrument noise	jacksonto	07/27/18 07:13
PCB-1221 Peak 3	3.27	Instrument noise	jacksonto	07/27/18 07:13

Lab Sample ID: ICV 280-423815/38 Client Sample ID:

Date Analyzed: 07/27/18 03:59 Lab File ID: 07261838.D GC Column: CLP1 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
PCB-1016 Peak 1	3.48	Baseline Smoothing	jacksonto	07/27/18 07:14
PCB-1016 Peak 2	3.94	Baseline Smoothing	jacksonto	07/27/18 07:14
PCB-1016 Peak 3	4.08	Baseline Smoothing	jacksonto	07/27/18 07:14
PCB-1016 Peak 4	4.29	Baseline Smoothing	jacksonto	07/27/18 07:14
PCB-1016 Peak 5	4.53	Baseline Smoothing	jacksonto	07/27/18 07:14
PCB-1260 Peak 1	6.00	Baseline Smoothing	jacksonto	07/27/18 07:14
PCB-1260 Peak 2	6.72	Baseline Smoothing	jacksonto	07/27/18 07:14
PCB-1260 Peak 3	7.21	Baseline Smoothing	jacksonto	07/27/18 07:14
PCB-1260 Peak 4	7.65	Baseline Smoothing	jacksonto	07/27/18 07:14
PCB-1260 Peak 5	8.03	Baseline Smoothing	jacksonto	07/27/18 07:14

PCBS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SGC_P3 Analysis Batch Number: 424773

Lab Sample ID: CCVIS 280-424773/3 Client Sample ID:

Date Analyzed: 08/03/18 11:18 Lab File ID: 08031803.D GC Column: CLP2 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
PCB-1260 Peak 1	6.64	Baseline Smoothing	jacksonto	08/03/18 12:01
PCB-1260 Peak 2	7.11	Baseline Smoothing	jacksonto	08/03/18 12:01
PCB-1260 Peak 3	7.64	Baseline Smoothing	jacksonto	08/03/18 12:01
PCB-1260 Peak 4	8.00	Baseline Smoothing	jacksonto	08/03/18 12:01
PCB-1260 Peak 5	8.51	Baseline Smoothing	jacksonto	08/03/18 12:01

PCBS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SGC_P3 Analysis Batch Number: 424773

Lab Sample ID: MB 280-423389/1-A Client Sample ID:

Date Analyzed: 08/03/18 11:39 Lab File ID: 08031804.D GC Column: CLP1 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
PCB-1016		Unspecified		
PCB-1221		Unspecified		
PCB-1232		Unspecified		
PCB-1242		Unspecified		
PCB-1248		Unspecified		
PCB-1254		Unspecified		
PCB-1260		Unspecified		
PCB-1262		Unspecified		
PCB-1268		Unspecified		
PCB-1016 Peak 1		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1016 Peak 2		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1016 Peak 3		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1016 Peak 4		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1016 Peak 5		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1221 Peak 1		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1221 Peak 2		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1221 Peak 3		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1232 Peak 1		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1232 Peak 2		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1232 Peak 3		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1232 Peak 4		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1232 Peak 5		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1242 Peak 1		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1242 Peak 2		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1242 Peak 3		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1242 Peak 4		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1242 Peak 5		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1248 Peak 1		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1248 Peak 2		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1248 Peak 3		Invalid Compound ID	jacksonto	08/03/18 12:02

PCBS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SGC_P3 Analysis Batch Number: 424773

Lab Sample ID: MB 280-423389/1-A Client Sample ID:

Date Analyzed: 08/03/18 11:39 Lab File ID: 08031804.D GC Column: CLP1 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
PCB-1248 Peak 4		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1248 Peak 5		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1254 Peak 1		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1254 Peak 2		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1254 Peak 3		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1254 Peak 4		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1254 Peak 5		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1260 Peak 1		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1260 Peak 2		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1260 Peak 3		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1260 Peak 4		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1260 Peak 5		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1262 Peak 1		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1262 Peak 2		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1262 Peak 3		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1262 Peak 4		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1262 Peak 5		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1268 Peak 1		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1268 Peak 2		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1268 Peak 3		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1268 Peak 4		Invalid Compound ID	jacksonto	08/03/18 12:02
PCB-1268 Peak 5		Invalid Compound ID	jacksonto	08/03/18 12:02

PCBS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SGC_P3 Analysis Batch Number: 424773

Lab Sample ID: MB 280-423389/1-A Client Sample ID:

Date Analyzed: 08/03/18 11:39 Lab File ID: 08031804.D GC Column: CLP2 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
PCB-1016		Unspecified		
PCB-1221		Unspecified		
PCB-1232		Unspecified		
PCB-1242		Unspecified		
PCB-1248		Unspecified		
PCB-1254		Unspecified		
PCB-1260		Unspecified		
PCB-1262		Unspecified		
PCB-1268		Unspecified		
PCB-1016 Peak 1		Unspecified		
PCB-1016 Peak 2		Unspecified		
PCB-1016 Peak 3		Unspecified		
PCB-1016 Peak 4		Unspecified		
PCB-1016 Peak 5		Unspecified		
PCB-1221 Peak 1		Unspecified		
PCB-1221 Peak 2		Unspecified		
PCB-1221 Peak 3		Unspecified		
PCB-1232 Peak 1		Unspecified		
PCB-1232 Peak 2		Unspecified		
PCB-1232 Peak 3		Unspecified		
PCB-1232 Peak 4		Unspecified		
PCB-1232 Peak 5		Unspecified		
PCB-1242 Peak 1		Unspecified		
PCB-1242 Peak 2		Unspecified		
PCB-1242 Peak 3		Unspecified		
PCB-1242 Peak 4		Unspecified		
PCB-1242 Peak 5		Unspecified		
PCB-1248 Peak 1		Unspecified		
PCB-1248 Peak 2		Unspecified		
PCB-1248 Peak 3		Unspecified		

PCBS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SGC_P3 Analysis Batch Number: 424773

Lab Sample ID: MB 280-423389/1-A Client Sample ID:

Date Analyzed: 08/03/18 11:39 Lab File ID: 08031804.D GC Column: CLP2 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
PCB-1248 Peak 4		Unspecified		
PCB-1248 Peak 5		Unspecified		
PCB-1254 Peak 1		Unspecified		
PCB-1254 Peak 2		Unspecified		
PCB-1254 Peak 3		Unspecified		
PCB-1254 Peak 4		Unspecified		
PCB-1254 Peak 5		Unspecified		
PCB-1260 Peak 1		Unspecified		
PCB-1260 Peak 2		Unspecified		
PCB-1260 Peak 3		Unspecified		
PCB-1260 Peak 4		Unspecified		
PCB-1260 Peak 5		Unspecified		
PCB-1262 Peak 1		Unspecified		
PCB-1262 Peak 2		Unspecified		
PCB-1262 Peak 3		Unspecified		
PCB-1262 Peak 4		Unspecified		
PCB-1262 Peak 5		Unspecified		
PCB-1268 Peak 1		Unspecified		
PCB-1268 Peak 2		Unspecified		
PCB-1268 Peak 3		Unspecified		
PCB-1268 Peak 4		Unspecified		
PCB-1268 Peak 5		Unspecified		

PCBS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SGC_P3 Analysis Batch Number: 424773

Lab Sample ID: 160-29498-2 Client Sample ID: CRC-B21-0205

Date Analyzed: 08/03/18 12:23 Lab File ID: 08031806.D GC Column: CLP1 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
PCB-1016		Unspecified		
PCB-1221		Unspecified		
PCB-1232		Unspecified		
PCB-1242		Unspecified		
PCB-1248		Unspecified		
PCB-1254		Unspecified		
PCB-1260		Unspecified		
PCB-1262		Unspecified		
PCB-1268		Unspecified		
PCB-1016 Peak 1		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1016 Peak 2		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1016 Peak 3		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1016 Peak 4		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1016 Peak 5		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1221 Peak 1		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1221 Peak 2		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1221 Peak 3		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1232 Peak 1		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1232 Peak 2		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1232 Peak 3		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1232 Peak 4		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1232 Peak 5		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1242 Peak 1		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1242 Peak 2		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1242 Peak 3		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1242 Peak 4		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1242 Peak 5		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1248 Peak 1		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1248 Peak 2		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1248 Peak 3		Invalid Compound ID	jacksonto	08/03/18 13:25

8082A

PCBS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SGC_P3 Analysis Batch Number: 424773

Lab Sample ID: 160-29498-2 Client Sample ID: CRC-B21-0205

Date Analyzed: 08/03/18 12:23 Lab File ID: 08031806.D GC Column: CLP1 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
PCB-1248 Peak 4		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1248 Peak 5		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1254 Peak 1		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1254 Peak 2		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1254 Peak 3		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1254 Peak 4		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1254 Peak 5		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1260 Peak 1		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1260 Peak 2		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1260 Peak 3		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1260 Peak 4		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1260 Peak 5		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1262 Peak 1		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1262 Peak 2		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1262 Peak 3		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1262 Peak 4		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1262 Peak 5		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1268 Peak 1		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1268 Peak 2		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1268 Peak 3		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1268 Peak 4		Invalid Compound ID	jacksonto	08/03/18 13:25
PCB-1268 Peak 5		Invalid Compound ID	jacksonto	08/03/18 13:25

PCBS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SGC_P3 Analysis Batch Number: 424773

Lab Sample ID: 160-29498-2 Client Sample ID: CRC-B21-0205

Date Analyzed: 08/03/18 12:23 Lab File ID: 08031806.D GC Column: CLP2 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
PCB-1016		Unspecified		
PCB-1221		Unspecified		
PCB-1232		Unspecified		
PCB-1242		Unspecified		
PCB-1248		Unspecified		
PCB-1254		Unspecified		
PCB-1260		Unspecified		
PCB-1262		Unspecified		
PCB-1268		Unspecified		
PCB-1016 Peak 1		Unspecified		
PCB-1016 Peak 2		Unspecified		
PCB-1016 Peak 3		Unspecified		
PCB-1016 Peak 4		Unspecified		
PCB-1016 Peak 5		Unspecified		
PCB-1221 Peak 1		Unspecified		
PCB-1221 Peak 2		Unspecified		
PCB-1221 Peak 3		Unspecified		
PCB-1232 Peak 1		Unspecified		
PCB-1232 Peak 2		Unspecified		
PCB-1232 Peak 3		Unspecified		
PCB-1232 Peak 4		Unspecified		
PCB-1232 Peak 5		Unspecified		
PCB-1242 Peak 1		Unspecified		
PCB-1242 Peak 2		Unspecified		
PCB-1242 Peak 3		Unspecified		
PCB-1242 Peak 4		Unspecified		
PCB-1242 Peak 5		Unspecified		
PCB-1248 Peak 1		Unspecified		
PCB-1248 Peak 2		Unspecified		
PCB-1248 Peak 3		Unspecified		

PCBS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SGC_P3 Analysis Batch Number: 424773

Lab Sample ID: 160-29498-2 Client Sample ID: CRC-B21-0205

Date Analyzed: 08/03/18 12:23 Lab File ID: 08031806.D GC Column: CLP2 ID: 0.32(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
PCB-1248 Peak 4		Unspecified		
PCB-1248 Peak 5		Unspecified		
PCB-1254 Peak 1		Unspecified		
PCB-1254 Peak 2		Unspecified		
PCB-1254 Peak 3		Unspecified		
PCB-1254 Peak 4		Unspecified		
PCB-1254 Peak 5		Unspecified		
PCB-1260 Peak 1		Unspecified		
PCB-1260 Peak 2		Unspecified		
PCB-1260 Peak 3		Unspecified		
PCB-1260 Peak 4		Unspecified		
PCB-1260 Peak 5		Unspecified		
PCB-1262 Peak 1		Unspecified		
PCB-1262 Peak 2		Unspecified		
PCB-1262 Peak 3		Unspecified		
PCB-1262 Peak 4		Unspecified		
PCB-1262 Peak 5		Unspecified		
PCB-1268 Peak 1		Unspecified		
PCB-1268 Peak 2		Unspecified		
PCB-1268 Peak 3		Unspecified		
PCB-1268 Peak 4		Unspecified		
PCB-1268 Peak 5		Unspecified		

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
108345_00001	01/22/68		Eckert & Ziegler, Lot 108345		(Purchased Reagent)		Americium-241	7.916 Bq
							Pu-239	7.695 Bq
							Thorium-230	7.314 Bq
108346_00001	01/22/68		Eckert & Ziegler, Lot 108346		(Purchased Reagent)		Americium-241	8.008 Bq
							Pu-239	7.835 Bq
							Thorium-230	7.57 Bq
82232-334_00001	06/03/60		Eckert & Ziegler, Lot 82232-334		(Purchased Reagent)		Americium-241	7.281 Bq
							Pu-239	7.137 Bq
							Thorium-230	7.63 Bq
82233-334_00001	06/03/60		Eckert & Zigler, Lot 82233-334		(Purchased Reagent)		Americium-241	5.114 Bq
							Pu-239	6.064 Bq
							Thorium-230	4.95 Bq
82236-334_00001	06/02/60		Eckert & Ziegler, Lot 82236-334		(Purchased Reagent)		Americium-241	6.891 Bq
							Pu-239	6.664 Bq
							Thorium-230	7.107 Bq
82237-334_00003	06/01/60		Eckert & Ziegler, Lot 82237-334		(Purchased Reagent)		Americium-241	5.608 Bq
							Pu-239	6.424 Bq
							Thorium-230	5.856 Bq
82238-334_00001	06/01/60		Eckert & Ziegler, Lot 82238-334		(Purchased Reagent)		Americium-241	5.932 Bq
							Pu-239	6.753 Bq
							Thorium-230	7.099 Bq
82240-334_00001	06/08/60		Eckert & Ziegler, Lot 82240-334		(Purchased Reagent)		Americium-241	8.298 Bq
							Pu-239	7.163 Bq
							Thorium-230	6.304 Bq
82241-334_00001	06/08/60		Eckert & Ziegler, Lot 82241-334		(Purchased Reagent)		Americium-241	6.638 Bq
							Pu-239	6.797 Bq
							Thorium-230	6.629 Bq
82243-334_00001	06/09/60		Eckert & Ziegler, Lot 82243-334		(Purchased Reagent)		Americium-241	6.39 Bq
							Pu-239	5.979 Bq
							Thorium-230	5.856 Bq
82244-334_00001	06/09/60		Eckert & Zigler, Lot 82244-334		(Purchased Reagent)		Americium-241	6.897 Bq
							Pu-239	6.717 Bq
							Thorium-230	7.352 Bq
82246-334_00001	06/09/60		Eckert & Ziegler, Lot 82246-334		(Purchased Reagent)		Americium-241	6.002 Bq
							Pu-239	5.353 Bq
							Thorium-230	5.57 Bq
p-Xylene_00013	12/01/18		Sigma Aldrich, Lot SHBB3168V		(Purchased Reagent)		Flashpoint	25 Celsius
pH Buffer 7SS_00034	06/13/19		Ricca, Lot 4709G98		(Purchased Reagent)		pH adj. to 25 deg C	7 SU
Rocky Flats_00001	12/14/54		NIST, Lot 4353		(Purchased Reagent)		Gross Alpha	27.1 pCi/g
							Gross Beta	26.8 pCi/g
Source A_00001	04/01/59	02/23/11	water, Lot 79670-334	0.9986 Source	Gamma Ampuole_00001	0.9986 g	Americium-241	9.4429 Bq

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Cd-109	132.909 Bq
							Ce-139	4.4538 Bq
							Cesium-137	3.7296 Bq
							Co-57	2.9513 Bq
							Cobalt-60	6.2002 Bq
							Hg-203	9.6996 Bq
							Sn-113	7.6266 Bq
							Y-88	12.712 Bq
.Gamma Ampuole_00001	04/07/59		Analytics, Lot 79670-334		(Purchased Reagent)		Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
Source E_00001	04/01/59	02/23/11	water, Lot 79670-334	1.0205 g	Gamma Ampuole_00001	1.0205 g	Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
.Gamma Ampuole_00001	04/07/59		Analytics, Lot 79670-334		(Purchased Reagent)		Americium-241	9442.9 Bq
							Cd-109	132909 Bq
							Ce-139	4453.8 Bq
							Cesium-137	3729.6 Bq
							Co-57	2951.3 Bq
							Cobalt-60	6200.2 Bq
							Hg-203	9699.6 Bq
							Sn-113	7626.6 Bq
							Y-88	12712 Bq
Source F_00001	01/01/61	02/23/11	water, Lot 83725-334	10 mL	Gamma Ampuole_00003	2.0327 mL	Americium-241	1846.42 Bq
							Cd-109	26819.3 Bq
							Ce-139	890.424 Bq
							Cesium-137	743.562 Bq
							Co-57	580.6 Bq
							Cobalt-60	1222.38 Bq
							Hg-203	1926.02 Bq
							Sn-113	1576.93 Bq
							Y-88	2572.87 Bq
.Gamma Ampuole_00003	01/19/61		Analytics, Lot 83725-334		(Purchased Reagent)		Americium-241	9083.6 Bq
							Cd-109	131939 Bq

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Ce-139	4380.5 Bq
							Cesium-137	3658 Bq
							Co-57	2856.3 Bq
							Cobalt-60	6013.6 Bq
							Hg-203	9475.2 Bq
							Sn-113	7757.8 Bq
							Y-88	12657.4 Bq
Source H_00002	01/01/51	01/01/12	wataer, Lot 83725-334	10 mL	Gamma Ampuole_00003	2.1184 g	Americium-241	1924.27 Bq
							Cd-109	27950 Bq
							Ce-139	927.965 Bq
							Cesium-137	774.911 Bq
							Co-57	605.079 Bq
							Cobalt-60	1273.92 Bq
							Hg-203	2007.23 Bq
							Sn-113	1643.41 Bq
							Y-88	2681.34 Bq
.Gamma Ampuole_00003	01/19/61	Analytics, Lot 83725-334			(Purchased Reagent)		Americium-241	9083.6 Bq
							Cd-109	131939 Bq
							Ce-139	4380.5 Bq
							Cesium-137	3658 Bq
							Co-57	2856.3 Bq
							Cobalt-60	6013.6 Bq
							Hg-203	9475.2 Bq
							Sn-113	7757.8 Bq
							Y-88	12657.4 Bq
Sr-90_00004	09/17/59	06/21/11	0.1M HCL, Lot 0	100 mL	Sr-90_00001	5.0139 g	Gross Beta	45120.6 dpm/mL
							Sr	22560.3 dpm/mL
							Sr-90	22560.3 dpm/mL
.Sr-90_00001	09/17/59	Eckert & Ziegler, Lot 80573-334			(Purchased Reagent)		Gross Beta	14998.5 Bq/g
							Sr	7499.25 Bq/g
							Sr-90	7499.25 Bq/g
Sr-90_00018	03/12/19	11/28/12	0.1M HCL, Lot 0	100 mL	Sr-90_00017	4.9997 g	Gross Beta	44774.2 dpm/mL
							Sr-90	22387.1 dpm/mL
.Sr-90_00017	11/29/62	Analytics, Lot 92352			(Purchased Reagent)		Gross Beta	14925.6 Bq/g
							Sr-90	7462.82 Bq/g
Th-229_00024	12/20/18	08/01/18	0.1M HNO3, Lot n/a	250 mL	Th-229_00017	7.5 mL	At-217	67.2296 dpm/mL
							Thorium-229	67.2296 dpm/mL
.Th-229_00017	12/20/18	08/20/14	0.1M HNO3, Lot n/a	100 mL	Th-229_00016	5.0464 g	At-217	2240.99 dpm/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Thorium-229	2240.99 dpm/mL
..Th-229_00016	08/06/64	Analytics, Lot 97790			(Purchased Reagent)		At-217	740.127 Bq/g
							Thorium-229	740.127 Bq/g
Th-230_00016	11/29/62	11/28/12	0.5M HNO3, Lot 0	100 mL	Th-230_00015	5.0489 g	Gross Alpha	2374.49 dpm/mL
							Thorium-230	2374.49 dpm/mL
.Th-230_00015	11/29/62	Analytics, Lot 92523			(Purchased Reagent)		Gross Alpha	783.829 Bq/g
							Thorium-230	783.829 Bq/g
Th-230_00019	08/04/19	08/13/13	1M HNO3, Lot n/a	100 mL	Th-230_00018	5.0731 mL	Gross Alpha	2228.23 dpm/mL
							Thorium-230	2228.23 dpm/mL
.Th-230_00018	08/08/63	Eckert & Ziegler Analytics, Lot 92776			(Purchased Reagent)		Gross Alpha	43922.5 dpm/g
							Thorium-230	43922.5 dpm/g
TRM-2_00002	03/20/50	DOE, Lot TRM-2			(Purchased Reagent)		Lead-210	22.1 pCi/g
							Radium-226	25.4 pCi/g
							Thorium-230	24.5 pCi/g
							Uranium-234	6.2 pCi/g
							Uranium-238	6 pCi/g
Tuna Can LCS_00006	09/29/17	Analytics, Lot 74139-334			(Purchased Reagent)		Americium-241	219 dpm/g
							Cesium-137	82.3 dpm/g
							Cobalt-60	136 dpm/g
Tuna Can LCS_00007	09/21/18	Analytics, Lot 74139-334			(Purchased Reagent)		Americium-241	219 dpm/g
							Cesium-137	82.3 dpm/g
							Cobalt-60	136 dpm/g
Tuna Can_00003	02/09/17	Eckert & Ziegler, Lot 90099			(Purchased Reagent)		Americium-241	1164 Bq
							Cd-109	16373 Bq
							Ce-139	549 Bq
							Cesium-137	467 Bq
							Co-57	362 Bq
							Cobalt-60	735 Bq
							Hg-203	1171 Bq
							Lead-210	14936 Bq
							Sn-113	967 Bq
							Y-88	1590 Bq
Tuna Can_00006	03/01/16	Eckert & Ziegler, Lot 83814-334			(Purchased Reagent)		Americium-241	1195 Bq
							Cd-109	16353 Bq
							Ce-139	543 Bq
							Cesium-137	453 Bq
							Co-57	354 Bq
							Cobalt-60	745 Bq
							Hg-203	1175 Bq
							Lead-210	14606 Bq
							Sn-113	961 Bq

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica St. Louis Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Y-88	1568 Bq
U-232_00039	11/28/18	03/31/10	1M HNO3, Lot n/a	500 mL	U-232_00004	4 mL	Uranium-232	77.4755 dpm/mL
.U-232_00004	04/07/53	02/09/05	2M HNO3, Lot 0	100 g	U-232_00001	5.0007 g	Uranium-232	9684.44 dpm/mL
..U-232_00001	04/07/53	Analytics, Lot 65788-334			(Purchased Reagent)		Uranium-232	3227.7 Bq/g
UNAT_00014	11/28/18	12/21/17	1M HNO3, Lot n/a	200 mL	UNAT Parent_00001	20 mL	Uranium-234	70.6912 dpm/mL
							Uranium-235	3.37064 dpm/mL
							Uranium-238	72.265 dpm/mL
.UNAT Parent_00001	11/28/18	05/03/13	1M HNO3, Lot n/a	200 mL	UNAT Ampoule_00001	19.2509 g	Uranium-234	706.912 dpm/mL
							Uranium-235	33.7064 dpm/mL
							Uranium-238	722.65 dpm/mL
..UNAT Ampoule_00001	03/30/58	New Brunswick Lab, Lot CRM 145			(Purchased Reagent)		Uranium-234	7344.2 dpm/g
							Uranium-235	350.18 dpm/g
							Uranium-238	7507.7 dpm/g

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
8081 LCS_00433	07/31/18	07/24/18	P&T Methanol, Lot MethanolP&T_00208	50 mL	8081HCBPrim_00001	0.5 mL	Hexachlorobenzene	0.5 ug/mL
					8081LCSPrim_00039	0.5 mL	4,4'-DDD	0.5 ug/mL
							4,4'-DDE	0.5 ug/mL
							4,4'-DDT	0.5 ug/mL
							Aldrin	0.5 ug/mL
							alpha-BHC	0.5 ug/mL
							beta-BHC	0.5 ug/mL
							cis-Chlordane	0.5 ug/mL
							delta-BHC	0.5 ug/mL
							Dieldrin	0.5 ug/mL
							Endosulfan I	0.5 ug/mL
							Endosulfan II	0.5 ug/mL
							Endosulfan sulfate	0.5 ug/mL
							Endrin	0.5 ug/mL
							Endrin aldehyde	0.5 ug/mL
							Endrin ketone	0.5 ug/mL
							gamma-BHC (Lindane)	0.5 ug/mL
							Heptachlor	0.5 ug/mL
							Heptachlor epoxide	0.5 ug/mL
							Methoxychlor	0.5 ug/mL
							trans-Chlordane	0.5 ug/mL
.8081HCBPrim_00001	06/14/19	06/14/18	Hexane, Lot Hexane Cycl 00050	10 mL	8081HCBStkSS_00036	0.5 mL	Hexachlorobenzene	50 ug/mL
..8081HCBStkSS_00036	06/14/19	Ultra Scientific, Lot CR-5129			(Purchased Reagent)		Hexachlorobenzene	1000 ug/mL
.8081LCSPrim_00039	09/13/18	03/13/18	Hexane, Lot Hexane_Cycl_00048	10 mL	8081ABResPS_00015	0.25 mL	4,4'-DDD	50 ug/mL
							4,4'-DDE	50 ug/mL
							4,4'-DDT	50 ug/mL
							Aldrin	50 ug/mL
							alpha-BHC	50 ug/mL
							beta-BHC	50 ug/mL
							cis-Chlordane	50 ug/mL
							delta-BHC	50 ug/mL
							Dieldrin	50 ug/mL
							Endosulfan I	50 ug/mL
							Endosulfan II	50 ug/mL
							Endosulfan sulfate	50 ug/mL
							Endrin	50 ug/mL
							Endrin aldehyde	50 ug/mL
							Endrin ketone	50 ug/mL
							gamma-BHC (Lindane)	50 ug/mL
							Heptachlor	50 ug/mL
							Heptachlor epoxide	50 ug/mL
							Methoxychlor	50 ug/mL
							trans-Chlordane	50 ug/mL
..8081ABResPS_00015	01/31/19	Restek, Lot A0108399			(Purchased Reagent)		4,4'-DDD	2000 ug/mL
							4,4'-DDE	2000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							4,4'-DDT	2000 ug/mL
							Aldrin	2000 ug/mL
							alpha-BHC	2000 ug/mL
							beta-BHC	2000 ug/mL
							cis-Chlordane	2000 ug/mL
							delta-BHC	2000 ug/mL
							Dieldrin	2000 ug/mL
							Endosulfan I	2000 ug/mL
							Endosulfan II	2000 ug/mL
							Endosulfan sulfate	2000 ug/mL
							Endrin	2000 ug/mL
							Endrin aldehyde	2000 ug/mL
							Endrin ketone	2000 ug/mL
							gamma-BHC (Lindane)	2000 ug/mL
							Heptachlor	2000 ug/mL
							Heptachlor epoxide	2000 ug/mL
							Methoxychlor	2000 ug/mL
							trans-Chlordane	2000 ug/mL
8081/82 Surr_00103	12/27/18	06/27/18	ACETONE, Lot Acetone_00220	1000 mL	AR_SURR_RES_00080	1 mL	DCB Decachlorobiphenyl	0.2 ug/mL
							Tetrachloro-m-xylene	0.2 ug/mL
.AR_SURR_RES_00080	06/27/19		RESTEK, Lot A0130424		(Purchased Reagent)		DCB Decachlorobiphenyl	200 ug/mL
							Tetrachloro-m-xylene	200 ug/mL
8081_EvalBPEM_00012	08/16/18	02/16/18	Hexane, Lot 173156	100 mL	8081EvalBStk2_00019	20 uL	4,4'-DDT	0.04 ug/mL
							Endrin	0.04 ug/mL
.8081EvalBStk2_00019	08/31/18		AccuStandard, Inc, Lot 214101383-05		(Purchased Reagent)		4,4'-DDT	200 ug/mL
							Endrin	200 ug/mL
8081_IS_00008	12/02/18	06/02/18	Hexane, Lot 189035	500 mL	BNB stock_00014	1 mL	1-Bromo-2-nitrobenzene	2 ug/mL
.BNB stock_00014	08/31/20		Restek, Lot A0127264		(Purchased Reagent)		1-Bromo-2-nitrobenzene	1000 ug/mL
8081ABICVL3_00033	08/31/18	04/06/18	Hexane, Lot 4839289	100 mL	8081ABICVStk_00031	2.5 mL	Endrin	25 ng/mL
							gamma-BHC (Lindane)	25 ng/mL
							Heptachlor	25 ng/mL
							Heptachlor epoxide	25 ng/mL
							Methoxychlor	25 ng/mL
							DCB Decachlorobiphenyl	25 ng/mL
							Tetrachloro-m-xylene	25 ng/mL
.8081ABICVStk_00031	08/31/18	04/06/18	Hexane, Lot 4839289	50 mL	8081ABResSS_00011	0.025 mL	Endrin	1000 ng/mL
							gamma-BHC (Lindane)	1000 ng/mL
							Heptachlor	1000 ng/mL
							Heptachlor epoxide	1000 ng/mL
							Methoxychlor	1000 ng/mL
					AR_SURR_RES_00075	0.25 mL	DCB Decachlorobiphenyl	1000 ng/mL
							Tetrachloro-m-xylene	1000 ng/mL
..8081ABResSS_00011	02/28/19		Restek, Lot A0108854		(Purchased Reagent)		Endrin	2000 ug/mL
							gamma-BHC (Lindane)	2000 ug/mL
							Heptachlor	2000 ug/mL
							Heptachlor epoxide	2000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Methoxychlor	2000 ug/mL
..AR_SURR_RES_00075	12/30/22	RESTEK, Lot A0121594			(Purchased Reagent)		DCB Decachlorobiphenyl	200 ug/mL
							Tetrachloro-m-xylene	200 ug/mL
8081ChlorL1_00023	11/15/18	05/15/18	Hexane, Lot 189045	100 mL	8081ChlrWSPS_00014	0.05 mL	Chlordane (technical) Peak 1	50 ng/mL
							Chlordane (technical) Peak 2	50 ng/mL
							Chlordane (technical) Peak 3	50 ng/mL
							Chlordane (technical) Peak 4	50 ng/mL
							Chlordane (technical) Peak 5	50 ng/mL
							Technical Chlordane Peak 1	50 ng/mL
							Technical Chlordane Peak 2	50 ng/mL
							Technical Chlordane Peak 3	50 ng/mL
							Technical Chlordane Peak 4	50 ng/mL
							Technical Chlordane Peak 5	50 ng/mL
.8081ChlrWSPS_00014	11/15/18	05/15/18	hexane, Lot 189045	10 mL	8081ChlrStkPS_00023	0.2 mL	Chlordane (technical) Peak 1	100 ug/mL
							Chlordane (technical) Peak 2	100 ug/mL
							Chlordane (technical) Peak 3	100 ug/mL
							Chlordane (technical) Peak 4	100 ug/mL
							Chlordane (technical) Peak 5	100 ug/mL
							Technical Chlordane Peak 1	100 ug/mL
							Technical Chlordane Peak 2	100 ug/mL
							Technical Chlordane Peak 3	100 ug/mL
							Technical Chlordane Peak 4	100 ug/mL
							Technical Chlordane Peak 5	100 ug/mL
..8081ChlrStkPS_00023	04/30/20	Restek, Lot A0118733			(Purchased Reagent)		Chlordane (technical) Peak 1	5000 ug/mL
							Chlordane (technical) Peak 2	5000 ug/mL
							Chlordane (technical) Peak 3	5000 ug/mL
							Chlordane (technical) Peak 4	5000 ug/mL
							Chlordane (technical) Peak 5	5000 ug/mL
							Technical Chlordane Peak 1	5000 ug/mL
							Technical Chlordane Peak 2	5000 ug/mL
							Technical Chlordane Peak 3	5000 ug/mL
							Technical Chlordane Peak 4	5000 ug/mL
							Technical Chlordane Peak 5	5000 ug/mL
8081ChlorL2_00024	11/15/18	05/15/18	Hexane, Lot 189045	100 mL	8081ChlrWSPS_00014	0.2 mL	Chlordane (technical) Peak 1	200 ng/mL
							Chlordane (technical) Peak 2	200 ng/mL
							Chlordane (technical) Peak 3	200 ng/mL
							Chlordane (technical) Peak 4	200 ng/mL
							Chlordane (technical) Peak 5	200 ng/mL
							Technical Chlordane Peak 1	200 ng/mL
							Technical Chlordane Peak 2	200 ng/mL
							Technical Chlordane Peak 3	200 ng/mL
							Technical Chlordane Peak 4	200 ng/mL
							Technical Chlordane Peak 5	200 ng/mL
.8081ChlrWSPS_00014	11/15/18	05/15/18	hexane, Lot 189045	10 mL	8081ChlrStkPS_00023	0.2 mL	Chlordane (technical) Peak 1	100 ug/mL
							Chlordane (technical) Peak 2	100 ug/mL
							Chlordane (technical) Peak 3	100 ug/mL
							Chlordane (technical) Peak 4	100 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Chlordane (technical) Peak 5	100 ug/mL
							Technical Chlordane Peak 1	100 ug/mL
							Technical Chlordane Peak 2	100 ug/mL
							Technical Chlordane Peak 3	100 ug/mL
							Technical Chlordane Peak 4	100 ug/mL
							Technical Chlordane Peak 5	100 ug/mL
..8081ChlrStkPS_00023	04/30/20		Restek, Lot A0118733		(Purchased Reagent)		Chlordane (technical) Peak 1	5000 ug/mL
							Chlordane (technical) Peak 2	5000 ug/mL
							Chlordane (technical) Peak 3	5000 ug/mL
							Chlordane (technical) Peak 4	5000 ug/mL
							Chlordane (technical) Peak 5	5000 ug/mL
							Technical Chlordane Peak 1	5000 ug/mL
							Technical Chlordane Peak 2	5000 ug/mL
							Technical Chlordane Peak 3	5000 ug/mL
							Technical Chlordane Peak 4	5000 ug/mL
							Technical Chlordane Peak 5	5000 ug/mL
8081ChlorL3_00022	11/15/18	05/15/18	Hexane, Lot 189045	100 mL	8081ChlrWSPS_00014	0.5 mL	Chlordane (technical) Peak 1	500 ng/mL
							Chlordane (technical) Peak 2	500 ng/mL
							Chlordane (technical) Peak 3	500 ng/mL
							Chlordane (technical) Peak 4	500 ng/mL
							Chlordane (technical) Peak 5	500 ng/mL
							Technical Chlordane Peak 1	500 ng/mL
							Technical Chlordane Peak 2	500 ng/mL
							Technical Chlordane Peak 3	500 ng/mL
							Technical Chlordane Peak 4	500 ng/mL
							Technical Chlordane Peak 5	500 ng/mL
.8081ChlrWSPS_00014	11/15/18	05/15/18	hexane, Lot 189045	10 mL	8081ChlrStkPS_00023	0.2 mL	Chlordane (technical) Peak 1	100 ug/mL
							Chlordane (technical) Peak 2	100 ug/mL
							Chlordane (technical) Peak 3	100 ug/mL
							Chlordane (technical) Peak 4	100 ug/mL
							Chlordane (technical) Peak 5	100 ug/mL
							Technical Chlordane Peak 1	100 ug/mL
							Technical Chlordane Peak 2	100 ug/mL
							Technical Chlordane Peak 3	100 ug/mL
							Technical Chlordane Peak 4	100 ug/mL
							Technical Chlordane Peak 5	100 ug/mL
..8081ChlrStkPS_00023	04/30/20		Restek, Lot A0118733		(Purchased Reagent)		Chlordane (technical) Peak 1	5000 ug/mL
							Chlordane (technical) Peak 2	5000 ug/mL
							Chlordane (technical) Peak 3	5000 ug/mL
							Chlordane (technical) Peak 4	5000 ug/mL
							Chlordane (technical) Peak 5	5000 ug/mL
							Technical Chlordane Peak 1	5000 ug/mL
							Technical Chlordane Peak 2	5000 ug/mL
							Technical Chlordane Peak 3	5000 ug/mL
							Technical Chlordane Peak 4	5000 ug/mL
							Technical Chlordane Peak 5	5000 ug/mL
8081ChlorL4_00022	11/15/18	05/15/18	Hexane, Lot 189045	250 mL	8081ChlrWSPS_00014	2.5 mL	Chlordane (technical) Peak 1	1000 ng/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Chlordane (technical) Peak 2	1000 ng/mL
							Chlordane (technical) Peak 3	1000 ng/mL
							Chlordane (technical) Peak 4	1000 ng/mL
							Chlordane (technical) Peak 5	1000 ng/mL
							Technical Chlordane Peak 1	1000 ng/mL
							Technical Chlordane Peak 2	1000 ng/mL
							Technical Chlordane Peak 3	1000 ng/mL
							Technical Chlordane Peak 4	1000 ng/mL
							Technical Chlordane Peak 5	1000 ng/mL
.8081ChlrWSPS_00014	11/15/18	05/15/18	hexane, Lot 189045	10 mL	8081ChlrStkPS_00023	0.2 mL	Chlordane (technical) Peak 1	100 ug/mL
							Chlordane (technical) Peak 2	100 ug/mL
							Chlordane (technical) Peak 3	100 ug/mL
							Chlordane (technical) Peak 4	100 ug/mL
							Chlordane (technical) Peak 5	100 ug/mL
							Technical Chlordane Peak 1	100 ug/mL
							Technical Chlordane Peak 2	100 ug/mL
							Technical Chlordane Peak 3	100 ug/mL
							Technical Chlordane Peak 4	100 ug/mL
							Technical Chlordane Peak 5	100 ug/mL
..8081ChlrStkPS_00023	04/30/20		Restek, Lot A0118733		(Purchased Reagent)		Chlordane (technical) Peak 1	5000 ug/mL
							Chlordane (technical) Peak 2	5000 ug/mL
							Chlordane (technical) Peak 3	5000 ug/mL
							Chlordane (technical) Peak 4	5000 ug/mL
							Chlordane (technical) Peak 5	5000 ug/mL
							Technical Chlordane Peak 1	5000 ug/mL
							Technical Chlordane Peak 2	5000 ug/mL
							Technical Chlordane Peak 3	5000 ug/mL
							Technical Chlordane Peak 4	5000 ug/mL
							Technical Chlordane Peak 5	5000 ug/mL
8081ChlorL4_00022	11/15/18	05/15/18	Hexane, Lot 189045	250 mL	8081ChlrWSPS_00014	2.5 mL	Technical Chlordane	1000 ng/mL
.8081ChlrWSPS_00014	11/15/18	05/15/18	hexane, Lot 189045	10 mL	8081ChlrStkPS_00023	0.2 mL	Technical Chlordane	100 ug/mL
..8081ChlrStkPS_00023	04/30/20		Restek, Lot A0118733		(Purchased Reagent)		Technical Chlordane	5000 ug/mL
8081ChlorL5_00023	11/15/18	05/15/18	Hexane, Lot 189045	100 mL	8081ChlrWSPS_00014	2 mL	Chlordane (technical) Peak 1	2000 ng/mL
							Chlordane (technical) Peak 2	2000 ng/mL
							Chlordane (technical) Peak 3	2000 ng/mL
							Chlordane (technical) Peak 4	2000 ng/mL
							Chlordane (technical) Peak 5	2000 ng/mL
							Technical Chlordane Peak 1	2000 ng/mL
							Technical Chlordane Peak 2	2000 ng/mL
							Technical Chlordane Peak 3	2000 ng/mL
							Technical Chlordane Peak 4	2000 ng/mL
							Technical Chlordane Peak 5	2000 ng/mL
.8081ChlrWSPS_00014	11/15/18	05/15/18	hexane, Lot 189045	10 mL	8081ChlrStkPS_00023	0.2 mL	Chlordane (technical) Peak 1	100 ug/mL
							Chlordane (technical) Peak 2	100 ug/mL
							Chlordane (technical) Peak 3	100 ug/mL
							Chlordane (technical) Peak 4	100 ug/mL
							Chlordane (technical) Peak 5	100 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Technical Chlordane Peak 1	100 ug/mL
							Technical Chlordane Peak 2	100 ug/mL
							Technical Chlordane Peak 3	100 ug/mL
							Technical Chlordane Peak 4	100 ug/mL
							Technical Chlordane Peak 5	100 ug/mL
..8081ChlrStkPS_00023	04/30/20		Restek, Lot A0118733		(Purchased Reagent)		Chlordane (technical) Peak 1	5000 ug/mL
							Chlordane (technical) Peak 2	5000 ug/mL
							Chlordane (technical) Peak 3	5000 ug/mL
							Chlordane (technical) Peak 4	5000 ug/mL
							Chlordane (technical) Peak 5	5000 ug/mL
							Technical Chlordane Peak 1	5000 ug/mL
							Technical Chlordane Peak 2	5000 ug/mL
							Technical Chlordane Peak 3	5000 ug/mL
							Technical Chlordane Peak 4	5000 ug/mL
							Technical Chlordane Peak 5	5000 ug/mL
8081ChlSSL3_00022	09/14/18	03/14/18	Hexane, Lot 189045	100 mL	8081ChlrStkSS_00024	0.01 mL	Chlordane (technical) Peak 1	500 ng/mL
							Chlordane (technical) Peak 2	500 ng/mL
							Chlordane (technical) Peak 3	500 ng/mL
							Chlordane (technical) Peak 4	500 ng/mL
							Chlordane (technical) Peak 5	500 ng/mL
							Technical Chlordane	500 ng/mL
.8081ChlrStkSS_00024	02/29/20		Restek, Lot A0117232		(Purchased Reagent)		Chlordane (technical) Peak 1	5000 ug/mL
							Chlordane (technical) Peak 2	5000 ug/mL
							Chlordane (technical) Peak 3	5000 ug/mL
							Chlordane (technical) Peak 4	5000 ug/mL
							Chlordane (technical) Peak 5	5000 ug/mL
							Technical Chlordane	5000 ug/mL
8081IcalL1_00025	12/20/18	06/20/18	Hexane, Lot 192742	100 mL	8081ABCalStk_00033	0.4 mL	4,4'-DDD	4 ng/mL
							4,4'-DDE	4 ng/mL
							4,4'-DDT	4 ng/mL
							Aldrin	4 ng/mL
							alpha-BHC	4 ng/mL
							beta-BHC	4 ng/mL
							cis-Chlordane	4 ng/mL
							delta-BHC	4 ng/mL
							Dieldrin	4 ng/mL
							Endosulfan I	4 ng/mL
							Endosulfan II	4 ng/mL
							Endosulfan sulfate	4 ng/mL
							Endrin	4 ng/mL
							Endrin aldehyde	4 ng/mL
							Endrin ketone	4 ng/mL
							gamma-BHC (Lindane)	4 ng/mL
							Heptachlor	4 ng/mL
							Heptachlor epoxide	4 ng/mL
							Methoxychlor	4 ng/mL
							trans-Chlordane	4 ng/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Hexachlorobenzene	4 ng/mL
							Isodrin	4 ng/mL
							Mirex	4 ng/mL
							DCB Decachlorobiphenyl	4 ng/mL
							Tetrachloro-m-xylene	4 ng/mL
.8081ABCalStk_00033	12/20/18	06/20/18	Hexane, Lot 192742	100 mL	8081ABResPS_00026	0.05 mL	4,4'-DDD	1000 ng/mL
							4,4'-DDE	1000 ng/mL
							4,4'-DDT	1000 ng/mL
							Aldrin	1000 ng/mL
							alpha-BHC	1000 ng/mL
							beta-BHC	1000 ng/mL
							cis-Chlordane	1000 ng/mL
							delta-BHC	1000 ng/mL
							Dieldrin	1000 ng/mL
							Endosulfan I	1000 ng/mL
							Endosulfan II	1000 ng/mL
							Endosulfan sulfate	1000 ng/mL
							Endrin	1000 ng/mL
							Endrin aldehyde	1000 ng/mL
							Endrin ketone	1000 ng/mL
							gamma-BHC (Lindane)	1000 ng/mL
							Heptachlor	1000 ng/mL
							Heptachlor epoxide	1000 ng/mL
							Methoxychlor	1000 ng/mL
							trans-Chlordane	1000 ng/mL
					8081HCBStkPS_00021	1 mL	Hexachlorobenzene	1000 ng/mL
					8081IsodrinPS_00021	0.1 mL	Isodrin	1000 ng/mL
					8081MirxStkPS_00030	1 mL	Mirex	1000 ng/mL
					AR_SURR_RES_00073	0.5 mL	DCB Decachlorobiphenyl	1000 ng/mL
							Tetrachloro-m-xylene	1000 ng/mL
..8081ABResPS_00026	12/20/18		Restek, Lot A0129369		(Purchased Reagent)		4,4'-DDD	2000 ug/mL
							4,4'-DDE	2000 ug/mL
							4,4'-DDT	2000 ug/mL
							Aldrin	2000 ug/mL
							alpha-BHC	2000 ug/mL
							beta-BHC	2000 ug/mL
							cis-Chlordane	2000 ug/mL
							delta-BHC	2000 ug/mL
							Dieldrin	2000 ug/mL
							Endosulfan I	2000 ug/mL
							Endosulfan II	2000 ug/mL
							Endosulfan sulfate	2000 ug/mL
							Endrin	2000 ug/mL
							Endrin aldehyde	2000 ug/mL
							Endrin ketone	2000 ug/mL
							gamma-BHC (Lindane)	2000 ug/mL
							Heptachlor	2000 ug/mL
							Heptachlor epoxide	2000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Methoxychlor	2000 ug/mL
							trans-Chlordane	2000 ug/mL
..8081HCBStkPS_00021	12/20/18	Accustandard, Inc., Lot 216101286			(Purchased Reagent)		Hexachlorobenzene	100 ug/mL
..8081IsodrinPS_00021	12/20/18	Accustandard, Lot 216111205			(Purchased Reagent)		Isodrin	1000 ug/mL
..8081MirxStkPS_00030	12/20/18	Accustandard, Inc., Lot 214031359-03			(Purchased Reagent)		Mirex	100 ug/mL
..AR_SURR_RES_00073	12/20/18	RESTEK, Lot A0121594			(Purchased Reagent)		DCB Decachlorobiphenyl	200 ug/mL
							Tetrachloro-m-xylene	200 ug/mL
8081IcalL2_00025	12/20/18	06/20/18	Hexane, Lot 192742	100 mL	8081ABCalStk_00033	1 mL	4,4'-DDD	10 ng/mL
							4,4'-DDE	10 ng/mL
							4,4'-DDT	10 ng/mL
							Aldrin	10 ng/mL
							alpha-BHC	10 ng/mL
							beta-BHC	10 ng/mL
							cis-Chlordane	10 ng/mL
							delta-BHC	10 ng/mL
							Dieldrin	10 ng/mL
							Endosulfan I	10 ng/mL
							Endosulfan II	10 ng/mL
							Endosulfan sulfate	10 ng/mL
							Endrin	10 ng/mL
							Endrin aldehyde	10 ng/mL
							Endrin ketone	10 ng/mL
							gamma-BHC (Lindane)	10 ng/mL
							Heptachlor	10 ng/mL
							Heptachlor epoxide	10 ng/mL
							Methoxychlor	10 ng/mL
							trans-Chlordane	10 ng/mL
							Hexachlorobenzene	10 ng/mL
							Isodrin	10 ng/mL
							Mirex	10 ng/mL
							DCB Decachlorobiphenyl	10 ng/mL
							Tetrachloro-m-xylene	10 ng/mL
.8081ABCalStk_00033	12/20/18	06/20/18	Hexane, Lot 192742	100 mL	8081ABResPS_00026	0.05 mL	4,4'-DDD	1000 ng/mL
							4,4'-DDE	1000 ng/mL
							4,4'-DDT	1000 ng/mL
							Aldrin	1000 ng/mL
							alpha-BHC	1000 ng/mL
							beta-BHC	1000 ng/mL
							cis-Chlordane	1000 ng/mL
							delta-BHC	1000 ng/mL
							Dieldrin	1000 ng/mL
							Endosulfan I	1000 ng/mL
							Endosulfan II	1000 ng/mL
							Endosulfan sulfate	1000 ng/mL
							Endrin	1000 ng/mL
							Endrin aldehyde	1000 ng/mL
							Endrin ketone	1000 ng/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							gamma-BHC (Lindane)	1000 ng/mL
							Heptachlor	1000 ng/mL
							Heptachlor epoxide	1000 ng/mL
							Methoxychlor	1000 ng/mL
							trans-Chlordane	1000 ng/mL
					8081HCBStkPS_00021	1 mL	Hexachlorobenzene	1000 ng/mL
					8081IsodrinPS_00021	0.1 mL	Isodrin	1000 ng/mL
					8081MirxStkPS_00030	1 mL	Mirex	1000 ng/mL
					AR_SURR_RES_00073	0.5 mL	DCB Decachlorobiphenyl	1000 ng/mL
							Tetrachloro-m-xylene	1000 ng/mL
..8081ABResPS_00026	12/20/18		Restek, Lot A0129369		(Purchased Reagent)		4,4'-DDD	2000 ug/mL
							4,4'-DDE	2000 ug/mL
							4,4'-DDT	2000 ug/mL
							Aldrin	2000 ug/mL
							alpha-BHC	2000 ug/mL
							beta-BHC	2000 ug/mL
							cis-Chlordane	2000 ug/mL
							delta-BHC	2000 ug/mL
							Dieldrin	2000 ug/mL
							Endosulfan I	2000 ug/mL
							Endosulfan II	2000 ug/mL
							Endosulfan sulfate	2000 ug/mL
							Endrin	2000 ug/mL
							Endrin aldehyde	2000 ug/mL
							Endrin ketone	2000 ug/mL
							gamma-BHC (Lindane)	2000 ug/mL
							Heptachlor	2000 ug/mL
							Heptachlor epoxide	2000 ug/mL
							Methoxychlor	2000 ug/mL
							trans-Chlordane	2000 ug/mL
..8081HCBStkPS_00021	12/20/18		Accustandard, Inc., Lot 216101286		(Purchased Reagent)		Hexachlorobenzene	100 ug/mL
..8081IsodrinPS_00021	12/20/18		Accustandard, Lot 216111205		(Purchased Reagent)		Isodrin	1000 ug/mL
..8081MirxStkPS_00030	12/20/18		Accustandard, Inc., Lot 214031359-03		(Purchased Reagent)		Mirex	100 ug/mL
..AR_SURR_RES_00073	12/20/18		RESTEK, Lot A0121594		(Purchased Reagent)		DCB Decachlorobiphenyl	200 ug/mL
							Tetrachloro-m-xylene	200 ug/mL
8081IcalL3_00028	12/20/18	06/20/18	Hexane, Lot 192742	100 mL	8081ABCalStk_00033	2.5 mL	4,4'-DDD	25 ng/mL
							4,4'-DDE	25 ng/mL
							4,4'-DDT	25 ng/mL
							Aldrin	25 ng/mL
							alpha-BHC	25 ng/mL
							beta-BHC	25 ng/mL
							cis-Chlordane	25 ng/mL
							delta-BHC	25 ng/mL
							Dieldrin	25 ng/mL
							Endosulfan I	25 ng/mL
							Endosulfan II	25 ng/mL
							Endosulfan sulfate	25 ng/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Endrin	25 ng/mL
							Endrin aldehyde	25 ng/mL
							Endrin ketone	25 ng/mL
							gamma-BHC (Lindane)	25 ng/mL
							Heptachlor	25 ng/mL
							Heptachlor epoxide	25 ng/mL
							Methoxychlor	25 ng/mL
							trans-Chlordane	25 ng/mL
							Hexachlorobenzene	25 ng/mL
							Isodrin	25 ng/mL
							Mirex	25 ng/mL
							DCB Decachlorobiphenyl	25 ng/mL
							Tetrachloro-m-xylene	25 ng/mL
.8081ABCalStk_00033	12/20/18	06/20/18	Hexane, Lot 192742	100 mL	8081ABResPS_00026	0.05 mL	4,4'-DDD	1000 ng/mL
							4,4'-DDE	1000 ng/mL
							4,4'-DDT	1000 ng/mL
							Aldrin	1000 ng/mL
							alpha-BHC	1000 ng/mL
							beta-BHC	1000 ng/mL
							cis-Chlordane	1000 ng/mL
							delta-BHC	1000 ng/mL
							Dieldrin	1000 ng/mL
							Endosulfan I	1000 ng/mL
							Endosulfan II	1000 ng/mL
							Endosulfan sulfate	1000 ng/mL
							Endrin	1000 ng/mL
							Endrin aldehyde	1000 ng/mL
							Endrin ketone	1000 ng/mL
							gamma-BHC (Lindane)	1000 ng/mL
							Heptachlor	1000 ng/mL
							Heptachlor epoxide	1000 ng/mL
							Methoxychlor	1000 ng/mL
							trans-Chlordane	1000 ng/mL
					8081HCBStkPS_00021	1 mL	Hexachlorobenzene	1000 ng/mL
					8081IsodrinPS_00021	0.1 mL	Isodrin	1000 ng/mL
					8081MirxStkPS_00030	1 mL	Mirex	1000 ng/mL
					AR_SURR_RES_00073	0.5 mL	DCB Decachlorobiphenyl	1000 ng/mL
							Tetrachloro-m-xylene	1000 ng/mL
..8081ABResPS_00026	12/20/18		Restek, Lot A0129369		(Purchased Reagent)		4,4'-DDD	2000 ug/mL
							4,4'-DDE	2000 ug/mL
							4,4'-DDT	2000 ug/mL
							Aldrin	2000 ug/mL
							alpha-BHC	2000 ug/mL
							beta-BHC	2000 ug/mL
							cis-Chlordane	2000 ug/mL
							delta-BHC	2000 ug/mL
							Dieldrin	2000 ug/mL
							Endosulfan I	2000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Endosulfan II	2000 ug/mL
							Endosulfan sulfate	2000 ug/mL
							Endrin	2000 ug/mL
							Endrin aldehyde	2000 ug/mL
							Endrin ketone	2000 ug/mL
							gamma-BHC (Lindane)	2000 ug/mL
							Heptachlor	2000 ug/mL
							Heptachlor epoxide	2000 ug/mL
							Methoxychlor	2000 ug/mL
							trans-Chlordane	2000 ug/mL
..8081HCBStkPS_00021	12/20/18	Accustandard, Inc., Lot 216101286			(Purchased Reagent)		Hexachlorobenzene	100 ug/mL
..8081IsodrinPS_00021	12/20/18	Accustandard, Lot 216111205			(Purchased Reagent)		Isodrin	1000 ug/mL
..8081MirxStkPS_00030	12/20/18	Accustandard, Inc., Lot 214031359-03			(Purchased Reagent)		Mirex	100 ug/mL
..AR_SURR_RES_00073	12/20/18	RESTEK, Lot A0121594			(Purchased Reagent)		DCB Decachlorobiphenyl	200 ug/mL
							Tetrachloro-m-xylene	200 ug/mL
8081IcalL4_00031	12/20/18	06/20/18	Hexane, Lot 192742	500 mL	8081ABCalStk_00033	25 mL	4,4'-DDD	50 ng/mL
							4,4'-DDE	50 ng/mL
							4,4'-DDT	50 ng/mL
							Aldrin	50 ng/mL
							alpha-BHC	50 ng/mL
							beta-BHC	50 ng/mL
							cis-Chlordane	50 ng/mL
							delta-BHC	50 ng/mL
							Dieldrin	50 ng/mL
							Endosulfan I	50 ng/mL
							Endosulfan II	50 ng/mL
							Endosulfan sulfate	50 ng/mL
							Endrin	50 ng/mL
							Endrin aldehyde	50 ng/mL
							Endrin ketone	50 ng/mL
							gamma-BHC (Lindane)	50 ng/mL
							Heptachlor	50 ng/mL
							Heptachlor epoxide	50 ng/mL
							Methoxychlor	50 ng/mL
							trans-Chlordane	50 ng/mL
							Hexachlorobenzene	50 ng/mL
							Isodrin	50 ng/mL
							Mirex	50 ng/mL
							DCB Decachlorobiphenyl	50 ng/mL
							Tetrachloro-m-xylene	50 ng/mL
.8081ABCalStk_00033	12/20/18	06/20/18	Hexane, Lot 192742	100 mL	8081ABResPS_00026	0.05 mL	4,4'-DDD	1000 ng/mL
							4,4'-DDE	1000 ng/mL
							4,4'-DDT	1000 ng/mL
							Aldrin	1000 ng/mL
							alpha-BHC	1000 ng/mL
							beta-BHC	1000 ng/mL
							cis-Chlordane	1000 ng/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							delta-BHC	1000 ng/mL
							Dieldrin	1000 ng/mL
							Endosulfan I	1000 ng/mL
							Endosulfan II	1000 ng/mL
							Endosulfan sulfate	1000 ng/mL
							Endrin	1000 ng/mL
							Endrin aldehyde	1000 ng/mL
							Endrin ketone	1000 ng/mL
							gamma-BHC (Lindane)	1000 ng/mL
							Heptachlor	1000 ng/mL
							Heptachlor epoxide	1000 ng/mL
							Methoxychlor	1000 ng/mL
							trans-Chlordane	1000 ng/mL
					8081HCBStkPS_00021	1 mL	Hexachlorobenzene	1000 ng/mL
					8081IsodrinPS_00021	0.1 mL	Isodrin	1000 ng/mL
					8081MirxStkPS_00030	1 mL	Mirex	1000 ng/mL
					AR_SURR_RES_00073	0.5 mL	DCB Decachlorobiphenyl	1000 ng/mL
							Tetrachloro-m-xylene	1000 ng/mL
..8081ABResPS_00026	12/20/18		Restek, Lot A0129369		(Purchased Reagent)		4,4'-DDD	2000 ug/mL
							4,4'-DDE	2000 ug/mL
							4,4'-DDT	2000 ug/mL
							Aldrin	2000 ug/mL
							alpha-BHC	2000 ug/mL
							beta-BHC	2000 ug/mL
							cis-Chlordane	2000 ug/mL
							delta-BHC	2000 ug/mL
							Dieldrin	2000 ug/mL
							Endosulfan I	2000 ug/mL
							Endosulfan II	2000 ug/mL
							Endosulfan sulfate	2000 ug/mL
							Endrin	2000 ug/mL
							Endrin aldehyde	2000 ug/mL
							Endrin ketone	2000 ug/mL
							gamma-BHC (Lindane)	2000 ug/mL
							Heptachlor	2000 ug/mL
							Heptachlor epoxide	2000 ug/mL
							Methoxychlor	2000 ug/mL
							trans-Chlordane	2000 ug/mL
..8081HCBStkPS_00021	12/20/18		Accustandard, Inc., Lot 216101286		(Purchased Reagent)		Hexachlorobenzene	100 ug/mL
..8081IsodrinPS_00021	12/20/18		Accustandard, Lot 216111205		(Purchased Reagent)		Isodrin	1000 ug/mL
..8081MirxStkPS_00030	12/20/18		Accustandard, Inc., Lot 214031359-03		(Purchased Reagent)		Mirex	100 ug/mL
..AR_SURR_RES_00073	12/20/18		RESTEK, Lot A0121594		(Purchased Reagent)		DCB Decachlorobiphenyl	200 ug/mL
							Tetrachloro-m-xylene	200 ug/mL
8081IcalL5_00026	12/20/18	06/20/18	Hexane, Lot 192742	100 mL	8081ABCalStk_00033	7.5 mL	4,4'-DDD	75 ng/mL
							4,4'-DDE	75 ng/mL
							4,4'-DDT	75 ng/mL
							Aldrin	75 ng/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							alpha-BHC	75 ng/mL
							beta-BHC	75 ng/mL
							cis-Chlordane	75 ng/mL
							delta-BHC	75 ng/mL
							Dieldrin	75 ng/mL
							Endosulfan I	75 ng/mL
							Endosulfan II	75 ng/mL
							Endosulfan sulfate	75 ng/mL
							Endrin	75 ng/mL
							Endrin aldehyde	75 ng/mL
							Endrin ketone	75 ng/mL
							gamma-BHC (Lindane)	75 ng/mL
							Heptachlor	75 ng/mL
							Heptachlor epoxide	75 ng/mL
							Methoxychlor	75 ng/mL
							trans-Chlordane	75 ng/mL
							Hexachlorobenzene	75 ng/mL
							Isodrin	75 ng/mL
							Mirex	75 ng/mL
							DCB Decachlorobiphenyl	75 ng/mL
							Tetrachloro-m-xylene	75 ng/mL
.8081ABCalStk_00033	12/20/18	06/20/18	Hexane, Lot 192742	100 mL	8081ABResPS_00026	0.05 mL	4,4'-DDD	1000 ng/mL
							4,4'-DDE	1000 ng/mL
							4,4'-DDT	1000 ng/mL
							Aldrin	1000 ng/mL
							alpha-BHC	1000 ng/mL
							beta-BHC	1000 ng/mL
							cis-Chlordane	1000 ng/mL
							delta-BHC	1000 ng/mL
							Dieldrin	1000 ng/mL
							Endosulfan I	1000 ng/mL
							Endosulfan II	1000 ng/mL
							Endosulfan sulfate	1000 ng/mL
							Endrin	1000 ng/mL
							Endrin aldehyde	1000 ng/mL
							Endrin ketone	1000 ng/mL
							gamma-BHC (Lindane)	1000 ng/mL
							Heptachlor	1000 ng/mL
							Heptachlor epoxide	1000 ng/mL
							Methoxychlor	1000 ng/mL
							trans-Chlordane	1000 ng/mL
					8081HCBStkPS_00021	1 mL	Hexachlorobenzene	1000 ng/mL
					8081IsodrinPS_00021	0.1 mL	Isodrin	1000 ng/mL
					8081MirxStkPS_00030	1 mL	Mirex	1000 ng/mL
					AR_SURR_RES_00073	0.5 mL	DCB Decachlorobiphenyl	1000 ng/mL
							Tetrachloro-m-xylene	1000 ng/mL
..8081ABResPS_00026	12/20/18		Restek, Lot A0129369		(Purchased Reagent)		4,4'-DDD	2000 ug/mL
							4,4'-DDE	2000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							4,4'-DDT	2000 ug/mL
							Aldrin	2000 ug/mL
							alpha-BHC	2000 ug/mL
							beta-BHC	2000 ug/mL
							cis-Chlordane	2000 ug/mL
							delta-BHC	2000 ug/mL
							Dieldrin	2000 ug/mL
							Endosulfan I	2000 ug/mL
							Endosulfan II	2000 ug/mL
							Endosulfan sulfate	2000 ug/mL
							Endrin	2000 ug/mL
							Endrin aldehyde	2000 ug/mL
							Endrin ketone	2000 ug/mL
							gamma-BHC (Lindane)	2000 ug/mL
							Heptachlor	2000 ug/mL
							Heptachlor epoxide	2000 ug/mL
							Methoxychlor	2000 ug/mL
							trans-Chlordane	2000 ug/mL
..8081HCBStkPS_00021	12/20/18	Accustandard, Inc., Lot 216101286			(Purchased Reagent)		Hexachlorobenzene	100 ug/mL
..8081IsodrinPS_00021	12/20/18	Accustandard, Lot 216111205			(Purchased Reagent)		Isodrin	1000 ug/mL
..8081MirxStkPS_00030	12/20/18	Accustandard, Inc., Lot 214031359-03			(Purchased Reagent)		Mirex	100 ug/mL
..AR_SURR_RES_00073	12/20/18	RESTEK, Lot A0121594			(Purchased Reagent)		DCB Decachlorobiphenyl	200 ug/mL
							Tetrachloro-m-xylene	200 ug/mL
8081IcalL6_00025	12/20/18	06/20/18	Hexane, Lot 192742	100 mL	8081ABCalStk_00033	10 mL	4,4'-DDD	100 ng/mL
							4,4'-DDE	100 ng/mL
							4,4'-DDT	100 ng/mL
							Aldrin	100 ng/mL
							alpha-BHC	100 ng/mL
							beta-BHC	100 ng/mL
							cis-Chlordane	100 ng/mL
							delta-BHC	100 ng/mL
							Dieldrin	100 ng/mL
							Endosulfan I	100 ng/mL
							Endosulfan II	100 ng/mL
							Endosulfan sulfate	100 ng/mL
							Endrin	100 ng/mL
							Endrin aldehyde	100 ng/mL
							Endrin ketone	100 ng/mL
							gamma-BHC (Lindane)	100 ng/mL
							Heptachlor	100 ng/mL
							Heptachlor epoxide	100 ng/mL
							Methoxychlor	100 ng/mL
							trans-Chlordane	100 ng/mL
							Hexachlorobenzene	100 ng/mL
							Isodrin	100 ng/mL
							Mirex	100 ng/mL
							DCB Decachlorobiphenyl	100 ng/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Tetrachloro-m-xylene	100 ng/mL
.8081ABCalStk_00033	12/20/18	06/20/18	Hexane, Lot 192742	100 mL	8081ABResPS_00026	0.05 mL	4,4'-DDD	1000 ng/mL
							4,4'-DDE	1000 ng/mL
							4,4'-DDT	1000 ng/mL
							Aldrin	1000 ng/mL
							alpha-BHC	1000 ng/mL
							beta-BHC	1000 ng/mL
							cis-Chlordane	1000 ng/mL
							delta-BHC	1000 ng/mL
							Dieldrin	1000 ng/mL
							Endosulfan I	1000 ng/mL
							Endosulfan II	1000 ng/mL
							Endosulfan sulfate	1000 ng/mL
							Endrin	1000 ng/mL
							Endrin aldehyde	1000 ng/mL
							Endrin ketone	1000 ng/mL
							gamma-BHC (Lindane)	1000 ng/mL
							Heptachlor	1000 ng/mL
							Heptachlor epoxide	1000 ng/mL
							Methoxychlor	1000 ng/mL
							trans-Chlordane	1000 ng/mL
					8081HCBStkPS_00021	1 mL	Hexachlorobenzene	1000 ng/mL
					8081IsodrinPS_00021	0.1 mL	Isodrin	1000 ng/mL
					8081MirxStkPS_00030	1 mL	Mirex	1000 ng/mL
					AR_SURR_RES_00073	0.5 mL	DCB Decachlorobiphenyl	1000 ng/mL
							Tetrachloro-m-xylene	1000 ng/mL
..8081ABResPS_00026	12/20/18		Restek, Lot A0129369		(Purchased Reagent)		4,4'-DDD	2000 ug/mL
							4,4'-DDE	2000 ug/mL
							4,4'-DDT	2000 ug/mL
							Aldrin	2000 ug/mL
							alpha-BHC	2000 ug/mL
							beta-BHC	2000 ug/mL
							cis-Chlordane	2000 ug/mL
							delta-BHC	2000 ug/mL
							Dieldrin	2000 ug/mL
							Endosulfan I	2000 ug/mL
							Endosulfan II	2000 ug/mL
							Endosulfan sulfate	2000 ug/mL
							Endrin	2000 ug/mL
							Endrin aldehyde	2000 ug/mL
							Endrin ketone	2000 ug/mL
							gamma-BHC (Lindane)	2000 ug/mL
							Heptachlor	2000 ug/mL
							Heptachlor epoxide	2000 ug/mL
							Methoxychlor	2000 ug/mL
							trans-Chlordane	2000 ug/mL
..8081HCBStkPS_00021	12/20/18		Accustandard, Inc., Lot 216101286		(Purchased Reagent)		Hexachlorobenzene	100 ug/mL
..8081IsodrinPS_00021	12/20/18		Accustandard, Lot 216111205		(Purchased Reagent)		Isodrin	1000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
..8081MirxStkPS_00030	12/20/18	Accustandard, Inc., Lot 214031359-03			(Purchased Reagent)		Mirex	100 ug/mL
..AR_SURR_RES_00073	12/20/18	RESTEK, Lot A0121594			(Purchased Reagent)		DCB Decachlorobiphenyl	200 ug/mL
							Tetrachloro-m-xylene	200 ug/mL
8081Toxaphene_00031	11/13/18	05/16/18	ACETONE, Lot Acetone 000196	500 mL	8081 ToxStock_00018	1 mL	Toxaphene	2 ug/mL
.8081 ToxStock_00018	01/30/25	AccuStandard, Lot 215011420			(Purchased Reagent)		Toxaphene	1000 ug/mL
8081TOXCCVL4_00014	11/12/18	05/12/18	Hexane, Lot 189045	250 mL	8081ToxPS_00034	0.1 mL	Toxaphene Peak 1	2000 ng/mL
							Toxaphene Peak 2	2000 ng/mL
							Toxaphene Peak 3	2000 ng/mL
							Toxaphene Peak 4	2000 ng/mL
							Toxaphene Peak 5	2000 ng/mL
.8081ToxPS_00034	03/31/21	Restek, Lot A0123422			(Purchased Reagent)		Toxaphene Peak 1	5000 ug/mL
							Toxaphene Peak 2	5000 ug/mL
							Toxaphene Peak 3	5000 ug/mL
							Toxaphene Peak 4	5000 ug/mL
							Toxaphene Peak 5	5000 ug/mL
8081TOXCCVL4_00014	11/12/18	05/12/18	Hexane, Lot 189045	250 mL	8081ToxPS_00034	0.1 mL	Toxaphene	2000 ng/mL
.8081ToxPS_00034	03/31/21	Restek, Lot A0123422			(Purchased Reagent)		Toxaphene	5000 ug/mL
8081ToxICVL3_00012	09/14/18	03/14/18	Hexane, Lot 189045	100 mL	8081ToxSS_00019	0.1 mL	Toxaphene	1000 ng/mL
							Toxaphene Peak 1	1000 ng/mL
							Toxaphene Peak 2	1000 ng/mL
							Toxaphene Peak 3	1000 ng/mL
							Toxaphene Peak 4	1000 ng/mL
							Toxaphene Peak 5	1000 ng/mL
.8081ToxSS_00019	01/30/25	Accustandard, Inc., Lot 215011420			(Purchased Reagent)		Toxaphene	1000 ug/mL
							Toxaphene Peak 1	1000 ug/mL
							Toxaphene Peak 2	1000 ug/mL
							Toxaphene Peak 3	1000 ug/mL
							Toxaphene Peak 4	1000 ug/mL
							Toxaphene Peak 5	1000 ug/mL
8081ToxL1_00020	11/12/18	05/12/18	Hexane, Lot 189045	100 mL	8081ToxPS_00034	0.004 mL	Toxaphene Peak 1	200 ng/mL
							Toxaphene Peak 2	200 ng/mL
							Toxaphene Peak 3	200 ng/mL
							Toxaphene Peak 4	200 ng/mL
							Toxaphene Peak 5	200 ng/mL
.8081ToxPS_00034	03/31/21	Restek, Lot A0123422			(Purchased Reagent)		Toxaphene Peak 1	5000 ug/mL
							Toxaphene Peak 2	5000 ug/mL
							Toxaphene Peak 3	5000 ug/mL
							Toxaphene Peak 4	5000 ug/mL
							Toxaphene Peak 5	5000 ug/mL
8081ToxL2_00021	11/12/18	05/12/18	Hexane, Lot 175756	100 mL	8081ToxPS_00034	0.01 mL	Toxaphene Peak 1	500 ng/mL
							Toxaphene Peak 2	500 ng/mL
							Toxaphene Peak 3	500 ng/mL
							Toxaphene Peak 4	500 ng/mL
							Toxaphene Peak 5	500 ng/mL
.8081ToxPS_00034	03/31/21	Restek, Lot A0123422			(Purchased Reagent)		Toxaphene Peak 1	5000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Toxaphene Peak 2	5000 ug/mL
							Toxaphene Peak 3	5000 ug/mL
							Toxaphene Peak 4	5000 ug/mL
							Toxaphene Peak 5	5000 ug/mL
8081ToxL3_00020	11/12/18	05/12/18	Hexane, Lot 189045	100 mL	8081ToxPS_00034	0.02 mL	Toxaphene Peak 1	1000 ng/mL
							Toxaphene Peak 2	1000 ng/mL
							Toxaphene Peak 3	1000 ng/mL
							Toxaphene Peak 4	1000 ng/mL
							Toxaphene Peak 5	1000 ng/mL
.8081ToxPS_00034	03/31/21		Restek, Lot A0123422		(Purchased Reagent)		Toxaphene Peak 1	5000 ug/mL
							Toxaphene Peak 2	5000 ug/mL
							Toxaphene Peak 3	5000 ug/mL
							Toxaphene Peak 4	5000 ug/mL
							Toxaphene Peak 5	5000 ug/mL
8081ToxL5_00021	11/12/18	05/12/18	Hexane, Lot 189045	100 mL	8081ToxPS_00034	0.1 mL	Toxaphene Peak 1	5000 ng/mL
							Toxaphene Peak 2	5000 ng/mL
							Toxaphene Peak 3	5000 ng/mL
							Toxaphene Peak 4	5000 ng/mL
							Toxaphene Peak 5	5000 ng/mL
.8081ToxPS_00034	03/31/21		Restek, Lot A0123422		(Purchased Reagent)		Toxaphene Peak 1	5000 ug/mL
							Toxaphene Peak 2	5000 ug/mL
							Toxaphene Peak 3	5000 ug/mL
							Toxaphene Peak 4	5000 ug/mL
							Toxaphene Peak 5	5000 ug/mL
8081ToxL6_00023	11/12/18	05/12/18	Hexane, Lot 189045	100 mL	8081ToxPS_00034	0.2 mL	Toxaphene Peak 1	10000 ng/mL
							Toxaphene Peak 2	10000 ng/mL
							Toxaphene Peak 3	10000 ng/mL
							Toxaphene Peak 4	10000 ng/mL
							Toxaphene Peak 5	10000 ng/mL
.8081ToxPS_00034	03/31/21		Restek, Lot A0123422		(Purchased Reagent)		Toxaphene Peak 1	5000 ug/mL
							Toxaphene Peak 2	5000 ug/mL
							Toxaphene Peak 3	5000 ug/mL
							Toxaphene Peak 4	5000 ug/mL
							Toxaphene Peak 5	5000 ug/mL
8082 LCS_00048	08/05/18	02/05/18	ACETONE, Lot Acetone_00201	500 mL	8082LCSSTOCK_00036	1 mL	PCB-1016	2 ug/mL
							PCB-1260	2 ug/mL
.8082LCSSTOCK_00036	08/31/22		RESTEK, Lot A0119290		(Purchased Reagent)		PCB-1016	1000 ug/mL
							PCB-1260	1000 ug/mL
8151 LCS_00096	08/07/18	06/07/18	P&T Methanol, Lot MethanolP&T_00197	100 mL	8151_LCS_Stck_00047	1 mL	2,4,5-T	10 ug/mL
							2,4-D	10 ug/mL
							2,4-DB	10 ug/mL
							Dalapon	10 ug/mL
							Dicamba	10 ug/mL
							Dichlorprop	10 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Dinoseb	10 ug/mL
							MCPA	1000 ug/mL
							MCPP	1000 ug/mL
							Picloram	10 ug/mL
							Silvex (2,4,5-TP)	10 ug/mL
					MCPA&MCPP_00027	1 mL	MCPA	1000 ug/mL
							MCPP	1000 ug/mL
.8151_LCS_Stck_00047	12/06/18	Accustandard, Lot 216111344			(Purchased Reagent)		2,4,5-T	1000 ug/mL
							2,4-D	1000 ug/mL
							2,4-DB	1000 ug/mL
							Dalapon	1000 ug/mL
							Dicamba	1000 ug/mL
							Dichlorprop	1000 ug/mL
							Dinoseb	1000 ug/mL
							MCPA	10000 ug/mL
							MCPP	10000 ug/mL
							Picloram	1000 ug/mL
							Silvex (2,4,5-TP)	1000 ug/mL
.MCPA&MCPP_00027	05/25/19	AccuStandard, Lot 217041338			(Purchased Reagent)		MCPA	90 mg/mL
							MCPP	90 mg/mL
8151ICALL1_00067	01/23/19	08/02/18	Hexane, Lot Hexane_Cycl_00051	5 mL	8151ICALL6_00064	0.25 mL	Pentachlorophenol	0.0477375 ug/mL
							2,4,5-T	0.04787 ug/mL
							2,4-D	0.047015 ug/mL
							2,4-DB	0.0475575 ug/mL
							Dicamba	0.0474625 ug/mL
							Dichlorprop	0.0476575 ug/mL
							Dinoseb	0.0477125 ug/mL
							Silvex (2,4,5-TP)	0.048 ug/mL
							Dalapon	0.0452675 ug/mL
							MCPA	4.69917 ug/mL
							MCPP	4.71271 ug/mL
							Picloram	0.047255 ug/mL
							2,4-Dichlorophenylacetic acid	0.0464 ug/mL
.8151ICALL6_00064	01/23/19	08/02/18	HEXANE, Lot Hexane_Cycl_00051	10 mL	8151WorkALT_00014	1 mL	Pentachlorophenol	0.95475 ug/mL
							2,4,5-T	0.9574 ug/mL
							2,4-D	0.9403 ug/mL
							2,4-DB	0.95115 ug/mL
							Dicamba	0.94925 ug/mL
							Dichlorprop	0.95315 ug/mL
							Dinoseb	0.95425 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Silvex (2,4,5-TP)	0.96 ug/mL
							Dalapon	0.90535 ug/mL
							MCPA	93.9834 ug/mL
							MCPP	94.2542 ug/mL
							Picloram	0.9451 ug/mL
							2,4-Dichlorophenylacetic acid	0.928 ug/mL
..8151WorkALT_00014	01/23/19	07/23/18	Hexane, Lot 190112	10 mL	8151PCP_Mrkr_00003	0.1 mL	Pentachlorophenol	9.5475 ug/mL
					8151ResMix#1_00012	0.5 mL	2,4,5-T	9.574 ug/mL
							2,4-D	9.403 ug/mL
							2,4-DB	9.5115 ug/mL
							Dicamba	9.4925 ug/mL
							Dichlorprop	9.5315 ug/mL
							Dinoseb	9.5425 ug/mL
							Silvex (2,4,5-TP)	9.6 ug/mL
					8151ResMix#2_00011	50 uL	Dalapon	9.0535 ug/mL
					8151ResMix#3_00016	0.5 mL	MCPA	939.834 ug/mL
							MCPP	942.542 ug/mL
					8151StkPicPS_00048	1 mL	Picloram	9.451 ug/mL
					8151StkSurr_00066	1 mL	2,4-Dichlorophenylacetic acid	9.28 ug/mL
...8151PCP_Mrkr_00003	06/30/19		Restek, Lot A0128694		(Purchased Reagent)		Pentachlorophenol	954.75 ug/mL
...8151ResMix#1_00012	11/30/24		Restek, Lot a0132107		(Purchased Reagent)		2,4,5-T	191.48 ug/mL
							2,4-D	188.06 ug/mL
							2,4-DB	190.23 ug/mL
							Dicamba	189.85 ug/mL
							Dichlorprop	190.63 ug/mL
							Dinoseb	190.85 ug/mL
							Silvex (2,4,5-TP)	192 ug/mL
...8151ResMix#2_00011	01/31/24		Restek, Lot A0124376		(Purchased Reagent)		Dalapon	1810.7 ug/mL
...8151ResMix#3_00016	08/31/24		Restek, Lot A0130139		(Purchased Reagent)		MCPA	18796.7 ug/mL
							MCPP	18850.8 ug/mL
...8151StkPicPS_00048	10/11/19		AccuStandard, Lot 216101091		(Purchased Reagent)		Picloram	94.51 ug/mL
...8151StkSurr_00066	04/20/20		AccuStandard, Lot 215041203-02		(Purchased Reagent)		2,4-Dichlorophenylacetic acid	92.8 ug/mL
8151ICALL2_00069	01/23/19	08/02/18	Hexane, Lot Hexane_Cycl_00051	5 mL	8151ICALL6_00064	0.5 mL	Pentachlorophenol	0.095475 ug/mL
							2,4,5-T	0.09574 ug/mL
							2,4-D	0.09403 ug/mL
							2,4-DB	0.095115 ug/mL
							Dicamba	0.094925 ug/mL
							Dichlorprop	0.095315 ug/mL
							Dinoseb	0.095425 ug/mL
							Silvex (2,4,5-TP)	0.096 ug/mL
							Dalapon	0.090535 ug/mL
							MCPA	9.39834 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							MCPP	9.42542 ug/mL
							Picloram	0.09451 ug/mL
							2,4-Dichlorophenylacetic acid	0.0928 ug/mL
.8151ICALL6_00064	01/23/19	08/02/18	HEXANE, Lot Hexane_Cycl_00051	10 mL	8151WorkALT_00014	1 mL	Pentachlorophenol	0.95475 ug/mL
							2,4,5-T	0.9574 ug/mL
							2,4-D	0.9403 ug/mL
							2,4-DB	0.95115 ug/mL
							Dicamba	0.94925 ug/mL
							Dichlorprop	0.95315 ug/mL
							Dinoseb	0.95425 ug/mL
							Silvex (2,4,5-TP)	0.96 ug/mL
							Dalapon	0.90535 ug/mL
							MCPA	93.9834 ug/mL
							MCPP	94.2542 ug/mL
							Picloram	0.9451 ug/mL
							2,4-Dichlorophenylacetic acid	0.928 ug/mL
..8151WorkALT_00014	01/23/19	07/23/18	Hexane, Lot 190112	10 mL	8151PCP_Mrkr_00003	0.1 mL	Pentachlorophenol	9.5475 ug/mL
					8151ResMix#1_00012	0.5 mL	2,4,5-T	9.574 ug/mL
							2,4-D	9.403 ug/mL
							2,4-DB	9.5115 ug/mL
							Dicamba	9.4925 ug/mL
							Dichlorprop	9.5315 ug/mL
							Dinoseb	9.5425 ug/mL
							Silvex (2,4,5-TP)	9.6 ug/mL
					8151ResMix#2_00011	50 uL	Dalapon	9.0535 ug/mL
					8151ResMix#3_00016	0.5 mL	MCPA	939.834 ug/mL
							MCPP	942.542 ug/mL
					8151StkPicPS_00048	1 mL	Picloram	9.451 ug/mL
					8151StkSurr_00066	1 mL	2,4-Dichlorophenylacetic acid	9.28 ug/mL
...8151PCP_Mrkr_00003	06/30/19		Restek, Lot A0128694		(Purchased Reagent)		Pentachlorophenol	954.75 ug/mL
...8151ResMix#1_00012	11/30/24		Restek, Lot a0132107		(Purchased Reagent)		2,4,5-T	191.48 ug/mL
							2,4-D	188.06 ug/mL
							2,4-DB	190.23 ug/mL
							Dicamba	189.85 ug/mL
							Dichlorprop	190.63 ug/mL
							Dinoseb	190.85 ug/mL
							Silvex (2,4,5-TP)	192 ug/mL
...8151ResMix#2_00011	01/31/24		Restek, Lot A0124376		(Purchased Reagent)		Dalapon	1810.7 ug/mL
...8151ResMix#3_00016	08/31/24		Restek, Lot A0130139		(Purchased Reagent)		MCPA	18796.7 ug/mL
							MCPP	18850.8 ug/mL
...8151StkPicPS_00048	10/11/19		AccuStandard, Lot 216101091		(Purchased Reagent)		Picloram	94.51 ug/mL
...8151StkSurr_00066	04/20/20		AccuStandard, Lot 215041203-02		(Purchased Reagent)		2,4-Dichlorophenylacetic acid	92.8 ug/mL
8151ICALL3_00062	01/23/19	08/02/18	Hexane, Lot Hexane_Cycl_00051	5 mL	8151WorkALT_00014	0.125 mL	Pentachlorophenol	0.238688 ug/mL
							2,4,5-T	0.23935 ug/mL
							2,4-D	0.235075 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							2,4-DB	0.237788 ug/mL
							Dicamba	0.237313 ug/mL
							Dichlorprop	0.238288 ug/mL
							Dinoseb	0.238563 ug/mL
							Silvex (2,4,5-TP)	0.24 ug/mL
							Dalapon	0.226338 ug/mL
							MCPA	23.4959 ug/mL
							MCPP	23.5635 ug/mL
							Picloram	0.236275 ug/mL
							2,4-Dichlorophenylacetic acid	0.232 ug/mL
.8151WorkALT_00014	01/23/19	07/23/18	Hexane, Lot 190112	10 mL	8151PCP_Mrkr_00003	0.1 mL	Pentachlorophenol	9.5475 ug/mL
					8151ResMix#1_00012	0.5 mL	2,4,5-T	9.574 ug/mL
							2,4-D	9.403 ug/mL
							2,4-DB	9.5115 ug/mL
							Dicamba	9.4925 ug/mL
							Dichlorprop	9.5315 ug/mL
							Dinoseb	9.5425 ug/mL
							Silvex (2,4,5-TP)	9.6 ug/mL
					8151ResMix#2_00011	50 uL	Dalapon	9.0535 ug/mL
					8151ResMix#3_00016	0.5 mL	MCPA	939.834 ug/mL
							MCPP	942.542 ug/mL
					8151StkPicPS_00048	1 mL	Picloram	9.451 ug/mL
					8151StkSurr_00066	1 mL	2,4-Dichlorophenylacetic acid	9.28 ug/mL
..8151PCP_Mrkr_00003	06/30/19		Restek, Lot A0128694		(Purchased Reagent)		Pentachlorophenol	954.75 ug/mL
..8151ResMix#1_00012	11/30/24		Restek, Lot a0132107		(Purchased Reagent)		2,4,5-T	191.48 ug/mL
							2,4-D	188.06 ug/mL
							2,4-DB	190.23 ug/mL
							Dicamba	189.85 ug/mL
							Dichlorprop	190.63 ug/mL
							Dinoseb	190.85 ug/mL
							Silvex (2,4,5-TP)	192 ug/mL
..8151ResMix#2_00011	01/31/24		Restek, Lot A0124376		(Purchased Reagent)		Dalapon	1810.7 ug/mL
..8151ResMix#3_00016	08/31/24		Restek, Lot A0130139		(Purchased Reagent)		MCPA	18796.7 ug/mL
							MCPP	18850.8 ug/mL
..8151StkPicPS_00048	10/11/19		AccuStandard, Lot 216101091		(Purchased Reagent)		Picloram	94.51 ug/mL
..8151StkSurr_00066	04/20/20		AccuStandard, Lot 215041203-02		(Purchased Reagent)		2,4-Dichlorophenylacetic acid	92.8 ug/mL
8151ICALL4_00129	01/23/19	07/23/18	Hexane, Lot 190112	50 mL	8151WorkALT_00014	2.5 mL	2,4-Dichlorophenylacetic acid	0.464 ug/mL
.8151WorkALT_00014	01/23/19	07/23/18	Hexane, Lot 190112	10 mL	8151StkSurr_00066	1 mL	2,4-Dichlorophenylacetic acid	9.28 ug/mL
..8151StkSurr_00066	04/20/20		AccuStandard, Lot 215041203-02		(Purchased Reagent)		2,4-Dichlorophenylacetic acid	92.8 ug/mL
8151ICALL4_00129	01/23/19	07/23/18	Hexane, Lot 190112	50 mL	8151WorkALT_00014	2.5 mL	2,4,5-T	0.4787 ug/mL
							2,4-D	0.47015 ug/mL
							Silvex (2,4,5-TP)	0.48 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
.8151WorkALT_00014	01/23/19	07/23/18	Hexane, Lot 190112	10 mL	8151ResMix#1_00012	0.5 mL	2,4,5-T	9.574 ug/mL
							2,4-D	9.403 ug/mL
							Silvex (2,4,5-TP)	9.6 ug/mL
..8151ResMix#1_00012	11/30/24		Restek, Lot a0132107		(Purchased Reagent)		2,4,5-T	191.48 ug/mL
							2,4-D	188.06 ug/mL
							Silvex (2,4,5-TP)	192 ug/mL
8151ICALL4_00130	01/23/19	08/02/18	Hexane, Lot Hexane_Cycl_00051	25 mL	8151WorkALT_00014	1.25 mL	Pentachlorophenol	0.477375 ug/mL
							2,4,5-T	0.4787 ug/mL
							2,4-D	0.47015 ug/mL
							2,4-DB	0.475575 ug/mL
							Dicamba	0.474625 ug/mL
							Dichlorprop	0.476575 ug/mL
							Dinoseb	0.477125 ug/mL
							Silvex (2,4,5-TP)	0.48 ug/mL
							Dalapon	0.452675 ug/mL
							MCPA	46.9917 ug/mL
							MCPP	47.1271 ug/mL
							Picloram	0.47255 ug/mL
							2,4-Dichlorophenylacetic acid	0.464 ug/mL
.8151WorkALT_00014	01/23/19	07/23/18	Hexane, Lot 190112	10 mL	8151PCP_Mrkr_00003	0.1 mL	Pentachlorophenol	9.5475 ug/mL
					8151ResMix#1_00012	0.5 mL	2,4,5-T	9.574 ug/mL
							2,4-D	9.403 ug/mL
							2,4-DB	9.5115 ug/mL
							Dicamba	9.4925 ug/mL
							Dichlorprop	9.5315 ug/mL
							Dinoseb	9.5425 ug/mL
							Silvex (2,4,5-TP)	9.6 ug/mL
					8151ResMix#2_00011	50 uL	Dalapon	9.0535 ug/mL
					8151ResMix#3_00016	0.5 mL	MCPA	939.834 ug/mL
							MCPP	942.542 ug/mL
					8151StkPicPS_00048	1 mL	Picloram	9.451 ug/mL
					8151StkSurr_00066	1 mL	2,4-Dichlorophenylacetic acid	9.28 ug/mL
..8151PCP_Mrkr_00003	06/30/19		Restek, Lot A0128694		(Purchased Reagent)		Pentachlorophenol	954.75 ug/mL
..8151ResMix#1_00012	11/30/24		Restek, Lot a0132107		(Purchased Reagent)		2,4,5-T	191.48 ug/mL
							2,4-D	188.06 ug/mL
							2,4-DB	190.23 ug/mL
							Dicamba	189.85 ug/mL
							Dichlorprop	190.63 ug/mL
							Dinoseb	190.85 ug/mL
							Silvex (2,4,5-TP)	192 ug/mL
..8151ResMix#2_00011	01/31/24		Restek, Lot A0124376		(Purchased Reagent)		Dalapon	1810.7 ug/mL
..8151ResMix#3_00016	08/31/24		Restek, Lot A0130139		(Purchased Reagent)		MCPA	18796.7 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							MCPP	18850.8 ug/mL
..8151StkPicPS_00048	10/11/19	AccuStandard, Lot 216101091			(Purchased Reagent)		Picloram	94.51 ug/mL
..8151StkSurr_00066	04/20/20	AccuStandard, Lot 215041203-02			(Purchased Reagent)		2,4-Dichlorophenylacetic acid	92.8 ug/mL
8151ICALL5_00061	01/23/19	08/02/18	HEXANE, Lot Hexane_Cycl_00051	5 mL	8151WorkALT_00014	0.375 mL	Pentachlorophenol	0.716063 ug/mL
							2,4,5-T	0.71805 ug/mL
							2,4-D	0.705225 ug/mL
							2,4-DB	0.713363 ug/mL
							Dicamba	0.711938 ug/mL
							Dichlorprop	0.714862 ug/mL
							Dinoseb	0.715688 ug/mL
							Silvex (2,4,5-TP)	0.72 ug/mL
							Dalapon	0.679013 ug/mL
							MCPA	70.4875 ug/mL
							MCPP	70.6907 ug/mL
							Picloram	0.708825 ug/mL
							2,4-Dichlorophenylacetic acid	0.696 ug/mL
.8151WorkALT_00014	01/23/19	07/23/18	Hexane, Lot 190112	10 mL	8151PCP_Mrkr_00003	0.1 mL	Pentachlorophenol	9.5475 ug/mL
					8151ResMix#1_00012	0.5 mL	2,4,5-T	9.574 ug/mL
							2,4-D	9.403 ug/mL
							2,4-DB	9.5115 ug/mL
							Dicamba	9.4925 ug/mL
							Dichlorprop	9.5315 ug/mL
							Dinoseb	9.5425 ug/mL
							Silvex (2,4,5-TP)	9.6 ug/mL
					8151ResMix#2_00011	50 uL	Dalapon	9.0535 ug/mL
					8151ResMix#3_00016	0.5 mL	MCPA	939.834 ug/mL
							MCPP	942.542 ug/mL
					8151StkPicPS_00048	1 mL	Picloram	9.451 ug/mL
					8151StkSurr_00066	1 mL	2,4-Dichlorophenylacetic acid	9.28 ug/mL
..8151PCP_Mrkr_00003	06/30/19	Restek, Lot A0128694			(Purchased Reagent)		Pentachlorophenol	954.75 ug/mL
..8151ResMix#1_00012	11/30/24	Restek, Lot a0132107			(Purchased Reagent)		2,4,5-T	191.48 ug/mL
							2,4-D	188.06 ug/mL
							2,4-DB	190.23 ug/mL
							Dicamba	189.85 ug/mL
							Dichlorprop	190.63 ug/mL
							Dinoseb	190.85 ug/mL
							Silvex (2,4,5-TP)	192 ug/mL
..8151ResMix#2_00011	01/31/24	Restek, Lot A0124376			(Purchased Reagent)		Dalapon	1810.7 ug/mL
..8151ResMix#3_00016	08/31/24	Restek, Lot A0130139			(Purchased Reagent)		MCPA	18796.7 ug/mL
							MCPP	18850.8 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
..8151StkPicPS_00048	10/11/19	AccuStandard, Lot 216101091			(Purchased Reagent)		Picloram	94.51 ug/mL
..8151StkSurr_00066	04/20/20	AccuStandard, Lot 215041203-02			(Purchased Reagent)		2,4-Dichlorophenylacetic acid	92.8 ug/mL
8151ICALL6_00064	01/23/19	08/02/18	HEXANE, Lot Hexane_Cycl_00051	10 mL	8151WorkALT_00014	1 mL	Pentachlorophenol	0.95475 ug/mL
							2,4,5-T	0.9574 ug/mL
							2,4-D	0.9403 ug/mL
							2,4-DB	0.95115 ug/mL
							Dicamba	0.94925 ug/mL
							Dichlorprop	0.95315 ug/mL
							Dinoseb	0.95425 ug/mL
							Silvex (2,4,5-TP)	0.96 ug/mL
							Dalapon	0.90535 ug/mL
							MCPA	93.9834 ug/mL
							MCPP	94.2542 ug/mL
							Picloram	0.9451 ug/mL
							2,4-Dichlorophenylacetic acid	0.928 ug/mL
.8151WorkALT_00014	01/23/19	07/23/18	Hexane, Lot 190112	10 mL	8151PCP_Mrkr_00003	0.1 mL	Pentachlorophenol	9.5475 ug/mL
					8151ResMix#1_00012	0.5 mL	2,4,5-T	9.574 ug/mL
							2,4-D	9.403 ug/mL
							2,4-DB	9.5115 ug/mL
							Dicamba	9.4925 ug/mL
							Dichlorprop	9.5315 ug/mL
							Dinoseb	9.5425 ug/mL
							Silvex (2,4,5-TP)	9.6 ug/mL
					8151ResMix#2_00011	50 uL	Dalapon	9.0535 ug/mL
					8151ResMix#3_00016	0.5 mL	MCPA	939.834 ug/mL
							MCPP	942.542 ug/mL
					8151StkPicPS_00048	1 mL	Picloram	9.451 ug/mL
					8151StkSurr_00066	1 mL	2,4-Dichlorophenylacetic acid	9.28 ug/mL
..8151PCP_Mrkr_00003	06/30/19	Restek, Lot A0128694			(Purchased Reagent)		Pentachlorophenol	954.75 ug/mL
..8151ResMix#1_00012	11/30/24	Restek, Lot a0132107			(Purchased Reagent)		2,4,5-T	191.48 ug/mL
							2,4-D	188.06 ug/mL
							2,4-DB	190.23 ug/mL
							Dicamba	189.85 ug/mL
							Dichlorprop	190.63 ug/mL
							Dinoseb	190.85 ug/mL
							Silvex (2,4,5-TP)	192 ug/mL
..8151ResMix#2_00011	01/31/24	Restek, Lot A0124376			(Purchased Reagent)		Dalapon	1810.7 ug/mL
..8151ResMix#3_00016	08/31/24	Restek, Lot A0130139			(Purchased Reagent)		MCPA	18796.7 ug/mL
							MCPP	18850.8 ug/mL
..8151StkPicPS_00048	10/11/19	AccuStandard, Lot 216101091			(Purchased Reagent)		Picloram	94.51 ug/mL
..8151StkSurr_00066	04/20/20	AccuStandard, Lot 215041203-02			(Purchased Reagent)		2,4-Dichlorophenylacetic acid	92.8 ug/mL
8151ICALL7_00061	01/23/19	08/02/18	HEXANE, Lot Hexane_Cycl_00051	5 mL	8151WorkALT_00014	1 mL	Pentachlorophenol	1.9095 ug/mL
							2,4,5-T	1.9148 ug/mL
							2,4-D	1.8806 ug/mL
							2,4-DB	1.9023 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Dicamba	1.8985 ug/mL
							Dichlorprop	1.9063 ug/mL
							Dinoseb	1.9085 ug/mL
							Silvex (2,4,5-TP)	1.92 ug/mL
							Dalapon	1.8107 ug/mL
							MCPA	187.967 ug/mL
							MCPP	188.508 ug/mL
							Picloram	1.8902 ug/mL
							2,4-Dichlorophenylacetic acid	1.856 ug/mL
.8151WorkALT_00014	01/23/19	07/23/18	Hexane, Lot 190112	10 mL	8151PCP_Mrkr_00003	0.1 mL	Pentachlorophenol	9.5475 ug/mL
					8151ResMix#1_00012	0.5 mL	2,4,5-T	9.574 ug/mL
							2,4-D	9.403 ug/mL
							2,4-DB	9.5115 ug/mL
							Dicamba	9.4925 ug/mL
							Dichlorprop	9.5315 ug/mL
							Dinoseb	9.5425 ug/mL
							Silvex (2,4,5-TP)	9.6 ug/mL
					8151ResMix#2_00011	50 uL	Dalapon	9.0535 ug/mL
					8151ResMix#3_00016	0.5 mL	MCPA	939.834 ug/mL
							MCPP	942.542 ug/mL
					8151StkPicPS_00048	1 mL	Picloram	9.451 ug/mL
					8151StkSurr_00066	1 mL	2,4-Dichlorophenylacetic acid	9.28 ug/mL
..8151PCP_Mrkr_00003	06/30/19		Restek, Lot A0128694		(Purchased Reagent)		Pentachlorophenol	954.75 ug/mL
..8151ResMix#1_00012	11/30/24		Restek, Lot a0132107		(Purchased Reagent)		2,4,5-T	191.48 ug/mL
							2,4-D	188.06 ug/mL
							2,4-DB	190.23 ug/mL
							Dicamba	189.85 ug/mL
							Dichlorprop	190.63 ug/mL
							Dinoseb	190.85 ug/mL
							Silvex (2,4,5-TP)	192 ug/mL
..8151ResMix#2_00011	01/31/24		Restek, Lot A0124376		(Purchased Reagent)		Dalapon	1810.7 ug/mL
..8151ResMix#3_00016	08/31/24		Restek, Lot A0130139		(Purchased Reagent)		MCPA	18796.7 ug/mL
							MCPP	18850.8 ug/mL
..8151StkPicPS_00048	10/11/19		AccuStandard, Lot 216101091		(Purchased Reagent)		Picloram	94.51 ug/mL
..8151StkSurr_00066	04/20/20		AccuStandard, Lot 215041203-02		(Purchased Reagent)		2,4-Dichlorophenylacetic acid	92.8 ug/mL
8151ICV_00018	10/18/18	04/18/18	Hexane, Lot Hex_cycl_00049	10 mL	8151SSWrking_00031	0.375 mL	2,4-Dichlorophenylacetic acid	0.348 ug/mL
.8151SSWrking_00031	10/18/18	04/18/18	Hexane, Lot Hex_cycl_00049	5 mL	8151StkSurr_00063	0.5 mL	2,4-Dichlorophenylacetic acid	9.28 ug/mL
..8151StkSurr_00063	10/18/18		AccuStandard, Lot 217031077		(Purchased Reagent)		2,4-Dichlorophenylacetic acid	92.8 ug/mL
8151ICV_00018	10/18/18	04/18/18	Hexane, Lot Hex_cycl_00049	10 mL	8151SSWrking_00031	0.375 mL	2,4,5-T	0.355463 ug/mL
							2,4-D	0.352613 ug/mL
							Silvex (2,4,5-TP)	0.356438 ug/mL
.8151SSWrking_00031	10/18/18	04/18/18	Hexane, Lot Hex_cycl_00049	5 mL	8151SSStk_00034	0.5 mL	2,4,5-T	9.479 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							2,4-D	9.403 ug/mL
							Silvex (2,4,5-TP)	9.505 ug/mL
..8151SSStk_00034	10/18/18	UltraScientific, Lot CP-2639			(Purchased Reagent)		2,4,5-T	94.79 ug/mL
							2,4-D	94.03 ug/mL
							Silvex (2,4,5-TP)	95.05 ug/mL
8151Surrogate_00164	09/14/18	07/14/18	P&T Methanol, Lot MethanolP&T 00207	200 mL	8151-SurStock_00094	1 mL	2,4-Dichlorophenylacetic acid	5 ug/mL
.8151-SurStock_00094	06/30/19	Restek, Lot A0128506			(Purchased Reagent)		2,4-Dichlorophenylacetic acid	1000 ug/mL
8270Surrogate_00123	07/09/19	07/09/18	ACETONE, Lot Acetone_00221	1000 mL	8270SurStkHL_00275	5 mL	2,4,6 - Tribromophenol	100 ug/mL
							2,4,6-Tribromophenol	100 ug/mL
							2-Fluorobiphenyl	100 ug/mL
							2-Fluorophenol	100 ug/mL
							Nitrobenzene-d5	100 ug/mL
							Phenol-d5	100 ug/mL
							Phenol-d6	100 ug/mL
							Terphenyl-d14	100 ug/mL
					8270SurStkHL_00276	5 mL	2,4,6 - Tribromophenol	100 ug/mL
							2,4,6-Tribromophenol	100 ug/mL
							2-Fluorobiphenyl	100 ug/mL
							2-Fluorophenol	100 ug/mL
							Nitrobenzene-d5	100 ug/mL
							Phenol-d5	100 ug/mL
							Phenol-d6	100 ug/mL
							Terphenyl-d14	100 ug/mL
					8270SurStkHL_00277	5 mL	2,4,6 - Tribromophenol	100 ug/mL
							2,4,6-Tribromophenol	100 ug/mL
							2-Fluorobiphenyl	100 ug/mL
							2-Fluorophenol	100 ug/mL
							Nitrobenzene-d5	100 ug/mL
							Phenol-d5	100 ug/mL
							Phenol-d6	100 ug/mL
							Terphenyl-d14	100 ug/mL
					8270SurStkHL_00278	5 mL	2,4,6 - Tribromophenol	100 ug/mL
							2,4,6-Tribromophenol	100 ug/mL
							2-Fluorobiphenyl	100 ug/mL
							2-Fluorophenol	100 ug/mL
							Nitrobenzene-d5	100 ug/mL
							Phenol-d5	100 ug/mL
							Phenol-d6	100 ug/mL
							Terphenyl-d14	100 ug/mL
.8270SurStkHL_00275	07/09/19	Restek, Lot A0133251			(Purchased Reagent)		2,4,6 - Tribromophenol	5000 ug/mL
							2,4,6-Tribromophenol	5000 ug/mL
							2-Fluorobiphenyl	5000 ug/mL
							2-Fluorophenol	5000 ug/mL
							Nitrobenzene-d5	5000 ug/mL
							Phenol-d5	5000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Phenol-d6	5000 ug/mL
							Terphenyl-d14	5000 ug/mL
.8270SurStkHL_00276	07/09/19		Restek, Lot A0133251		(Purchased Reagent)		2,4,6 - Tribromophenol	5000 ug/mL
							2,4,6-Tribromophenol	5000 ug/mL
							2-Fluorobiphenyl	5000 ug/mL
							2-Fluorophenol	5000 ug/mL
							Nitrobenzene-d5	5000 ug/mL
							Phenol-d5	5000 ug/mL
							Phenol-d6	5000 ug/mL
							Terphenyl-d14	5000 ug/mL
.8270SurStkHL_00277	07/09/19		Restek, Lot A0133251		(Purchased Reagent)		2,4,6 - Tribromophenol	5000 ug/mL
							2,4,6-Tribromophenol	5000 ug/mL
							2-Fluorobiphenyl	5000 ug/mL
							2-Fluorophenol	5000 ug/mL
							Nitrobenzene-d5	5000 ug/mL
							Phenol-d5	5000 ug/mL
							Phenol-d6	5000 ug/mL
							Terphenyl-d14	5000 ug/mL
.8270SurStkHL_00278	07/09/19		Restek, Lot A0133251		(Purchased Reagent)		2,4,6 - Tribromophenol	5000 ug/mL
							2,4,6-Tribromophenol	5000 ug/mL
							2-Fluorobiphenyl	5000 ug/mL
							2-Fluorophenol	5000 ug/mL
							Nitrobenzene-d5	5000 ug/mL
							Phenol-d5	5000 ug/mL
							Phenol-d6	5000 ug/mL
							Terphenyl-d14	5000 ug/mL
8270TCLPSpike_00060	12/22/18	07/12/18	P&T Methanol, Lot MethanolP&T_00196	100 mL	8270 TCLP Stk_00075	4 mL	1,4-Dichlorobenzene	50 ug/mL
							2,4,5-Trichlorophenol	50 ug/mL
							2,4,6-Trichlorophenol	50 ug/mL
							2,4-Dinitrotoluene	20 ug/mL
							2-Methylphenol	50 ug/mL
							3 & 4 Methylphenol	100 ug/mL
							3-Methylphenol	100 ug/mL
							4-Methylphenol	100 ug/mL
							Hexachlorobenzene	20 ug/mL
							Hexachlorobutadiene	50 ug/mL
							Hexachloroethane	50 ug/mL
							Nitrobenzene	50 ug/mL
							Pentachlorophenol	100 ug/mL
							Pyridine	50 ug/mL
					8270 TCLP Stk_00077	6 mL	1,4-Dichlorobenzene	50 ug/mL
							2,4,5-Trichlorophenol	50 ug/mL
							2,4,6-Trichlorophenol	50 ug/mL
							2,4-Dinitrotoluene	20 ug/mL
							2-Methylphenol	50 ug/mL
							3 & 4 Methylphenol	100 ug/mL
							3-Methylphenol	100 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							4-Methylphenol	100 ug/mL
							Hexachlorobenzene	20 ug/mL
							Hexachlorobutadiene	50 ug/mL
							Hexachloroethane	50 ug/mL
							Nitrobenzene	50 ug/mL
							Pentachlorophenol	100 ug/mL
							Pyridine	50 ug/mL
.8270 TCLP Stk_00075	03/20/19		Supelco, Lot LC26210V		(Purchased Reagent)		1,4-Dichlorobenzene	500 ug/mL
							2,4,5-Trichlorophenol	500 ug/mL
							2,4,6-Trichlorophenol	500 ug/mL
							2,4-Dinitrotoluene	200 ug/mL
							2-Methylphenol	500 ug/mL
							3 & 4 Methylphenol	1000 ug/mL
							3-Methylphenol	1000 ug/mL
							4-Methylphenol	1000 ug/mL
							Hexachlorobenzene	200 ug/mL
							Hexachlorobutadiene	500 ug/mL
							Hexachloroethane	500 ug/mL
							Nitrobenzene	500 ug/mL
							Pentachlorophenol	1000 ug/mL
							Pyridine	500 ug/mL
.8270 TCLP Stk_00077	12/22/18		Supelco, Lot LC26210V		(Purchased Reagent)		1,4-Dichlorobenzene	500 ug/mL
							2,4,5-Trichlorophenol	500 ug/mL
							2,4,6-Trichlorophenol	500 ug/mL
							2,4-Dinitrotoluene	200 ug/mL
							2-Methylphenol	500 ug/mL
							3 & 4 Methylphenol	1000 ug/mL
							3-Methylphenol	1000 ug/mL
							4-Methylphenol	1000 ug/mL
							Hexachlorobenzene	200 ug/mL
							Hexachlorobutadiene	500 ug/mL
							Hexachloroethane	500 ug/mL
							Nitrobenzene	500 ug/mL
							Pentachlorophenol	1000 ug/mL
							Pyridine	500 ug/mL
AR_1248_ICV_00013	12/06/18	06/06/18	Hexane, Lot 186983	100 mL	AR_1248_RESss_00010	25 uL	PCB-1248	250 ng/mL
.AR_1248_RESss_00010	06/06/19		RESTEK, Lot A0124143		(Purchased Reagent)		PCB-1248	1000 ug/mL
AR_1248_L1_00021	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_1248_L7_00016	0.25 mL	PCB-1248 Peak 1	0.025 ug/mL
							PCB-1248 Peak 2	0.025 ug/mL
							PCB-1248 Peak 3	0.025 ug/mL
							PCB-1248 Peak 4	0.025 ug/mL
							PCB-1248 Peak 5	0.025 ug/mL
.AR_1248_L7_00016	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1248_RES_00011	100 uL	PCB-1248 Peak 1	1 ug/mL
							PCB-1248 Peak 2	1 ug/mL
							PCB-1248 Peak 3	1 ug/mL
							PCB-1248 Peak 4	1 ug/mL
							PCB-1248 Peak 5	1 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
..AR_1248_RES_00011	04/22/19		RESTEK, Lot A0121842		(Purchased Reagent)		PCB-1248 Peak 1	1000 ug/mL
							PCB-1248 Peak 2	1000 ug/mL
							PCB-1248 Peak 3	1000 ug/mL
							PCB-1248 Peak 4	1000 ug/mL
							PCB-1248 Peak 5	1000 ug/mL
AR_1248_L2_00020	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_1248_L7_00016	0.5 mL	PCB-1248 Peak 1	0.05 ug/mL
							PCB-1248 Peak 2	0.05 ug/mL
							PCB-1248 Peak 3	0.05 ug/mL
							PCB-1248 Peak 4	0.05 ug/mL
							PCB-1248 Peak 5	0.05 ug/mL
.AR_1248_L7_00016	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1248_RES_00011	100 uL	PCB-1248 Peak 1	1 ug/mL
							PCB-1248 Peak 2	1 ug/mL
							PCB-1248 Peak 3	1 ug/mL
							PCB-1248 Peak 4	1 ug/mL
							PCB-1248 Peak 5	1 ug/mL
..AR_1248_RES_00011	04/22/19		RESTEK, Lot A0121842		(Purchased Reagent)		PCB-1248 Peak 1	1000 ug/mL
							PCB-1248 Peak 2	1000 ug/mL
							PCB-1248 Peak 3	1000 ug/mL
							PCB-1248 Peak 4	1000 ug/mL
							PCB-1248 Peak 5	1000 ug/mL
AR_1248_L3_00020	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_1248_L7_00016	1 mL	PCB-1248 Peak 1	0.1 ug/mL
							PCB-1248 Peak 2	0.1 ug/mL
							PCB-1248 Peak 3	0.1 ug/mL
							PCB-1248 Peak 4	0.1 ug/mL
							PCB-1248 Peak 5	0.1 ug/mL
.AR_1248_L7_00016	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1248_RES_00011	100 uL	PCB-1248 Peak 1	1 ug/mL
							PCB-1248 Peak 2	1 ug/mL
							PCB-1248 Peak 3	1 ug/mL
							PCB-1248 Peak 4	1 ug/mL
							PCB-1248 Peak 5	1 ug/mL
..AR_1248_RES_00011	04/22/19		RESTEK, Lot A0121842		(Purchased Reagent)		PCB-1248 Peak 1	1000 ug/mL
							PCB-1248 Peak 2	1000 ug/mL
							PCB-1248 Peak 3	1000 ug/mL
							PCB-1248 Peak 4	1000 ug/mL
							PCB-1248 Peak 5	1000 ug/mL
AR_1248_L4_00021	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_1248_L7_00016	2.5 mL	PCB-1248 Peak 1	0.25 ug/mL
							PCB-1248 Peak 2	0.25 ug/mL
							PCB-1248 Peak 3	0.25 ug/mL
							PCB-1248 Peak 4	0.25 ug/mL
							PCB-1248 Peak 5	0.25 ug/mL
.AR_1248_L7_00016	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1248_RES_00011	100 uL	PCB-1248 Peak 1	1 ug/mL
							PCB-1248 Peak 2	1 ug/mL
							PCB-1248 Peak 3	1 ug/mL
							PCB-1248 Peak 4	1 ug/mL
							PCB-1248 Peak 5	1 ug/mL
..AR_1248_RES_00011	04/22/19		RESTEK, Lot A0121842		(Purchased Reagent)		PCB-1248 Peak 1	1000 ug/mL
							PCB-1248 Peak 2	1000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							PCB-1248 Peak 3	1000 ug/mL
							PCB-1248 Peak 4	1000 ug/mL
							PCB-1248 Peak 5	1000 ug/mL
AR_1248_L5_00020	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_1248_L7_00016	5 mL	PCB-1248 Peak 1	0.5 ug/mL
							PCB-1248 Peak 2	0.5 ug/mL
							PCB-1248 Peak 3	0.5 ug/mL
							PCB-1248 Peak 4	0.5 ug/mL
							PCB-1248 Peak 5	0.5 ug/mL
.AR_1248_L7_00016	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1248_RES_00011	100 uL	PCB-1248 Peak 1	1 ug/mL
							PCB-1248 Peak 2	1 ug/mL
							PCB-1248 Peak 3	1 ug/mL
							PCB-1248 Peak 4	1 ug/mL
							PCB-1248 Peak 5	1 ug/mL
..AR_1248_RES_00011	04/22/19		RESTEK, Lot A0121842		(Purchased Reagent)		PCB-1248 Peak 1	1000 ug/mL
							PCB-1248 Peak 2	1000 ug/mL
							PCB-1248 Peak 3	1000 ug/mL
							PCB-1248 Peak 4	1000 ug/mL
							PCB-1248 Peak 5	1000 ug/mL
AR_1248_L6_00018	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_1248_L7_00016	7.5 mL	PCB-1248 Peak 1	0.75 ug/mL
							PCB-1248 Peak 2	0.75 ug/mL
							PCB-1248 Peak 3	0.75 ug/mL
							PCB-1248 Peak 4	0.75 ug/mL
							PCB-1248 Peak 5	0.75 ug/mL
.AR_1248_L7_00016	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1248_RES_00011	100 uL	PCB-1248 Peak 1	1 ug/mL
							PCB-1248 Peak 2	1 ug/mL
							PCB-1248 Peak 3	1 ug/mL
							PCB-1248 Peak 4	1 ug/mL
							PCB-1248 Peak 5	1 ug/mL
..AR_1248_RES_00011	04/22/19		RESTEK, Lot A0121842		(Purchased Reagent)		PCB-1248 Peak 1	1000 ug/mL
							PCB-1248 Peak 2	1000 ug/mL
							PCB-1248 Peak 3	1000 ug/mL
							PCB-1248 Peak 4	1000 ug/mL
							PCB-1248 Peak 5	1000 ug/mL
AR_1248_L7_00016	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1248_RES_00011	100 uL	PCB-1248 Peak 1	1 ug/mL
							PCB-1248 Peak 2	1 ug/mL
							PCB-1248 Peak 3	1 ug/mL
							PCB-1248 Peak 4	1 ug/mL
							PCB-1248 Peak 5	1 ug/mL
.AR_1248_RES_00011	04/22/19		RESTEK, Lot A0121842		(Purchased Reagent)		PCB-1248 Peak 1	1000 ug/mL
							PCB-1248 Peak 2	1000 ug/mL
							PCB-1248 Peak 3	1000 ug/mL
							PCB-1248 Peak 4	1000 ug/mL
							PCB-1248 Peak 5	1000 ug/mL
AR_1660_ICV_00013	12/06/18	06/06/18	Hexane, Lot 186983	100 mL	AR_1660_RESss_00010	25 uL	PCB-1016	250 ng/mL
							PCB-1260	250 ng/mL
					AR_SURR_RES_00090	6.25 uL	DCB Decachlorobiphenyl	12.5 ng/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Tetrachloro-m-xylene	12.5 ng/mL
.AR_1660_RESss_00010	06/06/19		RESTEK, Lot A0114674		(Purchased Reagent)		PCB-1016	1000 ug/mL
							PCB-1260	1000 ug/mL
.AR_SURR_RES_00090	06/06/19		RESTEK, Lot A0130424		(Purchased Reagent)		DCB Decachlorobiphenyl	200 ug/mL
							Tetrachloro-m-xylene	200 ug/mL
AR_1660_L1_00030	10/22/18	04/22/18	hexane, Lot 175756	10 mL	AR_1660_L7_00024	0.25 mL	PCB-1016 Peak 1	0.025 ug/mL
							PCB-1016 Peak 2	0.025 ug/mL
							PCB-1016 Peak 3	0.025 ug/mL
							PCB-1016 Peak 4	0.025 ug/mL
							PCB-1016 Peak 5	0.025 ug/mL
							PCB-1260 Peak 1	0.025 ug/mL
							PCB-1260 Peak 2	0.025 ug/mL
							PCB-1260 Peak 3	0.025 ug/mL
							PCB-1260 Peak 4	0.025 ug/mL
							PCB-1260 Peak 5	0.025 ug/mL
							DCB Decachlorobiphenyl	0.00125 ug/mL
							Tetrachloro-m-xylene	0.00125 ug/mL
.AR_1660_L7_00024	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1016_RES_00012	100 uL	PCB-1016 Peak 1	1 ug/mL
							PCB-1016 Peak 2	1 ug/mL
							PCB-1016 Peak 3	1 ug/mL
							PCB-1016 Peak 4	1 ug/mL
							PCB-1016 Peak 5	1 ug/mL
					AR_1260_RES_00014	100 uL	PCB-1260 Peak 1	1 ug/mL
							PCB-1260 Peak 2	1 ug/mL
							PCB-1260 Peak 3	1 ug/mL
							PCB-1260 Peak 4	1 ug/mL
							PCB-1260 Peak 5	1 ug/mL
					AR_SURR_RES_00092	25 uL	DCB Decachlorobiphenyl	0.05 ug/mL
							Tetrachloro-m-xylene	0.05 ug/mL
..AR_1016_RES_00012	04/22/19		RESTEK, Lot A0122038		(Purchased Reagent)		PCB-1016 Peak 1	1000 ug/mL
							PCB-1016 Peak 2	1000 ug/mL
							PCB-1016 Peak 3	1000 ug/mL
							PCB-1016 Peak 4	1000 ug/mL
							PCB-1016 Peak 5	1000 ug/mL
..AR_1260_RES_00014	04/22/19		RESTEK, Lot A0122906		(Purchased Reagent)		PCB-1260 Peak 1	1000 ug/mL
							PCB-1260 Peak 2	1000 ug/mL
							PCB-1260 Peak 3	1000 ug/mL
							PCB-1260 Peak 4	1000 ug/mL
							PCB-1260 Peak 5	1000 ug/mL
..AR_SURR_RES_00092	04/22/19		RESTEK, Lot A0130424		(Purchased Reagent)		DCB Decachlorobiphenyl	200 ug/mL
							Tetrachloro-m-xylene	200 ug/mL
AR_1660_L2_00029	10/22/18	04/22/18	hexane, Lot 175756	10 mL	AR_1660_L7_00024	0.5 mL	PCB-1016 Peak 1	0.05 ug/mL
							PCB-1016 Peak 2	0.05 ug/mL
							PCB-1016 Peak 3	0.05 ug/mL
							PCB-1016 Peak 4	0.05 ug/mL
							PCB-1016 Peak 5	0.05 ug/mL
							PCB-1260 Peak 1	0.05 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							PCB-1260 Peak 2	0.05 ug/mL
							PCB-1260 Peak 3	0.05 ug/mL
							PCB-1260 Peak 4	0.05 ug/mL
							PCB-1260 Peak 5	0.05 ug/mL
							DCB Decachlorobiphenyl	0.0025 ug/mL
							Tetrachloro-m-xylene	0.0025 ug/mL
.AR_1660_L7_00024	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1016_RES_00012	100 uL	PCB-1016 Peak 1	1 ug/mL
							PCB-1016 Peak 2	1 ug/mL
							PCB-1016 Peak 3	1 ug/mL
							PCB-1016 Peak 4	1 ug/mL
							PCB-1016 Peak 5	1 ug/mL
					AR_1260_RES_00014	100 uL	PCB-1260 Peak 1	1 ug/mL
							PCB-1260 Peak 2	1 ug/mL
							PCB-1260 Peak 3	1 ug/mL
							PCB-1260 Peak 4	1 ug/mL
							PCB-1260 Peak 5	1 ug/mL
					AR_SURR_RES_00092	25 uL	DCB Decachlorobiphenyl	0.05 ug/mL
							Tetrachloro-m-xylene	0.05 ug/mL
..AR_1016_RES_00012	04/22/19		RESTEK, Lot A0122038		(Purchased Reagent)		PCB-1016 Peak 1	1000 ug/mL
							PCB-1016 Peak 2	1000 ug/mL
							PCB-1016 Peak 3	1000 ug/mL
							PCB-1016 Peak 4	1000 ug/mL
							PCB-1016 Peak 5	1000 ug/mL
..AR_1260_RES_00014	04/22/19		RESTEK, Lot A0122906		(Purchased Reagent)		PCB-1260 Peak 1	1000 ug/mL
							PCB-1260 Peak 2	1000 ug/mL
							PCB-1260 Peak 3	1000 ug/mL
							PCB-1260 Peak 4	1000 ug/mL
							PCB-1260 Peak 5	1000 ug/mL
..AR_SURR_RES_00092	04/22/19		RESTEK, Lot A0130424		(Purchased Reagent)		DCB Decachlorobiphenyl	200 ug/mL
							Tetrachloro-m-xylene	200 ug/mL
AR_1660_L3_00030	10/22/18	04/22/18	hexane, Lot 175756	10 mL	AR_1660_L7_00024	1 mL	PCB-1016 Peak 1	0.1 ug/mL
							PCB-1016 Peak 2	0.1 ug/mL
							PCB-1016 Peak 3	0.1 ug/mL
							PCB-1016 Peak 4	0.1 ug/mL
							PCB-1016 Peak 5	0.1 ug/mL
							PCB-1260 Peak 1	0.1 ug/mL
							PCB-1260 Peak 2	0.1 ug/mL
							PCB-1260 Peak 3	0.1 ug/mL
							PCB-1260 Peak 4	0.1 ug/mL
							PCB-1260 Peak 5	0.1 ug/mL
							DCB Decachlorobiphenyl	0.005 ug/mL
							Tetrachloro-m-xylene	0.005 ug/mL
.AR_1660_L7_00024	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1016_RES_00012	100 uL	PCB-1016 Peak 1	1 ug/mL
							PCB-1016 Peak 2	1 ug/mL
							PCB-1016 Peak 3	1 ug/mL
							PCB-1016 Peak 4	1 ug/mL
							PCB-1016 Peak 5	1 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					AR_1260_RES_00014	100 uL	PCB-1260 Peak 1	1 ug/mL
							PCB-1260 Peak 2	1 ug/mL
							PCB-1260 Peak 3	1 ug/mL
							PCB-1260 Peak 4	1 ug/mL
							PCB-1260 Peak 5	1 ug/mL
					AR_SURR_RES_00092	25 uL	DCB Decachlorobiphenyl	0.05 ug/mL
							Tetrachloro-m-xylene	0.05 ug/mL
..AR_1016_RES_00012	04/22/19		RESTEK, Lot A0122038		(Purchased Reagent)		PCB-1016 Peak 1	1000 ug/mL
							PCB-1016 Peak 2	1000 ug/mL
							PCB-1016 Peak 3	1000 ug/mL
							PCB-1016 Peak 4	1000 ug/mL
							PCB-1016 Peak 5	1000 ug/mL
..AR_1260_RES_00014	04/22/19		RESTEK, Lot A0122906		(Purchased Reagent)		PCB-1260 Peak 1	1000 ug/mL
							PCB-1260 Peak 2	1000 ug/mL
							PCB-1260 Peak 3	1000 ug/mL
							PCB-1260 Peak 4	1000 ug/mL
							PCB-1260 Peak 5	1000 ug/mL
..AR_SURR_RES_00092	04/22/19		RESTEK, Lot A0130424		(Purchased Reagent)		DCB Decachlorobiphenyl	200 ug/mL
							Tetrachloro-m-xylene	200 ug/mL
AR_1660_L4_00067	10/22/18	04/22/18	hexane, Lot 175756	10 mL	AR_1660_L7_00024	2.5 mL	PCB-1016 Peak 1	0.25 ug/mL
							PCB-1016 Peak 2	0.25 ug/mL
							PCB-1016 Peak 3	0.25 ug/mL
							PCB-1016 Peak 4	0.25 ug/mL
							PCB-1016 Peak 5	0.25 ug/mL
							PCB-1260 Peak 1	0.25 ug/mL
							PCB-1260 Peak 2	0.25 ug/mL
							PCB-1260 Peak 3	0.25 ug/mL
							PCB-1260 Peak 4	0.25 ug/mL
							PCB-1260 Peak 5	0.25 ug/mL
							DCB Decachlorobiphenyl	0.0125 ug/mL
							Tetrachloro-m-xylene	0.0125 ug/mL
.AR_1660_L7_00024	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1016_RES_00012	100 uL	PCB-1016 Peak 1	1 ug/mL
							PCB-1016 Peak 2	1 ug/mL
							PCB-1016 Peak 3	1 ug/mL
							PCB-1016 Peak 4	1 ug/mL
							PCB-1016 Peak 5	1 ug/mL
					AR_1260_RES_00014	100 uL	PCB-1260 Peak 1	1 ug/mL
							PCB-1260 Peak 2	1 ug/mL
							PCB-1260 Peak 3	1 ug/mL
							PCB-1260 Peak 4	1 ug/mL
							PCB-1260 Peak 5	1 ug/mL
					AR_SURR_RES_00092	25 uL	DCB Decachlorobiphenyl	0.05 ug/mL
							Tetrachloro-m-xylene	0.05 ug/mL
..AR_1016_RES_00012	04/22/19		RESTEK, Lot A0122038		(Purchased Reagent)		PCB-1016 Peak 1	1000 ug/mL
							PCB-1016 Peak 2	1000 ug/mL
							PCB-1016 Peak 3	1000 ug/mL
							PCB-1016 Peak 4	1000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							PCB-1016 Peak 5	1000 ug/mL
..AR_1260_RES_00014	04/22/19		RESTEK, Lot A0122906		(Purchased Reagent)		PCB-1260 Peak 1	1000 ug/mL
							PCB-1260 Peak 2	1000 ug/mL
							PCB-1260 Peak 3	1000 ug/mL
							PCB-1260 Peak 4	1000 ug/mL
							PCB-1260 Peak 5	1000 ug/mL
..AR_SURR_RES_00092	04/22/19		RESTEK, Lot A0130424		(Purchased Reagent)		DCB Decachlorobiphenyl	200 ug/mL
							Tetrachloro-m-xylene	200 ug/mL
AR_1660_L5_00064	10/22/18	04/22/18	hexane, Lot 175756	25 mL	AR_1660_L7_00024	12.5 mL	PCB-1016 Peak 1	0.5 ug/mL
							PCB-1016 Peak 2	0.5 ug/mL
							PCB-1016 Peak 3	0.5 ug/mL
							PCB-1016 Peak 4	0.5 ug/mL
							PCB-1016 Peak 5	0.5 ug/mL
							PCB-1260 Peak 1	0.5 ug/mL
							PCB-1260 Peak 2	0.5 ug/mL
							PCB-1260 Peak 3	0.5 ug/mL
							PCB-1260 Peak 4	0.5 ug/mL
							PCB-1260 Peak 5	0.5 ug/mL
							DCB Decachlorobiphenyl	0.025 ug/mL
							Tetrachloro-m-xylene	0.025 ug/mL
.AR_1660_L7_00024	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1016_RES_00012	100 uL	PCB-1016 Peak 1	1 ug/mL
							PCB-1016 Peak 2	1 ug/mL
							PCB-1016 Peak 3	1 ug/mL
							PCB-1016 Peak 4	1 ug/mL
							PCB-1016 Peak 5	1 ug/mL
					AR_1260_RES_00014	100 uL	PCB-1260 Peak 1	1 ug/mL
							PCB-1260 Peak 2	1 ug/mL
							PCB-1260 Peak 3	1 ug/mL
							PCB-1260 Peak 4	1 ug/mL
							PCB-1260 Peak 5	1 ug/mL
					AR_SURR_RES_00092	25 uL	DCB Decachlorobiphenyl	0.05 ug/mL
							Tetrachloro-m-xylene	0.05 ug/mL
..AR_1016_RES_00012	04/22/19		RESTEK, Lot A0122038		(Purchased Reagent)		PCB-1016 Peak 1	1000 ug/mL
							PCB-1016 Peak 2	1000 ug/mL
							PCB-1016 Peak 3	1000 ug/mL
							PCB-1016 Peak 4	1000 ug/mL
							PCB-1016 Peak 5	1000 ug/mL
..AR_1260_RES_00014	04/22/19		RESTEK, Lot A0122906		(Purchased Reagent)		PCB-1260 Peak 1	1000 ug/mL
							PCB-1260 Peak 2	1000 ug/mL
							PCB-1260 Peak 3	1000 ug/mL
							PCB-1260 Peak 4	1000 ug/mL
							PCB-1260 Peak 5	1000 ug/mL
..AR_SURR_RES_00092	04/22/19		RESTEK, Lot A0130424		(Purchased Reagent)		DCB Decachlorobiphenyl	200 ug/mL
							Tetrachloro-m-xylene	200 ug/mL
AR_1660_L5_00064	10/22/18	04/22/18	hexane, Lot 175756	25 mL	AR_1660_L7_00024	12.5 mL	PCB-1016	0.5 ug/mL
							PCB-1260	0.5 ug/mL
.AR_1660_L7_00024	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1016_RES_00012	100 uL	PCB-1016	1 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					AR_1260_RES_00014	100 uL	PCB-1260	1 ug/mL
..AR_1016_RES_00012	04/22/19		RESTEK, Lot A0122038		(Purchased Reagent)		PCB-1016	1000 ug/mL
..AR_1260_RES_00014	04/22/19		RESTEK, Lot A0122906		(Purchased Reagent)		PCB-1260	1000 ug/mL
AR_1660_L6_00031	10/22/18	04/22/18	hexane, Lot 175756	10 mL	AR_1660_L7_00024	7.5 mL	PCB-1016 Peak 1	0.75 ug/mL
							PCB-1016 Peak 2	0.75 ug/mL
							PCB-1016 Peak 3	0.75 ug/mL
							PCB-1016 Peak 4	0.75 ug/mL
							PCB-1016 Peak 5	0.75 ug/mL
							PCB-1260 Peak 1	0.75 ug/mL
							PCB-1260 Peak 2	0.75 ug/mL
							PCB-1260 Peak 3	0.75 ug/mL
							PCB-1260 Peak 4	0.75 ug/mL
							PCB-1260 Peak 5	0.75 ug/mL
							DCB Decachlorobiphenyl	0.0375 ug/mL
							Tetrachloro-m-xylene	0.0375 ug/mL
.AR_1660_L7_00024	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1016_RES_00012	100 uL	PCB-1016 Peak 1	1 ug/mL
							PCB-1016 Peak 2	1 ug/mL
							PCB-1016 Peak 3	1 ug/mL
							PCB-1016 Peak 4	1 ug/mL
							PCB-1016 Peak 5	1 ug/mL
					AR_1260_RES_00014	100 uL	PCB-1260 Peak 1	1 ug/mL
							PCB-1260 Peak 2	1 ug/mL
							PCB-1260 Peak 3	1 ug/mL
							PCB-1260 Peak 4	1 ug/mL
							PCB-1260 Peak 5	1 ug/mL
					AR_SURR_RES_00092	25 uL	DCB Decachlorobiphenyl	0.05 ug/mL
							Tetrachloro-m-xylene	0.05 ug/mL
..AR_1016_RES_00012	04/22/19		RESTEK, Lot A0122038		(Purchased Reagent)		PCB-1016 Peak 1	1000 ug/mL
							PCB-1016 Peak 2	1000 ug/mL
							PCB-1016 Peak 3	1000 ug/mL
							PCB-1016 Peak 4	1000 ug/mL
							PCB-1016 Peak 5	1000 ug/mL
..AR_1260_RES_00014	04/22/19		RESTEK, Lot A0122906		(Purchased Reagent)		PCB-1260 Peak 1	1000 ug/mL
							PCB-1260 Peak 2	1000 ug/mL
							PCB-1260 Peak 3	1000 ug/mL
							PCB-1260 Peak 4	1000 ug/mL
							PCB-1260 Peak 5	1000 ug/mL
..AR_SURR_RES_00092	04/22/19		RESTEK, Lot A0130424		(Purchased Reagent)		DCB Decachlorobiphenyl	200 ug/mL
							Tetrachloro-m-xylene	200 ug/mL
AR_1660_L7_00024	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1016_RES_00012	100 uL	PCB-1016 Peak 1	1 ug/mL
							PCB-1016 Peak 2	1 ug/mL
							PCB-1016 Peak 3	1 ug/mL
							PCB-1016 Peak 4	1 ug/mL
							PCB-1016 Peak 5	1 ug/mL
					AR_1260_RES_00014	100 uL	PCB-1260 Peak 1	1 ug/mL
							PCB-1260 Peak 2	1 ug/mL
							PCB-1260 Peak 3	1 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							PCB-1260 Peak 4	1 ug/mL
							PCB-1260 Peak 5	1 ug/mL
					AR_SURR_RES_00092	25 uL	DCB Decachlorobiphenyl	0.05 ug/mL
							Tetrachloro-m-xylene	0.05 ug/mL
.AR_1016_RES_00012	04/22/19		RESTEK, Lot A0122038		(Purchased Reagent)		PCB-1016 Peak 1	1000 ug/mL
							PCB-1016 Peak 2	1000 ug/mL
							PCB-1016 Peak 3	1000 ug/mL
							PCB-1016 Peak 4	1000 ug/mL
							PCB-1016 Peak 5	1000 ug/mL
.AR_1260_RES_00014	04/22/19		RESTEK, Lot A0122906		(Purchased Reagent)		PCB-1260 Peak 1	1000 ug/mL
							PCB-1260 Peak 2	1000 ug/mL
							PCB-1260 Peak 3	1000 ug/mL
							PCB-1260 Peak 4	1000 ug/mL
							PCB-1260 Peak 5	1000 ug/mL
.AR_SURR_RES_00092	04/22/19		RESTEK, Lot A0130424		(Purchased Reagent)		DCB Decachlorobiphenyl	200 ug/mL
							Tetrachloro-m-xylene	200 ug/mL
AR_2154_ICV_00013	12/06/18	06/06/18	Hexane, Lot 186983	100 mL	AR_1221_RESss_00010	25 uL	PCB-1221	250 ng/mL
					AR_1254_RESss_00010	25 uL	PCB-1254	250 ng/mL
.AR_1221_RESss_00010	06/06/19		RESTEK, Lot A0117382		(Purchased Reagent)		PCB-1221	1000 ug/mL
.AR_1254_RESss_00010	06/06/19		RESTEK, Lot A0105373		(Purchased Reagent)		PCB-1254	1000 ug/mL
AR_2154_L1_00020	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_2154_L7_00016	0.25 mL	PCB-1221 Peak 1	0.025 ug/mL
							PCB-1221 Peak 2	0.025 ug/mL
							PCB-1221 Peak 3	0.025 ug/mL
							PCB-1254 Peak 1	0.025 ug/mL
							PCB-1254 Peak 2	0.025 ug/mL
							PCB-1254 Peak 3	0.025 ug/mL
							PCB-1254 Peak 4	0.025 ug/mL
							PCB-1254 Peak 5	0.025 ug/mL
.AR_2154_L7_00016	10/22/18	04/22/18	Hexane, Lot 475756	100 mL	AR_1221_RES_00011	100 uL	PCB-1221 Peak 1	1 ug/mL
							PCB-1221 Peak 2	1 ug/mL
							PCB-1221 Peak 3	1 ug/mL
					AR_1254_RES_00011	100 uL	PCB-1254 Peak 1	1 ug/mL
							PCB-1254 Peak 2	1 ug/mL
							PCB-1254 Peak 3	1 ug/mL
							PCB-1254 Peak 4	1 ug/mL
							PCB-1254 Peak 5	1 ug/mL
..AR_1221_RES_00011	04/22/19		RESTEK, Lot A0123714		(Purchased Reagent)		PCB-1221 Peak 1	1000 ug/mL
							PCB-1221 Peak 2	1000 ug/mL
							PCB-1221 Peak 3	1000 ug/mL
..AR_1254_RES_00011	04/22/19		RESTEK, Lot A0125350		(Purchased Reagent)		PCB-1254 Peak 1	1000 ug/mL
							PCB-1254 Peak 2	1000 ug/mL
							PCB-1254 Peak 3	1000 ug/mL
							PCB-1254 Peak 4	1000 ug/mL
							PCB-1254 Peak 5	1000 ug/mL
AR_2154_L2_00021	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_2154_L7_00016	0.5 mL	PCB-1221 Peak 1	0.05 ug/mL
							PCB-1221 Peak 2	0.05 ug/mL
							PCB-1221 Peak 3	0.05 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							PCB-1254 Peak 1	0.05 ug/mL
							PCB-1254 Peak 2	0.05 ug/mL
							PCB-1254 Peak 3	0.05 ug/mL
							PCB-1254 Peak 4	0.05 ug/mL
							PCB-1254 Peak 5	0.05 ug/mL
.AR_2154_L7_00016	10/22/18	04/22/18	Hexane, Lot 475756	100 mL	AR_1221_RES_00011	100 uL	PCB-1221 Peak 1	1 ug/mL
							PCB-1221 Peak 2	1 ug/mL
							PCB-1221 Peak 3	1 ug/mL
					AR_1254_RES_00011	100 uL	PCB-1254 Peak 1	1 ug/mL
							PCB-1254 Peak 2	1 ug/mL
							PCB-1254 Peak 3	1 ug/mL
							PCB-1254 Peak 4	1 ug/mL
							PCB-1254 Peak 5	1 ug/mL
..AR_1221_RES_00011	04/22/19		RESTEK, Lot A0123714		(Purchased Reagent)		PCB-1221 Peak 1	1000 ug/mL
							PCB-1221 Peak 2	1000 ug/mL
							PCB-1221 Peak 3	1000 ug/mL
..AR_1254_RES_00011	04/22/19		RESTEK, Lot A0125350		(Purchased Reagent)		PCB-1254 Peak 1	1000 ug/mL
							PCB-1254 Peak 2	1000 ug/mL
							PCB-1254 Peak 3	1000 ug/mL
							PCB-1254 Peak 4	1000 ug/mL
							PCB-1254 Peak 5	1000 ug/mL
AR_2154_L3_00020	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_2154_L7_00016	1 mL	PCB-1221 Peak 1	0.1 ug/mL
							PCB-1221 Peak 2	0.1 ug/mL
							PCB-1221 Peak 3	0.1 ug/mL
							PCB-1254 Peak 1	0.1 ug/mL
							PCB-1254 Peak 2	0.1 ug/mL
							PCB-1254 Peak 3	0.1 ug/mL
							PCB-1254 Peak 4	0.1 ug/mL
							PCB-1254 Peak 5	0.1 ug/mL
.AR_2154_L7_00016	10/22/18	04/22/18	Hexane, Lot 475756	100 mL	AR_1221_RES_00011	100 uL	PCB-1221 Peak 1	1 ug/mL
							PCB-1221 Peak 2	1 ug/mL
							PCB-1221 Peak 3	1 ug/mL
					AR_1254_RES_00011	100 uL	PCB-1254 Peak 1	1 ug/mL
							PCB-1254 Peak 2	1 ug/mL
							PCB-1254 Peak 3	1 ug/mL
							PCB-1254 Peak 4	1 ug/mL
							PCB-1254 Peak 5	1 ug/mL
..AR_1221_RES_00011	04/22/19		RESTEK, Lot A0123714		(Purchased Reagent)		PCB-1221 Peak 1	1000 ug/mL
							PCB-1221 Peak 2	1000 ug/mL
							PCB-1221 Peak 3	1000 ug/mL
..AR_1254_RES_00011	04/22/19		RESTEK, Lot A0125350		(Purchased Reagent)		PCB-1254 Peak 1	1000 ug/mL
							PCB-1254 Peak 2	1000 ug/mL
							PCB-1254 Peak 3	1000 ug/mL
							PCB-1254 Peak 4	1000 ug/mL
							PCB-1254 Peak 5	1000 ug/mL
AR_2154_L4_00021	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_2154_L7_00016	2.5 mL	PCB-1221 Peak 1	0.25 ug/mL
							PCB-1221 Peak 2	0.25 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							PCB-1221 Peak 3	0.25 ug/mL
							PCB-1254 Peak 1	0.25 ug/mL
							PCB-1254 Peak 2	0.25 ug/mL
							PCB-1254 Peak 3	0.25 ug/mL
							PCB-1254 Peak 4	0.25 ug/mL
							PCB-1254 Peak 5	0.25 ug/mL
.AR_2154_L7_00016	10/22/18	04/22/18	Hexane, Lot 475756	100 mL	AR_1221_RES_00011	100 uL	PCB-1221 Peak 1	1 ug/mL
							PCB-1221 Peak 2	1 ug/mL
							PCB-1221 Peak 3	1 ug/mL
					AR_1254_RES_00011	100 uL	PCB-1254 Peak 1	1 ug/mL
							PCB-1254 Peak 2	1 ug/mL
							PCB-1254 Peak 3	1 ug/mL
							PCB-1254 Peak 4	1 ug/mL
							PCB-1254 Peak 5	1 ug/mL
..AR_1221_RES_00011	04/22/19		RESTEK, Lot A0123714		(Purchased Reagent)		PCB-1221 Peak 1	1000 ug/mL
							PCB-1221 Peak 2	1000 ug/mL
							PCB-1221 Peak 3	1000 ug/mL
..AR_1254_RES_00011	04/22/19		RESTEK, Lot A0125350		(Purchased Reagent)		PCB-1254 Peak 1	1000 ug/mL
							PCB-1254 Peak 2	1000 ug/mL
							PCB-1254 Peak 3	1000 ug/mL
							PCB-1254 Peak 4	1000 ug/mL
							PCB-1254 Peak 5	1000 ug/mL
AR_2154_L5_00020	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_2154_L7_00016	5 mL	PCB-1221 Peak 1	0.5 ug/mL
							PCB-1221 Peak 2	0.5 ug/mL
							PCB-1221 Peak 3	0.5 ug/mL
							PCB-1254 Peak 1	0.5 ug/mL
							PCB-1254 Peak 2	0.5 ug/mL
							PCB-1254 Peak 3	0.5 ug/mL
							PCB-1254 Peak 4	0.5 ug/mL
							PCB-1254 Peak 5	0.5 ug/mL
.AR_2154_L7_00016	10/22/18	04/22/18	Hexane, Lot 475756	100 mL	AR_1221_RES_00011	100 uL	PCB-1221 Peak 1	1 ug/mL
							PCB-1221 Peak 2	1 ug/mL
							PCB-1221 Peak 3	1 ug/mL
					AR_1254_RES_00011	100 uL	PCB-1254 Peak 1	1 ug/mL
							PCB-1254 Peak 2	1 ug/mL
							PCB-1254 Peak 3	1 ug/mL
							PCB-1254 Peak 4	1 ug/mL
							PCB-1254 Peak 5	1 ug/mL
..AR_1221_RES_00011	04/22/19		RESTEK, Lot A0123714		(Purchased Reagent)		PCB-1221 Peak 1	1000 ug/mL
							PCB-1221 Peak 2	1000 ug/mL
							PCB-1221 Peak 3	1000 ug/mL
..AR_1254_RES_00011	04/22/19		RESTEK, Lot A0125350		(Purchased Reagent)		PCB-1254 Peak 1	1000 ug/mL
							PCB-1254 Peak 2	1000 ug/mL
							PCB-1254 Peak 3	1000 ug/mL
							PCB-1254 Peak 4	1000 ug/mL
							PCB-1254 Peak 5	1000 ug/mL
AR_2154_L5_00020	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_2154_L7_00016	5 mL	PCB-1221	0.5 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							PCB-1254	0.5 ug/mL
.AR_2154_L7_00016	10/22/18	04/22/18	Hexane, Lot 475756	100 mL	AR_1221_RES_00011	100 uL	PCB-1221	1 ug/mL
					AR_1254_RES_00011	100 uL	PCB-1254	1 ug/mL
..AR_1221_RES_00011	04/22/19		RESTEK, Lot A0123714		(Purchased Reagent)		PCB-1221	1000 ug/mL
..AR_1254_RES_00011	04/22/19		RESTEK, Lot A0125350		(Purchased Reagent)		PCB-1254	1000 ug/mL
AR_2154_L6_00018	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_2154_L7_00016	7.5 mL	PCB-1221 Peak 1	0.75 ug/mL
							PCB-1221 Peak 2	0.75 ug/mL
							PCB-1221 Peak 3	0.75 ug/mL
							PCB-1254 Peak 1	0.75 ug/mL
							PCB-1254 Peak 2	0.75 ug/mL
							PCB-1254 Peak 3	0.75 ug/mL
							PCB-1254 Peak 4	0.75 ug/mL
							PCB-1254 Peak 5	0.75 ug/mL
.AR_2154_L7_00016	10/22/18	04/22/18	Hexane, Lot 475756	100 mL	AR_1221_RES_00011	100 uL	PCB-1221 Peak 1	1 ug/mL
							PCB-1221 Peak 2	1 ug/mL
							PCB-1221 Peak 3	1 ug/mL
					AR_1254_RES_00011	100 uL	PCB-1254 Peak 1	1 ug/mL
							PCB-1254 Peak 2	1 ug/mL
							PCB-1254 Peak 3	1 ug/mL
							PCB-1254 Peak 4	1 ug/mL
							PCB-1254 Peak 5	1 ug/mL
..AR_1221_RES_00011	04/22/19		RESTEK, Lot A0123714		(Purchased Reagent)		PCB-1221 Peak 1	1000 ug/mL
							PCB-1221 Peak 2	1000 ug/mL
							PCB-1221 Peak 3	1000 ug/mL
..AR_1254_RES_00011	04/22/19		RESTEK, Lot A0125350		(Purchased Reagent)		PCB-1254 Peak 1	1000 ug/mL
							PCB-1254 Peak 2	1000 ug/mL
							PCB-1254 Peak 3	1000 ug/mL
							PCB-1254 Peak 4	1000 ug/mL
							PCB-1254 Peak 5	1000 ug/mL
AR_2154_L7_00016	10/22/18	04/22/18	Hexane, Lot 475756	100 mL	AR_1221_RES_00011	100 uL	PCB-1221 Peak 1	1 ug/mL
							PCB-1221 Peak 2	1 ug/mL
							PCB-1221 Peak 3	1 ug/mL
					AR_1254_RES_00011	100 uL	PCB-1254 Peak 1	1 ug/mL
							PCB-1254 Peak 2	1 ug/mL
							PCB-1254 Peak 3	1 ug/mL
							PCB-1254 Peak 4	1 ug/mL
							PCB-1254 Peak 5	1 ug/mL
.AR_1221_RES_00011	04/22/19		RESTEK, Lot A0123714		(Purchased Reagent)		PCB-1221 Peak 1	1000 ug/mL
							PCB-1221 Peak 2	1000 ug/mL
							PCB-1221 Peak 3	1000 ug/mL
.AR_1254_RES_00011	04/22/19		RESTEK, Lot A0125350		(Purchased Reagent)		PCB-1254 Peak 1	1000 ug/mL
							PCB-1254 Peak 2	1000 ug/mL
							PCB-1254 Peak 3	1000 ug/mL
							PCB-1254 Peak 4	1000 ug/mL
							PCB-1254 Peak 5	1000 ug/mL
AR_3262_ICV_00013	12/06/18	06/06/18	Hexane, Lot 186983	100 mL	AR_1232_RESss_00010	25 uL	PCB-1232	250 ng/mL
					AR_1262_RESss_00010	25 uL	PCB-1262	250 ng/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
.AR_1232_RESss_00010	06/06/19		RESTEK, Lot A095877		(Purchased Reagent)		PCB-1232	1000 ug/mL
.AR_1262_RESss_00010	06/06/19		RESTEK, Lot A094156		(Purchased Reagent)		PCB-1262	1000 ug/mL
AR_3262_L1_00021	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_3262_L7_00016	0.25 mL	PCB-1232 Peak 1	0.025 ug/mL
							PCB-1232 Peak 2	0.025 ug/mL
							PCB-1232 Peak 3	0.025 ug/mL
							PCB-1232 Peak 4	0.025 ug/mL
							PCB-1232 Peak 5	0.025 ug/mL
							PCB-1262 Peak 1	0.025 ug/mL
							PCB-1262 Peak 2	0.025 ug/mL
							PCB-1262 Peak 3	0.025 ug/mL
							PCB-1262 Peak 4	0.025 ug/mL
							PCB-1262 Peak 5	0.025 ug/mL
.AR_3262_L7_00016	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1232_RES_00012	100 uL	PCB-1232 Peak 1	1 ug/mL
							PCB-1232 Peak 2	1 ug/mL
							PCB-1232 Peak 3	1 ug/mL
							PCB-1232 Peak 4	1 ug/mL
							PCB-1232 Peak 5	1 ug/mL
					AR_1262_RES_00012	100 uL	PCB-1262 Peak 1	1 ug/mL
							PCB-1262 Peak 2	1 ug/mL
							PCB-1262 Peak 3	1 ug/mL
							PCB-1262 Peak 4	1 ug/mL
							PCB-1262 Peak 5	1 ug/mL
..AR_1232_RES_00012	04/22/19		RESTEK, Lot A0124543		(Purchased Reagent)		PCB-1232 Peak 1	1000 ug/mL
							PCB-1232 Peak 2	1000 ug/mL
							PCB-1232 Peak 3	1000 ug/mL
							PCB-1232 Peak 4	1000 ug/mL
							PCB-1232 Peak 5	1000 ug/mL
..AR_1262_RES_00012	04/22/19		RESTEK, Lot A0127459		(Purchased Reagent)		PCB-1262 Peak 1	1000 ug/mL
							PCB-1262 Peak 2	1000 ug/mL
							PCB-1262 Peak 3	1000 ug/mL
							PCB-1262 Peak 4	1000 ug/mL
							PCB-1262 Peak 5	1000 ug/mL
AR_3262_L2_00020	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_3262_L7_00016	0.5 mL	PCB-1232 Peak 1	0.05 ug/mL
							PCB-1232 Peak 2	0.05 ug/mL
							PCB-1232 Peak 3	0.05 ug/mL
							PCB-1232 Peak 4	0.05 ug/mL
							PCB-1232 Peak 5	0.05 ug/mL
							PCB-1262 Peak 1	0.05 ug/mL
							PCB-1262 Peak 2	0.05 ug/mL
							PCB-1262 Peak 3	0.05 ug/mL
							PCB-1262 Peak 4	0.05 ug/mL
							PCB-1262 Peak 5	0.05 ug/mL
.AR_3262_L7_00016	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1232_RES_00012	100 uL	PCB-1232 Peak 1	1 ug/mL
							PCB-1232 Peak 2	1 ug/mL
							PCB-1232 Peak 3	1 ug/mL
							PCB-1232 Peak 4	1 ug/mL
							PCB-1232 Peak 5	1 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					AR_1262_RES_00012	100 uL	PCB-1262 Peak 1	1 ug/mL
							PCB-1262 Peak 2	1 ug/mL
							PCB-1262 Peak 3	1 ug/mL
							PCB-1262 Peak 4	1 ug/mL
							PCB-1262 Peak 5	1 ug/mL
..AR_1232_RES_00012	04/22/19		RESTEK, Lot A0124543		(Purchased Reagent)		PCB-1232 Peak 1	1000 ug/mL
							PCB-1232 Peak 2	1000 ug/mL
							PCB-1232 Peak 3	1000 ug/mL
							PCB-1232 Peak 4	1000 ug/mL
							PCB-1232 Peak 5	1000 ug/mL
..AR_1262_RES_00012	04/22/19		RESTEK, Lot A0127459		(Purchased Reagent)		PCB-1262 Peak 1	1000 ug/mL
							PCB-1262 Peak 2	1000 ug/mL
							PCB-1262 Peak 3	1000 ug/mL
							PCB-1262 Peak 4	1000 ug/mL
							PCB-1262 Peak 5	1000 ug/mL
AR_3262_L3_00020	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_3262_L7_00016	1 mL	PCB-1232 Peak 1	0.1 ug/mL
							PCB-1232 Peak 2	0.1 ug/mL
							PCB-1232 Peak 3	0.1 ug/mL
							PCB-1232 Peak 4	0.1 ug/mL
							PCB-1232 Peak 5	0.1 ug/mL
							PCB-1262 Peak 1	0.1 ug/mL
							PCB-1262 Peak 2	0.1 ug/mL
							PCB-1262 Peak 3	0.1 ug/mL
							PCB-1262 Peak 4	0.1 ug/mL
							PCB-1262 Peak 5	0.1 ug/mL
.AR_3262_L7_00016	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1232_RES_00012	100 uL	PCB-1232 Peak 1	1 ug/mL
							PCB-1232 Peak 2	1 ug/mL
							PCB-1232 Peak 3	1 ug/mL
							PCB-1232 Peak 4	1 ug/mL
							PCB-1232 Peak 5	1 ug/mL
					AR_1262_RES_00012	100 uL	PCB-1262 Peak 1	1 ug/mL
							PCB-1262 Peak 2	1 ug/mL
							PCB-1262 Peak 3	1 ug/mL
							PCB-1262 Peak 4	1 ug/mL
							PCB-1262 Peak 5	1 ug/mL
..AR_1232_RES_00012	04/22/19		RESTEK, Lot A0124543		(Purchased Reagent)		PCB-1232 Peak 1	1000 ug/mL
							PCB-1232 Peak 2	1000 ug/mL
							PCB-1232 Peak 3	1000 ug/mL
							PCB-1232 Peak 4	1000 ug/mL
							PCB-1232 Peak 5	1000 ug/mL
..AR_1262_RES_00012	04/22/19		RESTEK, Lot A0127459		(Purchased Reagent)		PCB-1262 Peak 1	1000 ug/mL
							PCB-1262 Peak 2	1000 ug/mL
							PCB-1262 Peak 3	1000 ug/mL
							PCB-1262 Peak 4	1000 ug/mL
							PCB-1262 Peak 5	1000 ug/mL
AR_3262_L4_00021	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_3262_L7_00016	2.5 mL	PCB-1232 Peak 1	0.25 ug/mL
							PCB-1232 Peak 2	0.25 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							PCB-1232 Peak 3	0.25 ug/mL
							PCB-1232 Peak 4	0.25 ug/mL
							PCB-1232 Peak 5	0.25 ug/mL
							PCB-1262 Peak 1	0.25 ug/mL
							PCB-1262 Peak 2	0.25 ug/mL
							PCB-1262 Peak 3	0.25 ug/mL
							PCB-1262 Peak 4	0.25 ug/mL
							PCB-1262 Peak 5	0.25 ug/mL
.AR_3262_L7_00016	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1232_RES_00012	100 uL	PCB-1232 Peak 1	1 ug/mL
							PCB-1232 Peak 2	1 ug/mL
							PCB-1232 Peak 3	1 ug/mL
							PCB-1232 Peak 4	1 ug/mL
							PCB-1232 Peak 5	1 ug/mL
					AR_1262_RES_00012	100 uL	PCB-1262 Peak 1	1 ug/mL
							PCB-1262 Peak 2	1 ug/mL
							PCB-1262 Peak 3	1 ug/mL
							PCB-1262 Peak 4	1 ug/mL
							PCB-1262 Peak 5	1 ug/mL
..AR_1232_RES_00012	04/22/19		RESTEK, Lot A0124543		(Purchased Reagent)		PCB-1232 Peak 1	1000 ug/mL
							PCB-1232 Peak 2	1000 ug/mL
							PCB-1232 Peak 3	1000 ug/mL
							PCB-1232 Peak 4	1000 ug/mL
							PCB-1232 Peak 5	1000 ug/mL
..AR_1262_RES_00012	04/22/19		RESTEK, Lot A0127459		(Purchased Reagent)		PCB-1262 Peak 1	1000 ug/mL
							PCB-1262 Peak 2	1000 ug/mL
							PCB-1262 Peak 3	1000 ug/mL
							PCB-1262 Peak 4	1000 ug/mL
							PCB-1262 Peak 5	1000 ug/mL
AR_3262_L5_00020	10/22/18	04/22/18	Hexane, Lot 475756	10 mL	AR_3262_L7_00016	5 mL	PCB-1232 Peak 1	0.5 ug/mL
							PCB-1232 Peak 2	0.5 ug/mL
							PCB-1232 Peak 3	0.5 ug/mL
							PCB-1232 Peak 4	0.5 ug/mL
							PCB-1232 Peak 5	0.5 ug/mL
							PCB-1262 Peak 1	0.5 ug/mL
							PCB-1262 Peak 2	0.5 ug/mL
							PCB-1262 Peak 3	0.5 ug/mL
							PCB-1262 Peak 4	0.5 ug/mL
							PCB-1262 Peak 5	0.5 ug/mL
.AR_3262_L7_00016	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1232_RES_00012	100 uL	PCB-1232 Peak 1	1 ug/mL
							PCB-1232 Peak 2	1 ug/mL
							PCB-1232 Peak 3	1 ug/mL
							PCB-1232 Peak 4	1 ug/mL
							PCB-1232 Peak 5	1 ug/mL
					AR_1262_RES_00012	100 uL	PCB-1262 Peak 1	1 ug/mL
							PCB-1262 Peak 2	1 ug/mL
							PCB-1262 Peak 3	1 ug/mL
							PCB-1262 Peak 4	1 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							PCB-1262 Peak 5	1 ug/mL
..AR_1232_RES_00012	04/22/19		RESTEK, Lot A0124543		(Purchased Reagent)		PCB-1232 Peak 1	1000 ug/mL
							PCB-1232 Peak 2	1000 ug/mL
							PCB-1232 Peak 3	1000 ug/mL
							PCB-1232 Peak 4	1000 ug/mL
							PCB-1232 Peak 5	1000 ug/mL
..AR_1262_RES_00012	04/22/19		RESTEK, Lot A0127459		(Purchased Reagent)		PCB-1262 Peak 1	1000 ug/mL
							PCB-1262 Peak 2	1000 ug/mL
							PCB-1262 Peak 3	1000 ug/mL
							PCB-1262 Peak 4	1000 ug/mL
							PCB-1262 Peak 5	1000 ug/mL
AR_3262_L6_00018	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_3262_L7_00016	7.5 mL	PCB-1232 Peak 1	0.75 ug/mL
							PCB-1232 Peak 2	0.75 ug/mL
							PCB-1232 Peak 3	0.75 ug/mL
							PCB-1232 Peak 4	0.75 ug/mL
							PCB-1232 Peak 5	0.75 ug/mL
							PCB-1262 Peak 1	0.75 ug/mL
							PCB-1262 Peak 2	0.75 ug/mL
							PCB-1262 Peak 3	0.75 ug/mL
							PCB-1262 Peak 4	0.75 ug/mL
							PCB-1262 Peak 5	0.75 ug/mL
.AR_3262_L7_00016	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1232_RES_00012	100 uL	PCB-1232 Peak 1	1 ug/mL
							PCB-1232 Peak 2	1 ug/mL
							PCB-1232 Peak 3	1 ug/mL
							PCB-1232 Peak 4	1 ug/mL
							PCB-1232 Peak 5	1 ug/mL
					AR_1262_RES_00012	100 uL	PCB-1262 Peak 1	1 ug/mL
							PCB-1262 Peak 2	1 ug/mL
							PCB-1262 Peak 3	1 ug/mL
							PCB-1262 Peak 4	1 ug/mL
							PCB-1262 Peak 5	1 ug/mL
..AR_1232_RES_00012	04/22/19		RESTEK, Lot A0124543		(Purchased Reagent)		PCB-1232 Peak 1	1000 ug/mL
							PCB-1232 Peak 2	1000 ug/mL
							PCB-1232 Peak 3	1000 ug/mL
							PCB-1232 Peak 4	1000 ug/mL
							PCB-1232 Peak 5	1000 ug/mL
..AR_1262_RES_00012	04/22/19		RESTEK, Lot A0127459		(Purchased Reagent)		PCB-1262 Peak 1	1000 ug/mL
							PCB-1262 Peak 2	1000 ug/mL
							PCB-1262 Peak 3	1000 ug/mL
							PCB-1262 Peak 4	1000 ug/mL
							PCB-1262 Peak 5	1000 ug/mL
AR_3262_L7_00016	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1232_RES_00012	100 uL	PCB-1232 Peak 1	1 ug/mL
							PCB-1232 Peak 2	1 ug/mL
							PCB-1232 Peak 3	1 ug/mL
							PCB-1232 Peak 4	1 ug/mL
							PCB-1232 Peak 5	1 ug/mL
					AR_1262_RES_00012	100 uL	PCB-1262 Peak 1	1 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							PCB-1262 Peak 2	1 ug/mL
							PCB-1262 Peak 3	1 ug/mL
							PCB-1262 Peak 4	1 ug/mL
							PCB-1262 Peak 5	1 ug/mL
.AR_1232_RES_00012	04/22/19		RESTEK, Lot A0124543		(Purchased Reagent)		PCB-1232 Peak 1	1000 ug/mL
							PCB-1232 Peak 2	1000 ug/mL
							PCB-1232 Peak 3	1000 ug/mL
							PCB-1232 Peak 4	1000 ug/mL
							PCB-1232 Peak 5	1000 ug/mL
.AR_1262_RES_00012	04/22/19		RESTEK, Lot A0127459		(Purchased Reagent)		PCB-1262 Peak 1	1000 ug/mL
							PCB-1262 Peak 2	1000 ug/mL
							PCB-1262 Peak 3	1000 ug/mL
							PCB-1262 Peak 4	1000 ug/mL
							PCB-1262 Peak 5	1000 ug/mL
AR_4268_ICV_00013	12/06/18	06/06/18	Hexane, Lot 186983	100 mL	AR_1242_RESss_00010	25 uL	PCB-1242	250 ng/mL
					AR_1268_RESss_00010	25 uL	PCB-1268	250 ng/mL
.AR_1242_RESss_00010	06/06/19		RESTEK, Lot A0105175		(Purchased Reagent)		PCB-1242	1000 ug/mL
.AR_1268_RESss_00010	06/06/19		RESTEK, Lot A095820		(Purchased Reagent)		PCB-1268	1000 ug/mL
AR_4268_L1_00020	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_4268_L7_00015	0.25 mL	PCB-1242 Peak 1	0.025 ug/mL
							PCB-1242 Peak 2	0.025 ug/mL
							PCB-1242 Peak 3	0.025 ug/mL
							PCB-1242 Peak 4	0.025 ug/mL
							PCB-1242 Peak 5	0.025 ug/mL
							PCB-1268 Peak 1	0.025 ug/mL
							PCB-1268 Peak 2	0.025 ug/mL
							PCB-1268 Peak 3	0.025 ug/mL
							PCB-1268 Peak 4	0.025 ug/mL
							PCB-1268 Peak 5	0.025 ug/mL
.AR_4268_L7_00015	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1242_RES_00011	100 uL	PCB-1242 Peak 1	1 ug/mL
							PCB-1242 Peak 2	1 ug/mL
							PCB-1242 Peak 3	1 ug/mL
							PCB-1242 Peak 4	1 ug/mL
							PCB-1242 Peak 5	1 ug/mL
					AR_1268_RES_00011	100 uL	PCB-1268 Peak 1	1 ug/mL
							PCB-1268 Peak 2	1 ug/mL
							PCB-1268 Peak 3	1 ug/mL
							PCB-1268 Peak 4	1 ug/mL
							PCB-1268 Peak 5	1 ug/mL
..AR_1242_RES_00011	04/22/19		RESTEK, Lot A0124535		(Purchased Reagent)		PCB-1242 Peak 1	1000 ug/mL
							PCB-1242 Peak 2	1000 ug/mL
							PCB-1242 Peak 3	1000 ug/mL
							PCB-1242 Peak 4	1000 ug/mL
							PCB-1242 Peak 5	1000 ug/mL
..AR_1268_RES_00011	04/22/19		RESTEK, Lot A0124544		(Purchased Reagent)		PCB-1268 Peak 1	1000 ug/mL
							PCB-1268 Peak 2	1000 ug/mL
							PCB-1268 Peak 3	1000 ug/mL
							PCB-1268 Peak 4	1000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							PCB-1268 Peak 5	1000 ug/mL
AR_4268_L2_00019	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_4268_L7_00015	0.5 mL	PCB-1242 Peak 1	0.05 ug/mL
							PCB-1242 Peak 2	0.05 ug/mL
							PCB-1242 Peak 3	0.05 ug/mL
							PCB-1242 Peak 4	0.05 ug/mL
							PCB-1242 Peak 5	0.05 ug/mL
							PCB-1268 Peak 1	0.05 ug/mL
							PCB-1268 Peak 2	0.05 ug/mL
							PCB-1268 Peak 3	0.05 ug/mL
							PCB-1268 Peak 4	0.05 ug/mL
							PCB-1268 Peak 5	0.05 ug/mL
.AR_4268_L7_00015	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1242_RES_00011	100 uL	PCB-1242 Peak 1	1 ug/mL
							PCB-1242 Peak 2	1 ug/mL
							PCB-1242 Peak 3	1 ug/mL
							PCB-1242 Peak 4	1 ug/mL
							PCB-1242 Peak 5	1 ug/mL
					AR_1268_RES_00011	100 uL	PCB-1268 Peak 1	1 ug/mL
							PCB-1268 Peak 2	1 ug/mL
							PCB-1268 Peak 3	1 ug/mL
							PCB-1268 Peak 4	1 ug/mL
							PCB-1268 Peak 5	1 ug/mL
..AR_1242_RES_00011	04/22/19		RESTEK, Lot A0124535		(Purchased Reagent)		PCB-1242 Peak 1	1000 ug/mL
							PCB-1242 Peak 2	1000 ug/mL
							PCB-1242 Peak 3	1000 ug/mL
							PCB-1242 Peak 4	1000 ug/mL
							PCB-1242 Peak 5	1000 ug/mL
..AR_1268_RES_00011	04/22/19		RESTEK, Lot A0124544		(Purchased Reagent)		PCB-1268 Peak 1	1000 ug/mL
							PCB-1268 Peak 2	1000 ug/mL
							PCB-1268 Peak 3	1000 ug/mL
							PCB-1268 Peak 4	1000 ug/mL
							PCB-1268 Peak 5	1000 ug/mL
AR_4268_L3_00019	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_4268_L7_00015	1 mL	PCB-1242 Peak 1	0.1 ug/mL
							PCB-1242 Peak 2	0.1 ug/mL
							PCB-1242 Peak 3	0.1 ug/mL
							PCB-1242 Peak 4	0.1 ug/mL
							PCB-1242 Peak 5	0.1 ug/mL
							PCB-1268 Peak 1	0.1 ug/mL
							PCB-1268 Peak 2	0.1 ug/mL
							PCB-1268 Peak 3	0.1 ug/mL
							PCB-1268 Peak 4	0.1 ug/mL
							PCB-1268 Peak 5	0.1 ug/mL
.AR_4268_L7_00015	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1242_RES_00011	100 uL	PCB-1242 Peak 1	1 ug/mL
							PCB-1242 Peak 2	1 ug/mL
							PCB-1242 Peak 3	1 ug/mL
							PCB-1242 Peak 4	1 ug/mL
							PCB-1242 Peak 5	1 ug/mL
					AR_1268_RES_00011	100 uL	PCB-1268 Peak 1	1 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							PCB-1268 Peak 2	1 ug/mL
							PCB-1268 Peak 3	1 ug/mL
							PCB-1268 Peak 4	1 ug/mL
							PCB-1268 Peak 5	1 ug/mL
..AR_1242_RES_00011	04/22/19		RESTEK, Lot A0124535		(Purchased Reagent)		PCB-1242 Peak 1	1000 ug/mL
							PCB-1242 Peak 2	1000 ug/mL
							PCB-1242 Peak 3	1000 ug/mL
							PCB-1242 Peak 4	1000 ug/mL
							PCB-1242 Peak 5	1000 ug/mL
..AR_1268_RES_00011	04/22/19		RESTEK, Lot A0124544		(Purchased Reagent)		PCB-1268 Peak 1	1000 ug/mL
							PCB-1268 Peak 2	1000 ug/mL
							PCB-1268 Peak 3	1000 ug/mL
							PCB-1268 Peak 4	1000 ug/mL
							PCB-1268 Peak 5	1000 ug/mL
AR_4268_L4_00022	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_4268_L7_00015	2.5 mL	PCB-1242 Peak 1	0.25 ug/mL
							PCB-1242 Peak 2	0.25 ug/mL
							PCB-1242 Peak 3	0.25 ug/mL
							PCB-1242 Peak 4	0.25 ug/mL
							PCB-1242 Peak 5	0.25 ug/mL
							PCB-1268 Peak 1	0.25 ug/mL
							PCB-1268 Peak 2	0.25 ug/mL
							PCB-1268 Peak 3	0.25 ug/mL
							PCB-1268 Peak 4	0.25 ug/mL
							PCB-1268 Peak 5	0.25 ug/mL
.AR_4268_L7_00015	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1242_RES_00011	100 uL	PCB-1242 Peak 1	1 ug/mL
							PCB-1242 Peak 2	1 ug/mL
							PCB-1242 Peak 3	1 ug/mL
							PCB-1242 Peak 4	1 ug/mL
							PCB-1242 Peak 5	1 ug/mL
					AR_1268_RES_00011	100 uL	PCB-1268 Peak 1	1 ug/mL
							PCB-1268 Peak 2	1 ug/mL
							PCB-1268 Peak 3	1 ug/mL
							PCB-1268 Peak 4	1 ug/mL
							PCB-1268 Peak 5	1 ug/mL
..AR_1242_RES_00011	04/22/19		RESTEK, Lot A0124535		(Purchased Reagent)		PCB-1242 Peak 1	1000 ug/mL
							PCB-1242 Peak 2	1000 ug/mL
							PCB-1242 Peak 3	1000 ug/mL
							PCB-1242 Peak 4	1000 ug/mL
							PCB-1242 Peak 5	1000 ug/mL
..AR_1268_RES_00011	04/22/19		RESTEK, Lot A0124544		(Purchased Reagent)		PCB-1268 Peak 1	1000 ug/mL
							PCB-1268 Peak 2	1000 ug/mL
							PCB-1268 Peak 3	1000 ug/mL
							PCB-1268 Peak 4	1000 ug/mL
							PCB-1268 Peak 5	1000 ug/mL
AR_4268_L5_00020	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_4268_L7_00015	5 mL	PCB-1242 Peak 1	0.5 ug/mL
							PCB-1242 Peak 2	0.5 ug/mL
							PCB-1242 Peak 3	0.5 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							PCB-1242 Peak 4	0.5 ug/mL
							PCB-1242 Peak 5	0.5 ug/mL
							PCB-1268 Peak 1	0.5 ug/mL
							PCB-1268 Peak 2	0.5 ug/mL
							PCB-1268 Peak 3	0.5 ug/mL
							PCB-1268 Peak 4	0.5 ug/mL
							PCB-1268 Peak 5	0.5 ug/mL
.AR_4268_L7_00015	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1242_RES_00011	100 uL	PCB-1242 Peak 1	1 ug/mL
							PCB-1242 Peak 2	1 ug/mL
							PCB-1242 Peak 3	1 ug/mL
							PCB-1242 Peak 4	1 ug/mL
							PCB-1242 Peak 5	1 ug/mL
					AR_1268_RES_00011	100 uL	PCB-1268 Peak 1	1 ug/mL
							PCB-1268 Peak 2	1 ug/mL
							PCB-1268 Peak 3	1 ug/mL
							PCB-1268 Peak 4	1 ug/mL
							PCB-1268 Peak 5	1 ug/mL
..AR_1242_RES_00011	04/22/19		RESTEK, Lot A0124535		(Purchased Reagent)		PCB-1242 Peak 1	1000 ug/mL
							PCB-1242 Peak 2	1000 ug/mL
							PCB-1242 Peak 3	1000 ug/mL
							PCB-1242 Peak 4	1000 ug/mL
							PCB-1242 Peak 5	1000 ug/mL
..AR_1268_RES_00011	04/22/19		RESTEK, Lot A0124544		(Purchased Reagent)		PCB-1268 Peak 1	1000 ug/mL
							PCB-1268 Peak 2	1000 ug/mL
							PCB-1268 Peak 3	1000 ug/mL
							PCB-1268 Peak 4	1000 ug/mL
							PCB-1268 Peak 5	1000 ug/mL
AR_4268_L6_00017	10/22/18	04/22/18	Hexane, Lot 175756	10 mL	AR_4268_L7_00015	7.5 mL	PCB-1242 Peak 1	0.75 ug/mL
							PCB-1242 Peak 2	0.75 ug/mL
							PCB-1242 Peak 3	0.75 ug/mL
							PCB-1242 Peak 4	0.75 ug/mL
							PCB-1242 Peak 5	0.75 ug/mL
							PCB-1268 Peak 1	0.75 ug/mL
							PCB-1268 Peak 2	0.75 ug/mL
							PCB-1268 Peak 3	0.75 ug/mL
							PCB-1268 Peak 4	0.75 ug/mL
							PCB-1268 Peak 5	0.75 ug/mL
.AR_4268_L7_00015	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1242_RES_00011	100 uL	PCB-1242 Peak 1	1 ug/mL
							PCB-1242 Peak 2	1 ug/mL
							PCB-1242 Peak 3	1 ug/mL
							PCB-1242 Peak 4	1 ug/mL
							PCB-1242 Peak 5	1 ug/mL
					AR_1268_RES_00011	100 uL	PCB-1268 Peak 1	1 ug/mL
							PCB-1268 Peak 2	1 ug/mL
							PCB-1268 Peak 3	1 ug/mL
							PCB-1268 Peak 4	1 ug/mL
							PCB-1268 Peak 5	1 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
..AR_1242_RES_00011	04/22/19		RESTEK, Lot A0124535		(Purchased Reagent)		PCB-1242 Peak 1	1000 ug/mL
							PCB-1242 Peak 2	1000 ug/mL
							PCB-1242 Peak 3	1000 ug/mL
							PCB-1242 Peak 4	1000 ug/mL
							PCB-1242 Peak 5	1000 ug/mL
..AR_1268_RES_00011	04/22/19		RESTEK, Lot A0124544		(Purchased Reagent)		PCB-1268 Peak 1	1000 ug/mL
							PCB-1268 Peak 2	1000 ug/mL
							PCB-1268 Peak 3	1000 ug/mL
							PCB-1268 Peak 4	1000 ug/mL
							PCB-1268 Peak 5	1000 ug/mL
AR_4268_L7_00015	10/22/18	04/22/18	Hexane, Lot 175756	100 mL	AR_1242_RES_00011	100 uL	PCB-1242 Peak 1	1 ug/mL
							PCB-1242 Peak 2	1 ug/mL
							PCB-1242 Peak 3	1 ug/mL
							PCB-1242 Peak 4	1 ug/mL
							PCB-1242 Peak 5	1 ug/mL
					AR_1268_RES_00011	100 uL	PCB-1268 Peak 1	1 ug/mL
							PCB-1268 Peak 2	1 ug/mL
							PCB-1268 Peak 3	1 ug/mL
							PCB-1268 Peak 4	1 ug/mL
							PCB-1268 Peak 5	1 ug/mL
.AR_1242_RES_00011	04/22/19		RESTEK, Lot A0124535		(Purchased Reagent)		PCB-1242 Peak 1	1000 ug/mL
							PCB-1242 Peak 2	1000 ug/mL
							PCB-1242 Peak 3	1000 ug/mL
							PCB-1242 Peak 4	1000 ug/mL
							PCB-1242 Peak 5	1000 ug/mL
.AR_1268_RES_00011	04/22/19		RESTEK, Lot A0124544		(Purchased Reagent)		PCB-1268 Peak 1	1000 ug/mL
							PCB-1268 Peak 2	1000 ug/mL
							PCB-1268 Peak 3	1000 ug/mL
							PCB-1268 Peak 4	1000 ug/mL
							PCB-1268 Peak 5	1000 ug/mL
BNB IS_00012	01/26/19	07/26/18	Hexane, Lot 190112	100 mL	BNB 10000ppb_00008	10 mL	1-Bromo-2-nitrobenzene	1000 ng/mL
.BNB 10000ppb_00008	01/26/19	07/26/18	Hexane, Lot 190112	100 mL	BNB stock_00015	1 mL	1-Bromo-2-nitrobenzene	10000 ng/mL
..BNB stock_00015	07/26/19		Restek, Lot A0127264		(Purchased Reagent)		1-Bromo-2-nitrobenzene	1000 ug/mL
CN 10ppm_00305	07/24/18	07/17/18	2% NaOH, Lot 1% NaOH_00322	100 mg/L	CN CAL Std_00060	1 mL	Cyanide, Amenable	10 mg/L
							Cyanide, Free	10 mg/L
							Cyanide, Non-amenable	10 mg/L
							Cyanide, Total	10 mg/L
							Cyanide, Weak Acid Dissociable	10 mg/L
.CN CAL Std_00060	07/31/18		Ricca, Lot 1801H28		(Purchased Reagent)		Cyanide, Amenable	1000 mg/L
							Cyanide, Free	1000 mg/L
							Cyanide, Non-amenable	1000 mg/L
							Cyanide, Total	1000 mg/L
							Cyanide, Weak Acid Dissociable	1000 mg/L
CN CAL 1 ppm_01403	07/24/18	07/24/18	1% NaOH, Lot N/A	100 mL	CN 10ppm_00305	10 mL	Cyanide, Total	1 mg/L
.CN 10ppm_00305	07/24/18	07/17/18	2% NaOH, Lot 1% NaOH_00322	100 mg/L	CN CAL Std_00060	1 mL	Cyanide, Total	10 mg/L

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
..CN CAL Std_00060	07/31/18	Ricca, Lot 1801H28			(Purchased Reagent)		Cyanide, Total	1000 mg/L
CN ICV Daily_01169	07/24/18	07/24/18	1% HNO3, Lot N/A	100 mL	CN ICV Int_00493	1 mL	Cyanide, Total	0.1 mg/L
.CN ICV Int_00493	07/24/18	07/17/18	1% NaOH, Lot 1% NaOH_00322	100 mL	CN ICV Std_00050	1 mL	Cyanide, Total	10 mg/L
..CN ICV Std_00050	07/30/18	SPEX, Lot 13-60YPX			(Purchased Reagent)		Cyanide, Total	1000 mg/L
CN ICV Int_00493	07/24/18	07/17/18	1% NaOH, Lot 1% NaOH_00322	100 mL	CN ICV Std_00050	1 mL	Cyanide, Amenable	10 mg/L
							Cyanide, Free	10 mg/L
							Cyanide, Non-amenable	0 mg/L
							Cyanide, Total	10 mg/L
							Cyanide, Weak Acid Dissociable	10 mg/L
.CN ICV Std_00050	07/30/18	SPEX, Lot 13-60YPX			(Purchased Reagent)		Cyanide, Amenable	1000 mg/L
							Cyanide, Free	1000 mg/L
							Cyanide, Non-amenable	0 mg/L
							Cyanide, Total	1000 mg/L
							Cyanide, Weak Acid Dissociable	1000 mg/L
Hg Biwk ICV_00253	08/06/18	07/23/18	1% HNO3, Lot K23022	100 mL	Hg ICV Stock_00010	0.4 mL	Mercury	0.4 mg/L
.Hg ICV Stock_00010	03/05/19	Inorganic Ventures, Lot H2-HG02113R			(Purchased Reagent)		Mercury	100 mg/L
Hg Daily Spk_02209	07/26/18	07/25/18	1% HNO3, Lot K23022	100 mL	Hg Mnth Spike_00130	1 mL	Mercury	0.1 mg/L
.Hg Mnth Spike_00130	08/09/18	07/09/18	1% HNO3, Lot K23022	100 mL	Hg Ultra Prim_00012	1 mL	Mercury	10 mg/L
..Hg Ultra Prim_00012	03/09/19	Ultra Scientific, Lot T00602			(Purchased Reagent)		Mercury	1000 mg/L
ICP CCV_00334	11/09/18	07/19/18	5%/5% HCL/HNO3, Lot SEE LOGBOOK	500 mL	ICP ICAL1A_00795	250 mL	Arsenic	1 mg/L
							Lead	1 mg/L
							Selenium	1 mg/L
							Barium	0.5 mg/L
							Cadmium	0.5 mg/L
							Chromium	0.5 mg/L
							Silver	0.5 mg/L
.ICP ICAL1A_00795	11/09/18	07/19/18	5%/5% HCL/HNO3, Lot SEE LOGBOOK	1000 mL	1000 As_00020	2 mL	Arsenic	2 mg/L
					1000 Pb_00023	2 mL	Lead	2 mg/L
					1000 Se_00018	2 mL	Selenium	2 mg/L
					Icp cal std 3_00017	10 mL	Barium	1 mg/L
							Cadmium	1 mg/L
							Chromium	1 mg/L
							Silver	1 mg/L
..1000 As_00020	05/04/19	Inorganic Venture, Lot M2-AS657780			(Purchased Reagent)		Arsenic	1000 mg/L
..1000 Pb_00023	06/19/19	Inorganic Ventures, Lot M2-PB656988			(Purchased Reagent)		Lead	1000 mg/L
..1000 Se_00018	11/09/18	Inorganic Ventures, Lot M2-SE02058R			(Purchased Reagent)		Selenium	1000 mg/L
..Icp cal std 3_00017	11/13/18	Inorganic Ventures, Lot K2-MEB652538			(Purchased Reagent)		Barium	100 mg/L
							Cadmium	100 mg/L
							Chromium	100 mg/L
							Silver	100 mg/L
ICP ICSA_00167	02/14/19	07/11/18	5%/5% HCL/HNO3, Lot SEE LOGBOOK	250 mL	Icp stk ICSA_00023	25 mL	Al	500 mg/L

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Ca	500 mg/L
							Fe	200 mg/L
							Mg	500 mg/L
.Icp stk ICSA_00023	02/14/19	Inorganic Ventures, Lot K2-MEB643109			(Purchased Reagent)		Al	5000 mg/L
							Ca	5000 mg/L
							Fe	2000 mg/L
							Mg	5000 mg/L
ICP ICSAB_00187	10/13/18	07/24/18	5%/5% HCL/HNO3, Lot SEE LOGBOOK	250 mL	1000 Zr_00016	0.25 mL	Zr	1 mg/L
					10000 Si_00014	0.25 mL	Si	10 mg/L
					10000 Th_00017	0.05 mL	Th	2 mg/L
					ANALYTES B_00014	2.5 mL	Barium	0.5 mg/L
							Be	0.5 mg/L
							Cadmium	1 mg/L
							Chromium	0.5 mg/L
							Co	0.5 mg/L
							Cu	0.5 mg/L
							Lead	1 mg/L
							Mn	0.5 mg/L
							Ni	1 mg/L
							Silver	1 mg/L
							V	0.5 mg/L
							Zn	1 mg/L
					ICP ISAB 1B_00011	2.5 mL	Tl	10 mg/L
					ICP ISAB STD1_00010	2.5 mL	Arsenic	2 mg/L
							B	2 mg/L
							K	50 mg/L
							Li	1 mg/L
							Mo	1 mg/L
							Na	50 mg/L
							P	2 mg/L
							Sb	1 mg/L
							Selenium	5 mg/L
							Sr	1 mg/L
					ICP ISAB STD2_00013	2.5 mL	Sn	10 mg/L
							Ti	1 mg/L
					Icp stk ICSA_00023	25 mL	Al	500 mg/L
							Ca	500 mg/L
							Fe	200 mg/L
							Mg	500 mg/L
.1000 Zr_00016	10/13/18	Inorganic Ventures, Lot K2-ZR01106			(Purchased Reagent)		Zr	1000 mg/L
.10000 Si_00014	11/08/18	Inorganic ventures, Lot J2-SI03056			(Purchased Reagent)		Si	10000 mg/L
.10000 Th_00017	12/22/18	Inorganic Ventures, Lot k2-TH01117			(Purchased Reagent)		Th	10000 mg/L
.ANALYTES B_00014	04/01/19	SPEX, Lot 5-177MKBY			(Purchased Reagent)		Barium	50 mg/L
							Be	50 mg/L
							Cadmium	100 mg/L
							Chromium	50 mg/L
							Co	50 mg/L

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Cu	50 mg/L
							Lead	100 mg/L
							Mn	50 mg/L
							Ni	100 mg/L
							Silver	100 mg/L
							V	50 mg/L
							Zn	100 mg/L
.ICP ISAB 1B_00011	12/01/18		High Purity, Lot 1734922		(Purchased Reagent)		Tl	1000 mg/L
.ICP ISAB STD1_00010	12/01/18		High Purity, Lot 1734921		(Purchased Reagent)		Arsenic	200 mg/L
							B	200 mg/L
							K	5000 mg/L
							Li	100 mg/L
							Mo	100 mg/L
							Na	5000 mg/L
							P	200 mg/L
							Sb	100 mg/L
							Selenium	500 mg/L
							Sr	100 mg/L
.ICP ISAB STD2_00013	01/03/19		High Purity, Lot 1721944		(Purchased Reagent)		Sn	1000 mg/L
							Ti	100 mg/L
.Icp stk ICSA_00023	02/14/19		Inorganic Ventures, Lot K2-MEB643109		(Purchased Reagent)		Al	5000 mg/L
							Ca	5000 mg/L
							Fe	2000 mg/L
							Mg	5000 mg/L
ICP ICV_00599	10/01/18	07/26/18	5%HNO3/5% HCl, Lot SEE LOGBOOK	100 mL	Icp ICVL A_00013	1 mL	Arsenic	0.25 ppm
							Barium	0.25 ppm
							Cadmium	0.25 ppm
							Chromium	0.25 ppm
							Lead	0.25 ppm
							Selenium	0.5 ppm
					Icp ICVL B_00015	1 mL	Silver	0.25 ppm
.Icp ICVL A_00013	10/01/18		High Purity, Lot 1729362		(Purchased Reagent)		Arsenic	25 mg/L
							Barium	25 mg/L
							Cadmium	25 mg/L
							Chromium	25 mg/L
							Lead	25 mg/L
							Selenium	50 mg/L
.Icp ICVL B_00015	10/01/18		HIGH PURITY, Lot 1706610		(Purchased Reagent)		Silver	25 mg/L
ICP LLCCV_02311	07/27/18	07/26/18	5%HNO3/5% HCl, Lot SEE LOGBOOK	100 mL	ICP LLCCV-4_00006	1 mL	Arsenic	15 ppb
							Barium	10 ppb
							Cadmium	5 ppb
							Chromium	10 ppb
							Lead	9 ppb
							Selenium	20 ppb
							Silver	10 ppb

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
.ICP LLCCV-4_00006	06/08/19	Inorganic Ventures, Lot M2-MEB665287			(Purchased Reagent)		Arsenic	1.5 mg/L
							Barium	1 mg/L
							Cadmium	0.5 mg/L
							Chromium	1 mg/L
							Lead	0.9 mg/L
							Selenium	2 mg/L
							Silver	1 mg/L
ICP PDS 1_00025	06/16/19	Inorganic Ventures, Lot M2-MEB659764			(Purchased Reagent)		Arsenic	20 mg/L
							Barium	10 mg/L
							Cadmium	5 mg/L
							Chromium	5 mg/L
							Lead	10 mg/L
							Selenium	20 mg/L
							Silver	5 mg/L
ICP SPK 2B_00077	07/03/19	Inorganic Ventures, Lot M2-MEB665203			(Purchased Reagent)		B	100 mg/L
							Mo	100 mg/L
							Sb	50 mg/L
							Si	1000 mg/L
							SiO2	2140 mg/L
							Sn	200 mg/L
							Sulfur	200 mg/L
							Ti	100 mg/L
							Zr	50 mg/L
ICP SPK 3A_00149	07/10/19	Inorganic Ventures, Lot N2-MEB668028			(Purchased Reagent)		Al	200 mg/L
							Arsenic	100 mg/L
							Barium	200 mg/L
							Be	5 mg/L
							Bi	200 mg/L
							Ca	5000 mg/L
							Cadmium	10 mg/L
							Chromium	20 mg/L
							Co	50 mg/L
							Cu	25 mg/L
							Fe	100 mg/L
							K	5000 mg/L
							Lead	50 mg/L
							Li	100 mg/L
							Mg	5000 mg/L
							Mn	50 mg/L
							Na	5000 mg/L
							Ni	50 mg/L
							P	1000 mg/L
							Selenium	200 mg/L
							Silver	5 mg/L
							Sr	100 mg/L
							Th	100 mg/L
							Tl	200 mg/L

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							U	200 mg/L
							V	50 mg/L
							Zn	50 mg/L
MS-AFCACCV080_00073	11/30/18	06/23/18	Methylene Chloride, Lot 187286	0.5 mL	MS-IS_00014	50 uL	1,4-Dichlorobenzene-d4	40 ug/mL
							Acenaphthene-d10	40 ug/mL
							Chrysene-d12	40 ug/mL
							Naphthalene-d8	40 ug/mL
							Perylene-d12	40 ug/mL
							Phenanthrene-d10	40 ug/mL
.MS-IS_00014	04/04/19	04/04/18	Methylene Chloride, Lot 181545	250 mL	MS-567684_00019	5 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
					MS-567684_00020	45 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
..MS-567684_00019	07/31/20	Restek, Lot A0112833			(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
..MS-567684_00020	08/31/22	Restek, Lot A0129635			(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
MS-BZHDA-CCV_00046	11/30/18	06/07/18	Methylene Chloride, Lot 187286	0.5 mL	MS-IS_00014	50 uL	1,4-Dichlorobenzene-d4	40 ug/mL
							Acenaphthene-d10	40 ug/mL
							Chrysene-d12	40 ug/mL
							Naphthalene-d8	40 ug/mL
							Perylene-d12	40 ug/mL
							Phenanthrene-d10	40 ug/mL
.MS-IS_00014	04/04/19	04/04/18	Methylene Chloride, Lot 181545	250 mL	MS-567684_00019	5 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Phenanthrene-d10	400 ug/mL
					MS-567684_00020	45 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
..MS-567684_00019	07/31/20		Restek, Lot A0112833		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
..MS-567684_00020	08/31/22		Restek, Lot A0129635		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
MS-DFTPP_00046							Aramite, Total	
							Diallate	
							Isosafrole	
							Methyl Phenols,Total	
							Phthalic acid	
							Tentatively Identified Compound	
							Total Cresols	
							TPAH	
					MS-47548-U_00015	1 mL	4,4'-DDD	0.05 ug/mL
							4,4'-DDE	0.05 ug/mL
							4,4'-DDT	50 ug/mL
							Benzidine_T	50 ug/mL
							DFTPP	50 ug/mL
							Pentachlorophenol_T	50 ug/mL
.MS-47548-U_00015	03/31/19		Supelco, Lot XA19099V		(Purchased Reagent)		4,4'-DDD	1 ug/mL
							4,4'-DDE	1 ug/mL
							4,4'-DDT	1000 ug/mL
							Benzidine_T	1000 ug/mL
							DFTPP	1000 ug/mL
							Pentachlorophenol_T	1000 ug/mL
MS-HSLA004_00036	09/30/18	06/18/18	Methylene Chloride, Lot 187286	0.5 mL	MS-HSLA_STK_00042	10 uL	2,4,6 - Tribromophenol	4 ug/mL
							2,4,6-Tribromophenol	4 ug/mL
							2-Fluorobiphenyl	4 ug/mL
							2-Fluorophenol	4 ug/mL
							Nitrobenzene-d5	4 ug/mL
							Phenol-d5	4 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Terphenyl-d14	4 ug/mL
							Famphur	4 ug/mL
							2,3-Dichlorobenzenamine	4 ug/mL
							3,5-Dimethylphenol	4 ug/mL
							Alachlor	4 ug/mL
							Alpha Methyl Styrene	4 ug/mL
							Benzo[e]pyrene	4 ug/mL
							3,3'-Dichlorobenzidine	4 ug/mL
							Benzoic acid	8 ug/mL
							Indene	8 ug/mL
							Atrazine	4 ug/mL
							Caprolactam	4 ug/mL
							1,1'-Biphenyl	4 ug/mL
							1,2,4,5-Tetrachlorobenzene	4 ug/mL
							1,2,4-Trichlorobenzene	4 ug/mL
							1,2-Dichlorobenzene	4 ug/mL
							1,2-Diphenylhydrazine	4.0439 ug/mL
							1,3-Dichlorobenzene	4 ug/mL
							1,3-Dinitrobenzene	4 ug/mL
							1,4-Dichlorobenzene	4 ug/mL
							1,4-Dioxane	4 ug/mL
							1-Methylnaphthalene	4 ug/mL
							2,2'-oxybis[1-chloropropane]	4 ug/mL
							2,3,4,6-Tetrachlorophenol	4 ug/mL
							2,4,5-Trichlorophenol	4 ug/mL
							2,4,6-Trichlorophenol	4 ug/mL
							2,4-Dichlorophenol	4 ug/mL
							2,4-Dimethylphenol	4 ug/mL
							2,4-Dinitrophenol	8 ug/mL
							2,4-Dinitrotoluene	4 ug/mL
							2,6-Dichlorophenol	4 ug/mL
							2,6-Dinitrotoluene	4 ug/mL
							2-Chloronaphthalene	4 ug/mL
							2-Chlorophenol	4 ug/mL
							2-Methylnaphthalene	4 ug/mL
							2-Methylphenol	4 ug/mL
							2-Nitroaniline	4 ug/mL
							2-Nitrophenol	4 ug/mL
							3 & 4 Methylphenol	4 ug/mL
							3-Methylphenol	4 ug/mL
							3-Nitroaniline	4 ug/mL
							4,6-Dinitro-2-methylphenol	8 ug/mL
							4-Bromophenyl phenyl ether	4 ug/mL
							4-Chloro-3-methylphenol	4 ug/mL
							4-Chloroaniline	4 ug/mL
							4-Chlorophenyl phenyl ether	4 ug/mL
							4-Methylphenol	4 ug/mL
							4-Nitroaniline	4 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							4-Nitrophenol	8 ug/mL
							Acenaphthene	4 ug/mL
							Acenaphthylene	4 ug/mL
							Acetophenone	4 ug/mL
							Aniline	4 ug/mL
							Anthracene	4 ug/mL
							Azobenzene	4 ug/mL
							Benzo[a]anthracene	4 ug/mL
							Benzo[a]pyrene	4 ug/mL
							Benzo[b]fluoranthene	4 ug/mL
							Benzo[g,h,i]perylene	4 ug/mL
							Benzo[k]fluoranthene	4 ug/mL
							Benzyl alcohol	4 ug/mL
							Bis(2-chloroethoxy)methane	4 ug/mL
							Bis(2-chloroethyl)ether	4 ug/mL
							Bis(2-ethylhexyl) phthalate	4 ug/mL
							Butyl benzyl phthalate	4 ug/mL
							Carbazole	4 ug/mL
							Chrysene	4 ug/mL
							Di-n-butyl phthalate	4 ug/mL
							Di-n-octyl phthalate	4 ug/mL
							Dibenz(a,h)anthracene	4 ug/mL
							Dibenzofuran	4 ug/mL
							Diethyl phthalate	4 ug/mL
							Dimethyl phthalate	4 ug/mL
							Diphenylamine	3.4 ug/mL
							Fluoranthene	4 ug/mL
							Fluorene	4 ug/mL
							Hexachlorobenzene	4 ug/mL
							Hexachlorobutadiene	4 ug/mL
							Hexachlorocyclopentadiene	4 ug/mL
							Hexachloroethane	4 ug/mL
							Hexadecane	4 ug/mL
							Indeno[1,2,3-cd]pyrene	4 ug/mL
							Isophorone	4 ug/mL
							n-Decane	4 ug/mL
							N-Nitrosodi-n-propylamine	4 ug/mL
							N-Nitrosodimethylamine	4 ug/mL
							N-Nitrosodiphenylamine	4 ug/mL
							Naphthalene	4 ug/mL
							Nitrobenzene	4 ug/mL
							Pentachlorophenol	8 ug/mL
							Phenanthrene	4 ug/mL
							Phenol	4 ug/mL
							Pyrene	4 ug/mL
							Pyridine	8 ug/mL
					MS-IS_00014	50 uL	1,4-Dichlorobenzene-d4	40 ug/mL
							Acenaphthene-d10	40 ug/mL

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Chrysene-d12	40 ug/mL
							Naphthalene-d8	40 ug/mL
							Perylene-d12	40 ug/mL
							Phenanthrene-d10	40 ug/mL
.MS-HSLA_STK_00042	09/30/18	04/11/18	Methylene Chloride, Lot 181545	10 mL	MS-567685_00004	0.4 mL	2,4,6 - Tribromophenol	200 ug/mL
							2,4,6-Tribromophenol	200 ug/mL
							2-Fluorobiphenyl	200 ug/mL
							2-Fluorophenol	200 ug/mL
							Nitrobenzene-d5	200 ug/mL
							Phenol-d5	200 ug/mL
							Terphenyl-d14	200 ug/mL
					MS-568023_00042	1 mL	Famphur	200 ug/mL
					MS-568033_00026	0.5 mL	2,3-Dichlorobenzenamine	200 ug/mL
							3,5-Dimethylphenol	200 ug/mL
							Alachlor	200 ug/mL
							Alpha Methyl Styrene	200 ug/mL
							Benzo[e]pyrene	200 ug/mL
					MS-569730 HSL_00007	1 mL	3,3'-Dichlorobenzidine	200 ug/mL
					MS-569731_00079	2 mL	Benzoic acid	400 ug/mL
							Indene	400 ug/mL
					MS-569732 HSL_00005	1 mL	Atrazine	200 ug/mL
							Caprolactam	200 ug/mL
					MS-571995_00001	2 mL	1,1'-Biphenyl	200 ug/mL
							1,2,4,5-Tetrachlorobenzene	200 ug/mL
							1,2,4-Trichlorobenzene	200 ug/mL
							1,2-Dichlorobenzene	200 ug/mL
							1,2-Diphenylhydrazine	202.195 ug/mL
							1,3-Dichlorobenzene	200 ug/mL
							1,3-Dinitrobenzene	200 ug/mL
							1,4-Dichlorobenzene	200 ug/mL
							1,4-Dioxane	200 ug/mL
							1-Methylnaphthalene	200 ug/mL
							2,2'-oxybis[1-chloropropane]	200 ug/mL
							2,3,4,6-Tetrachlorophenol	200 ug/mL
							2,4,5-Trichlorophenol	200 ug/mL
							2,4,6-Trichlorophenol	200 ug/mL
							2,4-Dichlorophenol	200 ug/mL
							2,4-Dimethylphenol	200 ug/mL
							2,4-Dinitrophenol	400 ug/mL
							2,4-Dinitrotoluene	200 ug/mL
							2,6-Dichlorophenol	200 ug/mL
							2,6-Dinitrotoluene	200 ug/mL
							2-Chloronaphthalene	200 ug/mL
							2-Chlorophenol	200 ug/mL
							2-Methylnaphthalene	200 ug/mL
							2-Methylphenol	200 ug/mL
							2-Nitroaniline	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							2-Nitrophenol	200 ug/mL
							3 & 4 Methylphenol	200 ug/mL
							3-Methylphenol	200 ug/mL
							3-Nitroaniline	200 ug/mL
							4,6-Dinitro-2-methylphenol	400 ug/mL
							4-Bromophenyl phenyl ether	200 ug/mL
							4-Chloro-3-methylphenol	200 ug/mL
							4-Chloroaniline	200 ug/mL
							4-Chlorophenyl phenyl ether	200 ug/mL
							4-Methylphenol	200 ug/mL
							4-Nitroaniline	200 ug/mL
							4-Nitrophenol	400 ug/mL
							Acenaphthene	200 ug/mL
							Acenaphthylene	200 ug/mL
							Acetophenone	200 ug/mL
							Aniline	200 ug/mL
							Anthracene	200 ug/mL
							Azobenzene	200 ug/mL
							Benzo[a]anthracene	200 ug/mL
							Benzo[a]pyrene	200 ug/mL
							Benzo[b]fluoranthene	200 ug/mL
							Benzo[g,h,i]perylene	200 ug/mL
							Benzo[k]fluoranthene	200 ug/mL
							Benzyl alcohol	200 ug/mL
							Bis(2-chloroethoxy)methane	200 ug/mL
							Bis(2-chloroethyl)ether	200 ug/mL
							Bis(2-ethylhexyl) phthalate	200 ug/mL
							Butyl benzyl phthalate	200 ug/mL
							Carbazole	200 ug/mL
							Chrysene	200 ug/mL
							Di-n-butyl phthalate	200 ug/mL
							Di-n-octyl phthalate	200 ug/mL
							Dibenz(a,h)anthracene	200 ug/mL
							Dibenzofuran	200 ug/mL
							Diethyl phthalate	200 ug/mL
							Dimethyl phthalate	200 ug/mL
							Diphenylamine	170 ug/mL
							Fluoranthene	200 ug/mL
							Fluorene	200 ug/mL
							Hexachlorobenzene	200 ug/mL
							Hexachlorobutadiene	200 ug/mL
							Hexachlorocyclopentadiene	200 ug/mL
							Hexachloroethane	200 ug/mL
							Hexadecane	200 ug/mL
							Indeno[1,2,3-cd]pyrene	200 ug/mL
							Isophorone	200 ug/mL
							n-Decane	200 ug/mL
							N-Nitrosodi-n-propylamine	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							N-Nitrosodimethylamine	200 ug/mL
							N-Nitrosodiphenylamine	200 ug/mL
							Naphthalene	200 ug/mL
							Nitrobenzene	200 ug/mL
							Pentachlorophenol	400 ug/mL
							Phenanthrene	200 ug/mL
							Phenol	200 ug/mL
							Pyrene	200 ug/mL
							Pyridine	400 ug/mL
..MS-567685_00004	01/30/19		Restek, Lot A0130500		(Purchased Reagent)		2,4,6 - Tribromophenol	5000 ug/mL
							2,4,6-Tribromophenol	5000 ug/mL
							2-Fluorobiphenyl	5000 ug/mL
							2-Fluorophenol	5000 ug/mL
							Nitrobenzene-d5	5000 ug/mL
							Phenol-d5	5000 ug/mL
							Terphenyl-d14	5000 ug/mL
..MS-568023_00042	05/31/19		Restek, Lot A0127668		(Purchased Reagent)		Famphur	2000 ug/mL
..MS-568033_00026	06/30/19		Restek, Lot A0133057		(Purchased Reagent)		2,3-Dichlorobenzenamine	4000 ug/mL
							3,5-Dimethylphenol	4000 ug/mL
							Alachlor	4000 ug/mL
							Alpha Methyl Styrene	4000 ug/mL
							Benzo[e]pyrene	4000 ug/mL
..MS-569730 HSL_00007	11/30/18		Restek, Lot A0127472		(Purchased Reagent)		3,3'-Dichlorobenzidine	2000 ug/mL
..MS-569731_00079	03/31/19		Restek, Lot A0130477		(Purchased Reagent)		Benzoic acid	2000 ug/mL
							Indene	2000 ug/mL
..MS-569732 HSL_00005	11/30/18		Restek, Lot A0127580		(Purchased Reagent)		Atrazine	2000 ug/mL
							Caprolactam	2000 ug/mL
..MS-571995_00001	09/30/18		Restek, Lot A0125805		(Purchased Reagent)		1,1'-Biphenyl	1000 ug/mL
							1,2,4,5-Tetrachlorobenzene	1000 ug/mL
							1,2,4-Trichlorobenzene	1000 ug/mL
							1,2-Dichlorobenzene	1000 ug/mL
							1,2-Diphenylhydrazine	1010.97 ug/mL
							1,3-Dichlorobenzene	1000 ug/mL
							1,3-Dinitrobenzene	1000 ug/mL
							1,4-Dichlorobenzene	1000 ug/mL
							1,4-Dioxane	1000 ug/mL
							1-Methylnaphthalene	1000 ug/mL
							2,2'-oxybis[1-chloropropane]	1000 ug/mL
							2,3,4,6-Tetrachlorophenol	1000 ug/mL
							2,4,5-Trichlorophenol	1000 ug/mL
							2,4,6-Trichlorophenol	1000 ug/mL
							2,4-Dichlorophenol	1000 ug/mL
							2,4-Dimethylphenol	1000 ug/mL
							2,4-Dinitrophenol	2000 ug/mL
							2,4-Dinitrotoluene	1000 ug/mL
							2,6-Dichlorophenol	1000 ug/mL
							2,6-Dinitrotoluene	1000 ug/mL
							2-Chloronaphthalene	1000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							2-Chlorophenol	1000 ug/mL
							2-Methylnaphthalene	1000 ug/mL
							2-Methylphenol	1000 ug/mL
							2-Nitroaniline	1000 ug/mL
							2-Nitrophenol	1000 ug/mL
							3 & 4 Methylphenol	1000 ug/mL
							3-Methylphenol	1000 ug/mL
							3-Nitroaniline	1000 ug/mL
							4,6-Dinitro-2-methylphenol	2000 ug/mL
							4-Bromophenyl phenyl ether	1000 ug/mL
							4-Chloro-3-methylphenol	1000 ug/mL
							4-Chloroaniline	1000 ug/mL
							4-Chlorophenyl phenyl ether	1000 ug/mL
							4-Methylphenol	1000 ug/mL
							4-Nitroaniline	1000 ug/mL
							4-Nitrophenol	2000 ug/mL
							Acenaphthene	1000 ug/mL
							Acenaphthylene	1000 ug/mL
							Acetophenone	1000 ug/mL
							Aniline	1000 ug/mL
							Anthracene	1000 ug/mL
							Azobenzene	1000 ug/mL
							Benzo[a]anthracene	1000 ug/mL
							Benzo[a]pyrene	1000 ug/mL
							Benzo[b]fluoranthene	1000 ug/mL
							Benzo[g,h,i]perylene	1000 ug/mL
							Benzo[k]fluoranthene	1000 ug/mL
							Benzyl alcohol	1000 ug/mL
							Bis(2-chloroethoxy)methane	1000 ug/mL
							Bis(2-chloroethyl)ether	1000 ug/mL
							Bis(2-ethylhexyl) phthalate	1000 ug/mL
							Butyl benzyl phthalate	1000 ug/mL
							Carbazole	1000 ug/mL
							Chrysene	1000 ug/mL
							Di-n-butyl phthalate	1000 ug/mL
							Di-n-octyl phthalate	1000 ug/mL
							Dibenz(a,h)anthracene	1000 ug/mL
							Dibenzofuran	1000 ug/mL
							Diethyl phthalate	1000 ug/mL
							Dimethyl phthalate	1000 ug/mL
							Diphenylamine	850 ug/mL
							Fluoranthene	1000 ug/mL
							Fluorene	1000 ug/mL
							Hexachlorobenzene	1000 ug/mL
							Hexachlorobutadiene	1000 ug/mL
							Hexachlorocyclopentadiene	1000 ug/mL
							Hexachloroethane	1000 ug/mL
							Hexadecane	1000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Indeno[1,2,3-cd]pyrene	1000 ug/mL
							Isophorone	1000 ug/mL
							n-Decane	1000 ug/mL
							N-Nitrosodi-n-propylamine	1000 ug/mL
							N-Nitrosodimethylamine	1000 ug/mL
							N-Nitrosodiphenylamine	1000 ug/mL
							Naphthalene	1000 ug/mL
							Nitrobenzene	1000 ug/mL
							Pentachlorophenol	2000 ug/mL
							Phenanthrene	1000 ug/mL
							Phenol	1000 ug/mL
							Pyrene	1000 ug/mL
							Pyridine	2000 ug/mL
.MS-IS_00014	04/04/19	04/04/18	Methylene Chloride, Lot 181545	250 mL	MS-567684_00019	5 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
					MS-567684_00020	45 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
..MS-567684_00019	07/31/20		Restek, Lot A0112833		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
..MS-567684_00020	08/31/22		Restek, Lot A0129635		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
MS-HSLA010_00036	09/30/18	06/18/18	Methylene Chloride, Lot 187286	0.5 mL	MS-HSLA_STK_00042	25 uL	2,4,6 - Tribromophenol	10 ug/mL
							2,4,6-Tribromophenol	10 ug/mL
							2-Fluorobiphenyl	10 ug/mL
							2-Fluorophenol	10 ug/mL
							Nitrobenzene-d5	10 ug/mL
							Phenol-d5	10 ug/mL
							Terphenyl-d14	10 ug/mL
							Famphur	10 ug/mL
							2,3-Dichlorobenzenamine	10 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							3,5-Dimethylphenol	10 ug/mL
							Alachlor	10 ug/mL
							Alpha Methyl Styrene	10 ug/mL
							Benzo[e]pyrene	10 ug/mL
							3,3'-Dichlorobenzidine	10 ug/mL
							Benzoic acid	20 ug/mL
							Indene	20 ug/mL
							Atrazine	10 ug/mL
							Caprolactam	10 ug/mL
							1,1'-Biphenyl	10 ug/mL
							1,2,4,5-Tetrachlorobenzene	10 ug/mL
							1,2,4-Trichlorobenzene	10 ug/mL
							1,2-Dichlorobenzene	10 ug/mL
							1,2-Diphenylhydrazine	10.1097 ug/mL
							1,3-Dichlorobenzene	10 ug/mL
							1,3-Dinitrobenzene	10 ug/mL
							1,4-Dichlorobenzene	10 ug/mL
							1,4-Dioxane	10 ug/mL
							1-Methylnaphthalene	10 ug/mL
							2,2'-oxybis[1-chloropropane]	10 ug/mL
							2,3,4,6-Tetrachlorophenol	10 ug/mL
							2,4,5-Trichlorophenol	10 ug/mL
							2,4,6-Trichlorophenol	10 ug/mL
							2,4-Dichlorophenol	10 ug/mL
							2,4-Dimethylphenol	10 ug/mL
							2,4-Dinitrophenol	20 ug/mL
							2,4-Dinitrotoluene	10 ug/mL
							2,6-Dichlorophenol	10 ug/mL
							2,6-Dinitrotoluene	10 ug/mL
							2-Chloronaphthalene	10 ug/mL
							2-Chlorophenol	10 ug/mL
							2-Methylnaphthalene	10 ug/mL
							2-Methylphenol	10 ug/mL
							2-Nitroaniline	10 ug/mL
							2-Nitrophenol	10 ug/mL
							3 & 4 Methylphenol	10 ug/mL
							3-Methylphenol	10 ug/mL
							3-Nitroaniline	10 ug/mL
							4,6-Dinitro-2-methylphenol	20 ug/mL
							4-Bromophenyl phenyl ether	10 ug/mL
							4-Chloro-3-methylphenol	10 ug/mL
							4-Chloroaniline	10 ug/mL
							4-Chlorophenyl phenyl ether	10 ug/mL
							4-Methylphenol	10 ug/mL
							4-Nitroaniline	10 ug/mL
							4-Nitrophenol	20 ug/mL
							Acenaphthene	10 ug/mL
							Acenaphthylene	10 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Acetophenone	10 ug/mL
							Aniline	10 ug/mL
							Anthracene	10 ug/mL
							Azobenzene	10 ug/mL
							Benzo[a]anthracene	10 ug/mL
							Benzo[a]pyrene	10 ug/mL
							Benzo[b]fluoranthene	10 ug/mL
							Benzo[g,h,i]perylene	10 ug/mL
							Benzo[k]fluoranthene	10 ug/mL
							Benzyl alcohol	10 ug/mL
							Bis(2-chloroethoxy)methane	10 ug/mL
							Bis(2-chloroethyl)ether	10 ug/mL
							Bis(2-ethylhexyl) phthalate	10 ug/mL
							Butyl benzyl phthalate	10 ug/mL
							Carbazole	10 ug/mL
							Chrysene	10 ug/mL
							Di-n-butyl phthalate	10 ug/mL
							Di-n-octyl phthalate	10 ug/mL
							Dibenz(a,h)anthracene	10 ug/mL
							Dibenzofuran	10 ug/mL
							Diethyl phthalate	10 ug/mL
							Dimethyl phthalate	10 ug/mL
							Diphenylamine	8.5 ug/mL
							Fluoranthene	10 ug/mL
							Fluorene	10 ug/mL
							Hexachlorobenzene	10 ug/mL
							Hexachlorobutadiene	10 ug/mL
							Hexachlorocyclopentadiene	10 ug/mL
							Hexachloroethane	10 ug/mL
							Hexadecane	10 ug/mL
							Indeno[1,2,3-cd]pyrene	10 ug/mL
							Isophorone	10 ug/mL
							n-Decane	10 ug/mL
							N-Nitrosodi-n-propylamine	10 ug/mL
							N-Nitrosodimethylamine	10 ug/mL
							N-Nitrosodiphenylamine	10 ug/mL
							Naphthalene	10 ug/mL
							Nitrobenzene	10 ug/mL
							Pentachlorophenol	20 ug/mL
							Phenanthrene	10 ug/mL
							Phenol	10 ug/mL
							Pyrene	10 ug/mL
							Pyridine	20 ug/mL
					MS-IS_00014	50 uL	1,4-Dichlorobenzene-d4	40 ug/mL
							Acenaphthene-d10	40 ug/mL
							Chrysene-d12	40 ug/mL
							Naphthalene-d8	40 ug/mL
							Perylene-d12	40 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Phenanthrene-d10	40 ug/mL
.MS-HSLA_STK_00042	09/30/18	04/11/18	Methylene Chloride, Lot 181545	10 mL	MS-567685_00004	0.4 mL	2,4,6 - Tribromophenol	200 ug/mL
							2,4,6-Tribromophenol	200 ug/mL
							2-Fluorobiphenyl	200 ug/mL
							2-Fluorophenol	200 ug/mL
							Nitrobenzene-d5	200 ug/mL
							Phenol-d5	200 ug/mL
							Terphenyl-d14	200 ug/mL
					MS-568023_00042	1 mL	Famphur	200 ug/mL
					MS-568033_00026	0.5 mL	2,3-Dichlorobenzenamine	200 ug/mL
							3,5-Dimethylphenol	200 ug/mL
							Alachlor	200 ug/mL
							Alpha Methyl Styrene	200 ug/mL
							Benzo[e]pyrene	200 ug/mL
					MS-569730 HSL_00007	1 mL	3,3'-Dichlorobenzidine	200 ug/mL
					MS-569731_00079	2 mL	Benzoic acid	400 ug/mL
							Indene	400 ug/mL
					MS-569732 HSL_00005	1 mL	Atrazine	200 ug/mL
							Caprolactam	200 ug/mL
					MS-571995_00001	2 mL	1,1'-Biphenyl	200 ug/mL
							1,2,4,5-Tetrachlorobenzene	200 ug/mL
							1,2,4-Trichlorobenzene	200 ug/mL
							1,2-Dichlorobenzene	200 ug/mL
							1,2-Diphenylhydrazine	202.195 ug/mL
							1,3-Dichlorobenzene	200 ug/mL
							1,3-Dinitrobenzene	200 ug/mL
							1,4-Dichlorobenzene	200 ug/mL
							1,4-Dioxane	200 ug/mL
							1-Methylnaphthalene	200 ug/mL
							2,2'-oxybis[1-chloropropane]	200 ug/mL
							2,3,4,6-Tetrachlorophenol	200 ug/mL
							2,4,5-Trichlorophenol	200 ug/mL
							2,4,6-Trichlorophenol	200 ug/mL
							2,4-Dichlorophenol	200 ug/mL
							2,4-Dimethylphenol	200 ug/mL
							2,4-Dinitrophenol	400 ug/mL
							2,4-Dinitrotoluene	200 ug/mL
							2,6-Dichlorophenol	200 ug/mL
							2,6-Dinitrotoluene	200 ug/mL
							2-Chloronaphthalene	200 ug/mL
							2-Chlorophenol	200 ug/mL
							2-Methylnaphthalene	200 ug/mL
							2-Methylphenol	200 ug/mL
							2-Nitroaniline	200 ug/mL
							2-Nitrophenol	200 ug/mL
							3 & 4 Methylphenol	200 ug/mL
							3-Methylphenol	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							3-Nitroaniline	200 ug/mL
							4,6-Dinitro-2-methylphenol	400 ug/mL
							4-Bromophenyl phenyl ether	200 ug/mL
							4-Chloro-3-methylphenol	200 ug/mL
							4-Chloroaniline	200 ug/mL
							4-Chlorophenyl phenyl ether	200 ug/mL
							4-Methylphenol	200 ug/mL
							4-Nitroaniline	200 ug/mL
							4-Nitrophenol	400 ug/mL
							Acenaphthene	200 ug/mL
							Acenaphthylene	200 ug/mL
							Acetophenone	200 ug/mL
							Aniline	200 ug/mL
							Anthracene	200 ug/mL
							Azobenzene	200 ug/mL
							Benzo[a]anthracene	200 ug/mL
							Benzo[a]pyrene	200 ug/mL
							Benzo[b]fluoranthene	200 ug/mL
							Benzo[g,h,i]perylene	200 ug/mL
							Benzo[k]fluoranthene	200 ug/mL
							Benzyl alcohol	200 ug/mL
							Bis(2-chloroethoxy)methane	200 ug/mL
							Bis(2-chloroethyl)ether	200 ug/mL
							Bis(2-ethylhexyl) phthalate	200 ug/mL
							Butyl benzyl phthalate	200 ug/mL
							Carbazole	200 ug/mL
							Chrysene	200 ug/mL
							Di-n-butyl phthalate	200 ug/mL
							Di-n-octyl phthalate	200 ug/mL
							Dibenz(a,h)anthracene	200 ug/mL
							Dibenzofuran	200 ug/mL
							Diethyl phthalate	200 ug/mL
							Dimethyl phthalate	200 ug/mL
							Diphenylamine	170 ug/mL
							Fluoranthene	200 ug/mL
							Fluorene	200 ug/mL
							Hexachlorobenzene	200 ug/mL
							Hexachlorobutadiene	200 ug/mL
							Hexachlorocyclopentadiene	200 ug/mL
							Hexachloroethane	200 ug/mL
							Hexadecane	200 ug/mL
							Indeno[1,2,3-cd]pyrene	200 ug/mL
							Isophorone	200 ug/mL
							n-Decane	200 ug/mL
							N-Nitrosodi-n-propylamine	200 ug/mL
							N-Nitrosodimethylamine	200 ug/mL
							N-Nitrosodiphenylamine	200 ug/mL
							Naphthalene	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Nitrobenzene	200 ug/mL
							Pentachlorophenol	400 ug/mL
							Phenanthrene	200 ug/mL
							Phenol	200 ug/mL
							Pyrene	200 ug/mL
							Pyridine	400 ug/mL
..MS-567685_00004	01/30/19		Restek, Lot A0130500		(Purchased Reagent)		2,4,6 - Tribromophenol	5000 ug/mL
							2,4,6-Tribromophenol	5000 ug/mL
							2-Fluorobiphenyl	5000 ug/mL
							2-Fluorophenol	5000 ug/mL
							Nitrobenzene-d5	5000 ug/mL
							Phenol-d5	5000 ug/mL
							Terphenyl-d14	5000 ug/mL
..MS-568023_00042	05/31/19		Restek, Lot A0127668		(Purchased Reagent)		Famphur	2000 ug/mL
..MS-568033_00026	06/30/19		Restek, Lot A0133057		(Purchased Reagent)		2,3-Dichlorobenzenamine	4000 ug/mL
							3,5-Dimethylphenol	4000 ug/mL
							Alachlor	4000 ug/mL
							Alpha Methyl Styrene	4000 ug/mL
							Benzo[e]pyrene	4000 ug/mL
..MS-569730 HSL_00007	11/30/18		Restek, Lot A0127472		(Purchased Reagent)		3,3'-Dichlorobenzidine	2000 ug/mL
..MS-569731_00079	03/31/19		Restek, Lot A0130477		(Purchased Reagent)		Benzoic acid	2000 ug/mL
							Indene	2000 ug/mL
..MS-569732 HSL_00005	11/30/18		Restek, Lot A0127580		(Purchased Reagent)		Atrazine	2000 ug/mL
							Caprolactam	2000 ug/mL
..MS-571995_00001	09/30/18		Restek, Lot A0125805		(Purchased Reagent)		1,1'-Biphenyl	1000 ug/mL
							1,2,4,5-Tetrachlorobenzene	1000 ug/mL
							1,2,4-Trichlorobenzene	1000 ug/mL
							1,2-Dichlorobenzene	1000 ug/mL
							1,2-Diphenylhydrazine	1010.97 ug/mL
							1,3-Dichlorobenzene	1000 ug/mL
							1,3-Dinitrobenzene	1000 ug/mL
							1,4-Dichlorobenzene	1000 ug/mL
							1,4-Dioxane	1000 ug/mL
							1-Methylnaphthalene	1000 ug/mL
							2,2'-oxybis[1-chloropropane]	1000 ug/mL
							2,3,4,6-Tetrachlorophenol	1000 ug/mL
							2,4,5-Trichlorophenol	1000 ug/mL
							2,4,6-Trichlorophenol	1000 ug/mL
							2,4-Dichlorophenol	1000 ug/mL
							2,4-Dimethylphenol	1000 ug/mL
							2,4-Dinitrophenol	2000 ug/mL
							2,4-Dinitrotoluene	1000 ug/mL
							2,6-Dichlorophenol	1000 ug/mL
							2,6-Dinitrotoluene	1000 ug/mL
							2-Chloronaphthalene	1000 ug/mL
							2-Chlorophenol	1000 ug/mL
							2-Methylnaphthalene	1000 ug/mL
							2-Methylphenol	1000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							2-Nitroaniline	1000 ug/mL
							2-Nitrophenol	1000 ug/mL
							3 & 4 Methylphenol	1000 ug/mL
							3-Methylphenol	1000 ug/mL
							3-Nitroaniline	1000 ug/mL
							4,6-Dinitro-2-methylphenol	2000 ug/mL
							4-Bromophenyl phenyl ether	1000 ug/mL
							4-Chloro-3-methylphenol	1000 ug/mL
							4-Chloroaniline	1000 ug/mL
							4-Chlorophenyl phenyl ether	1000 ug/mL
							4-Methylphenol	1000 ug/mL
							4-Nitroaniline	1000 ug/mL
							4-Nitrophenol	2000 ug/mL
							Acenaphthene	1000 ug/mL
							Acenaphthylene	1000 ug/mL
							Acetophenone	1000 ug/mL
							Aniline	1000 ug/mL
							Anthracene	1000 ug/mL
							Azobenzene	1000 ug/mL
							Benzo[a]anthracene	1000 ug/mL
							Benzo[a]pyrene	1000 ug/mL
							Benzo[b]fluoranthene	1000 ug/mL
							Benzo[g,h,i]perylene	1000 ug/mL
							Benzo[k]fluoranthene	1000 ug/mL
							Benzyl alcohol	1000 ug/mL
							Bis(2-chloroethoxy)methane	1000 ug/mL
							Bis(2-chloroethyl)ether	1000 ug/mL
							Bis(2-ethylhexyl) phthalate	1000 ug/mL
							Butyl benzyl phthalate	1000 ug/mL
							Carbazole	1000 ug/mL
							Chrysene	1000 ug/mL
							Di-n-butyl phthalate	1000 ug/mL
							Di-n-octyl phthalate	1000 ug/mL
							Dibenz(a,h)anthracene	1000 ug/mL
							Dibenzofuran	1000 ug/mL
							Diethyl phthalate	1000 ug/mL
							Dimethyl phthalate	1000 ug/mL
							Diphenylamine	850 ug/mL
							Fluoranthene	1000 ug/mL
							Fluorene	1000 ug/mL
							Hexachlorobenzene	1000 ug/mL
							Hexachlorobutadiene	1000 ug/mL
							Hexachlorocyclopentadiene	1000 ug/mL
							Hexachloroethane	1000 ug/mL
							Hexadecane	1000 ug/mL
							Indeno[1,2,3-cd]pyrene	1000 ug/mL
							Isophorone	1000 ug/mL
							n-Decane	1000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							N-Nitrosodi-n-propylamine	1000 ug/mL
							N-Nitrosodimethylamine	1000 ug/mL
							N-Nitrosodiphenylamine	1000 ug/mL
							Naphthalene	1000 ug/mL
							Nitrobenzene	1000 ug/mL
							Pentachlorophenol	2000 ug/mL
							Phenanthrene	1000 ug/mL
							Phenol	1000 ug/mL
							Pyrene	1000 ug/mL
							Pyridine	2000 ug/mL
.MS-IS_00014	04/04/19	04/04/18	Methylene Chloride, Lot 181545	250 mL	MS-567684_00019	5 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
					MS-567684_00020	45 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
..MS-567684_00019	07/31/20		Restek, Lot A0112833		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
..MS-567684_00020	08/31/22		Restek, Lot A0129635		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
MS-HSLA020_00036	09/30/18	06/18/18	Methylene Chloride, Lot 187286	0.5 mL	MS-HSLA_STK_00042	50 uL	2,4,6 - Tribromophenol	20 ug/mL
							2,4,6-Tribromophenol	20 ug/mL
							2-Fluorobiphenyl	20 ug/mL
							2-Fluorophenol	20 ug/mL
							Nitrobenzene-d5	20 ug/mL
							Phenol-d5	20 ug/mL
							Terphenyl-d14	20 ug/mL
							Famphur	20 ug/mL
							2,3-Dichlorobenzenamine	20 ug/mL
							3,5-Dimethylphenol	20 ug/mL
							Alachlor	20 ug/mL
							Alpha Methyl Styrene	20 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Benzo[e]pyrene	20 ug/mL
							3,3'-Dichlorobenzidine	20 ug/mL
							Benzoic acid	40 ug/mL
							Indene	40 ug/mL
							Atrazine	20 ug/mL
							Caprolactam	20 ug/mL
							1,1'-Biphenyl	20 ug/mL
							1,2,4,5-Tetrachlorobenzene	20 ug/mL
							1,2,4-Trichlorobenzene	20 ug/mL
							1,2-Dichlorobenzene	20 ug/mL
							1,2-Diphenylhydrazine	20.2195 ug/mL
							1,3-Dichlorobenzene	20 ug/mL
							1,3-Dinitrobenzene	20 ug/mL
							1,4-Dichlorobenzene	20 ug/mL
							1,4-Dioxane	20 ug/mL
							1-Methylnaphthalene	20 ug/mL
							2,2'-oxybis[1-chloropropane]	20 ug/mL
							2,3,4,6-Tetrachlorophenol	20 ug/mL
							2,4,5-Trichlorophenol	20 ug/mL
							2,4,6-Trichlorophenol	20 ug/mL
							2,4-Dichlorophenol	20 ug/mL
							2,4-Dimethylphenol	20 ug/mL
							2,4-Dinitrophenol	40 ug/mL
							2,4-Dinitrotoluene	20 ug/mL
							2,6-Dichlorophenol	20 ug/mL
							2,6-Dinitrotoluene	20 ug/mL
							2-Chloronaphthalene	20 ug/mL
							2-Chlorophenol	20 ug/mL
							2-Methylnaphthalene	20 ug/mL
							2-Methylphenol	20 ug/mL
							2-Nitroaniline	20 ug/mL
							2-Nitrophenol	20 ug/mL
							3 & 4 Methylphenol	20 ug/mL
							3-Methylphenol	20 ug/mL
							3-Nitroaniline	20 ug/mL
							4,6-Dinitro-2-methylphenol	40 ug/mL
							4-Bromophenyl phenyl ether	20 ug/mL
							4-Chloro-3-methylphenol	20 ug/mL
							4-Chloroaniline	20 ug/mL
							4-Chlorophenyl phenyl ether	20 ug/mL
							4-Methylphenol	20 ug/mL
							4-Nitroaniline	20 ug/mL
							4-Nitrophenol	40 ug/mL
							Acenaphthene	20 ug/mL
							Acenaphthylene	20 ug/mL
							Acetophenone	20 ug/mL
							Aniline	20 ug/mL
							Anthracene	20 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Azobenzene	20 ug/mL
							Benzo[a]anthracene	20 ug/mL
							Benzo[a]pyrene	20 ug/mL
							Benzo[b]fluoranthene	20 ug/mL
							Benzo[g,h,i]perylene	20 ug/mL
							Benzo[k]fluoranthene	20 ug/mL
							Benzyl alcohol	20 ug/mL
							Bis(2-chloroethoxy)methane	20 ug/mL
							Bis(2-chloroethyl)ether	20 ug/mL
							Bis(2-ethylhexyl) phthalate	20 ug/mL
							Butyl benzyl phthalate	20 ug/mL
							Carbazole	20 ug/mL
							Chrysene	20 ug/mL
							Di-n-butyl phthalate	20 ug/mL
							Di-n-octyl phthalate	20 ug/mL
							Dibenz(a,h)anthracene	20 ug/mL
							Dibenzofuran	20 ug/mL
							Diethyl phthalate	20 ug/mL
							Dimethyl phthalate	20 ug/mL
							Diphenylamine	17 ug/mL
							Fluoranthene	20 ug/mL
							Fluorene	20 ug/mL
							Hexachlorobenzene	20 ug/mL
							Hexachlorobutadiene	20 ug/mL
							Hexachlorocyclopentadiene	20 ug/mL
							Hexachloroethane	20 ug/mL
							Hexadecane	20 ug/mL
							Indeno[1,2,3-cd]pyrene	20 ug/mL
							Isophorone	20 ug/mL
							n-Decane	20 ug/mL
							N-Nitrosodi-n-propylamine	20 ug/mL
							N-Nitrosodimethylamine	20 ug/mL
							N-Nitrosodiphenylamine	20 ug/mL
							Naphthalene	20 ug/mL
							Nitrobenzene	20 ug/mL
							Pentachlorophenol	40 ug/mL
							Phenanthrene	20 ug/mL
							Phenol	20 ug/mL
							Pyrene	20 ug/mL
							Pyridine	40 ug/mL
					MS-IS_00014	50 uL	1,4-Dichlorobenzene-d4	40 ug/mL
							Acenaphthene-d10	40 ug/mL
							Chrysene-d12	40 ug/mL
							Naphthalene-d8	40 ug/mL
							Perylene-d12	40 ug/mL
							Phenanthrene-d10	40 ug/mL
.MS-HSLA_STK_00042	09/30/18	04/11/18	Methylene Chloride, Lot 181545	10 mL	MS-567685_00004	0.4 mL	2,4,6 - Tribromophenol	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							2,4,6-Tribromophenol	200 ug/mL
							2-Fluorobiphenyl	200 ug/mL
							2-Fluorophenol	200 ug/mL
							Nitrobenzene-d5	200 ug/mL
							Phenol-d5	200 ug/mL
							Terphenyl-d14	200 ug/mL
					MS-568023_00042	1 mL	Famphur	200 ug/mL
					MS-568033_00026	0.5 mL	2,3-Dichlorobenzenamine	200 ug/mL
							3,5-Dimethylphenol	200 ug/mL
							Alachlor	200 ug/mL
							Alpha Methyl Styrene	200 ug/mL
							Benzo[e]pyrene	200 ug/mL
					MS-569730 HSL_00007	1 mL	3,3'-Dichlorobenzidine	200 ug/mL
					MS-569731_00079	2 mL	Benzoic acid	400 ug/mL
							Indene	400 ug/mL
					MS-569732 HSL_00005	1 mL	Atrazine	200 ug/mL
							Caprolactam	200 ug/mL
					MS-571995_00001	2 mL	1,1'-Biphenyl	200 ug/mL
							1,2,4,5-Tetrachlorobenzene	200 ug/mL
							1,2,4-Trichlorobenzene	200 ug/mL
							1,2-Dichlorobenzene	200 ug/mL
							1,2-Diphenylhydrazine	202.195 ug/mL
							1,3-Dichlorobenzene	200 ug/mL
							1,3-Dinitrobenzene	200 ug/mL
							1,4-Dichlorobenzene	200 ug/mL
							1,4-Dioxane	200 ug/mL
							1-Methylnaphthalene	200 ug/mL
							2,2'-oxybis[1-chloropropane]	200 ug/mL
							2,3,4,6-Tetrachlorophenol	200 ug/mL
							2,4,5-Trichlorophenol	200 ug/mL
							2,4,6-Trichlorophenol	200 ug/mL
							2,4-Dichlorophenol	200 ug/mL
							2,4-Dimethylphenol	200 ug/mL
							2,4-Dinitrophenol	400 ug/mL
							2,4-Dinitrotoluene	200 ug/mL
							2,6-Dichlorophenol	200 ug/mL
							2,6-Dinitrotoluene	200 ug/mL
							2-Chloronaphthalene	200 ug/mL
							2-Chlorophenol	200 ug/mL
							2-Methylnaphthalene	200 ug/mL
							2-Methylphenol	200 ug/mL
							2-Nitroaniline	200 ug/mL
							2-Nitrophenol	200 ug/mL
							3 & 4 Methylphenol	200 ug/mL
							3-Methylphenol	200 ug/mL
							3-Nitroaniline	200 ug/mL
							4,6-Dinitro-2-methylphenol	400 ug/mL
							4-Bromophenyl phenyl ether	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							4-Chloro-3-methylphenol	200 ug/mL
							4-Chloroaniline	200 ug/mL
							4-Chlorophenyl phenyl ether	200 ug/mL
							4-Methylphenol	200 ug/mL
							4-Nitroaniline	200 ug/mL
							4-Nitrophenol	400 ug/mL
							Acenaphthene	200 ug/mL
							Acenaphthylene	200 ug/mL
							Acetophenone	200 ug/mL
							Aniline	200 ug/mL
							Anthracene	200 ug/mL
							Azobenzene	200 ug/mL
							Benzo[a]anthracene	200 ug/mL
							Benzo[a]pyrene	200 ug/mL
							Benzo[b]fluoranthene	200 ug/mL
							Benzo[g,h,i]perylene	200 ug/mL
							Benzo[k]fluoranthene	200 ug/mL
							Benzyl alcohol	200 ug/mL
							Bis(2-chloroethoxy)methane	200 ug/mL
							Bis(2-chloroethyl)ether	200 ug/mL
							Bis(2-ethylhexyl) phthalate	200 ug/mL
							Butyl benzyl phthalate	200 ug/mL
							Carbazole	200 ug/mL
							Chrysene	200 ug/mL
							Di-n-butyl phthalate	200 ug/mL
							Di-n-octyl phthalate	200 ug/mL
							Dibenz(a,h)anthracene	200 ug/mL
							Dibenzofuran	200 ug/mL
							Diethyl phthalate	200 ug/mL
							Dimethyl phthalate	200 ug/mL
							Diphenylamine	170 ug/mL
							Fluoranthene	200 ug/mL
							Fluorene	200 ug/mL
							Hexachlorobenzene	200 ug/mL
							Hexachlorobutadiene	200 ug/mL
							Hexachlorocyclopentadiene	200 ug/mL
							Hexachloroethane	200 ug/mL
							Hexadecane	200 ug/mL
							Indeno[1,2,3-cd]pyrene	200 ug/mL
							Isophorone	200 ug/mL
							n-Decane	200 ug/mL
							N-Nitrosodi-n-propylamine	200 ug/mL
							N-Nitrosodimethylamine	200 ug/mL
							N-Nitrosodiphenylamine	200 ug/mL
							Naphthalene	200 ug/mL
							Nitrobenzene	200 ug/mL
							Pentachlorophenol	400 ug/mL
							Phenanthrene	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Phenol	200 ug/mL
							Pyrene	200 ug/mL
							Pyridine	400 ug/mL
..MS-567685_00004	01/30/19		Restek, Lot A0130500		(Purchased Reagent)		2,4,6 - Tribromophenol	5000 ug/mL
							2,4,6-Tribromophenol	5000 ug/mL
							2-Fluorobiphenyl	5000 ug/mL
							2-Fluorophenol	5000 ug/mL
							Nitrobenzene-d5	5000 ug/mL
							Phenol-d5	5000 ug/mL
							Terphenyl-d14	5000 ug/mL
..MS-568023_00042	05/31/19		Restek, Lot A0127668		(Purchased Reagent)		Famphur	2000 ug/mL
..MS-568033_00026	06/30/19		Restek, Lot A0133057		(Purchased Reagent)		2,3-Dichlorobenzenamine	4000 ug/mL
							3,5-Dimethylphenol	4000 ug/mL
							Alachlor	4000 ug/mL
							Alpha Methyl Styrene	4000 ug/mL
							Benzo[e]pyrene	4000 ug/mL
..MS-569730 HSL_00007	11/30/18		Restek, Lot A0127472		(Purchased Reagent)		3,3'-Dichlorobenzidine	2000 ug/mL
..MS-569731_00079	03/31/19		Restek, Lot A0130477		(Purchased Reagent)		Benzoic acid	2000 ug/mL
							Indene	2000 ug/mL
..MS-569732 HSL_00005	11/30/18		Restek, Lot A0127580		(Purchased Reagent)		Atrazine	2000 ug/mL
							Caprolactam	2000 ug/mL
..MS-571995_00001	09/30/18		Restek, Lot A0125805		(Purchased Reagent)		1,1'-Biphenyl	1000 ug/mL
							1,2,4,5-Tetrachlorobenzene	1000 ug/mL
							1,2,4-Trichlorobenzene	1000 ug/mL
							1,2-Dichlorobenzene	1000 ug/mL
							1,2-Diphenylhydrazine	1010.97 ug/mL
							1,3-Dichlorobenzene	1000 ug/mL
							1,3-Dinitrobenzene	1000 ug/mL
							1,4-Dichlorobenzene	1000 ug/mL
							1,4-Dioxane	1000 ug/mL
							1-Methylnaphthalene	1000 ug/mL
							2,2'-oxybis[1-chloropropane]	1000 ug/mL
							2,3,4,6-Tetrachlorophenol	1000 ug/mL
							2,4,5-Trichlorophenol	1000 ug/mL
							2,4,6-Trichlorophenol	1000 ug/mL
							2,4-Dichlorophenol	1000 ug/mL
							2,4-Dimethylphenol	1000 ug/mL
							2,4-Dinitrophenol	2000 ug/mL
							2,4-Dinitrotoluene	1000 ug/mL
							2,6-Dichlorophenol	1000 ug/mL
							2,6-Dinitrotoluene	1000 ug/mL
							2-Chloronaphthalene	1000 ug/mL
							2-Chlorophenol	1000 ug/mL
							2-Methylnaphthalene	1000 ug/mL
							2-Methylphenol	1000 ug/mL
							2-Nitroaniline	1000 ug/mL
							2-Nitrophenol	1000 ug/mL
							3 & 4 Methylphenol	1000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							3-Methylphenol	1000 ug/mL
							3-Nitroaniline	1000 ug/mL
							4,6-Dinitro-2-methylphenol	2000 ug/mL
							4-Bromophenyl phenyl ether	1000 ug/mL
							4-Chloro-3-methylphenol	1000 ug/mL
							4-Chloroaniline	1000 ug/mL
							4-Chlorophenyl phenyl ether	1000 ug/mL
							4-Methylphenol	1000 ug/mL
							4-Nitroaniline	1000 ug/mL
							4-Nitrophenol	2000 ug/mL
							Acenaphthene	1000 ug/mL
							Acenaphthylene	1000 ug/mL
							Acetophenone	1000 ug/mL
							Aniline	1000 ug/mL
							Anthracene	1000 ug/mL
							Azobenzene	1000 ug/mL
							Benzo[a]anthracene	1000 ug/mL
							Benzo[a]pyrene	1000 ug/mL
							Benzo[b]fluoranthene	1000 ug/mL
							Benzo[g,h,i]perylene	1000 ug/mL
							Benzo[k]fluoranthene	1000 ug/mL
							Benzyl alcohol	1000 ug/mL
							Bis(2-chloroethoxy)methane	1000 ug/mL
							Bis(2-chloroethyl)ether	1000 ug/mL
							Bis(2-ethylhexyl) phthalate	1000 ug/mL
							Butyl benzyl phthalate	1000 ug/mL
							Carbazole	1000 ug/mL
							Chrysene	1000 ug/mL
							Di-n-butyl phthalate	1000 ug/mL
							Di-n-octyl phthalate	1000 ug/mL
							Dibenz(a,h)anthracene	1000 ug/mL
							Dibenzofuran	1000 ug/mL
							Diethyl phthalate	1000 ug/mL
							Dimethyl phthalate	1000 ug/mL
							Diphenylamine	850 ug/mL
							Fluoranthene	1000 ug/mL
							Fluorene	1000 ug/mL
							Hexachlorobenzene	1000 ug/mL
							Hexachlorobutadiene	1000 ug/mL
							Hexachlorocyclopentadiene	1000 ug/mL
							Hexachloroethane	1000 ug/mL
							Hexadecane	1000 ug/mL
							Indeno[1,2,3-cd]pyrene	1000 ug/mL
							Isophorone	1000 ug/mL
							n-Decane	1000 ug/mL
							N-Nitrosodi-n-propylamine	1000 ug/mL
							N-Nitrosodimethylamine	1000 ug/mL
							N-Nitrosodiphenylamine	1000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Naphthalene	1000 ug/mL
							Nitrobenzene	1000 ug/mL
							Pentachlorophenol	2000 ug/mL
							Phenanthrene	1000 ug/mL
							Phenol	1000 ug/mL
							Pyrene	1000 ug/mL
							Pyridine	2000 ug/mL
.MS-IS_00014	04/04/19	04/04/18	Methylene Chloride, Lot 181545	250 mL	MS-567684_00019	5 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
					MS-567684_00020	45 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
..MS-567684_00019	07/31/20		Restek, Lot A0112833		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
..MS-567684_00020	08/31/22		Restek, Lot A0129635		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
MS-HSLA050_00037	09/30/18	06/18/18	Methylene Chloride, Lot 187286	0.5 mL	MS-HSLA_STK_00042	125 uL	2,4,6 - Tribromophenol	50 ug/mL
							2,4,6-Tribromophenol	50 ug/mL
							2-Fluorobiphenyl	50 ug/mL
							2-Fluorophenol	50 ug/mL
							Nitrobenzene-d5	50 ug/mL
							Phenol-d5	50 ug/mL
							Terphenyl-d14	50 ug/mL
							Famphur	50 ug/mL
							2,3-Dichlorobenzenamine	50 ug/mL
							3,5-Dimethylphenol	50 ug/mL
							Alachlor	50 ug/mL
							Alpha Methyl Styrene	50 ug/mL
							Benzo[e]pyrene	50 ug/mL
							3,3'-Dichlorobenzidine	50 ug/mL
							Benzoic acid	100 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Indene	100 ug/mL
							Atrazine	50 ug/mL
							Caprolactam	50 ug/mL
							1,1'-Biphenyl	50 ug/mL
							1,2,4,5-Tetrachlorobenzene	50 ug/mL
							1,2,4-Trichlorobenzene	50 ug/mL
							1,2-Dichlorobenzene	50 ug/mL
							1,2-Diphenylhydrazine	50.5487 ug/mL
							1,3-Dichlorobenzene	50 ug/mL
							1,3-Dinitrobenzene	50 ug/mL
							1,4-Dichlorobenzene	50 ug/mL
							1,4-Dioxane	50 ug/mL
							1-Methylnaphthalene	50 ug/mL
							2,2'-oxybis[1-chloropropane]	50 ug/mL
							2,3,4,6-Tetrachlorophenol	50 ug/mL
							2,4,5-Trichlorophenol	50 ug/mL
							2,4,6-Trichlorophenol	50 ug/mL
							2,4-Dichlorophenol	50 ug/mL
							2,4-Dimethylphenol	50 ug/mL
							2,4-Dinitrophenol	100 ug/mL
							2,4-Dinitrotoluene	50 ug/mL
							2,6-Dichlorophenol	50 ug/mL
							2,6-Dinitrotoluene	50 ug/mL
							2-Chloronaphthalene	50 ug/mL
							2-Chlorophenol	50 ug/mL
							2-Methylnaphthalene	50 ug/mL
							2-Methylphenol	50 ug/mL
							2-Nitroaniline	50 ug/mL
							2-Nitrophenol	50 ug/mL
							3 & 4 Methylphenol	50 ug/mL
							3-Methylphenol	50 ug/mL
							3-Nitroaniline	50 ug/mL
							4,6-Dinitro-2-methylphenol	100 ug/mL
							4-Bromophenyl phenyl ether	50 ug/mL
							4-Chloro-3-methylphenol	50 ug/mL
							4-Chloroaniline	50 ug/mL
							4-Chlorophenyl phenyl ether	50 ug/mL
							4-Methylphenol	50 ug/mL
							4-Nitroaniline	50 ug/mL
							4-Nitrophenol	100 ug/mL
							Acenaphthene	50 ug/mL
							Acenaphthylene	50 ug/mL
							Acetophenone	50 ug/mL
							Aniline	50 ug/mL
							Anthracene	50 ug/mL
							Azobenzene	50 ug/mL
							Benzo[a]anthracene	50 ug/mL
							Benzo[a]pyrene	50 ug/mL

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Benzo[b]fluoranthene	50 ug/mL
							Benzo[g,h,i]perylene	50 ug/mL
							Benzo[k]fluoranthene	50 ug/mL
							Benzyl alcohol	50 ug/mL
							Bis(2-chloroethoxy)methane	50 ug/mL
							Bis(2-chloroethyl)ether	50 ug/mL
							Bis(2-ethylhexyl) phthalate	50 ug/mL
							Butyl benzyl phthalate	50 ug/mL
							Carbazole	50 ug/mL
							Chrysene	50 ug/mL
							Di-n-butyl phthalate	50 ug/mL
							Di-n-octyl phthalate	50 ug/mL
							Dibenz(a,h)anthracene	50 ug/mL
							Dibenzofuran	50 ug/mL
							Diethyl phthalate	50 ug/mL
							Dimethyl phthalate	50 ug/mL
							Diphenylamine	42.5 ug/mL
							Fluoranthene	50 ug/mL
							Fluorene	50 ug/mL
							Hexachlorobenzene	50 ug/mL
							Hexachlorobutadiene	50 ug/mL
							Hexachlorocyclopentadiene	50 ug/mL
							Hexachloroethane	50 ug/mL
							Hexadecane	50 ug/mL
							Indeno[1,2,3-cd]pyrene	50 ug/mL
							Isophorone	50 ug/mL
							n-Decane	50 ug/mL
							N-Nitrosodi-n-propylamine	50 ug/mL
							N-Nitrosodimethylamine	50 ug/mL
							N-Nitrosodiphenylamine	50 ug/mL
							Naphthalene	50 ug/mL
							Nitrobenzene	50 ug/mL
							Pentachlorophenol	100 ug/mL
							Phenanthrene	50 ug/mL
							Phenol	50 ug/mL
							Pyrene	50 ug/mL
							Pyridine	100 ug/mL
					MS-IS_00014	50 uL	1,4-Dichlorobenzene-d4	40 ug/mL
							Acenaphthene-d10	40 ug/mL
							Chrysene-d12	40 ug/mL
							Naphthalene-d8	40 ug/mL
							Perylene-d12	40 ug/mL
							Phenanthrene-d10	40 ug/mL
.MS-HSLA_STK_00042	09/30/18	04/11/18	Methylene Chloride, Lot 181545	10 mL	MS-567685_00004	0.4 mL	2,4,6 - Tribromophenol	200 ug/mL
							2,4,6-Tribromophenol	200 ug/mL
							2-Fluorobiphenyl	200 ug/mL
							2-Fluorophenol	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Nitrobenzene-d5	200 ug/mL
							Phenol-d5	200 ug/mL
							Terphenyl-d14	200 ug/mL
					MS-568023_00042	1 mL	Famphur	200 ug/mL
					MS-568033_00026	0.5 mL	2,3-Dichlorobenzenamine	200 ug/mL
							3,5-Dimethylphenol	200 ug/mL
							Alachlor	200 ug/mL
							Alpha Methyl Styrene	200 ug/mL
							Benzo[e]pyrene	200 ug/mL
					MS-569730 HSL_00007	1 mL	3,3'-Dichlorobenzidine	200 ug/mL
					MS-569731_00079	2 mL	Benzoic acid	400 ug/mL
							Indene	400 ug/mL
					MS-569732 HSL_00005	1 mL	Atrazine	200 ug/mL
							Caprolactam	200 ug/mL
					MS-571995_00001	2 mL	1,1'-Biphenyl	200 ug/mL
							1,2,4,5-Tetrachlorobenzene	200 ug/mL
							1,2,4-Trichlorobenzene	200 ug/mL
							1,2-Dichlorobenzene	200 ug/mL
							1,2-Diphenylhydrazine	202.195 ug/mL
							1,3-Dichlorobenzene	200 ug/mL
							1,3-Dinitrobenzene	200 ug/mL
							1,4-Dichlorobenzene	200 ug/mL
							1,4-Dioxane	200 ug/mL
							1-Methylnaphthalene	200 ug/mL
							2,2'-oxybis[1-chloropropane]	200 ug/mL
							2,3,4,6-Tetrachlorophenol	200 ug/mL
							2,4,5-Trichlorophenol	200 ug/mL
							2,4,6-Trichlorophenol	200 ug/mL
							2,4-Dichlorophenol	200 ug/mL
							2,4-Dimethylphenol	200 ug/mL
							2,4-Dinitrophenol	400 ug/mL
							2,4-Dinitrotoluene	200 ug/mL
							2,6-Dichlorophenol	200 ug/mL
							2,6-Dinitrotoluene	200 ug/mL
							2-Chloronaphthalene	200 ug/mL
							2-Chlorophenol	200 ug/mL
							2-Methylnaphthalene	200 ug/mL
							2-Methylphenol	200 ug/mL
							2-Nitroaniline	200 ug/mL
							2-Nitrophenol	200 ug/mL
							3 & 4 Methylphenol	200 ug/mL
							3-Methylphenol	200 ug/mL
							3-Nitroaniline	200 ug/mL
							4,6-Dinitro-2-methylphenol	400 ug/mL
							4-Bromophenyl phenyl ether	200 ug/mL
							4-Chloro-3-methylphenol	200 ug/mL
							4-Chloroaniline	200 ug/mL
							4-Chlorophenyl phenyl ether	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							4-Methylphenol	200 ug/mL
							4-Nitroaniline	200 ug/mL
							4-Nitrophenol	400 ug/mL
							Acenaphthene	200 ug/mL
							Acenaphthylene	200 ug/mL
							Acetophenone	200 ug/mL
							Aniline	200 ug/mL
							Anthracene	200 ug/mL
							Azobenzene	200 ug/mL
							Benzo[a]anthracene	200 ug/mL
							Benzo[a]pyrene	200 ug/mL
							Benzo[b]fluoranthene	200 ug/mL
							Benzo[g,h,i]perylene	200 ug/mL
							Benzo[k]fluoranthene	200 ug/mL
							Benzyl alcohol	200 ug/mL
							Bis(2-chloroethoxy)methane	200 ug/mL
							Bis(2-chloroethyl)ether	200 ug/mL
							Bis(2-ethylhexyl) phthalate	200 ug/mL
							Butyl benzyl phthalate	200 ug/mL
							Carbazole	200 ug/mL
							Chrysene	200 ug/mL
							Di-n-butyl phthalate	200 ug/mL
							Di-n-octyl phthalate	200 ug/mL
							Dibenz(a,h)anthracene	200 ug/mL
							Dibenzofuran	200 ug/mL
							Diethyl phthalate	200 ug/mL
							Dimethyl phthalate	200 ug/mL
							Diphenylamine	170 ug/mL
							Fluoranthene	200 ug/mL
							Fluorene	200 ug/mL
							Hexachlorobenzene	200 ug/mL
							Hexachlorobutadiene	200 ug/mL
							Hexachlorocyclopentadiene	200 ug/mL
							Hexachloroethane	200 ug/mL
							Hexadecane	200 ug/mL
							Indeno[1,2,3-cd]pyrene	200 ug/mL
							Isophorone	200 ug/mL
							n-Decane	200 ug/mL
							N-Nitrosodi-n-propylamine	200 ug/mL
							N-Nitrosodimethylamine	200 ug/mL
							N-Nitrosodiphenylamine	200 ug/mL
							Naphthalene	200 ug/mL
							Nitrobenzene	200 ug/mL
							Pentachlorophenol	400 ug/mL
							Phenanthrene	200 ug/mL
							Phenol	200 ug/mL
							Pyrene	200 ug/mL
							Pyridine	400 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
..MS-567685_00004	01/30/19		Restek, Lot A0130500		(Purchased Reagent)		2,4,6 - Tribromophenol	5000 ug/mL
							2,4,6-Tribromophenol	5000 ug/mL
							2-Fluorobiphenyl	5000 ug/mL
							2-Fluorophenol	5000 ug/mL
							Nitrobenzene-d5	5000 ug/mL
							Phenol-d5	5000 ug/mL
							Terphenyl-d14	5000 ug/mL
..MS-568023_00042	05/31/19		Restek, Lot A0127668		(Purchased Reagent)		Famphur	2000 ug/mL
..MS-568033_00026	06/30/19		Restek, Lot A0133057		(Purchased Reagent)		2,3-Dichlorobenzenamine	4000 ug/mL
							3,5-Dimethylphenol	4000 ug/mL
							Alachlor	4000 ug/mL
							Alpha Methyl Styrene	4000 ug/mL
							Benzo[e]pyrene	4000 ug/mL
..MS-569730 HSL_00007	11/30/18		Restek, Lot A0127472		(Purchased Reagent)		3,3'-Dichlorobenzidine	2000 ug/mL
..MS-569731_00079	03/31/19		Restek, Lot A0130477		(Purchased Reagent)		Benzoic acid	2000 ug/mL
							Indene	2000 ug/mL
..MS-569732 HSL_00005	11/30/18		Restek, Lot A0127580		(Purchased Reagent)		Atrazine	2000 ug/mL
							Caprolactam	2000 ug/mL
..MS-571995_00001	09/30/18		Restek, Lot A0125805		(Purchased Reagent)		1,1'-Biphenyl	1000 ug/mL
							1,2,4,5-Tetrachlorobenzene	1000 ug/mL
							1,2,4-Trichlorobenzene	1000 ug/mL
							1,2-Dichlorobenzene	1000 ug/mL
							1,2-Diphenylhydrazine	1010.97 ug/mL
							1,3-Dichlorobenzene	1000 ug/mL
							1,3-Dinitrobenzene	1000 ug/mL
							1,4-Dichlorobenzene	1000 ug/mL
							1,4-Dioxane	1000 ug/mL
							1-Methylnaphthalene	1000 ug/mL
							2,2'-oxybis[1-chloropropane]	1000 ug/mL
							2,3,4,6-Tetrachlorophenol	1000 ug/mL
							2,4,5-Trichlorophenol	1000 ug/mL
							2,4,6-Trichlorophenol	1000 ug/mL
							2,4-Dichlorophenol	1000 ug/mL
							2,4-Dimethylphenol	1000 ug/mL
							2,4-Dinitrophenol	2000 ug/mL
							2,4-Dinitrotoluene	1000 ug/mL
							2,6-Dichlorophenol	1000 ug/mL
							2,6-Dinitrotoluene	1000 ug/mL
							2-Chloronaphthalene	1000 ug/mL
							2-Chlorophenol	1000 ug/mL
							2-Methylnaphthalene	1000 ug/mL
							2-Methylphenol	1000 ug/mL
							2-Nitroaniline	1000 ug/mL
							2-Nitrophenol	1000 ug/mL
							3 & 4 Methylphenol	1000 ug/mL
							3-Methylphenol	1000 ug/mL
							3-Nitroaniline	1000 ug/mL
							4,6-Dinitro-2-methylphenol	2000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							4-Bromophenyl phenyl ether	1000 ug/mL
							4-Chloro-3-methylphenol	1000 ug/mL
							4-Chloroaniline	1000 ug/mL
							4-Chlorophenyl phenyl ether	1000 ug/mL
							4-Methylphenol	1000 ug/mL
							4-Nitroaniline	1000 ug/mL
							4-Nitrophenol	2000 ug/mL
							Acenaphthene	1000 ug/mL
							Acenaphthylene	1000 ug/mL
							Acetophenone	1000 ug/mL
							Aniline	1000 ug/mL
							Anthracene	1000 ug/mL
							Azobenzene	1000 ug/mL
							Benzo[a]anthracene	1000 ug/mL
							Benzo[a]pyrene	1000 ug/mL
							Benzo[b]fluoranthene	1000 ug/mL
							Benzo[g,h,i]perylene	1000 ug/mL
							Benzo[k]fluoranthene	1000 ug/mL
							Benzyl alcohol	1000 ug/mL
							Bis(2-chloroethoxy)methane	1000 ug/mL
							Bis(2-chloroethyl)ether	1000 ug/mL
							Bis(2-ethylhexyl) phthalate	1000 ug/mL
							Butyl benzyl phthalate	1000 ug/mL
							Carbazole	1000 ug/mL
							Chrysene	1000 ug/mL
							Di-n-butyl phthalate	1000 ug/mL
							Di-n-octyl phthalate	1000 ug/mL
							Dibenz(a,h)anthracene	1000 ug/mL
							Dibenzofuran	1000 ug/mL
							Diethyl phthalate	1000 ug/mL
							Dimethyl phthalate	1000 ug/mL
							Diphenylamine	850 ug/mL
							Fluoranthene	1000 ug/mL
							Fluorene	1000 ug/mL
							Hexachlorobenzene	1000 ug/mL
							Hexachlorobutadiene	1000 ug/mL
							Hexachlorocyclopentadiene	1000 ug/mL
							Hexachloroethane	1000 ug/mL
							Hexadecane	1000 ug/mL
							Indeno[1,2,3-cd]pyrene	1000 ug/mL
							Isophorone	1000 ug/mL
							n-Decane	1000 ug/mL
							N-Nitrosodi-n-propylamine	1000 ug/mL
							N-Nitrosodimethylamine	1000 ug/mL
							N-Nitrosodiphenylamine	1000 ug/mL
							Naphthalene	1000 ug/mL
							Nitrobenzene	1000 ug/mL
							Pentachlorophenol	2000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Phenanthrene	1000 ug/mL
							Phenol	1000 ug/mL
							Pyrene	1000 ug/mL
							Pyridine	2000 ug/mL
.MS-IS_00014	04/04/19	04/04/18	Methylene Chloride, Lot 181545	250 mL	MS-567684_00019	5 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
					MS-567684_00020	45 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
..MS-567684_00019	07/31/20		Restek, Lot A0112833		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
..MS-567684_00020	08/31/22		Restek, Lot A0129635		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
MS-HSLA080_00036	09/30/18	06/18/18	Methylene Chloride, Lot 187286	0.5 mL	MS-HSLA_STK_00042	200 uL	2,4,6 - Tribromophenol	80 ug/mL
							2,4,6-Tribromophenol	80 ug/mL
							2-Fluorobiphenyl	80 ug/mL
							2-Fluorophenol	80 ug/mL
							Nitrobenzene-d5	80 ug/mL
							Phenol-d5	80 ug/mL
							Terphenyl-d14	80 ug/mL
							Famphur	80 ug/mL
							2,3-Dichlorobenzenamine	80 ug/mL
							3,5-Dimethylphenol	80 ug/mL
							Alachlor	80 ug/mL
							Alpha Methyl Styrene	80 ug/mL
							Benzo[e]pyrene	80 ug/mL
							3,3'-Dichlorobenzidine	80 ug/mL
							Benzoic acid	160 ug/mL
							Indene	160 ug/mL
							Atrazine	80 ug/mL
							Caprolactam	80 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							1,1'-Biphenyl	80 ug/mL
							1,2,4,5-Tetrachlorobenzene	80 ug/mL
							1,2,4-Trichlorobenzene	80 ug/mL
							1,2-Dichlorobenzene	80 ug/mL
							1,2-Diphenylhydrazine	80.878 ug/mL
							1,3-Dichlorobenzene	80 ug/mL
							1,3-Dinitrobenzene	80 ug/mL
							1,4-Dichlorobenzene	80 ug/mL
							1,4-Dioxane	80 ug/mL
							1-Methylnaphthalene	80 ug/mL
							2,2'-oxybis[1-chloropropane]	80 ug/mL
							2,3,4,6-Tetrachlorophenol	80 ug/mL
							2,4,5-Trichlorophenol	80 ug/mL
							2,4,6-Trichlorophenol	80 ug/mL
							2,4-Dichlorophenol	80 ug/mL
							2,4-Dimethylphenol	80 ug/mL
							2,4-Dinitrophenol	160 ug/mL
							2,4-Dinitrotoluene	80 ug/mL
							2,6-Dichlorophenol	80 ug/mL
							2,6-Dinitrotoluene	80 ug/mL
							2-Chloronaphthalene	80 ug/mL
							2-Chlorophenol	80 ug/mL
							2-Methylnaphthalene	80 ug/mL
							2-Methylphenol	80 ug/mL
							2-Nitroaniline	80 ug/mL
							2-Nitrophenol	80 ug/mL
							3 & 4 Methylphenol	80 ug/mL
							3-Methylphenol	80 ug/mL
							3-Nitroaniline	80 ug/mL
							4,6-Dinitro-2-methylphenol	160 ug/mL
							4-Bromophenyl phenyl ether	80 ug/mL
							4-Chloro-3-methylphenol	80 ug/mL
							4-Chloroaniline	80 ug/mL
							4-Chlorophenyl phenyl ether	80 ug/mL
							4-Methylphenol	80 ug/mL
							4-Nitroaniline	80 ug/mL
							4-Nitrophenol	160 ug/mL
							Acenaphthene	80 ug/mL
							Acenaphthylene	80 ug/mL
							Acetophenone	80 ug/mL
							Aniline	80 ug/mL
							Anthracene	80 ug/mL
							Azobenzene	80 ug/mL
							Benzo[a]anthracene	80 ug/mL
							Benzo[a]pyrene	80 ug/mL
							Benzo[b]fluoranthene	80 ug/mL
							Benzo[g,h,i]perylene	80 ug/mL
							Benzo[k]fluoranthene	80 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Benzyl alcohol	80 ug/mL
							Bis(2-chloroethoxy)methane	80 ug/mL
							Bis(2-chloroethyl)ether	80 ug/mL
							Bis(2-ethylhexyl) phthalate	80 ug/mL
							Butyl benzyl phthalate	80 ug/mL
							Carbazole	80 ug/mL
							Chrysene	80 ug/mL
							Di-n-butyl phthalate	80 ug/mL
							Di-n-octyl phthalate	80 ug/mL
							Dibenz(a,h)anthracene	80 ug/mL
							Dibenzofuran	80 ug/mL
							Diethyl phthalate	80 ug/mL
							Dimethyl phthalate	80 ug/mL
							Diphenylamine	68 ug/mL
							Fluoranthene	80 ug/mL
							Fluorene	80 ug/mL
							Hexachlorobenzene	80 ug/mL
							Hexachlorobutadiene	80 ug/mL
							Hexachlorocyclopentadiene	80 ug/mL
							Hexachloroethane	80 ug/mL
							Hexadecane	80 ug/mL
							Indeno[1,2,3-cd]pyrene	80 ug/mL
							Isophorone	80 ug/mL
							n-Decane	80 ug/mL
							N-Nitrosodi-n-propylamine	80 ug/mL
							N-Nitrosodimethylamine	80 ug/mL
							N-Nitrosodiphenylamine	80 ug/mL
							Naphthalene	80 ug/mL
							Nitrobenzene	80 ug/mL
							Pentachlorophenol	160 ug/mL
							Phenanthrene	80 ug/mL
							Phenol	80 ug/mL
							Pyrene	80 ug/mL
							Pyridine	160 ug/mL
					MS-IS_00014	50 uL	1,4-Dichlorobenzene-d4	40 ug/mL
							Acenaphthene-d10	40 ug/mL
							Chrysene-d12	40 ug/mL
							Naphthalene-d8	40 ug/mL
							Perylene-d12	40 ug/mL
							Phenanthrene-d10	40 ug/mL
.MS-HSLA_STK_00042	09/30/18	04/11/18	Methylene Chloride, Lot 181545	10 mL	MS-567685_00004	0.4 mL	2,4,6 - Tribromophenol	200 ug/mL
							2,4,6-Tribromophenol	200 ug/mL
							2-Fluorobiphenyl	200 ug/mL
							2-Fluorophenol	200 ug/mL
							Nitrobenzene-d5	200 ug/mL
							Phenol-d5	200 ug/mL
							Terphenyl-d14	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					MS-568023_00042	1 mL	Famphur	200 ug/mL
					MS-568033_00026	0.5 mL	2,3-Dichlorobenzenamine	200 ug/mL
							3,5-Dimethylphenol	200 ug/mL
							Alachlor	200 ug/mL
							Alpha Methyl Styrene	200 ug/mL
							Benzo[e]pyrene	200 ug/mL
					MS-569730 HSL_00007	1 mL	3,3'-Dichlorobenzidine	200 ug/mL
					MS-569731_00079	2 mL	Benzoic acid	400 ug/mL
							Indene	400 ug/mL
					MS-569732 HSL_00005	1 mL	Atrazine	200 ug/mL
							Caprolactam	200 ug/mL
					MS-571995_00001	2 mL	1,1'-Biphenyl	200 ug/mL
							1,2,4,5-Tetrachlorobenzene	200 ug/mL
							1,2,4-Trichlorobenzene	200 ug/mL
							1,2-Dichlorobenzene	200 ug/mL
							1,2-Diphenylhydrazine	202.195 ug/mL
							1,3-Dichlorobenzene	200 ug/mL
							1,3-Dinitrobenzene	200 ug/mL
							1,4-Dichlorobenzene	200 ug/mL
							1,4-Dioxane	200 ug/mL
							1-Methylnaphthalene	200 ug/mL
							2,2'-oxybis[1-chloropropane]	200 ug/mL
							2,3,4,6-Tetrachlorophenol	200 ug/mL
							2,4,5-Trichlorophenol	200 ug/mL
							2,4,6-Trichlorophenol	200 ug/mL
							2,4-Dichlorophenol	200 ug/mL
							2,4-Dimethylphenol	200 ug/mL
							2,4-Dinitrophenol	400 ug/mL
							2,4-Dinitrotoluene	200 ug/mL
							2,6-Dichlorophenol	200 ug/mL
							2,6-Dinitrotoluene	200 ug/mL
							2-Chloronaphthalene	200 ug/mL
							2-Chlorophenol	200 ug/mL
							2-Methylnaphthalene	200 ug/mL
							2-Methylphenol	200 ug/mL
							2-Nitroaniline	200 ug/mL
							2-Nitrophenol	200 ug/mL
							3 & 4 Methylphenol	200 ug/mL
							3-Methylphenol	200 ug/mL
							3-Nitroaniline	200 ug/mL
							4,6-Dinitro-2-methylphenol	400 ug/mL
							4-Bromophenyl phenyl ether	200 ug/mL
							4-Chloro-3-methylphenol	200 ug/mL
							4-Chloroaniline	200 ug/mL
							4-Chlorophenyl phenyl ether	200 ug/mL
							4-Methylphenol	200 ug/mL
							4-Nitroaniline	200 ug/mL
							4-Nitrophenol	400 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Acenaphthene	200 ug/mL
							Acenaphthylene	200 ug/mL
							Acetophenone	200 ug/mL
							Aniline	200 ug/mL
							Anthracene	200 ug/mL
							Azobenzene	200 ug/mL
							Benzo[a]anthracene	200 ug/mL
							Benzo[a]pyrene	200 ug/mL
							Benzo[b]fluoranthene	200 ug/mL
							Benzo[g,h,i]perylene	200 ug/mL
							Benzo[k]fluoranthene	200 ug/mL
							Benzyl alcohol	200 ug/mL
							Bis(2-chloroethoxy)methane	200 ug/mL
							Bis(2-chloroethyl)ether	200 ug/mL
							Bis(2-ethylhexyl) phthalate	200 ug/mL
							Butyl benzyl phthalate	200 ug/mL
							Carbazole	200 ug/mL
							Chrysene	200 ug/mL
							Di-n-butyl phthalate	200 ug/mL
							Di-n-octyl phthalate	200 ug/mL
							Dibenz(a,h)anthracene	200 ug/mL
							Dibenzofuran	200 ug/mL
							Diethyl phthalate	200 ug/mL
							Dimethyl phthalate	200 ug/mL
							Diphenylamine	170 ug/mL
							Fluoranthene	200 ug/mL
							Fluorene	200 ug/mL
							Hexachlorobenzene	200 ug/mL
							Hexachlorobutadiene	200 ug/mL
							Hexachlorocyclopentadiene	200 ug/mL
							Hexachloroethane	200 ug/mL
							Hexadecane	200 ug/mL
							Indeno[1,2,3-cd]pyrene	200 ug/mL
							Isophorone	200 ug/mL
							n-Decane	200 ug/mL
							N-Nitrosodi-n-propylamine	200 ug/mL
							N-Nitrosodimethylamine	200 ug/mL
							N-Nitrosodiphenylamine	200 ug/mL
							Naphthalene	200 ug/mL
							Nitrobenzene	200 ug/mL
							Pentachlorophenol	400 ug/mL
							Phenanthrene	200 ug/mL
							Phenol	200 ug/mL
							Pyrene	200 ug/mL
							Pyridine	400 ug/mL
..MS-567685_00004	01/30/19		Restek, Lot A0130500		(Purchased Reagent)		2,4,6 - Tribromophenol	5000 ug/mL
							2,4,6-Tribromophenol	5000 ug/mL
							2-Fluorobiphenyl	5000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							2-Fluorophenol	5000 ug/mL
							Nitrobenzene-d5	5000 ug/mL
							Phenol-d5	5000 ug/mL
							Terphenyl-d14	5000 ug/mL
..MS-568023_00042	05/31/19		Restek, Lot A0127668		(Purchased Reagent)		Famphur	2000 ug/mL
..MS-568033_00026	06/30/19		Restek, Lot A0133057		(Purchased Reagent)		2,3-Dichlorobenzenamine	4000 ug/mL
							3,5-Dimethylphenol	4000 ug/mL
							Alachlor	4000 ug/mL
							Alpha Methyl Styrene	4000 ug/mL
							Benzo[e]pyrene	4000 ug/mL
..MS-569730 HSL_00007	11/30/18		Restek, Lot A0127472		(Purchased Reagent)		3,3'-Dichlorobenzidine	2000 ug/mL
..MS-569731_00079	03/31/19		Restek, Lot A0130477		(Purchased Reagent)		Benzoic acid	2000 ug/mL
							Indene	2000 ug/mL
..MS-569732 HSL_00005	11/30/18		Restek, Lot A0127580		(Purchased Reagent)		Atrazine	2000 ug/mL
							Caprolactam	2000 ug/mL
..MS-571995_00001	09/30/18		Restek, Lot A0125805		(Purchased Reagent)		1,1'-Biphenyl	1000 ug/mL
							1,2,4,5-Tetrachlorobenzene	1000 ug/mL
							1,2,4-Trichlorobenzene	1000 ug/mL
							1,2-Dichlorobenzene	1000 ug/mL
							1,2-Diphenylhydrazine	1010.97 ug/mL
							1,3-Dichlorobenzene	1000 ug/mL
							1,3-Dinitrobenzene	1000 ug/mL
							1,4-Dichlorobenzene	1000 ug/mL
							1,4-Dioxane	1000 ug/mL
							1-Methylnaphthalene	1000 ug/mL
							2,2'-oxybis[1-chloropropane]	1000 ug/mL
							2,3,4,6-Tetrachlorophenol	1000 ug/mL
							2,4,5-Trichlorophenol	1000 ug/mL
							2,4,6-Trichlorophenol	1000 ug/mL
							2,4-Dichlorophenol	1000 ug/mL
							2,4-Dimethylphenol	1000 ug/mL
							2,4-Dinitrophenol	2000 ug/mL
							2,4-Dinitrotoluene	1000 ug/mL
							2,6-Dichlorophenol	1000 ug/mL
							2,6-Dinitrotoluene	1000 ug/mL
							2-Chloronaphthalene	1000 ug/mL
							2-Chlorophenol	1000 ug/mL
							2-Methylnaphthalene	1000 ug/mL
							2-Methylphenol	1000 ug/mL
							2-Nitroaniline	1000 ug/mL
							2-Nitrophenol	1000 ug/mL
							3 & 4 Methylphenol	1000 ug/mL
							3-Methylphenol	1000 ug/mL
							3-Nitroaniline	1000 ug/mL
							4,6-Dinitro-2-methylphenol	2000 ug/mL
							4-Bromophenyl phenyl ether	1000 ug/mL
							4-Chloro-3-methylphenol	1000 ug/mL
							4-Chloroaniline	1000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							4-Chlorophenyl phenyl ether	1000 ug/mL
							4-Methylphenol	1000 ug/mL
							4-Nitroaniline	1000 ug/mL
							4-Nitrophenol	2000 ug/mL
							Acenaphthene	1000 ug/mL
							Acenaphthylene	1000 ug/mL
							Acetophenone	1000 ug/mL
							Aniline	1000 ug/mL
							Anthracene	1000 ug/mL
							Azobenzene	1000 ug/mL
							Benzo[a]anthracene	1000 ug/mL
							Benzo[a]pyrene	1000 ug/mL
							Benzo[b]fluoranthene	1000 ug/mL
							Benzo[g,h,i]perylene	1000 ug/mL
							Benzo[k]fluoranthene	1000 ug/mL
							Benzyl alcohol	1000 ug/mL
							Bis(2-chloroethoxy)methane	1000 ug/mL
							Bis(2-chloroethyl)ether	1000 ug/mL
							Bis(2-ethylhexyl) phthalate	1000 ug/mL
							Butyl benzyl phthalate	1000 ug/mL
							Carbazole	1000 ug/mL
							Chrysene	1000 ug/mL
							Di-n-butyl phthalate	1000 ug/mL
							Di-n-octyl phthalate	1000 ug/mL
							Dibenz(a,h)anthracene	1000 ug/mL
							Dibenzofuran	1000 ug/mL
							Diethyl phthalate	1000 ug/mL
							Dimethyl phthalate	1000 ug/mL
							Diphenylamine	850 ug/mL
							Fluoranthene	1000 ug/mL
							Fluorene	1000 ug/mL
							Hexachlorobenzene	1000 ug/mL
							Hexachlorobutadiene	1000 ug/mL
							Hexachlorocyclopentadiene	1000 ug/mL
							Hexachloroethane	1000 ug/mL
							Hexadecane	1000 ug/mL
							Indeno[1,2,3-cd]pyrene	1000 ug/mL
							Isophorone	1000 ug/mL
							n-Decane	1000 ug/mL
							N-Nitrosodi-n-propylamine	1000 ug/mL
							N-Nitrosodimethylamine	1000 ug/mL
							N-Nitrosodiphenylamine	1000 ug/mL
							Naphthalene	1000 ug/mL
							Nitrobenzene	1000 ug/mL
							Pentachlorophenol	2000 ug/mL
							Phenanthrene	1000 ug/mL
							Phenol	1000 ug/mL
							Pyrene	1000 ug/mL

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Pyridine	2000 ug/mL
.MS-IS_00014	04/04/19	04/04/18	Methylene Chloride, Lot 181545	250 mL	MS-567684_00019	5 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
					MS-567684_00020	45 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
..MS-567684_00019	07/31/20		Restek, Lot A0112833		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
..MS-567684_00020	08/31/22		Restek, Lot A0129635		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
MS-HSLA120_00036	09/30/18	06/18/18	Methylene Chloride, Lot 187286	0.5 mL	MS-HSLA_STK_00042	300 uL	2,4,6 - Tribromophenol	120 ug/mL
							2,4,6-Tribromophenol	120 ug/mL
							2-Fluorobiphenyl	120 ug/mL
							2-Fluorophenol	120 ug/mL
							Nitrobenzene-d5	120 ug/mL
							Phenol-d5	120 ug/mL
							Terphenyl-d14	120 ug/mL
							Famphur	120 ug/mL
							2,3-Dichlorobenzenamine	120 ug/mL
							3,5-Dimethylphenol	120 ug/mL
							Alachlor	120 ug/mL
							Alpha Methyl Styrene	120 ug/mL
							Benzo[e]pyrene	120 ug/mL
							3,3'-Dichlorobenzidine	120 ug/mL
							Benzoic acid	240 ug/mL
							Indene	240 ug/mL
							Atrazine	120 ug/mL
							Caprolactam	120 ug/mL
							1,1'-Biphenyl	120 ug/mL
							1,2,4,5-Tetrachlorobenzene	120 ug/mL
							1,2,4-Trichlorobenzene	120 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							1,2-Dichlorobenzene	120 ug/mL
							1,2-Diphenylhydrazine	121.317 ug/mL
							1,3-Dichlorobenzene	120 ug/mL
							1,3-Dinitrobenzene	120 ug/mL
							1,4-Dichlorobenzene	120 ug/mL
							1,4-Dioxane	120 ug/mL
							1-Methylnaphthalene	120 ug/mL
							2,2'-oxybis[1-chloropropane]	120 ug/mL
							2,3,4,6-Tetrachlorophenol	120 ug/mL
							2,4,5-Trichlorophenol	120 ug/mL
							2,4,6-Trichlorophenol	120 ug/mL
							2,4-Dichlorophenol	120 ug/mL
							2,4-Dimethylphenol	120 ug/mL
							2,4-Dinitrophenol	240 ug/mL
							2,4-Dinitrotoluene	120 ug/mL
							2,6-Dichlorophenol	120 ug/mL
							2,6-Dinitrotoluene	120 ug/mL
							2-Chloronaphthalene	120 ug/mL
							2-Chlorophenol	120 ug/mL
							2-Methylnaphthalene	120 ug/mL
							2-Methylphenol	120 ug/mL
							2-Nitroaniline	120 ug/mL
							2-Nitrophenol	120 ug/mL
							3 & 4 Methylphenol	120 ug/mL
							3-Methylphenol	120 ug/mL
							3-Nitroaniline	120 ug/mL
							4,6-Dinitro-2-methylphenol	240 ug/mL
							4-Bromophenyl phenyl ether	120 ug/mL
							4-Chloro-3-methylphenol	120 ug/mL
							4-Chloroaniline	120 ug/mL
							4-Chlorophenyl phenyl ether	120 ug/mL
							4-Methylphenol	120 ug/mL
							4-Nitroaniline	120 ug/mL
							4-Nitrophenol	240 ug/mL
							Acenaphthene	120 ug/mL
							Acenaphthylene	120 ug/mL
							Acetophenone	120 ug/mL
							Aniline	120 ug/mL
							Anthracene	120 ug/mL
							Azobenzene	120 ug/mL
							Benzo[a]anthracene	120 ug/mL
							Benzo[a]pyrene	120 ug/mL
							Benzo[b]fluoranthene	120 ug/mL
							Benzo[g,h,i]perylene	120 ug/mL
							Benzo[k]fluoranthene	120 ug/mL
							Benzyl alcohol	120 ug/mL
							Bis(2-chloroethoxy)methane	120 ug/mL
							Bis(2-chloroethyl)ether	120 ug/mL

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Bis(2-ethylhexyl) phthalate	120 ug/mL
							Butyl benzyl phthalate	120 ug/mL
							Carbazole	120 ug/mL
							Chrysene	120 ug/mL
							Di-n-butyl phthalate	120 ug/mL
							Di-n-octyl phthalate	120 ug/mL
							Dibenz(a,h)anthracene	120 ug/mL
							Dibenzofuran	120 ug/mL
							Diethyl phthalate	120 ug/mL
							Dimethyl phthalate	120 ug/mL
							Diphenylamine	102 ug/mL
							Fluoranthene	120 ug/mL
							Fluorene	120 ug/mL
							Hexachlorobenzene	120 ug/mL
							Hexachlorobutadiene	120 ug/mL
							Hexachlorocyclopentadiene	120 ug/mL
							Hexachloroethane	120 ug/mL
							Hexadecane	120 ug/mL
							Indeno[1,2,3-cd]pyrene	120 ug/mL
							Isophorone	120 ug/mL
							n-Decane	120 ug/mL
							N-Nitrosodi-n-propylamine	120 ug/mL
							N-Nitrosodimethylamine	120 ug/mL
							N-Nitrosodiphenylamine	120 ug/mL
							Naphthalene	120 ug/mL
							Nitrobenzene	120 ug/mL
							Pentachlorophenol	240 ug/mL
							Phenanthrene	120 ug/mL
							Phenol	120 ug/mL
							Pyrene	120 ug/mL
							Pyridine	240 ug/mL
					MS-IS_00014	50 uL	1,4-Dichlorobenzene-d4	40 ug/mL
							Acenaphthene-d10	40 ug/mL
							Chrysene-d12	40 ug/mL
							Naphthalene-d8	40 ug/mL
							Perylene-d12	40 ug/mL
							Phenanthrene-d10	40 ug/mL
.MS-HSLA_STK_00042	09/30/18	04/11/18	Methylene Chloride, Lot 181545	10 mL	MS-567685_00004	0.4 mL	2,4,6 - Tribromophenol	200 ug/mL
							2,4,6-Tribromophenol	200 ug/mL
							2-Fluorobiphenyl	200 ug/mL
							2-Fluorophenol	200 ug/mL
							Nitrobenzene-d5	200 ug/mL
							Phenol-d5	200 ug/mL
							Terphenyl-d14	200 ug/mL
					MS-568023_00042	1 mL	Famphur	200 ug/mL
					MS-568033_00026	0.5 mL	2,3-Dichlorobenzenamine	200 ug/mL
							3,5-Dimethylphenol	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Alachlor	200 ug/mL
							Alpha Methyl Styrene	200 ug/mL
							Benzo[e]pyrene	200 ug/mL
					MS-569730 HSL_00007	1 mL	3,3'-Dichlorobenzidine	200 ug/mL
					MS-569731_00079	2 mL	Benzoic acid	400 ug/mL
							Indene	400 ug/mL
					MS-569732 HSL_00005	1 mL	Atrazine	200 ug/mL
							Caprolactam	200 ug/mL
					MS-571995_00001	2 mL	1,1'-Biphenyl	200 ug/mL
							1,2,4,5-Tetrachlorobenzene	200 ug/mL
							1,2,4-Trichlorobenzene	200 ug/mL
							1,2-Dichlorobenzene	200 ug/mL
							1,2-Diphenylhydrazine	202.195 ug/mL
							1,3-Dichlorobenzene	200 ug/mL
							1,3-Dinitrobenzene	200 ug/mL
							1,4-Dichlorobenzene	200 ug/mL
							1,4-Dioxane	200 ug/mL
							1-Methylnaphthalene	200 ug/mL
							2,2'-oxybis[1-chloropropane]	200 ug/mL
							2,3,4,6-Tetrachlorophenol	200 ug/mL
							2,4,5-Trichlorophenol	200 ug/mL
							2,4,6-Trichlorophenol	200 ug/mL
							2,4-Dichlorophenol	200 ug/mL
							2,4-Dimethylphenol	200 ug/mL
							2,4-Dinitrophenol	400 ug/mL
							2,4-Dinitrotoluene	200 ug/mL
							2,6-Dichlorophenol	200 ug/mL
							2,6-Dinitrotoluene	200 ug/mL
							2-Chloronaphthalene	200 ug/mL
							2-Chlorophenol	200 ug/mL
							2-Methylnaphthalene	200 ug/mL
							2-Methylphenol	200 ug/mL
							2-Nitroaniline	200 ug/mL
							2-Nitrophenol	200 ug/mL
							3 & 4 Methylphenol	200 ug/mL
							3-Methylphenol	200 ug/mL
							3-Nitroaniline	200 ug/mL
							4,6-Dinitro-2-methylphenol	400 ug/mL
							4-Bromophenyl phenyl ether	200 ug/mL
							4-Chloro-3-methylphenol	200 ug/mL
							4-Chloroaniline	200 ug/mL
							4-Chlorophenyl phenyl ether	200 ug/mL
							4-Methylphenol	200 ug/mL
							4-Nitroaniline	200 ug/mL
							4-Nitrophenol	400 ug/mL
							Acenaphthene	200 ug/mL
							Acenaphthylene	200 ug/mL
							Acetophenone	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Aniline	200 ug/mL
							Anthracene	200 ug/mL
							Azobenzene	200 ug/mL
							Benzo[a]anthracene	200 ug/mL
							Benzo[a]pyrene	200 ug/mL
							Benzo[b]fluoranthene	200 ug/mL
							Benzo[g,h,i]perylene	200 ug/mL
							Benzo[k]fluoranthene	200 ug/mL
							Benzyl alcohol	200 ug/mL
							Bis(2-chloroethoxy)methane	200 ug/mL
							Bis(2-chloroethyl)ether	200 ug/mL
							Bis(2-ethylhexyl) phthalate	200 ug/mL
							Butyl benzyl phthalate	200 ug/mL
							Carbazole	200 ug/mL
							Chrysene	200 ug/mL
							Di-n-butyl phthalate	200 ug/mL
							Di-n-octyl phthalate	200 ug/mL
							Dibenz(a,h)anthracene	200 ug/mL
							Dibenzofuran	200 ug/mL
							Diethyl phthalate	200 ug/mL
							Dimethyl phthalate	200 ug/mL
							Diphenylamine	170 ug/mL
							Fluoranthene	200 ug/mL
							Fluorene	200 ug/mL
							Hexachlorobenzene	200 ug/mL
							Hexachlorobutadiene	200 ug/mL
							Hexachlorocyclopentadiene	200 ug/mL
							Hexachloroethane	200 ug/mL
							Hexadecane	200 ug/mL
							Indeno[1,2,3-cd]pyrene	200 ug/mL
							Isophorone	200 ug/mL
							n-Decane	200 ug/mL
							N-Nitrosodi-n-propylamine	200 ug/mL
							N-Nitrosodimethylamine	200 ug/mL
							N-Nitrosodiphenylamine	200 ug/mL
							Naphthalene	200 ug/mL
							Nitrobenzene	200 ug/mL
							Pentachlorophenol	400 ug/mL
							Phenanthrene	200 ug/mL
							Phenol	200 ug/mL
							Pyrene	200 ug/mL
							Pyridine	400 ug/mL
..MS-567685_00004	01/30/19		Restek, Lot A0130500		(Purchased Reagent)		2,4,6 - Tribromophenol	5000 ug/mL
							2,4,6-Tribromophenol	5000 ug/mL
							2-Fluorobiphenyl	5000 ug/mL
							2-Fluorophenol	5000 ug/mL
							Nitrobenzene-d5	5000 ug/mL
							Phenol-d5	5000 ug/mL

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Terphenyl-d14	5000 ug/mL
..MS-568023_00042	05/31/19		Restek, Lot A0127668		(Purchased Reagent)		Famphur	2000 ug/mL
..MS-568033_00026	06/30/19		Restek, Lot A0133057		(Purchased Reagent)		2,3-Dichlorobenzenamine	4000 ug/mL
							3,5-Dimethylphenol	4000 ug/mL
							Alachlor	4000 ug/mL
							Alpha Methyl Styrene	4000 ug/mL
							Benzo[e]pyrene	4000 ug/mL
..MS-569730 HSL_00007	11/30/18		Restek, Lot A0127472		(Purchased Reagent)		3,3'-Dichlorobenzidine	2000 ug/mL
..MS-569731_00079	03/31/19		Restek, Lot A0130477		(Purchased Reagent)		Benzoic acid	2000 ug/mL
							Indene	2000 ug/mL
..MS-569732 HSL_00005	11/30/18		Restek, Lot A0127580		(Purchased Reagent)		Atrazine	2000 ug/mL
							Caprolactam	2000 ug/mL
..MS-571995_00001	09/30/18		Restek, Lot A0125805		(Purchased Reagent)		1,1'-Biphenyl	1000 ug/mL
							1,2,4,5-Tetrachlorobenzene	1000 ug/mL
							1,2,4-Trichlorobenzene	1000 ug/mL
							1,2-Dichlorobenzene	1000 ug/mL
							1,2-Diphenylhydrazine	1010.97 ug/mL
							1,3-Dichlorobenzene	1000 ug/mL
							1,3-Dinitrobenzene	1000 ug/mL
							1,4-Dichlorobenzene	1000 ug/mL
							1,4-Dioxane	1000 ug/mL
							1-Methylnaphthalene	1000 ug/mL
							2,2'-oxybis[1-chloropropane]	1000 ug/mL
							2,3,4,6-Tetrachlorophenol	1000 ug/mL
							2,4,5-Trichlorophenol	1000 ug/mL
							2,4,6-Trichlorophenol	1000 ug/mL
							2,4-Dichlorophenol	1000 ug/mL
							2,4-Dimethylphenol	1000 ug/mL
							2,4-Dinitrophenol	2000 ug/mL
							2,4-Dinitrotoluene	1000 ug/mL
							2,6-Dichlorophenol	1000 ug/mL
							2,6-Dinitrotoluene	1000 ug/mL
							2-Chloronaphthalene	1000 ug/mL
							2-Chlorophenol	1000 ug/mL
							2-Methylnaphthalene	1000 ug/mL
							2-Methylphenol	1000 ug/mL
							2-Nitroaniline	1000 ug/mL
							2-Nitrophenol	1000 ug/mL
							3 & 4 Methylphenol	1000 ug/mL
							3-Methylphenol	1000 ug/mL
							3-Nitroaniline	1000 ug/mL
							4,6-Dinitro-2-methylphenol	2000 ug/mL
							4-Bromophenyl phenyl ether	1000 ug/mL
							4-Chloro-3-methylphenol	1000 ug/mL
							4-Chloroaniline	1000 ug/mL
							4-Chlorophenyl phenyl ether	1000 ug/mL
							4-Methylphenol	1000 ug/mL
							4-Nitroaniline	1000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							4-Nitrophenol	2000 ug/mL
							Acenaphthene	1000 ug/mL
							Acenaphthylene	1000 ug/mL
							Acetophenone	1000 ug/mL
							Aniline	1000 ug/mL
							Anthracene	1000 ug/mL
							Azobenzene	1000 ug/mL
							Benzo[a]anthracene	1000 ug/mL
							Benzo[a]pyrene	1000 ug/mL
							Benzo[b]fluoranthene	1000 ug/mL
							Benzo[g,h,i]perylene	1000 ug/mL
							Benzo[k]fluoranthene	1000 ug/mL
							Benzyl alcohol	1000 ug/mL
							Bis(2-chloroethoxy)methane	1000 ug/mL
							Bis(2-chloroethyl)ether	1000 ug/mL
							Bis(2-ethylhexyl) phthalate	1000 ug/mL
							Butyl benzyl phthalate	1000 ug/mL
							Carbazole	1000 ug/mL
							Chrysene	1000 ug/mL
							Di-n-butyl phthalate	1000 ug/mL
							Di-n-octyl phthalate	1000 ug/mL
							Dibenz(a,h)anthracene	1000 ug/mL
							Dibenzofuran	1000 ug/mL
							Diethyl phthalate	1000 ug/mL
							Dimethyl phthalate	1000 ug/mL
							Diphenylamine	850 ug/mL
							Fluoranthene	1000 ug/mL
							Fluorene	1000 ug/mL
							Hexachlorobenzene	1000 ug/mL
							Hexachlorobutadiene	1000 ug/mL
							Hexachlorocyclopentadiene	1000 ug/mL
							Hexachloroethane	1000 ug/mL
							Hexadecane	1000 ug/mL
							Indeno[1,2,3-cd]pyrene	1000 ug/mL
							Isophorone	1000 ug/mL
							n-Decane	1000 ug/mL
							N-Nitrosodi-n-propylamine	1000 ug/mL
							N-Nitrosodimethylamine	1000 ug/mL
							N-Nitrosodiphenylamine	1000 ug/mL
							Naphthalene	1000 ug/mL
							Nitrobenzene	1000 ug/mL
							Pentachlorophenol	2000 ug/mL
							Phenanthrene	1000 ug/mL
							Phenol	1000 ug/mL
							Pyrene	1000 ug/mL
							Pyridine	2000 ug/mL
.MS-IS_00014	04/04/19	04/04/18	Methylene Chloride, Lot 181545	250 mL	MS-567684_00019	5 mL	1,4-Dichlorobenzene-d4	400 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
					MS-567684_00020	45 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
..MS-567684_00019	07/31/20		Restek, Lot A0112833		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
..MS-567684_00020	08/31/22		Restek, Lot A0129635		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
MS-HSLA160_00036	09/30/18	06/18/18	Methylene Chloride, Lot 187286	0.5 mL	MS-HSLA_STK_00042	400 uL	2,4,6 - Tribromophenol	160 ug/mL
							2,4,6-Tribromophenol	160 ug/mL
							2-Fluorobiphenyl	160 ug/mL
							2-Fluorophenol	160 ug/mL
							Nitrobenzene-d5	160 ug/mL
							Phenol-d5	160 ug/mL
							Terphenyl-d14	160 ug/mL
							Famphur	160 ug/mL
							2,3-Dichlorobenzenamine	160 ug/mL
							3,5-Dimethylphenol	160 ug/mL
							Alachlor	160 ug/mL
							Alpha Methyl Styrene	160 ug/mL
							Benzo[e]pyrene	160 ug/mL
							3,3'-Dichlorobenzidine	160 ug/mL
							Benzoic acid	320 ug/mL
							Indene	320 ug/mL
							Atrazine	160 ug/mL
							Caprolactam	160 ug/mL
							1,1'-Biphenyl	160 ug/mL
							1,2,4,5-Tetrachlorobenzene	160 ug/mL
							1,2,4-Trichlorobenzene	160 ug/mL
							1,2-Dichlorobenzene	160 ug/mL
							1,2-Diphenylhydrazine	161.756 ug/mL
							1,3-Dichlorobenzene	160 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							1,3-Dinitrobenzene	160 ug/mL
							1,4-Dichlorobenzene	160 ug/mL
							1,4-Dioxane	160 ug/mL
							1-Methylnaphthalene	160 ug/mL
							2,2'-oxybis[1-chloropropane]	160 ug/mL
							2,3,4,6-Tetrachlorophenol	160 ug/mL
							2,4,5-Trichlorophenol	160 ug/mL
							2,4,6-Trichlorophenol	160 ug/mL
							2,4-Dichlorophenol	160 ug/mL
							2,4-Dimethylphenol	160 ug/mL
							2,4-Dinitrophenol	320 ug/mL
							2,4-Dinitrotoluene	160 ug/mL
							2,6-Dichlorophenol	160 ug/mL
							2,6-Dinitrotoluene	160 ug/mL
							2-Chloronaphthalene	160 ug/mL
							2-Chlorophenol	160 ug/mL
							2-Methylnaphthalene	160 ug/mL
							2-Methylphenol	160 ug/mL
							2-Nitroaniline	160 ug/mL
							2-Nitrophenol	160 ug/mL
							3 & 4 Methylphenol	160 ug/mL
							3-Methylphenol	160 ug/mL
							3-Nitroaniline	160 ug/mL
							4,6-Dinitro-2-methylphenol	320 ug/mL
							4-Bromophenyl phenyl ether	160 ug/mL
							4-Chloro-3-methylphenol	160 ug/mL
							4-Chloroaniline	160 ug/mL
							4-Chlorophenyl phenyl ether	160 ug/mL
							4-Methylphenol	160 ug/mL
							4-Nitroaniline	160 ug/mL
							4-Nitrophenol	320 ug/mL
							Acenaphthene	160 ug/mL
							Acenaphthylene	160 ug/mL
							Acetophenone	160 ug/mL
							Aniline	160 ug/mL
							Anthracene	160 ug/mL
							Azobenzene	160 ug/mL
							Benzo[a]anthracene	160 ug/mL
							Benzo[a]pyrene	160 ug/mL
							Benzo[b]fluoranthene	160 ug/mL
							Benzo[g,h,i]perylene	160 ug/mL
							Benzo[k]fluoranthene	160 ug/mL
							Benzyl alcohol	160 ug/mL
							Bis(2-chloroethoxy)methane	160 ug/mL
							Bis(2-chloroethyl)ether	160 ug/mL
							Bis(2-ethylhexyl) phthalate	160 ug/mL
							Butyl benzyl phthalate	160 ug/mL
							Carbazole	160 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Chrysene	160 ug/mL
							Di-n-butyl phthalate	160 ug/mL
							Di-n-octyl phthalate	160 ug/mL
							Dibenz(a,h)anthracene	160 ug/mL
							Dibenzofuran	160 ug/mL
							Diethyl phthalate	160 ug/mL
							Dimethyl phthalate	160 ug/mL
							Diphenylamine	136 ug/mL
							Fluoranthene	160 ug/mL
							Fluorene	160 ug/mL
							Hexachlorobenzene	160 ug/mL
							Hexachlorobutadiene	160 ug/mL
							Hexachlorocyclopentadiene	160 ug/mL
							Hexachloroethane	160 ug/mL
							Hexadecane	160 ug/mL
							Indeno[1,2,3-cd]pyrene	160 ug/mL
							Isophorone	160 ug/mL
							n-Decane	160 ug/mL
							N-Nitrosodi-n-propylamine	160 ug/mL
							N-Nitrosodimethylamine	160 ug/mL
							N-Nitrosodiphenylamine	160 ug/mL
							Naphthalene	160 ug/mL
							Nitrobenzene	160 ug/mL
							Pentachlorophenol	320 ug/mL
							Phenanthrene	160 ug/mL
							Phenol	160 ug/mL
							Pyrene	160 ug/mL
							Pyridine	320 ug/mL
					MS-IS_00014	50 uL	1,4-Dichlorobenzene-d4	40 ug/mL
							Acenaphthene-d10	40 ug/mL
							Chrysene-d12	40 ug/mL
							Naphthalene-d8	40 ug/mL
							Perylene-d12	40 ug/mL
							Phenanthrene-d10	40 ug/mL
.MS-HSLA_STK_00042	09/30/18	04/11/18	Methylene Chloride, Lot 181545	10 mL	MS-567685_00004	0.4 mL	2,4,6 - Tribromophenol	200 ug/mL
							2,4,6-Tribromophenol	200 ug/mL
							2-Fluorobiphenyl	200 ug/mL
							2-Fluorophenol	200 ug/mL
							Nitrobenzene-d5	200 ug/mL
							Phenol-d5	200 ug/mL
							Terphenyl-d14	200 ug/mL
					MS-568023_00042	1 mL	Famphur	200 ug/mL
					MS-568033_00026	0.5 mL	2,3-Dichlorobenzenamine	200 ug/mL
							3,5-Dimethylphenol	200 ug/mL
							Alachlor	200 ug/mL
							Alpha Methyl Styrene	200 ug/mL
							Benzo[e]pyrene	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					MS-569730 HSL_00007	1 mL	3,3'-Dichlorobenzidine	200 ug/mL
					MS-569731_00079	2 mL	Benzoic acid	400 ug/mL
							Indene	400 ug/mL
					MS-569732 HSL_00005	1 mL	Atrazine	200 ug/mL
							Caprolactam	200 ug/mL
					MS-571995_00001	2 mL	1,1'-Biphenyl	200 ug/mL
							1,2,4,5-Tetrachlorobenzene	200 ug/mL
							1,2,4-Trichlorobenzene	200 ug/mL
							1,2-Dichlorobenzene	200 ug/mL
							1,2-Diphenylhydrazine	202.195 ug/mL
							1,3-Dichlorobenzene	200 ug/mL
							1,3-Dinitrobenzene	200 ug/mL
							1,4-Dichlorobenzene	200 ug/mL
							1,4-Dioxane	200 ug/mL
							1-Methylnaphthalene	200 ug/mL
							2,2'-oxybis[1-chloropropane]	200 ug/mL
							2,3,4,6-Tetrachlorophenol	200 ug/mL
							2,4,5-Trichlorophenol	200 ug/mL
							2,4,6-Trichlorophenol	200 ug/mL
							2,4-Dichlorophenol	200 ug/mL
							2,4-Dimethylphenol	200 ug/mL
							2,4-Dinitrophenol	400 ug/mL
							2,4-Dinitrotoluene	200 ug/mL
							2,6-Dichlorophenol	200 ug/mL
							2,6-Dinitrotoluene	200 ug/mL
							2-Chloronaphthalene	200 ug/mL
							2-Chlorophenol	200 ug/mL
							2-Methylnaphthalene	200 ug/mL
							2-Methylphenol	200 ug/mL
							2-Nitroaniline	200 ug/mL
							2-Nitrophenol	200 ug/mL
							3 & 4 Methylphenol	200 ug/mL
							3-Methylphenol	200 ug/mL
							3-Nitroaniline	200 ug/mL
							4,6-Dinitro-2-methylphenol	400 ug/mL
							4-Bromophenyl phenyl ether	200 ug/mL
							4-Chloro-3-methylphenol	200 ug/mL
							4-Chloroaniline	200 ug/mL
							4-Chlorophenyl phenyl ether	200 ug/mL
							4-Methylphenol	200 ug/mL
							4-Nitroaniline	200 ug/mL
							4-Nitrophenol	400 ug/mL
							Acenaphthene	200 ug/mL
							Acenaphthylene	200 ug/mL
							Acetophenone	200 ug/mL
							Aniline	200 ug/mL
							Anthracene	200 ug/mL
							Azobenzene	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Benzo[a]anthracene	200 ug/mL
							Benzo[a]pyrene	200 ug/mL
							Benzo[b]fluoranthene	200 ug/mL
							Benzo[g,h,i]perylene	200 ug/mL
							Benzo[k]fluoranthene	200 ug/mL
							Benzyl alcohol	200 ug/mL
							Bis(2-chloroethoxy)methane	200 ug/mL
							Bis(2-chloroethyl)ether	200 ug/mL
							Bis(2-ethylhexyl) phthalate	200 ug/mL
							Butyl benzyl phthalate	200 ug/mL
							Carbazole	200 ug/mL
							Chrysene	200 ug/mL
							Di-n-butyl phthalate	200 ug/mL
							Di-n-octyl phthalate	200 ug/mL
							Dibenz(a,h)anthracene	200 ug/mL
							Dibenzofuran	200 ug/mL
							Diethyl phthalate	200 ug/mL
							Dimethyl phthalate	200 ug/mL
							Diphenylamine	170 ug/mL
							Fluoranthene	200 ug/mL
							Fluorene	200 ug/mL
							Hexachlorobenzene	200 ug/mL
							Hexachlorobutadiene	200 ug/mL
							Hexachlorocyclopentadiene	200 ug/mL
							Hexachloroethane	200 ug/mL
							Hexadecane	200 ug/mL
							Indeno[1,2,3-cd]pyrene	200 ug/mL
							Isophorone	200 ug/mL
							n-Decane	200 ug/mL
							N-Nitrosodi-n-propylamine	200 ug/mL
							N-Nitrosodimethylamine	200 ug/mL
							N-Nitrosodiphenylamine	200 ug/mL
							Naphthalene	200 ug/mL
							Nitrobenzene	200 ug/mL
							Pentachlorophenol	400 ug/mL
							Phenanthrene	200 ug/mL
							Phenol	200 ug/mL
							Pyrene	200 ug/mL
							Pyridine	400 ug/mL
..MS-567685_00004	01/30/19		Restek, Lot A0130500		(Purchased Reagent)		2,4,6 - Tribromophenol	5000 ug/mL
							2,4,6-Tribromophenol	5000 ug/mL
							2-Fluorobiphenyl	5000 ug/mL
							2-Fluorophenol	5000 ug/mL
							Nitrobenzene-d5	5000 ug/mL
							Phenol-d5	5000 ug/mL
							Terphenyl-d14	5000 ug/mL
..MS-568023_00042	05/31/19		Restek, Lot A0127668		(Purchased Reagent)		Famphur	2000 ug/mL
..MS-568033_00026	06/30/19		Restek, Lot A0133057		(Purchased Reagent)		2,3-Dichlorobenzenamine	4000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							3,5-Dimethylphenol	4000 ug/mL
							Alachlor	4000 ug/mL
							Alpha Methyl Styrene	4000 ug/mL
							Benzo[e]pyrene	4000 ug/mL
..MS-569730 HSL_00007	11/30/18		Restek, Lot A0127472		(Purchased Reagent)		3,3'-Dichlorobenzidine	2000 ug/mL
..MS-569731_00079	03/31/19		Restek, Lot A0130477		(Purchased Reagent)		Benzoic acid	2000 ug/mL
							Indene	2000 ug/mL
..MS-569732 HSL_00005	11/30/18		Restek, Lot A0127580		(Purchased Reagent)		Atrazine	2000 ug/mL
							Caprolactam	2000 ug/mL
..MS-571995_00001	09/30/18		Restek, Lot A0125805		(Purchased Reagent)		1,1'-Biphenyl	1000 ug/mL
							1,2,4,5-Tetrachlorobenzene	1000 ug/mL
							1,2,4-Trichlorobenzene	1000 ug/mL
							1,2-Dichlorobenzene	1000 ug/mL
							1,2-Diphenylhydrazine	1010.97 ug/mL
							1,3-Dichlorobenzene	1000 ug/mL
							1,3-Dinitrobenzene	1000 ug/mL
							1,4-Dichlorobenzene	1000 ug/mL
							1,4-Dioxane	1000 ug/mL
							1-Methylnaphthalene	1000 ug/mL
							2,2'-oxybis[1-chloropropane]	1000 ug/mL
							2,3,4,6-Tetrachlorophenol	1000 ug/mL
							2,4,5-Trichlorophenol	1000 ug/mL
							2,4,6-Trichlorophenol	1000 ug/mL
							2,4-Dichlorophenol	1000 ug/mL
							2,4-Dimethylphenol	1000 ug/mL
							2,4-Dinitrophenol	2000 ug/mL
							2,4-Dinitrotoluene	1000 ug/mL
							2,6-Dichlorophenol	1000 ug/mL
							2,6-Dinitrotoluene	1000 ug/mL
							2-Chloronaphthalene	1000 ug/mL
							2-Chlorophenol	1000 ug/mL
							2-Methylnaphthalene	1000 ug/mL
							2-Methylphenol	1000 ug/mL
							2-Nitroaniline	1000 ug/mL
							2-Nitrophenol	1000 ug/mL
							3 & 4 Methylphenol	1000 ug/mL
							3-Methylphenol	1000 ug/mL
							3-Nitroaniline	1000 ug/mL
							4,6-Dinitro-2-methylphenol	2000 ug/mL
							4-Bromophenyl phenyl ether	1000 ug/mL
							4-Chloro-3-methylphenol	1000 ug/mL
							4-Chloroaniline	1000 ug/mL
							4-Chlorophenyl phenyl ether	1000 ug/mL
							4-Methylphenol	1000 ug/mL
							4-Nitroaniline	1000 ug/mL
							4-Nitrophenol	2000 ug/mL
							Acenaphthene	1000 ug/mL
							Acenaphthylene	1000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Acetophenone	1000 ug/mL
							Aniline	1000 ug/mL
							Anthracene	1000 ug/mL
							Azobenzene	1000 ug/mL
							Benzo[a]anthracene	1000 ug/mL
							Benzo[a]pyrene	1000 ug/mL
							Benzo[b]fluoranthene	1000 ug/mL
							Benzo[g,h,i]perylene	1000 ug/mL
							Benzo[k]fluoranthene	1000 ug/mL
							Benzyl alcohol	1000 ug/mL
							Bis(2-chloroethoxy)methane	1000 ug/mL
							Bis(2-chloroethyl)ether	1000 ug/mL
							Bis(2-ethylhexyl) phthalate	1000 ug/mL
							Butyl benzyl phthalate	1000 ug/mL
							Carbazole	1000 ug/mL
							Chrysene	1000 ug/mL
							Di-n-butyl phthalate	1000 ug/mL
							Di-n-octyl phthalate	1000 ug/mL
							Dibenz(a,h)anthracene	1000 ug/mL
							Dibenzofuran	1000 ug/mL
							Diethyl phthalate	1000 ug/mL
							Dimethyl phthalate	1000 ug/mL
							Diphenylamine	850 ug/mL
							Fluoranthene	1000 ug/mL
							Fluorene	1000 ug/mL
							Hexachlorobenzene	1000 ug/mL
							Hexachlorobutadiene	1000 ug/mL
							Hexachlorocyclopentadiene	1000 ug/mL
							Hexachloroethane	1000 ug/mL
							Hexadecane	1000 ug/mL
							Indeno[1,2,3-cd]pyrene	1000 ug/mL
							Isophorone	1000 ug/mL
							n-Decane	1000 ug/mL
							N-Nitrosodi-n-propylamine	1000 ug/mL
							N-Nitrosodimethylamine	1000 ug/mL
							N-Nitrosodiphenylamine	1000 ug/mL
							Naphthalene	1000 ug/mL
							Nitrobenzene	1000 ug/mL
							Pentachlorophenol	2000 ug/mL
							Phenanthrene	1000 ug/mL
							Phenol	1000 ug/mL
							Pyrene	1000 ug/mL
							Pyridine	2000 ug/mL
.MS-IS_00014	04/04/19	04/04/18	Methylene Chloride, Lot 181545	250 mL	MS-567684_00019	5 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
					MS-567684_00020	45 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
..MS-567684_00019	07/31/20		Restek, Lot A0112833		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
..MS-567684_00020	08/31/22		Restek, Lot A0129635		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
MS-HSLA200_00036	09/30/18	06/18/18	Methylene Chloride, Lot 187286	0.5 mL	MS-HSLA_STK_00042	500 uL	2,4,6 - Tribromophenol	200 ug/mL
							2,4,6-Tribromophenol	200 ug/mL
							2-Fluorobiphenyl	200 ug/mL
							2-Fluorophenol	200 ug/mL
							Nitrobenzene-d5	200 ug/mL
							Phenol-d5	200 ug/mL
							Terphenyl-d14	200 ug/mL
							Famphur	200 ug/mL
							2,3-Dichlorobenzenamine	200 ug/mL
							3,5-Dimethylphenol	200 ug/mL
							Alachlor	200 ug/mL
							Alpha Methyl Styrene	200 ug/mL
							Benzo[e]pyrene	200 ug/mL
							3,3'-Dichlorobenzidine	200 ug/mL
							Benzoic acid	400 ug/mL
							Indene	400 ug/mL
							Atrazine	200 ug/mL
							Caprolactam	200 ug/mL
							1,1'-Biphenyl	200 ug/mL
							1,2,4,5-Tetrachlorobenzene	200 ug/mL
							1,2,4-Trichlorobenzene	200 ug/mL
							1,2-Dichlorobenzene	200 ug/mL
							1,2-Diphenylhydrazine	202.195 ug/mL
							1,3-Dichlorobenzene	200 ug/mL
							1,3-Dinitrobenzene	200 ug/mL
							1,4-Dichlorobenzene	200 ug/mL
							1,4-Dioxane	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							1-Methylnaphthalene	200 ug/mL
							2,2'-oxybis[1-chloropropane]	200 ug/mL
							2,3,4,6-Tetrachlorophenol	200 ug/mL
							2,4,5-Trichlorophenol	200 ug/mL
							2,4,6-Trichlorophenol	200 ug/mL
							2,4-Dichlorophenol	200 ug/mL
							2,4-Dimethylphenol	200 ug/mL
							2,4-Dinitrophenol	400 ug/mL
							2,4-Dinitrotoluene	200 ug/mL
							2,6-Dichlorophenol	200 ug/mL
							2,6-Dinitrotoluene	200 ug/mL
							2-Chloronaphthalene	200 ug/mL
							2-Chlorophenol	200 ug/mL
							2-Methylnaphthalene	200 ug/mL
							2-Methylphenol	200 ug/mL
							2-Nitroaniline	200 ug/mL
							2-Nitrophenol	200 ug/mL
							3 & 4 Methylphenol	200 ug/mL
							3-Methylphenol	200 ug/mL
							3-Nitroaniline	200 ug/mL
							4,6-Dinitro-2-methylphenol	400 ug/mL
							4-Bromophenyl phenyl ether	200 ug/mL
							4-Chloro-3-methylphenol	200 ug/mL
							4-Chloroaniline	200 ug/mL
							4-Chlorophenyl phenyl ether	200 ug/mL
							4-Methylphenol	200 ug/mL
							4-Nitroaniline	200 ug/mL
							4-Nitrophenol	400 ug/mL
							Acenaphthene	200 ug/mL
							Acenaphthylene	200 ug/mL
							Acetophenone	200 ug/mL
							Aniline	200 ug/mL
							Anthracene	200 ug/mL
							Azobenzene	200 ug/mL
							Benzo[a]anthracene	200 ug/mL
							Benzo[a]pyrene	200 ug/mL
							Benzo[b]fluoranthene	200 ug/mL
							Benzo[g,h,i]perylene	200 ug/mL
							Benzo[k]fluoranthene	200 ug/mL
							Benzyl alcohol	200 ug/mL
							Bis(2-chloroethoxy)methane	200 ug/mL
							Bis(2-chloroethyl)ether	200 ug/mL
							Bis(2-ethylhexyl) phthalate	200 ug/mL
							Butyl benzyl phthalate	200 ug/mL
							Carbazole	200 ug/mL
							Chrysene	200 ug/mL
							Di-n-butyl phthalate	200 ug/mL
							Di-n-octyl phthalate	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Dibenz(a,h)anthracene	200 ug/mL
							Dibenzofuran	200 ug/mL
							Diethyl phthalate	200 ug/mL
							Dimethyl phthalate	200 ug/mL
							Diphenylamine	170 ug/mL
							Fluoranthene	200 ug/mL
							Fluorene	200 ug/mL
							Hexachlorobenzene	200 ug/mL
							Hexachlorobutadiene	200 ug/mL
							Hexachlorocyclopentadiene	200 ug/mL
							Hexachloroethane	200 ug/mL
							Hexadecane	200 ug/mL
							Indeno[1,2,3-cd]pyrene	200 ug/mL
							Isophorone	200 ug/mL
							n-Decane	200 ug/mL
							N-Nitrosodi-n-propylamine	200 ug/mL
							N-Nitrosodimethylamine	200 ug/mL
							N-Nitrosodiphenylamine	200 ug/mL
							Naphthalene	200 ug/mL
							Nitrobenzene	200 ug/mL
							Pentachlorophenol	400 ug/mL
							Phenanthrene	200 ug/mL
							Phenol	200 ug/mL
							Pyrene	200 ug/mL
							Pyridine	400 ug/mL
					MS-IS_00014	50 uL	1,4-Dichlorobenzene-d4	40 ug/mL
							Acenaphthene-d10	40 ug/mL
							Chrysene-d12	40 ug/mL
							Naphthalene-d8	40 ug/mL
							Perylene-d12	40 ug/mL
							Phenanthrene-d10	40 ug/mL
.MS-HSLA_STK_00042	09/30/18	04/11/18	Methylene Chloride, Lot 181545	10 mL	MS-567685_00004	0.4 mL	2,4,6 - Tribromophenol	200 ug/mL
							2,4,6-Tribromophenol	200 ug/mL
							2-Fluorobiphenyl	200 ug/mL
							2-Fluorophenol	200 ug/mL
							Nitrobenzene-d5	200 ug/mL
							Phenol-d5	200 ug/mL
							Terphenyl-d14	200 ug/mL
					MS-568023_00042	1 mL	Famphur	200 ug/mL
					MS-568033_00026	0.5 mL	2,3-Dichlorobenzenamine	200 ug/mL
							3,5-Dimethylphenol	200 ug/mL
							Alachlor	200 ug/mL
							Alpha Methyl Styrene	200 ug/mL
							Benzo[e]pyrene	200 ug/mL
					MS-569730 HSL_00007	1 mL	3,3'-Dichlorobenzidine	200 ug/mL
					MS-569731_00079	2 mL	Benzoic acid	400 ug/mL
							Indene	400 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					MS-569732 HSL_00005	1 mL	Atrazine	200 ug/mL
							Caprolactam	200 ug/mL
					MS-571995_00001	2 mL	1,1'-Biphenyl	200 ug/mL
							1,2,4,5-Tetrachlorobenzene	200 ug/mL
							1,2,4-Trichlorobenzene	200 ug/mL
							1,2-Dichlorobenzene	200 ug/mL
							1,2-Diphenylhydrazine	202.195 ug/mL
							1,3-Dichlorobenzene	200 ug/mL
							1,3-Dinitrobenzene	200 ug/mL
							1,4-Dichlorobenzene	200 ug/mL
							1,4-Dioxane	200 ug/mL
							1-Methylnaphthalene	200 ug/mL
							2,2'-oxybis[1-chloropropane]	200 ug/mL
							2,3,4,6-Tetrachlorophenol	200 ug/mL
							2,4,5-Trichlorophenol	200 ug/mL
							2,4,6-Trichlorophenol	200 ug/mL
							2,4-Dichlorophenol	200 ug/mL
							2,4-Dimethylphenol	200 ug/mL
							2,4-Dinitrophenol	400 ug/mL
							2,4-Dinitrotoluene	200 ug/mL
							2,6-Dichlorophenol	200 ug/mL
							2,6-Dinitrotoluene	200 ug/mL
							2-Chloronaphthalene	200 ug/mL
							2-Chlorophenol	200 ug/mL
							2-Methylnaphthalene	200 ug/mL
							2-Methylphenol	200 ug/mL
							2-Nitroaniline	200 ug/mL
							2-Nitrophenol	200 ug/mL
							3 & 4 Methylphenol	200 ug/mL
							3-Methylphenol	200 ug/mL
							3-Nitroaniline	200 ug/mL
							4,6-Dinitro-2-methylphenol	400 ug/mL
							4-Bromophenyl phenyl ether	200 ug/mL
							4-Chloro-3-methylphenol	200 ug/mL
							4-Chloroaniline	200 ug/mL
							4-Chlorophenyl phenyl ether	200 ug/mL
							4-Methylphenol	200 ug/mL
							4-Nitroaniline	200 ug/mL
							4-Nitrophenol	400 ug/mL
							Acenaphthene	200 ug/mL
							Acenaphthylene	200 ug/mL
							Acetophenone	200 ug/mL
							Aniline	200 ug/mL
							Anthracene	200 ug/mL
							Azobenzene	200 ug/mL
							Benzo[a]anthracene	200 ug/mL
							Benzo[a]pyrene	200 ug/mL
							Benzo[b]fluoranthene	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Benzo[g,h,i]perylene	200 ug/mL
							Benzo[k]fluoranthene	200 ug/mL
							Benzyl alcohol	200 ug/mL
							Bis(2-chloroethoxy)methane	200 ug/mL
							Bis(2-chloroethyl)ether	200 ug/mL
							Bis(2-ethylhexyl) phthalate	200 ug/mL
							Butyl benzyl phthalate	200 ug/mL
							Carbazole	200 ug/mL
							Chrysene	200 ug/mL
							Di-n-butyl phthalate	200 ug/mL
							Di-n-octyl phthalate	200 ug/mL
							Dibenz(a,h)anthracene	200 ug/mL
							Dibenzofuran	200 ug/mL
							Diethyl phthalate	200 ug/mL
							Dimethyl phthalate	200 ug/mL
							Diphenylamine	170 ug/mL
							Fluoranthene	200 ug/mL
							Fluorene	200 ug/mL
							Hexachlorobenzene	200 ug/mL
							Hexachlorobutadiene	200 ug/mL
							Hexachlorocyclopentadiene	200 ug/mL
							Hexachloroethane	200 ug/mL
							Hexadecane	200 ug/mL
							Indeno[1,2,3-cd]pyrene	200 ug/mL
							Isophorone	200 ug/mL
							n-Decane	200 ug/mL
							N-Nitrosodi-n-propylamine	200 ug/mL
							N-Nitrosodimethylamine	200 ug/mL
							N-Nitrosodiphenylamine	200 ug/mL
							Naphthalene	200 ug/mL
							Nitrobenzene	200 ug/mL
							Pentachlorophenol	400 ug/mL
							Phenanthrene	200 ug/mL
							Phenol	200 ug/mL
							Pyrene	200 ug/mL
							Pyridine	400 ug/mL
..MS-567685_00004	01/30/19		Restek, Lot A0130500		(Purchased Reagent)		2,4,6 - Tribromophenol	5000 ug/mL
							2,4,6-Tribromophenol	5000 ug/mL
							2-Fluorobiphenyl	5000 ug/mL
							2-Fluorophenol	5000 ug/mL
							Nitrobenzene-d5	5000 ug/mL
							Phenol-d5	5000 ug/mL
							Terphenyl-d14	5000 ug/mL
..MS-568023_00042	05/31/19		Restek, Lot A0127668		(Purchased Reagent)		Famphur	2000 ug/mL
..MS-568033_00026	06/30/19		Restek, Lot A0133057		(Purchased Reagent)		2,3-Dichlorobenzenamine	4000 ug/mL
							3,5-Dimethylphenol	4000 ug/mL
							Alachlor	4000 ug/mL
							Alpha Methyl Styrene	4000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Benzo[e]pyrene	4000 ug/mL
..MS-569730 HSL_00007	11/30/18		Restek, Lot A0127472		(Purchased Reagent)		3,3'-Dichlorobenzidine	2000 ug/mL
..MS-569731_00079	03/31/19		Restek, Lot A0130477		(Purchased Reagent)		Benzoic acid	2000 ug/mL
							Indene	2000 ug/mL
..MS-569732 HSL_00005	11/30/18		Restek, Lot A0127580		(Purchased Reagent)		Atrazine	2000 ug/mL
							Caprolactam	2000 ug/mL
..MS-571995_00001	09/30/18		Restek, Lot A0125805		(Purchased Reagent)		1,1'-Biphenyl	1000 ug/mL
							1,2,4,5-Tetrachlorobenzene	1000 ug/mL
							1,2,4-Trichlorobenzene	1000 ug/mL
							1,2-Dichlorobenzene	1000 ug/mL
							1,2-Diphenylhydrazine	1010.97 ug/mL
							1,3-Dichlorobenzene	1000 ug/mL
							1,3-Dinitrobenzene	1000 ug/mL
							1,4-Dichlorobenzene	1000 ug/mL
							1,4-Dioxane	1000 ug/mL
							1-Methylnaphthalene	1000 ug/mL
							2,2'-oxybis[1-chloropropane]	1000 ug/mL
							2,3,4,6-Tetrachlorophenol	1000 ug/mL
							2,4,5-Trichlorophenol	1000 ug/mL
							2,4,6-Trichlorophenol	1000 ug/mL
							2,4-Dichlorophenol	1000 ug/mL
							2,4-Dimethylphenol	1000 ug/mL
							2,4-Dinitrophenol	2000 ug/mL
							2,4-Dinitrotoluene	1000 ug/mL
							2,6-Dichlorophenol	1000 ug/mL
							2,6-Dinitrotoluene	1000 ug/mL
							2-Chloronaphthalene	1000 ug/mL
							2-Chlorophenol	1000 ug/mL
							2-Methylnaphthalene	1000 ug/mL
							2-Methylphenol	1000 ug/mL
							2-Nitroaniline	1000 ug/mL
							2-Nitrophenol	1000 ug/mL
							3 & 4 Methylphenol	1000 ug/mL
							3-Methylphenol	1000 ug/mL
							3-Nitroaniline	1000 ug/mL
							4,6-Dinitro-2-methylphenol	2000 ug/mL
							4-Bromophenyl phenyl ether	1000 ug/mL
							4-Chloro-3-methylphenol	1000 ug/mL
							4-Chloroaniline	1000 ug/mL
							4-Chlorophenyl phenyl ether	1000 ug/mL
							4-Methylphenol	1000 ug/mL
							4-Nitroaniline	1000 ug/mL
							4-Nitrophenol	2000 ug/mL
							Acenaphthene	1000 ug/mL
							Acenaphthylene	1000 ug/mL
							Acetophenone	1000 ug/mL
							Aniline	1000 ug/mL
							Anthracene	1000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Azobenzene	1000 ug/mL
							Benzo[a]anthracene	1000 ug/mL
							Benzo[a]pyrene	1000 ug/mL
							Benzo[b]fluoranthene	1000 ug/mL
							Benzo[g,h,i]perylene	1000 ug/mL
							Benzo[k]fluoranthene	1000 ug/mL
							Benzyl alcohol	1000 ug/mL
							Bis(2-chloroethoxy)methane	1000 ug/mL
							Bis(2-chloroethyl)ether	1000 ug/mL
							Bis(2-ethylhexyl) phthalate	1000 ug/mL
							Butyl benzyl phthalate	1000 ug/mL
							Carbazole	1000 ug/mL
							Chrysene	1000 ug/mL
							Di-n-butyl phthalate	1000 ug/mL
							Di-n-octyl phthalate	1000 ug/mL
							Dibenz(a,h)anthracene	1000 ug/mL
							Dibenzofuran	1000 ug/mL
							Diethyl phthalate	1000 ug/mL
							Dimethyl phthalate	1000 ug/mL
							Diphenylamine	850 ug/mL
							Fluoranthene	1000 ug/mL
							Fluorene	1000 ug/mL
							Hexachlorobenzene	1000 ug/mL
							Hexachlorobutadiene	1000 ug/mL
							Hexachlorocyclopentadiene	1000 ug/mL
							Hexachloroethane	1000 ug/mL
							Hexadecane	1000 ug/mL
							Indeno[1,2,3-cd]pyrene	1000 ug/mL
							Isophorone	1000 ug/mL
							n-Decane	1000 ug/mL
							N-Nitrosodi-n-propylamine	1000 ug/mL
							N-Nitrosodimethylamine	1000 ug/mL
							N-Nitrosodiphenylamine	1000 ug/mL
							Naphthalene	1000 ug/mL
							Nitrobenzene	1000 ug/mL
							Pentachlorophenol	2000 ug/mL
							Phenanthrene	1000 ug/mL
							Phenol	1000 ug/mL
							Pyrene	1000 ug/mL
							Pyridine	2000 ug/mL
.MS-IS_00014	04/04/19	04/04/18	Methylene Chloride, Lot 181545	250 mL	MS-567684_00019	5 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
					MS-567684_00020	45 mL	1,4-Dichlorobenzene-d4	400 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
..MS-567684_00019	07/31/20		Restek, Lot A0112833		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
..MS-567684_00020	08/31/22		Restek, Lot A0129635		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
MS-HSLACCV080_00158	09/30/18	06/18/18	Methylene Chloride, Lot 187286	0.5 mL	MS-IS_00014	50 uL	1,4-Dichlorobenzene-d4	40 ug/mL
							Acenaphthene-d10	40 ug/mL
							Chrysene-d12	40 ug/mL
							Naphthalene-d8	40 ug/mL
							Perylene-d12	40 ug/mL
							Phenanthrene-d10	40 ug/mL
.MS-IS_00014	04/04/19	04/04/18	Methylene Chloride, Lot 181545	250 mL	MS-567684_00019	5 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
					MS-567684_00020	45 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
..MS-567684_00019	07/31/20		Restek, Lot A0112833		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
..MS-567684_00020	08/31/22		Restek, Lot A0129635		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Phenanthrene-d10	2000 ug/mL
MS-HSLACCV080_00158	09/30/18	06/18/18	Methylene Chloride, Lot 187286	0.5 mL	MS-HSLA_STK_00042	200 uL	2,4,6-Tribromophenol	80 ug/mL
							2-Fluorobiphenyl	80 ug/mL
							2-Fluorophenol	80 ug/mL
							Nitrobenzene-d5	80 ug/mL
							Phenol-d5	80 ug/mL
							Terphenyl-d14	80 ug/mL
							1,2,4-Trichlorobenzene	80 ug/mL
							1,4-Dichlorobenzene	80 ug/mL
							2,4,5-Trichlorophenol	80 ug/mL
							2,4,6-Trichlorophenol	80 ug/mL
							2,4-Dinitrotoluene	80 ug/mL
							2-Chlorophenol	80 ug/mL
							2-Methylnaphthalene	80 ug/mL
							2-Methylphenol	80 ug/mL
							3 & 4 Methylphenol	80 ug/mL
							4-Chloro-3-methylphenol	80 ug/mL
							4-Nitrophenol	160 ug/mL
							Acenaphthene	80 ug/mL
							Anthracene	80 ug/mL
							Carbazole	80 ug/mL
							Hexachlorobenzene	80 ug/mL
							Hexachlorobutadiene	80 ug/mL
							Hexachloroethane	80 ug/mL
							N-Nitrosodi-n-propylamine	80 ug/mL
							Nitrobenzene	80 ug/mL
							Pentachlorophenol	160 ug/mL
							Phenol	80 ug/mL
							Pyrene	80 ug/mL
							Pyridine	160 ug/mL
.MS-HSLA_STK_00042	09/30/18	04/11/18	Methylene Chloride, Lot 181545	10 mL	MS-567685_00004	0.4 mL	2,4,6-Tribromophenol	200 ug/mL
							2-Fluorobiphenyl	200 ug/mL
							2-Fluorophenol	200 ug/mL
							Nitrobenzene-d5	200 ug/mL
							Phenol-d5	200 ug/mL
							Terphenyl-d14	200 ug/mL
					MS-571995_00001	2 mL	1,2,4-Trichlorobenzene	200 ug/mL
							1,4-Dichlorobenzene	200 ug/mL
							2,4,5-Trichlorophenol	200 ug/mL
							2,4,6-Trichlorophenol	200 ug/mL
							2,4-Dinitrotoluene	200 ug/mL
							2-Chlorophenol	200 ug/mL
							2-Methylnaphthalene	200 ug/mL
							2-Methylphenol	200 ug/mL
							3 & 4 Methylphenol	200 ug/mL
							4-Chloro-3-methylphenol	200 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							4-Nitrophenol	400 ug/mL
							Acenaphthene	200 ug/mL
							Anthracene	200 ug/mL
							Carbazole	200 ug/mL
							Hexachlorobenzene	200 ug/mL
							Hexachlorobutadiene	200 ug/mL
							Hexachloroethane	200 ug/mL
							N-Nitrosodi-n-propylamine	200 ug/mL
							Nitrobenzene	200 ug/mL
							Pentachlorophenol	400 ug/mL
							Phenol	200 ug/mL
							Pyrene	200 ug/mL
							Pyridine	400 ug/mL
..MS-567685_00004	01/30/19		Restek, Lot A0130500		(Purchased Reagent)		2,4,6-Tribromophenol	5000 ug/mL
							2-Fluorobiphenyl	5000 ug/mL
							2-Fluorophenol	5000 ug/mL
							Nitrobenzene-d5	5000 ug/mL
							Phenol-d5	5000 ug/mL
							Terphenyl-d14	5000 ug/mL
..MS-571995_00001	09/30/18		Restek, Lot A0125805		(Purchased Reagent)		1,2,4-Trichlorobenzene	1000 ug/mL
							1,4-Dichlorobenzene	1000 ug/mL
							2,4,5-Trichlorophenol	1000 ug/mL
							2,4,6-Trichlorophenol	1000 ug/mL
							2,4-Dinitrotoluene	1000 ug/mL
							2-Chlorophenol	1000 ug/mL
							2-Methylnaphthalene	1000 ug/mL
							2-Methylphenol	1000 ug/mL
							3 & 4 Methylphenol	1000 ug/mL
							4-Chloro-3-methylphenol	1000 ug/mL
							4-Nitrophenol	2000 ug/mL
							Acenaphthene	1000 ug/mL
							Anthracene	1000 ug/mL
							Carbazole	1000 ug/mL
							Hexachlorobenzene	1000 ug/mL
							Hexachlorobutadiene	1000 ug/mL
							Hexachloroethane	1000 ug/mL
							N-Nitrosodi-n-propylamine	1000 ug/mL
							Nitrobenzene	1000 ug/mL
							Pentachlorophenol	2000 ug/mL
							Phenol	1000 ug/mL
							Pyrene	1000 ug/mL
							Pyridine	2000 ug/mL
MS-IS_00014	04/04/19	04/04/18	Methylene Chloride, Lot 181545	250 mL	MS-567684_00019	5 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Phenanthrene-d10	400 ug/mL
					MS-567684_00020	45 mL	1,4-Dichlorobenzene-d4	400 ug/mL
							Acenaphthene-d10	400 ug/mL
							Chrysene-d12	400 ug/mL
							Naphthalene-d8	400 ug/mL
							Perylene-d12	400 ug/mL
							Phenanthrene-d10	400 ug/mL
.MS-567684_00019	07/31/20		Restek, Lot A0112833		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
.MS-567684_00020	08/31/22		Restek, Lot A0129635		(Purchased Reagent)		1,4-Dichlorobenzene-d4	2000 ug/mL
							Acenaphthene-d10	2000 ug/mL
							Chrysene-d12	2000 ug/mL
							Naphthalene-d8	2000 ug/mL
							Perylene-d12	2000 ug/mL
							Phenanthrene-d10	2000 ug/mL
MV-2cleve+AVA_00037	10/31/18	07/20/18	P&T Methanol, Lot 177891	10 mL	MV-568720_00022	202.5 uL	Acrolein	399.938 ug/mL
					MV-569723_00004	160 uL	2-Chloroethyl vinyl ether	40 ug/mL
					MV-569724_00016	160 uL	Vinyl acetate	80 ug/mL
.MV-568720_00022	10/31/18		RESTEK, Lot A0137497		(Purchased Reagent)		Acrolein	19750 ug/mL
.MV-569723_00004	12/31/20		RESTEK, Lot A0133302		(Purchased Reagent)		2-Chloroethyl vinyl ether	2500 ug/mL
.MV-569724_00016	10/31/18		RESTEK, Lot A0137562		(Purchased Reagent)		Vinyl acetate	5000 ug/mL
MV-568718-D_00014	05/31/22		RESTEK, Lot A0127975		(Purchased Reagent)		1,4-Dichlorobenzene-d4	250 ug/mL
							Chlorobenzene-d5	250 ug/mL
							Fluorobenzene	250 ug/mL
							TBA-d9 (IS)	5000 ug/mL
MV-ARCH SS A_00101	01/25/19	07/25/18	P&T Methanol, Lot 177891	50 mL	MV-567650_00027	5 mL	1,2-Dichloroethane-d4 (Surr)	250 ug/mL
							4-Bromofluorobenzene (Surr)	250 ug/mL
							Dibromofluoromethane (Surr)	250 ug/mL
							Toluene-d8 (Surr)	250 ug/mL
.MV-567650_00027	01/31/22		Restek, Lot A0124069		(Purchased Reagent)		1,2-Dichloroethane-d4 (Surr)	2500 ug/mL
							4-Bromofluorobenzene (Surr)	2500 ug/mL
							Dibromofluoromethane (Surr)	2500 ug/mL
							Toluene-d8 (Surr)	2500 ug/mL
MV-BFB_00026							1,2-Dichloroethene, Total	
							1,2-Dichloroethene, Total (URS)	
							1,3-Dichloropropene, Total	
							TAH	
							Tentatively Identified Compound	
							Total BTEX	

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Trihalomethanes, Total	
							Xylenes, Total	
							Xylenes, Total (URS)	
					MV-STS110N1_00066	1.25 mL	BFB	50 ug/mL
.MV-STS110N1_00066	10/31/19	Ultra Scientific, Lot CH-3248Z			(Purchased Reagent)		BFB	2000 ug/mL
MV-Gas/Ket A_00075	12/30/18	06/30/18	P&T Methanol, Lot 178178	10 mL	MV-569721_00006	128 uL	2-Butanone (MEK)	160 ug/mL
					MV-569722_00008	160 uL	Vinyl chloride	40 ug/mL
.MV-569721_00006	10/31/20	RESTEK, Lot A0131486			(Purchased Reagent)		2-Butanone (MEK)	12500 ug/mL
.MV-569722_00008	10/31/20	RESTEK, Lot A0131502			(Purchased Reagent)		Vinyl chloride	2500 ug/mL
MV-Gas/Ket A_00076	01/25/19	07/25/18	P&T Methanol, Lot 178178	10 mL	MV-569721_00006	128 uL	2-Butanone (MEK)	160 ug/mL
							2-Hexanone	160 ug/mL
							4-Methyl-2-pentanone (MIBK)	160 ug/mL
							Acetone	160 ug/mL
					MV-569722_00008	160 uL	Bromomethane	40 ug/mL
							Chloroethane	40 ug/mL
							Chloromethane	40 ug/mL
							Dichlorodifluoromethane	40 ug/mL
							Dichlorofluoromethane	40 ug/mL
							Trichlorofluoromethane	40 ug/mL
							Vinyl chloride	40 ug/mL
					MV-569727_00006	640 uL	Cyclohexanone	1600 ug/mL
.MV-569721_00006	10/31/20	RESTEK, Lot A0131486			(Purchased Reagent)		2-Butanone (MEK)	12500 ug/mL
							2-Hexanone	12500 ug/mL
							4-Methyl-2-pentanone (MIBK)	12500 ug/mL
							Acetone	12500 ug/mL
.MV-569722_00008	10/31/20	RESTEK, Lot A0131502			(Purchased Reagent)		Bromomethane	2500 ug/mL
							Chloroethane	2500 ug/mL
							Chloromethane	2500 ug/mL
							Dichlorodifluoromethane	2500 ug/mL
							Dichlorofluoromethane	2500 ug/mL
							Trichlorofluoromethane	2500 ug/mL
							Vinyl chloride	2500 ug/mL
.MV-569727_00006	03/31/19	RESTEK, Lot A0118487			(Purchased Reagent)		Cyclohexanone	25000 ug/mL
MV-Gas/Ket B_00043	11/30/18	05/28/18	P&T Methanol, Lot 177891	10 mL	MV-569721.sec_00005	128 uL	2-Butanone (MEK)	160 ug/mL
					MV-569722.sec_00004	160 uL	Vinyl chloride	40 ug/mL
.MV-569721.sec_00005	01/31/20	RESTEK, Lot A0113880			(Purchased Reagent)		2-Butanone (MEK)	12500 ug/mL
.MV-569722.sec_00004	01/31/20	RESTEK, Lot A0124116			(Purchased Reagent)		Vinyl chloride	2500 ug/mL
MV-Gas/Ket B_00044	11/30/18	07/17/18	P&T Methanol, Lot 177891	10 mL	MV-569721.sec_00005	128 uL	2-Butanone (MEK)	160 ug/mL
					MV-569722.sec_00004	160 uL	Vinyl chloride	40 ug/mL
.MV-569721.sec_00005	01/31/20	RESTEK, Lot A0113880			(Purchased Reagent)		2-Butanone (MEK)	12500 ug/mL
.MV-569722.sec_00004	01/31/20	RESTEK, Lot A0124116			(Purchased Reagent)		Vinyl chloride	2500 ug/mL
MV-Main A_00037	12/31/18	06/30/18	P&T Methanol, Lot 177891	20 mL	MV-571992_00001	320 uL	1,1,1,2-Tetrachloroethane	40 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							1,1,1-Trichloroethane	40 ug/mL
							1,1,2,2-Tetrachloroethane	40 ug/mL
							1,1,2-Trichloro-1,2,2-trifluoroethane	40 ug/mL
							1,1,2-Trichloroethane	40 ug/mL
							1,1-Dichloroethane	40 ug/mL
							1,1-Dichloroethene	40 ug/mL
							1,1-Dichloropropene	40 ug/mL
							1,2,3-Trichlorobenzene	40 ug/mL
							1,2,3-Trichloropropane	40 ug/mL
							1,2,4-Trichlorobenzene	40 ug/mL
							1,2,4-Trimethylbenzene	40 ug/mL
							1,2-Dibromo-3-Chloropropane	40 ug/mL
							1,2-Dichlorobenzene	40 ug/mL
							1,2-Dichloroethane	40 ug/mL
							1,2-Dichloropropane	40 ug/mL
							1,3,5-Trimethylbenzene	40 ug/mL
							1,3-Dichlorobenzene	40 ug/mL
							1,3-Dichloropropane	40 ug/mL
							1,4-Dichlorobenzene	40 ug/mL
							1,4-Dioxane	800 ug/mL
							2,2-Dichloropropane	40 ug/mL
							2-Chlorotoluene	40 ug/mL
							2-Methyl-2-propanol	400 ug/mL
							3-Chloro-1-propene	40 ug/mL
							4-Chlorotoluene	40 ug/mL
							4-Isopropyltoluene	40 ug/mL
							Acrylonitrile	400 ug/mL
							Benzene	40 ug/mL
							Bromobenzene	40 ug/mL
							Bromoform	40 ug/mL
							Carbon disulfide	40 ug/mL
							Carbon tetrachloride	40 ug/mL
							Chlorobenzene	40 ug/mL
							Chlorobromomethane	40 ug/mL
							Chlorodibromomethane	40 ug/mL
							Chloroform	40 ug/mL
							cis-1,2-Dichloroethene	40 ug/mL
							cis-1,3-Dichloropropene	40 ug/mL
							Cyclohexane	40 ug/mL
							Dibromomethane	40 ug/mL
							Dichlorobromomethane	40 ug/mL
							Ethyl ether	40 ug/mL
							Ethyl methacrylate	40 ug/mL
							Ethylbenzene	40 ug/mL
							Ethylene Dibromide	40 ug/mL
							Hexachlorobutadiene	40 ug/mL
							Hexane	40 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Iodomethane	40 ug/mL
							Isobutyl alcohol	1000 ug/mL
							Isopropylbenzene	40 ug/mL
							m-Xylene & p-Xylene	40 ug/mL
							Methyl acetate	80 ug/mL
							Methyl tert-butyl ether	40 ug/mL
							Methylcyclohexane	40 ug/mL
							Methylene Chloride	40 ug/mL
							n-Butylbenzene	40 ug/mL
							n-Heptane	40 ug/mL
							N-Propylbenzene	40 ug/mL
							Naphthalene	40 ug/mL
							o-Xylene	40 ug/mL
							sec-Butylbenzene	40 ug/mL
							Styrene	40 ug/mL
							tert-Butylbenzene	40 ug/mL
							Tetrachloroethene	40 ug/mL
							Tetrahydrofuran	80 ug/mL
							Toluene	40 ug/mL
							trans-1,2-Dichloroethene	40 ug/mL
							trans-1,3-Dichloropropene	40 ug/mL
							trans-1,4-Dichloro-2-butene	40 ug/mL
							Trichloroethene	40 ug/mL
					MV-CUS17739_00002	800 uL	1-Chlorohexane	40 ug/mL
							2-Pentanone	160 ug/mL
							sec-Butyl Alcohol	1200 ug/mL
.MV-571992_00001	12/31/18		RESTEK, Lot A0123711		(Purchased Reagent)		1,1,1,2-Tetrachloroethane	2500 ug/mL
							1,1,1-Trichloroethane	2500 ug/mL
							1,1,2,2-Tetrachloroethane	2500 ug/mL
							1,1,2-Trichloro-1,2,2-trifluoroethane	2500 ug/mL
							1,1,2-Trichloroethane	2500 ug/mL
							1,1-Dichloroethane	2500 ug/mL
							1,1-Dichloroethene	2500 ug/mL
							1,1-Dichloropropene	2500 ug/mL
							1,2,3-Trichlorobenzene	2500 ug/mL
							1,2,3-Trichloropropane	2500 ug/mL
							1,2,4-Trichlorobenzene	2500 ug/mL
							1,2,4-Trimethylbenzene	2500 ug/mL
							1,2-Dibromo-3-Chloropropane	2500 ug/mL
							1,2-Dichlorobenzene	2500 ug/mL
							1,2-Dichloroethane	2500 ug/mL
							1,2-Dichloropropane	2500 ug/mL
							1,3,5-Trimethylbenzene	2500 ug/mL
							1,3-Dichlorobenzene	2500 ug/mL
							1,3-Dichloropropane	2500 ug/mL
							1,4-Dichlorobenzene	2500 ug/mL
							1,4-Dioxane	50000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							2,2-Dichloropropane	2500 ug/mL
							2-Chlorotoluene	2500 ug/mL
							2-Methyl-2-propanol	25000 ug/mL
							3-Chloro-1-propene	2500 ug/mL
							4-Chlorotoluene	2500 ug/mL
							4-Isopropyltoluene	2500 ug/mL
							Acrylonitrile	25000 ug/mL
							Benzene	2500 ug/mL
							Bromobenzene	2500 ug/mL
							Bromoform	2500 ug/mL
							Carbon disulfide	2500 ug/mL
							Carbon tetrachloride	2500 ug/mL
							Chlorobenzene	2500 ug/mL
							Chlorobromomethane	2500 ug/mL
							Chlorodibromomethane	2500 ug/mL
							Chloroform	2500 ug/mL
							cis-1,2-Dichloroethene	2500 ug/mL
							cis-1,3-Dichloropropene	2500 ug/mL
							Cyclohexane	2500 ug/mL
							Dibromomethane	2500 ug/mL
							Dichlorobromomethane	2500 ug/mL
							Ethyl ether	2500 ug/mL
							Ethyl methacrylate	2500 ug/mL
							Ethylbenzene	2500 ug/mL
							Ethylene Dibromide	2500 ug/mL
							Hexachlorobutadiene	2500 ug/mL
							Hexane	2500 ug/mL
							Iodomethane	2500 ug/mL
							Isobutyl alcohol	62500 ug/mL
							Isopropylbenzene	2500 ug/mL
							m-Xylene & p-Xylene	2500 ug/mL
							Methyl acetate	5000 ug/mL
							Methyl tert-butyl ether	2500 ug/mL
							Methylcyclohexane	2500 ug/mL
							Methylene Chloride	2500 ug/mL
							n-Butylbenzene	2500 ug/mL
							n-Heptane	2500 ug/mL
							N-Propylbenzene	2500 ug/mL
							Naphthalene	2500 ug/mL
							o-Xylene	2500 ug/mL
							sec-Butylbenzene	2500 ug/mL
							Styrene	2500 ug/mL
							tert-Butylbenzene	2500 ug/mL
							Tetrachloroethene	2500 ug/mL
							Tetrahydrofuran	5000 ug/mL
							Toluene	2500 ug/mL
							trans-1,2-Dichloroethene	2500 ug/mL
							trans-1,3-Dichloropropene	2500 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							trans-1,4-Dichloro-2-butene	2500 ug/mL
							Trichloroethene	2500 ug/mL
.MV-CUS17739_00002	07/31/19	Ultra, Lot CR-2819			(Purchased Reagent)		1-Chlorohexane	1000 ug/mL
							2-Pentanone	4000 ug/mL
							sec-Butyl Alcohol	30000 ug/mL
MV-Main B_00022	12/31/18	08/01/18	P&T Methanol, Lot 127999	20 mL	MV-571992.sec_00001	320 uL	1,1,1-Trichloroethane	40 ug/mL
							1,1-Dichloroethane	40 ug/mL
							1,1-Dichloroethene	40 ug/mL
							1,2-Dichloroethane	40 ug/mL
							1,2-Dichloropropane	40 ug/mL
							1,3-Dichlorobenzene	40 ug/mL
							Benzene	40 ug/mL
							Carbon tetrachloride	40 ug/mL
							Chlorobenzene	40 ug/mL
							Chloroform	40 ug/mL
							Dichlorobromomethane	40 ug/mL
							Ethylbenzene	40 ug/mL
							Methylene Chloride	40 ug/mL
							Tetrachloroethene	40 ug/mL
							Toluene	40 ug/mL
							trans-1,2-Dichloroethene	40 ug/mL
							Trichloroethene	40 ug/mL
.MV-571992.sec_00001	12/31/18	RESTEK, Lot A0123775			(Purchased Reagent)		1,1,1-Trichloroethane	2500 ug/mL
							1,1-Dichloroethane	2500 ug/mL
							1,1-Dichloroethene	2500 ug/mL
							1,2-Dichloroethane	2500 ug/mL
							1,2-Dichloropropane	2500 ug/mL
							1,3-Dichlorobenzene	2500 ug/mL
							Benzene	2500 ug/mL
							Carbon tetrachloride	2500 ug/mL
							Chlorobenzene	2500 ug/mL
							Chloroform	2500 ug/mL
							Dichlorobromomethane	2500 ug/mL
							Ethylbenzene	2500 ug/mL
							Methylene Chloride	2500 ug/mL
							Tetrachloroethene	2500 ug/mL
							Toluene	2500 ug/mL
							trans-1,2-Dichloroethene	2500 ug/mL
							Trichloroethene	2500 ug/mL
MV-Supp A_00031	11/20/18	06/30/18	P&T Methanol, Lot 12799	10 mL	mv-570808_00004	160 uL	1,2,3-Trimethylbenzene	40 ug/mL
							1,3,5-Trichlorobenzene	40 ug/mL
							2-Chloro-1,3-butadiene	40 ug/mL
							2-Nitropropane	80 ug/mL
							Isopropyl alcohol	400 ug/mL
							Methacrylonitrile	400 ug/mL
							n-Butanol	1000 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					mv-570809_00004	160 uL	Ethyl acetate	80 ug/mL
							Methyl methacrylate	80 ug/mL
					mv-571993_00002	160 uL	Acetonitrile	400 ug/mL
							Isopropyl ether	40 ug/mL
							Propionitrile	400 ug/mL
							Tert-amyl methyl ether	40 ug/mL
							Tert-butyl ethyl ether	40 ug/mL
					mv-571994_00002	240 uL	Ethanol	2400 ug/mL
					mv-VO-TAOH-5_00005	800 uL	cis-1,4-Dichloro-2-butene	80 ug/mL
							Propene oxide	4000 ug/mL
							Tetrahydrothiophene	80 ug/mL
.mv-570808_00004	05/31/19		Restek, Lot A0132816		(Purchased Reagent)		1,2,3-Trimethylbenzene	2500 ug/mL
							1,3,5-Trichlorobenzene	2500 ug/mL
							2-Chloro-1,3-butadiene	2500 ug/mL
							2-Nitropropane	5000 ug/mL
							Isopropyl alcohol	25000 ug/mL
							Methacrylonitrile	25000 ug/mL
							n-Butanol	62500 ug/mL
.mv-570809_00004	04/30/19		Restek, Lot A0131668		(Purchased Reagent)		Ethyl acetate	5000 ug/mL
							Methyl methacrylate	5000 ug/mL
.mv-571993_00002	11/30/19		RESTEK, Lot A0132831		(Purchased Reagent)		Acetonitrile	25000 ug/mL
							Isopropyl ether	2500 ug/mL
							Propionitrile	25000 ug/mL
							Tert-amyl methyl ether	2500 ug/mL
							Tert-butyl ethyl ether	2500 ug/mL
.mv-571994_00002	11/30/20		RESTEK, Lot A0132270		(Purchased Reagent)		Ethanol	100000 ug/mL
.mv-VO-TAOH-5_00005	11/20/18		SPEX, Lot EN180524019		(Purchased Reagent)		cis-1,4-Dichloro-2-butene	1000 ug/mL
							Propene oxide	50000 ug/mL
							Tetrahydrothiophene	1000 ug/mL
SFD CAL INT_01521	10/13/18	07/24/18	Di Water, Lot NA	500 mL	50% NaOH_00013	2 mL	Sodium Hydroxide	2000 mg/L
					SFD CAL STK_00005	4.2697 g	Sulfide	1140.01 mg/L
.50% NaOH_00013	10/31/18		Fisher, Lot 166472		(Purchased Reagent)		Sodium Hydroxide	50 %
.SFD CAL STK_00005	12/31/23		FISHER, Lot 127305		(Purchased Reagent)		Sulfide	0.1335 g/g
TCLP Spike_00017	05/24/19		Inorganic Ventures, Lot M2-MEB664260		(Purchased Reagent)		Arsenic	300 mg/L
							Barium	1000 mg/L
							Cadmium	100 mg/L
							Chromium	500 mg/L
							Cu	200 mg/L
							Lead	500 mg/L
							Selenium	100 mg/L
							Silver	100 mg/L
							Zn	200 mg/L

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Nashville Job No.: 160-29498-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
Phenol LCSINT_00028	08/07/19	03/29/18	DI Water, Lot na	10 mL	W_Phenol STD_00001	1 mL	Phenolics, Total Recoverable	100 mg/L
							Phenols, Total	100 mg/L
.W_Phenol STD_00001	08/17/19	LabChem, Lot G212-19			(Purchased Reagent)		Phenolics, Total Recoverable	1000 mg/L
							Phenols, Total	1000 mg/L
W_EOX Spike S_00019	09/30/18	04/30/18	Ethyl Acetate, Lot 168481	250 mL	W_1,2,3-Trich_00007	0.425 g	Halogens, Extractable Organic	995.197 ug/mL
.W_1,2,3-Trich_00007	06/28/21	Sigma-Aldrich, Lot MKBX7627V			(Purchased Reagent)		Halogens, Extractable Organic	58.541 %
W_EOX STD_00075	08/21/18	06/29/18	Methanol, Lot 170287	10 mL	W_EOXSTDstock_00029	1 mL	Halogens, Extractable Organic	99.5197 mg/Kg
.W_EOXSTDstock_00029	08/21/18	02/21/18		100 mL	W_1,2,3-Trich_00005	0.17 g	Halogens, Extractable Organic	995197 ug/L
..W_1,2,3-Trich_00005	01/11/20	ACROS, Lot A0043055			(Purchased Reagent)		Halogens, Extractable Organic	58.541 %
W_Phenol CCV_00010	08/31/18	04/18/17	DI Water, Lot na	10 mL	W_Phenol Std._00029	1 mL	Phenols, Total	100 mg/L
.W_Phenol Std._00029	08/31/18	ERA, Lot 130316			(Purchased Reagent)		Phenols, Total	1000 mL
W_Phenol STD_00001	08/17/19	LabChem, Lot G212-19			(Purchased Reagent)		Phenols, Total	1000 mg/L

Reagent

108345_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
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CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 108345
Source Description: 24.1 mm Diameter x 0.77 mm Thick Stainless Steel Disk
Product Code: MIX-EAB-FOIL
Customer: TestAmerica Laboratories - St. Louis
P.O. Number: 2695542, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities (if detected) were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectrometry. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 22-January-2018 12:00 PM EST

Isotope	Activity, Bq	Energy Range, keV	Half-Life, d	Uncertainty u_A, %	u_B, %	U, %*
Pu-239	7.695E+00	4950-5240	8.806E+06	1.1	1.5	3.7
Am-241	7.916E+00	5280-5600	1.580E+05	1.1	1.5	3.7
Th-230	7.314E+00	4470-4760	2.753E+07	1.1	1.5	3.7
Total Activity	2.294E+01	3000-8000		0.7	1.5	3.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

SRS Number: 108345

Comments:

Diameter of active area: 19 mm

Mounted on customer supplied 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION:

Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Calibrated by: _____

A. Chen, Spectroscopist

QC Approved by: _____ Date: 29-JAN-18

J. Lahr, Spectroscopist

Reagent

108346_00001

Eckert & Ziegler
Analytics

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Atlanta, Georgia 30318
Tel 404 352 8677
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CERTIFICATE OF CALIBRATION
Standard Reference Source

SRS Number: 108346
Source Description: 24.1 mm Diameter x 0.77 mm Thick Stainless Steel Disk
Product Code: MIX-EAB-FOIL
Customer: TestAmerica Laboratories - St. Louis
P.O. Number: 2695542, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities (if detected) were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectrometry. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology (NIST) through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Reference Date: 22-January-2018 12:00 PM EST

Isotope	Activity, Bq	Energy Range, keV	Half-Life, d	Uncertainty u_A, %	u_B, %	U, %*
Pu-239	7.835E+00	4950-5240	8.806E+06	1.2	1.5	3.8
Am-241	8.008E+00	5280-5600	1.580E+05	1.2	1.5	3.8
Th-230	7.570E+00	4470-4760	2.753E+07	1.2	1.5	3.8
Total Activity	2.343E+01	3000-8000		0.9	1.5	3.5

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

SRS Number: 108346

Comments:

Diameter of active area: 19 mm

Mounted on customer supplied 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION:

Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Calibrated by: _____

A. Chen, Spectroscopist

QC Approved by: _____ Date: 29-JAN-18

J. Lahr, Spectroscopist

Reagent

82232-334_00001

Eckert & Ziegler
Analytics

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CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82232-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 3-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	7.630E+00	4420-4800	7.540E+04	0.7	1.1	2.6
Pu-239	7.137E+00	4950-5240	2.410E+04	0.7	1.1	2.6
Am-241	7.281E+00	5280-5600	4.326E+02	0.7	1.1	2.6
Total Activity	2.210E+01	3000-8000		0.4	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82233-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82233-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 3-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	4.950E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	6.064E+00	4950-5240	2.410E+04	0.7	1.1	2.6
Am-241	5.114E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	1.616E+01	3000-8000		0.1	1.1	2.2

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82236-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82236-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 2-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	7.107E+00	4420-4800	7.540E+04	0.7	1.1	2.6
Pu-239	6.664E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	6.891E+00	5280-5600	4.326E+02	0.7	1.1	2.6
Total Activity	2.071E+01	3000-8000		0.4	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.46 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82237-334_00003

Eckert & Ziegler
Analytics

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Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82237-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 1-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	5.856E+00	4420-4800	7.540E+04	1.0	1.1	3.0
Pu-239	6.424E+00	4950-5240	2.410E+04	0.9	1.1	2.8
Am-241	5.608E+00	5280-5600	4.326E+02	1.0	1.1	3.0
Total Activity	1.793E+01	3000-8000		0.6	1.1	2.5

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82238-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82238-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 1-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	7.099E+00	4420-4800	7.540E+04	1.0	1.1	3.0
Pu-239	6.753E+00	4950-5240	2.410E+04	1.1	1.1	3.1
Am-241	5.932E+00	5280-5600	4.326E+02	1.1	1.1	3.1
Total Activity	1.983E+01	3000-8000		0.8	1.1	2.7

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY — HEALTH PHYSICS SOCIETY — FOUNDED 1958

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82240-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82240-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 8-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	6.304E+00	4420-4800	7.540E+04	0.9	1.1	2.8
Pu-239	7.163E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	8.298E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	2.182E+01	3000-8000		0.5	1.1	2.4

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82241-334_00001

Eckert & Ziegler
Analytics

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Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82241-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 8-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	6.629E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	6.797E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	6.638E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	2.011E+01	3000-8000		0.4	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82243-334_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82243-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 9-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	5.856E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	5.979E+00	4950-5240	2.410E+04	0.8	1.1	2.7
Am-241	6.390E+00	5280-5600	4.326E+02	0.8	1.1	2.7
Total Activity	1.827E+01	3000-8000		0.3	1.1	2.3

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1966

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82244-334_00001

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Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82244-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 9-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	7.352E+00	4420-4800	7.540E+04	0.8	1.1	2.7
Pu-239	6.717E+00	4950-5240	2.410E+04	0.9	1.1	2.8
Am-241	6.897E+00	5280-5600	4.326E+02	0.9	1.1	2.8
Total Activity	2.101E+01	3000-8000		0.6	1.1	2.5

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06-24-2010
E. A. Taskaev, QA Manager Alternate

Reagent

82246-334_00001

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Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
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Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

82246-334

24.1 mm Diameter x 0.65 mm Thick Stainless Steel Disk

Customer: Test America/St. Louis
P.O. No.: 2355182, Item 1

This standard radionuclide source was prepared by electrodeposition onto a stainless steel disk. Total alpha activity was determined with a ZnS scintillation detector. Radionuclide activities and impurities were calculated from the total activity and the fraction of activity for each radionuclide determined by alpha spectroscopy. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Reference Date: 9-Jun-2010 12:00 PM EST

Isotope	Activity (Bq)	Energy Range (keV)	Half-Life, years	Uncertainty* Type (%) u_A	u_B	U
Th-230	5.570E+00	4420-4800	7.540E+04	1.0	1.1	3.0
Pu-239	5.353E+00	4950-5240	2.410E+04	1.0	1.1	3.0
Am-241	6.002E+00	5280-5600	4.326E+02	1.0	1.1	3.0
Total Activity	1.696E+01	3000-8000		0.7	1.1	2.6

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Comments:
Diameter of active area: 19 mm. Disk mounted on customer supplied disk 31.8 mm diameter x 0.45 mm thick stainless steel disk.

CAUTION: Active material deposited on the unmarked surface. Handle carefully to prevent scratching or damaging the active surface of this source (i.e., use Teflon coated forceps). Store in the container provided when not in use.

Source Calibrated by: _____
A. Chen, Spectroscopist

QA Approved: _____ Date: 06.24.2010
E. A. Taskaev, QA Manager Alternate

Reagent

Gamma Ampuole_00001

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Analytics

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Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

79670-334

5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2303925, Item 1
Calibration Date: 01-Apr-2009 12:00 EST **Grams of Master Source:** 0.028371

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	157860	———	3.390E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	462.60	1.691E+05	4.798E+03	0.4	1.7	3.5	HPGe
Co-57	122.1	271.79	8.904E+04	2.526E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	137.6	1.256E+05	3.563E+03	0.4	1.1	2.3	HPGe
Hg-203	279.2	46.61	2.788E+05	7.910E+03	0.3	1.1	2.3	HPGe
Sn-113	391.7	115.1	1.725E+05	4.894E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	10983	1.120E+05	3.178E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.205E+05	1.193E+04	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.184E+05	6.196E+03	0.7	1.1	2.6	HPGe
Co-60	1332.5	1925.4	2.185E+05	6.199E+03	0.7	1.1	2.6	HPGe
Y-88	1836.1	106.6	4.444E+05	1.261E+04	0.7	1.1	2.6	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
5.31740 grams 4M HCl solution with approximately 30 microg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the calibration date.

Source Prepared by: _____ for
W. Mao, Radiochemist

QA Approved: _____ Date: 5-13-09
D. M. Montgomery, QA Manager

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Gamma Ampuole_00003

Eckert & Ziegler
Analytics

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Atlanta, Georgia 30318
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Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

83725-334

5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis/Earth City, MO
P.O. No.: 2397508, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.028066

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	1.580E+05	———	3.261E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	4.763E+03	0.8	1.7	3.8	HPGe
Co-57	122.1	2.718E+02	8.711E+04	2.445E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	3.500E+03	0.5	1.1	2.4	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	7.727E+03	0.4	1.1	2.3	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	4.965E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	3.113E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	1.066E+02	4.224E+05	1.186E+04	0.5	1.1	2.4	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	6.012E+03	0.6	1.1	2.5	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	6.015E+03	0.6	1.1	2.5	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	1.255E+04	0.5	1.1	2.4	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY — HEALTH PHYSICS SOCIETY — FOUNDED 1956

Comments:
5.30203 grams 4M HCl solution with approximately 30 µg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the reference date.

Source Prepared by: M I Taskaeva
M. I. Taskaeva, Radiochemist

QA Approved: _____ Date: 13 JAN 11
J. D. McCorvey, QA Manager Alternate

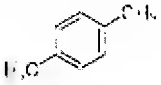
Reagent

p-Xylene_00013

SIGMA-ALDRICH
sigma-aldrich.com
3050 Spruce Street, Saint Louis, MO 63103, USA
Website: www.sigmaaldrich.com
Email USA: techserv@sial.com
Outside USA: eurtechserv@sial.com

Certificate of Analysis

Product Name:
p-Xylene - ReagentPlus®, 99%



1337821
ID: p-Xylene_00013
Exp:12/01/18 Prpd:JCB Opn:12/01/17
p-Xylene for Flashpoint

Product Number:	**134449**
Lot Number:	**SHBB3168V**
Brand:	SIAL
CAS Number:	106-42-3
MDL Number:	MFCD00008556
Formula:	C8H10
Formula Weight:	106.17 g/mol
Quality Release Date:	07 JUL 2011

Test	Specification	Result
Appearance (Color)	Colorless	Colorless
Appearance (Form)	Liquid	Liquid
Infrared spectrum	Conforms to Structure	Conforms
Purity (GC)	≥ 98.5 %	99.8 %

Jamie Gleason

Jamie Gleason, Manager
Quality Control
Milwaukee, Wisconsin US

Sigma-Aldrich warrants, that at the time of the quality release or subsequent retest date this product conformed to the information contained in this publication. The current Specification sheet may be available at Sigma-Aldrich.com. For further inquiries, please contact Technical Service. Purchaser must determine the suitability of the product for its particular use. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Reagent

pH Buffer 7SS_00034

RICCA CHEMICAL COMPANY®

1490 Lammers Pike
Batesville, IN 47006
http://www.riccachemical.com
1-888-GO-RICCA
customerservice@riccachemical.com

Certificate of Analysis

Buffer, Reference Standard, pH 7.00 ± 0.01 at 25°C (Color Coded Yellow)

Lot Number: 4709G98 **Product Number:** 1551

Manufacture Date: SEP 15, 2017
Expiration Date: SEP 2019

The certified value for this product is confirmed in independent testing by a second qualified chemist.
The NIST traceable pH value is certified to ±0.01 at 25 °C only. All other pH values at their corresponding temperatures are accurate to ± 0.05.

°C	0	5	10	15	20	25	30	35	40	45	50
pH	7.12	7.09	7.06	7.04	7.02	7.00	6.99	6.98	6.98	6.97	6.97

Name	CAS#	Grade
Water	7732-18-5	ACS/ASTM/USP/EP
Sodium Phosphate Dibasic	7558-79-4	ACS
Sodium Hydroxide	1310-73-2	Reagent
Potassium Dihydrogen Phosphate	7778-77-0	ACS
Yellow Dye	Proprietary	
Preservative	Proprietary	

1476848
ID: pH Buffer 7SS_00034
Exp:06/13/19 Prpd:JCB Opn:06/13/18
pH Buffer 7 - 2nd source

Test	Specification	Result	NIST SRM#
Appearance	Yellow liquid	Passed	
pH at 25°C	6.990-7.010	7.008	186 & 191
pH at 25°C Uncertainty	0.01	0.01	

Specification	Reference
Commercial Buffer Solutions	ASTM (D 1293 B)
Buffer A	ASTM (D 5464)
Buffer A	ASTM (D 5128)

pH measurements were performed in our Batesville, IN laboratory under ISO/IEC 17025 accreditation (L-A-B Certificate L2387.02) and are certified traceable to National Institute of Standards and Technology (NIST) Standard Reference Material as indicated above via an unbroken chain of comparisons. The uncertainty is calculated from the uncertainty of the measurement variation from sample to sample, the uncertainty in the NIST Standard Reference Material, and the uncertainty of the measurement process. The uncertainty is multiplied by k=2, corresponding to 95% coverage in a normal distribution.
Volumetric glassware complies with Class A tolerance requirements of ASTM E 288 and NIST Circular 434; it is calibrated before first use and recalibrated regularly in accordance with ASTM E 542 and NIST Procedure NBSIR 74-461. Balances are calibrated regularly with weights certified traceable to the NIST national mass standard. Thermometers and temperature probes are calibrated before first use and recalibrated regularly with a thermometer traceable to NIST standards. All products are prepared according to master documents that assure manufacture according to validated methods. Batch records document raw material traceability and production and testing history for each lot manufactured.

Part Number	Size / Package Type	Shelf Life (Unopened Container)
1551-16	500 mL natural poly	24 months

Recommended Storage: 15°C - 30°C (59°F - 86°F)

Jim Gibbs
Quality Control Supervisor
This Certificate of Analysis is designed to comply with ISO Guide 31 "Reference Materials -- Contents of Certificates and Labels."

LABORATORY ACCREDITATION BUREAU a division of A-S-B
ACCREDITED ISO/IEC 17025
Certificate # L2387.02 Testing

This test report shall not be reproduced, except in full, without the written approval of Ricca Chemical Company.

Reagent

Rocky Flats_00001

U. S. Department of Commerce
Malcolm Baldrige
Secretary

National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards

Certificate

Standard Reference Material 4353

Environmental Radioactivity

Source description	Rocky Flats Soil Number 1
Source identification	4353-
Reference time	December 15, 1980

General Comments(1)*

This Standard Reference Material (SRM), which has been developed in cooperation with member laboratories of the International Committee for Radionuclide Metrology, consists of approximately 90 grams of air-dried, pulverized soil(2) in a polyethylene bottle. The sample was collected from Rocky Flats, Colorado. This SRM is intended for use in tests of measurements of environmental radioactivity contained in matrices similar to the sample(3,4,5).

Working samples of this SRM should be dried in air at 40°C for at least 24 hours prior to weighing. The material has been tested extensively for homogeneity and the results are summarized in(6). Based on over 70 plutonium measurements, the sample contains typically one or two "hot" particles in each bottle. As described in Note (5), by judicious handling of user data, the effect of the "hot" particles upon estimates of deduced user analytical error can be made negligible for most applications.

Concentrations and uncertainties, EXCLUDING HOT PARTICLES, are quoted in the following table.

When additional data become available, it is expected that other radioactivity concentrations will be certified and purchasers will be notified. To aid in these certifications, users are requested to send their measurement results for uncertified radioactivities together with the methods used to NBS(1).

* See notes

Radionuclide	Activity Concentration ($Bq\ g^{-1}$ (7))	Total Uncertainty (Percent) (8)	Method Code Comments (9)
^{40}K	7.23×10^{-1}	9.6	5a
^{90}Sr	7.63×10^{-3}	10.2	1b, 2f, 3b, 4e
^{137}Cs	1.76×10^{-2}	4.5	1b, 1f, 3a, 4f, 5a
^{226}Ra	4.30×10^{-2}	6.6	2d
^{228}Ac	6.98×10^{-2}	5.1	5a
^{228}Th	7.08×10^{-2}	5.1	2c
^{230}Th	4.43×10^{-2}	5.1	2c
^{232}Th	6.93×10^{-2}	5.1	2c
^{234}U	3.91×10^{-2}	3.6	2c
^{238}U	3.89×10^{-2}	5.1	2c
^{238}Pu	1.66×10^{-4}	11.0	1c, 2c, 3c EXCLUDING
$^{239}Pu+^{240}Pu$	8.03×10^{-3}	7.5	1c, 2c, 3c HOT
^{241}Am	1.25×10^{-3}	7.3	1c, 2c, 3c PARTICLES

Mass spectrometry data (10)

This Standard Reference Material was prepared in the Center for Radiation Research, Nuclear Radiation Division, Radioactivity Group, D.D. Hoppes, Group Leader.

Washington, D.C. 20234
April, 1981

George A. Uriano, Chief
Office of Standard Reference Materials

Notes

(1) For further information contact K.G.W. Inn (301) 921-2383 or J.M.R. Hutchinson (301) 921-2396, National Bureau of Standards, Room C114, Building 245, Washington, D.C., 20234.

(2) The soil was pulverized with a "pancake" style air jet mill. The average particle size for the resulting powder is 8 μm. More than 99 percent, by weight, of the particles are less than 20 μm in diameter (VFI80).

(3) Semi-quantitative mineralogical composition by x-ray diffraction measurements (performed by Dr. H. Tourtelot, U.S. Geological Survey, Denver, CO):

Mineral	Percent by Weight
Quartz	55 - 60
Clays	25 - 30
Alkali Feldspars	5 - 10
Plagioclase	5

(4) See attached sheets: Semi-quantitative emission spectrographic analysis and Gamma-ray spectrum for SRM 4353.

(5) Suggested handling of data to obtain estimate of user analytical error for plutonium 239+240 measurements.

A. For each sample measurement, consider the difference between it and the certified $^{239+240}Pu$ concentration of 8.03×10^{-3} Bq g^{-1}. Classify each measurement according to whether the difference is too negative to be attributed to measurement error (outside the sum of the user and NBS uncertainties at the 3s estimated standard deviation level), too positive to be attributed to measurement error, or in between. The user uncertainty for a single measurement should be taken to be larger than 10 percent (1s), the uncertainty of the certifying laboratories. This 10 percent may reflect some inhomogeneity in the material.

B. If all sample measurements are in between take no action.

If any sample measurement is too low, the user's measurements process is suspect.

If no measurements are too low but k out of a total of n sample measurements are too high, calculate the probability of k or more being caused by hot particles and decide accordingly. The probability of at least one hot particle in a sample is given by $p = 1 - e^{-\alpha w}$, where $\alpha = 0.02$ with a 95 percent confidence interval of $0.004 < \alpha < 0.047$, and w is the sample weight in grams. Thus, the probability of k or more samples with hot particles is given by

$$\sum_{i=k}^{n} \frac{n!}{(n-i)!\, i!} p^i (1-p)^{n-i}$$

This probability has been calculated for a few typical examples and is given on the next page.

Samples Size(g)	Probability that k samples out of n contain hot particles									
	One Sample	Two Samples		Three Samples			Four Samples			
	n=1 k=1	n=2 k=1	n=2 k=2	n=3 k=1	n=3 k=2	n=3 =3	n=4 k=1	n=4 k=2	n=4 k=3	n=4 k=4
1	0.02	0.04	0.00	0.06	0.00	0.00	0.08	0.00	0.00	0.00
2	0.04	0.08	0.00	0.11	0.00	0.00	0.15	0.01	0.00	0.00
5	0.10	0.18	0.01	0.26	0.03	0.00	0.33	0.05	0.00	0.00
10	0.18	0.33	0.03	0.45	0.09	0.01	0.55	0.15	0.02	0.00
20	0.33	0.55	0.11	0.70	0.25	0.04	0.80	0.40	0.11	0.01

n = number of samples measured

k = number of samples with hot particle(s)

(6) Summary of homogeneity measurements

A. Fourteen 100g bottled samples were examined for inhomogeneities in their gamma-ray-emission rates by counting them in a 5-in NaI(Tl) well detector coupled to a multichannel analyzer. The count rates from each bottle were compared over each of twelve selected energy regions and also over the total gamma-ray spectrum (0.04-2.05 MeV). The net sample-to-sample inhomogeneities in the gamma-ray-emission rates are summarized below:

Energy Region (MeV)	Standard deviation of the mean (%)
0.04 - 0.11	0.70
0.11 - 0.16	1.81
0.16 - 0.19	0.57
0.19 - 0.27	0.59
0.27 - 0.31	2.21
0.31 - 0.45	1.37
0.45 - 0.79	0.76
0.79 - 1.03	0.73
1.03 - 1.28	1.06
1.28 - 1.62	0.58
1.62 - 1.95	1.05
1.95 - 2.05	4.08
0.04 - 2.05	0.35

B. Inhomogeneities of ^{90}Sr and ^{137}Cs are less than 2 percent for 10g samples.

C. Inhomogeneities of alpha-particle emitting radionuclides, excluding "hot" particles, are less than 3 percent.

(7) Certified values are those measured by two or more methods and/or two or more laboratories.

(8) The random and systematic uncertainties have been combined in quadrature at a level corresponding to a standard deviation of the mean. The stated overall uncertainties are three times this value.

(9) Analytical Methods (References in parentheses)

1. $HF-HNO_3$ or $HF-HNO_3-HClO_4$ dissolution
2. KF-pyrosulfate fusion (BPH80, MAR79, SHA79)
3. HCl, HNO_3 or $HCl-HNO_3$ leaching # (HAR80, LMB75, WNB70)
4. HCl-NaOH leaching (HAR80)

continued next page

5. Non-destructive analysis
   a. Gamma-ray spectrometry with Ge(Li) detector
   b. Beta-particle counting with thin-window Geiger counter
   c. Alpha-particle spectrometry with surface-barrier detector
   d. Radon emanation counting
   e. Beta-particle scintillation counting with plastic phosphor
   f. X-ray photons or beta-particle counting with gas-flow proportional counter

Approximately 8 percent of the contained $^{239}Pu+^{240}Pu$ resist HNO_3, HCl and HNO_3-HCl leaching.

(10) Mass spectrometry measurement

Nuclide	Atom Percent	
^{239}Pu	94.57	
^{240}Pu	5.23	Savannah River
^{241}Pu	0.178	(Dr. J. Halverson)
^{242}Pu	0.023	

PARTICIPATING IN THE ASSAYS

Environmental Measurements Laboratory
U.S. Department of Energy
New York, New York
(Dr. H.L. Volchok and Mr. M.S. Feiner)

National Bureau of Standards
U.S. Department of Commerce
Washington, D.C.
(Dr. J.M.R. Hutchinson and Dr. K.G.W. Inn)

Oregon State University
School of Oceanography
Newport, Oregon
(Dr. T.M. Beasley)

Radiation and Environmental Sciences Laboratory (U.S.D.O.E.)
(Reference laboratory
for the U.S. Nuclear Regulatory Commission)
Idaho Falls, Idaho
(Mr. D.G. Olson and Mr. D.R. Percival)

Woods Hole Oceanographic Institution
Woods Hole, Massachusetts
(Dr. V.T. Bowen and Dr. H.D. Livingston)

STATISTICIAN

Dr. W.S. Liggett Jr., National Bureau of Standards

UNCERTIFIED VALUES

The following activities are uncertified because there are no corroborative measurements with which to compare them, or because, as is the case for $^{239}Pu+^{240}Pu$ the value has been measured directly by only one laboratory (EML). The quoted $^{239}Pu+^{240}Pu$ value, below, is deduced from measurements on smaller samples and agrees, within estimated uncertainties with the EML value. A 90 g sample contains an average of 1.8 hot particles, each with an average activity of about 0.04 Bq.

Radionuclide	Activity concentration (Bq g^{-1})	Laboratory	Method Code
^{55}Fe	2.49×10^{-3}	WHOI	3f
^{235}U	1.9×10^{-3}	RESL	2c
$^{239}Pu+^{240}Pu$ (total in a large sample)	8.8×10^{-3}	Refer to certification page	

REFERENCES

BPH 80 R.P. Bernabee, D.R. Percival and F.D. Hindman, Liquid-liquid extraction separation and determination of plutonium and americium, Analytical Chemistry, 52 (14), 2351 (1980).

HAR 80 Environmental Measurements Laboratory Procedures Manual, HASL 300 with 8 supplements, J.H. Harley, ed., New York (1980).

LMB 75 H.D. Livingston, D.R. Mann and V.T. Bowen, Analytical procedures for transuranic elements in seawater and marine sediments, Analytical Methods in Oceanography, Advances in Chemistry Series No. 147, T.R.P. Gibb, Jr., ed., American Chemical Society, New York, 124 (1975).

MAR 79 D.B. Martin, Determination of strontium-89 and -90 in soil with total sample decomposition, Analytical Chemistry, 51 (12), 1968 (1979).

SHA 79 C.W. Sill, F.D. Hindman and J.I. Anderson, Simultaneous determination of alpha-emitting nuclides of radium through californium in large environmental and biological samples, Analytical Chemistry, 51 (8), 1307 (1979).

VFI 80 H.L. Volchok, M.S. Feiner, K.G.W. Inn and J.F. McInroy, Development of some natural matrix standards - progress report, Environmental International, 3, 395 (1980).

WNB 70 K.M. Wong, V.E. Noshkin and V.T. Bowen, Radiochemical procedures for the analysis of strontium, antimony, rare earths, caesium, and plutonium in seawater samples, Reference Methods for Marine Radiochemistry Studies, International Atomic Energy Agency Technical Report Series No. 118, International Atomic Energy Agency, Vienna, 119 (1970).

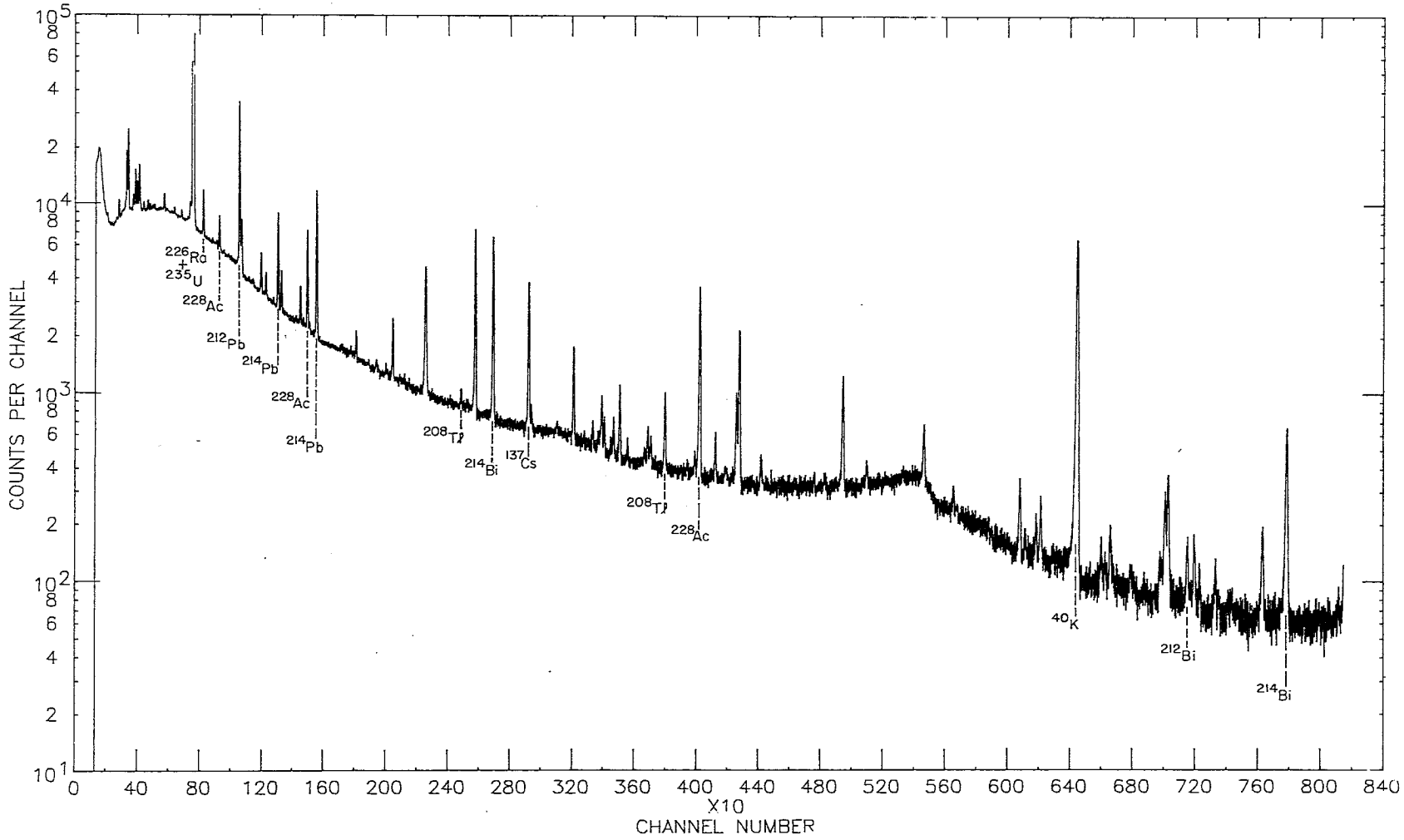
SEMI-QUANTITATIVE EMISSION SPECTROGRAPHIC ANALYSIS FOR SRM-4353

Si	%	> 34	Gd	ppm	< 15	Sr	ppm	220
Al	%	6.5	Ge	ppm	< 1.5	Ta	ppm	< 460
Fe	%	4.0	Hf	ppm	< 15	Tb	ppm	< 32
Mg	%	0.30	Ho	ppm	< 6.8	Th	ppm	< 22
Ca	%	0.65	In	ppm	< 6.8	Tl	ppm	< 4.6
Na	%	0.77	Ir	ppm	< 15	Tm	ppm	< 4.6
K	%	> 1.5	La	ppm	53	U	ppm	< 320
Ti	%	0.20	Li	ppm	< 68	V	ppm	68
P	%	0.088	Lu	ppm	< 15	W	ppm	< 10
Mn	%	0.055	Mn	ppm	550	Y	ppm	22
Ag	ppm	< 0.10	Mo	ppm	5.3	Yb	ppm	3.0
As	ppm	< 150	Nb	ppm	16	Zn	ppm	35
Au	ppm	< 10	Nd	ppm	74	Zr	ppm	330
B	ppm	22	Ni	ppm	290			
Ba	ppm	583	Os	ppm	< 22			
Be	ppm	2.2	Pb	ppm	42			
Bi	ppm	< 10	Pd	ppm	< 1.0			
Cd	ppm	< 32	Pr	ppm	< 68			
Ce	ppm	72	Pt	ppm	< 4.6			
Co	ppm	16	Re	ppm	< 10			
Cr	ppm	533	Rh	ppm	< 2.2			
Cu	ppm	33	Ru	ppm	< 2.2			
Dy	ppm	< 22	Sb	ppm	< 32			
Er	ppm	< 10	Sc	ppm	8.8			
Eu	ppm	< 2.2	Sm	ppm	< 10			
Ga	ppm	11	Sn	ppm	< 1.5			

MAJOR COMPONENTS
RECALCULATED AS OXIDES

SiO_2	%	> 73
Al_2O_3	%	12
Fe_2O_3	%	5.7
MgO	%	0.49
CaO	%	0.92
Na_2O	%	1.1
K_2O	%	> 1.8
TiO_2	%	0.33
P_2O_5	%	< 0.19
MnO	%	0.072

The relative uncertainty for each reported concentration is plus 50%, and minus 33%.



Gamma-ray spectum of SRM 4353, with 60 cm^3 Ge(Li) detector. Background has not been subtracted and contributes typically 20 percent to the peaks for many natural radioelements.

Reagent

Source A_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

79670-334

5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2303925, Item 1
Calibration Date: 01-Apr-2009 12:00 EST **Grams of Master Source:** 0.028371

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Hg-203	279.2	46.61	2.788E+05	7.910E+03	0.3	1.1	2.3	HPGe
Sn-113	391.7	115.1	1.725E+05	4.894E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	10983	1.120E+05	3.178E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.205E+05	1.193E+04	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.184E+05	6.196E+03	0.7	1.1	2.6	HPGe
Co-60	1332.5	1925.4	2.185E+05	6.199E+03	0.7	1.1	2.6	HPGe
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* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
5.31740 grams 4M HCl solution with approximately 30 microg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the calibration date.

Source Prepared by: mwaacaa for
W. Mao, Radiochemist

QA Approved: D. M. Montgomery
D. M. Montgomery, QA Manager Date: 5-13-09

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Source E_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

79670-334

5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2303925, Item 1
Calibration Date: 01-Apr-2009 12:00 EST **Grams of Master Source:** 0.028371

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	157860	———	3.390E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	462.60	1.691E+05	4.798E+03	0.4	1.7	3.5	HPGe
Co-57	122.1	271.79	8.904E+04	2.526E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	137.6	1.256E+05	3.563E+03	0.4	1.1	2.3	HPGe
Hg-203	279.2	46.61	2.788E+05	7.910E+03	0.3	1.1	2.3	HPGe
Sn-113	391.7	115.1	1.725E+05	4.894E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	10983	1.120E+05	3.178E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.205E+05	1.193E+04	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.184E+05	6.196E+03	0.7	1.1	2.6	HPGe
Co-60	1332.5	1925.4	2.185E+05	6.199E+03	0.7	1.1	2.6	HPGe
Y-88	1836.1	106.6	4.444E+05	1.261E+04	0.7	1.1	2.6	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
5.31740 grams 4M HCl solution with approximately 30 microg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the calibration date.

Source Prepared by: for
W. Mao, Radiochemist

QA Approved: Date: 5-13-09
D. M. Montgomery, QA Manager

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Source F_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

83725-334

5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis/Earth City, MO
P.O. No.: 2397508, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.028066

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	1.580E+05	———	3.261E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	4.763E+03	0.8	1.7	3.8	HPGe
Co-57	122.1	2.718E+02	8.711E+04	2.445E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	3.500E+03	0.5	1.1	2.4	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	7.727E+03	0.4	1.1	2.3	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	4.965E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	3.113E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	1.066E+02	4.224E+05	1.186E+04	0.5	1.1	2.4	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	6.012E+03	0.6	1.1	2.5	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	6.015E+03	0.6	1.1	2.5	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	1.255E+04	0.5	1.1	2.4	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

ACCREDITED SOURCE CALIBRATION LABORATORY — HEALTH PHYSICS SOCIETY — FOUNDED 1956

Comments:
5.30203 grams 4M HCl solution with approximately 30 µg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the reference date.

Source Prepared by: M I Taskaeva
M. I. Taskaeva, Radiochemist

QA Approved: _____ Date: 13 JAN 11
J. D. McCorvey, QA Manager Alternate

Reagent

Source H_00002

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

83725-334

5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis/Earth City, MO
P.O. No.: 2397508, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.028066

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Am-241	59.5	1.580E+05	———	3.261E+03	0.1	0.9	1.8	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	4.763E+03	0.8	1.7	3.8	HPGe
Co-57	122.1	2.718E+02	8.711E+04	2.445E+03	0.5	1.3	2.8	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	3.500E+03	0.5	1.1	2.4	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	7.727E+03	0.4	1.1	2.3	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	4.965E+03	0.5	1.1	2.4	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	3.113E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	1.066E+02	4.224E+05	1.186E+04	0.5	1.1	2.4	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	6.012E+03	0.6	1.1	2.5	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	6.015E+03	0.6	1.1	2.5	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	1.255E+04	0.5	1.1	2.4	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Comments:
5.30203 grams 4M HCl solution with approximately 30 µg/g each of Cd, Co, Ce, Hg, Sn, Cs, and Y carriers.

This standard will expire one year after the reference date.

Source Prepared by: M Taskaeva
M. I. Taskaeva, Radiochemist

QA Approved: _____ Date: 13 JAN 11
J. D. McCorvey, QA Manager Alternate

Reagent

Sr-90_00001

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

80573-334
5 mL Liquid in Flame Sealed Vial

Customer: Test America St. Louis
P.O. No.: 2324797, Item 1

This standard radionuclide source was prepared gravimetrically from a calibrated master solution. The master solution was calibrated by liquid scintillation counting. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry and liquid scintillation counting. The nuclear decay rate and assay date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty*, % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Sr-90	10515.5	3.782E+04	0.1	0.9	1.8	09/17/2009

*Uncertainty: U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: γ-impurities <0.1%. 5.04317 grams 0.1M HCl solution with approximately 30 microg/g each of Sr and Y carriers. NOTE: This source also contains Y-90 in secular equilibrium with Sr-90. The Y-90 activity is equal to the Sr-90 activity. Since Sr-90 and Y-90 both decay 100% by beta emission, the total beta emission rate for the source is twice the certified Sr-90 activity. The half-life for Y-90 is 64.08 hours.

Source Prepared by: _____
W. Mao, Radiochemist

QA Approved: _____ Date: 9-22-09
D. M. Montgomery, QA Manager

ACCREDITED SOURCE CALIBRATION LABORATORY
HEALTH PHYSICS SOCIETY
FOUNDED 1956

Corporate Office
Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia 30318

Reagent

Sr-90_00017

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

92352

Sr-90 5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2502682, Item 1 Product Code: 8090-5FSA-37kBq

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Sr-90	1.052E+04	3.749E+04	0.1	0.9	1.8	11/29/2012

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: γ-impurities<0.1%.
5.02357 g 0.1M HCl solution with approximately 30 µg/g each Sr and Y carriers.

NOTE: This source also contains Y-90 in secular equilibrium with Sr-90. The Y-90 activity is equal to the Sr-90 activity. Since Sr-90 and Y-90 both decay 100% by beta emission, the total activity for the source is twice the certified Sr-90 activity. The half-life for Y-90 is 64.08 hours.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 26 Nov 12
J.D. McCorvey, Counting Room Manager

RAD12-0042
Sr-90
hursts
None
Prep/Opened: 11/28/2012
Exp(1): 11/29/2062
Exp(2): 11/29/2062
51511
ID Sr-90_00017
Sr-90 Ampoule

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Single Isotope Certificate Rev 3, 23 August 2012

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

Sr-90_00018

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Reagent ID: Sr-90_00018

		Expiration Date:	11/29/2062
Description:	Sr-90 Calibration STD	Laboratory:	TestAmerica St. Louis
No. of Bottles:	1	Prepared By:	Hurst, Sarah
Storage Location:	RAD Separations Reagents - 1	Solvent:	0.1M HCL
Reagent Volume:	100.000 mL	Solvent Lot:	0
Creation Date:	11/28/2012		
Container(s):	51512		
Comment:	Rad12-0043		

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
Gross Beta	Sr-90_00017	11/29/2062	14925.64000	Bq/g	44774.23338	dpm/mL
Sr-90	Sr-90_00017	11/29/2062	7462.82000	Bq/g	22387.11669	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Sr-90_00017	Sr-90 Ampoule	ASTD	11/29/62	Analytics	92352		4.99970	g

St. Louis Radiological Standard Reverification Form

Standard ID Number: Sr-90_00018 (51512)
True Value = 1976.75 pCi/sample or g
Date Analyzed: 2/10/2014

Radionuclide: Sr-90 (Low mass)

Replicates		
#1	1935	pCi/sample or g
#2	1941	pCi/sample or g
#3	1924	pCi/sample or g

Mean = 1933.333

1 sigma = 8.621678 1.96 sigma = 16.89849

True Value minus 5% = 1877.913 (True Value - 5%)
True Value plus 5% = 2075.588 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 2/10/14

SOP Reference: STL-QA-0002, Current Revision

St. Louis Radiological Standard Reverification Form

Standard ID Number: Sr-90_00018 (51512)
True Value = 1948.75 pCi/sample or g
Date Analyzed: 2/10/2014

Radionuclide: Sr-90 (Medium mass)

Replicates		
#1	1911	pCi/sample or g
#2	1945	pCi/sample or g
#3	1893	pCi/sample or g

Mean = 1916.333

1 sigma = 26.40707 1.96 sigma = 51.75786

True Value minus 5% = 1851.313 (True Value - 5%)
True Value plus 5% = 2046.188 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 2/10/14

SOP Reference: STL-QA-0002, Current Revision

St. Louis Radiological Standard Reverification Form

Standard ID Number: Sr-90_00018 (51512)
True Value = 1992 pCi/sample or g
Date Analyzed: 2/10/2014

Radionuclide: Sr-90 (High mass)

Replicates		
#1	1907	pCi/sample or g
#2	1930	pCi/sample or g
#3	1937	pCi/sample or g

Mean = 1924.667

1 sigma = 15.69501 1.96 sigma = 30.76222

True Value minus 5% = 1892.4 (True Value - 5%)
True Value plus 5% = 2091.6 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 2/10/14

SOP Reference: STL-QA-0002, Current Revision

Protean Beta ICV-ACV recoveries from March 2013			
Protean Detector	**Low** pCi/sample	**Medium** pCi/sample	**High** pCi/sample
0	1962	1945	1971
1	2003	1947	1995
2	1960	1965	1998
3	1988	1942	1995
4	1977	1940	1997
5	1969	1949	2013
6	1986	1938	1986
7	1969	1964	1981
Average pCi/sample	1976.75	1948.75	1992

Protean Beta ICV-ACV recoveries from February 2014			
Protean Detector	**Low** pCi/sample	**Medium** pCi/sample	**High** pCi/sample
4	1935	1911	1907
5	1941	1945	1930
6	1924	1893	1937
Average pCi/sample	1933.33	1916.33	1924.67

Standard ID
Strontium 90
Sr-90_00018 #51512
Cert# 92352 Ref. date 11/29/12

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122640 **Operator:** 63903

Sample ID	WRKNO	Aliquot		Mass	Instr ID	CountTime		Ts	Tb	Dilution	Sigma	
	Analyte	Cs	Cb	XT	CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC
ICVABT-51512;B1	NA	1.000E+000sample		0.0513 g	Protean4	2/10/14 22:54		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	49	0.00	0.000E+000	4.900E-002	0.1157	**-1.908E-001**pCi/sample	5.869E-002	5.452E-002	3.382E+000	8.968E-001
	Gross Beta	9072	417	0.00	1.814E+003	4.170E-001	0.4224	**1.935E+003**pCi/sample	1.977E+002	4.063E+001	1.594E+000	7.165E-001
ICVABT-51512;B2	NA	1.000E+000sample		0.1114 g	Protean4	2/10/14 23:19		5.00	1000.00	1.00	2.00	
	Gross Alpha	1	49	0.00	2.000E-001	4.900E-002	0.0830	**8.194E-001**pCi/sample	2.174E+000	2.172E+000	4.713E+000	1.250E+000
	Gross Beta	8432	417	0.00	1.686E+003	4.170E-001	0.3973	**1.911E+003**pCi/sample	1.956E+002	4.164E+001	1.694E+000	7.616E-001
ICVABT-51512;B3	NA	1.000E+000sample		0.1813 g	Protean4	2/10/14 23:04		5.00	1000.00	1.00	2.00	
	Gross Alpha	1	49	0.00	2.000E-001	4.900E-002	0.0540	**1.260E+000**pCi/sample	3.343E+000	3.340E+000	7.248E+000	1.922E+000
	Gross Beta	8054	417	0.00	1.611E+003	4.170E-001	0.3804	**1.907E+003**pCi/sample	1.954E+002	4.251E+001	1.770E+000	7.956E-001

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery	LCL	UCL	ZFactor
					%			

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery	ZFactor
						%	

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

RadCapture, version 4.2.06, released 2/9/2012

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122640 **Operator:** 63903

Sample ID	WRKNO / Analyte	Aliquot Cs	Cb	Mass XT		Instr ID CPMs	CountTime CPMb	Eff	Activity	Ts	Tb UncTot	Dilution UncCnt	Sigma MDA	DLC
ICVABT-51512;B1	NA	1.000E+000	sample	0.0513	g	Protean5	2/10/14 23:04			5.00	1000.00	1.00	2.00	
	Gross Alpha	0	43	0.00	0.000E+000	4.300E-002	0.1145		**-1.692E-001** pCi/sample		5.510E-002	5.161E-002	3.337E+000	8.490E-001
	Gross Beta	9111	398	0.00	1.822E+003	3.980E-001	0.4228		**1.941E+003** pCi/sample		1.983E+002	4.068E+001	1.569E+000	6.992E-001
ICVABT-51512;B2	NA	1.000E+000	sample	0.1114	g	Protean5	2/10/14 22:54			5.00	1000.00	1.00	2.00	
	Gross Alpha	0	43	0.00	0.000E+000	4.300E-002	0.0823		**-2.353E-001** pCi/sample		7.661E-002	7.176E-002	4.639E+000	1.180E+000
	Gross Beta	8552	398	0.00	1.710E+003	3.980E-001	0.3960		**1.945E+003** pCi/sample		1.990E+002	4.207E+001	1.675E+000	7.465E-001
ICVABT-51512;B3	NA	1.000E+000	sample	0.1813	g	Protean5	2/10/14 23:19			5.00	1000.00	1.00	2.00	
	Gross Alpha	2	43	0.00	4.000E-001	4.300E-002	0.0532		**3.022E+000** pCi/sample		4.802E+000	4.790E+000	7.178E+000	1.826E+000
	Gross Beta	8046	398	0.00	1.609E+003	3.980E-001	0.3755		**1.930E+003** pCi/sample		1.977E+002	4.304E+001	1.766E+000	7.873E-001

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

RadCapture, version 4.2.06, released 2/9/2012

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122640 **Operator:** 63903

Sample ID	WRKNO	Aliquot		Mass		Instr ID	CountTime		Ts	Tb	Dilution	Sigma	
	Analyte	Cs	Cb	XT		CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC
ICVABT-51512;B1	NA	1.000E+000	sample	0.0513	g	Protean6	2/10/14 23:19		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	87	0.00	0.000E+000	8.700E-002	0.1165		**-3.362E-001** pCi/sample	8.166E-002	7.210E-002	3.776E+000	1.186E+000
	Gross Beta	8992	520	0.00	1.798E+003	5.200E-001	0.4209		**1.924E+003** pCi/sample	1.966E+002	4.059E+001	1.718E+000	8.029E-001
ICVABT-51512;B2	NA	1.000E+000	sample	0.1114	g	Protean6	2/10/14 23:04		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	87	0.00	0.000E+000	8.700E-002	0.0842		**-4.657E-001** pCi/sample	1.131E-001	9.985E-002	5.230E+000	1.642E+000
	Gross Beta	8356	520	0.00	1.671E+003	5.200E-001	0.3976		**1.893E+003** pCi/sample	1.937E+002	4.142E+001	1.819E+000	8.499E-001
ICVABT-51512;B3	NA	1.000E+000	sample	0.1813	g	Protean6	2/10/14 22:54		5.00	1000.00	1.00	2.00	
	Gross Alpha	0	87	0.00	0.000E+000	8.700E-002	0.0559		**-7.014E-001** pCi/sample	1.703E-001	1.504E-001	7.877E+000	2.474E+000
	Gross Beta	8127	520	0.00	1.625E+003	5.200E-001	0.3778		**1.937E+003** pCi/sample	1.985E+002	4.300E+001	1.914E+000	8.945E-001

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery	LCL	UCL	ZFactor
					%			

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery	ZFactor
						%	

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

RadCapture, version 4.2.06, released 2/9/2012

TestAmerica St. Louis

Standards Preparation Logbook Record

Nov-28-2012

Logbook: \\Qstlmo01\Stdslog\RAD_STD.std

RAD12-0042, Sr-90 Sr-90_00017 #51511 Analyst: hursts

Vendor: Analytics Lot No.: 92352
Solvent: None
Date Prep./Opened: 11-28-2012
Date Expires(1): 11-29-2062 (50 Years)
Date Expires(2): 11-29-2062 (50 Years)
Cert: 92352 Activity: 37490Bq Mass: 5.02357 Ref. Date: 11/29/12

Component	Initial Conc (dpm/g)	Final Conc (dpm/g)
Sr-90	447,769	447,769

RAD12-0043, Sr-90 Calibration STD Sr-90_00018 #51512 Analyst: hursts

Solvent: None Volume (ml): 100.00
Date Prep./Opened: 11-28-2012
Date Expires(1): 11-29-2062 (50 Years)
Date Expires(2): 11-29-2062 (50 Years)

Parent Std No.: RAD12-0042, Sr-90 Aliquot Amount (g): 4.9997
Parent Date Expires(1): 11-29-2062 Parent Date Expires(2): 11-29-2062

Component	Initial Conc (dpm/g)	Final Conc (dpm/mL)
Sr-90	447,769	22,387

Reviewed By: SD

St. Louis Radiological Standard Reverification Form

Standard ID Number: Rad12-0043
True Value = 2016.7 pCi/L or g
Date Analyzed: 11/30/2012

Radionuclide: Sr90

	Replicates	
#1	1964	pCi/L or g
#2	1958	pCi/L or g
#3	2015	pCi/L or g

Mean = 1979

1 sigma = 31.32092 1.96 sigma = 61.389

True Value minus 5% = 1915.865 (True Value - 5%)
True Value plus 5% = 2117.535 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: 11/30/12

SOP Reference: STL-QA-0002, Current Revision

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122629 **Operator:** 63903

Sample ID	WRKNO	*Aliquot*		*Mass*	*Instr ID*	*CountTime*		*Ts*	*Tb*	*Dilution*	*Sigma*	
	Analyte	Cs	Cb	XT	CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC
verification-1b	NA	*1.000E+000sample*		*0.0536 g*	*Purple16*	*11/30/12 10:42*		*8.00*	*1000.00*	*1.00*	*1.00*	
	Gross Alpha	123	175	0.00	1.538E+001	1.750E-001	0.4314	**1.587E+001**pCi/sample	1.707E+000	1.448E+000	8.638E-001	3.593E-001
	Gross Beta	14954	485	0.00	1.869E+003	4.850E-001	0.4285	**1.964E+003**pCi/sample	9.953E+001	1.607E+001	1.211E+000	6.021E-001
verification-2b	NA	*1.000E+000sample*		*0.0529 g*	*Purple17*	*11/30/12 10:43*		*8.00*	*1000.00*	*1.00*	*1.00*	
	Gross Alpha	53	87	0.00	6.625E+000	8.700E-002	0.1306	**2.254E+001**pCi/sample	3.391E+000	3.138E+000	2.356E+000	8.365E-001
	Gross Beta	15152	362	0.00	1.894E+003	3.620E-001	0.4356	**1.958E+003**pCi/sample	9.919E+001	1.591E+001	1.077E+000	5.117E-001
verification-3b	NA	*1.000E+000sample*		*0.0528 g*	*Purple18*	*11/30/12 10:43*		*8.00*	*1000.00*	*1.00*	*1.00*	
	Gross Alpha	85	62	0.00	1.063E+001	6.200E-002	0.1313	**3.624E+001**pCi/sample	4.462E+000	3.954E+000	2.160E+000	7.027E-001
	Gross Beta	15378	395	0.00	1.922E+003	3.950E-001	0.4296	**2.015E+003**pCi/sample	1.020E+002	1.625E+001	1.125E+000	5.420E-001

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery	LCL	UCL	ZFactor
					%			

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery	ZFactor
						%	

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Prep Report for Gross Alpha/Beta

Batch: M122629 **Prep Analyst:** 250

SampID	WRKNO	Aliquot		purple Gross	Tare	Mass	Dilution
verification-1b	NA	1.000E+000	sample	8.7067 g	8.6531 g	0.0536 g	1.00
verification-2b	NA	1.000E+000	sample	8.6615 g	8.6086 g	0.0529 g	1.00
verification-3b	NA	1.000E+000	sample	8.6935 g	8.6407 g	0.0528 g	1.00

Spike Information

Sample ID	Standard ID	Analyte	Std Conc	Aliquot	Ref Date	StdAdded
	Rad12-0043	SR-90	22.387 dpm/mL	0.1 mL	11-29-12	

MS — Spiked By

LM — Spike Verified By

11-28-12 — Spike Date

Standard Operating Procedures

SOPNumber	Title	Revision
☐		

Reviewed By — 11/30/12 Review Date

MS — Analyst/Relenquished By — 11/28/12 Release Date

Received By — 11/28/12 Receipt Date

MS 11-30-12 ~~112~~ 112343897/MS/11-28-12

Balance ID / Initials / Date

Reagent

Th-229_00016

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

97790
Th-229 5 mL Liquid in Flame Sealed Vial

430569
ID: Th-229_00016
Exp:08/06/64 Prpd:SCB Opn:08/20/14
Th-229 Ampoule

Customer: TestAmerica - St. Louis
P.O. No.: 2573570, Item 1 Product Code: 8229

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Th-229	2.681E+06	3.761E+03	0.5	1.5	3.1	08/06/2014

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: α-impurities: Th-228 2.83E-01 Bq, Th-230 2.33E+01 Bq, Th-232 1.51E0 Bq; γ-impurities (other than decay products)<0.1%.
5.08156 g 0.5M HNO3 solution. Carrier free.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QC Approved: _____ Date: 06 AUG 14
A. Chen, Spectroscopist

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

ANA Form005 Rev. —

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

U.S. DEPARTMENT OF COMMERCE
National Institute of Standards & Technology
Gaithersburg, MD 20899

Certificate of Participation

Eckert & Ziegler Analytics
Atlanta, Georgia

is a participant for the period January 1, 2014, through December 31, 2014, in a radioactivity measurements assurance program conducted by the National Institute of Standards and Technology, in cooperation with NRMAP Incorporated. Continued participation is evidenced by dated Reports of Traceability issued for particular radionuclides, which indicate the deviation of the participant's reported value from that measured by the National Institute of Standards and Technology. The significance of these Reports is addressed below.*

For the Director,

Michael P. Unterweger, Leader
Radioactivity Group
Physical Measurement Laboratory

*As guidance for the proper use of Reports of Traceability, it should be emphasized that the National Institute of Standards and Technology is concerned only with fostering good measurements capability and consistency with the national measurements system. The assurance of the proper application of that capability to the ultimate consumer products is the responsibility of each manufacturer of these products and of the Federal regulatory agencies.

A continuing traceability program in radioactivity demonstrates, to the degree established by the periodic assays of calibrated radioactivity samples, a continuing competence to maintain the methods and standards necessary for accurate measurement. Such a program cannot, however, endorse each and every measurement nor the final product, any more than a spot check can vouch for every unchecked item. Care should be taken, therefore, not to imply such endorsement. The proper use of this Report is governed by section 200.114 of Title 15 of the Code of Federal Regulations. These regulations may be met if Reports are quoted only in their entirety. Excerpts out of context may be misleading.

1380 Seaboard Industrial Boulevard
Atlanta, Georgia 30318 USA
Phone (404) 352-8677 • Fax (404) 352-2837
Email: analytics@ezag.com (Tax EIN: 58-1406082)

Eckert & Ziegler
Analytics

Recommended Procedure for Opening the Flame Sealed Vial

1) If the solution is to be diluted, it is recommended that the diluting solution have a composition comparable to that of the standard.

2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood.

3) Shake the vial to wet the entire inside surface of the vial. Return the vial to the upright position.

4) Check that all of the liquid has drained out of the neck of the vial. If necessary, gently tap the neck to speed the process.

5) The Wheaton vials we use are pre-scored.

6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.

7) Hold the vial upright and wrap with soft tissue, such as Chem Wipes, around the tip of the vial and secure with tape (see picture). Snap off the top of the vial by pressing the pre-scored part of the neck away towards you while pulling the tip of the vial away from you.

8) Transfer the solution from the vial using a pycnometer or pipet with a dispenser handle. NEVER PIPETTE BY MOUTH.

9) Seal any unused solution in a flame sealed glass vial, if possible, to minimize the evaporation loss.

Reagent

Th-229_00024

ExtChrom_Actin Prep Worksheet

(Used for Collecting Prep Info)

Batch Number: 160-381464 Analyst: Mazariegos, Chelsea M Batch Open: 8/9/2018 5:47:00PM

Batch End: 8/16/2018 3:52:00PM

Preparation, Extraction Chromatography Resin Actinide Separation

	Input Sample Lab ID 8/23/18	Input Sample Lab ID (Analytical Method)	SDG	Matrix	Initial Amount	Final Amount	Due Date	Analytical TAT	Div Rank	Comments
1	160-29904-A-1 96	160-29904-A-1 (A01R_Th)	N/A	Water	0.1 mL		8/27/18	18_Days	N/A	Th-229_00024 Contamination Check
2	160-29904-A-1 97	160-29904-A-1 (A01R_Th)	N/A	Water	0.1 mL		8/27/18	18_Days	N/A	Th-229_00024 Contamination Check
3	160-29904-A-1 98	160-29904-A-1 (A01R_Th)	N/A	Water	0.1 mL		8/27/18	18_Days	N/A	Th-229_00024 Contamination Check

Batch Notes

Balance ID	n/a
Analyst ID - Reagent Drop	CMM
Analyst ID - Reagent Drop Witness	KNF per CMM
Pipette ID	RAD116
Analyst ID - Column	N/A
Column Date	N/A
Analyst ID - CoPrecipitation	CMM
CoPrecipitation Date	08/09/2018
SOP Number	ST-RC-0100
Batch Comment	Th-229_00024 Contamination Check

Rad Worksheet

Batch Number: 160-381464
Method: ExtChrom
Analyst: Mazariegos, Chelsea M

Date Open: Aug 09 2018 5:47PM
Batch End: Aug 16 2018 3:52PM

Lab ID	Client ID	Method Chain	Basis	Initial weight/volume of sample	Th-229_00024
160-29904-A-1	Th-229 Verify	ExtChrom_Actin, A01R_Th	T	0.1 mL	0.1 mL
160-29904-A-1	Th-229 Verify	ExtChrom_Actin, A01R_Th	T	0.1 mL	0.1 mL
160-29904-A-1	Th-229 Verify	ExtChrom_Actin, A01R_Th	T	0.1 mL	0.1 mL

Balance ID: n/a
Analyst ID - Reagent Drop: CMM
Analyst ID - Reagent Drop Witness: KNF per CMM
Pipette ID: RAD116
Analyst ID - Column: N/A
Column Date: N/A
Analyst ID - CoPrecipitation: CMM
CoPrecipitation Date: 08/09/2018
SOP Number: ST-RC-0100

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TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:50:51PM 8/24/2018

Sample

Sample Name: 160-29904-A-1-G
SampleType: Sample
: 160-29904-A-1-G
Sample Collection Date: 8/1/2018 12:00:00PM

Spectrum #4 Analysis #1
Sample Volume : 0.0001L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 381464
AnalysisID: 738715

Analyst: 60040

Tracer

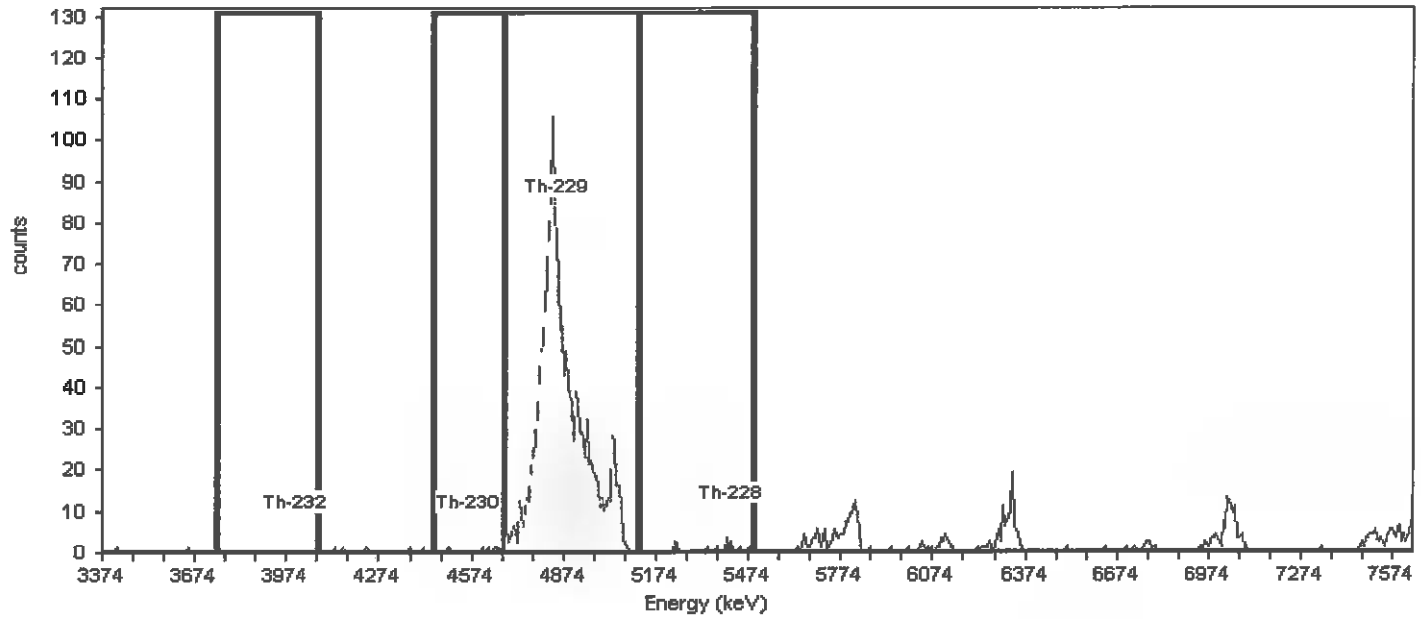
Tracer Name: Th-229_00024
Tracer Activity: 67.23 DPM/mL x (Vol.)0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/6/2014 11:00:28AM

Tracer Nuclide: Th-229
Tracer Recovery: 87.31%

Acquisition

Detector: AV96
Serial Number: 46-033P1
Acquisition Start Date: 8/23/2018 12:36:16PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 8/11/2018 5:18:07PM
Background Info: Sample: ICB;AV96; Det: AV96; Spectrum #1;
Aug-11-2018 17:18

Calibration Name: IC-1370619;AV96-05162018
Calibration Date: 5/17/2018 6:13:25AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 27.15% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/10/2018 6:48:54PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Manual Integration for tailing
RTM 8/24/2018

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	.0	100.2	0	0.0000	0.00	0.000	pCi/L
Th-230	4563.9	4,687.5	-123.6	4448.3	4679.5	28.7	99.7	6	2.0000	4.00	79.427	pCi/L
Th-229	4848.0	4,845.3	2.7	4679.5	5119.5	82.5	99.8	1527	1.0000	1526.00	26,440.990	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	96.7	99.8	12	18.0000	-6.00	-120.584	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:51:31PM 8/24/2018

Sample

Sample Name: 160-29904-A-1-H
SampleType: Sample
: 160-29904-A-1-H
Sample Collection Date: 8/1/2018 12:00:00PM

Spectrum #4 Analysis #1
Sample Volume : 0.0001L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 381464
AnalysisID: 738716

Analyst: 60040

Tracer

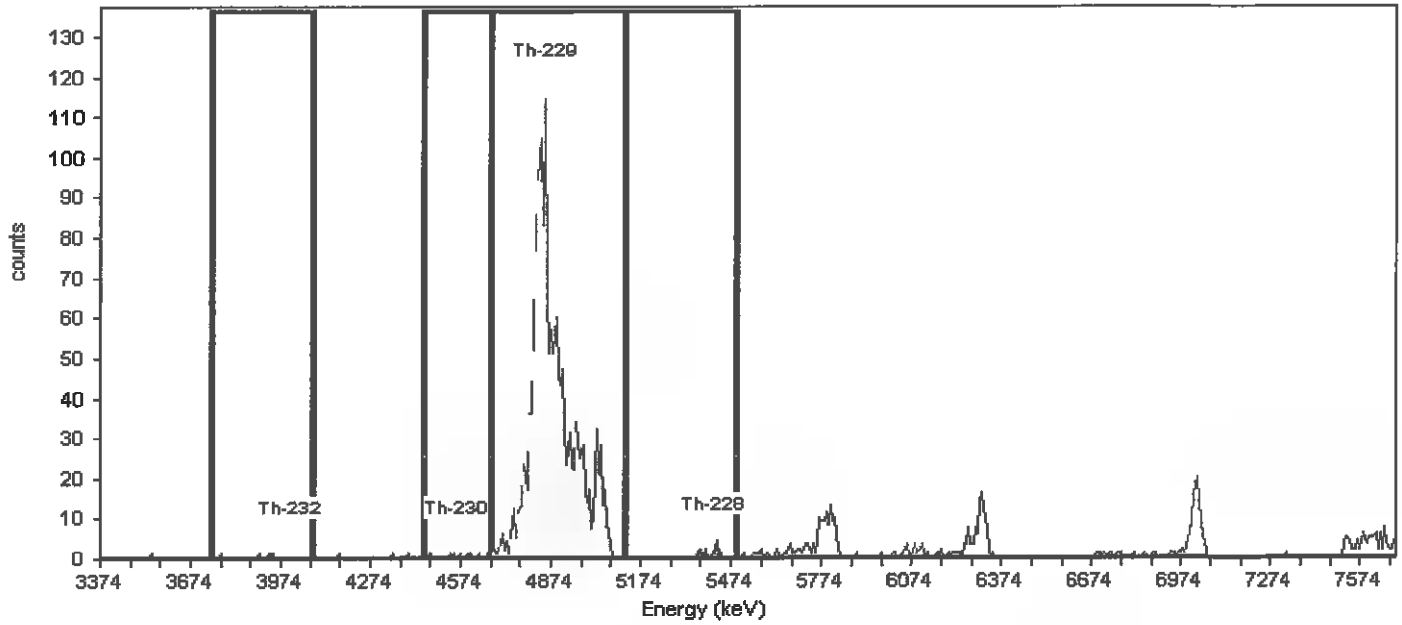
Tracer Name: Th-229_00024
Tracer Activity: 67.23 DPM/mL x (Vol.)0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/6/2014 11:00:28AM

Tracer Nuclide: Th-229
Tracer Recovery: 90.67%

Acquisition

Detector: AV97
Serial Number: 76-03393
Acquisition Start Date: 8/23/2018 12:36:17PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 8/11/2018 5:18:09PM
Background Info: Sample: ICB;AV97; Det: AV97; Spectrum #1; Aug-11-2018 17:18

Calibration Name: IC-1370620;AV97-05162018
Calibration Date: 5/17/2018 6:13:36AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.84% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/10/2018 6:48:54PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Manual Integration for tailing
RTM 8/24/2018

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	200.9	100.2	4	2.0000	2.00	38.482	pCi/L
Th-230	4560.2	4,687.5	-127.3	4448.3	4672.0	10.1	99.7	9	1.0000	8.00	154.698	pCi/L
Th-229	4848.0	4,845.3	2.7	4672.0	5119.5	91.7	99.8	1573	6.0000	1567.00	27,458.880	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	90.0	99.8	13	15.0866	-2.26	-44.228	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
7:52:52PM 8/24/2018

Sample

Sample Name: 160-29904-A-1-I
SampleType: Sample
: 160-29904-A-1-I
Sample Collection Date: 8/1/2018 12:00:00PM

Spectrum #4 Analysis #1
Sample Volume : 0.0001L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 381464
AnalysisID: 738717

Analyst: 60040

Tracer

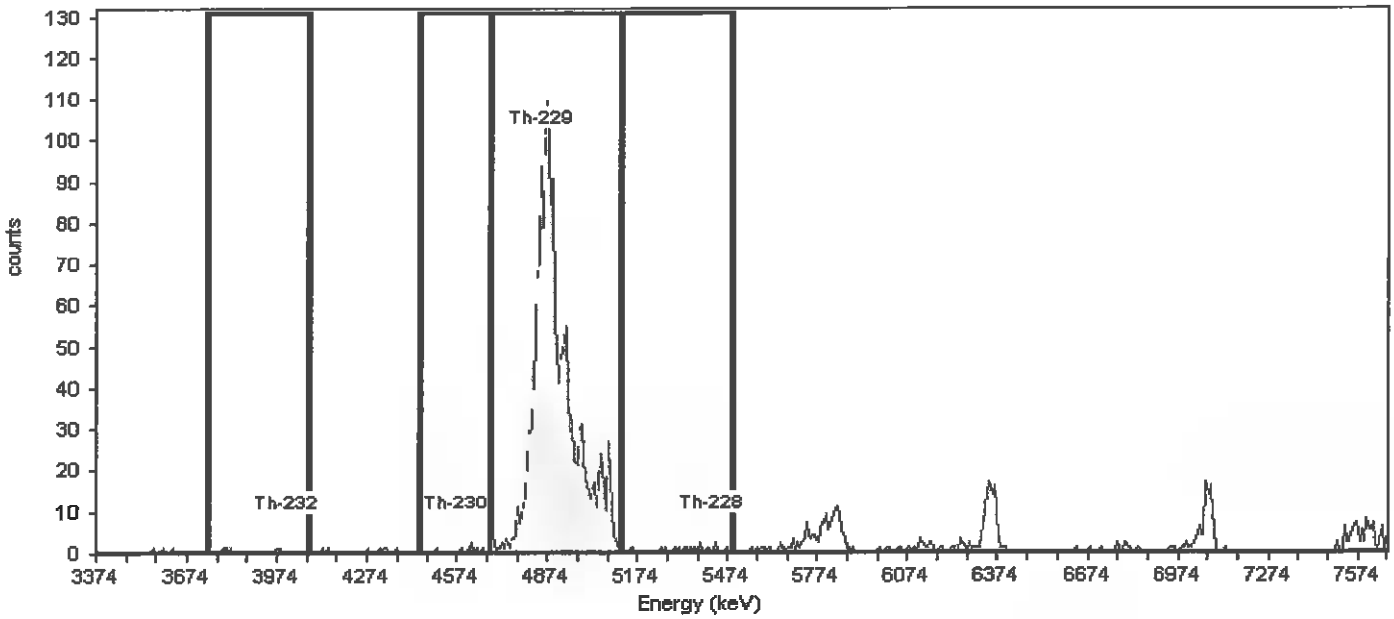
Tracer Name: Th-229_00024
Tracer Activity: 67.23 DPM/mL x (Vol.)0.10 mL = 6.72 DPM
Tracer Ref. Date: 8/6/2014 11:00:28AM

Tracer Nuclide: Th-229
Tracer Recovery: 99.79%

Acquisition

Detector: AV98
Serial Number: 46-033Q3
Acquisition Start Date: 8/23/2018 12:36:19PM
Live Time: 960.01 min.
Real Time: 960.02 min.
Background Date: 8/13/2018 2:36:17PM
Background Info: Sample: ICB;AV98; Det: AV98; Spectrum #1;
Aug-13-2018 14:36

Calibration Name: IC-7107;AV98-05172018
Calibration Date: 5/17/2018 8:54:10AM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 25.14% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th2007_ROI
Decay Correction: 8/10/2018 6:48:54PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Manual Integration for tailing
RTM 8/24/2018

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	41.9	100.2	5	6.0336	-1.03	-19.296	pCi/L
Th-230	4567.6	4,687.5	-119.9	4448.3	4686.9	54.7	99.7	7	3.0000	4.00	75.050	pCi/L
Th-229	4848.0	4,845.3	2.7	4686.9	5119.5	84.9	99.8	1620	5.0000	1615.00	30,220.390	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	10.1	99.8	17	17.0867	-0.17	-3.292	pCi/L

Standard ID Number: Th-229_00024
True Value = 30273 pCi/L
Date Analyzed: 8/4/2018

Radionuclide: Th-229

	Replicates	
#1	30310.44	pCi/L
#2	30956.57	pCi/L
#3	30944.9	pCi/L

Mean = 30737.3033

1 sigma = 369.720538 1.96 sigma = 724.6523

True Value minus 5% = 28759.35 (True Value - 5%)
True Value plus 5% = 31786.65 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: lm 8.6.18

2nd Reviewed By/Date: AB 8/24/18

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	8/6/2014 0:00		
Decayto Date/Time (t):	8/4/18 0:00		
Initial Activity (A_0):	67.23 dpm		
Initial Aliquot:	1 mL		
Initial Conc:	67.22958 dpm/mL		
***Soln. Density:**	1 g/mL		
Nuclide:	Th-229		
Half-Life (days):	2897163	decay days	fraction
****Decay Factor:**	0.9997	1459.00	0.00050
Decay Corr Activity:	6.7206E+01 dpm		
Decay Corr Conc:	6.7206E+01 dpm/mL		

Conversion/Calculations

Final Activity Unit:	pCi
Activity Unit Factor:	0.45045
Final Volume Unit:	L
Volume Unit Factor:	0.001
Final Concentration:	3.0273E+04 pCi/L
Aliquot Volume:	1.0000E+00 L
Final Activity (A):	3.0273E+04 pCi

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

Ref. 08·06·14

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Th-229_00024

Reagent ID: Th-229_00024

Description:	Th-229 Tracer	Expiration Date:	12/20/2018
No. of Bottles:	1	Laboratory:	TestAmerica St. Louis
Storage Location:	RAD Actinide STDs	Prepared By:	Bernsen, Sarah C
Reagent Volume:	250.000 mL	Solvent:	0.1M HNO3
Creation Date:	08/01/2018	Solvent Lot:	n/a
Open Date:			
Container(s):	1529235		
Comment:			

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
At-217	Th-229_00017	12/20/2018	2240.98600	dpm/mL	67.22958	dpm/mL
Th-229	Th-229_00017	12/20/2018	2240.98600	dpm/mL	67.22958	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Th-229_00017	Th-229 Parent		12/20/18				7.50000	mL

ExtChrom_Actin Prep Worksheet

(Used for Collecting Prep Info)

Batch Number: 160-380161 Analyst: Bernsen, Sarah C

Batch Open: 8/3/2018 12:14:00PM

Batch End: 8/3/2018 8:20:00PM

Preparation, Extraction Chromatography Resin Actinide Separation

	Input Sample Lab ID	Input Sample Lab ID (Analytical Method)	SDG	Matrix	Initial Amount	Final Amount	Due Date	Analytical TAT	Dlv Rank	Comments
1	160-29904-A-1 80	160-29904-A-1 (A01R_Th)	N/A	Water	0.1 mL		8/27/18	18_Days	N/A	Th-229_00024 Verification
2	160-29904-A-1 81	160-29904-A-1 (A01R_Th)	N/A	Water	0.1 mL		8/27/18	18_Days	N/A	Th-229_00024 Verification
3	160-29904-A-1 82	160-29904-A-1 (A01R_Th)	N/A	Water	0.1 mL		8/27/18	18_Days	N/A	Th-229_00024 Verification

Batch Notes

Balance ID	n/a
Analyst ID - Reagent Drop	CMM
Analyst ID - Reagent Drop Witness	CMA per CMM
Pipette ID	RAD104
Analyst ID - Column	N/A
Column Date	N/A
Analyst ID - CoPrecipitation	CMM
CoPrecipitation Date	08/03/2018
SOP Number	ST-RC-0100
Batch Comment	Th-229_00024 Verification

Rad Worksheet

Batch Number: 160-380161
Method: ExtChrom
Analyst: Bernsen, Sarah C

Date Open: Aug 03 2018 12:14PM
Batch End: Aug 03 2018 8:20PM

Lab ID	Client ID	Method Chain	Basis	Initial weight/volume of sample	Th-229_00024	Th-230_00036
160-29904-A-1	Th-229 Verify	ExtChrom_Actin, A01R_Th	T	0.1 mL	0.1 mL	0.3 mL
160-29904-A-1	Th-229 Verify	ExtChrom_Actin, A01R_Th	T	0.1 mL	0.1 mL	0.3 mL
160-29904-A-1	Th-229 Verify	ExtChrom_Actin, A01R_Th	T	0.1 mL	0.1 mL	0.3 mL

Balance ID: n/a
Analyst ID - Reagent Drop: CMM
Analyst ID - Reagent Drop Witness: CMA per CMM
Pipette ID: RAD104
Analyst ID - Column: N/A
Column Date: N/A
Analyst ID - CoPrecipitation: CMM
CoPrecipitation Date: 08/03/2018
SOP Number: ST-RC-0100

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Alpha Spectroscopy

Batch: 380161 **Operator:**

Blank Pop. Correct. ✓

Sample ID	Work Order #	Aliquot	Dilution	Sigma	Instrument	RunDateTime	RunDuration	TracerID	TracerAnalyte	TracerAdded	TracerYield
160-29904-A-1-A	160-29904-A-1-A	0.1000 mL	1.00	1.00	AV80	8/4/18 15:26	960.00	Th-230_00036	Th-230	2.007E+004	90.94%

Analyte	Activity		CountUnc	TotalUnc	MDA	DLC	
Th-228	3.28997E+002	pCi/L	1.482E+002	1.488E+002	4.685E+002	2.048E+002	148.8464
Th-229	3.03104E+004	pCi/L	7.742E+002	1.490E+003	2.646E+002	1.028E+002	1,489.9544
Th-230	5.47644E+004	pCi/L	9.899E+002	2.504E+003	1.370E+002	4.170E+001	2,504.0855
Th-232	5.80342E+001	pCi/L	7.855E+001	7.858E+001	2.921E+002	1.167E+002	78.5839

Sample ID	Work Order #	Aliquot	Dilution	Sigma	Instrument	RunDateTime	RunDuration	TracerID	TracerAnalyte	TracerAdded	TracerYield
160-29904-A-1-B	160-29904-A-1-B	0.1000 mL	1.00	1.00	AV81	8/4/18 15:26	960.00	Th-230_00036	Th-230	2.007E+004	89.63%

Analyte	Activity		CountUnc	TotalUnc	MDA	DLC	
Th-228	2.32281E+002	pCi/L	1.188E+002	1.192E+002	3.809E+002	1.615E+002	119.2230
Th-229	3.09566E+004	pCi/L	7.725E+002	1.512E+003	1.473E+002	4.479E+001	1,512.3371
Th-230	5.39766E+004	pCi/L	9.659E+002	2.464E+003	1.324E+002	4.028E+001	2,464.2002
Th-232	1.12808E+002	pCi/L	6.028E+001	6.047E+001	1.837E+002	6.309E+001	60.4670

Sample ID	Work Order #	Aliquot	Dilution	Sigma	Instrument	RunDateTime	RunDuration	TracerID	TracerAnalyte	TracerAdded	TracerYield
160-29904-A-1-C	160-29904-A-1-C	0.1000 mL	1.00	1.00	AV82	8/4/18 15:26	960.00	Th-230_00036	Th-230	2.007E+004	94.40%

Analyte	Activity		CountUnc	TotalUnc	MDA	DLC	
Th-228	4.88205E+002	pCi/L	1.216E+002	1.233E+002	3.028E+002	1.232E+002	123.3120
Th-229	3.09449E+004	pCi/L	7.639E+002	1.508E+003	2.078E+002	7.571E+001	1,507.5527
Th-230	5.68489E+004	pCi/L	1.006E+003	2.591E+003	2.186E+002	8.266E+001	2,590.8948
Th-232	5.61337E+001	pCi/L	5.614E+001	5.619E+001	2.069E+002	7.540E+001	56.1897

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity	StdAdded	Recovery	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Analyte	Sample Activity	Dup Sample ID	Dup Activity	RPD	RER	DER	Qualifier	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

Batch number: 380161 Th

Date: 8/16/18

Analyst: cmm

Reagent IDs used:

01	~~calcium nitrate~~
02	ammonium phosphate dibasic
03	bromocresol purple
04	NH4OH
05	HNO3
06	HCl
07	HF
08	3M HNO3/0.25M Boric
09	Load
10	3M HNO3
11	~~9M HCl~~ cmm 8/16/18
12	1M HCl 1532683
13	H2O2 1480569
14	Neodymium Carrier 1394461
15	Ethanol 1479964
16	~~pH strip lot~~ cmm 8/16/18
17	~~syringe filter lot~~ cmm 8/16/18
18	HF 1523711
19	
20	
21	
22	cmm 8/16/18

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
2:26:42PM 8/6/2018

Sample

Sample Name: 160-29904-A-1-A
SampleType: Sample
: 160-29904-A-1-A
Sample Collection Date: 8/1/2018 12:00:00PM

Spectrum #1 Analysis #1
Sample Volume : 0.0001L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 380161
AnalysisID: 736070

Analyst: 60040

Tracer

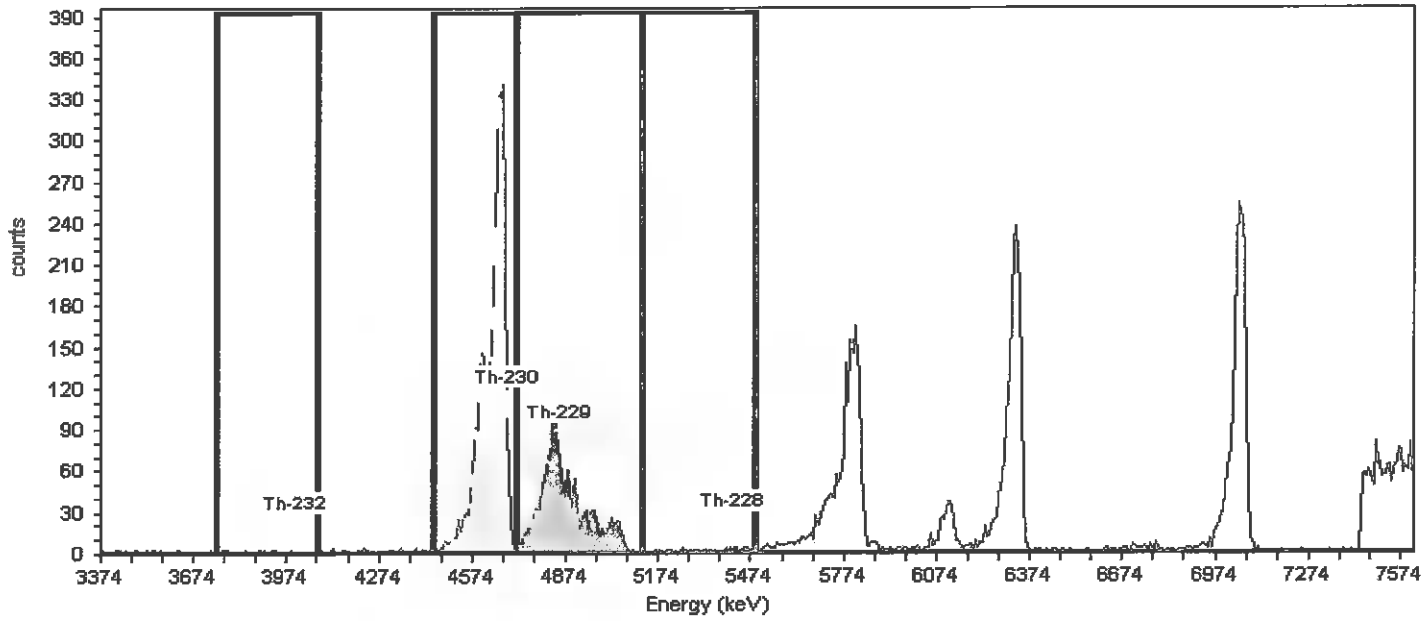
Tracer Name: Th-230_00036
Tracer Activity: 44.56 DPM/mL x (Vol.)0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 12:00:23PM

Tracer Nuclide: Th-230
Tracer Recovery: 90.94%

Acquisition

Detector: AV80
Serial Number: 46-03305
Acquisition Start Date: 8/4/2018 3:26:41PM
Live Time: 960.00 min.
Real Time: 960.04 min.
Background Date: 7/13/2018 12:11:37PM
Background Info: Sample: ICB;AV80; Det: AV80; Spectrum #2; Jul-13-2018 12:11

Calibration Name: IC-1370622;AV80-05152018
Calibration Date: 5/15/2018 6:38:17PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.32% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th-230_Tracer
Decay Correction: 8/4/2018 3:25:30PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	35.6	100.2	10	6.5750	2.97	58.040	pCi/L
Th-230	4688.0	4,687.5	0.5	4446.0	4717.0	18.7	99.7	3064	1.0000	3062.53	54,767.130	pCi/L
Th-229	4848.0	4,845.3	2.7	4717.0	5119.0	96.4	99.8	1548	5.0639	1542.96	30,310.470	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	18.0	99.8	37	20.0639	16.74	329.053	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
2:27:57PM 8/6/2018

Sample

Sample Name: 160-29904-A-1-B
SampleType: Sample
: 160-29904-A-1-B
Sample Collection Date: 8/1/2018 12:00:00PM

Spectrum #1 Analysis #1
Sample Volume : 0.0001L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 380161
AnalysisID: 736073

Analyst: 60040

Tracer

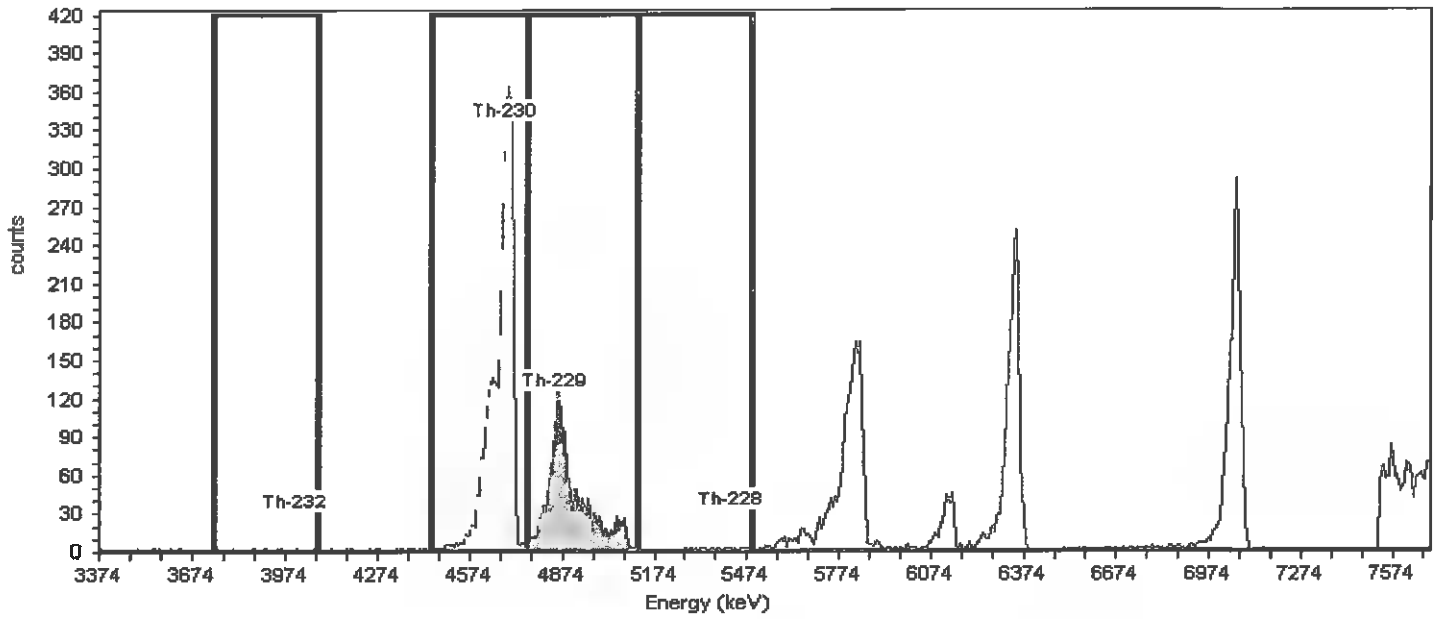
Tracer Name: Th-230_00036
Tracer Activity: 44.56 DPM/mL x (Vol.)0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 12:00:23PM

Tracer Nuclide: Th-230
Tracer Recovery: 89.63%

Acquisition

Detector: AV81
Serial Number: 52-104X5
Acquisition Start Date: 8/4/2018 3:26:41PM
Live Time: 960.00 min.
Real Time: 960.04 min.
Background Date: 7/12/2018 1:40:45PM
Background Info: Sample: ICB;AV81; Det: AV81; Spectrum #1; Jul-12-2018 13:40

Calibration Name: IC-1370619;AV81-05152018
Calibration Date: 5/15/2018 6:38:28PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 27.25% +/- 0.23% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th-230_Tracer
Decay Correction: 8/4/2018 3:25:31PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Manual Integration for tailing
RTM 8/6/2018

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	.3	100.2	8	2.0000	5.88	112.814	pCi/L
Th-230	4688.0	4,687.5	0.5	4448.3	4761.5	60.3	99.7	3126	1.0000	3125.00	53,979.240	pCi/L
Th-229	4848.0	4,845.3	2.7	4761.5	5119.5	68.2	99.8	1609	1.0000	1608.00	30,956.610	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	29.9	99.8	25	13.0000	12.06	232.336	pCi/L

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
2:28:47PM 8/6/2018

Sample

Sample Name: 160-29904-A-1-C
SampleType: Sample
: 160-29904-A-1-C
Sample Collection Date: 8/1/2018 12:00:00PM

Spectrum #1 Analysis #1
Sample Volume : 0.0001L
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: 380161
AnalysisID: 736074

Analyst: 60040

Tracer

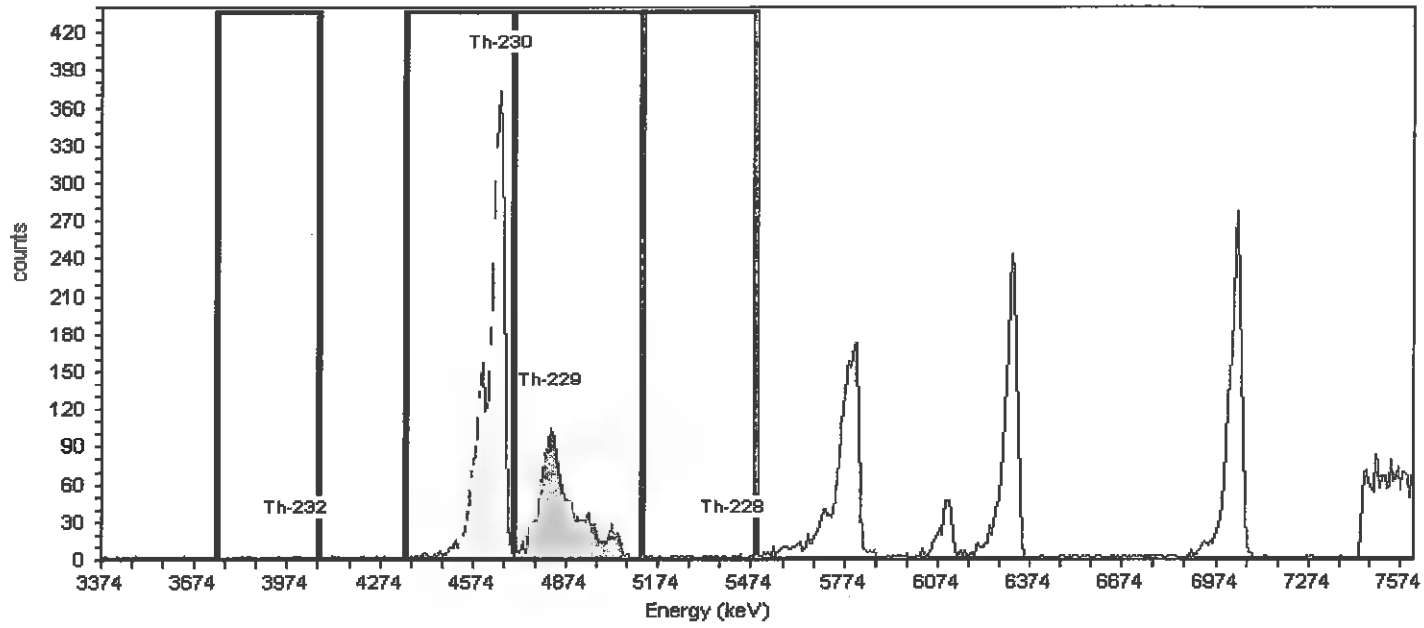
Tracer Name: Th-230_00036
Tracer Activity: 44.56 DPM/mL x (Vol.)0.30 mL = 13.37 DPM
Tracer Ref. Date: 8/8/2013 12:00:23PM

Tracer Nuclide: Th-230
Tracer Recovery: 94.40%

Acquisition

Detector: AV82
Serial Number: 46-032EE5
Acquisition Start Date: 8/4/2018 3:26:43PM
Live Time: 960.00 min.
Real Time: 960.04 min.
Background Date: 7/12/2018 1:40:46PM
Background Info: Sample: ICB;AV82; Det: AV82; Spectrum #1; Jul-12-2018 13:40

Calibration Name: IC-1370620;AV82-05152018
Calibration Date: 5/15/2018 6:38:42PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.51% +/- 0.24% TPU(2 sigma)



General Analysis

Analysis Method: Absolute ROI Analysis, Set Name = Th-230_Tracer
Decay Correction: 8/4/2018 3:25:31PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Thorium
MDA Source: Background

Manual Integration for tailing
RTM 8/6/2018

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
Th-232	3999.0	4,010.0	-11.0	3743.0	4072.0	202.0	100.2	6	3.0000	3.00	56.139	pCi/L
Th-230	4657.1	4,687.5	-30.4	4351.3	4701.9	30.7	99.7	3206	4.0000	3202.00	56,851.720	pCi/L
Th-229	4821.2	4,845.3	-24.1	4701.9	5119.5	80.7	99.8	1650	3.0000	1647.00	30,944.940	pCi/L
Th-228	5420.0	5,423.3	-3.3	5119.0	5493.0	259.1	99.8	34	7.9361	25.98	488.261	pCi/L

Reagent

Th-230_00015

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

92523
Th-230 5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2502650, Item 2 Product Code: 8230-5FSA-4kBq

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Th-230	2.753E+07	3.979E+03	0.1	0.9	1.8	11/29/2012

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: α-impurities 1.5915 Bq; γ-impurities (other than decay products)<0.1%.
5.07636 g 0.5M HNO3 solution. Carrier free.

Source Prepared by: M. I. Taskaeva, Radiochemist

QA Approved: J.D. McCorvey, Counting Room Manager Date: 27 Nov 12

51464
ID Th-230_00015
Th-230 Ampoule

RAD12-0040
Th-230 Ampoule
hursts
None
Prep/Opened: 11/28/2012
Exp(1): 11/28/2062
Exp(2): 11/28/2062

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Single Isotope Certificate Rev 3, 23 August 2012

Reagent

Th-230_00016

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

92523

Th-230 5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica St. Louis
P.O. No.: 2502650, Item 2 Product Code: 8230-5FSA-4kBq

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty*, % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Th-230	2.753E+07	3.979E+03	0.1	0.9	1.8	11/29/2012

*Uncertainty: U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: α-impurities 1.5915 Bq; γ-impurities (other than decay products)<0.1%.
5.07636 g 0.5M HNO3 solution. Carrier free.

Source Prepared by: M. I. Taskaeva, Radiochemist

QA Approved: J.D. McCorvey, Counting Room Manager Date: 27 Nov 12

51464
ID Th-230_00015
Th-230 Ampoule

RAD12-0040
Th-230 Ampoule
hursts
None
Prep/Opened: 11/28/2012
Exp(1): 11/28/2062
Exp(2): 11/28/2062

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1958

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

TestAmerica St. Louis

Standards Preparation Logbook Record

Nov-28-2012

Logbook: \\Qstlmo01\Stdslog\RAD_STD.std

RAD12-0040, Th-230 Ampoule Th-230_00015 # 51464 Analyst: hursts

Vendor: Analytics Lot No.: 92523
Solvent: None
Date Prep./Opened: 11-28-2012 Date Consumed: 11-28-2012
Date Expires(1): 11-28-2062 (50 Years)
Date Expires(2): 11-28-2062 (50 Years)
Cert: 92523 Activity: 3979Bq Reference Date: 11/29/12 Mass: 5.07636

Component	Initial Conc (dpm/g)	Final Conc (dpm/g)
Th-230	47,030	47,030

RAD12-0041, Th-230 Calibration Standard Th-230_00016 # 51465 Analyst: hursts

Solvent: 0.5M HNO3 Volume (ml): 100.00
Date Prep./Opened: 11-28-2012
Date Expires(1): 11-29-2062 (50 Years)
Date Expires(2): 11-29-2062 (50 Years)

Parent Std No.: RAD12-0040, Th-230 Ampoule Aliquot Amount (g): 5.0489
Parent Date Expires(1): 11-28-2062 Parent Date Expires(2): 11-28-2062

Component	Initial Conc (dpm/g)	Final Conc (dpm/mL)
Th-230	47,030	2,374.5

Reviewed By: SH

Page 1 of 1

St. Louis Radiological Standard Reverification Form

Standard ID Number: Rad12-0041
True Value = 1069.59 pCi/mL
Date Analyzed: 11/30/2012

Radionuclide: Th-230 Gross Alpha

	Replicates	
#1	1071	pCi/mL
#2	1027	pCi/mL
#3	1085	pCi/mL

Mean = 1061

1 sigma = 30.26549 1.96 sigma = 59.32036

True Value minus 5% = 1016.111 (True Value - 5%)
True Value plus 5% = 1123.07 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: JL 11/30/12

SOP Reference: STL-QA-0002, Current Revision

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gross Alpha/Beta

Batch: M122628 **Operator:** 63903

Sample ID	WRKNO	*Aliquot*		*Mass*	*Instr ID*	*CountTime*		*Ts*	*Tb*	*Dilution*	*Sigma*	
	Analyte	Cs	Cb	XT	CPMs	CPMb	Eff	Activity	UncTot	UncCnt	MDA	DLC
verification 1a	NA	*1.000E+000mL*		*0.0546 g*	*Purple16*	*11/30/12 13:03*		*8.00*	*1000.00*	*1.00*	*1.00*	
	Gross Alpha	2528	175	0.00	3.160E+002	1.750E-001	0.1328	**1.071E+006**pCi/L	6.469E+004	2.132E+004	2.807E+003	1.167E+003
	Gross Beta	792	485	0.00	9.900E+001	4.850E-001	0.4280	**1.037E+005**pCi/L	6.370E+003	3.702E+003	1.212E+003	6.028E+002
verification 2a	NA	*1.000E+000mL*		*0.0536 g*	*Purple17*	*11/30/12 13:03*		*8.00*	*1000.00*	*1.00*	*1.00*	
	Gross Alpha	2364	87	0.00	2.955E+002	8.700E-002	0.1295	**1.027E+006**pCi/L	6.225E+004	2.113E+004	2.376E+003	8.436E+002
	Gross Beta	764	362	0.00	9.550E+001	3.620E-001	0.4353	**9.846E+004**pCi/L	6.084E+003	3.576E+003	1.078E+003	5.121E+002
verification 3a	NA	*1.000E+000mL*		*0.0531 g*	*Purple18*	*11/30/12 13:04*		*8.00*	*1000.00*	*1.00*	*1.00*	
	Gross Alpha	2521	62	0.00	3.151E+002	6.200E-002	0.1308	**1.085E+006**pCi/L	6.551E+004	2.161E+004	2.168E+003	7.052E+002
	Gross Beta	788	395	0.00	9.850E+001	3.950E-001	0.4295	**1.029E+005**pCi/L	6.325E+003	3.680E+003	1.125E+003	5.421E+002

Laboratory Control Sample Information

SampID	WRKNO	Analyte	Activity	StdAdded	Recovery %	LCL	UCL	ZFactor

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Sample Activity	Dup Activity	RPD	RER	DER	ZFactor

Matrix Spike Information

SampID	SampMSID	Analyte	Sample Activity	MS Activity	StdAdded	MSRecovery %	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Prep Report for Gross Alpha/Beta

Batch: M122628 **Prep Analyst:** 250

SampID	WRKNO	Aliquot	Gross	Tare	Mass	Dilution
verification 1a	NA	6.500E-001 mL	8.6982 g	8.6436 g	0.0546 g	1.00
		Orange 5	protean 14		16	
verification 2a	NA	6.500E-001 mL	8.6698 g	8.6162 g	0.0536 g	1.00
		7	15		17	
verification 3a	NA	6.500E-001 mL	8.6466 g	8.5935 g	0.0531 g	1.00
		8			18	

Spike Information

Sample ID	Standard ID	Analyte	Std Conc	Aliquot	Ref Date	StdAdded
	Rad12-0041	Th-230	2374.5 dpm/mL	1.00 mL	11-29-12	

MS — Spiked By

LM per MS — Spike Verified By

11-28-12 — Spike Date

Standard Operating Procedures

SOPNumber	Title	Revision
☐		

JN — Reviewed By

11/30/12 — Review Date

MS — Analyst/Relenquished By

11-28-12 — Release Date

Unn — Received By

11/28/12 — Receipt Date

1123433897/MS/11-28-12

Balance ID / Initials / Date

Reagent

Th-230_00019

TestAmerica St. Louis

Standards Preparation Logbook Record

Aug-13-2013

Logbook: \\Qstlmo01\Stdslog\RAD_STD.std

RAD13-0028, Th-230 Ampoule — Analyst: marrss

Vendor: Analytics Lot No.: 92776
Solvent: None
Date Prep./Opened: 08-13-2013
Date Expires(1): 08-08-2063 (50 Years)
Date Expires(2): 08-08-2063 (50 Years)
Activity: 3.728 E+03 Bq, Ref date: 08/08/2013, Solution mass: 5.09261g, Source ID: 92776

Component	Initial Conc (dpm/g)	Final Conc (dpm/g)
Th-230	43,922	43,922

Th-230-00019 #181198

RAD13-0029, Th-230 Parent — Analyst: marrss

Solvent: ~~None~~ 1M HNO3 SUB 8/13/13 Volume (ml): 100.00
Date Prep./Opened: 08-13-2013
Date Expires(1): 08-08-2063 (50 Years)
Date Expires(2): 08-08-2063 (50 Years)

Parent Std No.: RAD13-0028, Th-230 Ampoule Aliquot Amount (g): 5.0731
Parent Date Expires(1): 08-08-2063 Parent Date Expires(2): 08-08-2063

Component	Initial Conc (dpm/g)	Final Conc (dpm/mL)
Th-230	43,922	2,228.2

Reviewed By: SUB

Page 1 of 1

Th-230 Parent

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Reagent ID: Th-230_00019

		Expiration Date:	08/08/2063
Description:	Th-230 Parent	Laboratory:	TestAmerica St. Louis
No. of Bottles:	1	Prepared By:	Bernsen, Sarah C
Storage Location:	RAD Actinide STDs	Solvent:	1M HNO3
Reagent Volume:	100.000 mL	Solvent Lot:	n/a
Creation Date:	08/13/2013		
Container(s):	181198		
Comment:			

Reagent Analyte Information

Analyte	Source ID	Source Expiration Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
Th-230	Th-230_00018	08/08/2063	43922.46	dpm/g	2228.23072	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
Th-230_00018	Th-230 Ampoule	ASTD	08/08/63	Eckert & Ziegler	92776		5.07310	mL

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404•352•8677
Fax 404•352•2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

92776

Th-230 5 mL Liquid in Flame Sealed Vial

Customer: TestAmerica
P.O. No.: 2532686, Item 1 Product Code: 8230-5FSA-4kBq

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty* , % Type u_A	u_B	U	Reference Date (12:00 PM EST)
Th-230	2.753E+07	3.728E+03	0.1	0.9	1.8	08/08/2013

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
Impurities: α-impurities 0.04%; γ-impurities (other than decay products)<0.1%.
5.09261 g 0.5M HNO3 solution. Carrier free.

Source Prepared by: R. Ormsby
R. Ormsby, Radiochemist

QA Approved:
J.D. McCorvey, Counting Room Manager

Date: 6AUG13

RAD13-0029
Th-230 Parent
marrss
None
Prep/Opened: 8/13/2013
Exp(1): 8/8/2063
Exp(2): 8/8/2063

181198
ID: Th-230_00019
Exp: 08/08/63 Prpd: SH Cal. 08/13/13
Th-230 Parent

ACCREDITED SOURCE CALIBRATION LABORATORY HEALTH PHYSICS SOCIETY FOUNDED 1956

Single Isotope Certificate Rev 3, 23 August 2012

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

Reagent

TRM-2_00002

Perry, Doug E

From: Salmi, Douglas R
Sent: March 20, 2000 10:48 AM
To: Perry, Doug E; Puissant, Pamela M
Subject: FW: SRMs for radiochemistry LCSs

Pam, Doug
FYI

-----Original Message-----
From: Minteer@aol.com [mailto:Minteer@aol.com]
Sent: March 20, 2000 10:36 AM
To: drsalmi@sandia.gov
Cc: dbourne@doeal.gov; GLDechant@aol.com; crandallb@quanterra.com
Subject: SRMs for radiochemistry LCSs

Doug:

As we discussed by telephone, please send approximately 500 grams each of PEM-1, TRM-2, and NBHD to STL St. Louis. These are to be used by STL as laboratory control samples. As with our other laboratories, STL will be asked to provide summaries of the data obtained in quarterly progress reports. This is not to assess their proficiency, but rather to help us develop interlaboratory acceptance criteria. The known values (given below) for PEM and TRM are good because the samples are well characterized. The known values for NBHD result from a single analysis and hence should be taken as estimates. All the values below are in pCi/g.

PEM-1:

Parameter	Result	Std. Dev.
Pu-238	8.03	0.37
Pu-239	41.0	3.0
Am-241	32.5	1.1
Cs-137	73.5	0.9
U-234	5.99	0.2
U-235	0.27	0.04
U-238	18.1	0.5

TRM-2

Parameter	Result	Uncertainty
U-238	6.0	+/- 4.0
U-234	6.2	+/- 4.0
Th-230	24.5	+/- 0.6
Ra-226	25.4	+/- 0.9
Pb-210	22.1	+/- 1.2

NBHD

Parameter	Result	Uncertainty
Am-241	1.47	+/- 0.28
Ra-226	67.3	+/- 5.5
U-234	174	none available
U-235	8.7	"
U-238	212	"
Cs-137	52.1	+/- 4.6
Pb-210	78.3	+/- 2.4
Pu-239/40	4.7	+/- 0.63
Pu-238	0.3	+/- 0.11
Th-230	83.4	+/- 6.5

Reagent

Tuna Can LCS_00006

Rec'd : 12-26-06

ANALYTICS
An Isotope Products Laboratories Company

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

74139-334
1.0 Liter Sand in 1 Liter Wide Mouth HDPE "S" Bottle

Customer: Severn Trent Laboratories/Earth City, MO
P.O. No.: 2169577, Item 1
Calibration Date: 01-Oct-2006 12:00 EST **Grams of Master Source:** 0.01552

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Pb-210	46.5	8145.9	———	3079.8	0.33	1.46	2.99	4π LS
Am-241	59.5	157860	———	2034.3	0.33	1.46	2.99	4π LS
Cd-109	88.0	462.60	189000	2933.5	0.57	1.70	3.59	HPGe
Co-57	122.1	271.79	94570	1467.8	0.34	1.30	2.69	HPGe
Ce-139	165.9	137.6	133800	2076.7	0.35	1.10	2.31	HPGe
Hg-203	279.2	46.61	295300	4583	0.40	1.10	2.34	HPGe
Sn-113	391.7	115.1	185600	2880.7	0.42	1.10	2.35	HPGe
Cs-137	661.7	10983	116700	1811.3	0.70	1.20	2.78	HPGe
Y-88	898.0	106.60	455400	7068	0.50	1.10	2.42	HPGe
Co-60	1173.2	1925.4	226900	3522	0.60	1.10	2.51	HPGe
Co-60	1332.5	1925.4	227000	3523	0.90	1.10	2.84	HPGe
Y-88	1836.1	106.6	481200	7469	0.90	1.10	2.84	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
1550 grams of sand. NOTE: Homogeneity was checked by the addition of Tc-99 tracer to the solution used to spike the sand. Ten 10-gram aliquots were removed after mixing and counted to measure the Tc-99. The standard deviation for the 10 measurements was 1.3% with a range of 4.8%. This demonstrates reasonable homogeneity for this source material down to a 10-gram aliquot.
This standard will expire one year after the calibration date.

Source Prepared by: M. I. Taskaeva, Radiochemist

QA Approved: for D. M. Montgomery, QA Manager Date: 12-21-06

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

St. Louis Radiological Standard Reverification Form

Standard ID Number: Tuna Can LCS_00006 (1012459)
True Value = 97.08 pCi/g
Date Analyzed: 9/29/2016

Radionuclide: Gamma LCS Am-241

	Replicates	
#1	96.82	pCi/g
#2	96.69	pCi/g
#3	97.75	pCi/g

Mean = 97.08667

1 sigma = 0.578129

1.96 sigma = 1.133133

True Value minus 5% = 92.226 (True Value - 5%)
True Value plus 5% = 101.934 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 10/03/16

SOP Reference: STL-QA-0002, Current Revision

St. Louis Radiological Standard Reverification Form

Standard ID Number: Tuna Can LCS_00006 (112459)
True Value = 29.45 pCi/g
Date Analyzed: 9/29/2016

Radionuclide: Gamma LCS Cs-137

	Replicates	
#1	28.26	pCi/g
#2	28.64	pCi/g
#3	28.37	pCi/g

Mean = 28.42333

1 sigma = 0.195533

1.96 sigma = 0.383246

True Value minus 5% = 27.9775 (True Value - 5%)
True Value plus 5% = 30.9225 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 10/03/16

SOP Reference: STL-QA-0002, Current Revision

St. Louis Radiological Standard Reverification Form

Standard ID Number: Tuna Can LCS_00006 (1012459)
True Value = 16.46 pCi/g
Date Analyzed: 9/29/116

Radionuclide: Gamma LCS Co-60

	Replicates	
#1	16.04	pCi/g
#2	15.77	pCi/g
#3	16.14	pCi/g

Mean = 15.98333

1 sigma = 0.191398

1.96 sigma = 0.375141

True Value minus 5% = 15.637 (True Value - 5%)
True Value plus 5% = 17.283 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DOE QSAS and LANL Statements of Work

Reviewed By/Date: Jody Watson 10/3/16

SOP Reference: STL-QA-0002, Current Revision

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gamma Spectroscopy

Batch: 272277 **Operator:**

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-272277~2-	LCS	341.90g	1.00	GammaVision	GV15	9 / 29 / 16 13:06	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	-2.044E-001pCi/g	5.500E-001	5.499E-001	1.436E+000	6.946E-001	-0.14	0.5500
AG-108M	10982	-1.018E-001pCi/g	9.743E-002	9.729E-002	3.075E-001	1.497E-001	-0.33	0.0974
AG-110M	10973	5.076E-002pCi/g	4.575E-002	4.567E-002	7.684E-001	3.751E-001	0.07	0.0457
AM-241	10818	9.682E+001pCi/g	5.100E+000	8.709E-001	1.290E+000	6.388E-001	75.07	5.0999
BA-133	10469	-1.624E-001pCi/g	1.661E-001	1.659E-001	5.506E-001	2.703E-001	-0.29	0.1661
BA-140	10463	-1.425E-001pCi/g	1.058E-001	1.055E-001	1.079E+000	5.219E-001	-0.13	0.1058
BE-7	10435	1.275E-001pCi/g	1.233E+000	1.233E+000	4.134E+000	2.030E+000	0.03	1.2334
BI-207	10195	1.058E-001pCi/g	7.194E-002	7.173E-002	2.372E-001	1.139E-001	0.45	0.0719
BI-210M	10173	8.477E-002pCi/g	9.587E-002	9.574E-002	4.994E-001	2.447E-001	0.17	0.0959
BI-212	10160	1.553E+000pCi/g	1.216E+000	1.214E+000	4.030E+000	1.941E+000	0.39	1.2163
BI-214	10154	8.681E-002pCi/g	3.647E-002	3.619E-002	1.088E+000	5.336E-001	0.08	0.0365
CD-109	9254	0.000E+000pCi/g	3.288E+000	3.288E+000	1.089E+001	5.402E+000	0.00	3.2880
CD-113M	17462	-1.456E+003pCi/g	1.073E+003	1.069E+003	3.536E+003	1.727E+003	-0.41	1,072.9969
CE-139	9241	7.398E-002pCi/g	7.038E-002	7.003E-002	2.323E-001	1.140E-001	0.32	0.0704
CE-141	9235	1.679E-002pCi/g	1.287E-001	1.287E-001	3.270E-001	1.601E-001	0.05	0.1287
CE-144	9221	-5.823E-001pCi/g	1.611E+000	1.610E+000	2.809E+000	1.390E+000	-0.21	1.6107
CF-249	9215	-3.279E-002pCi/g	1.794E-001	1.794E-001	6.001E-001	2.950E-001	-0.05	0.1794
CF-251	13690	-4.067E-001pCi/g	3.994E-001	3.978E-001	1.002E+000	4.903E-001	-0.41	0.3994
CO-56	8704	1.139E-001pCi/g	1.826E-001	1.825E-001	3.036E-001	1.454E-001	0.38	0.1826
CO-57	13694	4.528E-001pCi/g	4.266E-001	4.260E-001	1.102E+000	5.361E-001	0.41	0.4266
CO-58	8698	-1.658E-001pCi/g	1.376E-001	1.373E-001	4.558E-001	2.217E-001	-0.36	0.1376
CO-60	8692	1.604E+001pCi/g	8.400E-001	2.396E-001	9.914E-002	4.016E-002	161.75	0.8400
CR-51	8604	-9.651E-001pCi/g	1.169E+000	1.168E+000	3.438E+000	1.690E+000	-0.28	1.1689
CS-134	8553	6.593E-002pCi/g	8.889E-002	8.882E-002	5.089E-001	2.495E-001	0.13	0.0889
CS-136	8546	1.258E-001pCi/g	1.227E-001	1.225E-001	4.083E-001	1.980E-001	0.31	0.1227
CS-137	8539	2.826E+001pCi/g	1.520E+000	3.844E-001	2.878E-001	1.379E-001	98.20	1.5198
EU-152	7145	5.245E-001pCi/g	5.014E-001	5.007E-001	1.782E+000	8.797E-001	0.29	0.5014
EU-154	7138	4.532E-001pCi/g	3.576E-001	3.568E-001	3.623E+000	1.758E+000	0.13	0.3576
EU-155	7131	3.186E-001pCi/g	4.804E-001	4.800E-001	1.590E+000	7.880E-001	0.20	0.4804
FE-59	7073	-4.662E-001pCi/g	2.724E-001	2.714E-001	8.335E-001	4.027E-001	-0.56	0.2724
GA-68	18005	-2.864E+000pCi/g	6.167E+000	6.165E+000	1.352E+001	6.483E+000	-0.21	6.1671
GD-153	6824	-2.389E-001pCi/g	3.642E-001	3.639E-001	1.205E+000	5.975E-001	-0.20	0.3642
HF-181	6495	2.232E-002pCi/g	9.381E-002	9.380E-002	5.455E-001	2.678E-001	0.04	0.0938
HG-203	6466	-1.176E-001pCi/g	9.784E-002	9.761E-002	3.233E-001	1.585E-001	-0.36	0.0978
I-131	6380	1.345E-001pCi/g	1.325E-001	1.323E-001	2.783E-001	1.352E-001	0.48	0.1325
IR-192	6303	1.051E-001pCi/g	1.544E-001	1.543E-001	5.121E-001	2.528E-001	0.21	0.1544
K-40	6148	-3.414E-001pCi/g	3.403E+000	3.403E+000	1.694E+000	7.511E-001	-0.20	3.4027
LA-140	6096	6.964E-002pCi/g	2.842E-002	2.818E-002	6.304E-002	1.993E-002	1.10	0.0284
MN-54	5382	9.032E-003pCi/g	1.343E-001	1.343E-001	3.074E-001	1.474E-001	0.03	0.1343
NA-22	5201	7.656E-002pCi/g	4.569E-002	4.553E-002	1.483E-001	6.510E-002	0.52	0.0457
NB-94	5160	-6.911E-003pCi/g	8.527E-002	8.527E-002	2.509E-001	1.199E-001	-0.03	0.0853
NB-95	5154	-1.314E-001pCi/g	1.080E-001	1.078E-001	3.580E-001	1.732E-001	-0.37	0.1080
ND-147	5083	2.116E-001pCi/g	7.933E-001	7.932E-001	1.870E+000	9.017E-001	0.11	0.7933
NP-237	4757	-5.339E-001pCi/g	9.394E-001	9.389E-001	3.110E+000	1.543E+000	-0.17	0.9394
NP-239	4751	2.951E-001pCi/g	4.471E-001	4.467E-001	1.480E+000	7.333E-001	0.20	0.4471
PA-231	4541	0.000E+000pCi/g	1.548E+000	1.548E+000	1.296E+001	6.385E+000	0.00	1.5484
PA-233	4535	2.505E-001pCi/g	3.660E-001	3.657E-001	1.214E+000	5.993E-001	0.21	0.3660
PA-234	4528	9.127E-002pCi/g	1.542E-001	1.541E-001	1.714E+000	8.480E-001	0.05	0.1542
PA-234M	19453	2.654E+001pCi/g	1.513E+001	1.507E+001	5.612E+001	2.718E+001	0.47	15.1341
PB-210	4467	8.473E+002pCi/g	5.040E+001	8.041E+000	1.484E+001	7.350E+000	57.08	50.3970

PB-212	4454	5.507E-001pCi/g	1.742E-001	1.705E-001	3.941E-001	1.917E-001	1.40	0.1742
PB-214	4448	4.656E-001pCi/g	1.811E-001	1.795E-001	4.906E-001	2.371E-001	0.95	0.1811
PM-144	19585	-9.279E-002pCi/g	8.379E-002	8.365E-002	2.603E-001	1.247E-001	-0.36	0.0838
PM-146	2464	3.553E-001pCi/g	2.541E-001	2.534E-001	6.570E-001	3.117E-001	0.54	0.2541
RH-106	1882	0.000E+000pCi/g	4.336E-001	4.336E-001	5.120E+000	2.511E+000	0.00	0.4336
RU-103	1828	-1.980E-002pCi/g	1.475E-001	1.475E-001	2.961E-001	1.436E-001	-0.07	0.1475
SB-124	1784	1.062E-001pCi/g	8.303E-002	8.285E-002	5.042E-001	2.473E-001	0.21	0.0830
SB-125	1777	4.580E-001pCi/g	3.330E-001	3.322E-001	8.845E-001	4.300E-001	0.52	0.3330
SC-46	1739	-2.124E-001pCi/g	1.825E-001	1.822E-001	6.042E-001	2.955E-001	-0.35	0.1825
SN-113	1570	1.126E-001pCi/g	1.827E-001	1.826E-001	6.081E-001	2.988E-001	0.19	0.1827
SN-126	17459	-1.643E+000pCi/g	3.686E+000	3.685E+000	1.217E+001	6.066E+000	-0.13	3.6865
TA-182	1301	4.928E-001pCi/g	2.524E-001	2.512E-001	1.407E+000	6.803E-001	0.35	0.2524
TC-99M	17412	-2.091E-002pCi/g	1.038E-001	1.038E-001	3.452E-001	1.707E-001	-0.06	0.1038
TH-227	1058	5.331E+000pCi/g	2.061E+000	2.040E+000	6.682E+000	3.307E+000	0.80	2.0609
TH-229	1046	-1.252E+000pCi/g	1.725E+000	1.722E+000	4.349E+000	2.130E+000	-0.29	1.7249
TH-234	1027	-4.940E+000pCi/g	6.015E+000	6.009E+000	3.121E+001	1.555E+001	-0.16	6.0150
TL-208	929	4.162E-001pCi/g	1.180E-001	1.160E-001	2.299E-001	1.095E-001	1.81	0.1180
U-235	281	4.038E-001pCi/g	3.951E-001	3.946E-001	2.769E+000	1.369E+000	0.15	0.3951
Y-88	74	5.514E-002pCi/g	1.992E-002	1.971E-002	3.695E-001	1.776E-001	0.15	0.0199
ZN-65	31	0.000E+000pCi/g	1.231E-001	1.231E-001	1.061E+000	5.145E-001	0.00	0.1231
ZR-95	7	7.816E-003pCi/g	2.150E-001	2.150E-001	4.933E-001	2.360E-001	0.02	0.2150

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-272277~2-A	LCS 160-272277~2-A	CS-137	2.826E+001	pCi/g	2.945E+001	95.99%	-0.5385
		CO-60	1.604E+001	pCi/g	1.646E+001	97.45%	-0.3492
		AM-241	9.682E+001	pCi/g	9.708E+001	99.74%	-0.0356

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gamma Spectroscopy

Batch: 272277 **Operator:**

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-272277~2-	LCS	341.90g	1.00	GammaVision	GV05	9 / 29 / 16 19:17	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	6.948E-001pCi/g	4.428E-001	4.413E-001	1.386E+000	6.661E-001	0.50	0.4428
AG-108M	10982	-4.815E-002pCi/g	1.360E-001	1.359E-001	3.314E-001	1.611E-001	-0.15	0.1360
AG-110M	10973	-6.551E-002pCi/g	5.828E-002	5.819E-002	7.502E-001	3.646E-001	-0.09	0.0583
AM-241	10818	9.669E+001pCi/g	5.084E+000	8.185E-001	1.163E+000	5.751E-001	83.11	5.0845
BA-133	10469	-1.677E-001pCi/g	1.639E-001	1.637E-001	5.438E-001	2.661E-001	-0.31	0.1639
BA-140	10463	7.654E-001pCi/g	4.133E-001	4.114E-001	9.742E-001	4.664E-001	0.79	0.4133
BE-7	10435	-5.190E-001pCi/g	1.221E+000	1.221E+000	3.698E+000	1.806E+000	-0.14	1.2210
BI-207	10195	1.327E-001pCi/g	2.286E-001	2.285E-001	5.028E-001	2.394E-001	0.26	0.2286
BI-210M	10173	1.105E-001pCi/g	1.761E-001	1.760E-001	4.963E-001	2.426E-001	0.22	0.1761
BI-212	10160	-8.056E-001pCi/g	1.326E+000	1.326E+000	4.824E+000	2.326E+000	-0.17	1.3264
BI-214	10154	-3.129E-001pCi/g	1.874E-001	1.867E-001	1.276E+000	6.260E-001	-0.25	0.1874
CD-109	9254	1.605E+000pCi/g	2.280E+000	2.278E+000	7.558E+000	3.734E+000	0.21	2.2797
CD-113M	17462	-1.293E+003pCi/g	1.131E+003	1.128E+003	3.745E+003	1.826E+003	-0.35	1,131.1129
CE-139	9241	-6.545E-002pCi/g	8.083E-002	8.059E-002	2.679E-001	1.316E-001	-0.24	0.0808
CE-141	9235	7.536E-003pCi/g	1.415E-001	1.415E-001	4.733E-001	2.330E-001	0.02	0.1415
CE-144	9221	1.609E-001pCi/g	5.660E-001	5.659E-001	1.890E+000	9.298E-001	0.09	0.5660
CF-249	9215	-5.097E-002pCi/g	4.175E-002	4.166E-002	6.544E-001	3.214E-001	-0.08	0.0417
CF-251	13690	2.258E-001pCi/g	3.420E-001	3.414E-001	9.101E-001	4.433E-001	0.25	0.3420
CO-56	8704	-2.777E-003pCi/g	1.256E-001	1.256E-001	3.392E-001	1.622E-001	-0.01	0.1256
CO-57	13694	0.000E+000pCi/g	3.371E-002	3.371E-002	2.220E-001	1.091E-001	0.00	0.0337
CO-58	8698	1.419E-001pCi/g	1.238E-001	1.236E-001	4.114E-001	1.985E-001	0.34	0.1238
CO-60	8692	1.577E+001pCi/g	8.296E-001	2.480E-001	5.871E-002	1.856E-002	268.60	0.8296
CR-51	8604	8.429E-001pCi/g	8.344E-001	8.332E-001	2.771E+000	1.352E+000	0.30	0.8344
CS-134	8553	-1.864E-002pCi/g	1.769E-002	1.766E-002	5.873E-001	2.880E-001	-0.03	0.0177
CS-136	8546	1.666E-002pCi/g	1.960E-002	1.958E-002	4.831E-001	2.344E-001	0.03	0.0196
CS-137	8539	2.864E+001pCi/g	1.546E+000	4.128E-001	3.089E-001	1.474E-001	92.72	1.5462
EU-152	7145	2.755E-001pCi/g	3.412E-001	3.409E-001	1.401E+000	6.875E-001	0.20	0.3412
EU-154	7138	1.747E-001pCi/g	1.106E-001	1.102E-001	3.597E+000	1.737E+000	0.05	0.1106
EU-155	7131	2.480E-001pCi/g	3.696E-001	3.694E-001	1.226E+000	6.054E-001	0.20	0.3696
FE-59	7073	1.492E-001pCi/g	1.439E-001	1.437E-001	7.280E-001	3.478E-001	0.20	0.1439
GA-68	18005	-6.353E+000pCi/g	7.244E+000	7.235E+000	1.575E+001	7.557E+000	-0.40	7.2435
GD-153	6824	5.593E-002pCi/g	1.741E-001	1.741E-001	5.826E-001	2.858E-001	0.10	0.1741
HF-181	6495	1.366E-001pCi/g	1.060E-001	1.057E-001	4.948E-001	2.417E-001	0.28	0.1060
HG-203	6466	2.250E-002pCi/g	1.022E-001	1.022E-001	2.611E-001	1.269E-001	0.09	0.1022
I-131	6380	2.210E-002pCi/g	1.184E-002	1.179E-002	2.971E-001	1.441E-001	0.07	0.0118
IR-192	6303	8.284E-002pCi/g	7.520E-002	7.504E-002	3.258E-001	1.592E-001	0.25	0.0752
K-40	6148	7.507E-001pCi/g	5.361E-001	5.347E-001	1.327E+000	5.540E-001	0.57	0.5361
LA-140	6096	8.699E-002pCi/g	7.949E-002	7.936E-002	1.364E-001	5.501E-002	0.64	0.0795
MN-54	5382	-1.165E-001pCi/g	1.521E-001	1.520E-001	3.439E-001	1.646E-001	-0.34	0.1521
NA-22	5201	-2.814E-002pCi/g	5.797E-002	5.795E-002	2.055E-001	9.236E-002	-0.14	0.0580
NB-94	5160	6.783E-002pCi/g	6.927E-002	6.918E-002	2.389E-001	1.130E-001	0.28	0.0693
NB-95	5154	-1.620E-001pCi/g	1.191E-001	1.188E-001	3.935E-001	1.900E-001	-0.41	0.1191
ND-147	5083	-6.514E-001pCi/g	8.776E-001	8.768E-001	2.138E+000	1.031E+000	-0.30	0.8776
NP-237	4757	-4.627E-001pCi/g	7.177E-001	7.172E-001	2.379E+000	1.176E+000	-0.19	0.7177
NP-239	4751	2.276E-001pCi/g	3.340E-001	3.337E-001	1.108E+000	5.467E-001	0.21	0.3340
PA-231	4541	0.000E+000pCi/g	1.373E+000	1.373E+000	1.362E+001	6.701E+000	0.00	1.3729
PA-233	4535	2.236E-001pCi/g	3.060E-001	3.057E-001	1.017E+000	4.997E-001	0.22	0.3060
PA-234	4528	2.928E-001pCi/g	4.437E-001	4.434E-001	1.312E+000	6.465E-001	0.22	0.4437
PA-234M	19453	2.108E+001pCi/g	1.857E+001	1.854E+001	6.416E+001	3.107E+001	0.33	18.5748
PB-210	4467	8.671E+002pCi/g	5.159E+001	8.329E+000	1.461E+001	7.229E+000	59.34	51.5925

PB-212	4454	7.463E-001pCi/g	1.602E-001	1.528E-001	3.656E-001	1.769E-001	2.04	0.1602
PB-214	4448	2.370E-001pCi/g	2.355E-001	2.351E-001	7.474E-001	3.643E-001	0.32	0.2355
PM-144	19585	7.285E-002pCi/g	5.436E-002	5.422E-002	2.571E-001	1.222E-001	0.28	0.0544
PM-146	2464	1.040E-001pCi/g	3.321E-001	3.321E-001	7.921E-001	3.765E-001	0.13	0.3321
RA-226	1950	-4.839E-001pCi/g	3.042E+000	3.042E+000	5.837E+000	2.855E+000	-0.08	3.0419
RH-106	1882	-3.016E-001pCi/g	9.937E-001	9.936E-001	3.367E+000	1.626E+000	-0.09	0.9937
RU-103	1828	-6.222E-002pCi/g	1.352E-001	1.352E-001	3.240E-001	1.568E-001	-0.19	0.1352
SB-124	1784	-4.848E-002pCi/g	4.616E-002	4.609E-002	5.906E-001	2.896E-001	-0.08	0.0462
SB-125	1777	3.726E-001pCi/g	5.015E-001	5.012E-001	9.624E-001	4.671E-001	0.39	0.5015
SC-46	1739	-1.934E-001pCi/g	1.709E-001	1.706E-001	5.668E-001	2.757E-001	-0.34	0.1709
SN-113	1570	-1.832E-001pCi/g	6.511E-002	6.443E-002	6.636E-001	3.257E-001	-0.28	0.0651
SN-126	17459	-3.558E-001pCi/g	8.245E-001	8.243E-001	2.749E+000	1.352E+000	-0.13	0.8245
TA-182	1301	6.142E-001pCi/g	5.525E-001	5.517E-001	1.835E+000	8.906E-001	0.33	0.5525
TC-99M	17412	-6.331E-002pCi/g	7.898E-002	7.890E-002	2.620E-001	1.290E-001	-0.24	0.0790
TH-227	1058	1.965E+000pCi/g	1.983E+000	1.980E+000	6.552E+000	3.239E+000	0.30	1.9825
TH-229	1046	3.332E-001pCi/g	3.014E-001	3.002E-001	4.053E+000	1.977E+000	0.08	0.3014
TH-234	1027	5.142E-001pCi/g	1.278E+000	1.278E+000	6.351E+000	3.118E+000	0.08	1.2779
TL-208	929	3.882E-001pCi/g	9.932E-002	9.725E-002	2.123E-001	9.976E-002	1.83	0.0993
U-235	281	-5.267E-001pCi/g	7.677E-001	7.672E-001	2.130E+000	1.049E+000	-0.25	0.7677
Y-88	74	1.200E-001pCi/g	1.531E-001	1.529E-001	3.472E-001	1.653E-001	0.35	0.1531
ZN-65	31	-4.722E-001pCi/g	4.068E-001	4.061E-001	1.349E+000	6.559E-001	-0.35	0.4068
ZR-95	7	4.516E-001pCi/g	1.936E-001	1.922E-001	4.383E-001	2.068E-001	1.03	0.1936

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-272277~2-A	LCS 160-272277~2-A	CS-137	2.864E+001	pCi/g	2.944E+001	97.28%	-0.3615
		CO-60	1.577E+001	pCi/g	1.646E+001	95.82%	-0.5732
		AM-241	9.669E+001	pCi/g	9.708E+001	99.60%	-0.0539

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gamma Spectroscopy

Batch: 272277 **Operator:**

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-272277~2-	LCS	341.90g	1.00	GammaVision	GV10	9 / 30 / 16 19:13	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	5.161E-001pCi/g	4.930E-001	4.923E-001	1.066E+000	5.139E-001	0.48	0.4930
AG-108M	10982	-1.283E-001pCi/g	3.696E-002	3.637E-002	2.872E-001	1.401E-001	-0.45	0.0370
AG-110M	10973	-2.436E-001pCi/g	2.130E-001	2.126E-001	7.050E-001	3.451E-001	-0.35	0.2130
AM-241	10818	9.775E+001pCi/g	5.141E+000	8.314E-001	1.213E+000	6.008E-001	80.58	5.1409
BA-133	10469	7.040E-002pCi/g	1.351E-001	1.350E-001	4.510E-001	2.211E-001	0.16	0.1351
BA-140	10463	1.818E-001pCi/g	1.964E-001	1.962E-001	8.653E-001	4.175E-001	0.21	0.1964
BE-7	10435	-6.992E-001pCi/g	1.118E+000	1.117E+000	3.720E+000	1.828E+000	-0.19	1.1175
BI-207	10195	8.667E-002pCi/g	7.816E-002	7.803E-002	2.212E-001	1.066E-001	0.39	0.0782
BI-210M	10173	6.373E-002pCi/g	1.358E-001	1.357E-001	3.452E-001	1.681E-001	0.18	0.1358
BI-212	10160	1.530E+000pCi/g	1.367E+000	1.365E+000	4.535E+000	2.206E+000	0.34	1.3671
BI-214	10154	5.778E-001pCi/g	1.375E-001	1.341E-001	3.590E-001	1.707E-001	1.61	0.1375
CD-109	9254	1.642E+000pCi/g	2.301E+000	2.299E+000	7.619E+000	3.770E+000	0.22	2.3006
CD-113M	17462	9.148E+000pCi/g	9.992E+002	9.992E+002	3.367E+003	1.646E+003	0.00	999.2489
CE-139	9241	-2.055E-002pCi/g	6.937E-002	6.934E-002	2.318E-001	1.139E-001	-0.09	0.0694
CE-141	9235	1.025E-001pCi/g	7.847E-002	7.830E-002	2.128E-001	1.033E-001	0.48	0.0785
CE-144	9221	-4.688E-001pCi/g	5.253E-001	5.247E-001	1.741E+000	8.573E-001	-0.27	0.5253
CF-249	9215	1.362E-001pCi/g	1.495E-001	1.494E-001	4.985E-001	2.448E-001	0.27	0.1495
CF-251	13690	-3.095E-001pCi/g	3.513E-001	3.502E-001	9.286E-001	4.543E-001	-0.33	0.3513
CO-56	8704	1.879E-002pCi/g	1.572E-002	1.569E-002	2.803E-001	1.350E-001	0.07	0.0157
CO-57	13694	9.703E-002pCi/g	5.787E-002	5.764E-002	1.624E-001	7.956E-002	0.60	0.0579
CO-58	8698	2.483E-003pCi/g	9.680E-002	9.680E-002	3.289E-001	1.594E-001	0.01	0.0968
CO-60	8692	1.614E+001pCi/g	8.382E-001	2.145E-001	1.235E-001	5.442E-002	130.66	0.8382
CR-51	8604	-3.859E-001pCi/g	8.135E-001	8.132E-001	2.716E+000	1.332E+000	-0.14	0.8135
CS-134	8553	1.234E-001pCi/g	1.022E-001	1.020E-001	4.481E-001	2.199E-001	0.28	0.1022
CS-136	8546	1.085E-001pCi/g	7.572E-002	7.546E-002	2.841E-001	1.370E-001	0.38	0.0757
CS-137	8539	2.837E+001pCi/g	1.515E+000	3.427E-001	2.201E-001	1.050E-001	128.88	1.5151
EU-152	7145	4.455E-001pCi/g	3.696E-001	3.689E-001	1.216E+000	5.980E-001	0.37	0.3696
EU-154	7138	-8.727E-001pCi/g	8.178E-001	8.165E-001	2.720E+000	1.317E+000	-0.32	0.8178
EU-155	7131	2.450E-001pCi/g	3.372E-001	3.369E-001	1.118E+000	5.521E-001	0.22	0.3372
FE-59	7073	2.567E-001pCi/g	2.385E-001	2.382E-001	5.017E-001	2.396E-001	0.51	0.2385
GA-68	18005	-3.762E+000pCi/g	5.213E+000	5.209E+000	1.136E+001	5.457E+000	-0.33	5.2128
GD-153	6824	-1.804E-001pCi/g	2.541E-001	2.539E-001	8.419E-001	4.162E-001	-0.21	0.2541
HF-181	6495	9.232E-002pCi/g	1.044E-001	1.043E-001	4.959E-001	2.437E-001	0.19	0.1044
HG-203	6466	9.088E-002pCi/g	8.062E-002	8.045E-002	2.668E-001	1.306E-001	0.34	0.0806
I-131	6380	1.416E-002pCi/g	1.182E-002	1.180E-002	2.746E-001	1.339E-001	0.05	0.0118
IR-192	6303	-3.206E-003pCi/g	3.257E-003	3.251E-003	5.126E-001	2.534E-001	-0.01	0.0033
K-40	6148	-6.666E-002pCi/g	7.052E-001	7.052E-001	1.635E+000	7.434E-001	-0.04	0.7052
LA-140	6096	2.337E-002pCi/g	2.000E-002	1.996E-002	2.006E-001	9.142E-002	0.12	0.0200
MN-54	5382	1.200E-001pCi/g	1.052E-001	1.050E-001	2.364E-001	1.131E-001	0.51	0.1052
NA-22	5201	4.984E-002pCi/g	3.571E-002	3.562E-002	1.182E-001	5.202E-002	0.42	0.0357
NB-94	5160	3.947E-002pCi/g	6.204E-002	6.201E-002	2.207E-001	1.058E-001	0.18	0.0620
NB-95	5154	-1.353E-001pCi/g	9.204E-002	9.177E-002	3.033E-001	1.468E-001	-0.45	0.0920
ND-147	5083	-8.055E-001pCi/g	7.738E-001	7.724E-001	1.795E+000	8.692E-001	-0.45	0.7738
NP-237	4757	-4.782E-001pCi/g	6.851E-001	6.846E-001	2.269E+000	1.123E+000	-0.21	0.6851
NP-239	4751	-2.392E-001pCi/g	3.314E-001	3.311E-001	1.098E+000	5.427E-001	-0.22	0.3314
PA-231	4541	-2.858E+000pCi/g	4.644E+000	4.642E+000	1.540E+001	7.616E+000	-0.19	4.6444
PA-233	4535	-3.087E-003pCi/g	1.223E-001	1.223E-001	1.280E+000	6.331E-001	0.00	0.1223
PA-234	4528	6.645E-001pCi/g	3.995E-001	3.981E-001	5.016E-001	2.427E-001	1.32	0.3995
PA-234M	19453	1.019E+001pCi/g	7.871E+000	7.854E+000	5.194E+001	2.527E+001	0.20	7.8710
PB-210	4467	8.424E+002pCi/g	5.010E+001	7.962E+000	1.486E+001	7.359E+000	56.69	50.1004

PB-212	4454	7.213E-001pCi/g	1.549E-001	1.477E-001	3.494E-001	1.699E-001	2.06	0.1549
PB-214	4448	3.560E-001pCi/g	1.635E-001	1.624E-001	4.269E-001	2.062E-001	0.83	0.1635
PM-144	19585	4.197E-002pCi/g	5.362E-002	5.358E-002	2.115E-001	1.012E-001	0.20	0.0536
PM-146	2464	1.534E-001pCi/g	1.432E-001	1.429E-001	6.480E-001	3.101E-001	0.24	0.1432
RA-226	1950	4.820E-001pCi/g	1.940E+000	1.940E+000	5.198E+000	2.545E+000	0.09	1.9401
RH-106	1882	-1.076E+000pCi/g	8.905E-001	8.888E-001	2.950E+000	1.433E+000	-0.36	0.8905
RU-103	1828	5.218E-002pCi/g	9.724E-002	9.721E-002	2.375E-001	1.149E-001	0.22	0.0972
SB-124	1784	6.289E-002pCi/g	1.316E-001	1.316E-001	4.394E-001	2.156E-001	0.14	0.1316
SB-125	1777	-4.060E-001pCi/g	2.384E-001	2.375E-001	9.120E-001	4.454E-001	-0.45	0.2384
SC-46	1739	-1.325E-001pCi/g	1.242E-001	1.241E-001	5.329E-001	2.611E-001	-0.25	0.1242
SN-113	1570	1.363E-001pCi/g	1.516E-001	1.514E-001	5.030E-001	2.469E-001	0.27	0.1516
SN-126	17459	7.980E-001pCi/g	7.805E-001	7.794E-001	2.583E+000	1.272E+000	0.31	0.7805
TA-182	1301	3.939E-001pCi/g	3.736E-001	3.730E-001	1.242E+000	6.027E-001	0.32	0.3736
TC-99M	17412	-6.172E-002pCi/g	7.271E-002	7.262E-002	2.410E-001	1.188E-001	-0.26	0.0727
TH-227	1058	1.284E+000pCi/g	1.960E+000	1.958E+000	6.493E+000	3.214E+000	0.20	1.9597
TH-229	1046	1.458E+000pCi/g	1.568E+000	1.564E+000	3.942E+000	1.930E+000	0.37	1.5684
TH-234	1027	-1.796E+000pCi/g	5.751E+000	5.750E+000	6.531E+000	3.215E+000	-0.27	5.7506
TL-208	929	1.957E-001pCi/g	1.575E-001	1.572E-001	2.636E-001	1.271E-001	0.74	0.1575
U-235	281	2.796E-001pCi/g	5.431E-001	5.429E-001	1.808E+000	8.902E-001	0.15	0.5431
Y-88	74	-2.025E-001pCi/g	1.338E-001	1.334E-001	3.814E-001	1.849E-001	-0.53	0.1338
ZN-65	31	2.825E-001pCi/g	2.450E-001	2.446E-001	8.132E-001	3.940E-001	0.35	0.2450
ZR-95	7	-1.550E-001pCi/g	1.946E-001	1.944E-001	4.389E-001	2.107E-001	-0.35	0.1946

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-272277~2-A	LCS 160-272277~2-A	CS-137	2.837E+001	pCi/g	2.944E+001	96.35%	-0.4918
		CO-60	1.614E+001	pCi/g	1.645E+001	98.11%	-0.2592
		AM-241	9.775E+001	pCi/g	9.708E+001	100.69%	0.0929

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

Blanks Information

SampID	WRKNO	Analyte	Activity	UncTotal	ZFactor

Reagent

Tuna Can LCS_00007

ANALYTICS
An Isotope Products Laboratories Company

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

74139-334
1.0 Liter Sand in 1 Liter Wide Mouth HDPE "S" Bottle

Customer: Severn Trent Laboratories/Earth City, MO
P.O. No.: 2169577, Item 1
Calibration Date: 01-Oct-2006 12:00 EST Grams of Master Source: 0.01552

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Pb-210	46.5	8145.9	———	3079.5	0.33	1.46	2.99	4π LS
Am-241	59.5	157860	———	2034.3	0.33	1.46	2.99	4π LS
Cd-109	88.0	462.60	189000	2933.5	0.57	1.70	3.59	HPGe
Co-57	122.1	271.79	94670	1467.8	0.34	1.30	2.69	HPGe
Ce-139	165.9	137.6	133800	2076.7	0.35	1.10	2.31	HPGe
Hg-203	279.2	46.61	295300	4583	0.40	1.10	2.34	HPGe
Sn-113	391.7	115.1	185600	2880.7	0.42	1.10	2.35	HPGe
Cs-137	661.7	10983	116700	1811.3	0.70	1.20	2.78	HPGe
Y-88	898.0	106.60	455400	7068	0.50	1.10	2.42	HPGe
Co-60	1173.2	1925.4	226900	3522	0.60	1.10	2.51	HPGe
Co-60	1332.5	1925.4	227000	3523	0.90	1.10	2.84	HPGe
Y-88	1836.1	106.6	481200	7469	0.90	1.10	2.84	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. Uncertainty: U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
1550 grams of sand. NOTE: Homogeneity was checked by the addition of Tc-99 tracer to the solution used to spike the sand. Ten 10-gram aliquots were removed after mixing and counted to measure the Tc-99. The standard deviation for the 10 measurements was 1.3% with a range of 4.8%. This demonstrates reasonable homogeneity for this source material down to a 10-gram aliquot.
This standard will expire one year after the calibration date.

Source Prepared by: M. I. Taskaeva
M. I. Taskaeva, Radiochemist

QA Approved: for
D. M. Montgomery, QA Manager

Date: 12-21-06

End of Certificate

St. Louis Radiological Standard Verification

Standard ID Number: Tuna Can LCS_00007 (1282974)
True Value = 28.79 pCi/g
Date Analyzed: 9/21/2017

Radionuclide: Cs-137

	Replicates	
#1	28.31	pCi/g
#2	28.6	pCi/g
#3	28.53	pCi/g

Mean = 28.48

1 sigma = 0.15132746

1.96 sigma = 0.296602

True Value minus 5% = 27.3505 (True Value - 5%)
True Value plus 5% = 30.2295 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes (Acceptance Criteria)

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes (Acceptance Criteria)

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: JW 9/26/17

2nd Reviewed By/Date: RM 9-27-17

Standard ID Number: Tuna Can LCS_00007 (1282974)
True Value = 14.47 pCi/g
Date Analyzed: 9/21/2017

Radionuclide: Co-60

	Replicates	
#1	14.46	pCi/g
#2	14.27	pCi/g
#3	14.39	pCi/g

Mean = 14.3733333

1 sigma = 0.09609024

1.96 sigma = 0.188337

True Value minus 5% = 13.7465 (True Value - 5%)
True Value plus 5% = 15.1935 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: JW 9/26/17

2nd Reviewed By/Date: lm 9.27.17

Standard ID Number: Tuna Can LCS_00007 (1282974)
True Value = 96.93 pCi/g
Date Analyzed: 9/21/2017

Radionuclide: Am-241

	Replicates	
#1	93.28	pCi/g
#2	93.97	pCi/g
#3	92.89	pCi/g

Mean = 93.38

1 sigma = 0.54690036

1.96 sigma = 1.071925

True Value minus 5% = 92.0835 (True Value - 5%)
True Value plus 5% = 101.7765 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: JW 9/26/17

2nd Reviewed By/Date: RM 9.27.17

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Reagent ID: Tuna Can LCS_00007

Type:	ASTD	Expiration Date:	09/21/2018
Description:	Mixed Gamma Tuna Can LCS	Laboratory:	TestAmerica St. Louis
No. of Bottles:	1	Prepared By:	Watson, Jody L
Storage Location:	Gamma Closet	Vendor:	Analytics
Reagent Volume:	341.900 g	Vendor Lot #:	74139-334
Creation Date:	10/01/2006	Vendor Cat #:	
Open Date:			
Container(s):	1282974		
Comment:			

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
Am-241					219.00000	dpm/g
Co-60					136.00000	dpm/g
Cs-137					82.30000	dpm/g

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gamma Spectroscopy

Batch: 325347 **Operator:**

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-325347~2-	LCS	341.90g	1.00	GammaVision	GV16	9 / 21 / 17 3:43	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	9.048E-001pCi/g	2.661E-001	2.621E-001	6.631E-001	3.146E-001	1.36	0.2661
AG-108M	10982	3.668E-002pCi/g	1.157E-001	1.157E-001	2.696E-001	1.317E-001	0.14	0.1157
AG-110M	10973	-2.316E-001pCi/g	1.957E-001	1.953E-001	6.472E-001	3.170E-001	-0.36	0.1957
AM-241	10818	9.328E+001pCi/g	4.901E+000	7.673E-001	1.120E+000	5.552E-001	83.26	4.9013
BA-133	10469	-1.453E-001pCi/g	1.365E-001	1.363E-001	4.518E-001	2.219E-001	-0.32	0.1365
BA-140	10463	6.864E-001pCi/g	3.618E-001	3.600E-001	7.634E-001	3.681E-001	0.90	0.3618
BE-7	10435	-1.077E+000pCi/g	1.079E+000	1.078E+000	3.575E+000	1.759E+000	-0.30	1.0795
BI-207	10195	8.400E-002pCi/g	7.160E-002	7.147E-002	2.093E-001	1.011E-001	0.40	0.0716
BI-210M	10173	1.437E-001pCi/g	1.414E-001	1.411E-001	3.403E-001	1.661E-001	0.42	0.1414
BI-212	10160	1.463E+000pCi/g	1.237E+000	1.234E+000	4.096E+000	1.993E+000	0.36	1.2367
BI-214	10154	5.551E-001pCi/g	1.698E-001	1.673E-001	3.340E-001	1.591E-001	1.66	0.1698
CD-109	9254	0.000E+000pCi/g	1.206E+000	1.206E+000	8.996E+000	4.463E+000	0.00	1.2058
CD-113M	17462	-2.036E+001pCi/g	1.066E+003	1.066E+003	3.577E+003	1.755E+003	-0.01	1,065.6537
CE-139	9241	-2.403E-002pCi/g	6.710E-002	6.706E-002	2.238E-001	1.101E-001	-0.11	0.0671
CE-141	9235	-2.619E-002pCi/g	1.673E-001	1.673E-001	5.562E-001	2.753E-001	-0.05	0.1673
CE-144	9221	4.653E-001pCi/g	6.901E-001	6.897E-001	2.286E+000	1.132E+000	0.20	0.6901
CF-249	9215	4.298E-002pCi/g	1.363E-001	1.363E-001	4.555E-001	2.238E-001	0.09	0.1363
CF-251	13690	6.063E-002pCi/g	3.338E-001	3.338E-001	8.475E-001	4.149E-001	0.07	0.3338
CO-56	8704	1.207E-001pCi/g	1.049E-001	1.047E-001	2.271E-001	1.089E-001	0.53	0.1049
CO-57	13694	4.884E-001pCi/g	7.303E-001	7.299E-001	2.419E+000	1.198E+000	0.20	0.7303
CO-58	8698	9.260E-002pCi/g	9.393E-002	9.381E-002	3.126E-001	1.518E-001	0.30	0.0939
CO-60	8692	1.446E+001pCi/g	7.501E-001	1.891E-001	7.878E-002	3.285E-002	183.54	0.7501
CR-51	8604	1.380E+000pCi/g	6.647E-001	6.606E-001	1.513E+000	7.337E-001	0.91	0.6647
CS-134	8553	1.602E-001pCi/g	1.266E-001	1.263E-001	4.088E-001	2.007E-001	0.39	0.1266
CS-136	8546	-4.685E-002pCi/g	1.111E-001	1.111E-001	2.430E-001	1.170E-001	-0.19	0.1111
CS-137	8539	2.831E+001pCi/g	1.508E+000	3.231E-001	2.024E-001	9.666E-002	139.88	1.5079
EU-152	7145	1.876E-001pCi/g	1.741E-001	1.738E-001	1.466E+000	7.240E-001	0.13	0.1741
EU-154	7138	4.033E-001pCi/g	4.069E-001	4.064E-001	2.449E+000	1.185E+000	0.16	0.4069
EU-155	7131	2.237E-001pCi/g	2.684E-001	2.681E-001	1.489E+000	7.387E-001	0.15	0.2684
FE-59	7073	3.201E-002pCi/g	2.488E-001	2.488E-001	5.291E-001	2.545E-001	0.06	0.2488
GA-68	18005	-4.863E-002pCi/g	4.659E+000	4.659E+000	9.945E+000	4.775E+000	0.00	4.6590
GD-153	6824	-9.950E-003pCi/g	1.058E-002	1.057E-002	9.331E-001	4.623E-001	-0.01	0.0106
HF-181	6495	1.083E-001pCi/g	1.229E-001	1.228E-001	4.796E-001	2.360E-001	0.23	0.1229
HG-203	6466	-3.624E-002pCi/g	7.772E-002	7.769E-002	2.596E-001	1.273E-001	-0.14	0.0777
I-131	6380	1.408E-002pCi/g	2.242E-002	2.240E-002	2.512E-001	1.225E-001	0.06	0.0224
IR-192	6303	1.702E-002pCi/g	1.564E-002	1.560E-002	2.984E-001	1.466E-001	0.06	0.0156
K-40	6148	6.025E-001pCi/g	4.185E-001	4.174E-001	1.106E+000	4.874E-001	0.54	0.4185
LA-140	6096	-8.046E-002pCi/g	5.037E-002	5.019E-002	1.685E-001	7.637E-002	-0.48	0.0504
MN-54	5382	6.604E-004pCi/g	1.070E-001	1.070E-001	2.363E-001	1.135E-001	0.00	0.1070
NA-22	5201	-1.279E-001pCi/g	6.593E-002	6.562E-002	2.133E-001	1.003E-001	-0.60	0.0659
NB-94	5160	-5.086E-002pCi/g	8.124E-002	8.120E-002	2.727E-001	1.322E-001	-0.19	0.0812
NB-95	5154	0.000E+000pCi/g	3.061E-002	3.061E-002	2.565E-001	1.239E-001	0.00	0.0306
ND-147	5083	1.060E-001pCi/g	6.941E-001	6.941E-001	1.632E+000	7.906E-001	0.06	0.6941
NP-237	4757	3.913E-001pCi/g	7.714E-001	7.711E-001	2.554E+000	1.267E+000	0.15	0.7714
NP-239	4751	-9.779E-002pCi/g	4.296E-001	4.296E-001	1.425E+000	7.070E-001	-0.07	0.4296
PA-231	4541	0.000E+000pCi/g	1.002E+000	1.002E+000	1.318E+001	6.513E+000	0.00	1.0016
PA-233	4535	-3.806E-003pCi/g	3.221E-001	3.221E-001	1.179E+000	5.834E-001	0.00	0.3221
PA-234	4528	1.113E+000pCi/g	4.538E-001	4.501E-001	1.387E+000	6.863E-001	0.80	0.4538
PA-234M	19453	6.869E+000pCi/g	6.140E+000	6.130E+000	4.528E+001	2.201E+001	0.15	6.1399
PB-210	4467	7.675E+002pCi/g	4.562E+001	7.069E+000	1.340E+001	6.641E+000	57.27	45.6164

PB-212	4454	1.236E-001pCi/g	1.686E-001	1.684E-001	5.593E-001	2.754E-001	0.22	0.1686
PB-214	4448	7.401E-001pCi/g	1.726E-001	1.683E-001	4.225E-001	2.048E-001	1.75	0.1726
PM-144	19585	-2.998E-002pCi/g	6.878E-002	6.877E-002	2.326E-001	1.122E-001	-0.13	0.0688
PM-146	2464	7.664E-002pCi/g	2.679E-001	2.679E-001	6.105E-001	2.928E-001	0.13	0.2679
RH-106	1882	-1.029E+000pCi/g	1.345E+000	1.344E+000	4.469E+000	2.197E+000	-0.23	1.3453
RU-103	1828	1.035E-001pCi/g	9.723E-002	9.709E-002	2.256E-001	1.094E-001	0.46	0.0972
SB-124	1784	6.493E-002pCi/g	8.596E-002	8.589E-002	3.647E-001	1.787E-001	0.18	0.0860
SB-125	1777	1.207E-001pCi/g	7.017E-002	6.990E-002	8.276E-001	4.043E-001	0.15	0.0702
SC-46	1739	1.233E-001pCi/g	9.496E-002	9.475E-002	4.767E-001	2.335E-001	0.26	0.0950
SN-113	1570	1.378E-001pCi/g	1.461E-001	1.459E-001	4.842E-001	2.380E-001	0.28	0.1461
SN-126	17459	-1.547E+000pCi/g	3.304E+000	3.303E+000	1.091E+001	5.436E+000	-0.14	3.3036
TA-182	1301	1.291E-001pCi/g	2.200E-001	2.200E-001	1.126E+000	5.468E-001	0.11	0.2200
TC-99M	17412	-6.321E-002pCi/g	9.084E-002	9.077E-002	3.009E-001	1.489E-001	-0.21	0.0908
TH-227	1058	3.015E+000pCi/g	5.085E+000	5.082E+000	1.678E+001	8.363E+000	0.18	5.0847
TH-229	1046	-1.547E+000pCi/g	1.476E+000	1.471E+000	3.702E+000	1.815E+000	-0.42	1.4764
TH-234	1027	-4.867E+000pCi/g	6.764E+000	6.759E+000	2.817E+001	1.404E+001	-0.17	6.7638
TL-208	929	8.356E-002pCi/g	9.786E-002	9.777E-002	2.303E-001	1.110E-001	0.36	0.0979
U-235	281	-2.825E-002pCi/g	3.082E-002	3.079E-002	2.375E+000	1.175E+000	-0.01	0.0308
Y-88	74	-8.803E-002pCi/g	1.370E-001	1.369E-001	2.980E-001	1.438E-001	-0.30	0.1370
ZN-65	31	2.702E-001pCi/g	2.035E-001	2.031E-001	6.732E-001	3.253E-001	0.40	0.2035
ZR-95	7	1.762E-001pCi/g	1.492E-001	1.490E-001	3.353E-001	1.598E-001	0.53	0.1492

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity	StdAdded	Recovery	ZFactor
LCS 160-325347~2-A	LCS 160-325347~2-A	CS-137	2.831E+001 pCi/g	2.879E+001	98.34%	-0.2223
		CO-60	1.446E+001 pCi/g	1.447E+001	99.89%	-0.0145
		AM-241	9.328E+001 pCi/g	9.693E+001	96.23%	-0.5168

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gamma Spectroscopy

Batch: 327342 **Operator:**

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-327342~2-	LCS	341.90g	1.00	GammaVision	GV16	9 / 21 / 17 4:42	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	8.500E-001pCi/g	4.315E-001	4.293E-001	9.173E-001	4.417E-001	0.93	0.4315
AG-108M	10982	9.481E-002pCi/g	4.196E-002	4.168E-002	1.710E-001	8.234E-002	0.55	0.0420
AG-110M	10973	2.660E-001pCi/g	1.258E-001	1.250E-001	5.898E-001	2.883E-001	0.45	0.1258
AM-241	10818	9.397E+001pCi/g	4.945E+000	8.199E-001	1.222E+000	6.061E-001	76.89	4.9452
BA-133	10469	-1.453E-001pCi/g	1.318E-001	1.315E-001	4.360E-001	2.140E-001	-0.33	0.1318
BA-140	10463	5.361E-002pCi/g	3.530E-001	3.530E-001	8.313E-001	4.020E-001	0.06	0.3530
BE-7	10435	-1.086E+000pCi/g	1.072E+000	1.071E+000	3.550E+000	1.746E+000	-0.31	1.0722
BI-207	10195	2.619E-002pCi/g	6.426E-002	6.425E-002	2.170E-001	1.050E-001	0.12	0.0643
BI-210M	10173	1.103E-001pCi/g	1.431E-001	1.430E-001	4.310E-001	2.115E-001	0.26	0.1431
BI-212	10160	1.101E+000pCi/g	8.695E-001	8.676E-001	2.882E+000	1.386E+000	0.38	0.8695
BI-214	10154	5.139E-001pCi/g	1.198E-001	1.168E-001	3.497E-001	1.670E-001	1.47	0.1198
CD-109	9254	6.280E-001pCi/g	2.773E+000	2.773E+000	9.198E+000	4.564E+000	0.07	2.7735
CD-113M	17462	-1.256E+003pCi/g	1.086E+003	1.083E+003	3.587E+003	1.760E+003	-0.35	1,085.7017
CE-139	9241	6.951E-002pCi/g	6.700E-002	6.668E-002	2.210E-001	1.087E-001	0.31	0.0670
CE-141	9235	9.782E-002pCi/g	1.627E-001	1.627E-001	5.395E-001	2.670E-001	0.18	0.1627
CE-144	9221	4.705E-001pCi/g	6.877E-001	6.873E-001	2.278E+000	1.128E+000	0.21	0.6877
CF-249	9215	1.320E-001pCi/g	1.307E-001	1.305E-001	4.332E-001	2.126E-001	0.30	0.1307
CF-251	13690	-3.563E-001pCi/g	3.086E-001	3.070E-001	1.017E+000	4.995E-001	-0.35	0.3086
CO-56	8704	1.030E-001pCi/g	4.239E-002	4.206E-002	2.271E-001	1.089E-001	0.45	0.0424
CO-57	13694	5.054E-002pCi/g	5.763E-002	5.757E-002	1.911E-001	9.406E-002	0.26	0.0576
CO-58	8698	-1.279E-001pCi/g	7.199E-002	7.168E-002	3.394E-001	1.652E-001	-0.38	0.0720
CO-60	8692	1.427E+001pCi/g	7.415E-001	1.906E-001	7.412E-002	3.052E-002	192.59	0.7415
CR-51	8604	-8.335E-001pCi/g	4.560E-001	4.538E-001	4.338E+000	2.146E+000	-0.19	0.4560
CS-134	8553	1.485E-001pCi/g	1.204E-001	1.201E-001	4.276E-001	2.101E-001	0.35	0.1204
CS-136	8546	9.370E-002pCi/g	2.502E-002	2.443E-002	2.556E-001	1.233E-001	0.37	0.0250
CS-137	8539	2.860E+001pCi/g	1.523E+000	3.276E-001	2.249E-001	1.079E-001	127.17	1.5234
EU-152	7145	-3.312E-001pCi/g	1.998E-001	1.991E-001	1.602E+000	7.919E-001	-0.21	0.1998
EU-154	7138	5.882E-001pCi/g	3.374E-001	3.360E-001	2.309E+000	1.116E+000	0.25	0.3374
EU-155	7131	9.622E-002pCi/g	4.703E-001	4.703E-001	1.560E+000	7.741E-001	0.06	0.4703
FE-59	7073	-2.265E-001pCi/g	2.692E-001	2.690E-001	5.651E-001	2.725E-001	-0.40	0.2692
GA-68	18005	1.605E+000pCi/g	4.810E+000	4.809E+000	1.020E+001	4.904E+000	0.16	4.8096
GD-153	6824	-9.427E-002pCi/g	2.781E-001	2.780E-001	9.227E-001	4.571E-001	-0.10	0.2781
HF-181	6495	-1.433E-001pCi/g	1.439E-001	1.437E-001	4.765E-001	2.344E-001	-0.30	0.1439
HG-203	6466	8.908E-002pCi/g	7.501E-002	7.484E-002	2.480E-001	1.214E-001	0.36	0.0750
I-131	6380	7.504E-002pCi/g	7.274E-002	7.264E-002	2.476E-001	1.207E-001	0.30	0.0727
IR-192	6303	6.064E-002pCi/g	1.383E-001	1.382E-001	4.593E-001	2.271E-001	0.13	0.1383
K-40	6148	2.839E-002pCi/g	5.578E-001	5.578E-001	1.382E+000	6.252E-001	0.02	0.5578
LA-140	6096	-1.272E-002pCi/g	6.694E-002	6.694E-002	1.343E-001	5.927E-002	-0.09	0.0669
MN-54	5382	-1.293E-002pCi/g	7.314E-002	7.314E-002	2.220E-001	1.064E-001	-0.06	0.0731
NA-22	5201	-9.911E-002pCi/g	5.513E-002	5.491E-002	1.791E-001	8.323E-002	-0.55	0.0551
NB-94	5160	7.171E-002pCi/g	8.219E-002	8.210E-002	2.744E-001	1.331E-001	0.26	0.0822
NB-95	5154	6.785E-002pCi/g	6.382E-002	6.373E-002	2.130E-001	1.022E-001	0.32	0.0638
ND-147	5083	-3.054E-001pCi/g	7.104E-001	7.102E-001	1.663E+000	8.061E-001	-0.18	0.7104
NP-237	4757	-5.319E-001pCi/g	1.657E+000	1.657E+000	2.693E+000	1.337E+000	-0.20	1.6574
NP-239	4751	2.641E-001pCi/g	4.419E-001	4.416E-001	1.462E+000	7.256E-001	0.18	0.4419
PA-231	4541	-9.132E-002pCi/g	9.741E-002	9.729E-002	1.310E+001	6.472E+000	-0.01	0.0974
PA-233	4535	3.446E-001pCi/g	3.778E-001	3.774E-001	1.090E+000	5.386E-001	0.32	0.3778
PA-234	4528	2.876E-001pCi/g	4.140E-001	4.137E-001	1.371E+000	6.786E-001	0.21	0.4140
PA-234M	19453	-2.098E+001pCi/g	1.502E+001	1.498E+001	5.286E+001	2.580E+001	-0.40	15.0219
PB-210	4467	8.153E+002pCi/g	4.866E+001	8.716E+000	1.491E+001	7.395E+000	54.69	48.6615

PB-212	4454	5.258E-001pCi/g	1.077E-001	1.021E-001	3.165E-001	1.540E-001	1.66	0.1077
PB-214	4448	6.432E-001pCi/g	1.307E-001	1.263E-001	3.806E-001	1.838E-001	1.69	0.1307
PM-144	19585	-6.996E-002pCi/g	8.109E-002	8.101E-002	2.708E-001	1.313E-001	-0.26	0.0811
PM-146	2464	2.538E-001pCi/g	2.166E-001	2.162E-001	4.878E-001	2.315E-001	0.52	0.2166
RH-106	1882	9.992E-001pCi/g	1.049E+000	1.048E+000	3.485E+000	1.705E+000	0.29	1.0495
RU-103	1828	-1.026E-002pCi/g	7.167E-002	7.167E-002	2.444E-001	1.187E-001	-0.04	0.0717
SB-124	1784	-1.032E-001pCi/g	1.298E-001	1.297E-001	4.310E-001	2.118E-001	-0.24	0.1298
SB-125	1777	-1.763E-001pCi/g	1.830E-001	1.828E-001	8.131E-001	3.971E-001	-0.22	0.1830
SC-46	1739	1.436E-001pCi/g	1.225E-001	1.223E-001	4.056E-001	1.980E-001	0.35	0.1225
SN-113	1570	-9.433E-002pCi/g	7.930E-002	7.915E-002	5.086E-001	2.502E-001	-0.19	0.0793
SN-126	17459	-1.523E+000pCi/g	3.319E+000	3.318E+000	1.096E+001	5.462E+000	-0.14	3.3190
TA-182	1301	2.064E-001pCi/g	3.682E-001	3.680E-001	1.234E+000	6.007E-001	0.17	0.3682
TC-99M	17412	0.000E+000pCi/g	3.379E-002	3.379E-002	3.005E-001	1.487E-001	0.00	0.0338
TH-227	1058	-3.064E+000pCi/g	5.199E+000	5.196E+000	1.716E+001	8.551E+000	-0.18	5.1990
TH-229	1046	-1.641E+000pCi/g	1.217E+000	1.210E+000	3.998E+000	1.963E+000	-0.41	1.2168
TH-234	1027	-4.774E+000pCi/g	7.226E+000	7.222E+000	2.799E+001	1.395E+001	-0.17	7.2259
TL-208	929	2.380E-001pCi/g	9.205E-002	9.122E-002	2.092E-001	1.004E-001	1.14	0.0920
U-235	281	0.000E+000pCi/g	2.223E-001	2.223E-001	2.402E+000	1.189E+000	0.00	0.2223
Y-88	74	-1.225E-001pCi/g	1.401E-001	1.399E-001	3.034E-001	1.465E-001	-0.40	0.1401
ZN-65	31	-1.401E-001pCi/g	2.510E-001	2.509E-001	8.418E-001	4.096E-001	-0.17	0.2510
ZR-95	7	-4.541E-003pCi/g	4.520E-003	4.514E-003	4.071E-001	1.957E-001	-0.01	0.0045

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-327342~2-A	LCS 160-327342~2-A	CS-137	2.860E+001	pCi/g	2.879E+001	99.33%	-0.0887
		CO-60	1.427E+001	pCi/g	1.447E+001	98.62%	-0.1892
		AM-241	9.397E+001	pCi/g	9.693E+001	96.95%	-0.4168

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gamma Spectroscopy

Batch: 327322 **Operator:**

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
LCS 160-327322~2-	LCS	341.90g	1.00	GammaVision	GV16	9 / 21 / 17 3:01	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA	
AC-228	11136	8.750E-002pCi/g	4.692E-001	4.692E-001	1.026E+000	4.960E-001	0.09	0.4692
AG-108M	10982	3.131E-002pCi/g	4.204E-002	4.201E-002	2.628E-001	1.283E-001	0.12	0.0420
AG-110M	10973	1.045E-001pCi/g	8.401E-002	8.384E-002	5.938E-001	2.903E-001	0.18	0.0840
AM-241	10818	9.289E+001pCi/g	4.865E+000	6.537E-001	9.745E-001	4.823E-001	95.32	4.8649
BA-133	10469	1.368E-001pCi/g	1.303E-001	1.301E-001	4.317E-001	2.119E-001	0.32	0.1303
BA-140	10463	2.647E-001pCi/g	3.485E-001	3.482E-001	8.135E-001	3.931E-001	0.33	0.3485
BE-7	10435	-1.104E+000pCi/g	1.063E+000	1.061E+000	3.519E+000	1.730E+000	-0.31	1.0630
BI-207	10195	1.758E-002pCi/g	2.874E-002	2.873E-002	2.146E-001	1.038E-001	0.08	0.0287
BI-210M	10173	-6.782E-002pCi/g	1.268E-001	1.267E-001	4.230E-001	2.075E-001	-0.16	0.1268
BI-212	10160	-9.206E-001pCi/g	1.301E+000	1.300E+000	3.534E+000	1.712E+000	-0.26	1.3012
BI-214	10154	6.724E-001pCi/g	2.010E-001	1.979E-001	3.908E-001	1.875E-001	1.72	0.2010
CD-109	9254	5.730E+000pCi/g	1.460E+000	1.425E+000	3.488E+000	1.709E+000	1.64	1.4600
CD-113M	17462	-2.443E+002pCi/g	1.040E+003	1.040E+003	3.484E+003	1.709E+003	-0.07	1,040.1179
CE-139	9241	-5.180E-002pCi/g	7.253E-002	7.237E-002	2.405E-001	1.184E-001	-0.22	0.0725
CE-141	9235	-1.095E-001pCi/g	1.695E-001	1.694E-001	5.616E-001	2.780E-001	-0.19	0.1695
CE-144	9221	-4.716E-001pCi/g	7.236E-001	7.231E-001	2.397E+000	1.187E+000	-0.20	0.7236
CF-249	9215	1.332E-001pCi/g	1.321E-001	1.319E-001	4.376E-001	2.149E-001	0.30	0.1321
CF-251	13690	2.555E-001pCi/g	3.216E-001	3.208E-001	8.102E-001	3.963E-001	0.32	0.3216
CO-56	8704	7.595E-002pCi/g	4.158E-002	4.139E-002	2.386E-001	1.146E-001	0.32	0.0416
CO-57	13694	6.304E-002pCi/g	5.399E-002	5.389E-002	1.784E-001	8.773E-002	0.35	0.0540
CO-58	8698	4.917E-002pCi/g	9.888E-002	9.885E-002	3.320E-001	1.615E-001	0.15	0.0989
CO-60	8692	1.439E+001pCi/g	7.463E-001	1.867E-001	7.056E-002	2.874E-002	203.99	0.7463
CR-51	8604	-1.736E-002pCi/g	5.160E-001	5.160E-001	2.376E+000	1.165E+000	-0.01	0.5160
CS-134	8553	2.089E-001pCi/g	1.678E-001	1.674E-001	4.023E-001	1.974E-001	0.52	0.1678
CS-136	8546	8.617E-002pCi/g	5.071E-002	5.047E-002	2.414E-001	1.162E-001	0.36	0.0507
CS-137	8539	2.853E+001pCi/g	1.519E+000	3.225E-001	1.931E-001	9.202E-002	147.72	1.5188
EU-152	7145	6.155E-001pCi/g	3.994E-001	3.981E-001	1.428E+000	7.051E-001	0.43	0.3994
EU-154	7138	7.701E-001pCi/g	4.669E-001	4.652E-001	2.363E+000	1.142E+000	0.33	0.4669
EU-155	7131	2.663E-001pCi/g	4.397E-001	4.395E-001	1.455E+000	7.218E-001	0.18	0.4397
FE-59	7073	-4.433E-002pCi/g	2.429E-001	2.429E-001	5.165E-001	2.483E-001	-0.09	0.2429
GA-68	18005	-2.186E+000pCi/g	5.044E+000	5.043E+000	1.068E+001	5.136E+000	-0.20	5.0442
GD-153	6824	7.494E-002pCi/g	3.280E-001	3.280E-001	1.088E+000	5.398E-001	0.07	0.3280
HF-181	6495	1.034E-001pCi/g	1.372E-001	1.371E-001	4.695E-001	2.310E-001	0.22	0.1372
HG-203	6466	-1.999E-002pCi/g	7.720E-002	7.719E-002	2.586E-001	1.268E-001	-0.08	0.0772
I-131	6380	1.331E-002pCi/g	1.020E-001	1.020E-001	2.485E-001	1.212E-001	0.05	0.1020
IR-192	6303	2.431E-002pCi/g	1.338E-001	1.338E-001	4.456E-001	2.202E-001	0.05	0.1338
K-40	6148	-8.047E-001pCi/g	2.674E+000	2.674E+000	1.708E+000	7.880E-001	-0.47	2.6744
LA-140	6096	8.073E-002pCi/g	7.575E-002	7.563E-002	1.128E-001	4.852E-002	0.72	0.0757
MN-54	5382	1.764E-002pCi/g	1.033E-001	1.033E-001	2.279E-001	1.093E-001	0.08	0.1033
NA-22	5201	3.114E-002pCi/g	4.610E-002	4.608E-002	1.592E-001	7.327E-002	0.20	0.0461
NB-94	5160	9.861E-002pCi/g	7.976E-002	7.960E-002	2.642E-001	1.280E-001	0.37	0.0798
NB-95	5154	0.000E+000pCi/g	4.536E-002	4.536E-002	2.484E-001	1.199E-001	0.00	0.0454
ND-147	5083	1.353E+000pCi/g	6.646E-001	6.601E-001	1.513E+000	7.312E-001	0.89	0.6646
NP-237	4757	-5.262E-001pCi/g	3.908E-001	3.897E-001	2.736E+000	1.358E+000	-0.19	0.3908
NP-239	4751	-2.565E-001pCi/g	4.286E-001	4.284E-001	1.418E+000	7.037E-001	-0.18	0.4286
PA-231	4541	-5.356E-008pCi/g	3.922E+000	3.922E+000	1.307E+001	6.461E+000	0.00	3.9218
PA-233	4535	-3.806E-003pCi/g	1.397E-001	1.397E-001	1.069E+000	5.284E-001	0.00	0.1397
PA-234	4528	3.080E-001pCi/g	2.599E-001	2.594E-001	5.782E-001	2.820E-001	0.53	0.2599
PA-234M	19453	1.595E+001pCi/g	1.353E+001	1.350E+001	4.482E+001	2.178E+001	0.36	13.5253
PB-210	4467	7.622E+002pCi/g	4.531E+001	7.090E+000	1.361E+001	6.748E+000	55.98	45.3109

PB-212	4454	7.513E-001pCi/g	1.780E-001	1.712E-001	3.711E-001	1.813E-001	2.02	0.1780
PB-214	4448	5.325E-001pCi/g	1.616E-001	1.592E-001	4.404E-001	2.137E-001	1.21	0.1616
PM-144	19585	3.767E-002pCi/g	5.127E-002	5.124E-002	2.457E-001	1.188E-001	0.15	0.0513
PM-146	2464	-3.219E-001pCi/g	2.884E-001	2.879E-001	6.460E-001	3.105E-001	-0.50	0.2884
RH-106	1882	1.934E+000pCi/g	1.280E+000	1.276E+000	4.067E+000	1.996E+000	0.48	1.2804
RU-103	1828	1.121E-001pCi/g	5.519E-002	5.488E-002	1.474E-001	7.024E-002	0.76	0.0552
SB-124	1784	1.132E-001pCi/g	1.399E-001	1.398E-001	3.919E-001	1.923E-001	0.29	0.1399
SB-125	1777	1.076E-001pCi/g	8.679E-002	8.662E-002	8.612E-001	4.211E-001	0.12	0.0868
SC-46	1739	0.000E+000pCi/g	6.229E-002	6.229E-002	4.333E-001	2.118E-001	0.00	0.0623
SN-113	1570	5.394E-002pCi/g	1.424E-001	1.424E-001	4.754E-001	2.336E-001	0.11	0.1424
SN-126	17459	-1.519E+000pCi/g	3.303E+000	3.302E+000	1.090E+001	5.435E+000	-0.14	3.3026
TA-182	1301	-4.896E-001pCi/g	3.452E-001	3.444E-001	1.139E+000	5.530E-001	-0.43	0.3452
TC-99M	17412	0.000E+000pCi/g	1.694E-002	1.694E-002	3.153E-001	1.561E-001	0.00	0.0169
TH-227	1058	7.587E-001pCi/g	1.843E+000	1.843E+000	6.115E+000	3.029E+000	0.12	1.8434
TH-229	1046	-1.629E+000pCi/g	1.554E+000	1.548E+000	3.893E+000	1.910E+000	-0.42	1.5535
TH-234	1027	-4.783E+000pCi/g	1.167E+000	1.140E+000	2.788E+001	1.390E+001	-0.17	1.1667
TL-208	929	3.622E-001pCi/g	9.634E-002	9.449E-002	1.952E-001	9.343E-002	1.86	0.0963
U-235	281	3.472E-001pCi/g	7.050E-001	7.048E-001	2.523E+000	1.250E+000	0.14	0.7050
Y-88	74	-9.672E-003pCi/g	1.010E-002	1.009E-002	2.867E-001	1.382E-001	-0.03	0.0101
ZN-65	31	0.000E+000pCi/g	1.100E-001	1.100E-001	7.843E-001	3.808E-001	0.00	0.1100
ZR-95	7	-5.796E-002pCi/g	1.604E-001	1.604E-001	3.658E-001	1.750E-001	-0.16	0.1604

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery	ZFactor
LCS 160-327322~2-A	LCS 160-327322~2-A	CS-137	2.853E+001	pCi/g	2.879E+001	99.09%	-0.1216
		CO-60	1.439E+001	pCi/g	1.447E+001	99.44%	-0.0771
		AM-241	9.289E+001	pCi/g	9.693E+001	95.83%	-0.5747

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity	Dup Activity	RPD	RER	DER	Flag	ZFactor

Reagent

Tuna Can_00003

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

90099
1.0 Liter Sand in 1 Liter Wide Mouth HDPE Silgan Jar

Customer: TestAmerica St. Louis / Earth City, MO
P.O. No.: 2454150, Item 1
Reference Date: 01-Jan-2012 12:00 PM EST **Grams of Master Source:** 0.017180

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Additional radionuclides were added gravimetrically from solutions calibrated by gamma-ray spectrometry, ionization chamber, or liquid scintillation counting. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty* , % Type u_A	u_B	U	Calibration Method*
Pb-210	46.5	8.109E+03	———	3.094E+03	0.1	2.1	4.1	4π LS
Am-241	59.5	1.580E+05	———	2.037E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.677E+05	2.881E+03	0.5	2.3	4.7	HPGe
Co-57	122.1	2.718E+02	8.795E+04	1.511E+03	0.4	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.245E+05	2.139E+03	0.4	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.707E+05	4.651E+03	0.3	1.9	3.8	HPGe
Sn-113	391.7	1.151E+02	1.755E+05	3.015E+03	0.4	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.128E+05	1.938E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.228E+05	7.264E+03	0.5	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.084E+05	3.580E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.084E+05	3.581E+03	0.7	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.476E+05	7.690E+03	0.7	1.9	4.0	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Corporate Office

Comments:
1550 grams of sand. Homogenous down to 10 grams aliquot.
This standard will expire one year after the reference date.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 30 JAN 12
J.D. McCorvey, Counting Room Manager

Reagent

Tuna Can_00006

Eckert & Ziegler
Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

83814-334

1.0 Liter Sand in 1 Liter Wide Mouth HDPE Silgan Jar

Customer: Test America St. Louis
P.O. No.: 2395112, Item 1
Reference Date: 01-Jan-2011 12:00 PM EST **Grams of Master Source:** 0.016927

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* γps/gram	This Source γps	Uncertainty, % Type u_A	u_B	U	Calibration Method
Pb-210	46.5	8.120E+03	———	3.021E+03	0.1	2.1	4.1	4π LS
Am-241	59.5	1.580E+05	———	2.090E+03	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.697E+05	2.873E+03	0.8	2.3	4.9	HPGe
Co-57	122.1	2.718E+02	8.711E+04	1.475E+03	0.5	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	2.111E+03	0.5	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.753E+05	4.660E+03	0.4	1.9	3.9	HPGe
Sn-113	391.7	1.151E+02	1.769E+05	2.994E+03	0.5	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.109E+05	1.877E+03	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.224E+05	7.150E+03	0.5	1.9	3.9	HPGe
Co-60	1173.2	1.925E+03	2.142E+05	3.626E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.143E+05	3.627E+03	0.6	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.472E+05	7.570E+03	0.5	1.9	3.9	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)

Corporate Office
Laboratory

Comments:
1550 grams of sand. Homogeneous down to 10 gram aliquot.
This standard will expire one year after the reference date.

Source Prepared by: _____
Z. Dimitrova, Radiochemist

QA Approved: _____ Date: 2/11/11
J. D. McCorvey, QA Manager Alternate

Reagent

U-232_00001

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

65788-334

U-232 5 mL Liquid in Flame Sealed Vial

This standard radionuclide source was prepared gravimetrically from a calibrated master solution. The master solution was calibrated by the Department Des Applications Et De La Metrologie Des Rayonnements Ionisants (DAMRI), Paris, France, as Number 23236.

Radionuclide purity and calibration were checked using a germanium gamma spectrometer system. The nuclear decay rate and assay date for this source are given below.

ANALYTICS maintains traceability to the National Institute of Standards and Technology through Measurements Assurance Programs as described in USNRC Reg. Guide 4.15, Revision 1.

ISOTOPE:	U-232
ACTIVITY (dps):	1.624 E4
CALIBRATION DATE:	April 7, 2003 12:00 EST
HALF-LIFE:	68.9 years
TOTAL UNCERTAINTY*:	3.3%

*95% Confidence Level

Impurities: U-233 <53 dps
Am-241 <26 dps

5.03145 grams 2M HNO_3 solution.

P O NUMBER 1721862-000 OP, Item 2

SOURCE PREPARED BY: M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED: 4/8/03

Reagent

U-232_00039

Standard ID Number: U-232_00039
True Value = 66.863 dpm/mL
Date Analyzed: 11/28/2017

Radionuclide: U-232

	Replicates	
#1	67.179	dpm/mL
#2	67.976	dpm/mL
#3	62.701	dpm/mL

Mean = 65.952

1 sigma = 2.84351068 1.96 sigma = 5.573281

True Value minus 5% = 63.51985 (True Value - 5%)
True Value plus 5% = 70.20615 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: ALD 11/29/17

2nd Reviewed By/Date: RM 11.29.17

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	4/7/2003 0:00		
Decayto Date/Time (t):	11/28/17 0:00		
Initial Activity (A_0):	77.48 dpm		
Initial Aliquot:	1 mL		
Initial Conc:	77.476 dpm/mL		
***Soln. Density:**	1 g/mL		
Nuclide:	U-232		
Half-Life (days):	25165.725	decay days	fraction
****Decay Factor:**	0.8630	5349.00	0.21255
Decay Corr Activity:	6.6863E+01 dpm		
Decay Corr Conc:	6.6863E+01 dpm/mL		

Conversion/Calculations

Final Activity Unit:	dpm
Activity Unit Factor:	1.00000
Final Volume Unit:	mL
Volume Unit Factor:	1.000
Final Concentration:	6.6863E+01 dpm/mL
Aliquot Volume:	1.0000E+00 mL
Final Activity (A):	6.6863E+01 dpm

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:44:20AM 11/29/2017

Sample

Sample Name: Verification 1
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232_00039
AnalysisID: 715928

Analyst: 60040

Tracer

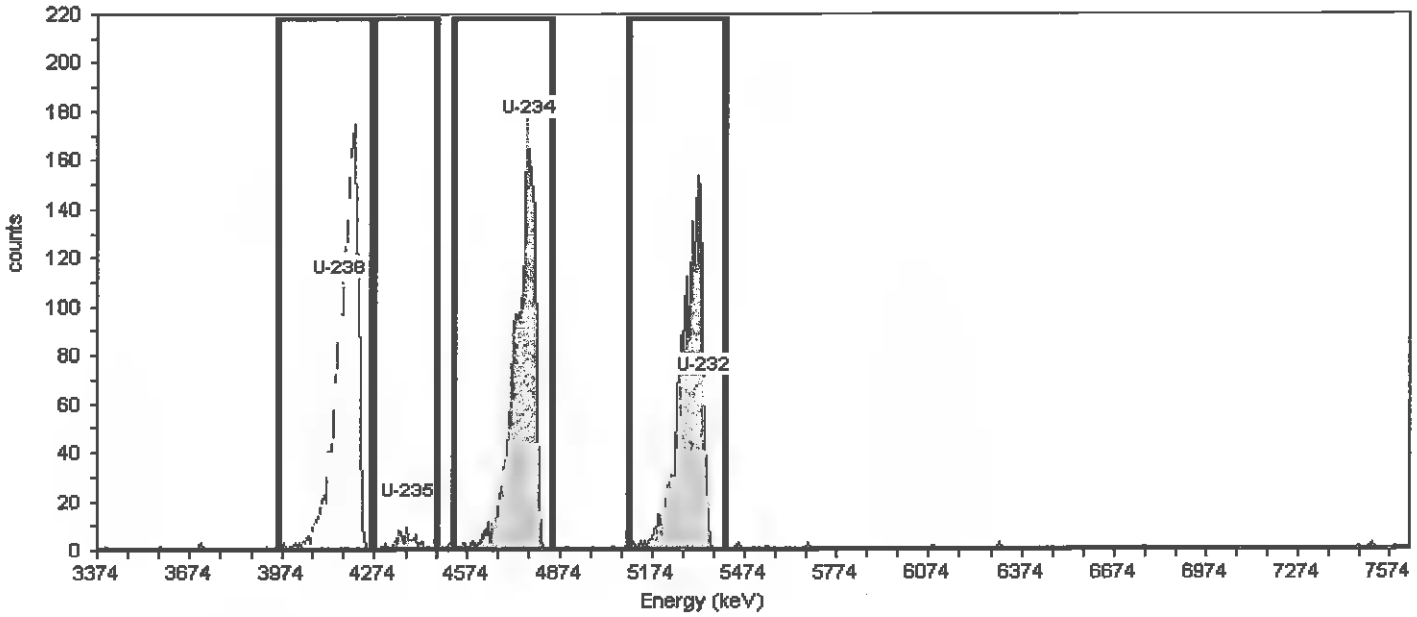
Tracer Name: UNAT_00013
Tracer Activity: 72.27 DPM/mL x (Vol.)0.10 mL = 7.23 DPM
Tracer Ref. Date: 3/30/2008 11:00:00AM

Tracer Nuclide: U-238
Tracer Recovery: 90.54%

Acquisition

Detector: AV118
Serial Number: 49-037F4
Acquisition Start Date: 11/28/2017 6:15:19PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:24PM
Background Info: Sample: ICB;AV118; Det: AV118; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9795;AV118-20170802
Calibration Date: 8/2/2017 1:38:49PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.06% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = U_Verify
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	78.5	100.0	1637	0.0000	1637.00	65.430	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	64.9	80.2	56	0.0000	56.00	3.082	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	75.3	99.8	1642	0.0000	1642.00	72.631	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	80.2	100.1	1524	1.0000	1523.00	67.179	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:44:02AM 11/29/2017

Sample

Sample Name: Verification 2
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232_00039
AnalysisID: 715926

Analyst: 60040

Tracer

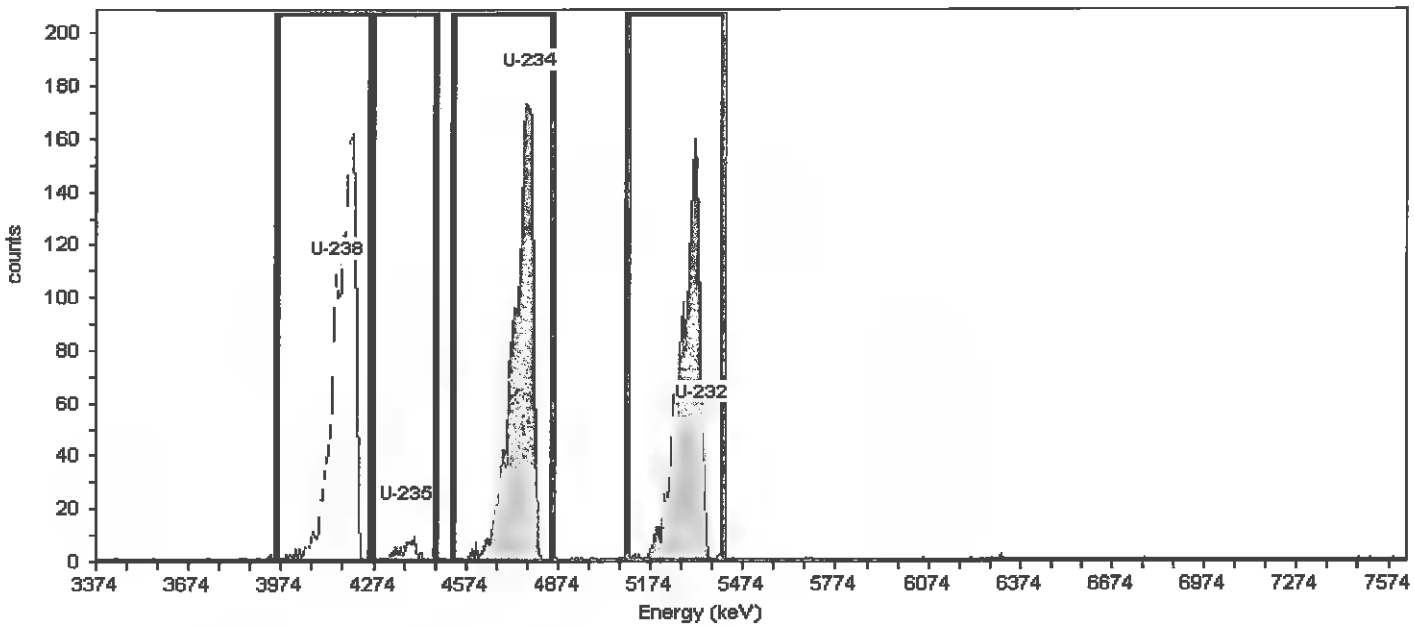
Tracer Name: UNAT_00013
Tracer Activity: 72.27 DPM/mL x (Vol.)0.10 mL = 7.23 DPM
Tracer Ref. Date: 3/30/2008 11:00:00AM

Tracer Nuclide: U-238
Tracer Recovery: 98.71%

Acquisition

Detector: AV119
Serial Number: 49-037G6
Acquisition Start Date: 11/28/2017 6:15:20PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:26PM
Background Info: Sample: ICB;AV119; Det: AV119; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9817;AV119-20170802
Calibration Date: 8/2/2017 1:39:16PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 23.42% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = U_Verify
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	84.0	100.0	1604	0.0000	1604.00	71.335	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	61.4	80.2	69	0.0000	69.00	3.876	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	71.1	99.8	1686	1.0000	1685.00	76.066	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	78.4	100.1	1513	3.0000	1510.00	67.976	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
10:43:36AM 11/29/2017

Sample

Sample Name: Verification 3
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232_00039
AnalysisID: 715927

Analyst: 60040

Tracer

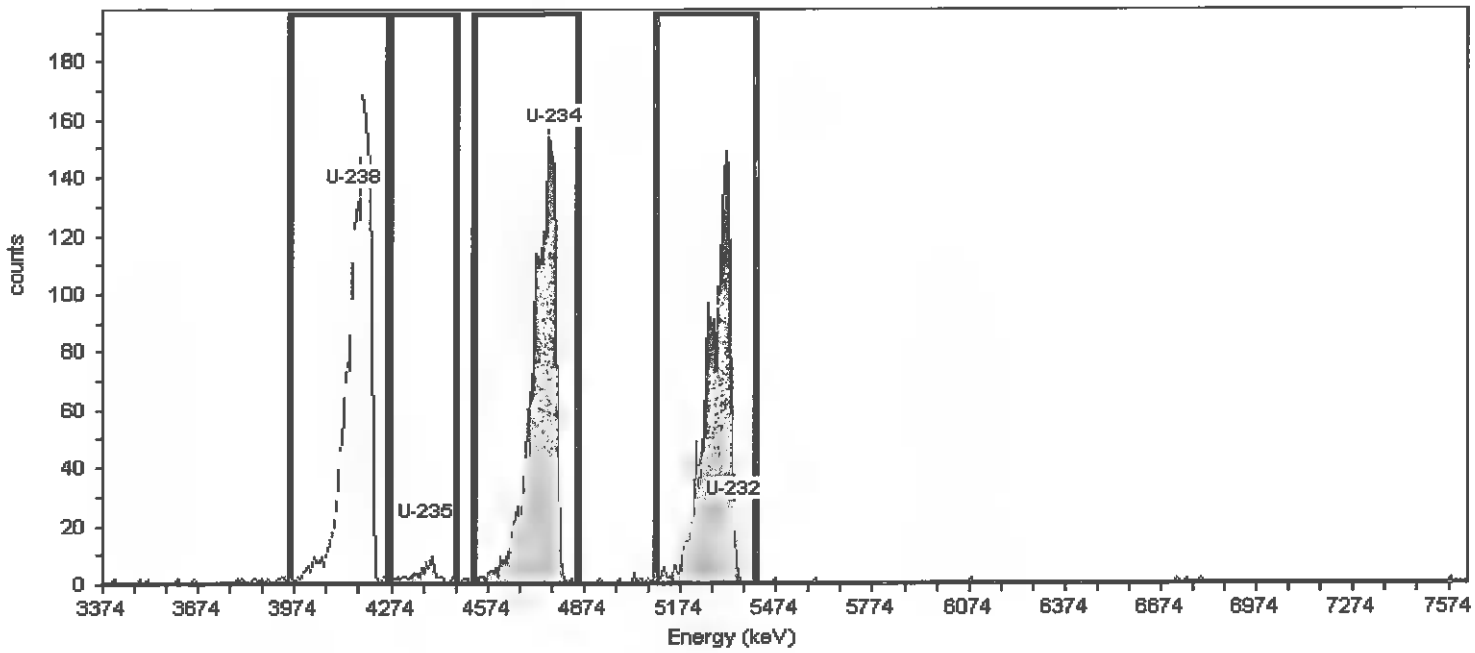
Tracer Name: UNAT_00013
Tracer Activity: 72.27 DPM/mL x (Vol.)0.10 mL = 7.23 DPM
Tracer Ref. Date: 3/30/2008 11:00:00AM

Tracer Nuclide: U-238
Tracer Recovery: 112.00%

Acquisition

Detector: AV120
Serial Number: 49-037W3
Acquisition Start Date: 11/28/2017 6:15:21PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:28PM
Background Info: Sample: ICB;AV120; Det: AV120; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9884;AV120-20170802
Calibration Date: 8/2/2017 1:39:29PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.48% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = U_Verify
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	72.0	100.0	1748	1.0000	1747.00	80.938	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	39.5	80.2	67	0.0000	67.00	3.456	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	80.4	99.8	1651	0.0000	1651.00	68.431	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	89.6	100.1	1519	2.0000	1517.00	62.701	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

U-232 Tracer Ver.

Aliquot Only

Batch No. : _____

960 min.

Balance ID : _____

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	Ver 1	0.1	113	RC = 118
2	2	1	116	1 = 119
3	3	1	117	1 = 120
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. I.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A

Initials / Date

Isotope : UNAT

Std Sol'n No. : UNAT-00013

Vol (mL) : 0.1

Ref Activity (dpm/mL) : 72.2650 (U-238)

Act Ref Date : 3-30-08

New Brunswick

Samples Spiked and Traced By:

SUB 11/22/17

Initials / Date

Verification Signature & Date:

amm 11/22/2017

Initials / Date

LCS Standard ☐ N/A

Initials / Date

Isotope : U-232 UNCLAN

Std Sol'n ID. : U-232-00039

Vol (mL) : 0.1

Ref Activity (dpm/mL) : 77.476

Act Ref Date : 04-07-03

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐	ST-RC-0003 Rev.	☐	ST-RC-0040 Rev.	☐	ST-RC-0110 Rev.
☐	ST-RC-0004 Rev.	☐	ST-RC-0041 Rev.	☐	ST-RC-0120 Rev.
☐	ST-RC-0014 Rev.	☐	ST-RC-0050 Rev.	☐	ST-RC-0232 Rev.
☐	ST-RC-0020 Rev.	☐	ST-RC-0090 Rev.	☐	ST-RC-0238 Rev.
☐	ST-RC-0021 Rev.	☐	ST-RC-0100 Rev.	☐	ST-RC-0240 Rev.
				☐	ST-RC-0241 Rev.
				☐	ST-RC-0242 Rev.
				☐	ST-RC-5016 Rev.
				☐	
				☐	

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time		Matrix	
Long Count	☐	Soil	☐
Short Count	☐	H_2O	☐

Prepared By : _____

Date : _____

Reviewed by: _____

Date: _____

\\Slsvr01\RAD\MasterForms\RAD-0045 Rev(3)

Uranium only via UTEVA

ST-RC-0238

Batch: ~~~~

*All ~~~~ mL/minute)

UTEVA lot: UTSR17E

11.4.4 ~~~~ UTEVA cartridge

11.4.5 ~~~~ 5mL 3M HNO_3 ~~~~ COMPLETED

11.4.6 ~~~~ Load sample

11.4.7 25mL 3M HNO_3 ~~~~ COMPLETED

11.4.8 5mL 9M HCl COMPLETED

11.4.9 20mL 5M HCl / 0.05M oxalic ~~~~ COMPLETED

11.4.10-11.4.11 Elute into clean tube with 15mL 1M HCl ~~~~ COMPLETED

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

U-232 Tracer Ver (U-only) (R01)

Aliquot Only

960 min

Batch No. : _____

Balance ID : _____

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	RC: 134 Ver 1 RC²: 52	0.1	118	RC = 113
2	RC: 136 2 RC²: 53	1	120	RC = 116
3	RC: 137 3 RC²: 54	1	121	RC = 117
4				
5				
6				
7	V1 - 131			
8	V2 - 132			
9	V3 - 133			
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

RC: 107
RC: 108
RC: 109

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A (Initials / Date)

Isotope : _____
Std Sol'n No. : _____
Vol (mL) : _____
Ref Activity (dpm/mL) : _____
Act Ref Date : _____

Samples Spiked and Traced By: SUB 11/22/17 (Initials / Date)

Verification Signature & Date: CMM 11/22/2017 (Initials / Date)

LCS Standard ☐ N/A (Initials / Date)

Isotope : U-232 uranium
Std Sol'n ID. : U-232-00039
Vol (mL) : 0.1
Ref Activity (dpm/mL) : 77.476
Act Ref Date : to 04-07-03
SUB 11-22-17

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐ ST-RC-0003 Rev.	☐ ST-RC-0040 Rev.	☐ ST-RC-0110 Rev.
☐ ST-RC-0004 Rev.	☐ ST-RC-0041 Rev.	☐ ST-RC-0120 Rev.
☐ ST-RC-0014 Rev.	☐ ST-RC-0050 Rev.	☐ ST-RC-0232 Rev.
☐ ST-RC-0020 Rev.	☐ ST-RC-0090 Rev.	☐ ST-RC-0238 Rev.
☐ ST-RC-0021 Rev.	☐ ST-RC-0100 Rev.	☐ ST-RC-0240 Rev.
		☐ ST-RC-0241 Rev.
		☐ ST-RC-0242 Rev.
		☐ ST-RC-5016 Rev.
		☐
		☐

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____
Date : _____

Reviewed by: _____
Date: _____

Sample

Sample Name: Ver 1
SampleType: Sample
:
Sample Collection Date:

Spectrum #4 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232 Tracer (u-only)
AnalysisID: 717491

Analyst: 60040

Tracer

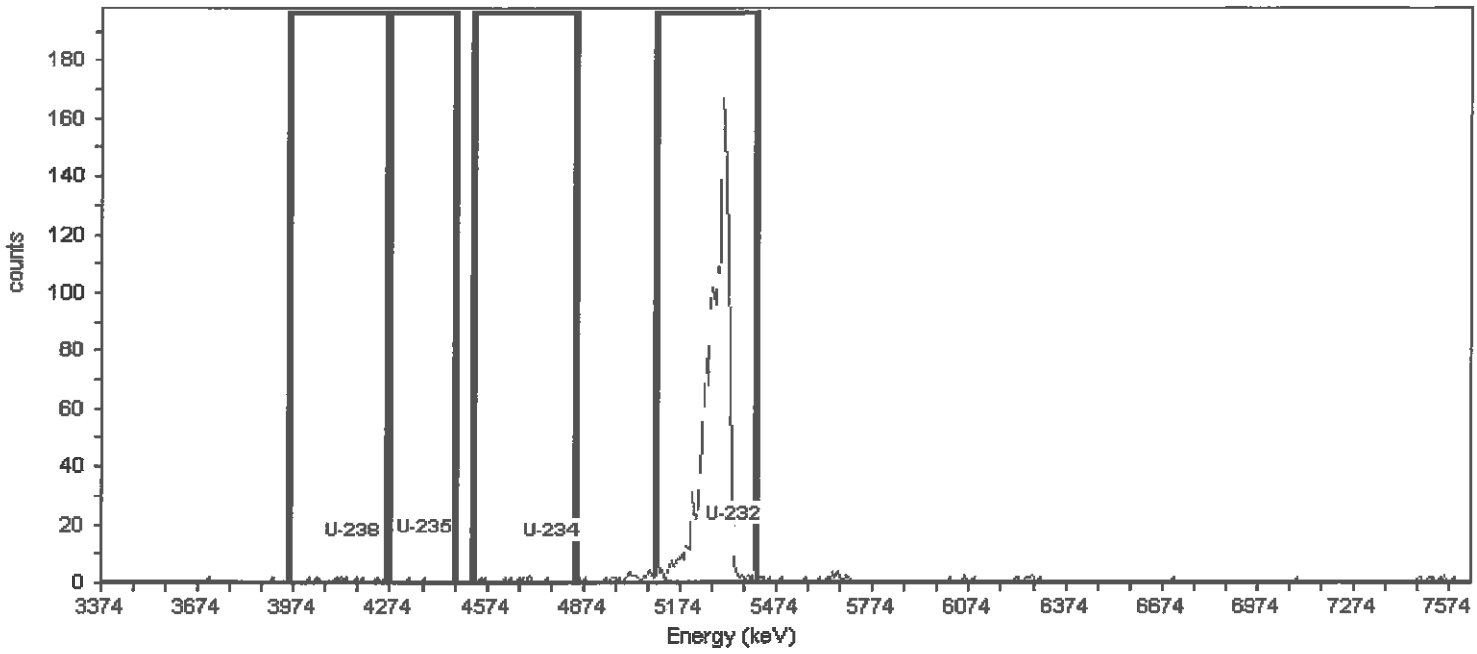
Tracer Name: U-232_00038
Tracer Activity: 82.25 DPM/mL x (Vol.)0.10 mL = 8.22 DPM
Tracer Ref. Date: 8/25/2011 8:22:32AM

Tracer Nuclide: U-232
Tracer Recovery: 83.11%

Acquisition

Detector: AV131
Serial Number: 49-164O2
Acquisition Start Date: 12/12/2017 3:26:02PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/18/2017 3:51:44PM
Background Info: Sample: ICB;AV131; Det: AV131; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9793;AV131-20170802
Calibration Date: 8/2/2017 4:14:43PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.64% +/- 0.31% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/27/2017 6:46:32PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	12.8	100.0	11	1.0000	10.00	0.509	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	18.3	80.2	2	0.0000	2.00	0.127	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	166.5	99.8	10	1.0000	9.00	0.459	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	77.5	100.1	1524	1.0000	1523.00	68.353	DPM/mL

Sample

Sample Name: Ver 2
SampleType: Sample
:
Sample Collection Date:

Spectrum #4 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232 Tracer (u-only)
AnalysisID: 717493

Analyst: 60040

Tracer

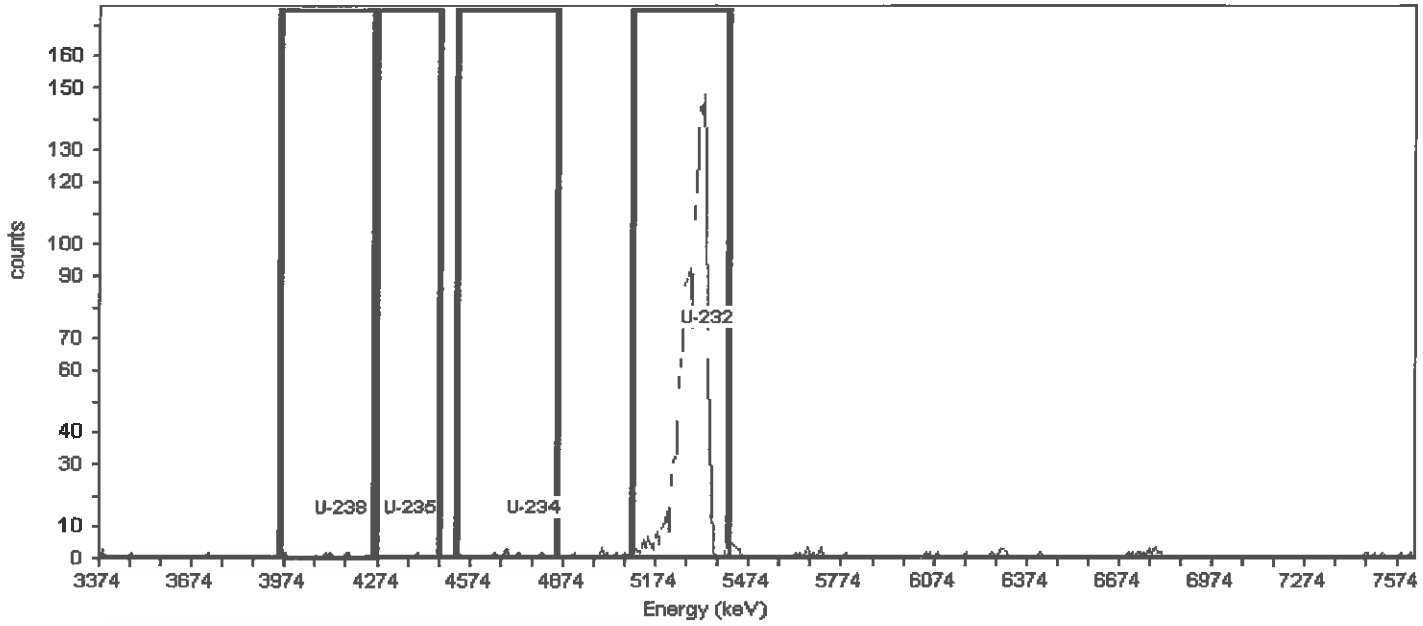
Tracer Name: U-232_00038
Tracer Activity: 82.25 DPM/mL x (Vol.)0.10 mL = 8.22 DPM
Tracer Ref. Date: 8/25/2011 8:22:32AM

Tracer Nuclide: U-232
Tracer Recovery: 93.78%

Acquisition

Detector: AV132
Serial Number: 49-164O4
Acquisition Start Date: 12/12/2017 3:26:03PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/18/2017 3:51:46PM
Background Info: Sample: ICB;AV132; Det: AV132; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9794;AV132-20170802
Calibration Date: 8/2/2017 4:14:59PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.51% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/27/2017 6:46:32PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	20.8	100.0	6	2.0000	4.00	0.197	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	18.3	80.2	1	1.0000	0.00	0.000	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	185.1	99.8	7	0.0000	7.00	0.346	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	84.0	100.1	1570	0.0000	1570.00	77.128	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
8:03:07AM 12/13/2017

Sample

Sample Name: Ver 3
SampleType: Sample
:
Sample Collection Date:

Spectrum #4 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232 Tracer (u-only)
AnalysisID: 717492

Analyst: 60040

Tracer

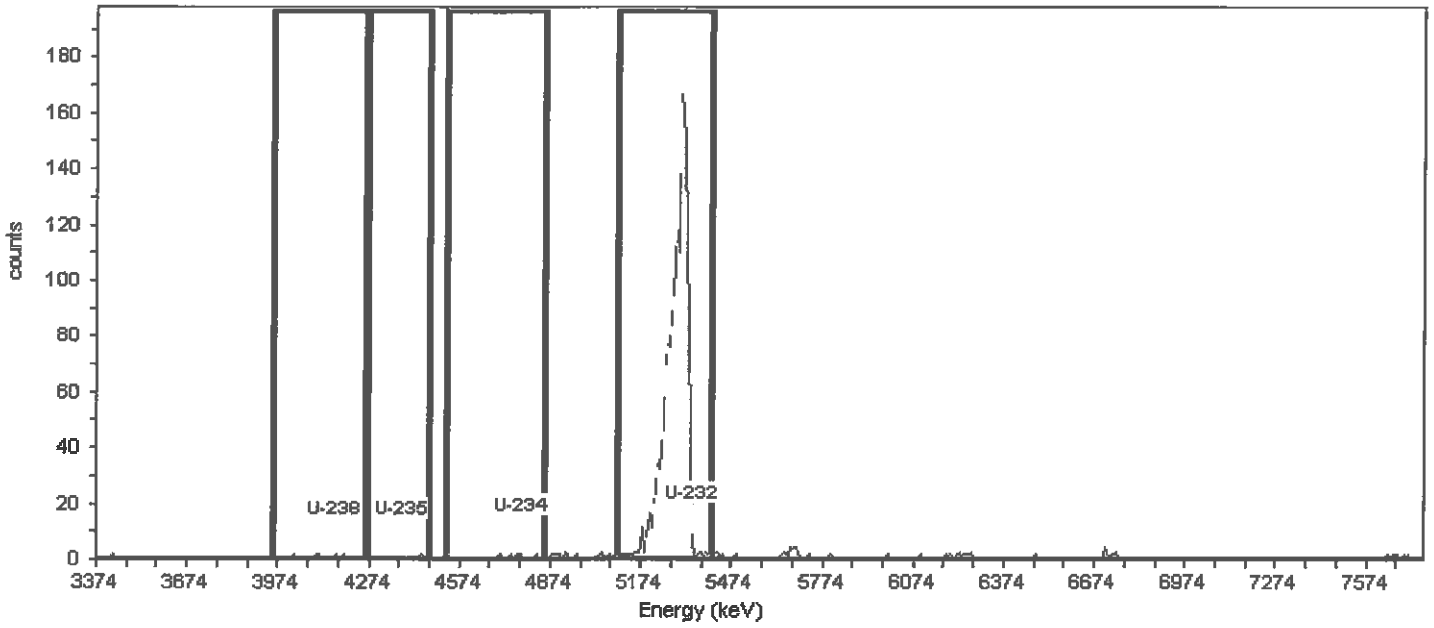
Tracer Name: U-232_00038
Tracer Activity: 82.25 DPM/mL x (Vol.)0.10 mL = 8.22 DPM
Tracer Ref. Date: 8/25/2011 8:22:32AM

Tracer Nuclide: U-232
Tracer Recovery: 79.51%

Acquisition

Detector: AV133
Serial Number: 49-169B4
Acquisition Start Date: 12/12/2017 3:26:04PM
Live Time: 960.00 min.
Real Time: 960.01 min.
Background Date: 11/18/2017 3:51:47PM
Background Info: Sample: ICB;AV133; Det: AV133; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9795;AV133-20170802
Calibration Date: 8/2/2017 4:15:28PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 24.83% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/27/2017 6:46:32PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	102.5	100.0	5	1.0000	4.00	0.211	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	18.1	80.2	1	0.0000	1.00	0.066	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	79.7	99.8	7	0.0000	7.00	0.370	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	69.9	100.1	1468	0.0000	1468.00	65.396	DPM/mL

Uranium only via UTEVA

ST-RC-0238

Batch: _____

*All rinses should flow at 1 mL/minute (only 3M HNO_3 may be done at 2 mL/minute)

UTEVA lot: UTSR17E

11.4.4 UTEVA Cartridge

11.4.5 5mL 3M HNO_3 COMPLETED ☐

11.4.6 Load sample

11.4.7 5mL 3M HNO_3 COMPLETED ☐

11.4.8 5mL 5M HCl COMPLETED ☐

11.4.9 20mL 5M HCl / 0.05M oxalic COMPLETED ☐

11.4.10-11.4.11 Elute into clean tube with 15mL 1M HCl COMPLETED ☐

Reagent

UNAT Ampoule_00001

New Brunswick Laboratory
U.S. Department of Energy

Certificate of Analysis
CRM 145
Uranyl (Normal) Nitrate Assay and Isotopic Solution

Uranium Mass Fraction: **0.0101356 g U/g solution ± 0.0000011 g U/g solution**
[10.1356 mg U/g solution ± 0.0011 mg U/g solution]

	$^{234}U/^{238}U$	$^{235}U/^{238}U$
Atom Ratio:	**0.000052841**	**0.0072543**
Atom Ratio Uncertainty:	**0.000000082**	**0.0000040**

	^{234}U	^{235}U	^{238}U
Atom Percent:	**0.0052458**	**0.72017**	**99.27458**
Atom Percent Uncertainty:	**0.0000081**	**0.00039**	**0.00039**
Weight Percent:	**0.0051579**	**0.71114**	**99.28370**
Weight Percent Uncertainty:	**0.0000080**	**0.00038**	**0.00038**

Relative Atomic Weight: **238.028918**
Relative Atomic Weight Uncertainty: **0.000012**

Note: ^{233}U and ^{236}U were not detected. The detection limit of uranium ratios for the technique used is 5×10^{-9}.

This Certified Reference Material (CRM) is a uranium concentration and isotopic solution standard intended for use in calibration of and/or quality control for uranium analysis methods. Each unit of CRM 145 consists of approximately 20-mL of uranyl nitrate solution in 1M nitric acid, contained in a sealed glass ampoule.

NOTE: The vial should be handled under proper radiologically-controlled conditions at all times.

The certified uranium content value is based on the mass of high-purity metal dissolved and diluted to a known solution mass. The stated uranium concentration was calculated as the prepared value and verified experimentally by the NBL-modified Davies and Gray titration. The certified uranium isotopic composition and atomic weight is based upon measurements performed on multiple samples by two different measurement techniques on a Thermal Ionization Mass Spectrometer (TIMS), calibrated using CRM U030-A as primary comparator and CRM 129-A as a quality control sample. The isotopic values are shared with CRM 112-A, uranium (normal) metal standard which was the source of uranium used to produce the solutions.

RAD13-0018
UNAT Spike
marrss
None
Prep/Opened: 5/3/2013
Exp(1): 5/10/2014
Exp(2): 5/10/2014

All uncertainties for the certified values are expressed as expanded uncertainties (U) where $U = k*u_c$, where u_c is the

September 30, 2010
Argonne, Illinois

www.nbl.doe.gov

Jon Neuhoff, Director
New Brunswick Laboratory

(Revision of Certificate dated March 30, 2008)

127971
ID: UNAT_00008
Exp: 05/10/14 Prpd: SB Crl: 05/03/13
UNAT spike

combined standard uncertainty and the coverage factor k = 2. Uncertainties were determined according to the JCGM 100:2008 *Guide to the Expression of Uncertainty in Measurement*. The coverage factor of 2 was chosen to provide an approximate 95% level of confidence. The input quantities associated with the uranium content included uncertainties due to weighing, CRM 112-A purity, and buoyancy factors. The input quantities associated with the uranium isotopic composition included uncertainties from the certified value for CRM U030-A, measurement precision, and background corrections associated with the analytical techniques.

The CRM was produced by dissolving uranium metal in a single batch and container, with extensive mixing of the resultant solution followed by dispensation into individual bottles. Subsequent measurements of a random sampling of the total lot produced did not indicate any inhomogeneity in uranium concentration or isotopic composition. The minimum sample sizes taken from packaged units and measured were 30 mg U by titration and 1 μg U by TIMS. The NBL makes no recommendation as to the minimum sample size to be used to ensure concentration or isotopic homogeneity.

Users are cautioned that once the vial is opened, the uranium concentration and/or isotopic composition of the material may be affected by evaporative losses or environmental contamination. User's should take appropriate precautions to safeguard the material before, during and after use to ensure valid certificate values.

Recommended Procedure for Ampoule Handling and Dispensing of Solution

1. The ampoule contains a strongly acidic solution of uranium. Appropriate precautions should be taken.

2. Before opening the ampoule, ensure that any dried uranium or condensed liquid in the neck or body of the ampoule is re-dissolved into solution. This can be accomplished by inverting the ampoule repeatedly.

3. The glass ampoules are scored at the neck for ease of opening. However, glass burrs and fragments pose a cut hazard to anyone opening the ampoules. Appropriate precautions should be taken.

4. Lightly moisten the scored line on the neck with distilled water to help ensure a clean break at the score.

5. Because of the narrow neck of the ampoule it may be difficult or impossible to pour the solution out. Here is one possible method:

    a. Obtain approximately 12-cm length of plastic capillary tubing (e.g. i.d. 0f 0.1", o.d. of 0.16").
    b. Insert one end of the capillary tubing fully into the ampoule
    c. Fold the remaining length of tubing along the outside of the ampoule, ensuring that the tube is not crimped and will allow the free flow of air through the tube and into the ampoule.
    d. Holding the ampoule and tubing in one hand, and a beaker or dispensing bottle in another, invert the ampoule over the container allowing the solution to drain into it.
    e. The capillary tubing allows air to flow into the ampoule, eliminating the "airlock" created by the narrow neck of the open ampoule.

6. The user should be wary of evaporative losses once the ampoule is opened, and prevent uranium contamination of the sample. It is recommended that the entire solution be accurately weighed and aliquanted as soon as possible after opening the sample. Precautions should be taken (clean glass/plastic ware, air filtration, etc) to prevent uranium contamination of the CRM with subsequent perturbation of the isotopic composition.

Reagent

UNAT_00014

Standard ID Number: UNAT_00013
True Value = 70.689 dpm/mL
Date Analyzed: 11/28/2017

Radionuclide: U-234

	Replicates	
#1	72.749	dpm/mL
#2	75.297	dpm/mL
#3	73.437	dpm/mL

Mean = 73.8276667

1 sigma = 1.31815831 1.96 sigma = 2.58359

True Value minus 5% = 67.15455 (True Value - 5%)
True Value plus 5% = 74.22345 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? **Yes** **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? **Yes** **(Acceptance Criteria)**

Standard Reverification Acceptable? **Yes**

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: Rm 12·21·17

2nd Reviewed By/Date: ALD 12/18/17

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	3/30/2008 0:00		
Decayto Date/Time (t):	11/28/17 0:00		
Initial Activity (A_0):	70.69	dpm	
Initial Aliquot:	1	mL	
Initial Conc:	70.69123	dpm/mL	
***Soln. Density:**	1	g/mL	
Nuclide:	U-234		
Half-Life (days):	89668875	decay days	fraction
****Decay Factor:**	1.0000	3530.00	0.00004
Decay Corr Activity:	7.0689E+01	dpm	
Decay Corr Conc:	7.0689E+01	dpm/mL	

Conversion/Calculations

Final Activity Unit:	dpm	
Activity Unit Factor:	1.00000	
Final Volume Unit:	mL	
Volume Unit Factor:	1.000	
Final Concentration:	7.0689E+01	dpm/mL
Aliquot Volume:	1.0000E+00	mL
Final Activity (A):	7.0689E+01	dpm

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:33:28PM 12/15/2017

Sample

Sample Name: Verification 1
SampleType: Sample

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Sample Collection Date:

Batch

Batch Name: U-232_00039
AnalysisID: 717874

Analyst: 60040

Tracer

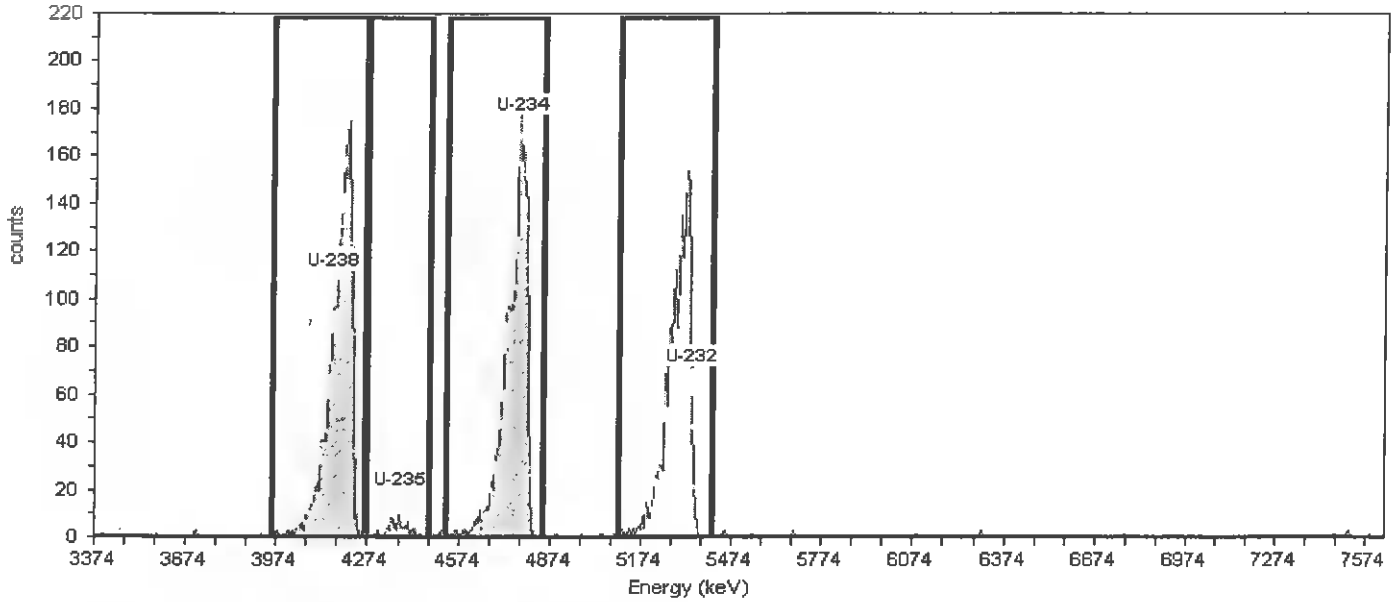
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 90.40%

Acquisition

Detector: AV118
Serial Number: 49-037F4
Acquisition Start Date: 11/28/2017 6:15:19PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:24PM
Background Info: Sample: ICB;AV118; Det: AV118; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9795;AV118-20170802
Calibration Date: 8/2/2017 1:38:49PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch²
Efficiency: 26.06% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	78.5	100.0	1637	0.0000	1637.00	72.382	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	64.9	80.2	56	0.0000	56.00	3.087	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	75.3	99.8	1642	0.0000	1642.00	72.749	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	80.2	100.1	1524	1.0000	1523.00	70.035	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:33:58PM 12/15/2017

Sample

Sample Name: Verification 2
SampleType: Sample

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Sample Collection Date:

Batch

Batch Name: U-232_00039
AnalysisID: 717875

Analyst: 60040

Tracer

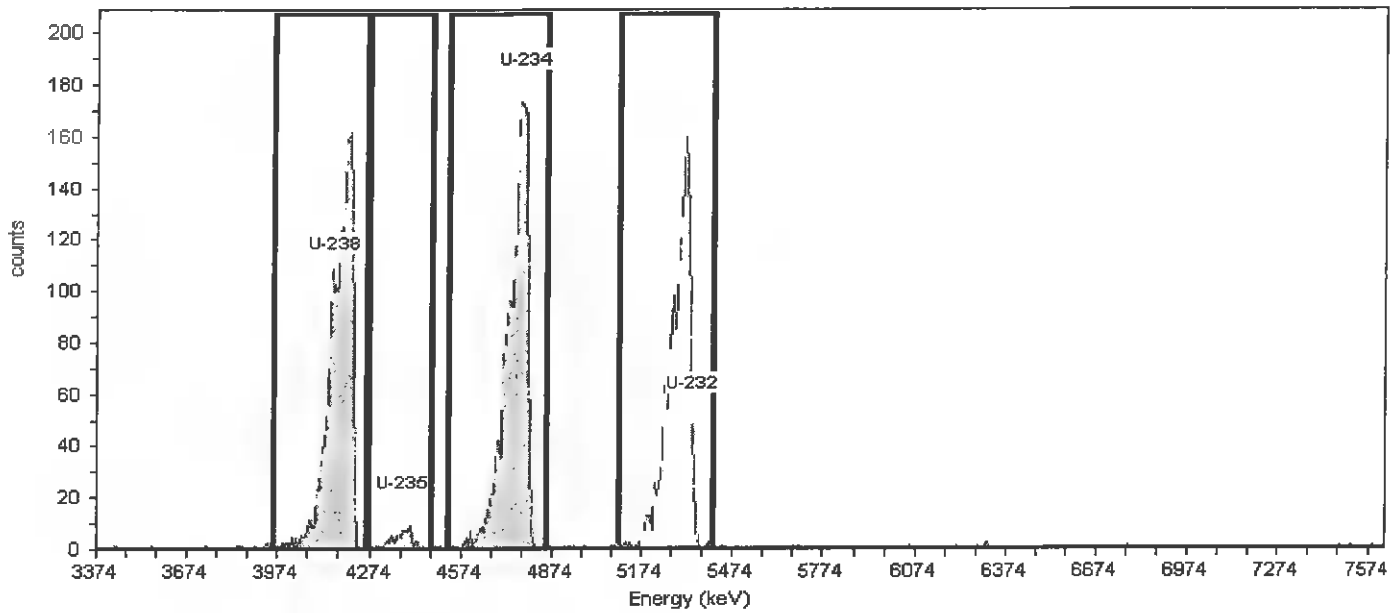
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 99.72%

Acquisition

Detector: AV119
Serial Number: 49-037G6
Acquisition Start Date: 11/28/2017 6:15:20PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:26PM
Background Info: Sample: ICB;AV119; Det: AV119; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9817;AV119-20170802
Calibration Date: 8/2/2017 1:39:16PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 23.42% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	84.0	100.0	1604	0.0000	1604.00	71.534	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	61.4	80.2	69	0.0000	69.00	3.837	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	71.1	99.8	1686	1.0000	1685.00	75.297	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	78.4	100.1	1513	3.0000	1510.00	77.261	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha-Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:34:11PM 12/15/2017

Sample

Sample Name: Verification 3
SampleType: Sample

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Sample Collection Date:

Batch

Batch Name: U-232_00039
AnalysisID: 717876

Analyst: 60040

Tracer

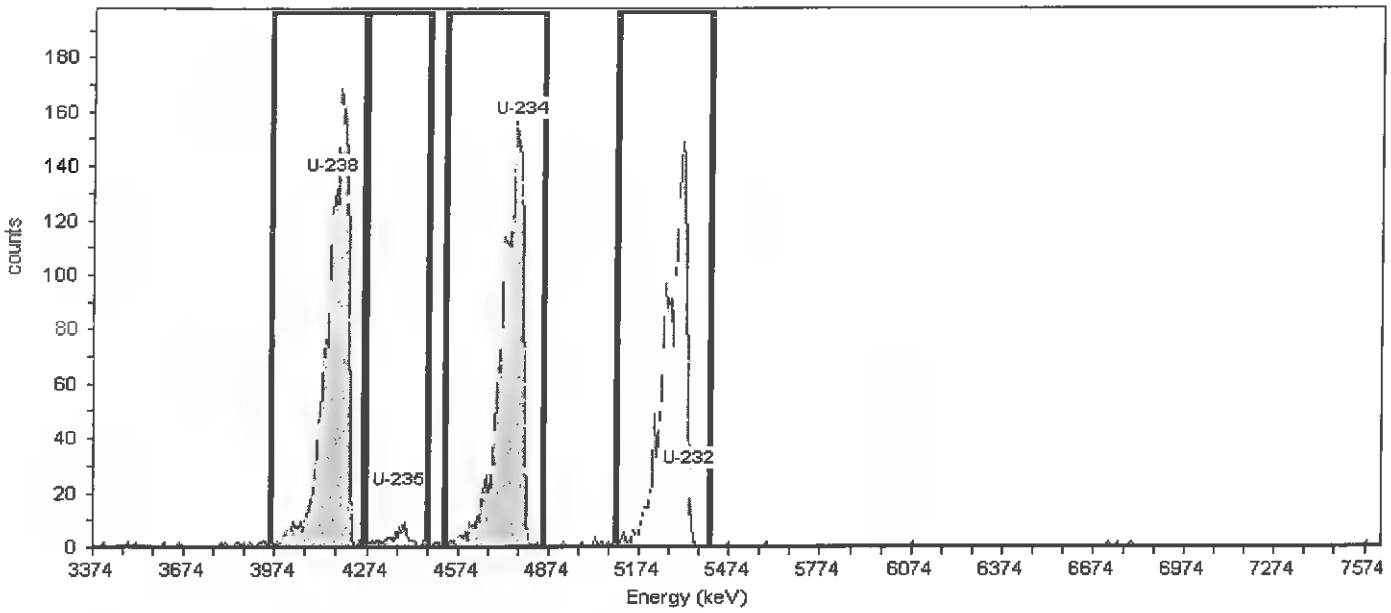
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 104.37%

Acquisition

Detector: AV120
Serial Number: 49-037W3
Acquisition Start Date: 11/28/2017 6:15:21PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:28PM
Background Info: Sample: ICB;AV120; Det: AV120; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9884;AV120-20170802
Calibration Date: 8/2/2017 1:39:29PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.48% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	72.0	100.0	1748	1.0000	1747.00	77.552	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	39.5	80.2	67	0.0000	67.00	3.708	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	80.4	99.8	1651	0.0000	1651.00	73.437	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	89.6	100.1	1519	2.0000	1517.00	80.860	DPM/mL

Ref. 3.30.2008

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

UNAT_00013

Reagent ID: UNAT_00013

Description:	UNAT spike	Expiration Date:	12/22/2017
No. of Bottles:	1	Laboratory:	TestAmerica St. Louis
Storage Location:	RAD Actinide STDs	Prepared By:	Bernsen, Sarah C
Reagent Volume:	200.000 mL	Solvent:	1M HNO3
Creation Date:	11/16/2016	Solvent Lot:	n/a
Open Date:			
Container(s):	1047854		
Comment:	only U-234 and U-238 are controlled as spike analytes, and therefore we have not verified the U-235		

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
U-234	UNAT Parent_00001	12/22/2017	706.91200	dpm/mL	70.69123	dpm/mL
U-235	UNAT Parent_00001	12/22/2017	33.70600	dpm/mL	3.37064	dpm/mL
U-238	UNAT Parent_00001	12/22/2017	722.65000	dpm/mL	72.26499	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
UNAT Parent_00001	UNAT Parent		12/22/17				20.00000	mL

U-232 Tracer Ver.

TESTAMERICA

THE LEADER IN ENVIRONMENTAL TESTING

Aliquot Only

Batch No.

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	Ver 1	0.1	113	DC = 118
2	2	1	116	1 = 119
3	3	1	117	1 = 120
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Balance ID :

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A

Initials / Date

Isotope : UNAT

Std Sol'n No. : UNAT-00013

Vol (mL) : 0.1

Ref Activity (dpm/mL) : 72.2650 (U-238)

Act Ref Date : 3-30-08

New Brunswick

Samples Spiked and Traced By:

SMB 11/22/17

Initials / Date

Verification Signature & Date:

amm 11/22/2017

Initials / Date

LCS Standard ☐ N/A

Initials / Date

Isotope : U-232 Uncert

Std Sol'n ID. : U-232-00039

Vol (mL) : 0.1

Ref Activity (dpm/mL) : 77.476

Act Ref Date : 04-07-03

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐ ST-RC-0003 Rev.	☐ ST-RC-0040 Rev.	☐ ST-RC-0110 Rev.
☐ ST-RC-0004 Rev.	☐ ST-RC-0041 Rev.	☐ ST-RC-0120 Rev.
☐ ST-RC-0014 Rev.	☐ ST-RC-0050 Rev.	☐ ST-RC-0232 Rev.
☐ ST-RC-0020 Rev.	☐ ST-RC-0090 Rev.	☐ ST-RC-0238 Rev.
☐ ST-RC-0021 Rev.	☐ ST-RC-0100 Rev.	☐ ST-RC-0240 Rev.
		☐ ST-RC-0241 Rev.
		☐ ST-RC-0242 Rev.
		☐ ST-RC-5016 Rev.
		☐
		☐

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA ☐	Sr ☐	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14 ☐	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____

Date : _____

Reviewed by: _____

Date: _____

Uranium only via UTEVA

Batch: ST-RC-0236

*All rinses should flow at 1 mL/minute unless 3M HNO_3 may be run at 3 mL/minute)

UTEVA for UTSR17E

11.4.4 UTEVA cartridge

11.4.5 5mL 3M HNO_3 COMPLETED

11.4.6 sample

11.4.7 25mL 3M HNO_3 COMPLETED

11.4.8 5mL 9M HCl COMPLETED

11.4.9 20mL 5M HCl / 0.05M oxalic COMPLETED

11.4.10-11.4.11 Elute into clean tube with 15mL 1M HCl COMPLETED

Form: RAD-0060, Revised 09/17/13

Standard ID Number: UNAT_00013
True Value = 72.265 dpm/mL
Date Analyzed: 11/28/2017

Radionuclide: U-238

	Replicates	
#1	72.382	dpm/mL
#2	71.534	dpm/mL
#3	77.552	dpm/mL

Mean = 73.8226667

1 sigma = 3.25741022 1.96 sigma = 6.384524

True Value minus 5% = 68.65175 (True Value - 5%)
True Value plus 5% = 75.87825 (True Value + 5%)

Accuracy:
Mean value within 5% of Certified (True) Value? Yes **(Acceptance Criteria)**

Precision:
1.96 sigma Value Within 10% of Mean Value? Yes **(Acceptance Criteria)**

Standard Reverification Acceptable? Yes

Note: Criteria for reverification of radiological standards is taken from the DoD/DOE Consolidated QSM and LANL Statements of Work

1st Reviewed By/Date: Rm 12·18·17

2nd Reviewed By/Date: ALD 12/18/17

Decay Calculations

Raw Sample/Standard Information

Initial Date/Time (t_0):	3/30/2008 0:00		
Decayto Date/Time (t):	11/28/17 0:00		
Initial Activity (A_0):	72.26 dpm		
Initial Aliquot:	1 mL		
Initial Conc:	72.26499 dpm/mL		
***Soln. Density:**	1 g/mL		
Nuclide:	U-238		
Half-Life (days):	1.63194E+12	decay days	fraction
****Decay Factor:**	1.0000	3530.00	0.00000
Decay Corr Activity:	7.2265E+01 dpm		
Decay Corr Conc:	7.2265E+01 dpm/mL		

Conversion/Calculations

Final Activity Unit:	dpm
Activity Unit Factor:	1.00000
Final Volume Unit:	mL
Volume Unit Factor:	1.000
Final Concentration:	7.2265E+01 dpm/mL
Aliquot Volume:	1.0000E+00 mL
Final Activity (A):	7.2265E+01 dpm

** Uses basic decay equation: $A = A_0 * \exp(-\ln(2)*(t-t_0)/(\text{half-life})$

* Soln. Density to be used when converting from liquid expressed in mass (g) units to liquid units (mL), and is only applied in that case.

Sample

Sample Name: Verification 1
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232_00039
AnalysisID: 717874

Analyst: 60040

Tracer

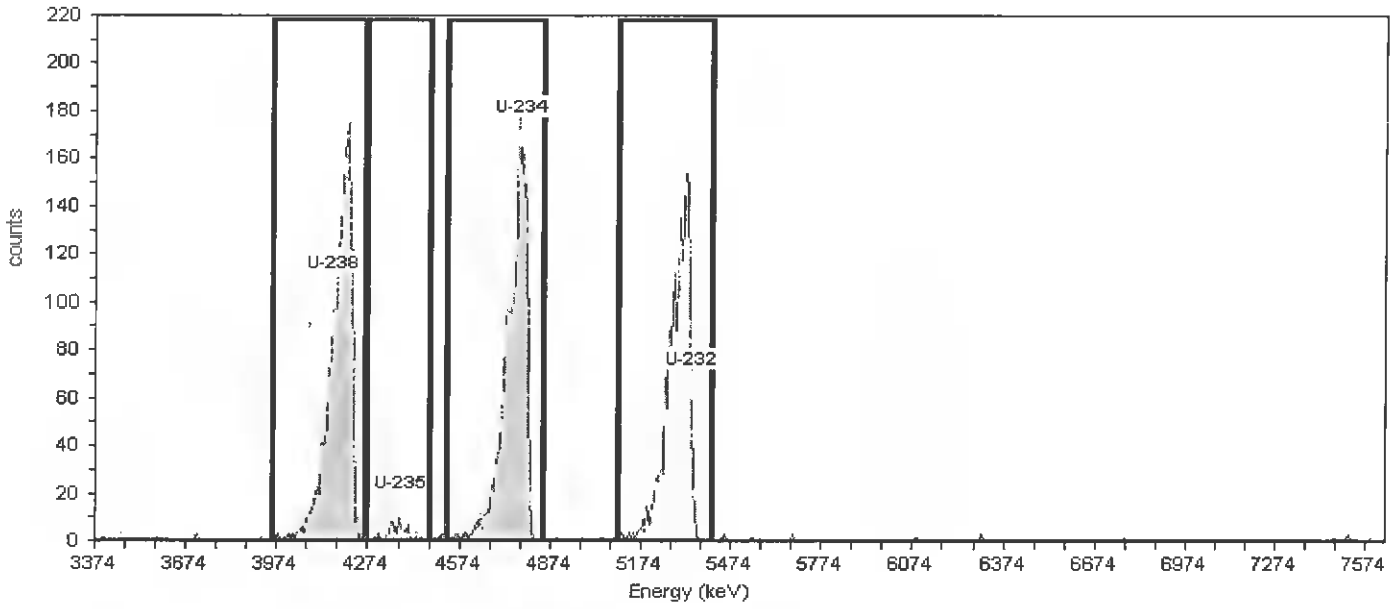
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 90.40%

Acquisition

Detector: AV118
Serial Number: 49-037F4
Acquisition Start Date: 11/28/2017 6:15:19PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:24PM
Background Info: Sample: ICB;AV118; Det: AV118; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9795;AV118-20170802
Calibration Date: 8/2/2017 1:38:49PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 26.06% +/- 0.34% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	78.5	100.0	1637	0.0000	1637.00	72.382	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	64.9	80.2	56	0.0000	56.00	3.087	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	75.3	99.8	1642	0.0000	1642.00	72.749	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	80.2	100.1	1524	1.0000	1523.00	70.035	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:33:58PM 12/15/2017

Sample

Sample Name: Verification 2
SampleType: Sample

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Sample Collection Date:

Batch

Batch Name: U-232_00039
AnalysisID: 717875

Analyst: 60040

Tracer

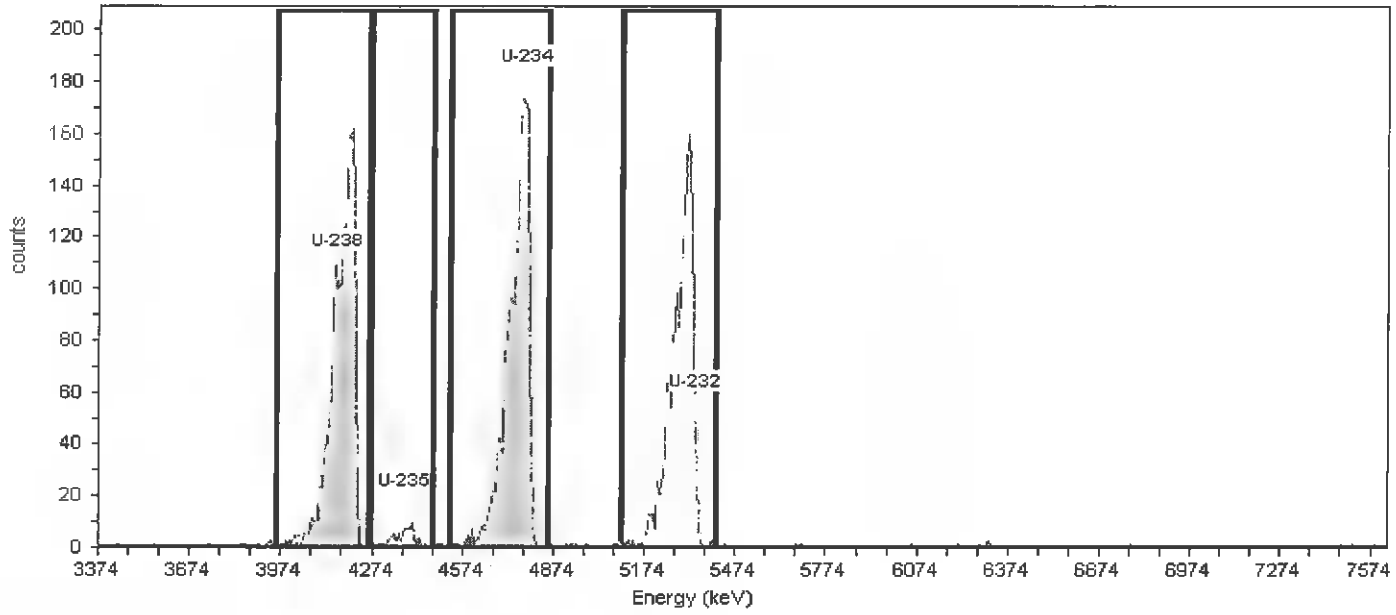
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 99.72%

Acquisition

Detector: AV119
Serial Number: 49-037G6
Acquisition Start Date: 11/28/2017 6:15:20PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:26PM
Background Info: Sample: ICB;AV119; Det: AV119; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9817;AV119-20170802
Calibration Date: 8/2/2017 1:39:16PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 23.42% +/- 0.29% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	84.0	100.0	1604	0.0000	1604.00	71.534	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	61.4	80.2	69	0.0000	69.00	3.837	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	71.1	99.8	1686	1.0000	1685.00	75.297	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	78.4	100.1	1513	3.0000	1510.00	77.261	DPM/mL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Alpha Spectroscopy Analysis Report

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
5:34:11PM 12/15/2017

Sample

Sample Name: Verification 3
SampleType: Sample
:
Sample Collection Date:

Spectrum #1 Analysis #1
Sample Volume : 0.1000mL
Aliquot: N/A Aliquot Fraction: N/A

Batch

Batch Name: U-232_00039
AnalysisID: 717876

Analyst: 60040

Tracer

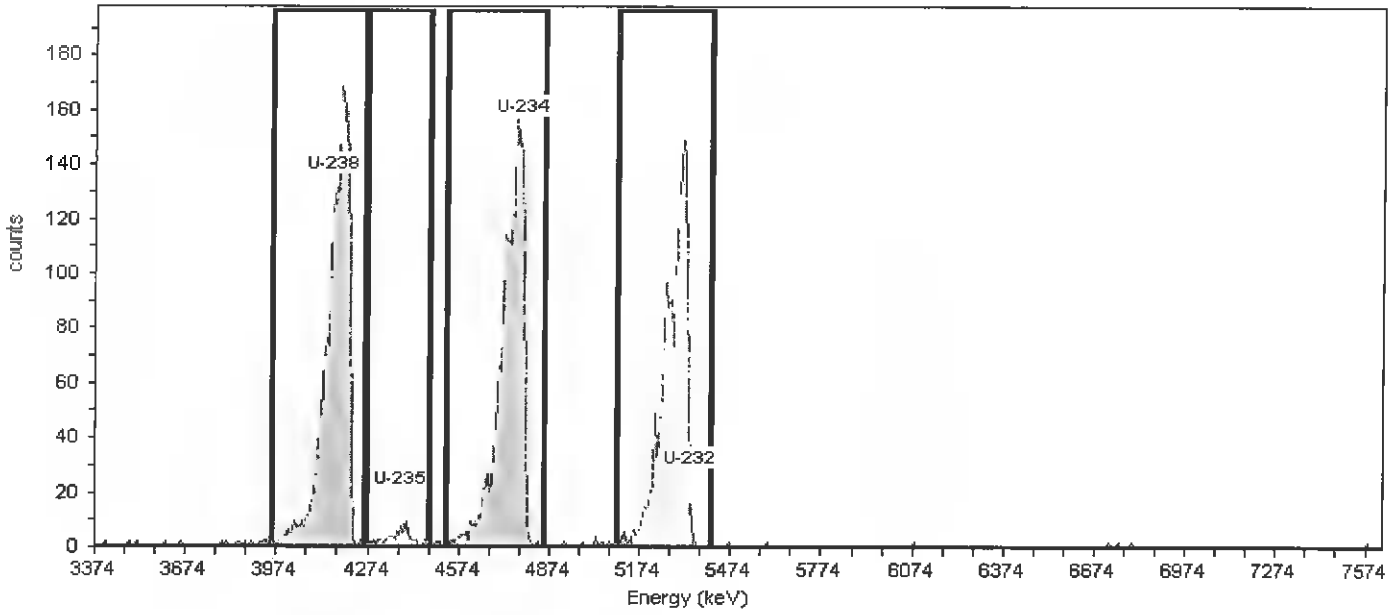
Tracer Name: U-232_00039
Tracer Activity: 77.48 DPM/mL x (Vol.)0.10 mL = 7.75 DPM
Tracer Ref. Date: 4/7/2003 11:00:47PM

Tracer Nuclide: U-232
Tracer Recovery: 104.37%

Acquisition

Detector: AV120
Serial Number: 49-037W3
Acquisition Start Date: 11/28/2017 6:15:21PM
Live Time: 960.00 min.
Real Time: 960.02 min.
Background Date: 11/18/2017 3:51:28PM
Background Info: Sample: ICB;AV120; Det: AV120; Spectrum #1; Nov-18-2017 15:51

Calibration Name: IC-9884;AV120-20170802
Calibration Date: 8/2/2017 1:39:29PM
Energy Cal: Gain = 7.4575 keV / Ch
Offset = 3,366.95 keV
Quadratic = 0.0000 keV / Ch^2
Efficiency: 22.48% +/- 0.33% TPU(2 sigma)



General Analysis

Analysis Method: ROI Analysis, Set Name = UROI
Decay Correction: 11/28/2017 12:43:59PM
MDA Constants: Kα = 1.65 , Kβ = 1.65

Nuclide Library: Uranium
MDA Source: Background

Nuclide Summary (ROI)

Nuclide	Peak Energy keV	Peak Expected keV	Peak Diff keV	ROI Start keV	ROI End keV	FWHM keV	B.R. %	Gross Counts	Bkgd Counts	Net Counts	Activity	Units
U-238	4157.5	4,196.0	-38.5	3956.1	4261.9	72.0	100.0	1748	1.0000	1747.00	77.552	DPM/mL
U-235	4381.2	4,396.0	-14.8	4269.3	4470.7	39.5	80.2	67	0.0000	67.00	3.708	DPM/mL
U-234	4776.4	4,775.8	0.6	4530.3	4851.0	80.4	99.8	1651	0.0000	1651.00	73.437	DPM/mL
U-232	5343.2	5,320.3	22.9	5097.1	5410.3	89.6	100.1	1519	2.0000	1517.00	80.860	DPM/mL

Ref. 3.30.2008

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

UNAT_00013

Reagent ID: UNAT_00013

Description:	UNAT spike	Expiration Date:	12/22/2017
No. of Bottles:	1	Laboratory:	TestAmerica St. Louis
Storage Location:	RAD Actinide STDs	Prepared By:	Bernsen, Sarah C
Reagent Volume:	200.000 mL	Solvent:	1M HNO3
Creation Date:	11/16/2016	Solvent Lot:	n/a
Open Date:			
Container(s):	1047854		
Comment:	only U-234 and U-238 are controlled as spike analytes, and therefore we have not verified the U-235		

Reagent Analyte Information

Analyte	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
U-234	UNAT Parent_00001	12/22/2017	706.91200	dpm/mL	70.69123	dpm/mL
U-235	UNAT Parent_00001	12/22/2017	33.70600	dpm/mL	3.37064	dpm/mL
U-238	UNAT Parent_00001	12/22/2017	722.65000	dpm/mL	72.26499	dpm/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
UNAT Parent_00001	UNAT Parent		12/22/17				20.00000	mL

U-232 Tracer Ver.

Aliquot Only

Batch No. :

Balance ID :

No.	Sample Number	Aliquot (g / mL)	Crucible ID	Dilution
1	Ver 1	0.1		118
2	2	1		119
3	3	1		120
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Note: If a section below is not used, marked the N/A box and initial & date next to the N/A. i.e. Mark the N/A box if a tracer is not added to the sample(s) then initial and date next to the N/A

Tracer ☐ N/A

Initials / Date

Isotope : U-NAT

Std Sol'n No. : U-NAT-00013

Vol (mL) : 0.1

Ref Activity (dpm/mL) : 72.2[illegible] (0.2[illegible])

Act Ref Date : 2-20-08

Non Gaussian

Samples Spiked and Traced By:

SAB 11/22/17

Initials / Date

Verification Signature & Date:

amm 11/22/2017

Initials / Date

LCS Standard ☐ N/A

Initials / Date

Isotope : U-232 Uncert

Std Sol'n ID. : U-232-00039

Vol (mL) : 0.1

Ref Activity (dpm/mL) : 77.47[illegible]

Act Ref Date : 04-07-03

SOP's applied in preparing these samples. Mark box to left for all that apply:

☐	ST-RC-0003 Rev.	☐	ST-RC-0040 Rev.	☐	ST-RC-0110 Rev.
☐	ST-RC-0004 Rev.	☐	ST-RC-0041 Rev.	☐	ST-RC-0120 Rev.
☐	ST-RC-0014 Rev.	☐	ST-RC-0050 Rev.	☐	ST-RC-0232 Rev.
☐	ST-RC-0020 Rev.	☐	ST-RC-0090 Rev.	☐	ST-RC-0238 Rev.
☐	ST-RC-0021 Rev.	☐	ST-RC-0100 Rev.	☐	ST-RC-0240 Rev.
				☐	ST-RC-0241 Rev.
				☐	ST-RC-0242 Rev.
				☐	ST-RC-5016 Rev.
				☐	
				☐	

Isotope(s)

αβ ☐	Iso Pu ☐	Tc-99 ☐	Iso Cm ☐
Iso Am ☐	Ra ☐	Iso Th ☐	Pu-241 ☐
KPA	Sr	Iso U ☐	Th-229 ☐
Np ☐	TAR ☐	C-14	Cl-36 ☐

Count Time	Matrix
Long Count ☐	Soil ☐
Short Count ☐	H_2O ☐

Prepared By : _____

Date : _____

Reviewed by: _____

Date: _____

\\Slsvr01\RAD\MasterForms\RAD-0045 Rev(3)

Uranium only via UTEVA

Batch: ST-RC-0238

*All [illegible] 3 mL/minute)

11.4.4 [illegible]

11.4.5 [illegible] HNO_3

11.4.6 [illegible] sample

11.4.7 25mL 3M HNO_3

11.4.8 5mL 9M HCl — COMPLETED

11.4.9 20mL 5M HCl / 0.05M oxalic

11.4.10-11.4.11 Elute into clean tube with 15mL 1M HCl

Form: RAD-0060, Revised 09/17/13

Reagent

1000 As_00020

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fax: 540.585.3012
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CERTIFICATE OF ANALYSIS

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01 ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Single Analyte Custom Grade Solution
Catalog Number:	CGMO1
Lot Number:	M2-MO657085
Matrix:	H2O tr. NH4OH
Value / Analyte(s):	1 000 µg/mL ea: Molybdenum
Starting Material:	Ammonium Molybdate
Starting Material Lot#:	2052
Starting Material Purity:	99.9933%

4938583
ID: 1000 Mo_00013
Exp: 04/06/21 Prpd: SJS
1000 Mo IV

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 1003 ± 6 µg/mL

Density: 1.000 g/mL (measured at 20 ± 4 °C)

Assay Information:

Assay Method #1 **1005 ± 3 µg/mL**
ICP Assay NIST SRM 3134 Lot Number: 130418

Assay Method #2 **1000 ± 4 µg/mL**
Calculated NIST SRM Lot Number: See Sec. 4.2

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{½}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2 (u_{char\ a})^2 + (w_b)^2 (u_{char\ b})^2]^{½}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{½}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

M	Ag	<	0.000601	M	Eu	<	0.000301	O	Na	<	0.010370	M	Se	<	0.005110	M	Zn	<	0.111820
M	Al		0.000977	M	Fe		0.000545	M	Nb	<	0.028857	i	Si	<	0.000001	M	Zr	<	0.000301
M	As		0.006654	M	Ga	<	0.001202	i	Nd	<	0.000001	M	Sm	<	0.001202				
M	Au	<	0.001512	M	Gd	<	0.000301	M	Ni	<	0.009619	M	Sn		0.000453				
M	B	<	0.004208	M	Ge	<	0.001202	M	Os	<	0.000302	M	Sr		0.000082				
O	Ba		0.000426	M	Hf	<	0.000301	i	P	<	0.000001	M	Ta	<	0.000301				
M	Be	<	0.001503	M	Hg	<	0.002117	M	Pb	<	0.001202	M	Tb	<	0.000301				
M	Bi	<	0.000301	M	Ho	<	0.000301	M	Pd	<	0.013911	i	Te	<	0.000001				
O	Ca		0.003293	M	In	<	0.037273	M	Pr		0.002057	M	Th	<	0.001202				
O	Cd	<	0.007835	M	Ir	<	0.000302	M	Pt	<	0.025851	O	Ti	<	0.010370				
M	Ce	<	0.030059	M	K		0.012847	M	Rb	<	0.004208	M	Tl		0.000113				
M	Co	<	0.010821	M	La	<	0.000301	M	Re		0.009268	M	Tm	<	0.000301				
M	Cr		0.004042	O	Li		0.000071	M	Rh	<	0.000301	M	U	<	0.000601				
M	Cs	<	0.002405	M	Lu	<	0.000301	M	Ru	<	0.008116	M	V	<	0.006012				
M	Cu	<	0.012024	O	Mg		0.000071	i	S	<	0.000001	M	W		0.102858				
M	Dy	<	0.001202	M	Mn	<	0.015631	M	Sb	<	0.024047	M	Y	<	0.000301				
M	Er	<	0.000301	s	Mo	<		M	Sc	<	0.003006	M	Yb	<	0.000301				

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

April 06, 2017

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- April 06, 2021

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Donna Senn
Product Documentation Technician

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Revision 1: Added 30 mL statement. 101717JB

M - Checked by ICP-MS O - Checked by ICP-OES i - Spectral Interference
n - Not Checked For s - Solution Standard Element

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 95.94 +6 6,7,8,9 [MoO4] -2(chemical form as received)
Chemical Compatibility -Mo is received in a NH4OH matrix giving the operator the option of using HCl or HF to stabilize acidic solutions. The [MoO4]-2 is soluble in concentrated HCl [MoOCl5]-2, dilute HF / HNO3 [MoOF5] -2 and basic media [MoO4]-2. Stable at ppm levels with some metals provided it is fluorinated. Do not mix with Alkaline or Rare Earths when HF is present. Stable with most inorganic anions provided it is in the [MoO4]-2 chemical form.
Stability - 2-100 ppb levels stable (alone or mixed with all other metals that are at comparable levels) as the [MoOF5]-2 for months in 1% HNO3 / LDPE container. 1-10,000 ppm single element solutions as the [MoO4] -2 chemically stable for years in 1% NH4OH in a LDPE container.
Mo Containing Samples (Preparation and Solution) -Metal (Soluble in HF / HNO3 or hot dilute HCl); Oxide (soluble in HF or NH4OH) ; Organic Matrices (Dry ash at 450EC in Pt0 and dissolve oxide with HF or HCl).
Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	**Estimated D.L.**	**Order**	**Interferences** (underlined indicates severe)
ICP-MS 95 amu	3 ppt	n/a	40Ar39K16O,79Br1 6O,190Os2+,190Pt 2+
ICP-OES 202.030 nm	0.008 / 0.0002 µg/mL	1	Os, Hf
ICP-OES 203.844 nm	0.012 / 0.002 µg/mL	1	
ICP-OES 204.598 nm	0.012 / 0.001 µg/mL	1	Ir, Ta

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

April 06, 2017

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- April 06, 2021

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Donna Senn
Product Documentation Technician

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Revision 1: Added 30 mL statement. 101717JB

Reagent

1000 Pb_00023

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

April 10, 2017

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- April 10, 2021

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Donna Senn
Product Documentation Technician

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Revision 1: Added 30 mL statements. 100617JB.

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CERTIFICATE OF ANALYSIS

1.0 ACCREDITATION / REGISTRATION

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ACCREDITED Testing Laboratory Certificate 883.01 — ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Single Analyte Custom Grade Solution
Catalog Number:	CGPB1
Lot Number:	M2-PB656988
Matrix:	0.5% (v/v) HNO3
Value / Analyte(s):	1 000 µg/mL ea: Lead
Starting Material:	Lead Nitrate
Starting Material Lot#:	1985
Starting Material Purity:	99.9987%

4907263
ID: 1000 Pb_00023
Exp: 04/10/21 Prpd: S/S
1000 Pb IV

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 999 ± 3 µg/mL

Density: 1.002 g/mL (measured at 20 ± 4 °C)

Assay Information:

Assay Method #1 **1001 ± 3 µg/mL**
EDTA NIST SRM 928 Lot Number: 928

Assay Method #2 **998 ± 3 µg/mL**
ICP Assay NIST SRM 3128 Lot Number: 101026

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{½}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\,(u_{char\ a})^2 + (w_b)^2\,(u_{char\ b})^2]^{½}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{½}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

M	Ag	<	0.000300	M	Eu	<	0.000300	O	Na		0.000381	M	Se	<	0.002403	M	Zn		0.001443
M	Al		0.007256	O	Fe		0.000809	M	Nb	<	0.000300	O	Si		0.002695	M	Zr	<	0.000601
M	As	<	0.000300	M	Ga	<	0.000300	M	Nd	<	0.000300	M	Sm	<	0.002403				
M	Au	<	0.000897	M	Gd		0.000343	O	Ni	<	0.002756	M	Sn	<	0.001803				
O	B	<	0.002808	M	Ge	<	0.000601	M	Os	<	0.000299	O	Sr		0.000038				
M	Ba		0.000675	M	Hf	<	0.000300	O	P	<	0.041600	M	Ta	<	0.000300				
O	Be	<	0.000232	M	Hg	<	0.000299	s	Pb	<		M	Tb	<	0.000300				
O	Bi		0.004312	M	Ho	<	0.000300	M	Pd	<	0.000300	M	Te	<	0.006609				
O	Ca		0.001941	M	In	<	0.000300	M	Pr	<	0.000300	M	Th	<	0.000300				
O	Cd		0.000027	M	Ir	<	0.000299	M	Pt	<	0.000300	M	Ti		0.000156				
M	Ce	<	0.000300	O	K		0.001290	M	Rb	<	0.001202	M	Tl	<	0.006009				
M	Co	<	0.000601	M	La	<	0.000300	M	Re	<	0.000300	M	Tm	<	0.000300				
M	Cr		0.000073	O	Li		0.000045	O	Rh	<	0.009048	M	U	<	0.000300				
M	Cs	<	0.003004	M	Lu	<	0.000601	M	Ru	<	0.000299	M	V	<	0.000300				
O	Cu	<	0.002080	O	Mg		0.000169	O	S	<	0.031200	M	W	<	0.000601				
M	Dy	<	0.000601	M	Mn	<	0.000601	M	Sb	<	0.000300	M	Y	<	0.000300				
M	Er	<	0.000300	M	Mo	<	0.000300	O	Sc	<	0.000504	M	Yb	<	0.000300				

M - Checked by ICP-MS O - Checked by ICP-OES i - Spectral Interference
n - Not Checked For s - Solution Standard Element

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 207.20 +2 6 Pb(H2O)6+2
Chemical Compatibility - Soluble in HCl, HF and HNO3. Avoid H2SO4. Stable with most metals and inorganic anions forming insoluble carbonate, borate, sulfate, sulfite, sulfide, phosphate, oxalate, chromate, tannate, iodate, and cyanide in neutral aqueous media.
Stability - 2-100 ppb levels stable for months in 1% HNO3 / LDPE container. 1-10,000 ppm solutions chemically stable for years in 2-5% HNO3 / LDPE container.
Pb Containing Samples (Preparation and Solution) -Metal (Best dissolved in 1:1 H2O / HNO3); Oxides (The many different Pb oxides are soluble in HNO3 with the exception of PbO2 which is soluble in HCl or HF); Ores and Alloys (Best attacked using 1:1 H2O / HNO3); Organic Matrices (Dry ash and dissolve in dilute HCl).
Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe)
ICP-MS 208 amu	5 ppt	n/a	192Pt16O, 192Os16O
ICP-OES 168.215 nm	0.03 / 0.003 µg/mL	1	Co
ICP-OES 217.000 nm	0.09 / 0.03 µg/mL	1	W, Ir, Hf, Sb, Th
ICP-OES 220.353 nm	0.04 / 0.006 µg/mL	1	Bi, Nb

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

Reagent

1000 Se_00018

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

March 30, 2017

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **March 30, 2021**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year from the date of removal from the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being handled and stored in accordance with the instructions given in Sec 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Donna Senn
Product Documentation Technician

Donna Senn

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Michael J Booth

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Paul R Gaines

INORGANIC VENTURES
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CERTIFICATE OF ANALYSIS

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01
ACCREDITED Reference Material Producer Certificate 883.02

4687890
ID: 1000 Se_00018
Exp: 03/30/21 Prpd: SJS
1000 Se IV

2.0 PRODUCT DESCRIPTION

Product Code:	Single Analyte Custom Grade Solution
Catalog Number:	CGSE(4)1
Lot Number:	M2-SE02058R
Matrix:	2% (v/v) HNO3
Value / Analyte(s):	1 000 µg/mL ea: Selenium
Starting Material:	Se Shot
Starting Material Lot#:	1616
Starting Material Purity:	99.9995%

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 1002 ± 4 µg/mL
Certified Density: 1.011 g/mL (measured at 20 ± 1 °C)

Assay Information:

Assay Method #1 **1004 ± 4 µg/mL**
ICP Assay NIST SRM 3149 Lot Number: 100901

Assay Method #2 **1000 ± 5 µg/mL**
Calculated NIST SRM Lot Number: See Sec. 4.2

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\,(u_{char\ a})^2 + (w_b)^2\,(u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

M	Ag		0.000353	M	Eu	<	0.000370	O	Na		0.002152	s	Se	<		O	Zn		0.000073
O	Al	<	0.005555	O	Fe		0.000209	O	Nb	<	0.001667	O	Si		0.000530	O	Zr	<	0.001111
O	As	<	0.005555	M	Ga	<	0.000370	M	Nd	<	0.000370	M	Sm	<	0.000370				
M	Au	<	0.000370	M	Gd	<	0.000370	O	Ni	<	0.003333	O	Sn	<	0.003333				
M	B	<	0.007405	M	Ge	<	0.001851	n	Os	<		O	Sr	<	0.000078				
O	Ba	<	0.000333	M	Hf	<	0.001851	O	P	<	0.002222	M	Ta	<	0.001851				
O	Be	<	0.000100	O	Hg	<	0.002222	M	Pb	<	0.007405	M	Tb	<	0.000370				
O	Bi	<	0.006666	M	Ho	<	0.000370	M	Pd	<	0.003703	M	Te	<	0.037027				
O	Ca		0.000497	M	In	<	0.003703	M	Pr	<	0.000370	M	Th	<	0.003703				
O	Cd	<	0.000444	M	Ir	<	0.003703	M	Pt	<	0.007405	O	Ti	<	0.000444				
M	Ce	<	0.000370	O	K		0.000397	M	Rb	<	0.001111	M	Tl	<	0.000370				
O	Co	<	0.000889	M	La	<	0.000370	M	Re	<	0.000370	M	Tm	<	0.000370				
O	Cr	<	0.001667	O	Li	<	0.000067	M	Rh	<	0.000370	M	U	<	0.000370				
M	Cs	<	0.000370	M	Lu	<	0.000370	M	Ru	<	0.001851	M	V	<	0.000370				
O	Cu		0.000927	O	Mg		0.000073	O	S	<	0.007777	O	W	<	0.003333				
M	Dy	<	0.000370	O	Mn	<	0.000222	M	Sb	<	0.011108	M	Y	<	0.000370				
M	Er	<	0.000370	O	Mo	<	0.000556	O	Sc	<	0.000333	M	Yb	<	0.000370				

M - Checked by ICP-MS O - Checked by ICP-OES i - Spectral Interference
n - Not Checked For s - Solution Standard Element

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag keep cap tightly sealed when not in use. Store and use at 20° ± 4° C. Do not pippette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 78.96 +4 6 H2SeO3
Chemical Compatibility -Soluble in HCl, HNO3,H3PO4, H2SO4 and HF aqueous matrices and water. It is stable with most inorganic anions but many cationic metals form the insoluble selenites under pH neutral conditions. When fluorinated and/or under acidic conditions precipitation is typically not a problem at moderate to low concentrations.
Stability - 2-100 ppb levels stable for months alone or mixed with other elements at equivalent levels in 1% HNO3 / LDPE container. 1-10,000 ppm solutions chemically stable for years in 1-5% HNO3 / LDPE container.
Se Containing Samples (Preparation and Solution) -Metal (soluble in HNO3); Oxides (readily soluble in water); Minerals and alloys (acid digestion with HNO3or HNO3 / HF); Organic Matrices (acid digestion with hot concentrated H2SO4 accompanied by the careful dropwise addition of H2O2 until clear).
Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	**Estimated D.L.**	**Order**	**Interferences** (underlined indicates severe)
ICP-MS 82 amu	200 ppt	N/A	12C35Cl2
ICP-OES 196.026 nm	0.08/0.006 µg/mL	1	Fe
ICP-OES 203.985 nm	0.2/0.05 µg/mL	1	Sb, Ir, Cr, Ta
ICP-OES 206.279 nm	0.3/0.16 µg/mL	1	Cr, Pt

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

Reagent

1000 Zr_00016

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CERTIFICATE OF ANALYSIS

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1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 863.01
ACCREDITED Reference Material Producer Certificate 863.02

2.0 PRODUCT DESCRIPTION

4292765
ID: 1000 Zr_00016
Exp: 05/13/16 Prpd: SJS
1000 Zr IV

Product Code:	Single Analyte Custom Grade Solution
Catalog Number:	CGZR1
Lot Number:	K2-ZR01116
Matrix:	tr. HF
Value / Analyte(s):	1 000 µg/mL ea: Zirconium
Starting Material:	ZrO2
Starting Material Lot#:	1842
Starting Material Purity:	99.9913%

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 999 ± 5 µg/mL

Certified Density: 1.000 g/mL (measured at 20 ± 1 °C)

Assay Information:

Assay Method #1 **1000 ± 3 µg/mL**
ICP Assay NIST SRM 3169 Lot Number: 130920

Assay Method #2 **999 ± 4 µg/mL**
Calculated NIST SRM Lot Number: See Sec. 4.2

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods

Characterization of CRM by one method

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\,(u_{char\ a})^2 + (w_b)^2\,(u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-FIlter is 99.9985% efficient for the removal of particles down to 0.3 µm.

n	Ag	<		M	Eu	<	0.000247	O	Na	<	0.314400	M	Se	<	0.494400	O	Zn		0.000103
O	Al	<	0.073360	O	Fe		0.004483	O	Nb	<	0.104800	O	Si	<	0.104800	s	Zr	<	
M	As	<	0.012360	M	Ga	<	0.001236	M	Nd	<	0.000742	M	Sm	<	0.007416				
M	Au	<	0.012360	M	Gd	<	0.000247	O	Ni	<	0.003144	M	Sn	<	0.024720				
M	B	<	0.009888	M	Ge	<	0.000742	n	Os	<		M	Sr		0.000296				
M	Ba	<	0.007416	O	Hf		0.010760	O	P	<	0.052400	O	Ta	<	0.104800				
M	Be	<	0.000247	O	Hg	<	0.001048	M	Pb		0.000317	M	Tb	<	0.000247				
M	Bi	<	0.017304	M	Ho	<	0.000247	M	Pd	<	0.024720	M	Te	<	0.247200				
O	Ca	<	0.104800	M	In	<	0.002472	M	Pr	<	0.000247	M	Th	<	0.012360				
O	Cd		0.059178	M	Ir	<	0.012360	M	Pt	<	0.024720	M	Ti	<	0.017304				
M	Ce	<	0.002472	O	K	<	0.157200	M	Rb	<	0.002472	M	Tl	<	0.000247				
M	Co	<	0.002472	M	La	<	0.000247	M	Re	<	0.000247	M	Tm	<	0.000247				
O	Cr	<	0.010480	M	Li	<	0.009888	M	Rh	<	0.000247	M	U	<	0.001236				
M	Cs	<	0.012360	M	Lu	<	0.000247	M	Ru	<	0.000247	M	V	<	0.019776				
O	Cu		0.002242	O	Mg		0.000112	O	S		0.044831	M	W	<	0.024720				
M	Dy	<	0.000247	M	Mn	<	0.012360	M	Sb	<	0.002472	M	Y	<	0.000247				
M	Er	<	0.000247	O	Mo		0.001659	O	Sc	<	0.002096	M	Yb	<	0.000247				

M - Checked by ICP-MS O - Checked by ICP-OES i - Spectral Interference
n - Not Checked For s - Solution Standard Element

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag keep cap tightly sealed when not in use. Store and use at 20° ± 4° C. Do not pippette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 91.22 +4 6,7,8 Zr(F)6-2
Chemical Compatibility -Soluble in concentrated HCl, HF, H2SO4 (very hot) and HNO3. Avoid H3PO4and neutral to basic media. Unstable at ppm levels with metals that would pull F- away (i.e. Do not mix with Alkaline or Rare Earths or high levels of transition elements unless they are fluorinated). Stable with most inorganic anions but precipitation with phosphate, oxalate, and tartrate with a tendency to hydrolyze forming the hydrated oxide in all dilute acids except HF.
Stability - 2-100 ppb levels stable (alone or mixed with all other metals that are at comparable levels) as the Zr(F)6-2 + Zr(OH)4F2-2 for months in 1% HNO3 / LDPE container. 1-10,000 ppm single element solutions as the Zr(F)6-2 chemically stable for years in 2-5% HNO3 / trace HF in a LDPE container.
Zr Containing Samples (Preparation and Solution) -Metal (Soluble in H2O / HF / HNO3); Oxide unlike TiO2 the ZrO2 is best fused in one of the following ways (Na2O2 in Ni0, Na2CO3 in Pt0 or Borax in Pt0); Organic Matrices (dry ash at 450 0C in Pt0 and dissolve by fusing with Na2CO3 and dissolving in HF / HNO3 / H2O).
Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	**Estimated D.L.**	**Order**	**Interferences** (underlined indicates severe)
ICP-MS 90 amu	2 ppt	N/A	74Ge16O, 74Se16O, [180X+2 (where X = Hf, Ta, W)]
ICP-OES 272.261 nm	0.018/0.001 µg/mL	1	Cr, V, Th, W
ICP-OES 339.198 nm	0.008/0.0007 µg/mL	1	Th, Mo
ICP-OES 343.823 nm	0.007/0.0004 µg/mL	1	Hf, Nb

HF Note: This standard should not be prepared or stored in glass.

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

May 13, 2016

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- May 13, 2020

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year from the date of removal from the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being handled and stored in accordance with the instructions given in Sec 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Donna Senn
Product Documentation Technician

Donna Senn

Certificate Approved By:

Michael Booth
QC Supervisor

Michael J Booth

Certifying Officer:

Paul Gaines
PhD., Senior Technical Director

Paul R Gaines

Reagent

10000 Si_00014

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CERTIFICATE OF ANALYSIS

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (SAI Global File Number 010105).

ACCREDITED Testing Laboratory Certificate 885.01

ACCREDITED Reference Material Producer Certificate 863.02

2.0 PRODUCT DESCRIPTION

Product Code:	Single Analyte Custom Grade Solution
Catalog Number:	CGSI10
Lot Number:	K2-SI03060
Matrix:	1% (v/v) HNO3 1.4% (v/v) HF
Value / Analyte(s):	10 000 µg/mL ea: Silicon
Starting Material:	Fumed Silica
Starting Material Lot#:	1771
Starting Material Purity:	99.9929%

4060918
ID: 10000 SI_00014
Exp: 04/16/16 Prpd: SJS
10000 SI IV

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 10 012 ± 55 µg/mL

Certified Density: 1.045 g/mL (measured at 20 ± 1 °C)

Assay Information:

Assay Method #1 **10 012 ± 46 µg/mL**
ICP Assay NIST SRM 3150 Lot Number: 130912

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / \{(1/u_{char\ a})^2 + (1/u_{char\ b})^2)\}$

$w_b = (1/u_{char\ b})^2 / \{(1/u_{char\ a})^2 + (1/u_{char\ b})^2)\}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{sts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2 (u_{char\ a})^2 + (w_b)^2 (u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{sts} = short term stability standard uncertainty (transportation)

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{sts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{sts} = short term stability standard uncertainty (transportation)

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-FIlter is 99.9985% efficient for the removal of particles down to 0.3 µm.

M	Ag	<	0.000703	M	Eu	<	0.000351	O	Na		0.008156	M	Se	<	0.008447	O	Zn	<	0.023040
O	Al		0.041068	M	Fe		0.019299	O	Nb	<	0.005760	s	Si	<		O	Zr	<	0.000806
M	As	<	0.035197	M	Ga	<	0.000351	M	Nd	<	0.000351	M	Sm	<	0.000351				
M	Au	<	0.000703	M	Gd	<	0.000351	M	Ni	<	0.001055	M	Sn	<	0.001055				
O	B		0.114646	M	Ge	<	0.000703	M	Os	<	0.000351	O	Sr	<	0.000138				
O	Ba		0.000676	M	Hf	<	0.002111	O	P	<	0.115200	M	Ta		0.002951				
O	Be	<	0.000036	M	Hg	<	0.001406	M	Pb	<	0.002815	M	Tb	<	0.000351				
M	Bi	<	0.000351	M	Ho	<	0.000351	M	Pd	<	0.000351	M	Te	<	0.010559				
O	Ca		0.004976	M	In	<	0.000351	M	Pr	<	0.000351	M	Th	<	0.000351				
M	Cd	<	0.000351	M	Ir	<	0.000351	M	Pt	<	0.000351	O	Ti		0.002759				
M	Ce	<	0.000351	O	K		0.001857	M	Rb	<	0.007039	M	Tl	<	0.000351				
M	Co	<	0.000351	M	La	<	0.000351	M	Re	<	0.000351	M	Tm	<	0.000351				
M	Cr	<	0.005631	O	Li	<	0.000029	M	Rh	<	0.000351	M	U	<	0.000351				
M	Cs	<	0.000351	M	Lu	<	0.000351	M	Ru	<	0.000351	O	V	<	0.001728				
M	Cu	<	0.004223	O	Mg		0.001645	O	S		1.529492	M	W	<	0.000351				
M	Dy	<	0.000351	M	Mn	<	0.003519	M	Sb	<	0.002111	M	Y	<	0.000351				
M	Er	<	0.000351	M	Mo	<	0.004927	O	Sc	<	0.000039	M	Yb	<	0.000351				

M - Checked by ICP-MS O - Checked by ICP-OES i - Spectral Interference
n - Not Checked For s - Solution Standard Element

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag keep cap tightly sealed when not in use. Store and use at 20° ± 4° C. Do not pippette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 28.09 +4 6 Si(OH)x(F)y2-
Chemical Compatibility -Soluble in HCl, HF, H3PO4 H2SO4 and HNO3 as the Si(OH)x(F)y2-. Avoid neutral to basic media. Unstable at ppm levels with metals that would pull F- away (i.e. Do not mix with Alkaline or Rare Earths, or high levels of transition elements unless they are fluorinated. Stable with most inorganic anions with a tendency to hydrolyze forming silicic acid (silicic acid is soluble up to ∼100 ppm in water) in all dilute acids except HF.
Stability - 2-100 ppb levels - stability unknown - (alone or mixed with all other metals) as the Si(OH)x(F)y2-. 1-10,000 ppm single element solutions as the Si(OH)x(F)y2- chemically stable for years in 2-5 % HNO3 / trace HF in a LDPE container.
Si Containing Samples (Preparation and Solution) -Metal (Soluble in 1:1:1 H2O / HF / HNO3); Oxide - SiO2, amorphic (dissolve by heating in 1:1:1 H2O / HF / HNO3); Oxide - quartz (fuse in Pt0 with Na2CO3); Geological Samples(fuse in Pt0with Na2CO3 followed by HCl solution of the fuseate); Organic Matrices containing silicates and non volatile silicon compounds (dry ash at 4500C in Pt0 and dissolve by gently warming with 1:1:1 H2O / HF / H2SO4 or fuse / ash with Na2CO3 and dissolve fuseate with HCl / H2O); Silicone Oils - dimethyl silicones depolymerize to form volatile monomer units when heated (Measure directly in alcoholic KOH / xylene mixture where sample is treated first with the KOH at 60-1000C to "unzip" the Si-O-Si polymeric structure or digest with conc. H2SO4 / H2O2 followed by cooling and dissolution of the dehydrated silica with HF.) Note that the direct analysis of silicone oils in an organic solvent will result in false high results due to high vapor pressure of volatile monomer units like hexamethylcyclotrisiloxane. The KOH forms the K2+Si(CH3)2O= salt which is not volatile at room temperature.
Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	**Estimated D.L.**	**Order**	**Interferences** (underlined indicates severe)
ICP-MS 28 amu	4000 - 8000 ppt	N/A	N2, 12C16O
ICP-OES 212.412 nm	0.02/0.01 µg/mL	1	Hf, Os, Mo, Ta
ICP-OES 251.611 nm	0.012/0.003 µg/mL	1	Ta, U, Zn, Th
ICP-OES 288.158 nm	0.03/0.004 µg/mL	1	Ta, Ce, Cr, Cd, Th

HF Note: This standard should not be prepared or stored in glass.

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- SAI Global File Number 010105

10.4 ISO/IEC Guide 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

April 18, 2016

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- April 18, 2020

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year from the date of removal from the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being handled and stored in accordance with the instructions given in Sec 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Brenda Francis
Product Documentation Technician

Certificate Approved By:

Michael Booth
QC Supervisor

Certifying Officer:

Paul Gaines
PhD., Senior Technical Director

Reagent

10000 Th_00017

INORGANIC VENTURES

CERTIFICATE OF ANALYSIS

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 880.01 ACCREDITED Reference Material Producer Certificate 880.02

2.0 PRODUCT DESCRIPTION

Product Code:	Single Analyte Custom Grade Solution
Catalog Number:	CGTH10
Lot Number:	K2-TH01117
Matrix:	5% (v/v) HNO3
Value / Analyte(s):	10 000 µg/mL ea: Thorium
Starting Material:	Thorium Nitrate
Starting Material Lot#:	1803
Starting Material Purity:	99.9787%

4902227
ID: 10000 Th_00017
Exp: 05/19/20 Prpd: SJS
10,000 Th Inorganic Vent

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 10 014 ± 36 µg/mL

Certified Density: 1.042 g/mL (measured at 20 ± 1 °C)

Assay Information:

Assay Method #1	**10021 ± 26 µg/mL** EDTA NIST SRM 928 Lot Number: 928
Assay Method #2	**9999 ± 39 µg/mL** Calculated NIST SRM Lot Number: See Sec. 4.2

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods

Characterization of CRM by one method

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\,(u_{char\ a})^2 + (w_b)^2\,(u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

M	Ag	<	0.000583	M	Eu	<	0.000194	O	Na		1.616495	M	Se	<	0.003303	M	Zn	<	0.009716
M	Al		0.022525	O	Fe		0.975471	M	Nb	<	0.001166	I	Si	<		M	Zr		0.167606
M	As	<	0.001749	M	Ga	<	0.000777	M	Nd		0.006757	M	Sm		0.002252				
M	Au	<	0.001343	M	Gd		0.001023	M	Ni		0.157368	M	Sn	<	0.000388				
M	B	<	0.008356	M	Ge	<	0.000971	M	Os	<	0.004222	M	Sr		0.006040				
M	Ba		0.001126	M	Hf	<	0.000777	I	P	<		M	Ta	<	0.000194				
M	Be	<	0.000388	M	Hg	<	0.000383	M	Pb		0.003685	M	Tb	<	0.000388				
M	Bi	<	0.000194	M	Ho	<	0.000194	M	Pd	<	0.000777	M	Te	<	0.058300				
O	Ca		0.958748	M	In	<	0.000777	M	Pr		0.001740	S	Th	<					
M	Cd	<	0.000194	M	Ir	<	0.000191	M	Pt	<	0.000388	M	Ti	<	0.034980				
M	Ce		0.018634	M	K		0.134740	M	Rb	<	0.001360	M	Tl	<	0.000194				
M	Co		0.002662	M	La		0.005528	M	Re	<	0.000194	M	Tm	<	0.000194				
M	Cr		0.309617	M	Li	<	0.000388	M	Rh	<	0.000194	M	U		0.470466				
M	Cs		0.002866	M	Lu	<	0.000194	M	Ru	<	0.000191	M	V	<	0.004081				
M	Cu		0.012388	O	Mg		0.445929	I	S	<		M	W	<	0.001943				
M	Dy	<	0.001554	M	Mn		0.022013	M	Sb	<	0.000388	M	Y	<	0.001166				
M	Er	<	0.000194	M	Mo	<	0.020405	M	Sc	<	0.000777	M	Yb	<	0.000194				

M - Checked by ICP-MS O - Checked by ICP-OES i - Spectral Interference
n - Not Checked For s - Solution Standard Element

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag keep cap tightly sealed when not in use. Store and use at 20° ± 4° C. Do not pippette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 232.04 +4 8 Th(OH) 3+ and Th(OH)22+
Chemical Compatibility -Soluble in HCl, and HNO3. Avoid H3PO4, H2SO4 and HF although solubilities may not be a problem depending upon pH and matrix (For example: ThF4 is soluble in acids). Avoid neutral to basic media. Th4+ is stable with most metals and inorganic anions forming an insoluble carbonate, oxide, fluoride, oxalate, sulfate and phosphate in neutral to slightly acidic media.
Stability - 2-100 ppb levels stable for months in 1% HNO3 / LDPE container. 1-10,000 ppm solutions chemically stable for years in 2-5% HNO3 / LDPE container.
Th Containing Samples (Preparation and Solution) -Metal (Soluble in Aqua Regia); Oxide (The heated oxide is not soluble in acids except hot conc. H2SO4); Ores (Na2O2 fusion at 480 ± 20EC for 7 minutes, cool and treat sintered mass with 50 mL cold water and stand until disintegrated. The mass is transferred to a beaker and acidified with HCl with 25 mL excess HCl added. Any residue is collected on a Whatman No. 42 filter, dried and ignited to 1000 EC in Pt0 crucible and the ash treated with H2SO4 / HF and fumed. If residue remains, then treat it by peroxide fusion as above.)
Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	**Estimated D.L.**	**Order**	**Interferences** (underlined indicates severe)
ICP-MS 232 amu	1 ppt	N/A	
ICP-OES 274.716 nm	0.08 / 0.008 µg/mL	1	Ti, Ta, Fe, V
ICP-OES 283.231 nm	0.07 / 0.007 µg/mL	1	U, Mo, Ti, Fe, Cr
ICP-OES 283.730 nm	0.07 / 0.007 µg/mL	1	U, Zr

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

May 19, 2016

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- May 19, 2020

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year from the date of removal from the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being handled and stored in accordance with the instructions given in Sec 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Brenda Francis
Product Documentation Technician

Certificate Approved By:

Michael Booth
QC Supervisor

Certifying Officer:

Paul Gaines
PhD., Senior Technical Director

Reagent

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Fair Lawn, NJ 07410
201.796.7100 tel
201.796.1329 fax

Certificate of Analysis

Fisher Scientific's Quality System has been found to conform to Quality Management System Standard ISO9001:2008 standard by SAI Global Certificate Number CERT - 0090918

This is to certify that units of the lot number below were tested and found to comply with the specifications of the grade listed. Certain data have been supplied by third parties. Fisher Scientific expressly disclaims all warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose. Certain products (USP/FCC/NF/EP/BP/JP grades) are sold for use in food, drug, or medical device manufacturing. Fisher does not claim regulatory coverage under 21 CFR nor maintain DMF's with the FDA. The following are the actual analytical results obtained:

Catalog Number	**SS254**	**Quality Test / Release Date**	**10/7/2016**
Lot Number	**166472**	**Expiration Date**	**Oct/18**
Description	**SODIUM HYDROXIDE, 50%, CERTIFIED**		
Country of Origin	**United States**		
Chemical Origin	**Inorganic-non animal**		
BSE/TSE Comment	This product is of mineral origin, not animal origin, and to the best of our knowledge, does not contribute to BSE or TSE.		
Chemical Comment	This product is not manufactured with natural latex rubber or genetically modified organisms. Also it is not manufactured using allergenic materials, including dyes/food dyes, eggs/egg products, fish/shellfish/crustaceans, flavors, glutens, legumes, milk, mollusks, MSG, mustards, plant nuts/seeds/oils, peanuts/peanut products, protein hydrolysates, soybean products, spices, sulfites, sulfates, tree nuts or oils, and wheat.		

Result name	Units	Specifications	Test Value
APPEARANCE		REPORT	CLEAR, COLORLESS LIQUID HAVING NO SEDIMENT OR PARTICULATES
AMMONIUM HYDROX. PPT	%	<= 0.010	<0.010
ASSAY	%	Inclusive Between 50 - 52	50
CARBONATE	%	<= 0.10	0.06
CHLORIDE	%	<= 0.005	<0.005
HEAVY METALS (as Ag)	%	<= 0.001	<0.001
IDENTIFICATION	PASS/FAIL	= PASS TEST	PASS TEST
IRON (Fe)	ppm	<= 5	<5
NITROGEN COMPOUNDS	ppm	<= 5	<5
PHOSPHATE (PO4)	ppm	<= 5	<5
POTASSIUM (K)	%	<= 0.025	<0.003
SILICA (SiO2)	%	<= 0.01	<0.01
SULFATE (SO4)	%	<= 0.002	<0.002

Teresa Bailey-Wyche

Quality Assurance Specialist - Certificate of Analysis BPF

Note: The data listed is valid for all package sizes of this lot of this product, expressed as a extension of this catalog number listed above. If there are any questions with this certificate, please call Chemical Services at (800) 227-6701.
*Based on suggested storage condition.

Reagent

8081 ToxStock_00018

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

Catalog No: P-093S-H-10X
Description: Toxaphene Standard
Lot: 215011420
Solvent: Hexane
Hazards: **HIGHLY FLAMMABLE** - *Refer to SDS for safety info*

Danger 2

Date Certified: Jan 30, 2015
Expiration: Jan 30, 2025
Sample Size: 1 mL
Components: 1
Storage Condition: Ambient (>5 °C)

Included on ISO/IEC 17025 Scope of Accreditation: Yes

Included on ISO Guide 34 Scope of Accreditation: Yes

Component	CAS #	Purity % (GC/MS)	Prepared Concentration[1] (µg/mL)	Certified Analyte Concentration[2] (µg/mL)
Toxaphene	8001-35-2	Tech Mix	1001	1001

A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot number has had its expiration date extended and is identical to the same lot number without the suffix.

[1] All weights are traceable through NIST, Test No. 822-275872-11

[2] Certified Analyte Concentration = Purity x Prepared Concentration. The Uncertainty associated with the gravimetric values reported on this certificate is ±0.24%. The CRM Uncertainty calculated for this product is ±5%. These values are the expanded uncertainty and represent an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.

Labels and certificates follow U.S. Conventions in reporting numerical values:
A comma (,) is used to separate units of one-thousand or greater.
A period (.) is used as a decimal place marker.

See reverse side for additional information

Certified By: _____
Larry Decker, Organic QC Manager

Page 1 of 1

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

OR-ORG/INO-001
Rev. 5/16

Reagent

8081/82 Surr_00103

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

8081/82 Surr_00103

Reagent ID: 8081/82 Surr_00103

		Expiration Date:	12/27/2018
Description:	0.2ug/mL 8081/82 Surrogate	Laboratory:	TestAmerica Denver
No. of Bottles:	4	Prepared By:	Zhang, Jian
Storage Location:	North Prep	Solvent:	ACETONE
Reagent Volume:	1000.000 mL	Solvent Lot:	Acetone_00220
Creation Date:	06/27/2018		
Open Date:			
Container(s):	5192488, 5192489, 5192490, 5192491		
Comment:	Take 1 mL of AR_SURR_RES (Restek Cat# 32000) or 8081 SurStock and dilute to 1000 mL in Acetone. Expires after 6 months.		

PASS QAM 070318

Reagent Analyte Information

Analyte	%R	%D	Source ID	Source Exp. Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
DCB Decachlorobiphenyl	98	2.0	AR_SURR_RES_00080	06/27/2019	200.00000	ug/mL	0.20000	ug/mL
Tetrachloro-m-xylene	96	4.6	AR_SURR_RES_00080	06/27/2019	200.00000	ug/mL	0.20000	ug/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
AR_SURR_RES_00080	Pesticide Surrogate Mix 200ppm	ASTD	06/27/19	RESTEK	A0130424	32000	1.00000	mL

Preliminary Report

TestAmerica Denver
Recovery Report

Data File:	\\ChromNA\Denver\ChromData\SGC_P3\20180702-71571.b\07021840.D				
Lims ID:	808001/82 Surr_00103				
Client ID:					
Sample Type:	Client				
Inject. Date:	02-Jul-2018 22:59:16	ALS Bottle#:	40	Worklist Smp#:	40
Injection Vol:	1.0 ul	Dil. Factor:	10.0000		
Sample Info:	808001/82 Surr_0				
Misc. Info.:	280-0071571-040				
Operator ID:	JAX	Instrument ID:	SGC_P3		
Method:	\\ChromNA\Denver\ChromData\SGC_P3\20180702-71571.b\PCB_P3.m				
Limit Group:	GCSV - 8082 - IS				
Last Update:	03-Jul-2018 08:25:18	Calib Date:	20-May-2018 23:47:28		
Integrator:	Falcon				
Quant Method:	Internal Standard	Quant By:	Initial Calibration		
Last ICal File:	\\ChromNA\Denver\ChromData\SGC_P3\20180520-70135.b\05201835.D				
Column 1 :	CLP1 Pesticides Column 1 (0.32 mm)		Det: GC ECD1A		
Column 2 :	CLP2 Pesticides Column 2 (0.32 mm)		Det: GC ECD2B		
Process Host:	CTX0303				

Surrogate Recovery, Detector: GC ECD1A

Compound	Amount Added	Amount Recovered	% Rec.	%D
$ 14 Tetrachloro-m-xylene	200.0	19.1	95.51	4.6
$ 15 DCB Decachlorobiphenyl	200.0	19.6	98.06	2.0

Surrogate Recovery, Detector: GC ECD2B

Compound	Amount Added	Amount Recovered	% Rec.
$ 14 Tetrachloro-m-xylene	200.0	17.2	85.79
$ 15 DCB Decachlorobiphenyl	200.0	19.0	94.86

Reagent

8081ABResPS_00015

RESTEK®
110 Benner Circle
Bellefonte, PA 16823-8812
Tel: (800)356-1688
Fax: (814)353-1309

www.restek.com

CERTIFIED REFERENCE MATERIAL

Certificate of Analysis

ACCREDITED
ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

ilac-MRA

ACCREDITED
ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32415 **Lot No.:** A0108399

Description : Organochlorine Pesticide Mix AB #3

Organochlorine Pesticide Mix AB #3 2,000 µg/mL, Hexane/Toluene (50:50), 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : January 31, 2019 **Storage:** 10°C or colder

Handling: Sonicate prior to use.

CERTIFIED VALUES

Elution Order	Compound		Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	alpha-BHC		2,000.0 µg/mL	+/- 11.7371 µg/mL	Gravimetric
	CAS # 319-84-6	(Lot 0911942)		+/- 78.2355 µg/mL	Unstressed
	Purity 99%			+/- 124.1521 µg/mL	Stressed
2	gamma-BHC (Lindane)		2,000.5 µg/mL	+/- 11.7401 µg/mL	Gravimetric
	CAS # 58-89-9	(Lot 2951000)		+/- 78.2551 µg/mL	Unstressed
	Purity 99%			+/- 124.1832 µg/mL	Stressed
3	beta-BHC		2,001.2 µg/mL	+/- 11.7439 µg/mL	Gravimetric
	CAS # 319-85-7	(Lot SZBD116XV)		+/- 78.2809 µg/mL	Unstressed
	Purity 98%			+/- 124.2241 µg/mL	Stressed
4	delta-BHC		2,000.7 µg/mL	+/- 11.7411 µg/mL	Gravimetric
	CAS # 319-86-8	(Lot ER02101401)		+/- 78.2617 µg/mL	Unstressed
	Purity 98%			+/- 124.1937 µg/mL	Stressed
5	Heptachlor		2,001.2 µg/mL	+/- 11.7439 µg/mL	Gravimetric
	CAS # 76-44-8	(Lot RM03111)		+/- 78.2809 µg/mL	Unstressed
	Purity 98%			+/- 124.2241 µg/mL	Stressed
6	Aldrin		2,001.5 µg/mL	+/- 11.7459 µg/mL	Gravimetric
	CAS # 309-00-2	(Lot 3094500)		+/- 78.2942 µg/mL	Unstressed
	Purity 99%			+/- 124.2453 µg/mL	Stressed
7	Heptachlor epoxide (isomer B)		2,000.0 µg/mL	+/- 11.7371 µg/mL	Gravimetric
	CAS # 1024-57-3	(Lot ER121511-01)		+/- 78.2355 µg/mL	Unstressed
	Purity 99%			+/- 124.1521 µg/mL	Stressed

8	trans-Chlordane **CAS #** 5103-74-2 **Purity** 99%	(Lot ER061906-04)	2,000.5	µg/mL	+/- 11.7401 +/- 78.2551 +/- 124.1832	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
9	cis-Chlordane **CAS #** 5103-71-9 **Purity** 99%	(Lot ER062410-01)	2,000.0	µg/mL	+/- 11.7371 +/- 78.2355 +/- 124.1521	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
10	Endosulfan I **CAS #** 959-98-8 **Purity** 98%	(Lot ER012105-02)	2,000.7	µg/mL	+/- 11.7411 +/- 78.2617 +/- 124.1937	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
11	4,4'-DDE **CAS #** 72-55-9 **Purity** 99%	(Lot ER011106-01)	2,000.5	µg/mL	+/- 11.7401 +/- 78.2551 +/- 124.1832	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
12	Dieldrin **CAS #** 60-57-1 **Purity** 98%	(Lot ER030105-03)	2,000.7	µg/mL	+/- 11.7411 +/- 78.2617 +/- 124.1937	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
13	Endrin **CAS #** 72-20-8 **Purity** 99%	(Lot LC06045V)	2,001.0	µg/mL	+/- 11.7430 +/- 78.2746 +/- 124.2142	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
14	4,4'-DDD **CAS #** 72-54-8 **Purity** 97%	(Lot ER061207-01)	2,000.1	µg/mL	+/- 11.7379 +/- 78.2410 +/- 124.1608	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
15	Endosulfan II **CAS #** 33213-65-9 **Purity** 99%	(Lot ER102407-02)	2,000.5	µg/mL	+/- 11.7401 +/- 78.2551 +/- 124.1832	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
16	4,4'-DDT **CAS #** 50-29-3 **Purity** 99%	(Lot S37912V)	2,000.5	µg/mL	+/- 11.7401 +/- 78.2551 +/- 124.1832	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
17	Endrin aldehyde **CAS #** 7421-93-4 **Purity** 98%	(Lot ER082306-01)	2,000.1	µg/mL	+/- 11.7376 +/- 78.2387 +/- 124.1572	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
18	Endosulfan sulfate **CAS #** 1031-07-8 **Purity** 99%	(Lot 30918)	2,000.5	µg/mL	+/- 11.7401 +/- 78.2551 +/- 124.1832	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
19	Methoxychlor **CAS #** 72-43-5 **Purity** 99%	(Lot 3296700)	2,000.0	µg/mL	+/- 11.7371 +/- 78.2355 +/- 124.1521	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
20	Endrin ketone **CAS #** 53494-70-5 **Purity** 99%	(Lot 3169200)	2,000.5	µg/mL	+/- 11.7401 +/- 78.2551 +/- 124.1832	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed

Solvent: Hexane/Toluene (50:50)
CAS # 110-54-3/108-88-3
Purity 99%

Column:
30m x .25mm x .2um
Rtx-CLP II (cat.# 11323)

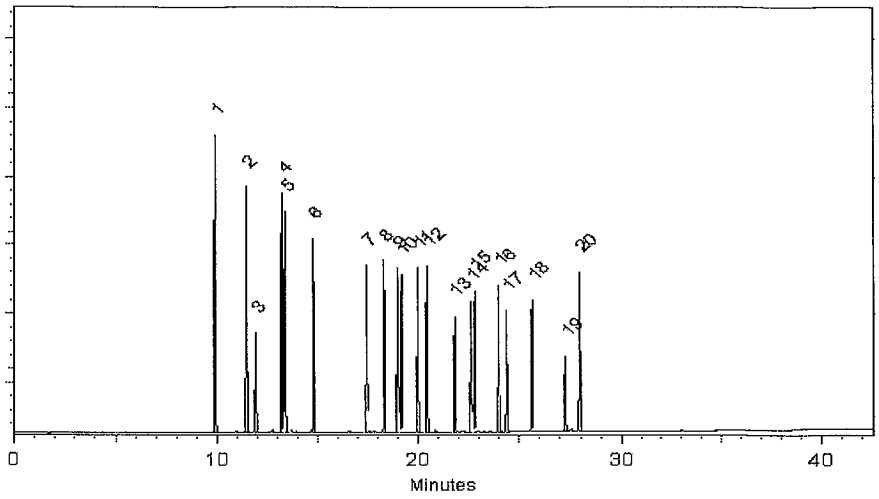
Carrier Gas:
helium-constant pressure 20 psi.

Temp. Program:
150°C to 300°C
@ 4°C/min. (hold 5 min.)

Inj. Temp:
200°C

Det. Temp:
300°C

Det. Type:
ECD



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Connor Flannery - Mix Technician

Date Mixed: 19-Jan-2015 **Balance:** 1128360905

Jennifer L. Pollino - QC Analyst

Date Passed: 21-Jan-2015

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Reagent

8081ABResPS_00026

RESTEK
110 Benner Circle
Bellefonte, PA 16823-8812
Tel: (800)356-1688
Fax: (814)353-1309

www.restek.com

CERTIFIED REFERENCE MATERIAL

Certificate of Analysis

ACCREDITED
ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

ACCREDITED
ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #2222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32415 **Lot No.:** A0129369

Description : Organochlorine Pesticide Mix AB #3

Organochlorine Pesticide Mix AB #3 2,000 µg/mL, Hexane/Toluene (50:50), 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : July 31, 2021 **Storage:** 10°C or colder

Handling: Sonicate prior to use.

CERTIFIED VALUES

Elution Order	Compound		Grav. Conc. (weight/volume)		Expanded Uncertainty (95% C.L.; K=2)		
1	alpha-BHC		2,012.0	µg/mL	+/- 11.8075	µg/mL	Gravimetric
	CAS # 319-84-6	(Lot 0911942)			+/- 91.6450	µg/mL	Unstressed
	Purity 99%				+/- 132.3230	µg/mL	Stressed
2	gamma-BHC (Lindane)		2,010.5	µg/mL	+/- 11.7987	µg/mL	Gravimetric
	CAS # 58-89-9	(Lot 6357300)			+/- 91.5767	µg/mL	Unstressed
	Purity 99%				+/- 132.2244	µg/mL	Stressed
3	beta-BHC		2,011.9	µg/mL	+/- 11.8072	µg/mL	Gravimetric
	CAS # 319-85-7	(Lot SZBD116XV)			+/- 91.6423	µg/mL	Unstressed
	Purity 98%				+/- 132.3191	µg/mL	Stressed
4	delta-BHC		2,017.0	µg/mL	+/- 11.8369	µg/mL	Gravimetric
	CAS # 319-86-8	(Lot ER02101401)			+/- 91.8728	µg/mL	Unstressed
	Purity 99%				+/- 132.6518	µg/mL	Stressed
5	Heptachlor		2,011.5	µg/mL	+/- 11.8046	µg/mL	Gravimetric
	CAS # 76-44-8	(Lot NT056422)			+/- 91.6223	µg/mL	Unstressed
	Purity 99%				+/- 132.2901	µg/mL	Stressed
6	Aldrin		2,009.0	µg/mL	+/- 11.7899	µg/mL	Gravimetric
	CAS # 309-00-2	(Lot 5923100)			+/- 91.5084	µg/mL	Unstressed
	Purity 98%				+/- 132.1257	µg/mL	Stressed
7	Heptachlor epoxide (isomer B)		2,007.0	µg/mL	+/- 11.7782	µg/mL	Gravimetric
	CAS # 1024-57-3	(Lot ER121511-01)			+/- 91.4173	µg/mL	Unstressed
	Purity 99%				+/- 131.9942	µg/mL	Stressed

Column:
30m x .25mm x .2um
Rtx-CLP II (cat.# 11323)

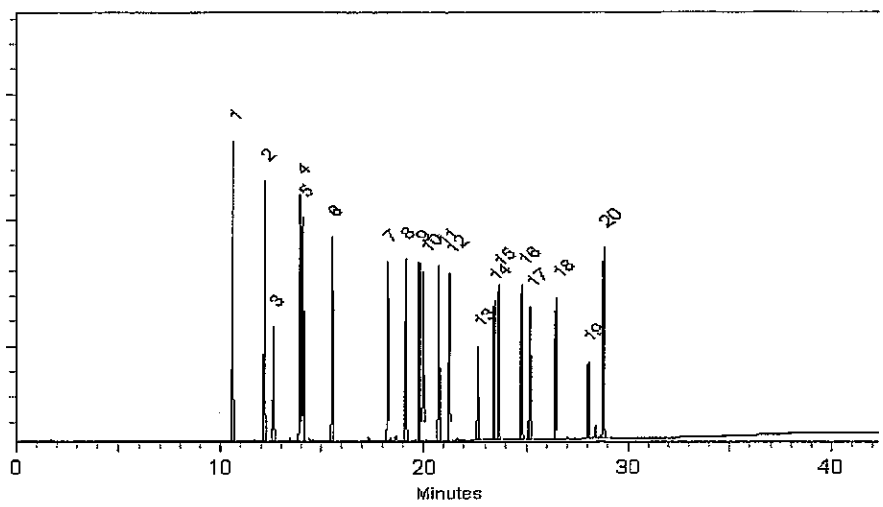
Carrier Gas:
helium-constant pressure 20 psi.

Temp. Program:
150°C to 300°C
@ 4°C/min. (hold 5 min.)

Inj. Temp:
200°C

Det. Temp:
300°C

Det. Type:
ECD



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Tom Suckar - Mix Technician

Date Mixed: 24-Jul-2017 **Balance:** B442140311

Diane Shaffer - Operations Tech-ARM QC

Date Passed: 25-Jul-2017

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

8	trans-Chlordane		2,007.0	µg/mL	+/-	11.7782	µg/mL	Gravimetric
	CAS # 5103-74-2	(Lot ER061906-04)			+/-	91.4173	µg/mL	Unstressed
	Purity 99%				+/-	131.9942	µg/mL	Stressed
9	cis-Chlordane		2,006.0	µg/mL	+/-	11.7723	µg/mL	Gravimetric
	CAS # 5103-71-9	(Lot ER062410-01)			+/-	91.3717	µg/mL	Unstressed
	Purity 99%				+/-	131.9284	µg/mL	Stressed
10	Endosulfan I		2,013.0	µg/mL	+/-	11.8134	µg/mL	Gravimetric
	CAS # 959-98-8	(Lot ER012105-02)			+/-	91.6906	µg/mL	Unstressed
	Purity 99%				+/-	132.3888	µg/mL	Stressed
11	4,4'-DDE		2,008.5	µg/mL	+/-	11.7870	µg/mL	Gravimetric
	CAS # 72-55-9	(Lot GHYQG)			+/-	91.4856	µg/mL	Unstressed
	Purity 99%				+/-	132.0928	µg/mL	Stressed
12	Dieldrin		2,006.0	µg/mL	+/-	11.7723	µg/mL	Gravimetric
	CAS # 60-57-1	(Lot ER030105-03)			+/-	91.3717	µg/mL	Unstressed
	Purity 99%				+/-	131.9284	µg/mL	Stressed
13	Endrin		2,019.3	µg/mL	+/-	11.8503	µg/mL	Gravimetric
	CAS # 72-20-8	(Lot 6429800)			+/-	91.9771	µg/mL	Unstressed
	Purity 98%				+/-	132.8025	µg/mL	Stressed
14	4,4'-DDD		2,014.9	µg/mL	+/-	11.8244	µg/mL	Gravimetric
	CAS # 72-54-8	(Lot ER061207-01)			+/-	91.7762	µg/mL	Unstressed
	Purity 98%				+/-	132.5124	µg/mL	Stressed
15	Endosulfan II		2,007.5	µg/mL	+/-	11.7811	µg/mL	Gravimetric
	CAS # 33213-65-9	(Lot ER102407-02)			+/-	91.4401	µg/mL	Unstressed
	Purity 99%				+/-	132.0271	µg/mL	Stressed
16	Endrin aldehyde		2,008.5	µg/mL	+/-	11.7870	µg/mL	Gravimetric
	CAS # 7421-93-4	(Lot ER082306-01)			+/-	91.4856	µg/mL	Unstressed
	Purity 99%				+/-	132.0928	µg/mL	Stressed
17	4,4'-DDT		2,009.0	µg/mL	+/-	11.7899	µg/mL	Gravimetric
	CAS # 50-29-3	(Lot S37912V)			+/-	91.5084	µg/mL	Unstressed
	Purity 99%				+/-	132.1257	µg/mL	Stressed
18	Endosulfan sulfate		2,009.3	µg/mL	+/-	11.7916	µg/mL	Gravimetric
	CAS # 1031-07-8	(Lot SZBC213XV)			+/-	91.5211	µg/mL	Unstressed
	Purity 96%				+/-	132.1441	µg/mL	Stressed
19	Methoxychlor		2,015.4	µg/mL	+/-	11.8273	µg/mL	Gravimetric
	CAS # 72-43-5	(Lot 6429900)			+/-	91.7985	µg/mL	Unstressed
	Purity 98%				+/-	132.5446	µg/mL	Stressed
20	Endrin ketone		2,007.5	µg/mL	+/-	11.7811	µg/mL	Gravimetric
	CAS # 53494-70-5	(Lot 160405JLM)			+/-	91.4401	µg/mL	Unstressed
	Purity 99%				+/-	132.0271	µg/mL	Stressed

Solvent: Hexane/Toluene (50:50)
CAS # 110-54-3/108-88-3
Purity 99%

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Reagent

8081ABResSS_00011

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CERTIFIED REFERENCE MATERIAL

Certificate of Analysis

ACCREDITED
ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

ACCREDITED
ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32415.sec **Lot No.:** A0108854

Description : Organochlorine Pesticide Mix AB #3

Organochlorine Pesticide Mix AB #3 2,000 µg/mL, Hexane/Toluene (50:50), 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : February 28, 2019 **Storage:** 10°C or colder

Handling: Sonicate prior to use.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	alpha-BHC **CAS #** 319-84-6.SEC (Lot 1623900) **Purity** 99%	2,009.5 µg/mL	+/- 11.7929 µg/mL +/- 78.6071 µg/mL +/- 124.7419 µg/mL	Gravimetric Unstressed Stressed
2	gamma-BHC (Lindane) **CAS #** 58-89-9.SEC (Lot LC00563V) **Purity** 99%	2,010.0 µg/mL	+/- 11.7958 µg/mL +/- 78.6267 µg/mL +/- 124.7729 µg/mL	Gravimetric Unstressed Stressed
3	beta-BHC **CAS #** 319-85-7.SEC (Lot 1808700) **Purity** 98%	2,003.1 µg/mL	+/- 11.7554 µg/mL +/- 78.3575 µg/mL +/- 124.3458 µg/mL	Gravimetric Unstressed Stressed
4	delta-BHC **CAS #** 319-86-8.SEC (Lot 1912200) **Purity** 99%	2,003.5 µg/mL	+/- 11.7577 µg/mL +/- 78.3724 µg/mL +/- 124.3694 µg/mL	Gravimetric Unstressed Stressed
5	Heptachlor **CAS #** 76-44-8.SEC (Lot 1745400) **Purity** 99%	2,000.5 µg/mL	+/- 11.7401 µg/mL +/- 78.2551 µg/mL +/- 124.1832 µg/mL	Gravimetric Unstressed Stressed
6	Aldrin **CAS #** 309-00-2.SEC (Lot ER062311-01) **Purity** 98%	2,004.1 µg/mL	+/- 11.7612 µg/mL +/- 78.3959 µg/mL +/- 124.4067 µg/mL	Gravimetric Unstressed Stressed
7	Heptachlor epoxide (isomer B) **CAS #** 1024-57-3.SEC (Lot 3352500) **Purity** 99%	2,006.0 µg/mL	+/- 11.7723 µg/mL +/- 78.4702 µg/mL +/- 124.5246 µg/mL	Gravimetric Unstressed Stressed

8	trans-Chlordane		2,006.0	µg/mL	+/-	11.7723	µg/mL	Gravimetric
	CAS # 5103-74-2.SEC	(Lot LC06193V)			+/-	78.4702	µg/mL	Unstressed
	Purity 99%				+/-	124.5246	µg/mL	Stressed
9	cis-Chlordane		2,009.0	µg/mL	+/-	11.7899	µg/mL	Gravimetric
	CAS # 5103-71-9.SEC	(Lot 24407)			+/-	78.5876	µg/mL	Unstressed
	Purity 99%				+/-	124.7108	µg/mL	Stressed
10	4,4'-DDE		2,001.5	µg/mL	+/-	11.7459	µg/mL	Gravimetric
	CAS # 72-55-9.SEC	(Lot 1833500)			+/-	78.2942	µg/mL	Unstressed
	Purity 99%				+/-	124.2453	µg/mL	Stressed
11	Endosulfan I		2,002.1	µg/mL	+/-	11.7497	µg/mL	Gravimetric
	CAS # 959-98-8.SEC	(Lot 1710200)			+/-	78.3192	µg/mL	Unstressed
	Purity 98%				+/-	124.2850	µg/mL	Stressed
12	Dieldrin		1,995.3	µg/mL	+/-	11.7094	µg/mL	Gravimetric
	CAS # 60-57-1.SEC	(Lot 1274700)			+/-	78.0509	µg/mL	Unstressed
	Purity 98%				+/-	123.8591	µg/mL	Stressed
13	Endrin		2,000.0	µg/mL	+/-	11.7371	µg/mL	Gravimetric
	CAS # 72-20-8 *	(Lot LC06045V)			+/-	78.2355	µg/mL	Unstressed
	Purity 99%				+/-	124.1521	µg/mL	Stressed
14	4,4'-DDD		2,009.0	µg/mL	+/-	11.7899	µg/mL	Gravimetric
	CAS # 72-54-8.SEC	(Lot 1141700)			+/-	78.5876	µg/mL	Unstressed
	Purity 98%				+/-	124.7108	µg/mL	Stressed
15	Endosulfan II		2,010.0	µg/mL	+/-	11.7958	µg/mL	Gravimetric
	CAS # 33213-65-9.SEC	(Lot 3437500)			+/-	78.6267	µg/mL	Unstressed
	Purity 99%				+/-	124.7729	µg/mL	Stressed
16	4,4'-DDT		2,016.5	µg/mL	+/-	11.8340	µg/mL	Gravimetric
	CAS # 50-29-3.SEC	(Lot 3478000)			+/-	78.8809	µg/mL	Unstressed
	Purity 99%				+/-	125.1764	µg/mL	Stressed
17	Endrin aldehyde		2,016.4	µg/mL	+/-	11.8331	µg/mL	Gravimetric
	CAS # 7421-93-4.SEC	(Lot 21752)			+/-	78.8751	µg/mL	Unstressed
	Purity 98%				+/-	125.1671	µg/mL	Stressed
18	Methoxychlor		2,007.0	µg/mL	+/-	11.7782	µg/mL	Gravimetric
	CAS # 72-43-5.SEC	(Lot LC09014V)			+/-	78.5093	µg/mL	Unstressed
	Purity 99%				+/-	124.5867	µg/mL	Stressed
19	Endosulfan sulfate		2,007.5	µg/mL	+/-	11.7813	µg/mL	Gravimetric
	CAS # 1031-07-8.SEC	(Lot 1888900)			+/-	78.5301	µg/mL	Unstressed
	Purity 98%				+/-	124.6196	µg/mL	Stressed
20	Endrin ketone		2,007.5	µg/mL	+/-	11.7813	µg/mL	Gravimetric
	CAS # 53494-70-5.SEC	(Lot 091307RD)			+/-	78.5301	µg/mL	Unstressed
	Purity 98%				+/-	124.6196	µg/mL	Stressed

Solvent: Hexane/Toluene (50:50)
CAS # 110-54-3/108-88-3
Purity 99%

*** Restek is unable to identify a reliable and/or acceptable second source for this material - the same batch of neat material may have been used to produce both the primary and secondary standard. The primary and secondary standards were prepared using different equipment and personnel.**

Column:
30m x .25mm x .2um
Rtx-CLP II (cat.# 11323)

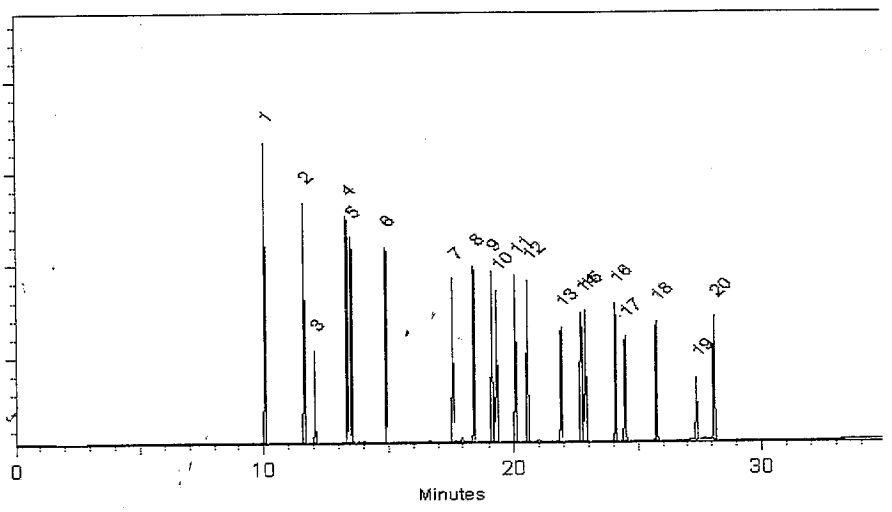
Carrier Gas:
helium-constant pressure 20 psi.

Temp. Program:
150°C to 300°C
@ 4°C/min. (hold 5 min.)

Inj. Temp:
200°C

Det. Temp:
300°C

Det. Type:
ECD



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Lane Kibe - Mix Technician

Date Mixed: 04-Feb-2015 **Balance:** B345965662

Diane Shaffer - QAAnalyst

Date Passed: 12-Feb-2015

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Reagent

8081ChlrStkPS_00023

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CERTIFIED REFERENCE MATERIAL

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ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

Certificate of Analysis

ilac-MRA

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ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32072 **Lot No.:** A0118733

Description : Chlordane Standard

Chlordane Standard 5,000 µg/mL, Isooctane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : April 30, 2020 **Storage:** 10°C or colder

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	Chlordane	5,032.0 µg/mL	+/- 29.5306 µg/mL	Gravimetric
	CAS # 57-74-9 (Lot 30912)		+/- 159.4840 µg/mL	Unstressed
	Purity -----%		+/- 208.3392 µg/mL	Stressed

Solvent: Isooctane
CAS # 540-84-1
Purity 99%

Tech Tips:
CAS #57-74-9 nomenclature is based on EPA method 8081B.

Reagent

8081ChlrStkSS_00024

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CERTIFIED REFERENCE MATERIAL

Certificate of Analysis

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Reference Material Producer
Certificate #3222.01

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ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 571052-sl **Lot No.:** A0117232

Description : Chlordane Standard

Chlordane Standard 5000 µg/mL, Isooctane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : February 29, 2020 **Storage:** 10°C or colder

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Chlordane	5,050.0 µg/mL	+/- 29.6362	µg/mL	Gravimetric
	CAS # 57-74-9.SEC (Lot 30912)		+/- 160.0545	µg/mL	Unstressed
	Purity ----%		+/- 209.0845	µg/mL	Stressed

Solvent: Isooctane
CAS # 540-84-1
Purity 99%

Tech Tips:
CAS #57-74-9 nomenclature is based on EPA method 8081B.

Reagent

8081EvalBStk2_00019

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

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Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

Catalog No: M-8081-DS
Description: 4,4'-DDT & Endrin
Lot: 214101383-05
Solvent: Hexane
Hazards: *Refer to SDS for complete safety information*

Signal Word: Danger

Date Certified: Jul 31, 2017
Expiration: Aug 31, 2018
Sample Size: 1 mL
Components: 2
Storage Condition: Ambient (>5 °C)

Included on ISO/IEC 17025 Scope of Accreditation: Yes

Included on ISO Guide 34 Scope of Accreditation: Yes

Component	CAS #	Purity % (GC/MS)	Prepared Concentration[1] (µg/mL)	Certified Analyte Concentration[2] (µg/mL)
4,4'-DDT	50-29-3	99.7	202.5	201.9
Endrin	72-20-8	99.0	202.4	200.4

A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot number has had its expiration date extended and is identical to the same lot number without the suffix.

[1] All weights are traceable through NIST, Test No. 822-275872-11

[2] Certified Analyte Concentration = Purity x Prepared Concentration.

The Uncertainty associated with the certified concentration reported on this certificate is ±2.4%. This value is the combined expanded uncertainty and represents an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.

Labels and certificates follow U.S. Conventions in reporting numerical values: A comma (,) is used to separate units of one-thousand or greater. A period (.) is used as a decimal place marker.

See reverse side for additional information

Certified By: _____
Larry Decker, Organic QC Manager

For use in routine laboratory analysis.

Reagent

8081HCBStkPS_00021

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
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CERTIFICATE OF ANALYSIS

Catalog No: APP-9-112
Description: Hexachlorobenzene
Lot: 216101286
Solvent: Methanol
Hazards: *Refer to SDS for complete safety information*

Signal Word: Danger

Date Certified: Oct 26, 2016
Expiration: Oct 26, 2026
Sample Size: 1 mL
Components: 1
Storage Condition: Ambient (>5 °C)

Included on ISO/IEC 17025 Scope of Accreditation: Yes

Included on ISO Guide 34 Scope of Accreditation: Yes

Component	CAS #	Purity % (GC/MS)	Prepared Concentration[1] (µg/mL)	Certified Analyte Concentration[2] (µg/mL)
Hexachlorobenzene	118-74-1	99.2	100.4	99.6

A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot number has had its expiration date extended and is identical to the same lot number without the suffix.

[1] All weights are traceable through NIST, Test No. 822-275872-11

[2] Certified Analyte Concentration = Purity x Prepared Concentration.

The Uncertainty associated with the gravimetric values reported on this certificate is ±0.24%. This value is the expanded uncertainty and represents an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.

Labels and certificates follow U.S. Conventions in reporting numerical values: A comma (,) is used to separate units of one-thousand or greater. A period (.) is used as a decimal place marker.

See reverse side for additional information

Certified By: _____
Larry Decker, Organic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

OR-ORG/INO-001
Rev. 7/11

CERTIFICATION REPORT

1. **Quality Documentation:** This certificate is designed in accordance with ISO Guide 31 (Reference Materials - Contents of Certificates and Labels) and ISO Guide 35 (Reference Materials – General and Statistical Principles for Certification).

2. **Quality Standards:**

   ISO Guide 34 - General Requirements for the Competence of Reference Material Producers ANAB Certificate Number AR-1463

   AR-1463

   ISO/IEC 17025 - General Requirements for the Competence of Testing and Calibration Laboratories ANAB Certificate Number AT-1339

   AT-1339

   ISO 9001 - Quality Management System - Requirements Eagle Registrations Certificate Number 3774

3. **Intended Use:** The product covered by this certificate is designed for calibration or for use in quality control procedures for the specified chemical compounds listed on the reverse side. This product can be used for quantification and/or identification. This product can also be used as a reference material to validate analytical procedures, subject to the conditions under Section 11. If dilution is required, use only Class A glassware and diluent compatible with all certified analytes in this preparation. All solutions should be thoroughly mixed prior to use.

4. **Raw Materials:** Reference standards are prepared from the highest quality starting materials with defined purities. All analytes and solvents are obtained from pre-qualified vendors and then analyzed or evaluated prior to use.

5. **Manufacturing:** All balances are calibrated daily using an in-house procedure with weights that are compared annually to master weights and traceable to NIST. The balances are also calibrated annually by an ISO/IEC 17025 accredited calibration laboratory. Please refer to the NIST test number listed on the front of this certificate. Class A glassware is used in the manufacture and quality control of all standards and calibrated using an in-house procedure. Good Laboratory Practices have been used throughout the preparation of this CRM.

6. **Homogeneity Assessment:** Homogeneity of the finished product is assessed by analyzing sample batches or by other methods consistent with the intended use of the product and by procedures that comply with the appropriate Quality System requirements, and ISO Guide 35.

7. **Stability Assessment:** The manufacturer guarantees the stability of this solution through the expiration date stated on the label, when handled and stored according to the conditions stated on the label. To ensure a uniform solution, mix the contents of the sealed container thoroughly prior to use. Care should be taken not to contaminate the contents of the original container.

8. **Analytical Quality Control:** Products are tested by validated analytical methods specified in the manufacturer's quality system.

9. **Uncertainty Statistics and Confidence Limits:** The uncertainty values as stated on the face of this certificate have been determined using the EURACHEM/CITAC Guide. We report a combined expanded uncertainty equal to the positive square root of the total variance of the uncertainty of the components using the following formula: $u_m = \sqrt{(u(P))^2 + (u(m))^2 + (u(V))^2}$. The expanded uncertainty, U_{CRM} assumes a normal distribution and a coverage factor of k=2 is chosen using approximately a 95% confidence level. The U_{CRM} for organic products is ±5%, the U_{CRM} for inorganic products is ±2%.

10. **Warranties:** The manufacturer warrants that its products shall conform to the description of such products as provided in its catalog or on the specific product label. This warranty is exclusive, and the manufacturer makes no other warranty, express or implied, including any implied warranty of merchantability or fitness for any particular purpose.

11. **Legal Notice and Limit of Liability:** This product is for routine laboratory analysis and research purposes only. Due to the hazardous nature, only trained personnel should handle this product. The company's liability will be limited to replacement of product or refund of purchase price. Notice of claims must be made within thirty (30) days from date of delivery.

Reagent

8081HCBStkSS_00036

Certificate of Analysis

Hexachlorobenzene Solution

Product Number: EPA-1125 **Page:** 1 of 1

Lot Number: CR-5129 **Lot Issue Date:** 08-Nov-2017 **Expiration Date:** 31-Dec-2021

This ISO Guide 34 Reference Material (RM) was manufactured and verified in accordance with ULTRA's ISO 9001 registered quality system, and the analyte concentrations were verified by our ISO 17025 accredited laboratory. The true value and uncertainty value at the 95% confidence level for each analyte, determined gravimetrically, is listed below.

Analyte	CAS#	Analyte Lot	True Value
hexachlorobenzene	000118-74-1	RM03125	1003 ± 5 µg/mL

Matrix: acetone

Storage: Store at Room Temperature (15° to 30°C).

ULTRA uses balances calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1 and ISO 9001, and calibrated Class A glassware in the manufacturing of these standards.

John Russo
President

Monica Bourgeois
Director of QA/RA

ISO 9001
Registered
TUV USA, Inc.

250 SMITH STREET ▪ NORTH KINGSTOWN, RHODE ISLAND 02852 ▪ WWW.ULTRASCI.COM

Reagent

8081IsodrinPS_00021

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USA

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Tel (203)786-5290
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www.AccuStandard.com

CERTIFICATE OF ANALYSIS

Catalog No: P-471S-10X
Description: Isodrin
Lot: 216111205
Solvent: Methanol
Hazards: *Refer to SDS for complete safety information*

Signal Word: Danger

Date Certified: Nov 15, 2016
Expiration: Nov 15, 2019
Sample Size: 1 mL
Components: 1
Storage Condition: Ambient (>5 °C)

Included on ISO/IEC 17025 Scope of Accreditation: Yes

Included on ISO Guide 34 Scope of Accreditation: Yes

Component	CAS #	Purity % (GC/MS)	Prepared Concentration[1] (µg/mL)	Certified Analyte Concentration[2] (µg/mL)
Isodrin	465-73-6	96.3	1044*	1005

Received
03.28.18
KDK

* Weight compensated to 100% purity.

A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot number has had its expiration date extended and is identical to the same lot number without the suffix.

[1] All weights are traceable through NIST, Test No. 822-275872-11

[2] Certified Analyte Concentration = Purity x Prepared Concentration.

The Uncertainty associated with the gravimetric values reported on this certificate is ±0.24%. This value is the expanded uncertainty and represents an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.

Labels and certificates follow U.S. Conventions in reporting numerical values: A comma (,) is used to separate units of one-thousand or greater. A period (.) is used as a decimal place marker.

See reverse side for additional information

Certified By: _____
Larry Decker, Organic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001:2015

QR-ORG/INO-001
Rev. 4/17

Reagent

8081LCSPrim_00039

Preliminary Report

TestAmerica Denver

LCS, Lab Control Sample Report

Sample Path: \\ChromNA\Denver\ChromData\SGC_P1\20180317-68081.b\062F6701.D
Lims ID: 8081LCSPrim_00039 Inj. Date: 18-Mar-2018 01:30:44
Worklist ID: 280-0068081-067 Instrument: SGC_P1
Method: P1 8081 IS

Detector 1: GC ECD1A

Compound	Amount Added	Amount Recovered	%Rec	Limits 1 3510C	Limits 2 3510C	Limits 3 3546
8 alpha-BHC	250.0	247.0	98.8	54-138	73-133	
9 gamma-BHC (Lindane)	250.0	243.7	97.5	59-134	71-132	
10 beta-BHC	250.0	250.3	100.1	56-136	67-133	
12 delta-BHC	250.0	252.7	101.1	52-142	72-135	
15 Heptachlor	250.0	224.1	89.6	54-130	52-129	
16 Aldrin	250.0	243.1	97.3	45-134	44-127	
21 Heptachlor epoxide	250.0	239.4	95.8	61-133	77-132	
22 trans-Chlordane	250.0	247.0	98.8	56-136	73-131	
23 cis-Chlordane	250.0	246.8	98.7	60-129	75-128	
24 4,4'-DDE	250.0	247.4	99.0	57-135	74-124	
25 Endosulfan I	250.0	240.1	96.1	62-126	73-128	
27 Dieldrin	250.0	242.1	96.8	60-136	78-132	
30 Endrin	250.0	224.8	89.9	60-138	74-171	
32 4,4'-DDD	250.0	250.5	100.2	56-143	78-138	
34 Endosulfan II	250.0	234.7	93.9	52-135	75-132	
35 4,4'-DDT	250.0	205.7	82.3	51-143	72-139	
36 Endrin aldehyde	250.0	231.7	92.7	51-132	59-136	
37 Methoxychlor	250.0	190.2	76.1	54-145	67-150	
39 Endosulfan sulfate	250.0	238.0	95.2	62-133	77-135	
40 Endrin ketone	250.0	230.3	92.1	58-134	75-137	

Detector 2: GC ECD2B

Compound	Amount Added	Amount Recovered	%Rec	Limits 1 3510C	Limits 2 3510C	Limits 3 3546
8 alpha-BHC	250.0	292.3	116.9	54-138	73-133	
9 gamma-BHC (Lindane)	250.0	297.0	118.8	59-134	71-132	
10 beta-BHC	250.0	313.5	125.4	56-136	67-133	
12 delta-BHC	250.0	287.0	114.8	52-142	72-135	
15 Heptachlor	250.0	237.8	95.1	54-130	52-129	
16 Aldrin	250.0	279.7	111.9	45-134	44-127	
21 Heptachlor epoxide	250.0	265.9	106.4	61-133	77-132	
22 trans-Chlordane	250.0	290.1	116.0	56-136	73-131	
23 cis-Chlordane	250.0	290.7	116.3	60-129	75-128	
24 4,4'-DDE	250.0	281.6	112.7	57-135	74-124	
25 Endosulfan I	250.0	266.8	106.7	62-126	73-128	
27 Dieldrin	250.0	265.2	106.1	60-136	78-132	
30 Endrin	250.0	252.6	101.0	60-138	74-171	
32 4,4'-DDD	250.0	291.3	116.5	56-143	78-138	
34 Endosulfan II	250.0	264.5	105.8	52-135	75-132	
35 4,4'-DDT	250.0	231.5	92.6	51-143	72-139	
36 Endrin aldehyde	250.0	261.7	104.7	51-132	59-136	

Preliminary Report

Sample Path: \\ChromNA\Denver\ChromData\SGC_P1\20180317-68081.b\062F6701.D

Compound	Amount Added	Amount Recovered	%Rec	Limits 1 3510C	Limits 2 3510C	Limits 3 3546
37 Methoxychlor	250.0	205.2	82.1	54-145	67-150	
39 Endosulfan sulfate	250.0	267.8	107.1	62-133	77-135	
40 Endrin ketone	250.0	248.9	99.6	58-134	75-137	

Samples for Limit Group: 1, Lims Prep Method: 3510C

280-106663-D-1-G
280-106663-C-4-A
280-106663-C-7-A
280-106663-E-2-A
280-106663-F-5-E
280-106663-C-8-A
280-106663-E-3-A
280-106663-D-6-B
280-106663-C-9-A

Samples for Limit Group: 2, Lims Prep Method: 3510C

280-106663-D-1-G
280-106663-C-4-A
280-106663-C-7-A
280-106663-E-2-A
280-106663-F-5-E
280-106663-C-8-A
280-106663-E-3-A
280-106663-D-6-B
280-106663-C-9-A

Samples for Limit Group: 3, Lims Prep Method: 3546

280-107015-D-1-A
280-106935-U-1-A
280-107015-C-3-A
280-106948-B-3-A
280-107015-C-6-A
280-106948-D-6-A

Reagent

8081MirxStkPS_00030

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CERTIFICATE OF ANALYSIS

Catalog No: P-066S
Description: Mirex
Lot: 214031359-03
Solvent: Methanol
Hazards: *Refer to SDS for complete safety information*

Signal Word: Danger

Date Certified: Oct 6, 2017
Expiration: Oct 6, 2021
Sample Size: 1 mL
Components: 1
Storage Condition: Ambient (>5 °C)

Included on ISO/IEC 17025 Scope of Accreditation: Yes

Included on ISO Guide 34 Scope of Accreditation: Yes

Component	CAS #	Purity % (GC/MS)	Prepared Concentration[1] (µg/mL)	Certified Analyte Concentration[2] (µg/mL)
Mirex	2385-85-5	98.9	100.3	99.2

A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot number has had its expiration date extended and is identical to the same lot number without the suffix.

[1] All weights are traceable through NIST, Test No. 822-275872-11

[2] Certified Analyte Concentration = Purity x Prepared Concentration.

The Uncertainty associated with the certified concentration reported on this certificate is ±2.4%. This value is the combined expanded uncertainty and represents an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.

Labels and certificates follow U.S. Conventions in reporting numerical values: A comma (,) is used to separate units of one-thousand or greater. A period (.) is used as a decimal place marker.

The information on this certificate may not be reproduced without the express permission of the manufacturer. See reverse side for additional information

Certified By: Larry Decker, Organic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001:2015

QR-ORG/INO-001
Rev. 4/17

CERTIFICATION REPORT

1. **Quality Documentation:** This certificate is designed in accordance with ISO Guide 31 (Reference Materials - Contents of Certificates and Labels) and ISO Guide 35 (Reference Materials – General and Statistical Principles for Certification).

2. **Quality Standards:**

   ISO Guide 34 - General Requirements for the Competence of Reference Material Producers ANAB Certificate Number AR-1463

   AR-1463

   ISO/IEC 17025 - General Requirements for the Competence of Testing and Calibration Laboratories ANAB Certificate Number AT-1339

   AT-1339

   ISO 9001:2015 - Quality Management System - Requirements Eagle Registrations Certificate Number 3774

3. **Intended Use:** The product covered by this certificate is designed for calibration or for use in quality control procedures for the specified chemical compounds listed on the reverse side. This product can be used for quantification and/or identification. This product can also be used as a reference material to validate analytical procedures, subject to the conditions under Section 11. If dilution is required, use only Class A glassware and diluent compatible with all certified analytes in this preparation. All solutions should be thoroughly mixed prior to use.

4. **Raw Materials:** Reference standards are prepared from the highest quality starting materials with defined purities. All analytes and solvents are obtained from pre-qualified vendors and then analyzed or evaluated prior to use.

5. **Manufacturing:** All balances are calibrated daily using an in-house procedure with weights that are compared annually to master weights and traceable to NIST. The balances are also calibrated annually by an ISO/IEC 17025 accredited calibration laboratory. Please refer to the NIST test number listed on the front of this certificate. Class A glassware is used in the manufacture and quality control of all standards and calibrated using an in-house procedure. Good Laboratory Practices have been used throughout the preparation of this CRM.

6. **Homogeneity Assessment:** Homogeneity of the finished product is assessed by analyzing sample batches or by other methods consistent with the intended use of the product and by procedures that comply with the appropriate Quality System requirements, and ISO Guide 35. This product is sufficiently homogeneous and any sample size would be within the uncertainty budget.

7. **Stability Assessment:** The manufacturer guarantees the stability of this solution through the expiration date stated on the label, when handled and stored according to the conditions stated on the label. To ensure a uniform solution, mix the contents of the sealed container thoroughly prior to use. Care should be taken not to contaminate the contents of the original container.

8. **Analytical Quality Control:** Products are tested by validated analytical methods specified in the manufacturer's quality system.

9. **Uncertainty Statistics and Confidence Limits:** The uncertainty values as stated on the face of this certificate have been determined using the EURACHEM/CITAC Guide. We report a combined expanded uncertainty equal to the positive square root of the total variance of the uncertainty of the components using the following formula: $u_m = \sqrt{(u(P))^2 + (u(m))^2 + (u(V))^2}$. The expanded uncertainty, U_{CRM} assumes a normal distribution and a coverage factor of k=2 is chosen using approximately a 95% confidence level. The U_{CRM} is ±2.4%.

10. **Warranties:** The manufacturer warrants that its products shall conform to the description of such products as provided in its catalog or on the specific product label. This warranty is exclusive, and the manufacturer makes no other warranty, express or implied, including any implied warranty of merchantability or fitness for any particular purpose.

11. **Legal Notice and Limit of Liability:** This product is for routine laboratory analysis and research purposes only. Due to the hazardous nature, only trained personnel should handle this product. The company's liability will be limited to replacement of product or refund of purchase price. Notice of claims must be made within thirty (30) days from date of delivery.

Reagent

8081ToxPS_00034

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CERTIFIED REFERENCE MATERIAL

Certificate of Analysis

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Reference Material Producer
Certificate #3222.01

ACCREDITED
ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32071 **Lot No.:** A0123422

Description : Toxaphene Standard

Toxaphene Standard 5,000 µg/mL, Isooctane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : March 31, 2021 **Storage:** 10°C or colder

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Toxaphene	5,018.0 µg/mL	+/- 29.4484	µg/mL	Gravimetric
	CAS # 8001-35-2 (Lot NT054507)		+/- 159.0403	µg/mL	Unstressed
	Purity ---%		+/- 207.7596	µg/mL	Stressed

Solvent: Isooctane
CAS # 540-84-1
Purity 99%

Column:
30m x .25mm x .2um
Rtx-CLP II (cat.# 11323)

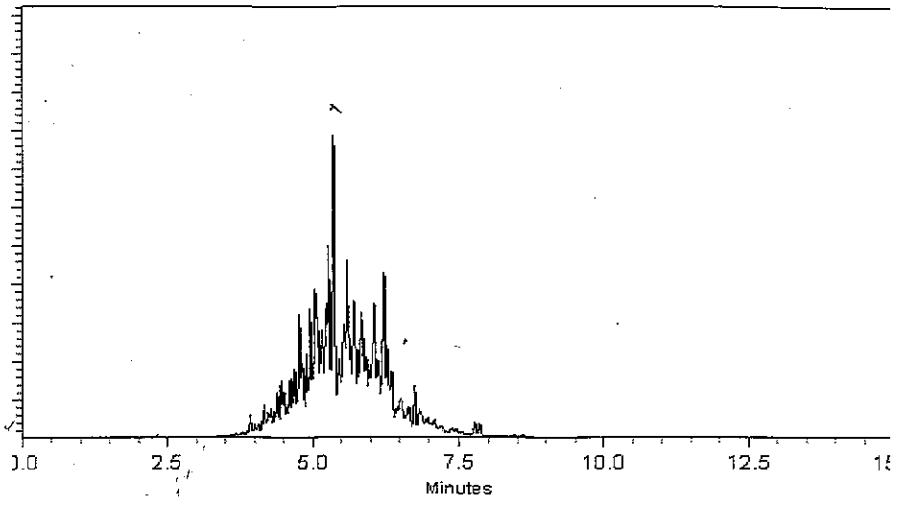
Carrier Gas:
helium-constant pressure 20 psi.

Temp. Program:
200°C to 300°C
@ 25°C/min. (hold 10 min.)

Inj. Temp:
250°C

Det. Temp:
300°C

Det. Type:
ECD



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Cathleen Soltis - Mix Technician

Date Mixed: 12-Dec-2016 **Balance:** B442140311

Diane Shaffer - Operations Tech-ARM QC

Date Passed: 13-Dec-2016

Manufactured under Restek's ISO 9001:2008
Registered Quality System
Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\,stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\,stability} + U^2_{shipping\,stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Reagent

8081ToxSS_00019

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USA

AccuStandard® Inc.

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CERTIFICATE OF ANALYSIS

Catalog No: P-093S-H-10X
Description: Toxaphene Standard
Lot: 215011420
Solvent: Hexane
Hazards: **HIGHLY FLAMMABLE** - *Refer to SDS for safety info*

Danger 2

Date Certified: Jan 30, 2015
Expiration: Jan 30, 2025
Sample Size: 1 mL
Components: 1
Storage Condition: Ambient (>5 °C)

Included on ISO/IEC 17025 Scope of Accreditation: Yes

Included on ISO Guide 34 Scope of Accreditation: Yes

Component	CAS #	Purity % (GC/MS)	Prepared Concentration[1] (µg/mL)	Certified Analyte Concentration[2] (µg/mL)
Toxaphene	8001-35-2	Tech Mix	1001	1001

A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot number has had its expiration date extended and is identical to the same lot number without the suffix.

[1] All weights are traceable through NIST, Test No. 822-275872-11

[2] Certified Analyte Concentration = Purity x Prepared Concentration. The Uncertainty associated with the gravimetric values reported on this certificate is ±0.24%. The CRM Uncertainty calculated for this product is ±5%. These values are the expanded uncertainty and represent an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.

Labels and certificates follow U.S. Conventions in reporting numerical values:
A comma (,) is used to separate units of one-thousand or greater.
A period (.) is used as a decimal place marker.

See reverse side for additional information

Certified By: _____
Larry Decker, Organic QC Manager

Page 1 of 1

For use in routine laboratory analysis.

Reagent

8082LCSSTOCK_00036

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CERTIFIED REFERENCE MATERIAL

Certificate of Analysis

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Reference Material Producer
Certificate #3222.01

ACCREDITED
ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32039 **Lot No.:** A0119290

Description : Aroclor® 1016/1260 Mix

Aroclor® 1016/1260 Mix 1,000 µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : August 31, 2022 **Storage:** 25°C nominal

Handling: This product contains PCBs.

CERTIFIED VALUES

Elution Order	Compound		Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1016 **CAS #** 12674-11-2 **Purity** ----%	(Lot W-125-01)	1,005.0 µg/mL	+/- 5.8567 +/- 31.8448 +/- 41.6041	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
2	Aroclor 1260 **CAS #** 11096-82-5 **Purity** ----%	(Lot W-129-06)	1,007.2 µg/mL	+/- 5.8695 +/- 31.9145 +/- 41.6951	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

8151-SurStock_00094

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Certificate of Analysis

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Certificate #3222.01

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Testing Laboratory
Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 567804 **Lot No.:** A0128506

Description : DCAA Standard

DCAA Standard 1,000 µg/ml, Methanol, 1 ml/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : June 30, 2019 **Storage:** 10°C or colder

Handling: This product is photosensitive.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	2,4-dichlorophenylacetic acid	1,007.0 µg/mL	+/- 5.9813 µg/mL	Gravimetric
	CAS # 19719-28-9 (Lot S30618V)		+/- 53.5730 µg/mL	Unstressed
	Purity 99%		+/- 53.6627 µg/mL	Stressed

Solvent: Methanol
CAS # 67-56-1
Purity 99%

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

k is a coverage factor of 2, which gives a level of confidence of approximately 95%.

- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Reagent

8151_LCS_Stck_00047

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USA

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CERTIFICATE OF ANALYSIS

Catalog No: S-66380
Description: Custom Herbicide Standard
Lot: 216111344
Solvent: Methanol
Hazards: *Refer to SDS for complete safety information*

Signal Word: Danger

Date Certified: Dec 6, 2016
Expiration: Dec 6, 2018
Sample Size: 1 mL
Components: 11
Storage Condition: Refrig (0-5 °C)

Included on ISO/IEC 17025 Scope of Accreditation: Yes

Included on ISO Guide 34 Scope of Accreditation: Yes

Component	CAS #	Purity % (GC/MS)	Prepared Concentration[1] (µg/mL)	Certified Analyte Concentration[2] (µg/mL)
2,4-D	94-75-7	99.1	1005	996
2,4-DB	94-82-6	97.8	1029*	1006
Dichlorprop	120-36-5	98.1	1009	990
Silvex	93-72-1	99.9	1002	1001
Dalapon	75-99-0	90.0	1120*	1008
2,4,5-T	93-76-5	96.5	1036*	1000
Dicamba	1918-00-9	98.0	1009	989
Dinoseb	88-85-7	100.0	1001	1001
Picloram	1918-02-1	100.0	1008	1008
MCPA acid	94-74-6	98.9	10015	9905
MCPP acid	7085-19-0	99.9	10003	9993

* Weight compensated to 100% purity.

A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot number has had its expiration date extended and is identical to the same lot number without the suffix.

[1] All weights are traceable through NIST, Test No. 822-275872-11

[2] Certified Analyte Concentration = Purity x Prepared Concentration.

The Uncertainty associated with the gravimetric values reported on this certificate is ±0.24%. This value is the expanded uncertainty and represents an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.

Labels and certificates follow U.S. Conventions in reporting numerical values: A comma (,) is used to separate units of one-thousand or greater. A period (.) is used as a decimal place marker.

See reverse side for additional information

Certified By: Larry Decker, Organic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

OR-ORG/INO-001
Rev. 5/16

Reagent

8151PCP_Mrkr_00003

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Testing Laboratory
Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32268 **Lot No.:** A0128694

Description : Pentachloroanisole Standard

Pentachloroanisole 1000µg/mL, Methanol, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : June 30, 2019 **Storage:** 10°C or colder

Handling: This product is photosensitive.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	Pentachloroanisole	1,005.0 µg/mL	+/- 10.1241 µg/mL	Gravimetric
	CAS # 1825-21-4 (Lot 5785800)		+/- 34.6759 µg/mL	Unstressed
	Purity 99%		+/- 34.6759 µg/mL	Stressed

Solvent: Methanol
CAS # 67-56-1
Purity 99%

Column:
30m x 0.25mm x 0.25µm
Rtx-5 (cat.#10223)

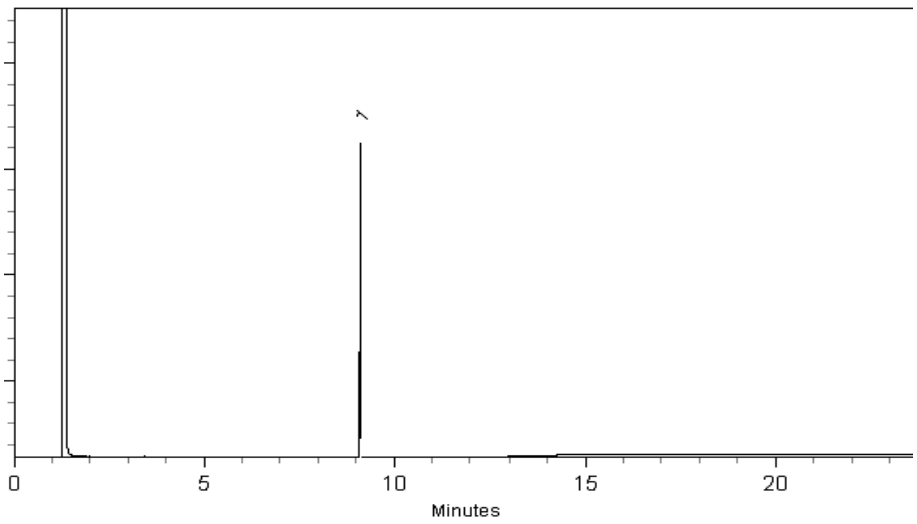
Carrier Gas:
hydrogen-constant pressure 10 psi.

Temp. Program:
75°C (hold 1 min.) to 330°C
@ 20°C/min. (hold 10 min.)

Inj. Temp:
250°C

Det. Temp:
330°C

Det. Type:
FID



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Lane Kibe - Mix Technician

Date Mixed: 26-Jun-2017 **Balance:** B442140311

Diane Shaffer - Operations Tech-ARM QC

Date Passed: 27-Jun-2017

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Reagent

8151ResMix#1_00012

RESTEK®
110 Benner Circle
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Fax: (814)353-1309

www.restek.com

CERTIFIED REFERENCE MATERIAL

Certificate of Analysis

ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32055 **Lot No.:** A0132107

Description : Herbicide Mix #1/ME (Methyl Ester)

Herbicide Mix #1/ME (Methyl Ester) 200 µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : November 30, 2024 **Storage:** 10°C or colder

Handling: This product is photosensitive.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	Dicamba methyl ester **CAS #** 6597-78-0 (Lot 1813500) **Purity** 98%	201.1 µg/mL	+/- 1.4259 µg/mL +/- 6.7876 µg/mL +/- 6.7876 µg/mL	Gravimetric Unstressed Stressed
2	Dichlorprop methyl ester **CAS #** 57153-17-0 (Lot 3917300) **Purity** 99%	202.0 µg/mL	+/- 1.4323 µg/mL +/- 6.8182 µg/mL +/- 6.8182 µg/mL	Gravimetric Unstressed Stressed
3	2,4-D methyl ester **CAS #** 1928-38-7 (Lot 2403400) **Purity** 99%	202.0 µg/mL	+/- 1.4323 µg/mL +/- 6.8182 µg/mL +/- 6.8182 µg/mL	Gravimetric Unstressed Stressed
4	2,4,5-TP (silvex) methyl ester **CAS #** 4841-20-7 (Lot 504400) **Purity** 99%	202.0 µg/mL	+/- 1.4323 µg/mL +/- 6.8182 µg/mL +/- 6.8182 µg/mL	Gravimetric Unstressed Stressed
5	2,4,5-T methyl ester **CAS #** 1928-37-6 (Lot 777400) **Purity** 98%	201.9 µg/mL	+/- 1.4315 µg/mL +/- 6.8141 µg/mL +/- 6.8141 µg/mL	Gravimetric Unstressed Stressed
6	Dinoseb methyl ether **CAS #** 6099-79-2 (Lot 820200) **Purity** 99%	202.0 µg/mL	+/- 1.4323 µg/mL +/- 6.8182 µg/mL +/- 6.8182 µg/mL	Gravimetric Unstressed Stressed
7	2,4-DB methyl ester **CAS #** 18625-12-2 (Lot 3464700) **Purity** 99%	202.0 µg/mL	+/- 1.4323 µg/mL +/- 6.8182 µg/mL +/- 6.8182 µg/mL	Gravimetric Unstressed Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Column:
30m x 0.25mm x 0.25µm
Rtx-5 (cat.#10223)

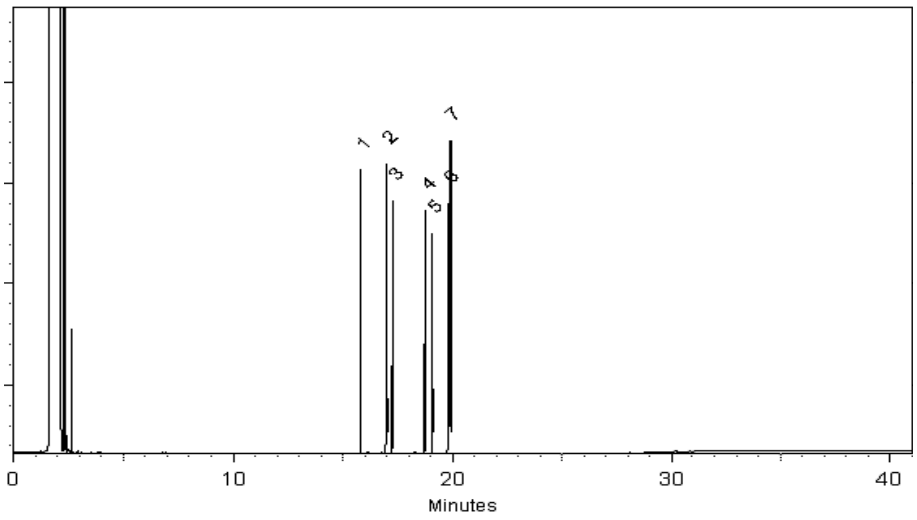
Carrier Gas:
hydrogen-constant pressure 10 psi.

Temp. Program:
40°C (hold 2 min.) to 330°C
@ 10°C/min. (hold 10 min.)

Inj. Temp:
250°C

Det. Temp:
330°C

Det. Type:
FID



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Tom Suckar - Mix Technician

Date Mixed: 02-Nov-2017 **Balance:** 1128360905

Jennifer Pollino - Operations Tech-ARM QC

Date Passed: 06-Nov-2017

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

k is a coverage factor of 2, which gives a level of confidence of approximately 95%.

- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

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25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
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0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Reagent

8151ResMix#2_00011

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CERTIFIED REFERENCE MATERIAL

Certificate of Analysis

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Certificate #3222.01

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Testing Laboratory
Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32057 **Lot No.:** A0124376

Description : Herbicide Mix #2/ME (Methyl Ester)

Herbicide Mix #2/ME (Methyl Ester) 2,000 µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : January 31, 2024 **Storage:** 10°C or colder

Handling: This product is photosensitive.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Dalapon methyl ester	1,988.5 µg/mL	+/- 11.8111	µg/mL	Gravimetric
	CAS # 17640-02-7 (Lot 3903800)		+/- 66.6751	µg/mL	Unstressed
	Purity 97%		+/- 66.6751	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

-9
-10
-11

Reagent

8151ResMix#3_00016

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CERTIFIED REFERENCE MATERIAL

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Certificate #3222.01

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Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32059 **Lot No.:** A0130139

Description : Herbicide Mix #3/ME (Methyl Ester)

Herbicide Mix #3/ME (Methyl Ester) 20,000 µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : August 31, 2024 **Storage:** 10°C or colder

Handling: This product is photosensitive.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	MCPP (Mecoprop) methyl ester **CAS #** 2786-19-8 (Lot 5708400) **Purity** 99%	20,084.0 µg/mL	+/- 185.8611 µg/mL +/- 688.3404 µg/mL +/- 688.3404 µg/mL	Gravimetric Unstressed Stressed
2	MCPA methyl ester **CAS #** 2436-73-9 (Lot 1498500) **Purity** 99%	20,112.0 µg/mL	+/- 186.1202 µg/mL +/- 689.3001 µg/mL +/- 689.3001 µg/mL	Gravimetric Unstressed Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

-12
-13
-14
-15
-16

Reagent

8151StkPicPS_00048

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

Catalog No: P-198S
Description: Picloram Methyl Ester
Lot: 216101091
Solvent: Methanol
Hazards: *Refer to SDS for complete safety information*

Signal Word: Danger

Date Certified: Oct 11, 2016
Expiration: Oct 11, 2019
Sample Size: 1 mL
Components: 1
Storage Condition: Ambient (>5 °C)

Included on ISO/IEC 17025 Scope of Accreditation: Yes

Included on ISO Guide 34 Scope of Accreditation: Yes

Component	CAS #	Purity % (GC/MS)	Prepared Concentration[1] (µg/mL)	Certified Analyte Concentration[2] (µg/mL)
Picloram methyl ester	14143-55-6	99.3	100.6	99.9

A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot number has had its expiration date extended and is identical to the same lot number without the suffix.

[1] All weights are traceable through NIST, Test No. 822-275872-11

[2] Certified Analyte Concentration = Purity x Prepared Concentration.

The Uncertainty associated with the gravimetric values reported on this certificate is ±0.24%. This value is the expanded uncertainty and represents an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.

Labels and certificates follow U.S. Conventions in reporting numerical values: A comma (,) is used to separate units of one-thousand or greater. A period (.) is used as a decimal place marker.

See reverse side for additional information

Certified By: Larry Decker, Organic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

OR-ORG/INO-001
Rev. 7/11

CERTIFICATION REPORT

1. **Quality Documentation:** This certificate is designed in accordance with ISO Guide 31 (Reference Materials - Contents of Certificates and Labels) and ISO Guide 35 (Reference Materials – General and Statistical Principles for Certification).

2. **Quality Standards:**

   ISO Guide 34 - General Requirements for the Competence of Reference Material Producers ANAB Certificate Number AR-1463

   AR-1463

   ISO/IEC 17025 - General Requirements for the Competence of Testing and Calibration Laboratories ANAB Certificate Number AT-1339

   AT-1339

   ISO 9001 - Quality Management System - Requirements Eagle Registrations Certificate Number 3774

3. **Intended Use:** The product covered by this certificate is designed for calibration or for use in quality control procedures for the specified chemical compounds listed on the reverse side. This product can be used for quantification and/or identification. This product can also be used as a reference material to validate analytical procedures, subject to the conditions under Section 11. If dilution is required, use only Class A glassware and diluent compatible with all certified analytes in this preparation. All solutions should be thoroughly mixed prior to use.

4. **Raw Materials:** Reference standards are prepared from the highest quality starting materials with defined purities. All analytes and solvents are obtained from pre-qualified vendors and then analyzed or evaluated prior to use.

5. **Manufacturing:** All balances are calibrated daily using an in-house procedure with weights that are compared annually to master weights and traceable to NIST. The balances are also calibrated annually by an ISO/IEC 17025 accredited calibration laboratory. Please refer to the NIST test number listed on the front of this certificate. Class A glassware is used in the manufacture and quality control of all standards and calibrated using an in-house procedure. Good Laboratory Practices have been used throughout the preparation of this CRM.

6. **Homogeneity Assessment:** Homogeneity of the finished product is assessed by analyzing sample batches or by other methods consistent with the intended use of the product and by procedures that comply with the appropriate Quality System requirements, and ISO Guide 35.

7. **Stability Assessment:** The manufacturer guarantees the stability of this solution through the expiration date stated on the label, when handled and stored according to the conditions stated on the label. To ensure a uniform solution, mix the contents of the sealed container thoroughly prior to use. Care should be taken not to contaminate the contents of the original container.

8. **Analytical Quality Control:** Products are tested by validated analytical methods specified in the manufacturer's quality system.

9. **Uncertainty Statistics and Confidence Limits:** The uncertainty values as stated on the face of this certificate have been determined using the EURACHEM/CITAC Guide. We report a combined expanded uncertainty equal to the positive square root of the total variance of the uncertainty of the components using the following formula: $u_m = \sqrt{(u(P))^2 + (u(m))^2 + (u(V))^2}$. The expanded uncertainty, U_{CRM} assumes a normal distribution and a coverage factor of k=2 is chosen using approximately a 95% confidence level. The U_{CRM} for organic products is ±5%, the U_{CRM} for inorganic products is ±2%.

10. **Warranties:** The manufacturer warrants that its products shall conform to the description of such products as provided in its catalog or on the specific product label. This warranty is exclusive, and the manufacturer makes no other warranty, express or implied, including any implied warranty of merchantability or fitness for any particular purpose.

11. **Legal Notice and Limit of Liability:** This product is for routine laboratory analysis and research purposes only. Due to the hazardous nature, only trained personnel should handle this product. The company's liability will be limited to replacement of product or refund of purchase price. Notice of claims must be made within thirty (30) days from date of delivery.

Reagent

8151StkSurr_00063

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CERTIFICATE OF ANALYSIS

Catalog No: M-515-SS
Description: 2,4-Dichlorophenylacetic methyl ester
Lot: 217031077
Solvent: Methyl tert-butyl ether (MtBE)
Hazards: *Refer to SDS for complete safety information*

Signal Word: Danger

Date Certified: Mar 6, 2017
Expiration: Mar 6, 2019
Sample Size: 1 mL
Components: 1
Storage Condition: Ambient (>5 °C)

Included on ISO/IEC 17025 Scope of Accreditation: Yes

Included on ISO Guide 34 Scope of Accreditation: Yes

Component	CAS #	Purity % (GC/MS)	Prepared Concentration[1] (µg/mL)	Certified Analyte Concentration[2] (µg/mL)
Methyl-2,4-Dichlorophenylacetate	55954-23-9	98.8	100.9	99.7

5 vials

KPK 011718

A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot number has had its expiration date extended and is identical to the same lot number without the suffix.

[1] All weights are traceable through NIST, Test No. 822-275872-11

[2] Certified Analyte Concentration = Purity x Prepared Concentration.

The Uncertainty associated with the gravimetric values reported on this certificate is ±0.24%. This value is the expanded uncertainty and represents an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.

Labels and certificates follow U.S. Conventions in reporting numerical values: A comma (,) is used to separate units of one-thousand or greater. A period (.) is used as a decimal place marker.

See reverse side for additional information

Certified By: Larry Decker, Organic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001:2015

QR-ORG/INO-001
Rev. 4/17

Reagent

8151StkSurr_00066

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

Catalog No: M-515-SS
Description: 2,4-Dichlorophenylacetic methyl ester
Lot: 215041203-02
Solvent: Methyl tert-butyl ether (MtBE)
Hazards: *Refer to SDS for complete safety information*

Signal Word: Danger

Date Certified: Mar 20, 2018
Expiration: Apr 20, 2020
Sample Size: 1 mL
Components: 1
Storage Condition: Ambient (>5 °C)

Included on ISO/IEC 17025 Scope of Accreditation: Yes

Included on ISO Guide 34 Scope of Accreditation: Yes

Component	CAS #	Purity % (GC/MS)	Prepared Concentration[1] (µg/mL)	Certified Analyte Concentration[2] (µg/mL)
Methyl-2,4-Dichlorophenylacetate	55954-23-9	98.8	100.3	99.1

RECEIVED
03.28.18
KOK

A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot number has had its expiration date extended and is identical to the same lot number without the suffix.

[1] All weights are traceable through NIST, Test No. 822-275872-11

[2] Certified Analyte Concentration = Purity x Prepared Concentration.

The Uncertainty associated with the certified concentration reported on this certificate is ±2.4%. This value is the combined expanded uncertainty and represents an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.

Labels and certificates follow U.S. Conventions in reporting numerical values: A comma (,) is used to separate units of one-thousand or greater. A period (.) is used as a decimal place marker.

The information on this certificate may not be reproduced without the express permission of the manufacturer. See reverse side for additional information

Certified By: Larry Decker, Organic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001:2015

QR-ORG/INO-001
Rev. 4/17

Reagent

8151Surrogate_00164

Report Date: 18-Jul-2018 15:55:56 Chrom Revision: 2.2 07-Jun-2018 07:41:54

Preliminary Report

TestAmerica Denver

Recovery Report

Data File: \\ChromNA\Denver\ChromData\SGC_M\20180717-72046.b\07170007.D
Lims ID: 8151Surrogate 00164
Client ID:
Sample Type: Client
Inject. Date: 17-Jul-2018 15:09:16 ALS Bottle#: 7 Worklist Smp#: 7
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: 8151Surrogate 00
Misc. Info.: 280-0072046-007
Operator ID: CSM Instrument ID: SGC_M

Method: \\ChromNA\Denver\ChromData\SGC_M\20180717-72046.b\8151_615.m
Limit Group: GCSV - 8151
Method Label: 8151A: Herbicides: DV-GC-0022
Last Update: 18-Jul-2018 08:44:32 Calib Date: 06-Jul-2018 14:19:26
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_M\20180706-71714.b\07060009.D

Column 1 : CLP1 Pesticides Column 1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 Pesticides Column 2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0307

First Level Reviewer: mardickc Date: 17-Jul-2018 15:24:44

Surrogate Recovery, Detector: GC ECD1A

Compound	Amount Added	Amount Recovered	% Rec.
$ 3 2,4-Dichlorophenylacetic acid	0.2500	0.2244	89.76

Surrogate Recovery, Detector: GC ECD2B

Compound	Amount Added	Amount Recovered	% Rec.
$ 3 2,4-Dichlorophenylacetic acid	0.2500	0.2424	96.98

ok
csm
7-18-18

Reagent

8270 TCLP Stk_00075

Certificate of Composition

DESCRIPTION: TEST AMERICA INC.

QUOTE 22266359 LOT NO.: LC26210V EXPIRATION DATE: Apr-2019

SOLVENT: METHANOL 85 %
DICHLOROMETHANE 15 %

ANALYTE (1)	CAS NUMBER	PERCENT PURITY (2)	WEIGHT CONCENTRATION (3)			SUPELCO LOT NO
HEXACHLOROBENZENE	118-74-1	99.2	200.0	+/-	1.00	LB99528
HEXACHLOROBUTADIENE	87-68-3	96.6	500.4	+/-	2.50	LC19488
HEXACHLOROETHANE	67-72-1	99.4	500.0	+/-	2.50	LB29072
NITROBENZENE	98-95-3	99.9	501.0	+/-	2.51	LB47070
PENTACHLOROPHENOL	87-86-5	97.5	1001	+/-	5.0	LC17897
PYRIDINE (LOW WATER)	110-86-1	99.9	500.0	+/-	2.50	LC15471
1,4-DICHLOROBENZENE	106-46-7	99.9	501.0	+/-	2.51	LB90630
2-METHYLPHENOL	95-48-7	99.9	500.0	+/-	2.50	LB91878
2,4-DINITROTOLUENE	121-14-2	97.8	200.5	+/-	1.00	LB46632
2,4,5-TRICHLOROPHENOL	95-95-4	99.7	500.0	+/-	2.50	LB35288
2,4,6-TRICHLOROPHENOL	88-06-2	99.9	500.0	+/-	2.50	LB65559
3-METHYLPHENOL	108-39-4	99.8	500.0	+/-	2.50	LB83715
4-METHYLPHENOL	106-44-5	99.8	500.0	+/-	2.50	LB32518

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, based upon balance and Class A volumetric glassware tolerances. Weights are corrected for analytes less than 98% pure.

Duane Funk

Duane Funk
Quality Manager

Supelco warrants that its products conform to the information contained in this publication. Purchaser must determine the suitability of the product for its particular use. Please see the latest catalog or order invoice and packing slip for additional terms and conditions of sale.
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Reagent

8270 TCLP Stk_00077

Certificate of Composition

DESCRIPTION: TEST AMERICA INC.

QUOTE 22266359 LOT NO.: LC26210V EXPIRATION DATE: Apr-2019

SOLVENT: METHANOL 85 %
DICHLOROMETHANE 15 %

ANALYTE (1)	CAS NUMBER	PERCENT PURITY (2)	WEIGHT CONCENTRATION (3)			SUPELCO LOT NO
HEXACHLOROBENZENE	118-74-1	99.2	200.0	+/-	1.00	LB99528
HEXACHLOROBUTADIENE	87-68-3	96.6	500.4	+/-	2.50	LC19488
HEXACHLOROETHANE	67-72-1	99.4	500.0	+/-	2.50	LB29072
NITROBENZENE	98-95-3	99.9	501.0	+/-	2.51	LB47070
PENTACHLOROPHENOL	87-86-5	97.5	1001	+/-	5.0	LC17897
PYRIDINE (LOW WATER)	110-86-1	99.9	500.0	+/-	2.50	LC15471
1,4-DICHLOROBENZENE	106-46-7	99.9	501.0	+/-	2.51	LB90630
2-METHYLPHENOL	95-48-7	99.9	500.0	+/-	2.50	LB91878
2,4-DINITROTOLUENE	121-14-2	97.8	200.5	+/-	1.00	LB46632
2,4,5-TRICHLOROPHENOL	95-95-4	99.7	500.0	+/-	2.50	LB35288
2,4,6-TRICHLOROPHENOL	88-06-2	99.9	500.0	+/-	2.50	LB65559
3-METHYLPHENOL	108-39-4	99.8	500.0	+/-	2.50	LB83715
4-METHYLPHENOL	106-44-5	99.8	500.0	+/-	2.50	LB32518

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, based upon balance and Class A volumetric glassware tolerances. Weights are corrected for analytes less than 98% pure.

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Certificate #3222.01

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Testing Laboratory
Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 567685 **Lot No.:** A0133251

Description : 8270 Surrogate Standard

8270 Surrogate Standard 5,000µg/mL, Methylene chloride, 5mL/ampul

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : December 31, 2022 **Storage:** 10°C or colder

Handling: Sonicate prior to use.

CERTIFIED VALUES

Elution Order	Compound		Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	2-Fluorophenol		5,038.1 µg/mL	+/- 29.2918 µg/mL		Gravimetric
	CAS # 367-12-4	(Lot STBD7945V)		+/- 147.0277 µg/mL		Unstressed
	Purity 99%			+/- 178.4124 µg/mL		Stressed
2	Phenol-d5		5,031.4 µg/mL	+/- 29.2530 µg/mL		Gravimetric
	CAS # 4165-62-2	(Lot X-479)		+/- 146.8331 µg/mL		Unstressed
	Purity 99%			+/- 178.1763 µg/mL		Stressed
3	Nitrobenzene-d5		5,017.5 µg/mL	+/- 29.1720 µg/mL		Gravimetric
	CAS # 4165-60-0	(Lot PR-25462)		+/- 146.4265 µg/mL		Unstressed
	Purity 99%			+/- 177.6829 µg/mL		Stressed
4	2-Fluorobiphenyl		5,017.5 µg/mL	+/- 29.1720 µg/mL		Gravimetric
	CAS # 321-60-8	(Lot Z20C043)		+/- 146.4265 µg/mL		Unstressed
	Purity 99%			+/- 177.6829 µg/mL		Stressed
5	2,4,6-Tribromophenol		5,043.2 µg/mL	+/- 29.3216 µg/mL		Gravimetric
	CAS # 118-79-6	(Lot 29699MJV)		+/- 147.1775 µg/mL		Unstressed
	Purity 99%			+/- 178.5942 µg/mL		Stressed
6	p-Terphenyl-d14		5,030.3 µg/mL	+/- 29.2464 µg/mL		Gravimetric
	CAS # 1718-51-0	(Lot PR-27278)		+/- 146.8000 µg/mL		Unstressed
	Purity 99%			+/- 178.1362 µg/mL		Stressed

Solvent: Methylene chloride
CAS # 75-09-2
Purity 99%

Tech Tips:
Due to the limited solubility of p-terphenyl-d14 in methanol, we do not recommend that this mixture be diluted in methanol.

Column:
30m x 0.25mm x 0.25µm
Rtx-5 (cat.#10223)

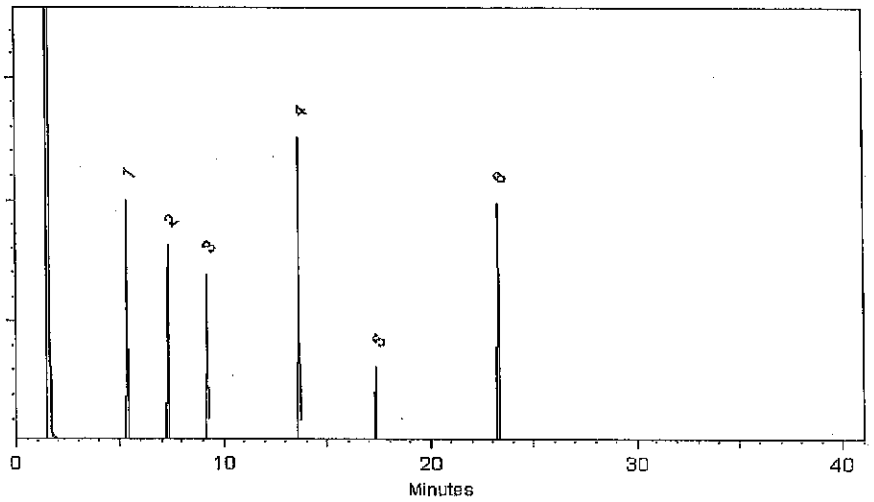
Carrier Gas:
hydrogen-constant pressure 10 psi.

Temp. Program:
40°C (hold 2 min.) to 330°C
@ 10°C/min. (hold 10 min.)

Inj. Temp:
250°C

Det. Temp:
330°C

Det. Type:
FID



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Matt Fragassi - Mix Technician

Date Mixed: 12-Dec-2017 **Balance:** B442140311

Jennifer Pollino - Operations Tech-ARM QC

Date Passed: 14-Dec-2017

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Reagent

8270SurStkHL_00276

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FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 567685 **Lot No.:** A0133251

Description : 8270 Surrogate Standard

8270 Surrogate Standard 5,000µg/mL, Methylene chloride, 5mL/ampul

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : December 31, 2022 **Storage:** 10°C or colder

Handling: Sonicate prior to use.

CERTIFIED VALUES

Elution Order	Compound		Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	2-Fluorophenol		5,038.1 µg/mL	+/- 29.2918 µg/mL		Gravimetric
	CAS # 367-12-4	(Lot STBD7945V)		+/- 147.0277 µg/mL		Unstressed
	Purity 99%			+/- 178.4124 µg/mL		Stressed
2	Phenol-d5		5,031.4 µg/mL	+/- 29.2530 µg/mL		Gravimetric
	CAS # 4165-62-2	(Lot X-479)		+/- 146.8331 µg/mL		Unstressed
	Purity 99%			+/- 178.1763 µg/mL		Stressed
3	Nitrobenzene-d5		5,017.5 µg/mL	+/- 29.1720 µg/mL		Gravimetric
	CAS # 4165-60-0	(Lot PR-25462)		+/- 146.4265 µg/mL		Unstressed
	Purity 99%			+/- 177.6829 µg/mL		Stressed
4	2-Fluorobiphenyl		5,017.5 µg/mL	+/- 29.1720 µg/mL		Gravimetric
	CAS # 321-60-8	(Lot Z20C043)		+/- 146.4265 µg/mL		Unstressed
	Purity 99%			+/- 177.6829 µg/mL		Stressed
5	2,4,6-Tribromophenol		5,043.2 µg/mL	+/- 29.3216 µg/mL		Gravimetric
	CAS # 118-79-6	(Lot 29699MJV)		+/- 147.1775 µg/mL		Unstressed
	Purity 99%			+/- 178.5942 µg/mL		Stressed
6	p-Terphenyl-d14		5,030.3 µg/mL	+/- 29.2464 µg/mL		Gravimetric
	CAS # 1718-51-0	(Lot PR-27278)		+/- 146.8000 µg/mL		Unstressed
	Purity 99%			+/- 178.1362 µg/mL		Stressed

Solvent: Methylene chloride
CAS # 75-09-2
Purity 99%

Tech Tips:
Due to the limited solubility of p-terphenyl-d14 in methanol, we do not recommend that this mixture be diluted in methanol.

Column:
30m x 0.25mm x 0.25µm
Rtx-5 (cat.#10223)

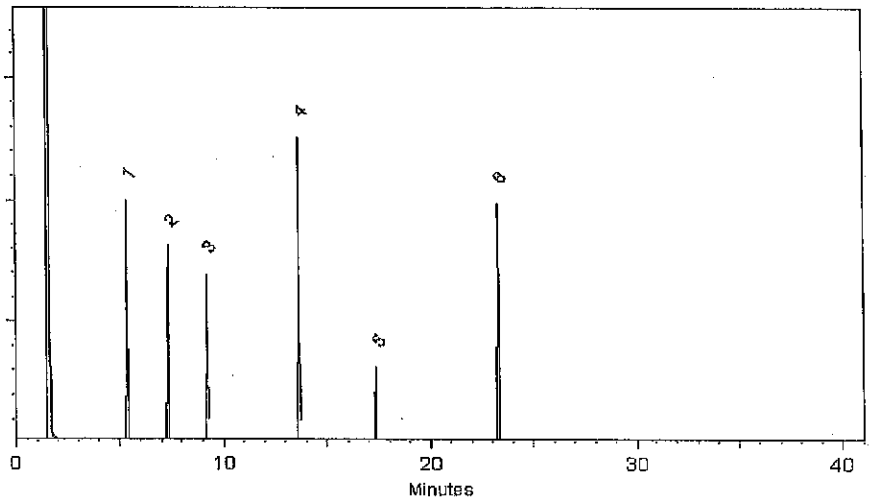
Carrier Gas:
hydrogen-constant pressure 10 psi.

Temp. Program:
40°C (hold 2 min.) to 330°C
@ 10°C/min. (hold 10 min.)

Inj. Temp:
250°C

Det. Temp:
330°C

Det. Type:
FID



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Matt Fragassi - Mix Technician

Date Mixed: 12-Dec-2017 **Balance:** B442140311

Jennifer Pollino - Operations Tech-ARM QC

Date Passed: 14-Dec-2017

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Reagent

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This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 567685 **Lot No.:** A0133251

Description : 8270 Surrogate Standard

8270 Surrogate Standard 5,000µg/mL, Methylene chloride, 5mL/ampul

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : December 31, 2022 **Storage:** 10°C or colder

Handling: Sonicate prior to use.

CERTIFIED VALUES

Elution Order	Compound		Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	2-Fluorophenol		5,038.1 µg/mL	+/- 29.2918 µg/mL		Gravimetric
	CAS # 367-12-4	(Lot STBD7945V)		+/- 147.0277 µg/mL		Unstressed
	Purity 99%			+/- 178.4124 µg/mL		Stressed
2	Phenol-d5		5,031.4 µg/mL	+/- 29.2530 µg/mL		Gravimetric
	CAS # 4165-62-2	(Lot X-479)		+/- 146.8331 µg/mL		Unstressed
	Purity 99%			+/- 178.1763 µg/mL		Stressed
3	Nitrobenzene-d5		5,017.5 µg/mL	+/- 29.1720 µg/mL		Gravimetric
	CAS # 4165-60-0	(Lot PR-25462)		+/- 146.4265 µg/mL		Unstressed
	Purity 99%			+/- 177.6829 µg/mL		Stressed
4	2-Fluorobiphenyl		5,017.5 µg/mL	+/- 29.1720 µg/mL		Gravimetric
	CAS # 321-60-8	(Lot Z20C043)		+/- 146.4265 µg/mL		Unstressed
	Purity 99%			+/- 177.6829 µg/mL		Stressed
5	2,4,6-Tribromophenol		5,043.2 µg/mL	+/- 29.3216 µg/mL		Gravimetric
	CAS # 118-79-6	(Lot 29699MJV)		+/- 147.1775 µg/mL		Unstressed
	Purity 99%			+/- 178.5942 µg/mL		Stressed
6	p-Terphenyl-d14		5,030.3 µg/mL	+/- 29.2464 µg/mL		Gravimetric
	CAS # 1718-51-0	(Lot PR-27278)		+/- 146.8000 µg/mL		Unstressed
	Purity 99%			+/- 178.1362 µg/mL		Stressed

Solvent: Methylene chloride
CAS # 75-09-2
Purity 99%

Tech Tips:
Due to the limited solubility of p-terphenyl-d14 in methanol, we do not recommend that this mixture be diluted in methanol.

Column:
30m x 0.25mm x 0.25µm
Rtx-5 (cat.#10223)

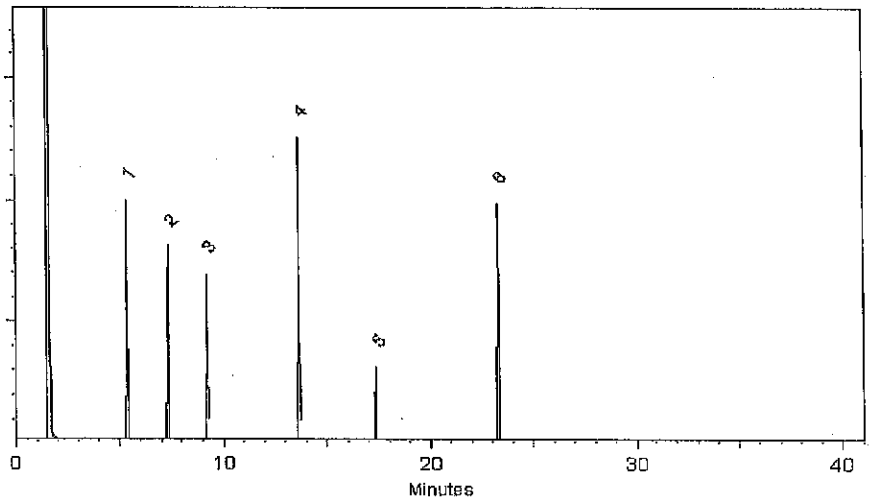
Carrier Gas:
hydrogen-constant pressure 10 psi.

Temp. Program:
40°C (hold 2 min.) to 330°C
@ 10°C/min. (hold 10 min.)

Inj. Temp:
250°C

Det. Temp:
330°C

Det. Type:
FID



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Matt Fragassi - Mix Technician

Date Mixed: 12-Dec-2017 **Balance:** B442140311

Jennifer Pollino - Operations Tech-ARM QC

Date Passed: 14-Dec-2017

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Reagent

8270SurStkHL_00278

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Catalog No. : 567685 **Lot No.:** A0133251

Description : 8270 Surrogate Standard

8270 Surrogate Standard 5,000µg/mL, Methylene chloride, 5mL/ampul

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : December 31, 2022 **Storage:** 10°C or colder

Handling: Sonicate prior to use.

CERTIFIED VALUES

Elution Order	Compound		Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	2-Fluorophenol		5,038.1 µg/mL	+/- 29.2918 µg/mL		Gravimetric
	CAS # 367-12-4	(Lot STBD7945V)		+/- 147.0277 µg/mL		Unstressed
	Purity 99%			+/- 178.4124 µg/mL		Stressed
2	Phenol-d5		5,031.4 µg/mL	+/- 29.2530 µg/mL		Gravimetric
	CAS # 4165-62-2	(Lot X-479)		+/- 146.8331 µg/mL		Unstressed
	Purity 99%			+/- 178.1763 µg/mL		Stressed
3	Nitrobenzene-d5		5,017.5 µg/mL	+/- 29.1720 µg/mL		Gravimetric
	CAS # 4165-60-0	(Lot PR-25462)		+/- 146.4265 µg/mL		Unstressed
	Purity 99%			+/- 177.6829 µg/mL		Stressed
4	2-Fluorobiphenyl		5,017.5 µg/mL	+/- 29.1720 µg/mL		Gravimetric
	CAS # 321-60-8	(Lot Z20C043)		+/- 146.4265 µg/mL		Unstressed
	Purity 99%			+/- 177.6829 µg/mL		Stressed
5	2,4,6-Tribromophenol		5,043.2 µg/mL	+/- 29.3216 µg/mL		Gravimetric
	CAS # 118-79-6	(Lot 29699MJV)		+/- 147.1775 µg/mL		Unstressed
	Purity 99%			+/- 178.5942 µg/mL		Stressed
6	p-Terphenyl-d14		5,030.3 µg/mL	+/- 29.2464 µg/mL		Gravimetric
	CAS # 1718-51-0	(Lot PR-27278)		+/- 146.8000 µg/mL		Unstressed
	Purity 99%			+/- 178.1362 µg/mL		Stressed

Solvent: Methylene chloride
CAS # 75-09-2
Purity 99%

Tech Tips:
Due to the limited solubility of p-terphenyl-d14 in methanol, we do not recommend that this mixture be diluted in methanol.

Column:
30m x 0.25mm x 0.25µm
Rtx-5 (cat.#10223)

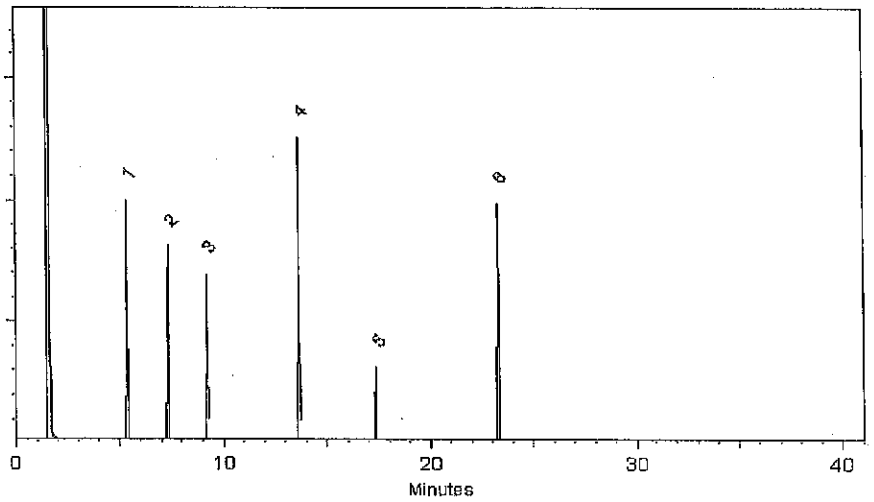
Carrier Gas:
hydrogen-constant pressure 10 psi.

Temp. Program:
40°C (hold 2 min.) to 330°C
@ 10°C/min. (hold 10 min.)

Inj. Temp:
250°C

Det. Temp:
330°C

Det. Type:
FID



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Matt Fragassi - Mix Technician

Date Mixed: 12-Dec-2017 **Balance:** B442140311

Jennifer Pollino - Operations Tech-ARM QC

Date Passed: 14-Dec-2017

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Reagent

ANALYTES B_00014

Reference Materials Producer
Cert #2495.01

SPEXertificate®

Certificate of Reference Material

Chemical Testing
Cert #2495.02

Catalog Number: INT-B1 **Lot No.** 5-177MKBY

Description: Analytes B

Matrix: 5% HNO_3

This **ASSURANCE®** Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for analytical instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

The CRM is prepared from high purity single element concentrates of individual elements using Class A laboratory ware to give precise concentrations. See side 2 for details of certification.

Instrumental Analysis by ICP Spectrometer:

Analyte	Labeled	Certified	Uncertainty	SRM	Analyte	Labeled	Certified	Uncertainty	SRM
Ag	100 µg/mL	99.1 µg/mL	±0.5 µg/mL	3151*	Be	50 µg/mL	49.6 µg/mL	±0.3 µg/mL	3105a*
Cd	100 µg/mL	98.9 µg/mL	±0.5 µg/mL	3108*	Co	50 µg/mL	49.4 µg/mL	±0.3 µg/mL	3113*
Ni	100 µg/mL	98.9 µg/mL	±0.5 µg/mL	3136*	Cr	50 µg/mL	49.6 µg/mL	±0.3 µg/mL	3112a*
Pb	100 µg/mL	99.1 µg/mL	±0.5 µg/mL	3128*	Cu	50 µg/mL	49.8 µg/mL	±0.3 µg/mL	3114*
Zn	100 µg/mL	98.9 µg/mL	±0.5 µg/mL	3168a*	Mn	50 µg/mL	49.3 µg/mL	±0.3 µg/mL	3132*
Ba	50 µg/mL	49.3 µg/mL	±0.3 µg/mL	3104a*	V	50 µg/mL	49.8 µg/mL	±0.3 µg/mL	3165*

* - indicates NIST SRM † - indicates SPEX CertiPrep CRM (when NIST SRM is not available)

SPEX CertiPrep Reference Multi: Lot# 9-164YP, 12-03YP

5078581
ID: ANALYTES B_00014
Exp: 04/01/18 Prpd: SJS
ICP ANALYTES B SPEX

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable and accurate to ±0.5% of the certified (measured) value. This includes uncertainty components due to preparation, measurement, homogeneity, and short-term and long-term stability. No measured concentration of any individual component exceeds ±2% of the labeled value. This guarantee is valid for a period of one year from the date of certification only when the material is unopened and stored under ambient laboratory conditions.

Date of Certification: APR · 2018 Certifying Officer: Kathleen Cullen

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Report of Certification

This Certified Reference Material (CRM) has been prepared and certified under an ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 quality system consistent with the following guides:

- ISO 9001: Quality management systems – Requirements – certified by UL-DQS
- ISO 17025: General requirements for the competence of testing and calibration laboratories – accredited by A2LA
- ISO Guide 34: General requirements for the competence of reference material producers – accredited by A2LA
- ISO Guide 31: Reference Materials – Contents of certificates and labels
- ISO Guide 35: Reference Materials – General & Statistical Principals for Certification
- Guide To The Expression Of Uncertainty In Measurement 1997
- EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
- ASTM Guide D6362-98
- NIST Technical Note 1297
- ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
- ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

Instructions for Use:

Primary usage of this CRM is in neat form or diluted serially with matrix of a purity at or greater than the purity of the original matrix solution. If dilution is required the diluent must be compatible with all certified analytes and contain stabilizers appropriate for the period of intended use. The CRM can also be used as a spike or with a spike, again with appropriate compatibility considerations. All solutions should be thoroughly mixed, by shaking, prior to use and never pipetted directly from the bottle. All surfaces that come in contact with the solution must be thoroughly cleaned and leached prior to use. Dilutions should be performed only with Class A volumetric glassware.

Method of Preparation:

Clean laboratory procedures and techniques have been used throughout the preparation. All materials, equipment, analytical instrumentation and personnel have been qualified prior to use. The highest purity acids applicable, 18 megohm, double deionized water, acid-leached triple-rinsed bottles (where appropriate), and Class A/calibrated volumetrics have been used in all preparations.

Homogeneity:

The homogeneity of the CRM has been confirmed by procedures consistent with ISO 17025:2005, ISO Guide 34:2009, and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed to prove homogeneity in accordance with our internal procedure 4600-HOMOGEN-1A. Since the product is highly homogeneous, any sample size taken for analysis would be within the uncertainty budget. This is consistent with the intended use of the CRM.

Statistical Estimator and Confidence Limits:

The certified value 'X' listed on the reverse of this document is at the 95% level of confidence and can be expressed as:

- $X = x \pm U$ where X = certified value, U = expanded uncertainty, x = property value
- $U = ku_c$ where $k = 2$ is the coverage factor at the 95% confidence level
- u_c is obtained by combining the individual element standard uncertainty components u_i, and $u_c = \sqrt{\sum u_i^2}$

Certification Traveler Report:

All certified values reported were derived from the Traveler Report (SPEX CertiPrep's traceability documentation) identified by the lot number of this CRM. During the stated period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

Legal Notice:

SPEX CertiPrep reference materials are not for any cosmetic, drug or household application and are to be used only by qualified individuals who are trained in appropriate procedures. No claims against SPEX CertiPrep, LLC of any kind whatsoever, whether based on breach of warranty, alleged negligence, or otherwise, with respect to this Reference Material shall be greater than the purchase price. In no event shall SPEX CertiPrep, LLC be liable for any loss of profits or any incidental, special, or consequential damages.

Reagent

AR_1016_RES_00012

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CERTIFIED REFERENCE MATERIAL

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ilac-MRA ACCREDITED ISO/IEC 17025 Accredited Testing Laboratory Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32006 **Lot No.:** A0122038

Description : Aroclor® 1016 Standard

Aroclor 1016 1000µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : January 31, 2023 **Storage:** 25°C nominal

Handling: This product contains PCBs.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1016	1,003.0 µg/mL	+/- 5.8862	µg/mL	Gravimetric
	CAS # 12674-11-2 (Lot W-125-04)		+/- 31.7890	µg/mL	Unstressed
	Purity ----%		+/- 41.5271	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_1221_RES_00011

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This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32007 **Lot No.:** A0123714

Description : Aroclor® 1221 Standard

Aroclor® 1221 Standard 1,000 µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : March 31, 2023 **Storage:** 25°C nominal

Handling: This product contains PCBs.

C E R T I F I E D V A L U E S

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1221	1,007.0 µg/mL	+/- 5.9813	µg/mL	Gravimetric
	CAS # 11104-28-2 (Lot 2781200)		+/- 31.9292	µg/mL	Unstressed
	Purity ----%		+/- 41.7029	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_1221_RESss_00010

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This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32007.sec **Lot No.:** A0117382

Description : Aroclor® 1221 Standard

Aroclor® 1221 Standard 1,000 µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : May 31, 2022 **Storage:** 25°C nominal

Handling: This product contains PCBs.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1221	1,000.0 µg/mL	+/- 10.0737	µg/mL	Gravimetric
	CAS # 11104-28-2.SEC (Lot W-126-07)		+/- 32.7345	µg/mL	Unstressed
	Purity ----%		+/- 42.2047	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_1232_RES_00012

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FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32008 **Lot No.:** A0124534

Description : Aroclor® 1232 Standard

Aroclor® 1232 Standard 1,000 µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : April 30, 2023 **Storage:** 25°C nominal

Handling: This product contains PCBs.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1232	1,000.0 µg/mL	+/- 5.9397	µg/mL	Gravimetric
	CAS # 11141-16-5 (Lot W-107-05)		+/- 31.7072	µg/mL	Unstressed
	Purity ----%		+/- 41.4130	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_1232_RESss_00010

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This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32008.sec **Lot No.:** A095877

Description : Aroclor® 1232 Standard

Aroclor® 1232 Standard 1,000 µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : September 30, 2019 **Storage:** 25°C nominal

Handling: This product contains PCBs.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1232	1,000.0 µg/mL	+/- 5.9397	µg/mL	Gravimetric
	CAS # 11141-16-5.SEC (Lot 130604JLM)		+/- 20.8959	µg/mL	Unstressed
	Purity ----%		+/- 34.3792	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_1242_RES_00011

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This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32009 **Lot No.:** A0124535

Description : Aroclor® 1242 Standard

Aroclor® 1242 Standard 1,000 µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : April 30, 2023 **Storage:** 25°C nominal

Handling: This product contains PCBs.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1242	1,002.0 µg/mL	+/- 5.9516	µg/mL	Gravimetric
	CAS # 53469-21-9 (Lot 01141-A)		+/- 31.7706	µg/mL	Unstressed
	Purity ----%		+/- 41.4958	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_1242_RESss_00010

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This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32009.SEC **Lot No.:** A0105175

Description : Aroclor® 1242 Standard

Aroclor® 1242 Standard 1,000 µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : November 30, 2020 **Storage:** 25°C nominal

Handling: This product contains PCB's

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1242	1,000.0 µg/mL	+/- 10.0737 µg/mL		Gravimetric
	CAS # 53469-21-9.SEC (Lot NTO1020)		+/- 32.1814 µg/mL		Unstressed
	Purity ----%		+/- 42.2011 µg/mL		Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_1248_RES_00011

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FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32010 **Lot No.:** A0121842

Description : Aroclor® 1248 Standard

Aroclor® 1248 Standard 1,000µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : December 31, 2022 **Storage:** 25°C nominal

Handling: This product contains PCBs.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1248	996.8 µg/mL	+/- 5.8498	µg/mL	Gravimetric
	CAS # 12672-29-6 (Lot 07)		+/- 31.5925	µg/mL	Unstressed
	Purity ----%		+/- 41.2704	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_1248_RESss_00010

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FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32010.SEC **Lot No.:** A0124143

Description : Aroclor® 1248 Standard

Aroclor® 1248 Standard 1,000µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : April 30, 2023 **Storage:** 25°C nominal

Handling: This product contains PCBs.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1248	1,008.0 µg/mL	+/- 5.9872	µg/mL	Gravimetric
	CAS # 12672-29-6.SEC (Lot 106-248)		+/- 31.9609	µg/mL	Unstressed
	Purity ----%		+/- 41.7443	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_1254_RES_00011

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FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32011 **Lot No.:** A0125350

Description : Aroclor® 1254 Standard

Aroclor® 1254 Standard 1,000 µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : May 31, 2023 **Storage:** 25°C nominal

Handling: This product contains PCBs.

CERTIFIED VALUES

Elution Order	Compound		Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1254		1,005.6 µg/mL	+/- 5.9014	µg/mL	Gravimetric
	CAS # 11097-69-1	(Lot 124-191-B)		+/- 31.8715	µg/mL	Unstressed
	Purity ----%			+/- 41.6347	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_1254_RESss_00010

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Certificate #3222.01

Certificate of Analysis

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Testing Laboratory
Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32011.SEC **Lot No.:** A0105373

Description : Aroclor® 1254 Standard

Aroclor® 1254 Standard 1,000 µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : November 30, 2020 **Storage:** 25°C nominal

Handling: This product contains PCB's

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1254	1,004.0 µg/mL	+/- 10.1140	µg/mL	Gravimetric
	CAS # 11097-69-1.SEC (Lot RM00922)		+/- 32.3101	µg/mL	Unstressed
	Purity ----%		+/- 42.3699	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_1260_RES_00014

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FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32012 **Lot No.:** A0122906

Description : Aroclor® 1260 Standard

Aroclor 1260 1000µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : February 28, 2023 **Storage:** 25°C nominal

Handling: This product contains PCBs.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1260	1,003.2 µg/mL	+/- 5.8873	µg/mL	Gravimetric
	CAS # 11096-82-5 (Lot W-129-06)		+/- 31.7954	µg/mL	Unstressed
	Purity ----%		+/- 41.5354	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_1262_RES_00012

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FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32409 **Lot No.:** A0127459

Description : Aroclor® 1262 Standard

Aroclor® 1262 Standard 1,000 µg/mL, 1mL/ampul, Hexane

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : August 31, 2023 **Storage:** 25°C nominal

Handling: This product contains PCBs.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1262	1,008.0 µg/mL	+/- 5.9872	µg/mL	Gravimetric
	CAS # 37324-23-5 (Lot 3067100)		+/- 31.9609	µg/mL	Unstressed
	Purity ----%		+/- 41.7443	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_1262_RESss_00010

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Certificate of Analysis

FOR LABORATORY USE ONLY-READ MSDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32409.sec **Lot No.:** A094156

Description : Aroclor® 1262 Standard

Aroclor® 1262 Standard 1,000 µg/mL, 1mL/ampul, Hexane

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : June 2019 **Storage:** 25°C nominal

Handling: This product contains PCB's

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1262	1,000.0 µg/mL	+/- 5.9397	µg/mL	Gravimetric
	CAS # 37324-23-5.SEC		+/- 20.8959	µg/mL	Unstressed
	Purity ----%		+/- 34.3792	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_1268_RES_00011

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FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32410 **Lot No.:** A0124544

Description : Aroclor® 1268 Standard

Aroclor® 1268 Standard 1,000 µg/mL, 1mL/ampul, Hexane

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : April 30, 2023 **Storage:** 25°C nominal

Handling: This product contains PCBs.

CERTIFIED VALUES

Elution Order	Compound		Grav. Conc. (weight/volume)		Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1268		1,000.0	µg/mL	+/- 5.9397	µg/mL	Gravimetric
	CAS # 11100-14-4	(Lot 390-50A)			+/- 31.7072	µg/mL	Unstressed
	Purity ----%				+/- 41.4130	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_1268_RESss_00010

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This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32410.sec **Lot No.:** A095820

Description : Aroclor® 1268 Standard

Aroclor® 1268 Standard 1,000 µg/mL, 1mL/ampul, Hexane

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : September 30, 2019 **Storage:** 25°C nominal

Handling: This product contains PCB's

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1268	1,005.0 µg/mL	+/- 5.9694	µg/mL	Gravimetric
	CAS # 11100-14-4.SEC (Lot W-131-05)		+/- 21.0004	µg/mL	Unstressed
	Purity ----%		+/- 34.5511	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_1660_RESss_00010

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This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32039.SEC **Lot No.:** A0114674

Description : Aroclor® 1016/1260 Mix

Aroclor® 1016/1260 Mix 1,000 µg/mL, Hexane, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : January 31, 2022 **Storage:** 25°C nominal

Handling: This product contains PCB's

CERTIFIED VALUES

Elution Order	Compound		Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Aroclor 1016		1,000.7 µg/mL	+/- 5.9437	µg/mL	Gravimetric
	CAS # 12674-11-2.SEC	(Lot 129)		+/- 31.7284	µg/mL	Unstressed
	Purity ----%			+/- 41.4406	µg/mL	Stressed
2	Aroclor 1260		1,000.0 µg/mL	+/- 5.9397	µg/mL	Gravimetric
	CAS # 11096-82-5.SEC	(Lot NTO1023)		+/- 31.7072	µg/mL	Unstressed
	Purity ----%			+/- 41.4130	µg/mL	Stressed

Solvent: Hexane
CAS # 110-54-3
Purity 99%

Reagent

AR_SURR_RES_00073

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FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32000 **Lot No.:** A0121594

Description : Pesticide Surrogate Mix

Pesticide Surrogate Mix 200 µg/mL, Acetone, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : December 31, 2022 **Storage:** 10°C or colder

Handling: Contains PCBs - sonicate prior to use.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	2,4,5,6-Tetrachloro-m-xylene **CAS #** 877-09-8 (Lot 0052481) **Purity** 98%	200.0 µg/mL	+/- 1.1656 +/- 6.3378 +/- 8.2802	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
2	Decachlorobiphenyl (BZ# 209) **CAS #** 2051-24-3 (Lot ER071509-01) **Purity** 99%	201.2 µg/mL	+/- 1.1725 +/- 6.3753 +/- 8.3291	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed

Solvent: Acetone
CAS # 67-64-1
Purity 99%

Reagent

AR_SURR_RES_00075

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FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32000 **Lot No.:** A0121594

Description : Pesticide Surrogate Mix

Pesticide Surrogate Mix 200 µg/mL, Acetone, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : December 31, 2022 **Storage:** 10°C or colder

Handling: Contains PCBs - sonicate prior to use.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	2,4,5,6-Tetrachloro-m-xylene **CAS #** 877-09-8 (Lot 0052481) **Purity** 98%	200.0 µg/mL	+/- 1.1656 +/- 6.3378 +/- 8.2802	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
2	Decachlorobiphenyl (BZ# 209) **CAS #** 2051-24-3 (Lot ER071509-01) **Purity** 99%	201.2 µg/mL	+/- 1.1725 +/- 6.3753 +/- 8.3291	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed

Solvent: Acetone
CAS # 67-64-1
Purity 99%

Reagent

AR_SURR_RES_00080

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FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32000 **Lot No.:** A0130424

Description : Pesticide Surrogate Mix

Pesticide Surrogate Mix 200 µg/mL, Acetone, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : November 30, 2023 **Storage:** 10°C or colder

Handling: Contains PCBs - sonicate prior to use.

CERTIFIED VALUES

Elution Order	Compound		Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	2,4,5,6-Tetrachloro-m-xylene		201.2 µg/mL	+/- 1.1725	µg/mL	Gravimetric
	CAS # 877-09-8	(Lot 0052481)		+/- 6.3751	µg/mL	Unstressed
	Purity 98%			+/- 8.3288	µg/mL	Stressed
2	Decachlorobiphenyl (BZ# 209)		201.5 µg/mL	+/- 1.1742	µg/mL	Gravimetric
	CAS # 2051-24-3	(Lot ER071509-01)		+/- 6.3848	µg/mL	Unstressed
	Purity 99%			+/- 8.3415	µg/mL	Stressed

Solvent: Acetone
CAS # 67-64-1
Purity 99%

1-19-18

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Reagent

AR_SURR_RES_00090

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FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32000 **Lot No.:** A0130424

Description : Pesticide Surrogate Mix

Pesticide Surrogate Mix 200 µg/mL, Acetone, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : November 30, 2023 **Storage:** 10°C or colder

Handling: Contains PCBs - sonicate prior to use.

C E R T I F I E D V A L U E S

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	2,4,5,6-Tetrachloro-m-xylene	201.2 µg/mL	+/- 1.1725 µg/mL	Gravimetric
	CAS # 877-09-8 (Lot 0052481)		+/- 6.3751 µg/mL	Unstressed
	Purity 98%		+/- 8.3288 µg/mL	Stressed
2	Decachlorobiphenyl (BZ# 209)	201.5 µg/mL	+/- 1.1742 µg/mL	Gravimetric
	CAS # 2051-24-3 (Lot ER071509-01)		+/- 6.3848 µg/mL	Unstressed
	Purity 99%		+/- 8.3415 µg/mL	Stressed

Solvent: Acetone
CAS # 67-64-1
Purity 99%

Column:
30m x .25mm x .2um
Rtx-CLP II (cat.# 11323)

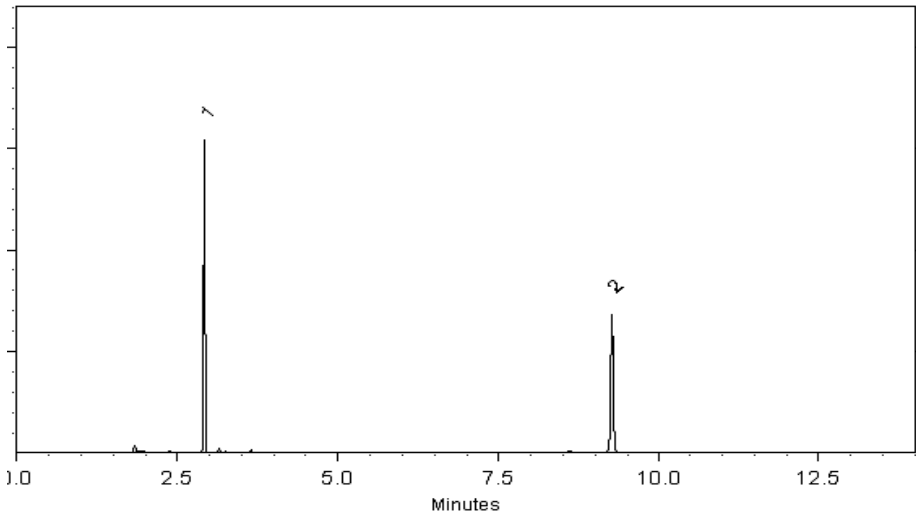
Carrier Gas:
helium-constant pressure 20 psi.

Temp. Program:
200°C to 300°C
@ 25°C/min. (hold 10 min.)

Inj. Temp:
250°C

Det. Temp:
300°C

Det. Type:
ECD



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Tom Suckar - Mix Technician

Date Mixed: 31-Aug-2017 **Balance:** B345965662

Jennifer Pollino - Operations Tech-ARM QC

Date Passed: 07-Sep-2017

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

k is a coverage factor of 2, which gives a level of confidence of approximately 95%.

- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Reagent

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FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32000 **Lot No.:** A0130424

Description : Pesticide Surrogate Mix

Pesticide Surrogate Mix 200 µg/mL, Acetone, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : November 30, 2023 **Storage:** 10°C or colder

Handling: Contains PCBs - sonicate prior to use.

C E R T I F I E D V A L U E S

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	2,4,5,6-Tetrachloro-m-xylene	201.2 µg/mL	+/- 1.1725 µg/mL	Gravimetric
	CAS # 877-09-8 (Lot 0052481)		+/- 6.3751 µg/mL	Unstressed
	Purity 98%		+/- 8.3288 µg/mL	Stressed
2	Decachlorobiphenyl (BZ# 209)	201.5 µg/mL	+/- 1.1742 µg/mL	Gravimetric
	CAS # 2051-24-3 (Lot ER071509-01)		+/- 6.3848 µg/mL	Unstressed
	Purity 99%		+/- 8.3415 µg/mL	Stressed

Solvent: Acetone
CAS # 67-64-1
Purity 99%

Column:
30m x .25mm x .2um
Rtx-CLP II (cat.# 11323)

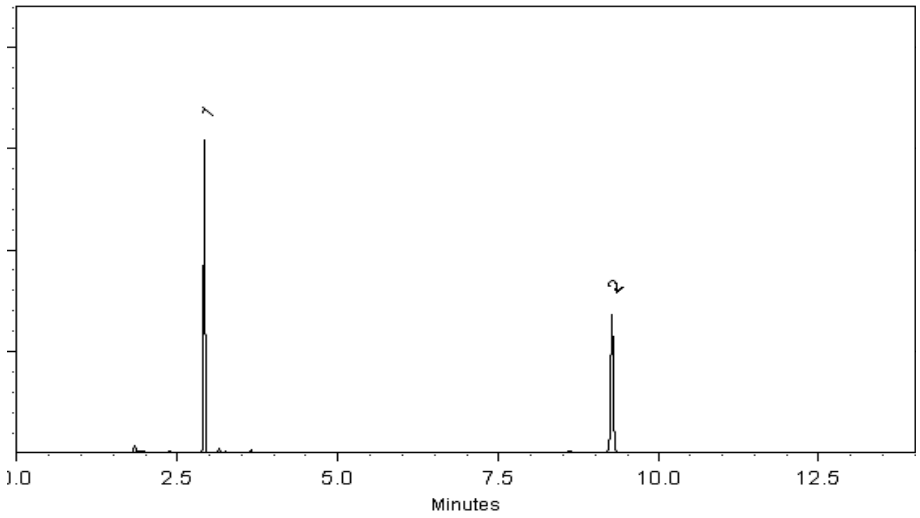
Carrier Gas:
helium-constant pressure 20 psi.

Temp. Program:
200°C to 300°C
@ 25°C/min. (hold 10 min.)

Inj. Temp:
250°C

Det. Temp:
300°C

Det. Type:
ECD



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Tom Suckar - Mix Technician

Date Mixed: 31-Aug-2017 **Balance:** B345965662

Jennifer Pollino - Operations Tech-ARM QC

Date Passed: 07-Sep-2017

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

k is a coverage factor of 2, which gives a level of confidence of approximately 95%.

- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Reagent

BNB stock_00014

RESTEK
110 Benner Circle
Bellefonte, PA 16823-8812
Tel: (800)356-1688
Fax: (814)353-1309

www.restek.com

CERTIFIED REFERENCE MATERIAL

Certificate of Analysis

ACCREDITED
ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

ACCREDITED
ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 32279 **Lot No.:** A0127264

Description : 1-Bromo-2-nitrobenzene Standard

1-Bromo-2-nitrobenzene Standard 1000 µg/mL, Acetone, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : August 31, 2020 **Storage:** 10°C or colder

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	1-Bromo-2-nitrobenzene	1,004.0 µg/mL	+/- 5.9635	µg/mL	Gravimetric
	CAS # 577-19-5 (Lot 643872/1)		+/- 56.3065	µg/mL	Unstressed
	Purity 99%		+/- 57.6234	µg/mL	Stressed

Solvent: Acetone
CAS # 67-64-1
Purity 99%

Column:
30m x 0.25mm x 0.25µm
Rtx-5 (cat.#10223)

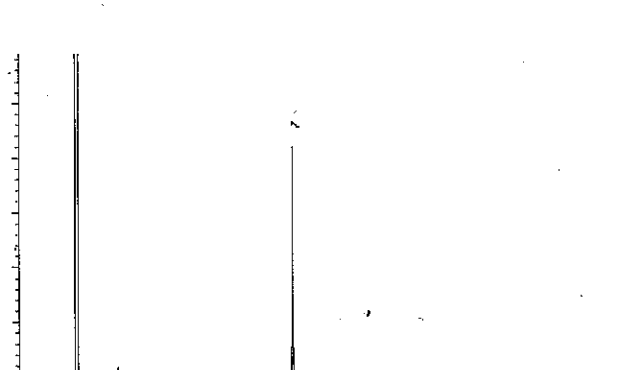
Carrier Gas:
hydrogen-constant pressure 10 psi.

Temp. Program:
75°C (hold 1 min.) to 330°C
@ 20°C/min. (hold 10 min.)

Inj. Temp:
250°C

Det. Temp:
330°C

Det. Type:
FID



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Matt Fragassi - Mix Technician

Date Mixed: 03-May-2017 **Balance:** B345965662

Justine Albertson - Operations Tech-ARM QC

Date Passed: 05-May-2017

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

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- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
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Reagent

BNB stock_00015

RESTEK
110 Benner Circle
Bellefonte, PA 16823-8812
Tel: (800)356-1688
Fax: (814)353-1309

www.restek.com

CERTIFIED REFERENCE MATERIAL

Certificate of Analysis

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Catalog No. : 32279 **Lot No.:** A0127264

Description : 1-Bromo-2-nitrobenzene Standard

1-Bromo-2-nitrobenzene Standard 1000 µg/mL, Acetone, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : August 31, 2020 **Storage:** 10°C or colder

CERTIFIED VALUES

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Solvent: Acetone
CAS # 67-64-1
Purity 99%

Column:
30m x 0.25mm x 0.25µm
Rtx-5 (cat.#10223)

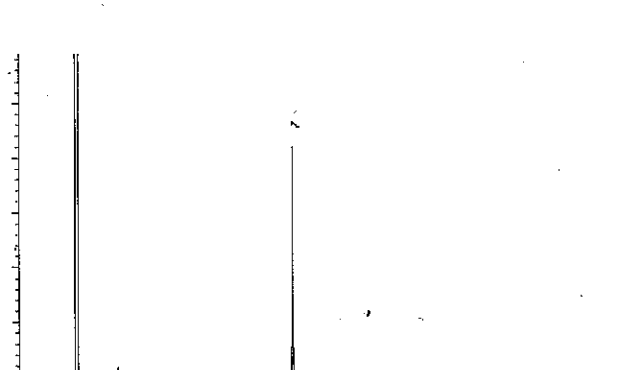
Carrier Gas:
hydrogen-constant pressure 10 psi.

Temp. Program:
75°C (hold 1 min.) to 330°C
@ 20°C/min. (hold 10 min.)

Inj. Temp:
250°C

Det. Temp:
330°C

Det. Type:
FID



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Matt Fragassi - Mix Technician

Date Mixed: 03-May-2017 **Balance:** B345965662

Justine Albertson - Operations Tech-ARM QC

Date Passed: 05-May-2017

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

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- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

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- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

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Handling Notes:

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- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Reagent

CN CAL Std_00060

RICCA CHEMICAL COMPANY®

448 West Fork Dr
Arlington, TX 76012
http://www.riccachemical.com
1-888-GO-RICCA
customerservice@riccachemical.com

Certificate of Analysis

Cyanide Standard, 1000 ppm CN

Lot Number: 1801H28 **Product Number:** 2543

Manufacture Date: JAN 26, 2018
Expiration Date: JUL 2018

This standard is prepared using accurate volumetric techniques from material that has been assayed against Silver Nitrate solution certified traceable to NIST Standard Reference Material 999. The certified value reported is the prepared value based upon the method of preparation of the material. The uncertainty in the prepared value is the combined uncertainty based on the stability of the assayed Potassium Cyanide, and the uncertainty in the mass and volume measurements.
Use 0.16% (w/v) (0.04 N) Sodium Hydroxide or 0.225 % (w/v) (0.04 N) Potassium Hydroxide to make dilutions of this standard. Restandardize weekly if extreme accuracy is required.

Name	CAS#	Grade
Water	7732-18-5	ACS/ASTM/USP/EP
Potassium Cyanide	151-50-8	ACS
Sodium Hydroxide	1310-73-2	Reagent

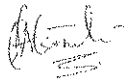
Test	Specification	Result
Appearance	Colorless liquid	Passed
Cyanide (CN)	995-1005 ppm	997 ppm

Specification	Reference
Stock Standard Cyanide Solution	APHA (4500-CN- F)
Stock Cyanide Solution	APHA (4500-CN- E)
Stock Cyanide Solution	APHA (4500-CN- K)
Stock Cyanide Solution	APHA (4500-CN- H)
Cyanide Reference Solution (1000 mg/L)	EPA (SW-846) (7.3.3.2)
Cyanide Calibration Stock Solution (1,000 mg/L CN-)	EPA (SW-846) (9213)
Stock Cyanide Solution	EPA (335.3)
Stock Cyanide Solution	EPA (335.2)
Cyanide Solution Stock	ASTM (D 4282)
Simple Cyanide Solution, Stock (1.0 g/L CN)	ASTM (D 4374)

Volumetric glassware complies with Class A tolerance requirements of ASTM E 288 and NIST Circular 434; it is calibrated before first use and recalibrated regularly in accordance with ASTM E 542 and NIST Procedure NBSIR 74-461. Balances are calibrated regularly with weights certified traceable to the NIST national mass standard. Thermometers and temperature probes are calibrated before first use and recalibrated regularly with a thermometer traceable to NIST standards. All products are prepared according to master documents that assure manufacture according to validated methods. Batch records document raw material traceability and production and testing history for each lot manufactured.

Part Number	Size / Package Type	Shelf Life (Unopened Container)
2543-4	120 mL amber poly	6 months

Recommended Storage: 2°C - 8°C (36°F - 46°F)



Israel Alamudun
Quality Control Supervisor
This Certificate of Analysis is designed to comply with ISO Guide 31 "Reference Materials -- Contents of Certificates and Labels."

This test report shall not be reproduced, except in full, without the written approval of Ricca Chemical Company.

Reagent

Hg ICV Stock_00010

INORGANIC VENTURES
CERTIFICATE OF ANALYSIS
Christiansburg, VA 24073 - USA
tel: 800.669.6779 - 540.585.3030
fax: 540.585.3012
info@inorganicventures.com

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01
ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Single Analyte Mass Spec Solution
Catalog Number:	MSHG-100PPM
Lot Number:	M2-HG659091
Matrix:	10% (v/v) HCl
Value / Analyte(s):	100 µg/mL ea: Mercury
Starting Material:	Hg metal
Starting Material Lot#:	05214TX, R307HGA1, 1780
Starting Material Purity:	99.9994%

4964959
ID: Hg ICV Stock_00010
Exp: 06/19/21 Prpd: CDH
Hg ICV Stock Inorganic Ve

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 100.10 ± 0.43 µg/mL

Density: 1.021 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Hg	ICP Assay	3133	061204
Hg	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2 (u_{char\ a})^2 + (w_b)^2 (u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

M	Ag	0.000171	M	Eu	< 0.000203	O	Na	0.000076	M	Se	< 0.013813	O	Zn	0.000012			
O	Al	0.000016	O	Fe	0.000014	M	Nb	< 0.000203	O	Si	0.000044	M	Zr	< 0.001218			
M	As	< 0.002844	M	Ga	< 0.000203	M	Nd	< 0.000203	M	Sm	< 0.000203						
O	Au	< 0.003219	M	Gd	< 0.000203	O	Ni	< 0.001812	M	Sn	< 0.000203						
O	B	< 0.002478	M	Ge	< 0.000609	M	Os	< 0.000201	O	Sr	< 0.000152						
M	Ba	< 0.000203	M	Hf	< 0.000203	O	P	< 0.010730	M	Ta	< 0.000203						
O	Be	< 0.000321	s	Hg	<	M	Pb	< 0.000203	M	Tb	< 0.000203						
M	Bi	< 0.013001	M	Ho	< 0.000203	M	Pd	< 0.000403	M	Te	< 0.001422						
O	Ca	0.000177	M	In	< 0.004062	M	Pr	< 0.000203	M	Th	< 0.000203						
M	Cd	0.000007	M	Ir	< 0.000201	M	Pt	< 0.000203	O	Ti	< 0.000530						
M	Ce	< 0.000203	M	K	0.000043	M	Rb	< 0.001218	O	Tl	< 0.002787						
M	Co	< 0.000406	M	La	< 0.000203	M	Re	< 0.001015	M	Tm	< 0.000203						
O	Cr	0.000016	O	Li	< 0.000180	M	Rh	< 0.000203	M	U	< 0.000812						
M	Cs	< 0.000203	M	Lu	< 0.000203	M	Ru	< 0.000201	M	V	< 0.000406						
M	Cu	< 0.000406	O	Mg	0.000037	O	S	< 0.023508	M	W	< 0.000609						
M	Dy	< 0.000203	M	Mn	< 0.000203	O	Sb	< 0.009657	M	Y	< 0.000203						
M	Er	< 0.000203	O	Mo	< 0.002152	M	Sc	< 0.000406	M	Yb	< 0.000203						

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 200.59 +2 4 Hg(OH)(aq) 1+
Chemical Compatibility - Stable in HNO3. Avoid basic media forming insoluble carbonate. The sulfide, basic carbonate, oxalate, phosphate, arsenite, arsenate and iodide are insoluble in water.
Stability - 2-100 ppb levels not stable in 1% HNO3 / LDPE container, stable in 10% HNO3 packaged in borosilicate glass. 1-100 ppm levels stable in 7% HNO3 packaged in borosilicate glass. 1000-10,000 ppm solutions are chemically stable for years in 5-10% HNO3 / LDPE container.
Hg Containing Samples (Preparation and Solution) - Metal (soluble in HNO3); Oxide (Soluble in HNO3); Ores and Organic based (The literature has more references to the preparation of Hg containing samples than any other element. Please consult the literature for your specific sample type, since such preparations are prone to error. Or e-mail our technical staff and we will contact you to discuss your particular sample preparation questions in further detail.).
Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe)
ICP-MS 202 amu	9 ppt	n/a	186W16O
ICP-OES 184.950 nm	0.03 / 0.005 µg/mL	1	
ICP-OES 194.227 nm	0.03 / 0.005 µg/mL	1	V
ICP-OES 253.652 nm	0.1 / 0.03 µg/mL	1	Ta, Co, Th ,Rh , Fe, U

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

INORGANIC VENTURES
CERTIFICATE OF ANALYSIS

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01
ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Single Analyte Mass Spec Solution
Catalog Number:	MSHG-100PPM
Lot Number:	M2-HG659091
Matrix:	10% (v/v) HCl
Value / Analyte(s):	100 µg/mL ea: Mercury
Starting Material:	Hg metal
Starting Material Lot#:	05214TX, R307HGA1, 1780
Starting Material Purity:	99.9994%

4964959
ID: Hg ICV Stock_00010
Exp: 06/19/21 Prpd: CDH
Hg ICV Stock Inorganic Ve

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 100.10 ± 0.43 µg/mL

Density: 1.021 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Hg	ICP Assay	3133	061204
Hg	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Reagent

Hg Ultra Prim_00012

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

TRIPLE ISO CERTIFICATION — ISO 17025 • ISO GUIDE 34 • ISO 9001

ISO Guide 34 Reference Material

Product Number: ICP-080
Lot Number: CR-3231

Lot Issue Date: 14-Jul 2017
Expiration Date: 31-Aug 2024

Product Name: Mercury ICP Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	StartingMaterial	Lot Number	Purity (%)	Calculated Value	Traceability & Method
mercury	*mercuric nitrate	RM11214	99.999%	1002 ± 2 µg/mL	NIST SRM 3133; ICP-OES

*light sensitive

Solvent: 2% nitric acid in low TOC water (< 50 ppb)

Non-Certified Values:

Density: 1.0101 g/mL @ 20.00 ± 0.05°C

Trace Metallic Impurities in Solution Standard in µg/mL

*	Al	<0.005 ND	*	Ga	<0.005 ND	n	Nb		n	S				
*	Sb	<0.005 ND	n	Ge		n	Os		n	Ta				
*	As	<0.005 ND	n	Au		*	Pd	<0.005 ND	n	Te				
*	Ba	<0.005 ND	n	Hf		*	P	<0.005 ND	n	Tb				
*	Be	<0.005 ND	n	Ho		*	Pt	<0.005 ND	n	Tl				
*	Bi	<0.005 ND	*	In	<0.005 ND	*	K	<0.005 ND	*	Th	<0.005 ND			
*	B	<0.005 ND	n	Ir		n	Pr		n	Tm				
*	Cd	<0.005 ND	*	Fe	<0.005 ND	n	Re		*	Sn	<0.005 ND			
*	Cs	<0.005 ND	*	La	<0.005 ND	n	Rh		*	Ti	<0.005 ND			
*	Ca	<0.005 ND	*	Pb	<0.005 ND	n	Rb		n	W				
n	Ce		*	Li	<0.005 ND	n	Ru		n	U				
*	Cr	<0.005 ND	n	Lu		n	Sm		*	V	<0.005 ND			
*	Co	<0.005 ND	*	Mg	<0.005 ND	n	Sc		n	Yb				
*	Cu	<0.005 ND	*	Mn	<0.005 ND	*	Se	<0.005 ND	n	Y				
n	Dy		s	Hg		*	Si	<0.005 ND	*	Zn	<0.005 ND			
*	Er	<0.005 ND	*	Mo	<0.005 ND	*	Ag	<0.005 ND	n	Zr				
*	Eu	<0.005 ND	n	Nd		*	Na	<0.005 ND						
*	Gd	<0.005 ND	*	Ni	<0.005 ND	*	Sr	<0.005 ND						

* - element checked; i - spectral interference; n – element not checked; D – element detected; ND – element not detected; s - standard element

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER
ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

ISO 9001 Registered Quality System – TUV USA

250 SMITH STREET • NORTH KINGSTOWN, RHODE ISLAND 02852 • WWW.ULTRASCI.COM

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICP-080
Lot Number: CR-3231

Lot Issue Date: 14-Jul 2017
Expiration Date: 31-Aug 2024

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

John Russo
President

Monica Bourgeois
Director of QA/RA

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER
ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

ISO 9001 Registered Quality System – TUV USA

250 SMITH STREET • NORTH KINGSTOWN, RHODE ISLAND 02852 • WWW.ULTRASCI.COM

Reagent

Icp cal std 3_00017

INORGANIC VENTURES
300 Technology Drive
Christiansburg, VA 24073 · USA
inorganicventures.com

CERTIFICATE OF ANALYSIS

tel: 800.669.6799 · 540.585.3030
fax: 540.585.3012
info@inorganicventures.com

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED
Reference Material Producer
Certificate 883.02

4577037
ID: icp cal std 3_00017
Exp: 10/12/19 Prpd: SJS
ICP CAL STD 3B IV

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	STLDEN-STD-3B
Lot Number:	K2-MEB652538
Matrix:	5% (v/v) HNO3
Value / Analyte(s):	10 000 µg/mL ea: Potassium, 4 000 µg/mL ea: Magnesium, 1 000 µg/mL ea: Calcium, Sodium, 500 µg/mL ea: Iron, 200 µg/mL ea: Lithium, Phosphorus, 100 µg/mL ea: Silver, Aluminum, Boron, Barium, Beryllium, Cadmium, Cobalt, Chromium+3, Copper, Manganese, Nickel, Strontium, Vanadium, Zinc

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Aluminum, Al	100.0 ± 0.6 µg/mL	Barium, Ba	100.0 ± 0.5 µg/mL
Beryllium, Be	100.0 ± 0.6 µg/mL	Boron, B	100.0 ± 0.6 µg/mL
Cadmium, Cd	100.0 ± 0.5 µg/mL	Calcium, Ca	1 000 ± 4 µg/mL
Chromium+3, Cr3	100.0 ± 0.6 µg/mL	Cobalt, Co	100.0 ± 0.5 µg/mL
Copper, Cu	100.0 ± 0.4 µg/mL	Iron, Fe	499.9 ± 2.0 µg/mL
Lithium, Li	200.0 ± 0.7 µg/mL	Magnesium, Mg	4 000 ± 16 µg/mL
Manganese, Mn	100.0 ± 0.4 µg/mL	Nickel, Ni	100.0 ± 0.4 µg/mL
Phosphorus, P	200.0 ± 0.9 µg/mL	Potassium, K	10 000.0 ± 40.0 µg/mL
Silver, Ag	100.0 ± 0.4 µg/mL	Sodium, Na	1 000 ± 4 µg/mL
Strontium, Sr	100.0 ± 0.4 µg/mL	Vanadium, V	100.0 ± 0.4 µg/mL
Zinc, Zn	100.0 ± 0.4 µg/mL		

Certified Density: 1.076 g/mL (measured at 20 ± 1 °C)

Assay Information:

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Donna Senn
Product Documentation Technician

Donna Senn

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Michael J Booth

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Paul R Gaines

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ag	ICP Assay	3151	992212
Ag	Volhard	999c	999c
Al	ICP Assay	3101a	060502
Al	EDTA	928	928
B	ICP Assay	3107	110830
Ba	ICP Assay	3104a	070222
Ba	Gravimetric		See Sec. 4.2
Be	ICP Assay	3105a	090514
Ca	ICP Assay	3109a	050825
Ca	EDTA	928	928
Cd	ICP Assay	3108	060531
Cd	EDTA	928	928
Co	ICP Assay	3113	000630 Co
Co	EDTA	928	928
Cr3	ICP Assay	3112a	030730Cr3
Cu	ICP Assay	3114	121207
Cu	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928
K	ICP Assay	3141a	140813
K	Gravimetric		See Sec. 4.2
Li	ICP Assay	3129a	100714
Li	Gravimetric		See Sec. 4.2
Mg	ICP Assay	3131a	050302
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	Gravimetric		
Na	ICP Assay	3152a	120715
Ni	ICP Assay	3136	120619
Ni	EDTA	928	928
P	ICP Assay	3139a	060717
P	Acidimetric	84L	84L
Sr	EDTA	928	928
Sr	ICP Assay	3153a	990906
V	EDTA	928	928
V	ICP Assay	3165	992706
Zn	ICP Assay	3168a	120629
Zn	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods | **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{½}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\,(u_{char\ a})^2 + (w_b)^2\,(u_{char\ b})^2]^{½}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{½}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag keep cap tightly sealed when not in use. Store and use at 20° ± 4° C. Do not pippette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

October 12, 2016

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- October 12, 2019

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year from the date of removal from the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being handled and stored in accordance with the instructions given in Sec 7.1.

Reagent

Icp ICVL A_00013

HIGH PURITY STANDARDS
www.highpuritystandards.com
P.O. Box 41727
Charleston, SC 29423
Phone: (843) 767-7900
Fax: (843) 767-7906

Certificate of Analysis

Product Description:

Name:	Intrepid ICVL
Part Number:	**SM-606-062**
	Solution A
Lot Number:	**1729362**
Matrix:	5% HNO_3
Purity:	99.5% - 99.9999%

4812545
ID: Icp ICVL A_00013
Exp: 10/01/18 Prpd: SJS
ICP ICVL SOLUTION A H

ISO/IEC 17025:2005 Accreditation
Certificate Number AT-1529

Certified Values:

Element	(mg/L)	SRM ID	SRM Lot#	Element	(mg/L)	SRM ID	SRM Lot#
Al	25.0 ± 0.1	3101a	140903	Li	25.0 ± 0.2	3129a	100714
As	25.0 ± 0.3	3103a	100818	Mg	1000 ± 5	3131a	140110
Ba	25.0 ± 0.2	3104a	140909	Mn	25.0 ± 0.3	3132	050429
Be	25.0 ± 0.3	3105a	090514	Ni	25.0 ± 0.1	3136	120619
B	25.0 ± 0.1	3107	110830	K	2000 ± 10	3141a	140813
Cd	25.0 ± 0.1	3108	130116	Se	50.0 ± 0.5	3149	100901
Ca	200 ± 1	3109a	130213	Na	200 ± 1	3152a	120715
Cr	25.0 ± 0.1	3112a	030730	Sr	25.0 ± 0.1	*	
Co	25.0 ± 0.1	3113	000630	Tl	50.0 ± 0.3	*	
Cu	25.0 ± 0.1	3114	121207	V	25.0 ± 0.2	*	
Fe	25.0 ± 0.1	3126a	140812	Zn	25.0 ± 0.1	3168a	120629
Pb	25.0 ± 0.2	3128	101026				

Certified values are based on gravimetric and volumetric preparation, and verified against NIST SRM 3100 series when available via inductively coupled plasma optical emission spectrometry (ICP-OES) and/or inductively coupled plasma mass spectrometry (ICP-MS) using an internal laboratory-developed method. The uncertainty in the certified value is calculated for a 95% confidence interval and coverage factor *k* is about 2.

* Refer to Traceability Information, Section d

Packaging and Storage Conditions:

The standard is packaged in a pre-cleaned polyethylene bottle. To maintain the integrity of this product, the solution should be kept tightly capped and stored under normal laboratory conditions.

Expiration Information:

The expiry date is guaranteed to be valid for twelve months from the shipping date provided and is guaranteed through the month of expiration. For this reason, standards from the same lot may have different expiration dates.

Shipped Date: **October 2017**

Expiration Date: **October 2018**

Certificate Issue Date: October 20, 2017

Moven Mututuvari

Moven Mututuvari PhD., Laboratory Manager

Preparation Information:

The standard is generally prepared from single element standard solutions that are ISO Guide 34 certified reference materials and manufactured under appropriate laboratory conditions using the methods developed at NIST for SRM Spectrometric Standard Solutions. Sub-boiling distilled high-purity acid has been used to place the materials in solution and to stabilize the standard. The matrix is as noted above in 18 megaohm deionized water. If during the period of validity, a recall is instituted due to substantial changes in the stability of this product, the purchaser will be notified.

Homogeneity:

This product is determined to be homogeneous following in-house procedures developed in accordance with the requirements of ISO Guide 34 and ISO Guide 35.

Intended Use:

This product is intended for use as a calibration standard, quality control standard, and/or for the validation of analytical methods.

Traceability Information:

The traceability of this standard is maintained through an unbroken chain of comparisons to appropriate standards with suitable procedure and measurement uncertainties. The maintenance of the base and derived units of International System of Units (SI) with traceability of measurement results (contemporary metrology) to SI ensures their comparability over time as follows.

a. **Standard Weight and Analytical Balance**
The standard weights (NBS weights Inventory No 20231A) are calibrated every two years by South Carolina Metrology Laboratory that is a participant in "NIST Weights and Measures Measurement Assurance Program" with a certificate of measurement traceability to NIST primary standards.
The balances are calibrated yearly by the ISO 17025 accredited metrology service, and are verified weekly by an in-house method using standard weights.

b. **Volumetric Device**
The calibration of volumetric vessels is checked annually using the ASTM method E542.

c. **Thermometer**
The standard thermometers are calibrated every year by the ISO 17025 accredited metrology service. The thermometers used in-house are verified against the standard thermometers yearly.

d. **Calibration Standards**
The Calibration Standard is traceable to SRM 3100 Series Spectrometric Standard Solutions. If a SRM is not available, a second source standard or independent lot is used.

Refer to Safety Datasheet (SDS) for hazardous information.

NOTICE: HPS products are intended for laboratory use only. All products should be handled and used by trained professional personnel. The responsibility for the safe handling and use of these products rests solely with the buyer and/or user. The data and information as stated was furnished by the manufacturer of the product. The information provided in this certificate pertains only to the lot number specified. None of the information provided in this certificate may be used, reproduced or transmitted in any form or by any means without written approval from High Purity Standards.

Reagent

Icp ICVL B_00015

HIGH-PURITY STANDARDS
www.highpuritystandards.com

P.O. Box 41727
Charleston, SC 29423
Phone (843) 767-7900
Fax (843) 767-7906

Certificate of Analysis

4812546
ID: Icp ICVL B_00015
Exp: 10/01/18 Prpd: SJS
ICP ICVL SOLUTION B HP

ISO/IEC 17025:2005 Accreditation
Certificate Number AT-1529

Product Description:

Name:	Intrepid ICVL
Part Number:	**SM-606-062 Solution B**
Lot Number:	**1729346**
Matrix:	2% HNO_3 + Tr HF
Purity:	99.92% - 99.999%

Certified Values:

Element	(mg/L)	SRM ID	SRM Lot#	Element	(mg/L)	SRM ID	SRM Lot#
Sb	25.0 ± 0.2	3102a	140911	Ag	25.0 ± 0.2	3151	160729
Mo	25.0 ± 0.2	3134	130418	Sn	50.0 ± 0.3	3161a	140917
P	200 ± 1	3139a	060717	Ti	25.0 ± 0.2	3162a	130925
Si	200 ± 2	3150	130912	Zr	25.0 ± 0.2	3169	130920

Certified values are based on gravimetric and volumetric preparation, and verified against NIST SRM 3100 series when available via inductively coupled plasma optical emission spectrometry (ICP-OES) and/or inductively coupled plasma mass spectrometry (ICP-MS) using an internal laboratory-developed method. The uncertainty in the certified value is calculated for a 95% confidence interval and coverage factor k is about 2.

* Refer to Traceability Information, Section d

Packaging and Storage Conditions:

The standard is packaged in a pre-cleaned polyethylene bottle. To maintain the integrity of this product, the solution should be kept tightly capped and stored under normal laboratory conditions.

Expiration Information:

The expiry date is guaranteed to be valid for twelve months from the shipping date provided and is guaranteed through the month of expiration. For this reason, standards from the same lot may have different expiration dates.

Shipped Date: **October 2017**

Expiration Date: **October 2018**

Certificate Issue Date: October 20, 2017

Moven Mutuvari

Moven Mutuvari PhD., Laboratory Manager

Reagent

ICP ISAB 1B_00011

HIGH-PURITY STANDARDS
www.highpuritystandards.com

P.O. Box 41727
Charleston, SC 29423
Phone (843) 767-7900
Fax (843) 767-7906

Certificate of Analysis

Certified Reference Material

ISO Guide 34:2009 (RMP) Accreditation
Certificate Number AR-1436

ISO/IEC 17025:2005 Accreditation
Certificate Number AT-1529

Product Description:

Name:	ICS-AB STD #1
Part Number:	**SM-606-037** Solution B
Lot Number:	**1734922**
Matrix:	2% HNO_3
Purity:	99.99%

4902379
ID: ICP ISAB 1B_00011
Exp: 12/01/18 Prpd: SJS
ICP ICSAB STD 1 SOL B H

Certified Values:

Element	(mg/L)	SRM ID	SRM Lot#
Tl	1000 ± 6	*	

Certified values are based on gravimetric and volumetric preparation, and verified against NIST SRM 3100 series when available via inductively coupled plasma optical emission spectrometry (ICP-OES) and/or inductively coupled plasma mass spectrometry (ICP-MS) using an internal laboratory-developed method. The uncertainty in the certified value is calculated for a 95% confidence interval and coverage factor k is about 2.

* Refer to Traceability Information, Section d

Packaging and Storage Conditions:

The standard is packaged in a pre-cleaned polyethylene bottle. To maintain the integrity of this product, the solution should be kept tightly capped and stored under normal laboratory conditions.

Expiration Information:

The expiry date is guaranteed to be valid for twelve months from the shipping date provided and is guaranteed through the month of expiration. For this reason, standards from the same lot may have different expiration dates.

Shipped Date:	**December 2017**
Expiration Date:	**December 2018**
Certificate Issue Date:	December 15, 2017

Moven Mututuvari

Moven Mututuvari PhD., Laboratory Manager

Preparation Information:

The standard is generally prepared from single element standard solutions that are ISO Guide 34 certified reference materials and manufactured under appropriate laboratory conditions using the methods developed at NIST for SRM Spectrometric Standard Solutions. Sub-boiling distilled high-purity acid has been used to place the materials in solution and to stabilize the standard. The matrix is as noted above in 18 megaohm deionized water. If during the period of validity, a recall is instituted due to substantial changes in the stability of this product, the purchaser will be notified.

Homogeneity:

This product is determined to be homogeneous following in-house procedures developed in accordance with the requirements of ISO Guide 34 and ISO Guide 35.

Intended Use:

This product is intended for use as a calibration standard, quality control standard, and/or for the validation of analytical methods.

Traceability Information:

The traceability of this standard is maintained through an unbroken chain of comparisons to appropriate standards with suitable procedure and measurement uncertainties. The maintenance of the base and derived units of International System of Units (SI) with traceability of measurement results (contemporary metrology) to SI ensures their comparability over time as follows.

a. **Standard Weight and Analytical Balance**
The standard weights (NBS weights Inventory No 20231A) are calibrated every two years by South Carolina Metrology Laboratory that is a participant in "NIST Weights and Measures Measurement Assurance Program" with a certificate of measurement traceability to NIST primary standards.
The balances are calibrated yearly by the ISO 17025 accredited metrology service, and are verified weekly by an in-house method using standard weights.

b. **Volumetric Device**
The calibration of volumetric vessels is checked annually using the ASTM method E542.

c. **Thermometer**
The standard thermometers are calibrated every year by the ISO 17025 accredited metrology service. The thermometers used in-house are verified against the standard thermometers yearly.

d. **Calibration Standards**
The Calibration Standard is traceable to SRM 3100 Series Spectrometric Standard Solutions. If a SRM is not available, a second source standard or independent lot is used.

Refer to Safety Datasheet (SDS) for hazardous information.

NOTICE: HPS products are intended for laboratory use only. All products should be handled and used by trained professional personnel. The responsibility for the safe handling and use of these products rests solely with the buyer and/or user. The data and information as stated was furnished by the manufacturer of the product. The information provided in this certificate pertains only to the lot number specified. None of the information provided in this certificate may be used, reproduced or transmitted in any form or by any means without written approval from High Purity Standards.

Reagent

ICP ISAB STD1_00010

HIGH-PURITY STANDARDS
www.highpuritystandards.com
P.O. Box 41727
Charleston, SC 29423
Phone (843) 767-7900
Fax (843) 767-7906

Certificate of Analysis

Certified Reference Material

Product Description:

Name:	ICS-AB STD#1
Part Number:	**SM-606-037**
	Solution A
Lot Number:	**1734921**
Matrix:	20% HCl
Purity:	99.999% - 99.9999%

4902371
ID: ICP ISAB STD1_00010
Exp: 12/01/18 Prpd: SJS
ICAP ICSAB STD 1 SOL A

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER
ide 34:2009 (RMP) Accreditation
ertificate Number AR-1436

ilac-MRA

ANAB ACCREDITED TESTING LABORATORY
ISO/IEC 17025:2005 Accreditation
Certificate Number AT-1529

Certified Values:

Element	(mg/L)	SRM ID	SRM Lot#	Element	(mg/L)	SRM ID	SRM Lot#
Sb	100.0 ± 0.6	3102a	140911	P	200.0 ± 1.2	3139a	060717
As	200 ± 2	3103a	100818	K	5000 ± 25	3141a	140813
B	200.0 ± 1.2	3107	110830	Se	500 ± 5	3149	100901
Li	100.0 ± 0.6	3129a	100714	Na	5000 ± 25	3152a	120715
Mo	100.0 ± 0.6	3134	130418	Sr	100.0 ± 0.5	*	

Certified values are based on gravimetric and volumetric preparation, and verified against NIST SRM 3100 series when available via inductively coupled plasma optical emission spectrometry (ICP-OES) and/or inductively coupled plasma mass spectrometry (ICP-MS) using an internal laboratory-developed method. The uncertainty in the certified value is calculated for a 95% confidence interval and coverage factor k is about 2.

* Refer to Traceability Information, Section d

Packaging and Storage Conditions:

The standard is packaged in a pre-cleaned polyethylene bottle. To maintain the integrity of this product, the solution should be kept tightly capped and stored under normal laboratory conditions.

Expiration Information:

The expiry date is guaranteed to be valid for twelve months from the shipping date provided and is guaranteed through the month of expiration. For this reason, standards from the same lot may have different expiration dates.

Shipped Date: **December 2017**

Expiration Date: **December 2018**

Certificate Issue Date: December 15, 2017

Moven Mutuvari

Moven Mutuvari PhD., Laboratory Manager

Preparation Information:

The standard is generally prepared from single element standard solutions that are ISO Guide 34 certified reference materials and manufactured under appropriate laboratory conditions using the methods developed at NIST for SRM Spectrometric Standard Solutions. Sub-boiling distilled high-purity acid has been used to place the materials in solution and to stabilize the standard. The matrix is as noted above in 18 megaohm deionized water. If during the period of validity, a recall is instituted due to substantial changes in the stability of this product, the purchaser will be notified.

Homogeneity:

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Traceability Information:

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b. **Volumetric Device**
The calibration of volumetric vessels is checked annually using the ASTM method E542.

c. **Thermometer**
The standard thermometers are calibrated every year by the ISO 17025 accredited metrology service. The thermometers used in-house are verified against the standard thermometers yearly.

d. **Calibration Standards**
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Refer to Safety Datasheet (SDS) for hazardous information.

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Reagent

ICP ISAB STD2_00013

Sample Name: ICP ISAB STD2_00011 Acquired: 7/3/2018 7:25:22 Type: Unk
Method: 6500_025 Mode: CONC Corr. Factor: 1.000000
User: rhoadesc Prep Date: Custom ID2: Custom ID3:
Comment: Standard recertification (8%) 20x

Elem	Ag3280	Al1670	As1890	B_2089	Ba4554	Be3130	Bi2230	Ca3179	Cd2288
Line	328.068 {103}	167.079 {502}	189.042 {478}	208.959 {461}	455.403 { 74}	313.042 {108}	223.061 {451}	317.933 {106}	228.802 {447}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.00006**	**-.00690**	**-.00583**	**-.00005**	**.00046**	**-.00003**	**.00889**	**.04235**	**.00044**
Stddev	.00020	.00053	.00126	.00130	.00003	.00012	.00399	.00007	.00003
%RSD	321.04	7.6209	21.545	2405.4	6.1016	392.14	44.929	.16754	6.0746
#1	.00008	-.00727	-.00494	.00086	.00048	.00005	.01172	.04230	.00042
#2	-.00021	-.00653	-.00672	-.00097	.00044	-.00011	.00607	.04240	.00046
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu3247	Fe2599	K_7664	Li6707	Mg2790	Mn2576	Mo2020
Line	228.616 {447}	205.560 {464}	324.754 {104}	259.940 {130}	766.490 { 44}	670.784 { 50}	279.079 {121}2	257.610 {131}	202.030 {467}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.00044**	**.00034**	**.00216**	**.01862**	**-.04392**	**-.00198**	**.00334**	**.00042**	**.00066**
Stddev	.00037	.00042	.00041	.00103	.03980	.00234	.00617	.00010	.00004
%RSD	85.544	124.10	19.108	5.5287	90.616	117.88	184.52	23.313	6.6074
#1	.00017	.00064	.00187	.01935	-.01578	-.00363	.00770	.00049	.00063
#2	.00070	.00004	.00245	.01789	-.07206	-.00033	-.00102	.00035	.00070
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2316	P_1782	Pb2203	S_1820	Sb2068	Se1960	Si2881	SiO2
Line	589.592 { 57}	231.604 {446}	178.284 {489}	220.353 {453}	182.034 {485}	206.833 {463}	196.090 {472}	288.158 {117}	288.158 {117}2
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.02159**	**.00057**	**-.00434**	F **-.00317**	**-.04238**	**-.00080**	**-.00166**	**.00671**	**.01436**
Stddev	.00014	.00044	.00114	.00110	.00159	.00456	.00058	.02387	.05109
%RSD	.64346	76.481	26.343	34.690	3.7552	568.46	34.810	355.63	355.63
#1	-.02149	.00026	-.00514	-.00239	-.04125	-.00403	-.00207	.02359	.05049
#2	-.02169	.00088	-.00353	-.00395	-.04351	.00242	-.00126	-.01017	-.02176
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None
High Limit				.00900					
Low Limit				-.00300					

Elem	Sn1899	Sr4077	Th2837	Ti3349	Tl1908	U_3701	V_2924	Zn2062	Zr3391
Line	189.989 {477}	407.771 { 83}	283.730 {119}	334.904 {101}	190.856 {477}	370.152 { 91}	292.402 {115}	206.200 {163}	339.198 { 99}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **49.229**	**.00004**	**-.00191**	F **4.9283**	**-.00214**	**.00870**	**-.00054**	**.00342**	**-.00298**
Stddev	.046	.00006	.00139	.0140	.00067	.04390	.00027	.00029	.00057
%RSD	.09407	174.51	73.200	.28319	31.237	504.79	50.451	8.6155	19.050
#1	49.197	-.00001	-.00289	4.9382	-.00166	.03974	-.00074	.00321	-.00258
#2	49.262	.00008	-.00092	4.9185	-.00261	-.02235	-.00035	.00362	-.00338
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	.10000			.01000					
Low Limit	-.10000			-.01000					

Int. Std.	Y_2243	Y_3600	Y_3774
Line	224.306 {450}	360.073 { 94}	377.433 { 89}
Units	Cts/S	Cts/S	Cts/S
Avg	**2971.1**	**55500.**	**4143.0**
Stddev	4.3	184.	14.9
%RSD	.14605	.33103	.36040
#1	2968.0	55630.	4132.5
#2	2974.2	55370.	4153.6

Sample Name: ICP ISAB STD2_00011 Acquired: 7/2/2018 19:23:25 Type: Unk
Method: 6500_025 Mode: CONC Corr. Factor: 1.000000
User: rhoadesc Prep Date: Custom ID2: Custom ID3:
Comment: Standard recertification (8%)

Elem	Ag3280	Al1670	As1890	B_2089	Ba4554	Be3130	Bi2230	Ca3179	Cd2288
Line	328.068 {103}	167.079 {502}	189.042 {478}	208.959 {461}	455.403 { 74}	313.042 {108}	223.061 {451}	317.933 {106}	228.802 {447}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.00061**	**-.01595**	**-.02613**	**.00451**	**.00011**	**-.00048**	**.21371**	**.01037**	**.00138**
Stddev	.00113	.00143	.00031	.00000	.00001	.00002	.00145	.00962	.00042
%RSD	186.17	8.9974	1.1694	.04020	11.626	3.3907	.67814	92.772	30.675
#1	-.00141	-.01493	-.02592	.00451	.00011	-.00046	.21269	.00357	.00108
#2	.00019	-.01696	-.02635	.00451	.00010	-.00049	.21474	.01717	.00168
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu3247	Fe2599	K_7664	Li6707	Mg2790	Mn2576	Mo2020
Line	228.616 {447}	205.560 {464}	324.754 {104}	259.940 {130}	766.490 { 44}	670.784 { 50}	279.079 {121}2	257.610 {131}	202.030 {467}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.00296**	**.00228**	**.05492**	**.01936**	**.08715**	F **-.02178**	**.00687**	**.00106**	**.00035**
Stddev	.00111	.00004	.00101	.00051	.00382	.00388	.00211	.00012	.00007
%RSD	37.565	1.6037	1.8430	2.6171	4.3864	17.824	30.758	11.120	19.271
#1	-.00217	.00225	.05564	.01900	.08986	-.01904	.00538	.00098	.00040
#2	-.00375	.00230	.05421	.01972	.08445	-.02453	.00836	.00114	.00031
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass
High Limit						25.000			
Low Limit						-.02000			

Elem	Na5895	Ni2316	P_1782	Pb2203	S_1820	Sb2068	Se1960	Si2881	SiO2
Line	589.592 { 57}	231.604 {446}	178.284 {489}	220.353 {453}	182.034 {485}	206.833 {463}	196.090 {472}	288.158 {117}	288.158 {117}2
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.02917**	**-.00052**	**-.01876**	**.00406**	**-.10075**	**.07719**	**.00456**	**.02709**	**.05798**
Stddev	.00696	.00044	.00243	.00121	.00935	.00444	.00209	.00419	.00897
%RSD	23.859	83.080	12.962	29.867	9.2760	5.7520	45.870	15.478	15.478
#1	.03409	-.00022	-.01704	.00320	-.09414	.08033	.00308	.02413	.05163
#2	.02425	-.00083	-.02048	.00491	-.10735	.07405	.00604	.03006	.06433
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Sn1899	Sr4077	Th2837	Ti3349	Tl1908	U_3701	V_2924	Zn2062	Zr3391
Line	189.989 {477}	407.771 { 83}	283.730 {119}	334.904 {101}	190.856 {477}	370.152 { 91}	292.402 {115}	206.200 {163}	339.198 { 99}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F **619.55**	**.00010**	**.00732**	F **96.343**	**-.01120**	**-.10281**	**-.01118**	**.00211**	**-.00184**
Stddev	4.12	.00010	.00115	.638	.00088	.02135	.00080	.00006	.00099
%RSD	.66567	101.87	15.727	.66246	7.8719	20.768	7.1813	2.6625	53.824
#1	622.47	.00017	.00651	96.794	-.01182	-.08772	-.01175	.00207	-.00114
#2	616.64	.00003	.00814	95.892	-.01057	-.11791	-.01061	.00215	-.00254
Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	50.000			10.000					
Low Limit	-.20000			-.02000					

Int. Std.	Y_2243	Y_3600	Y_3774
Line	224.306 {450}	360.073 { 94}	377.433 { 89}
Units	Cts/S	Cts/S	Cts/S
Avg	**2883.4**	**51409.**	**4166.8**
Stddev	1.2	118.	2.3
%RSD	.04117	.22890	.05610
#1	2882.6	51326.	4168.5
#2	2884.3	51492.	4165.2

HIGH-PURITY STANDARDS
www.highpuritystandards.com

P.O. Box 41727
Charleston, SC 29423
Phone: (843) 767-7900
Fax: (843) 767-7906

Certificate of Analysis

Certified Reference Material

ISO Guide 34:2009 (RMP) Accreditation
Certificate Number AR-1436

ISO/IEC 17025:2005 Accreditation
Certificate Number AT-1529

Product Description:

Name:	ICS-AB STD #2
Part Number:	**SM-606-038**
Lot Number:	**1721944**
Matrix:	20% HCl
Purity:	99.98% - 99.999%

Certified Values:

Element	(mg/L)	SRM ID	SRM Lot#		Element	(mg/L)	SRM ID	SRM Lot#
Sn	1000 ± 10	3161a	140917		Ti	100 ± 1	3162a	130925

Certified values are based on gravimetric and volumetric preparation, and verified against NIST SRM 3100 series when available via inductively coupled plasma optical emission spectrometry (ICP-OES) and/or inductively coupled plasma mass spectrometry (ICP-MS) using an internal laboratory-developed method. The uncertainty in the certified value is calculated for a 95% confidence interval and coverage factor k is about 2.

* Refer to Traceability Information, Section d

Packaging and Storage Conditions:

The standard is packaged in a pre-cleaned polyethylene bottle. To maintain the integrity of this product, the solution should be kept tightly capped and stored under normal laboratory conditions.

Expiration Information:

The expiry date is guaranteed to be valid for twelve months from the shipping date provided and is guaranteed through the month of expiration. For this reason, standards from the same lot may have different expiration dates.

Shipped Date: **August 2017**
Expiration Date: **August 2018**
Certificate Issue Date: August 8, 2017

Moven Mutuvari

Moven Mutuvari PhD., Laboratory Manager

P.O. Box 41727
Charleston, SC 29423
Phone: (843) 767-7900
Fax: (843) 767-7906

Preparation Information:

The Certified Reference Material (CRM) is generally prepared from single element standard solutions that are ISO Guide 34 certified reference materials and manufactured under appropriate laboratory conditions using the methods developed at NIST for SRM Spectrometric Standard Solutions. Sub-boiling distilled high-purity acid has been used to place the materials in solution and to stabilize the standard. The matrix is as noted above in 18 megaohm deionized water.

Stability of this product is based upon rigorous short term and long term testing of the solution for the certified value. This testing includes, but is not limited to, the effect of temperature and packaging on the product. If during the period of validity, a recall is instituted due to substantial changes in the stability of this product, the purchaser will be notified.

Homogeneity:

This product is determined to be homogeneous following in-house procedures developed in accordance with the requirements of ISO Guide 34 and ISO Guide 35.

Intended Use:

This product is intended for use as a calibration standard, quality control standard, and/or for the validation of analytical methods.

Traceability Information:

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Reagent

ICP LLCCV-4_00006

INORGANIC VENTURES
300 Technology Drive
Christiansburg, VA 24073 - USA
inorganicventures.com

CERTIFICATE OF ANALYSIS

tel: 800.669.6779 - 540.585.3030
fax: 540.585.3012
info@inorganicventures.com

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01 — ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	ICP-LLCCV-4
Lot Number:	N2-MEB665287
Matrix:	2% (v/v) HNO3
Value / Analyte(s):	300 mg/L ea: Potassium, 100 mg/L ea: Sodium, 20 mg/L ea: Magnesium, Calcium, 10 mg/L ea: Bismuth, Aluminum, Iron, Sulfur, 6 mg/L ea: Uranium, 4 mg/L ea: Nickel, 2 mg/L ea: Selenium, Zinc, Lithium, 1.5 mg/L ea: Copper, Arsenic, Thorium, Thallium, 1 mg/L ea: Vanadium, Strontium, Barium, Silver, Cobalt, Chromium, Manganese, 0.9 mg/L ea: Lead, 0.5 mg/L ea: Cadmium, 0.1 mg/L ea: Beryllium

5058196
ID: ICP LLCCV-4_00003
Exp: 02/07/21 Prpd: SJS
ICP LLCCV STD 4 IV

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Aluminum, Al	10.00 ± 0.05 mg/L	Arsenic, As	1.500 ± 0.011 mg/L
Barium, Ba	1.000 ± 0.006 mg/L	Beryllium, Be	0.1000 ± 0.0007 mg/L
Bismuth, Bi	10.00 ± 0.07 mg/L	Cadmium, Cd	0.4999 ± 0.0037 mg/L
Calcium, Ca	20.00 ± 0.08 mg/L	Chromium, Cr	1.000 ± 0.008 mg/L
Cobalt, Co	1.000 ± 0.006 mg/L	Copper, Cu	1.500 ± 0.006 mg/L
Iron, Fe	10.00 ± 0.05 mg/L	Lead, Pb	0.900 ± 0.004 mg/L
Lithium, Li	2.000 ± 0.012 mg/L	Magnesium, Mg	20.00 ± 0.12 mg/L
Manganese, Mn	1.000 ± 0.005 mg/L	Nickel, Ni	4.000 ± 0.024 mg/L
Potassium, K	300.0 ± 1.1 mg/L	Selenium, Se	2.000 ± 0.015 mg/L
Silver, Ag	1.000 ± 0.008 mg/L	Sodium, Na	100.0 ± 0.4 mg/L
Strontium, Sr	1.000 ± 0.006 mg/L	Sulfur, S	10.00 ± 0.05 mg/L
Thallium, Tl	1.500 ± 0.010 mg/L	Thorium, Th	1.500 ± 0.009 mg/L
Uranium, U	6.000 ± 0.032 mg/L	Vanadium, V	1.000 ± 0.006 mg/L
Zinc, Zn	2.000 ± 0.012 mg/L		

Density: 1.013 g/mL (measured at 20 ± 4 °C)

Assay Information:

V	EDTA	928	928
V	ICP Assay	3165	992706
Zn	ICP Assay	3168a	120629
Zn	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$
X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$
w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:
$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$
$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\ (u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{½}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\ (u_{char\ a})^2 + (w_b)^2\ (u_{char\ b})^2]^{½}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty
u_{lts} = long term stability standard uncertainty (storage)
u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\ (u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{½}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty
u_{lts} = long term stability standard uncertainty (storage)
u_{ts} = transport stability standard uncertainty

Certified Abundance:

IV's Certified Abundance

Isotope	Atom %
Uranium 238U	99.7 ± 0.1
Uranium 235U	0.28 ± 0.05

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Low Silver Note: This solution contains "LOW" levels of Silver. Please store this entire bottle inside a sealed glass jar.

Uranium Note: If uranium is present in this standard, it is natural abundance unless specified in Section 3

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

February 07, 2018

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- February 07, 2021

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Michael J Booth

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Paul R Gaines

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ag	ICP Assay	3151	992212
Ag	Volhard	999b	999b
Al	ICP Assay	3101a	140903
Al	EDTA	928	928
As	ICP Assay	3103a	100818
As	Calculated		See Sec. 4.2
Ba	ICP Assay	3104a	070222
Ba	Gravimetric		See Sec. 4.2
Be	ICP Assay	3105a	090514
Be	Calculated		See Sec. 4.2
Bi	ICP Assay	3106	991212
Bi	Calculated		See Sec. 4.2
Ca	ICP Assay	3109a	130213
Ca	EDTA	928	928
Cd	ICP Assay	3108	060531
Cd	EDTA	928	928
Co	ICP Assay	3113	000630 Co
Co	EDTA	928	928
Cr	ICP Assay	3112a	030730Cr3
Cu	ICP Assay	3114	121207
Cu	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928
K	ICP Assay	3141a	140813
K	Gravimetric		See Sec. 4.2
Li	ICP Assay	3129a	000505
Li	Calculated		See Sec. 4.2
Mg	ICP Assay	3131a	140110
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	ICP Assay	3152a	120715
Na	Gravimetric		See Sec. 4.2
Ni	ICP Assay	3136	120619
Ni	EDTA	928	928
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
S	ICP Assay	3154	892205
S	Acidimetric		traceable to 84L
Se	ICP Assay	3149	100901
Se	Calculated		See Sec. 4.2
Sr	EDTA	928	928
Sr	ICP Assay	3153a	990906
Th	EDTA	928	928
Th	Calculated		See Sec. 4.2
Tl	ICP Assay	3158	993012
Tl	Calculated		See Sec. 4.2
U	ICP Assay	3164	080521
U	Calculated		See Sec. 4.2

Reagent

ICP PDS 1_00025

INORGANIC VENTURES
5283 Corporate Drive
Christiansburg, VA 24073 USA
Independent Analysis

CERTIFICATE OF ANALYSIS

Toll Free (USA Only): 800.669.2698
Direct: 540.962.9281
Fax: 540.962.0013
Info@inorganicventures.com

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01
ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	STLDEN-PDS-1
Lot Number:	M2-MEB659764
Matrix:	3% (v/v) HNO3
Value / Analyte(s):	2 000 µg/mL ea: Calcium, Potassium, Magnesium, Sodium, 200 µg/mL ea: Phosphorus, 100 µg/mL ea: Iron, Aluminum, 50 µg/mL ea: Uranium, 20 µg/mL ea: Thorium, Thallium, Selenium, Zinc, Arsenic, 10 µg/mL ea: Barium, Lithium, Lead, 5 µg/mL ea: Strontium, Vanadium, Silver, Nickel, Manganese, Beryllium, Cadmium, Cobalt, Chromium, Copper

5010425
ID: ICP PDS 1_00025
Exp: 07/06/20 Prpd: SJS
ICP PDS 1 IV

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Aluminum, Al	100.0 ± 0.3 µg/mL	Arsenic, As	20.00 ± 0.14 µg/mL
Barium, Ba	10.00 ± 0.05 µg/mL	Beryllium, Be	5.000 ± 0.030 µg/mL
Cadmium, Cd	5.000 ± 0.030 µg/mL	Calcium, Ca	2 000 ± 8 µg/mL
Chromium, Cr	5.000 ± 0.026 µg/mL	Cobalt, Co	5.000 ± 0.026 µg/mL
Copper, Cu	4.999 ± 0.030 µg/mL	Iron, Fe	100.0 ± 0.4 µg/mL
Lead, Pb	10.00 ± 0.04 µg/mL	Lithium, Li	10.00 ± 0.04 µg/mL
Magnesium, Mg	2 000 ± 8 µg/mL	Manganese, Mn	5.000 ± 0.026 µg/mL
Nickel, Ni	5.000 ± 0.030 µg/mL	Phosphorus, P	200.0 ± 0.9 µg/mL
Potassium, K	2 000 ± 7 µg/mL	Selenium, Se	20.00 ± 0.10 µg/mL
Silver, Ag	5.000 ± 0.034 µg/mL	Sodium, Na	2 000 ± 7 µg/mL
Strontium, Sr	5.000 ± 0.030 µg/mL	Thallium, Tl	20.00 ± 0.12 µg/mL
Thorium, Th	20.00 ± 0.10 µg/mL	Uranium, U	50.00 ± 0.25 µg/mL
Vanadium, V	5.000 ± 0.030 µg/mL	Zinc, Zn	20.00 ± 0.12 µg/mL

Density: 1.042 g/mL (measured at 20 ± 4 °C)

Assay Information:

Zn	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\ (u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{½}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\ (u_{char\ a})^2 + (w_b)^2\ (u_{char\ b})^2]^{½}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\ (u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{½}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Certified Abundance:

IV's Certified Abundance

Isotope	Atom %
Uranium 238U	99.6 ± 0.1
Uranium 235U	0.37 ± 0.05

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Low Silver Note: This solution contains "LOW" levels of Silver. Please store this entire bottle inside a sealed glass jar.

Uranium Note: If uranium is present in this standard, it is natural abundance unless specified in Section 3

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

July 06, 2017

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **July 06, 2020**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Michael J Booth

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Paul R Gaines

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ag	ICP Assay	3151	992212
Ag	Volhard	999c	999c
Al	ICP Assay	3101a	140903
Al	EDTA	928	928
As	ICP Assay	3103a	100818
Ba	ICP Assay	3104a	140909
Ba	Gravimetric		See Sec. 4.2
Be	ICP Assay	3105a	090514
Ca	ICP Assay	3109a	130213
Ca	EDTA	928	928
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Co	ICP Assay	3113	000630 Co
Co	EDTA	928	928
Cr	ICP Assay	3112a	030730Cr3
Cr	Calculated		See Sec. 4.2
Cu	ICP Assay	3114	121207
Cu	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928
K	ICP Assay	3141a	140813
K	Gravimetric		See Sec. 4.2
Li	ICP Assay	3129a	100714
Li	Gravimetric		See Sec. 4.2
Mg	ICP Assay	3131a	050302
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	ICP Assay	3152a	120715
Na	Gravimetric		See Sec. 4.2
Ni	ICP Assay	3136	120619
Ni	EDTA	928	928
P	ICP Assay	3139a	060717
P	Acidimetric	84L	84L
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
Se	ICP Assay	3149	100901
Se	Calculated		See Sec. 4.2
Sr	EDTA	928	928
Sr	ICP Assay	3153a	990906
Th	EDTA	928	928
Th	Calculated		See Sec. 4.2
Tl	ICP Assay	3158	993012
Tl	Calculated		See Sec. 4.2
U	ICP Assay	3164	080521
U	Calculated		See Sec. 4.2
V	EDTA	928	928
V	ICP Assay	3165	992706
Zn	ICP Assay	3168a	120629

Reagent

ICP SPK 2B_00077

INORGANIC VENTURES
300 Technology Drive
Christiansburg, VA 24073 - USA
inorganicventures.com

CERTIFICATE OF ANALYSIS

tel: 800.669.6799 - 540.585.3030
fax: 540.585.3012
info.inorganicventures.com

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01 — ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

5200716
ID: ICP SPK 2B_00077
Exp:07/03/19 Prpd:MRJ Opn:07/03/18
ICP PREP SPIKE 2B

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	TA-ICP-SPK-2B
Lot Number:	N2-MEB665203
Matrix:	5% (v/v) HNO3 0.5% (v/v) HF
Value / Analyte(s):	1 000 µg/mL ea: Silicon, 200 µg/mL ea: Tin, Sulfur, 100 µg/mL ea: Boron, Molybdenum, Titanium, 50 µg/mL ea: Zirconium, Antimony

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Antimony, Sb	50.00 ± 0.30 µg/mL	Boron, B	100.0 ± 0.6 µg/mL
Molybdenum, Mo	100.0 ± 0.5 µg/mL	Silicon, Si	1 000 ± 6 µg/mL
Sulfur, S	200.0 ± 1.0 µg/mL	Tin, Sn	200.0 ± 0.8 µg/mL
Titanium, Ti	100.0 ± 0.6 µg/mL	Zirconium, Zr	50.00 ± 0.35 µg/mL

Density: 1.028 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
B	ICP Assay	3107	110830
Mo	ICP Assay	3134	130418
S	ICP Assay	3154	892205
S	Acidimetric		traceable to 84L
Sb	ICP Assay	3102a	140911
Si	ICP Assay	3150	130912
Sn	ICP Assay	3161a	070330
Sn	Calculated		See Sec. 4.2
Ti	ICP Assay	3162a	130925
Zr	ICP Assay	3169	130920

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\ (u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\ (u_{char\ a})^2 + (w_b)^2\ (u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\ (u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

HF Note: This standard should not be prepared or stored in glass.

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

February 06, 2018

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- February 06, 2021

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Reagent

ICP SPK 3A_00149

INORGANIC VENTURES
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CERTIFICATE OF ANALYSIS

tel: 800.669.6799 - 540.585.3030
fax: 540.585.3012
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1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 883.01 ACCREDITED Reference Material Producer Certificate 883.02

2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	STLDEN-SPK-3A
Lot Number:	N2-MEB668756
Matrix:	5% (v/v) HNO3
Value / Analyte(s):	5 000 µg/mL ea: Calcium, Potassium, Magnesium, Sodium, 1 000 µg/mL ea: Phosphorus, 200 µg/mL ea: Thallium, Uranium, Selenium, Bismuth, Aluminum, Barium, 100 µg/mL ea: Arsenic, Lithium, Iron, Strontium, Thorium, 50 µg/mL ea: Vanadium, Zinc, Lead, Nickel, Cobalt, Manganese, 25 µg/mL ea: Copper, 20 µg/mL ea: Chromium, 10 µg/mL ea: Cadmium, 5 µg/mL ea: Silver, Beryllium

5207037
ID: ICP SPK 3A_00149
Exp:07/10/19 Prpd:CRR Opn:07/10/18
ICP PREP SPIKE 3A IV

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Aluminum, Al	200.0 ± 0.7 µg/mL	Arsenic, As	100.0 ± 0.5 µg/mL
Barium, Ba	200.0 ± 0.9 µg/mL	Beryllium, Be	5.000 ± 0.029 µg/mL
Bismuth, Bi	200.0 ± 1.1 µg/mL	Cadmium, Cd	10.00 ± 0.06 µg/mL
Calcium, Ca	5 000 ± 20 µg/mL	Chromium, Cr	20.00 ± 0.10 µg/mL
Cobalt, Co	50.01 ± 0.23 µg/mL	Copper, Cu	25.00 ± 0.10 µg/mL
Iron, Fe	100.0 ± 0.4 µg/mL	Lead, Pb	50.00 ± 0.27 µg/mL
Lithium, Li	100.0 ± 0.4 µg/mL	Magnesium, Mg	5 000 ± 20 µg/mL
Manganese, Mn	50.00 ± 0.26 µg/mL	Nickel, Ni	50.00 ± 0.26 µg/mL
Phosphorus, P	1 000 ± 5 µg/mL	Potassium, K	4 999 ± 19 µg/mL
Selenium, Se	200.0 ± 1.2 µg/mL	Silver, Ag	5.001 ± 0.034 µg/mL
Sodium, Na	4 999 ± 19 µg/mL	Strontium, Sr	100.0 ± 0.4 µg/mL
Thallium, Tl	200.0 ± 1.1 µg/mL	Thorium, Th	100.0 ± 0.5 µg/mL
Uranium, U	200.0 ± 1.1 µg/mL	Vanadium, V	49.99 ± 0.21 µg/mL
Zinc, Zn	50.02 ± 0.21 µg/mL		

Density: 1.094 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ag	ICP Assay	3151	992212
Ag	Volhard	999c	999c
Al	ICP Assay	3101a	140903
Al	EDTA	928	928
As	ICP Assay	3103a	100818
As	Calculated		See Sec. 4.2
Ba	ICP Assay	3104a	140909
Ba	Gravimetric		See Sec. 4.2
Be	ICP Assay	3105a	090514
Bi	ICP Assay	3106	991212
Ca	ICP Assay	3109a	130213
Ca	EDTA	928	928
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Co	ICP Assay	3113	000630 Co
Co	EDTA	928	928
Cr	ICP Assay	3112a	030730Cr3
Cr	Calculated		See Sec. 4.2
Cu	ICP Assay	3114	121207
Cu	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928
K	ICP Assay	3141a	140813
K	Gravimetric		See Sec. 4.2
Li	ICP Assay	3129a	100714
Li	Gravimetric		See Sec. 4.2
Mg	ICP Assay	3131a	050302
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	ICP Assay	3152a	120715
Na	Gravimetric		See Sec. 4.2
Ni	ICP Assay	3136	120619
Ni	EDTA	928	928
P	ICP Assay	3139a	060717
P	Acidimetric	84L	84L
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
Se	ICP Assay	3149	100901
Se	Calculated		See Sec. 4.2
Sr	EDTA	928	928
Sr	ICP Assay	3153a	990906
Th	EDTA	928	928
Th	Calculated		See Sec. 4.2
Tl	ICP Assay	3158	993012
Tl	Calculated		See Sec. 4.2
U	ICP Assay	3164	080521
U	Calculated		See Sec. 4.2
V	EDTA	928	928

V	ICP Assay	3165	992706
Zn	ICP Assay	3168a	120629
Zn	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2 (u_{char\ a})^2 + (w_b)^2 (u_{char\ b})^2]^{1/2}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Certified Abundance:

IV's Certified Abundance

Isotope	Atom %
Uranium 238U	99.7 ± 0.1
Uranium 235U	0.28 ± 0.05

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Low Silver Note: This solution contains "LOW" levels of Silver. Please store this entire bottle inside a sealed glass jar.

Uranium Note: If uranium is present in this standard, it is natural abundance unless specified in Section 3

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.3 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

June 12, 2018

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- June 12, 2022

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

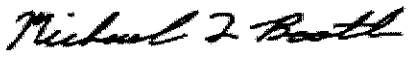
- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth
Supervisor, Quality Control



Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

Reagent

Icp stk ICSA_00023

11.1 Certification Issue Date

July 01, 2016

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **July 01, 2020**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year from the date of removal from the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being handled and stored in accordance with the instructions given in Sec 7.1.

11.4 Revision Status

- Revision 1 - Wednesday, Apr 26, 2017. Added TMI data

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Joseph Burns
Technical Support Technician

Certificate Approved By:

Michael Booth
Supervisor, Quality Control

Certifying Officer:

Paul Gaines
CEO, Senior Technical Director

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Christiansburg, VA 24073 - USA
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tel: 800.669.6779 - 540.562.9099
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CERTIFICATE OF ANALYSIS

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

ACCREDITED Testing Laboratory Certificate 863.01
ACCREDITED Reference Material Producer Certificate 863.02

2.0 PRODUCT DESCRIPTION

4698822
ID: icp stk ICSA_00023
Exp: 07/01/20 Prpd: SJS
ICP stock ICSA solution

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	CLPP-ICS-A
Lot Number:	K2-MEB643109
Matrix:	2% (v/v) HNO3
Value / Analyte(s):	5 000 µg/mL ea: Aluminum, Calcium, Magnesium, 2 000 µg/mL ea: Iron

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Aluminum, Al	5 000 ± 22 µg/mL	Calcium, Ca	5 000 ± 20 µg/mL
Iron, Fe	2 000 ± 8 µg/mL	Magnesium, Mg	5 000 ± 20 µg/mL

Certified Density: 1.085 g/mL (measured at 20 ± 1 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Al	ICP Assay	3101a	060502
Al	EDTA	928	928
Ca	ICP Assay	3109a	050825
Ca	EDTA	928	928
Fe	ICP Assay	3126a	051031
Fe	EDTA	928	928
Mg	ICP Assay	3131a	050302
Mg	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM by two independent methods **Characterization of CRM by one method**

Characterization of CRM/RM by Two Methods

Certified Value, $X_{CRM/RM}$, where two methods of characterization are used is the weighted mean of the two results:

$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$

X_a = mean of Assay Method A with standard uncertainty $u_{char\ a}$

X_b = mean of Assay Method B with standard uncertainty $u_{char\ b}$

w_a and w_b = the weighting factors for each method calculated using the inverse square of the variance:

$w_a = (1/u_{char\ a})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

$w_b = (1/u_{char\ b})^2 / ((1/u_{char\ a})^2 + (1/u_{char\ b})^2))$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a\&b} + u^2_{bb} + u^2_{its} + u^2_{ts})^{½}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a\&b} = [(w_a)^2\,(u_{char\ a})^2 + (w_b)^2\,(u_{char\ b})^2]^{½}$ where $u_{char\ a}$ and $u_{char\ b}$ are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$X_{CRM/RM}$ = mean of Assay Method A with standard uncertainty $u_{char\ a}$

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k\,(u^2_{char\ a} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{½}$

k = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char\ a}$ = square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

M	Ag	<	0.000400	M	Eu	<	0.000100	O	Na		0.027559	M	Se	<	0.002091	M	Zn		0.008219
s	Al	<		s	Fe	<		M	Nb	<	0.000100	O	Si		0.217000	M	Zr	<	0.001002
M	As	<	0.005613	M	Ga	<	0.000100	M	Nd	<	0.000601	M	Sm	<	0.000100				
M	Au	<	0.000199	M	Gd	<	0.000100	M	Ni	<	0.005613	M	Sn	<	0.000200				
M	B	<	0.008420	M	Ge	<	0.000400	M	Os	<	0.000099	M	Sr		0.043302				
M	Ba	<	0.001603	M	Hf	<	0.000100	O	P	<	0.108500	M	Ta	<	0.000100				
O	Be	<	0.000217	M	Hg	<	0.000597	M	Pb		0.003408	M	Tb	<	0.000100				
M	Bi	<	0.000400	M	Ho	<	0.000100	M	Pd	<	0.000100	M	Te	<	0.003107				
s	Ca	<		M	In	<	0.000400	M	Pr	<	0.000200	M	Th	<	0.000100				
M	Cd	<	0.000100	M	Ir	<	0.000099	M	Pt	<	0.000100	M	Ti	<	0.000801				
M	Ce	<	0.002004	O	K		0.011718	M	Rb	<	0.000100	M	Tl	<	0.000100				
M	Co	<	0.003207	M	La	<	0.000801	M	Re	<	0.000100	M	Tm	<	0.000100				
M	Cr		0.024658	O	Li		0.005425	M	Rh	<	0.000100	M	U	<	0.000100				
M	Cs	<	0.000601	M	Lu	<	0.000100	M	Ru	<	0.000099	M	V	<	0.000400				
M	Cu	<	0.004610	s	Mg	<		O	S		0.422173	M	W	<	0.000100				
M	Dy	<	0.000100	M	Mn		0.002606	M	Sb	<	0.000200	M	Y	<	0.000100				
M	Er	<	0.000100	M	Mo	<	0.000400	M	Sc	<	0.001403	M	Yb	<	0.000100				

M - Checked by ICP-MS O - Checked by ICP-OES i - Spectral Interference
n - Not Checked For s - Solution Standard Element

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag keep cap tightly sealed when not in use. Store and use at 20° ± 4° C. Do not pippette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.4 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.5 ISO Guide 34 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION, PERIOD OF VALIDITY AND REVISION HISTORY

Reagent

MCPA&MCPP_00027

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Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

Catalog No: S-66380-R1
Description: Custom Herbicide Standard
Lot: 217041338
Solvent: Methanol
Hazards: *Refer to SDS for complete safety information*

Signal Word: Danger

Date Certified: Apr 25, 2017
Expiration: May 25, 2019
Sample Size: 1 mL
Components: 2
Storage Condition: Refrig (0-5 °C)

Included on ISO/IEC 17025 Scope of Accreditation: Yes

Included on ISO Guide 34 Scope of Accreditation: Yes

Component	CAS #	Purity % (HPLC)	Prepared Concentration[1] (mg/mL)	Certified Analyte Concentration[2] (mg/mL)
MCPA acid	94-74-6	98.9	90.05	89.06
MCPP acid	7085-19-0	99.9	90.02	89.93

A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot number has had its expiration date extended and is identical to the same lot number without the suffix.

[1] All weights are traceable through NIST, Test No. 822-275872-11

[2] Certified Analyte Concentration = Purity x Prepared Concentration.

The Uncertainty associated with the gravimetric values reported on this certificate is ±0.24%. This value is the expanded uncertainty and represents an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.

Labels and certificates follow U.S. Conventions in reporting numerical values: A comma (,) is used to separate units of one-thousand or greater. A period (.) is used as a decimal place marker.

See reverse side for additional information

Certified By: Larry Decker, Organic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

OR-ORG/INO-001
Rev. 5/16

Reagent

MS-47548-U_00015

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16823-0048 USA · Phone(814)359-3441

Certificate of Analysis

Description: EPA 8270 GC/MS Tuning Solution II, 1x1ml, 1000µg/ml in methylene chloride

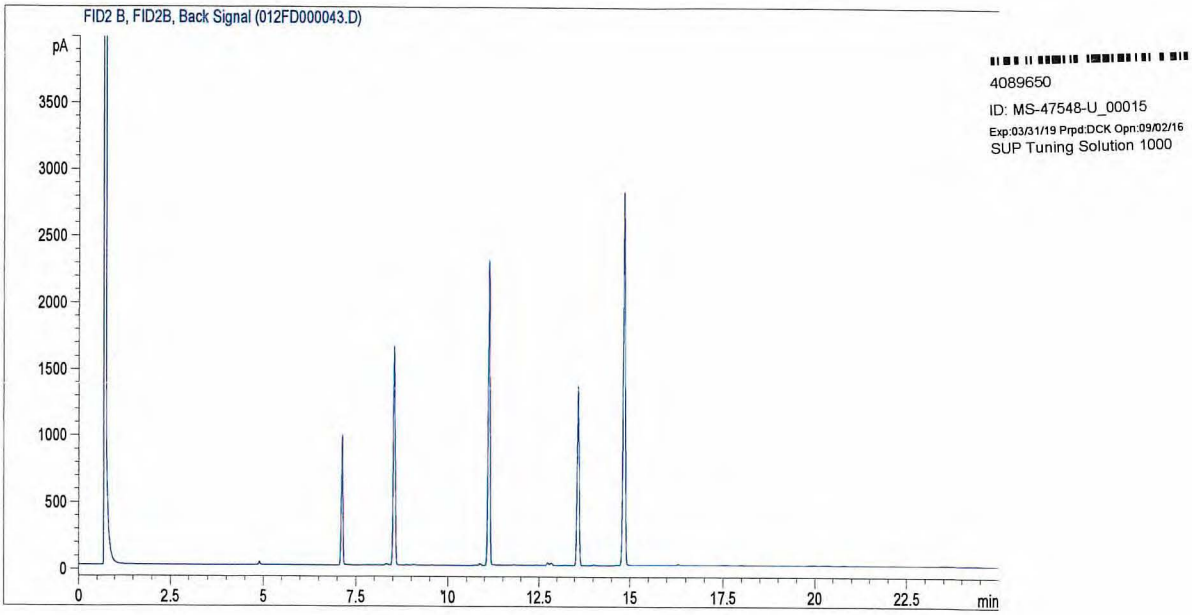
Part Number: 47548-U

Lot Number: XA19099V

Expiration Date: March 2019

Storage: Refrigerate

Analytical Method Parameters:
Column: Equity-5; 30 m x 0.53 mm, 1.5 µm df
150 °C to 280 °C (8.75 min) at 8 °C/min
Detector: FID; 310 °C
Injection Volume: 1µL



Elution	Analyte	Lot Number	CAS Number	Chromatographic Purity %	Certified Gravimetric Conc. µg/mL	Expanded Uncertainty µg/mL	Analytical Conc. µg/mL
1.	Pentachlorophenol	LC17897	87-86-5	97.5	1000.0	±38	945.6
2.	Decafluorotriphenylphosphine	LC14010	5074-71-5	98.6	986.0	±44	961.5
3.	Benzidine	LB83682	92-87-5	99.9	999.0	±38	1009.6
4.	4,4'-DDT	LA83013	50-29-3	98.0	980.8	±36	961.0
	Internal Standard	N/A	N/A	N/A	N/A	N/A	N/A

ANAB ACCREDITED TESTING LABORATORY Cert# AT-1607

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Produced in double accredited laboratory fulfulling
ISO/IEC 17025 and
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MS-567684_00019

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4101728
ID: MS-567684_00019
Exp: 07/31/20 Prpd: DCK
RES 8270 Internal Std Mix

Catalog No. : 567684 **Lot No.:** A0112833

Description : 8270 Internal Standard

8270 Internal Standard 2,000µg/mL, Methylene Chloride, 5mL/ampul

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : July 31, 2020 **Storage:** 10°C or colder

Handling: Sonication required. Mix is photosensitive.

CERTIFIED VALUES

Elution Order	Compound		Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	1,4-Dichlorobenzene-d4 **CAS #** 3855-82-1 **Purity** 99%	(Lot PR-18488)	2,014.8 µg/mL	+/- 11.7142 +/- 89.5186 +/- 98.3528	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
2	Naphthalene-d8 **CAS #** 1146-65-2 **Purity** 99%	(Lot M-1452)	2,015.8 µg/mL	+/- 11.7202 +/- 89.5645 +/- 98.4032	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
3	Acenaphthene-d10 **CAS #** 15067-26-2 **Purity** 97%	(Lot PR-21070)	2,002.0 µg/mL	+/- 11.6397 +/- 88.9491 +/- 97.7271	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
4	Phenanthrene-d10 **CAS #** 1517-22-2 **Purity** 99%	(Lot PR-23065)	2,007.1 µg/mL	+/- 11.6693 +/- 89.1750 +/- 97.9753	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
5	Chrysene-d12 **CAS #** 1719-03-5 **Purity** 99%	(Lot PR-25081)	2,013.2 µg/mL	+/- 11.7047 +/- 89.4460 +/- 98.2730	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
6	Perylene-d12 **CAS #** 1520-96-3 **Purity** 99%	(Lot PR-24113)	2,005.4 µg/mL	+/- 11.6598 +/- 89.1024 +/- 97.8955	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed

Reagent

MS-567684_00020

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5035055
ID: MS-567684_00020
Exp: 08/31/22 Prpd: OCK
RES 8270 Internal Std Mix

Catalog No. : 567684 **Lot No.:** A0129635

Description : 8270 Internal Standard

8270 Internal Standard 2,000µg/mL, Methylene Chloride, 5mL/ampul

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : August 31, 2022 **Storage:** 10°C or colder

Handling: Sonication required. Mix is photosensitive.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	1,4-Dichlorobenzene-d4 **CAS #** 3855-82-1 (Lot PR-18488) **Purity** 99%	2,014.1 µg/mL	+/- 11.7102 µg/mL +/- 90.7163 µg/mL +/- 100.6609 µg/mL	Gravimetric Unstressed Stressed
2	Naphthalene-d8 **CAS #** 1146-65-2 (Lot M-1452) **Purity** 99%	2,004.1 µg/mL	+/- 11.6520 µg/mL +/- 90.2659 µg/mL +/- 100.1611 µg/mL	Gravimetric Unstressed Stressed
3	Acenaphthene-d10 **CAS #** 15067-26-2 (Lot PR-25444) **Purity** 99%	2,011.1 µg/mL	+/- 11.6927 µg/mL +/- 90.5811 µg/mL +/- 100.5110 µg/mL	Gravimetric Unstressed Stressed
4	Phenanthrene-d10 **CAS #** 1517-22-2 (Lot PR-27621) **Purity** 99%	2,014.5 µg/mL	+/- 11.7125 µg/mL +/- 90.7343 µg/mL +/- 100.6809 µg/mL	Gravimetric Unstressed Stressed
5	Chrysene-d12 **CAS #** 1719-03-5 (Lot PR-27952) **Purity** 99%	2,013.6 µg/mL	+/- 11.7072 µg/mL +/- 90.6938 µg/mL +/- 100.6359 µg/mL	Gravimetric Unstressed Stressed
6	Perylene-d12 **CAS #** 1520-96-3 (Lot PR-27342) **Purity** 99%	2,012.2 µg/mL	+/- 11.6991 µg/mL +/- 90.6307 µg/mL +/- 100.5659 µg/mL	Gravimetric Unstressed Stressed

Reagent

MS-567685_00004

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This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 567685 **Lot No.:** A0130500

Description : 8270 Surrogate Standard

8270 Surrogate Standard 5,000µg/mL, Methylene chloride, 5mL/ampul

4941881
ID: MS-567685_00004
Exp: 09/30/22 Prpd: DCK
8270 Surrogates 5000ug/mL

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : September 30, 2022 **Storage:** 10°C or colder

Handling: Sonicate prior to use.

CERTIFIED VALUES

Elution Order	Compound		Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	2-Fluorophenol **CAS #** 367-12-4 **Purity** 99%	(Lot STBD7945V)	5,009.8 µg/mL	+/- 29.1274 µg/mL +/- 146.2028 µg/mL +/- 177.4114 µg/mL	Gravimetric Unstressed Stressed
2	Phenol-d5 **CAS #** 4165-62-2 **Purity** 99%	(Lot X-479)	5,013.6 µg/mL	+/- 29.1495 µg/mL +/- 146.3137 µg/mL +/- 177.5460 µg/mL	Gravimetric Unstressed Stressed
3	Nitrobenzene-d5 **CAS #** 4165-60-0 **Purity** 99%	(Lot PR-25462)	5,000.0 µg/mL	+/- 29.0704 µg/mL +/- 145.9168 µg/mL +/- 177.0644 µg/mL	Gravimetric Unstressed Stressed
4	2-Fluorobiphenyl **CAS #** 321-60-8 **Purity** 99%	(Lot B19Z016)	5,001.2 µg/mL	+/- 29.0774 µg/mL +/- 145.9518 µg/mL +/- 177.1069 µg/mL	Gravimetric Unstressed Stressed
5	2,4,6-Tribromophenol **CAS #** 118-79-6 **Purity** 99%	(Lot 29699MJV)	5,002.6 µg/mL	+/- 29.0855 µg/mL +/- 145.9926 µg/mL +/- 177.1564 µg/mL	Gravimetric Unstressed Stressed
6	p-Terphenyl-d14 **CAS #** 1718-51-0 **Purity** 99%	(Lot PR-27278)	5,004.0 µg/mL	+/- 29.0937 µg/mL +/- 146.0335 µg/mL +/- 177.2060 µg/mL	Gravimetric Unstressed Stressed

Reagent

MS-568023_00042

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This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 568023 **Lot No.:** A0127668

Description : 8270 Famphur Standard

8270 Famphur Standard 2,000µg/mL, Methylene Chloride, 1mL/ampul

4649426
ID: MS-568023_00042
Exp: 05/31/19 Prpd: DCK
RES HSLA Famphur 2000ug/m

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : May 31, 2019 **Storage:** 10°C or colder

Handling: This product is photosensitive.

CERTIFIED VALUES

Component #	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	Famphur	2,010.0 µg/mL	+/- 20.2482 µg/mL	Gravimetric
	CAS # 52-85-7 (Lot 5792500)		+/- 87.7744 µg/mL	Unstressed
	Purity 99%		+/- 87.8109 µg/mL	Stressed

Solvent: Methylene Chloride
CAS # 75-09-2
Purity 99%

Michael J Maye

Date Mixed: 17-May-2017 **Balance:** 1128353505

Manufactured under Restek's ISO 9001:2008
Registered Quality System
Certificate #FM 80397

Reagent

MS-568033_00026

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Catalog No. : 568033 **Lot No.:** A0133057

4941894
ID: MS-568033_00026
Exp: 06/30/19 Prpd: DCK
RES HSLA CUSTOM MIX 4000u

Description : Denver 8270 Standard

Denver 8270 Standard 4,000µg/mL, Methylene Chloride, 1mL/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : June 30, 2019 **Storage:** 10°C or colder

Handling: Sonicate prior to use. This product is photosensitive.

CERTIFIED VALUES

Component #	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	2,3-Dichloroaniline	4,000.0 µg/mL	+/- 37.1978 µg/mL	Gravimetric
	CAS # 608-27-5 (Lot FBV01)		+/- 55.9394 µg/mL	Unstressed
	Purity 99%		+/- 81.4485 µg/mL	Stressed
2	3,5-Dimethylphenol	4,016.0 µg/mL	+/- 37.3466 µg/mL	Gravimetric
	CAS # 108-68-9 (Lot 02801LZ)		+/- 56.1632 µg/mL	Unstressed
	Purity 99%		+/- 81.7743 µg/mL	Stressed
3	Alachlor	4,008.0 µg/mL	+/- 37.2722 µg/mL	Gravimetric
	CAS # 15972-60-8 (Lot 6104400)		+/- 56.0513 µg/mL	Unstressed
	Purity 99%		+/- 81.6114 µg/mL	Stressed
4	alpha-Methylstyrene	4,016.0 µg/mL	+/- 37.3466 µg/mL	Gravimetric
	CAS # 98-83-9 (Lot MKBS2502V)		+/- 56.1632 µg/mL	Unstressed
	Purity 99%		+/- 81.7743 µg/mL	Stressed
5	Benzo(e)pyrene	4,004.0 µg/mL	+/- 37.2350 µg/mL	Gravimetric
	CAS # 192-97-2 (Lot NT058329)		+/- 55.9953 µg/mL	Unstressed
	Purity 99%		+/- 81.5299 µg/mL	Stressed

Reagent

MS-569730 HSL_00007

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This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 569730 **Lot No.:** A0127472

Description : 8270 List 1 / Std #9

8270 List 1 / Std #9 2,000 ug/ml, Methylene Chloride, 5 ml/ampul

Container Size : 10 mL **Pkg Amt:** > 5 mL

Expiration Date : November 30, 2018 **Storage:** 10°C or colder

Handling: Contains carcinogen/reproductive toxin.

4941882
ID: MS-569730 AFC_00006
Exp: 11/30/18 Prpd: DCK
HSLA Amine Mix (2015) 200

4941892
ID: MS-569730 HSL_00007
Exp: 11/30/18 Prpd: DCK
HSLA Amine Mix (2015) 200

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	Benzidine	2,003.5 µg/mL	+/- 11.6483 µg/mL	Gravimetric
	CAS # 92-87-5 (Lot 170428KJA)		+/- 23.9496 µg/mL	Unstressed
	Purity 99%		+/- 38.1154 µg/mL	Stressed
2	3,3'-Dichlorobenzidine	2,002.1 µg/mL	+/- 11.6402 µg/mL	Gravimetric
	CAS # 91-94-1 (Lot 170123KJA)		+/- 23.9328 µg/mL	Unstressed
	Purity 99%		+/- 38.0887 µg/mL	Stressed

Solvent: Methylene Chloride
CAS # 75-09-2
Purity 99%

Reagent

MS-569731_00079

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4944222
ID: MS-569731_00079
Exp: 03/31/19 Prpd: DCK
HSLA Benzoic Acid (2015)

Catalog No. : 569731 **Lot No.:** A0130477

Description : 8270 List 1 / Std #10

8270 List 1 / Std #10 2,000µg/mL, Methylene chloride, 5mL/ampul

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : March 31, 2019 **Storage:** 10°C or colder

Handling: This product is photosensitive.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	Indene	1,996.3 µg/mL	+/- 11.6064 µg/mL	Gravimetric
	CAS # 95-13-6 (Lot MKBT8433V)		+/- 111.9283 µg/mL	Unstressed
	Purity 98%		+/- 114.5473 µg/mL	Stressed
2	Benzoic acid	2,000.8 µg/mL	+/- 11.6328 µg/mL	Gravimetric
	CAS # 65-85-0 (Lot MKBV5544V)		+/- 112.1829 µg/mL	Unstressed
	Purity 99%		+/- 114.8078 µg/mL	Stressed

Solvent: Methylene chloride
CAS # 75-09-2
Purity 99%

Reagent

MS-569732 HSL_00005

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Catalog No. : 569732 **Lot No.:** A0127580

Description : 8270 List 1 / Std #11

8270 List 1 / Std #11 2,000 ug/ml, Methylene Chloride, 5 ml/ampul

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : November 30, 2018 **Storage:** 10°C or colder

Handling: This product is photosensitive.

4941911
ID: MS-569732 HSL_00005
Exp: 11/30/18 Prpd: DCK
8270 List 1/ Std 11 (2015

4941908
ID: MS-569732 BZH_00007
Exp: 11/30/18 Prpd: DCK
8270 List 1/ Std 11 (2015

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	Benzaldehyde **CAS #** 100-52-7 (Lot SHBG8690V) **Purity** 99%	2,019.2 µg/mL	+/- 11.7396 µg/mL +/- 64.7257 µg/mL +/- 75.2411 µg/mL	Gravimetric Unstressed Stressed
2	epsilon-Caprolactam **CAS #** 105-60-2 (Lot I16X016) **Purity** 99%	2,014.2 µg/mL	+/- 11.7105 µg/mL +/- 64.5654 µg/mL +/- 75.0548 µg/mL	Gravimetric Unstressed Stressed
3	Atrazine **CAS #** 1912-24-9 (Lot P7XPN) **Purity** 99%	2,018.1 µg/mL	+/- 11.7333 µg/mL +/- 64.6910 µg/mL +/- 75.2008 µg/mL	Gravimetric Unstressed Stressed

Solvent: Methylene Chloride
CAS # 75-09-2
Purity 99%

Reagent

MS-571995_00001

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This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 571995 **Lot No.:** A0125805

Description : 8270 List 1 / Std #1 MegaMix (2017)

8270 List 1 / Std #1 MegaMix (2017) 500-2000 ug/ml, Methylene Chloride, 5 ml/ampul

4708214
ID: MS-571995_00001
Exp: 09/30/18 Prpd: DCK
RES HSLB Mega Mix (2017)

Container Size : 10 mL **Pkg Amt:** > 5 mL

Expiration Date : September 30, 2018 **Storage:** 10°C or colder

Handling: Carcinogen/reproductive toxin. Photosensitive. Sonicate.

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	1,4-Dioxane **CAS #** 123-91-1 (Lot SHBG1461V) **Purity** 99%	1,000.6 µg/mL	+/- 5.8176 µg/mL +/- 11.9612 µg/mL +/- 19.0361 µg/mL	Gravimetric Unstressed Stressed
2	N-Nitrosodimethylamine **CAS #** 62-75-9 (Lot 170310JLM) **Purity** 99%	1,002.3 µg/mL	+/- 5.8275 µg/mL +/- 11.9816 µg/mL +/- 19.0685 µg/mL	Gravimetric Unstressed Stressed
3	Pyridine **CAS #** 110-86-1 (Lot SHBC7174V) **Purity** 99%	2,003.5 µg/mL	+/- 11.6485 µg/mL +/- 23.9500 µg/mL +/- 38.1160 µg/mL	Gravimetric Unstressed Stressed
4	Phenol **CAS #** 108-95-2 (Lot SHBF1351V) **Purity** 99%	1,000.7 µg/mL	+/- 5.8183 µg/mL +/- 11.9628 µg/mL +/- 19.0387 µg/mL	Gravimetric Unstressed Stressed
5	Aniline **CAS #** 62-53-3 (Lot K22Z462) **Purity** 99%	1,001.7 µg/mL	+/- 5.8238 µg/mL +/- 11.9740 µg/mL +/- 19.0564 µg/mL	Gravimetric Unstressed Stressed
6	Bis(2-chloroethyl)ether **CAS #** 111-44-4 (Lot SHBD4430V) **Purity** 99%	1,000.5 µg/mL	+/- 5.8172 µg/mL +/- 11.9604 µg/mL +/- 19.0349 µg/mL	Gravimetric Unstressed Stressed
7	n-Decane (C10) **CAS #** 124-18-5 (Lot SHBD4608V) **Purity** 99%	1,001.3 µg/mL	+/- 5.8215 µg/mL +/- 11.9692 µg/mL +/- 19.0488 µg/mL	Gravimetric Unstressed Stressed

8	2-Chlorophenol		1,000.9	µg/mL	+/-	5.8191	µg/mL	Gravimetric
	CAS # 95-57-8	(Lot MKBD3900V)			+/-	11.9644	µg/mL	Unstressed
	Purity 99%				+/-	19.0412	µg/mL	Stressed
9	1,3-Dichlorobenzene		1,001.2	µg/mL	+/-	5.8213	µg/mL	Gravimetric
	CAS # 541-73-1	(Lot BCBM5751V)			+/-	11.9688	µg/mL	Unstressed
	Purity 99%				+/-	19.0482	µg/mL	Stressed
10	1,4-Dichlorobenzene		1,001.6	µg/mL	+/-	5.8232	µg/mL	Gravimetric
	CAS # 106-46-7	(Lot MKBS4401V)			+/-	11.9728	µg/mL	Unstressed
	Purity 99%				+/-	19.0545	µg/mL	Stressed
11	Benzyl alcohol		1,000.8	µg/mL	+/-	5.8185	µg/mL	Gravimetric
	CAS # 100-51-6	(Lot SHBC1850V)			+/-	11.9632	µg/mL	Unstressed
	Purity 99%				+/-	19.0393	µg/mL	Stressed
12	1,2-Dichlorobenzene		1,000.5	µg/mL	+/-	5.8168	µg/mL	Gravimetric
	CAS # 95-50-1	(Lot SHBD7331V)			+/-	11.9596	µg/mL	Unstressed
	Purity 99%				+/-	19.0336	µg/mL	Stressed
13	2-Methylphenol (o-cresol)		1,001.1	µg/mL	+/-	5.8207	µg/mL	Gravimetric
	CAS # 95-48-7	(Lot SHBC1479V)			+/-	11.9676	µg/mL	Unstressed
	Purity 99%				+/-	19.0463	µg/mL	Stressed
14	2,2'-oxybis(1-chloropropane)		1,000.7	µg/mL	+/-	5.8184	µg/mL	Gravimetric
	CAS # 108-60-1	(Lot 5922200)			+/-	11.9629	µg/mL	Unstressed
	Purity 98%				+/-	19.0389	µg/mL	Stressed
15	Acetophenone		1,001.1	µg/mL	+/-	5.8203	µg/mL	Gravimetric
	CAS # 98-86-2	(Lot MKBR7156V)			+/-	11.9668	µg/mL	Unstressed
	Purity 99%				+/-	19.0450	µg/mL	Stressed
16	3-Methylphenol (m-cresol)		501.0	µg/mL	+/-	2.9127	µg/mL	Gravimetric
	CAS # 108-39-4	(Lot SHBD0627V)			+/-	5.9886	µg/mL	Unstressed
	Purity 99%				+/-	9.5307	µg/mL	Stressed
17	4-Methylphenol (p-cresol)		500.8	µg/mL	+/-	2.9115	µg/mL	Gravimetric
	CAS # 106-44-5	(Lot 49396APV)			+/-	5.9862	µg/mL	Unstressed
	Purity 99%				+/-	9.5269	µg/mL	Stressed
18	N-Nitroso-di-n-propylamine		1,001.9	µg/mL	+/-	5.8253	µg/mL	Gravimetric
	CAS # 621-64-7	(Lot NOPCF)			+/-	11.9772	µg/mL	Unstressed
	Purity 99%				+/-	19.0615	µg/mL	Stressed
19	Hexachloroethane		1,000.0	µg/mL	+/-	5.8139	µg/mL	Gravimetric
	CAS # 67-72-1	(Lot 4H3SF)			+/-	11.9537	µg/mL	Unstressed
	Purity 99%				+/-	19.0241	µg/mL	Stressed
20	Nitrobenzene		1,001.5	µg/mL	+/-	5.8230	µg/mL	Gravimetric
	CAS # 98-95-3	(Lot SHBF2348V)			+/-	11.9724	µg/mL	Unstressed
	Purity 99%				+/-	19.0539	µg/mL	Stressed
21	Isophorone		981.1	µg/mL	+/-	5.7043	µg/mL	Gravimetric
	CAS # 78-59-1	(Lot MKBG2442V)			+/-	11.7283	µg/mL	Unstressed
	Purity 98%				+/-	18.6653	µg/mL	Stressed
22	2-Nitrophenol		1,000.2	µg/mL	+/-	5.8152	µg/mL	Gravimetric
	CAS # 88-75-5	(Lot BCBH7602V)			+/-	11.9565	µg/mL	Unstressed
	Purity 99%				+/-	19.0285	µg/mL	Stressed
23	2,4-Dimethylphenol		1,001.8	µg/mL	+/-	5.8244	µg/mL	Gravimetric
	CAS # 105-67-9	(Lot 10165155)			+/-	11.9752	µg/mL	Unstressed
	Purity 99%				+/-	19.0583	µg/mL	Stressed

24	Bis(2-chloroethoxy)methane		1,000.4	µg/mL	+/-	5.8162	µg/mL	Gravimetric
	CAS # 111-91-1	(Lot 5670100)			+/-	11.9584	µg/mL	Unstressed
	Purity 99%				+/-	19.0317	µg/mL	Stressed
25	2,4-Dichlorophenol		1,000.7	µg/mL	+/-	5.8180	µg/mL	Gravimetric
	CAS # 120-83-2	(Lot BCBH1617V)			+/-	11.9620	µg/mL	Unstressed
	Purity 99%				+/-	19.0374	µg/mL	Stressed
26	1,2,4-Trichlorobenzene		1,002.0	µg/mL	+/-	5.8259	µg/mL	Gravimetric
	CAS # 120-82-1	(Lot SHBC5541V)			+/-	11.9784	µg/mL	Unstressed
	Purity 99%				+/-	19.0634	µg/mL	Stressed
27	Naphthalene		1,001.8	µg/mL	+/-	5.8244	µg/mL	Gravimetric
	CAS # 91-20-3	(Lot MKBW2603V)			+/-	11.9752	µg/mL	Unstressed
	Purity 99%				+/-	19.0583	µg/mL	Stressed
28	2,6-Dichlorophenol		1,001.0	µg/mL	+/-	5.8197	µg/mL	Gravimetric
	CAS # 87-65-0	(Lot MKBP8620V)			+/-	11.9656	µg/mL	Unstressed
	Purity 99%				+/-	19.0431	µg/mL	Stressed
29	4-Chloroaniline		1,000.6	µg/mL	+/-	5.8174	µg/mL	Gravimetric
	CAS # 106-47-8	(Lot BCBJ1580V)			+/-	11.9608	µg/mL	Unstressed
	Purity 99%				+/-	19.0355	µg/mL	Stressed
30	Hexachlorobutadiene		1,000.2	µg/mL	+/-	5.8151	µg/mL	Gravimetric
	CAS # 87-68-3	(Lot J31X013)			+/-	11.9561	µg/mL	Unstressed
	Purity 99%				+/-	19.0279	µg/mL	Stressed
31	4-Chloro-3-methylphenol		1,002.0	µg/mL	+/-	5.8255	µg/mL	Gravimetric
	CAS # 59-50-7	(Lot STBC7309V)			+/-	11.9776	µg/mL	Unstressed
	Purity 99%				+/-	19.0621	µg/mL	Stressed
32	2-Methylnaphthalene		1,000.4	µg/mL	+/-	5.8161	µg/mL	Gravimetric
	CAS # 91-57-6	(Lot STBF0201V)			+/-	11.9582	µg/mL	Unstressed
	Purity 95%				+/-	19.0314	µg/mL	Stressed
33	1-Methylnaphthalene		999.5	µg/mL	+/-	5.8110	µg/mL	Gravimetric
	CAS # 90-12-0	(Lot 523400-9)			+/-	11.9477	µg/mL	Unstressed
	Purity 98%				+/-	19.0146	µg/mL	Stressed
34	1,2,4,5-Tetrachlorobenzene		1,000.7	µg/mL	+/-	5.8183	µg/mL	Gravimetric
	CAS # 95-94-3	(Lot MKBW7717V)			+/-	11.9628	µg/mL	Unstressed
	Purity 99%				+/-	19.0387	µg/mL	Stressed
35	Hexachlorocyclopentadiene		1,000.0	µg/mL	+/-	5.8143	µg/mL	Gravimetric
	CAS # 77-47-4	(Lot 0012015)			+/-	11.9545	µg/mL	Unstressed
	Purity 99%				+/-	19.0253	µg/mL	Stressed
36	2,4,6-Trichlorophenol		1,001.1	µg/mL	+/-	5.8207	µg/mL	Gravimetric
	CAS # 88-06-2	(Lot MKBL4698V)			+/-	11.9676	µg/mL	Unstressed
	Purity 99%				+/-	19.0463	µg/mL	Stressed
37	2,4,5-Trichlorophenol		1,000.5	µg/mL	+/-	5.8168	µg/mL	Gravimetric
	CAS # 95-95-4	(Lot FHN01)			+/-	11.9596	µg/mL	Unstressed
	Purity 99%				+/-	19.0336	µg/mL	Stressed
38	2-Chloronaphthalene		1,000.4	µg/mL	+/-	5.8164	µg/mL	Gravimetric
	CAS # 91-58-7	(Lot AJ2UI)			+/-	11.9588	µg/mL	Unstressed
	Purity 99%				+/-	19.0323	µg/mL	Stressed
39	Biphenyl		1,001.3	µg/mL	+/-	5.8218	µg/mL	Gravimetric
	CAS # 92-52-4	(Lot MKBV9808V)			+/-	11.9700	µg/mL	Unstressed
	Purity 99%				+/-	19.0501	µg/mL	Stressed

40	2-Nitroaniline		1,001.1	µg/mL	+/-	5.8205	µg/mL	Gravimetric
	CAS # 88-74-4	(Lot MKBK7597V)			+/-	11.9672	µg/mL	Unstressed
	Purity 99%				+/-	19.0456	µg/mL	Stressed
41	Acenaphthylene		1,000.1	µg/mL	+/-	5.8146	µg/mL	Gravimetric
	CAS # 208-96-8	(Lot L18Q)			+/-	11.9551	µg/mL	Unstressed
	Purity 98%				+/-	19.0264	µg/mL	Stressed
42	1,3-Dinitrobenzene		1,001.4	µg/mL	+/-	5.8220	µg/mL	Gravimetric
	CAS # 99-65-0	(Lot BCBN4329V)			+/-	11.9704	µg/mL	Unstressed
	Purity 99%				+/-	19.0507	µg/mL	Stressed
43	Dimethylphthalate		1,002.0	µg/mL	+/-	5.8255	µg/mL	Gravimetric
	CAS # 131-11-3	(Lot 10117699)			+/-	11.9776	µg/mL	Unstressed
	Purity 99%				+/-	19.0621	µg/mL	Stressed
44	2,6-Dinitrotoluene		1,000.1	µg/mL	+/-	5.8145	µg/mL	Gravimetric
	CAS # 606-20-2	(Lot BCBB8606V)			+/-	11.9549	µg/mL	Unstressed
	Purity 99%				+/-	19.0260	µg/mL	Stressed
45	3-Nitroaniline		1,000.6	µg/mL	+/-	5.8178	µg/mL	Gravimetric
	CAS # 99-09-2	(Lot 12836338V)			+/-	11.9616	µg/mL	Unstressed
	Purity 99%				+/-	19.0368	µg/mL	Stressed
46	Acenaphthene		1,002.2	µg/mL	+/-	5.8267	µg/mL	Gravimetric
	CAS # 83-32-9	(Lot MKBW9515V)			+/-	11.9800	µg/mL	Unstressed
	Purity 99%				+/-	19.0659	µg/mL	Stressed
47	2,4-Dinitrophenol		2,001.9	µg/mL	+/-	11.6392	µg/mL	Gravimetric
	CAS # 51-28-5	(Lot STBF9439V)			+/-	23.9308	µg/mL	Unstressed
	Purity 99%				+/-	38.0856	µg/mL	Stressed
48	Dibenzofuran		1,001.0	µg/mL	+/-	5.8201	µg/mL	Gravimetric
	CAS # 132-64-9	(Lot MKBW2691V)			+/-	11.9664	µg/mL	Unstressed
	Purity 99%				+/-	19.0444	µg/mL	Stressed
49	4-Nitrophenol		2,000.4	µg/mL	+/-	11.6305	µg/mL	Gravimetric
	CAS # 100-02-7	(Lot MKBV0501V)			+/-	23.9129	µg/mL	Unstressed
	Purity 99%				+/-	38.0570	µg/mL	Stressed
50	2,4-Dinitrotoluene		1,000.7	µg/mL	+/-	5.8183	µg/mL	Gravimetric
	CAS # 121-14-2	(Lot MKAA0690V)			+/-	11.9628	µg/mL	Unstressed
	Purity 99%				+/-	19.0387	µg/mL	Stressed
51	2,3,4,6-Tetrachlorophenol		1,005.4	µg/mL	+/-	5.8455	µg/mL	Gravimetric
	CAS # 58-90-2	(Lot B16W09031)			+/-	12.0186	µg/mL	Unstressed
	Purity 99%				+/-	19.1274	µg/mL	Stressed
52	Fluorene		1,000.5	µg/mL	+/-	5.8170	µg/mL	Gravimetric
	CAS # 86-73-7	(Lot 10193329)			+/-	11.9600	µg/mL	Unstressed
	Purity 99%				+/-	19.0342	µg/mL	Stressed
53	n-Hexadecane (C16)		1,001.2	µg/mL	+/-	5.8209	µg/mL	Gravimetric
	CAS # 544-76-3	(Lot SHBG9095V)			+/-	11.9680	µg/mL	Unstressed
	Purity 99%				+/-	19.0469	µg/mL	Stressed
54	Diethylphthalate		1,002.4	µg/mL	+/-	5.8280	µg/mL	Gravimetric
	CAS # 84-66-2	(Lot MKBV9622V)			+/-	11.9828	µg/mL	Unstressed
	Purity 99%				+/-	19.0704	µg/mL	Stressed
55	4-Chlorophenyl phenyl ether		1,001.4	µg/mL	+/-	5.8224	µg/mL	Gravimetric
	CAS # 7005-72-3	(Lot MKBX5225V)			+/-	11.9712	µg/mL	Unstressed
	Purity 99%				+/-	19.0520	µg/mL	Stressed

56	4-Nitroaniline		1,000.2	µg/mL	+/-	5.8152	µg/mL	Gravimetric
	CAS # 100-01-6	(Lot BCBG4702V)			+/-	11.9563	µg/mL	Unstressed
	Purity 98%				+/-	19.0283	µg/mL	Stressed
57	4,6-Dinitro-2-methylphenol (Dinitro-o-cresol)		2,000.6	µg/mL	+/-	11.6319	µg/mL	Gravimetric
	CAS # 534-52-1	(Lot LC22071V)			+/-	23.9157	µg/mL	Unstressed
	Purity 98%				+/-	38.0615	µg/mL	Stressed
58	Diphenylamine		850.3	µg/mL	+/-	4.9435	µg/mL	Gravimetric
	CAS # 122-39-4	(Lot MKBN8295V)			+/-	10.1641	µg/mL	Unstressed
	Purity 99%				+/-	16.1761	µg/mL	Stressed
59	Azobenzene		1,001.6	µg/mL	+/-	5.8236	µg/mL	Gravimetric
	CAS # 103-33-3	(Lot BCBQ0927V)			+/-	11.9736	µg/mL	Unstressed
	Purity 99%				+/-	19.0558	µg/mL	Stressed
60	4-Bromophenyl phenyl ether		1,000.1	µg/mL	+/-	5.8148	µg/mL	Gravimetric
	CAS # 101-55-3	(Lot STBB9729V)			+/-	11.9555	µg/mL	Unstressed
	Purity 98%				+/-	19.0270	µg/mL	Stressed
61	Hexachlorobenzene		1,001.0	µg/mL	+/-	5.8201	µg/mL	Gravimetric
	CAS # 118-74-1	(Lot LC24211V)			+/-	11.9664	µg/mL	Unstressed
	Purity 99%				+/-	19.0444	µg/mL	Stressed
62	Pentachlorophenol		2,007.3	µg/mL	+/-	11.6708	µg/mL	Gravimetric
	CAS # 87-86-5	(Lot 170306KJA)			+/-	23.9958	µg/mL	Unstressed
	Purity 99%				+/-	38.1889	µg/mL	Stressed
63	n-Octadecane (C18)		1,000.6	µg/mL	+/-	5.8176	µg/mL	Gravimetric
	CAS # 593-45-3	(Lot 27SOF)			+/-	11.9612	µg/mL	Unstressed
	Purity 99%				+/-	19.0361	µg/mL	Stressed
64	Phenanthrene		1,001.0	µg/mL	+/-	5.8199	µg/mL	Gravimetric
	CAS # 85-01-8	(Lot MKCB1762V)			+/-	11.9660	µg/mL	Unstressed
	Purity 99%				+/-	19.0437	µg/mL	Stressed
65	Anthracene		1,001.7	µg/mL	+/-	5.8242	µg/mL	Gravimetric
	CAS # 120-12-7	(Lot MKBV7759V)			+/-	11.9748	µg/mL	Unstressed
	Purity 99%				+/-	19.0577	µg/mL	Stressed
66	Carbazole		1,000.7	µg/mL	+/-	5.8182	µg/mL	Gravimetric
	CAS # 86-74-8	(Lot 5571400)			+/-	11.9626	µg/mL	Unstressed
	Purity 98%				+/-	19.0382	µg/mL	Stressed
67	Di-n-butylphthalate		1,001.4	µg/mL	+/-	5.8224	µg/mL	Gravimetric
	CAS # 84-74-2	(Lot MKBT0244V)			+/-	11.9712	µg/mL	Unstressed
	Purity 99%				+/-	19.0520	µg/mL	Stressed
68	Fluoranthene		1,000.4	µg/mL	+/-	5.8163	µg/mL	Gravimetric
	CAS # 206-44-0	(Lot MKBQ6360V)			+/-	11.9587	µg/mL	Unstressed
	Purity 98%				+/-	19.0320	µg/mL	Stressed
69	Pyrene		1,001.7	µg/mL	+/-	5.8240	µg/mL	Gravimetric
	CAS # 129-00-0	(Lot BCBR9108V)			+/-	11.9744	µg/mL	Unstressed
	Purity 99%				+/-	19.0571	µg/mL	Stressed
70	Benzyl butyl phthalate		1,001.2	µg/mL	+/-	5.8209	µg/mL	Gravimetric
	CAS # 85-68-7	(Lot MKBZ4553V)			+/-	11.9680	µg/mL	Unstressed
	Purity 98%				+/-	19.0469	µg/mL	Stressed
71	Benz(a)anthracene		1,000.3	µg/mL	+/-	5.8158	µg/mL	Gravimetric
	CAS # 56-55-3	(Lot ER031412-01)			+/-	11.9576	µg/mL	Unstressed
	Purity 99%				+/-	19.0304	µg/mL	Stressed

72	Chrysene		1,001.4	µg/mL	+/-	5.8222	µg/mL	Gravimetric
	CAS # 218-01-9	(Lot 012015)			+/-	11.9708	µg/mL	Unstressed
	Purity 99%				+/-	19.0513	µg/mL	Stressed
73	Bis(2-ethylhexyl)phthalate		1,001.4	µg/mL	+/-	5.8220	µg/mL	Gravimetric
	CAS # 117-81-7	(Lot MKBZ3868V)			+/-	11.9704	µg/mL	Unstressed
	Purity 99%				+/-	19.0507	µg/mL	Stressed
74	Di-n-octyl phthalate		1,002.6	µg/mL	+/-	5.8290	µg/mL	Gravimetric
	CAS # 117-84-0	(Lot 5555000)			+/-	11.9847	µg/mL	Unstressed
	Purity 99%				+/-	19.0735	µg/mL	Stressed
75	Benzo(b)fluoranthene		1,000.2	µg/mL	+/-	5.8151	µg/mL	Gravimetric
	CAS # 205-99-2	(Lot ER03101401)			+/-	11.9561	µg/mL	Unstressed
	Purity 99%				+/-	19.0279	µg/mL	Stressed
76	Benzo(k)fluoranthene		1,000.9	µg/mL	+/-	5.8195	µg/mL	Gravimetric
	CAS # 207-08-9	(Lot 012012K)			+/-	11.9652	µg/mL	Unstressed
	Purity 99%				+/-	19.0425	µg/mL	Stressed
77	Benzo(a)pyrene		1,000.4	µg/mL	+/-	5.8162	µg/mL	Gravimetric
	CAS # 50-32-8	(Lot ER071309-02)			+/-	11.9584	µg/mL	Unstressed
	Purity 99%				+/-	19.0317	µg/mL	Stressed
78	Indeno(1,2,3-cd)pyrene		1,000.5	µg/mL	+/-	5.8170	µg/mL	Gravimetric
	CAS # 193-39-5	(Lot ER082107-02)			+/-	11.9600	µg/mL	Unstressed
	Purity 99%				+/-	19.0342	µg/mL	Stressed
79	Dibenz(a,h)anthracene		1,001.6	µg/mL	+/-	5.8232	µg/mL	Gravimetric
	CAS # 53-70-3	(Lot ER032211-01)			+/-	11.9728	µg/mL	Unstressed
	Purity 99%				+/-	19.0545	µg/mL	Stressed
80	Benzo(g,h,i)perylene		1,000.5	µg/mL	+/-	5.8168	µg/mL	Gravimetric
	CAS # 191-24-2	(Lot ER05121401)			+/-	11.9596	µg/mL	Unstressed
	Purity 99%				+/-	19.0336	µg/mL	Stressed

Solvent: Methylene Chloride
CAS # 75-09-2
Purity 99%

Specific Reference Material Notes:

N-nitrosodiphenylamine 1000 ug/mL equivalent when used for GC analysis. Actual formulation is diphenylamine 855 ug/mL.
N-Nitrosodiphenylamine is prone to breakdown in the injection port and will be converted to diphenylamine.
N-Nitrosodiphenylamine is also a reactive species that can initiate premature decomposition of other compounds in the mix. For these reasons diphenylamine is used in the preparation of this mixture. When comparing the response of this compound to mixtures manufactured using N-nitrosodiphenylamine, a difference in response will be observed.
This lot was approved even though the %D for 4,6-DN-2-MP was greater than 10%.

Reagent

MV-567650_00027

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Tel: (800)356-1688
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CERTIFIED REFERENCE MATERIAL

Certificate of Analysis

ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 567650 **Lot No.:** A0124069

Description : 8260 Surrogate Standard

8260 Surrogate Standard 2,500 ug/ml, P&T Methanol, 5 ml/ampul

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : January 31, 2022 **Storage:** 0°C or colder

C E R T I F I E D V A L U E S

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	Dibromofluoromethane **CAS #** 1868-53-7 (Lot 0012016) **Purity** 99%	2,521.2 µg/mL	+/- 14.6582 µg/mL +/- 141.3584 µg/mL +/- 144.6660 µg/mL	Gravimetric Unstressed Stressed
2	1,2-Dichloroethane-d4 **CAS #** 17060-07-0 (Lot PR-25433) **Purity** 98%	2,513.8 µg/mL	+/- 14.6157 µg/mL +/- 140.9489 µg/mL +/- 144.2469 µg/mL	Gravimetric Unstressed Stressed
3	Toluene-d8 **CAS #** 2037-26-5 (Lot PR-27311) **Purity** 99%	2,519.4 µg/mL	+/- 14.6480 µg/mL +/- 141.2603 µg/mL +/- 144.5656 µg/mL	Gravimetric Unstressed Stressed
4	1-Bromo-4-fluorobenzene (BFB) **CAS #** 460-00-4 (Lot 20401KOV) **Purity** 99%	2,520.8 µg/mL	+/- 14.6559 µg/mL +/- 141.3360 µg/mL +/- 144.6430 µg/mL	Gravimetric Unstressed Stressed

Solvent: P&T Methanol
CAS # 67-56-1
Purity 99%

Column:
105m x 0.53mm x 3.0µm
Rtx-502.2 (cat.#10910)

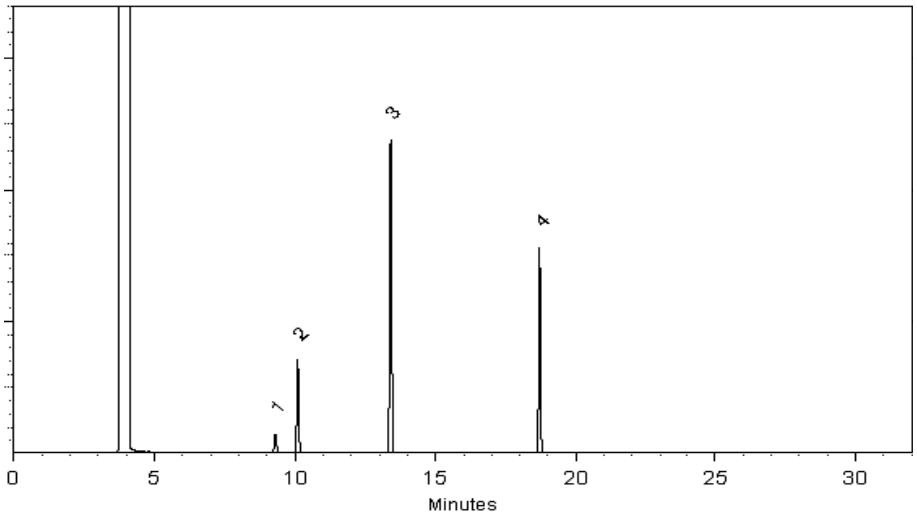
Carrier Gas:
hydrogen-constant pressure 11.0 psi.

Temp. Program:
40°C (hold 2 min.) to 240°C
@ 8°C/min. (hold 5 min.)

Inj. Temp:
200°C

Det. Temp:
250°C

Det. Type:
FID



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Isaiah Harrison - Mix Technician

Date Mixed: 09-Jan-2017 **Balance:** 1128342314

Amanda Miller - Operations Tech-ARM QC

Date Passed: 11-Jan-2017

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

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This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

rec'd 3/1/18

Catalog No. : 568718 **Lot No.:** A0127975

Description : 8260 Internal Standard 2014

8260 Internal Standard 2014 250-5,000 ug/ml, P&T Methanol, 5 ml/ampul

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : May 31, 2022 **Storage:** 0°C or colder

CERTIFIED VALUES

Elution Order	Compound		Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	tert-Butyl-d9-alcohol **CAS #** 25725-11-5 **Purity** 99%	(Lot I-201)	5,022.1 µg/mL	+/- 29.1976 +/- 107.5241 +/- 110.6500	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
2	2-Butanone-d5 **CAS #** 24313-50-6 **Purity** 99%	(Lot M-276)	1,257.5 µg/mL	+/- 7.3114 +/- 26.9239 +/- 27.7067	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
3	Fluorobenzene **CAS #** 462-06-6 **Purity** 99%	(Lot BCBK8171V)	250.8 µg/mL	+/- 1.4613 +/- 5.3699 +/- 5.5259	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
4	1,4-Dioxane-d8 **CAS #** 17647-74-4 **Purity** 99%	(Lot I-19942)	5,009.4 µg/mL	+/- 29.1236 +/- 107.2514 +/- 110.3694	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
5	Chlorobenzene-d5 **CAS #** 3114-55-4 **Purity** 99%	(Lot PR-21944)	251.7 µg/mL	+/- 1.4666 +/- 5.3891 +/- 5.5458	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed
6	1,4-Dichlorobenzene-d4 **CAS #** 3855-82-1 **Purity** 99%	(Lot PR-18488)	251.3 µg/mL	+/- 1.4645 +/- 5.3813 +/- 5.5377	µg/mL µg/mL µg/mL	Gravimetric Unstressed Stressed

Solvent: P&T Methanol/Water (90:10)
CAS # 67-56-1/7732-18-5
Purity 99%

Column:
105m x 0.53mm x 3.0µm
Rtx-502.2 (cat.#10910)

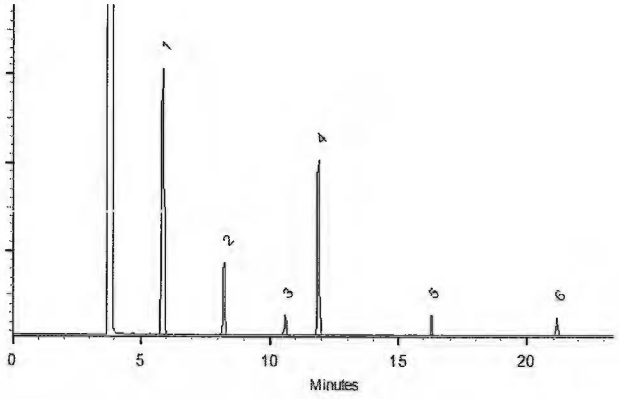
Carrier Gas:
hydrogen-constant pressure 11.0 psi.

Temp. Program:
40°C (hold 2 min.) to 240°C
@ 8°C/min. (hold 5 min.)

Inj. Temp:
200°C

Det. Temp:
250°C

Det. Type:
FID



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Matt Fragassi - Mix Technician

Date Mixed: 30-May-2017 **Balance:** 1128342314

Justine Albertson - Operations Tech-ARM QC

Date Passed: 06-Jun-2017

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

k is a coverage factor of 2, which gives a level of confidence of approximately 95%.

- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
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0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

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This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 569721.sec **Lot No.:** A0123880

Description : 8260 List 1/ Std #2 Ketones (2015)

8260 List 1/ Std #2 Ketones (2015) 12,500 µg/ml, P&T Methanol/Water (90:10), 1 ml/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : January 31, 2020 **Storage:** 0°C or colder

C E R T I F I E D V A L U E S

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	Acetone	12,501.6 µg/mL	+/- 73.1996 µg/mL	Gravimetric
	CAS # 67-64-1.SEC (Lot P14A572)		+/- 754.3267 µg/mL	Unstressed
	Purity 99%		+/- 756.1173 µg/mL	Stressed
2	2-Butanone (MEK)	12,503.6 µg/mL	+/- 73.2113 µg/mL	Gravimetric
	CAS # 78-93-3.SEC (Lot RA58J)		+/- 754.4473 µg/mL	Unstressed
	Purity 99%		+/- 756.2383 µg/mL	Stressed
3	4-Methyl-2-pentanone (MIBK)	12,506.0 µg/mL	+/- 73.2254 µg/mL	Gravimetric
	CAS # 108-10-1.SEC (Lot E29T040)		+/- 754.5921 µg/mL	Unstressed
	Purity 99%		+/- 756.3834 µg/mL	Stressed
4	2-Hexanone	12,504.0 µg/mL	+/- 73.2137 µg/mL	Gravimetric
	CAS # 591-78-6.SEC (Lot V3NRA)		+/- 754.4715 µg/mL	Unstressed
	Purity 99%		+/- 756.2625 µg/mL	Stressed

Solvent: P&T Methanol/Water (90:10)
CAS # 67-56-1/7732-18-5
Purity 99%

Column:
105m x 0.53mm x 3.0µm
Rtx-502.2 (cat.#10910)

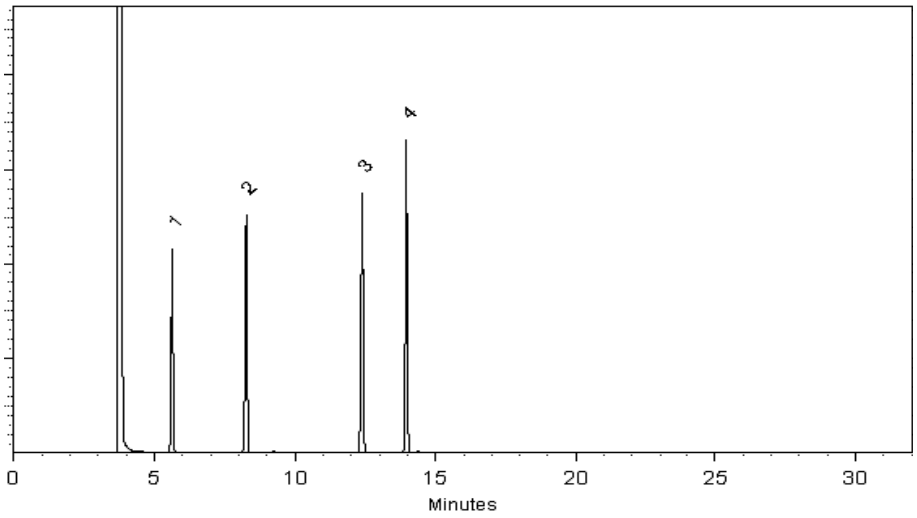
Carrier Gas:
hydrogen-constant pressure 11.0 psi.

Temp. Program:
40°C (hold 2 min.) to 240°C
@ 8°C/min. (hold 5 min.)

Inj. Temp:
200°C

Det. Temp:
250°C

Det. Type:
FID



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Michael J Maye

Date Mixed: 03-Jan-2017 **Balance:** 1127510105

Jennifer L Pollino

Jennifer Pollino - Operations Tech-ARM QC

Date Passed: 05-Jan-2017

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/µECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

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25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
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0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
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Catalog No. : 569722.SEC **Lot No.:** A0124116

Description : 8260 List 1 / Std #3 Gases (2015)

8260 List 1 / Std #3 Gases (2015) 2,500 ug/ml, P&T Methanol, 1 ml/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : January 31, 2020 **Storage:** 0°C or colder

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	Dichlorodifluoromethane (CFC-12)	2,503.4 µg/mL	+/- 19.5506 µg/mL	Gravimetric
	CAS # 75-71-8.SEC (Lot 23586)		+/- 140.9699 µg/mL	Unstressed
	Purity 99%		+/- 144.2404 µg/mL	Stressed
2	Chloromethane (methyl chloride)	2,508.1 µg/mL	+/- 21.1963 µg/mL	Gravimetric
	CAS # 74-87-3.SEC (Lot 18343)		+/- 141.4639 µg/mL	Unstressed
	Purity 99%		+/- 144.7353 µg/mL	Stressed
3	Vinyl chloride	2,518.6 µg/mL	+/- 19.4186 µg/mL	Gravimetric
	CAS # 75-01-4.SEC (Lot MKBK6872V)		+/- 141.7924 µg/mL	Unstressed
	Purity 99%		+/- 145.0836 µg/mL	Stressed
4	1,3-Butadiene	2,504.0 µg/mL	+/- 20.5722 µg/mL	Gravimetric
	CAS # 106-99-0.SEC (Lot 22331)		+/- 141.1450 µg/mL	Unstressed
	Purity 99%		+/- 144.4130 µg/mL	Stressed
5	Bromomethane (methyl bromide)	2,498.5 µg/mL	+/- 19.9806 µg/mL	Gravimetric
	CAS # 74-83-9.SEC (Lot Q119-46)		+/- 140.7602 µg/mL	Unstressed
	Purity 99%		+/- 144.0229 µg/mL	Stressed
6	Chloroethane (ethyl chloride)	2,494.9 µg/mL	+/- 17.8868 µg/mL	Gravimetric
	CAS # 75-00-3.SEC (Lot 00004202)		+/- 140.2786 µg/mL	Unstressed
	Purity 99%		+/- 143.5429 µg/mL	Stressed
7	Dichlorofluoromethane (CFC-21)	2,503.4 µg/mL	+/- 20.0421 µg/mL	Gravimetric
	CAS # 75-43-4.SEC (Lot SHBC0858V)		+/- 141.0350 µg/mL	Unstressed
	Purity 99%		+/- 144.3039 µg/mL	Stressed

8	Trichlorofluoromethane (CFC-11)		2,503.2	µg/mL	+/-	18.7037	µg/mL	Gravimetric
	CAS # 75-69-4.SEC	(Lot Q12B-59)			+/-	140.8450	µg/mL	Unstressed
	Purity 99%				+/-	144.1179	µg/mL	Stressed

Solvent: P&T Methanol
CAS # 67-56-1
Purity 99%

Column:
60m x 0.25mm x 1.4µm
Rtx-502.2 (cat.#10916)

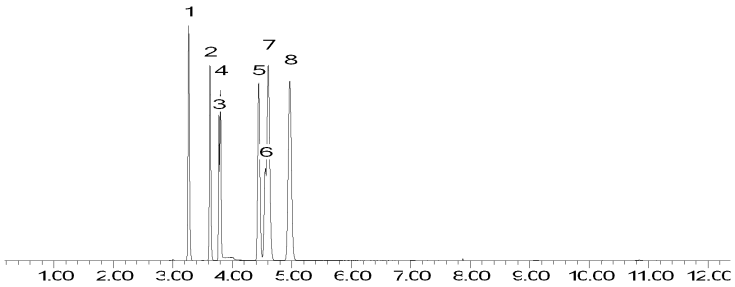
Carrier Gas:
helium-constant flow 2.0 mL/min.

Temp. Program:
40°C (hold 6 min.) to 100°C
@ 6°C/min.

Inj. Temp:
200°C

Det. Temp:
250°C

Det. Type:
MSD



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Brandon Reish - Mix Technician

Date Mixed: 12-Jan-2017 **Balance:** 1127510105

Jennifer Pollino - Operations Tech-ARM QC

Date Passed: 17-Jan-2017

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/µECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

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  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
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0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

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Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

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This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 569727 **Lot No.:** A0118487

Description : 8260 List 2/ Std #3 Cyclohexanone (2015)

8260 List 2/ Std #3 Cyclohexanone (2015) 25,000 µg/ml, Water, 1 ml/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : March 31, 2019 **Storage:** 10°C or colder

C E R T I F I E D V A L U E S

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	Cyclohexanone	25,000.4 µg/mL	+/- 146.3826 µg/mL	Gravimetric
	CAS # 108-94-1 (Lot MKBN5282V)		+/- 1,508.4819 µg/mL	Unstressed
	Purity 99%		+/- 1,512.0629 µg/mL	Stressed

Solvent: Water
CAS # 7732-18-5
Purity 99%

Column:
105m x 0.53mm x 3.0µm
Rtx-502.2 (cat.#10910)

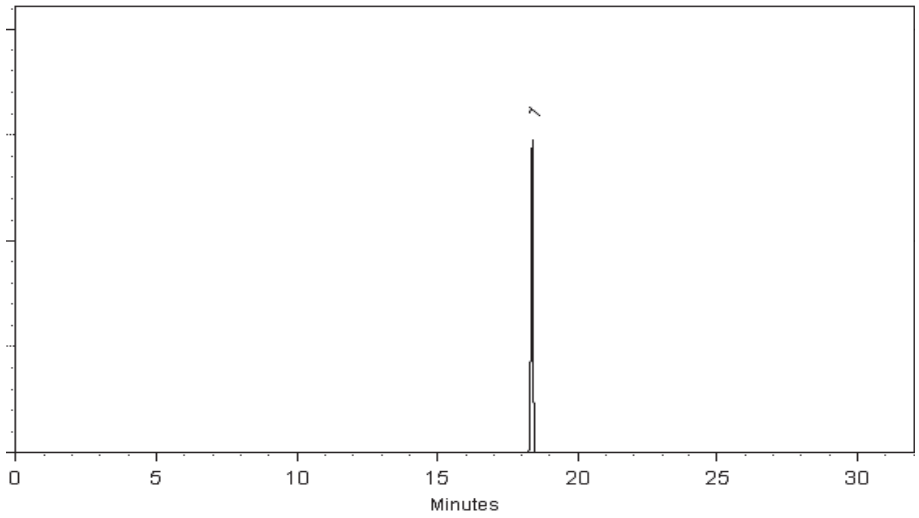
Carrier Gas:
hydrogen-constant pressure 11.0 psi.

Temp. Program:
40°C (hold 2 min.) to 240°C
@ 8°C/min. (hold 5 min.)

Inj. Temp:
200°C

Det. Temp:
250°C

Det. Type:
FID



This chromatogram represents a general set of testing conditions chosen for product acceptance. For optimal results in your lab, conditions should be adjusted for your specific instrument, method, and application.

Joseph Jaglowski - Mix Technician

Date Mixed: 31-Mar-2016 **Balance:** B442140311

Jodi E. Breon - QA Analyst

Date Passed: 04-Apr-2016

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

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- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

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  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31861, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Reagent

MV-CUS17739_00002

Certificate of Analysis

Custom Standard

Product Number: CUS-17739 **Page:** 1 of 1

Lot Number: CR-2819 **Lot Issue Date:** 19-Jun-2017 **Expiration Date:** 31-Jul-2019

This ISO Guide 34 Reference Material (RM) was manufactured and verified in accordance with ULTRA Scientific's ISO 9001 registered quality system. A review of the gravimetric preparation data by our ISO 17025 accredited laboratory serves to verify the concentration of each analyte. The true value and uncertainty value at the 95% confidence level for each analyte, determined gravimetrically, is listed below.

Analyte	CAS#	Analyte Lot	True Value
1-chlorohexane	000544-10-5	RM04263	998.8 ± 5.0 µg/mL
2-pentanone	000107-87-9	RM03775	4020 ± 20 µg/mL
sec-butanol	000078-92-2	RM01299	30116 ± 151 µg/mL

Matrix: methanol (purge & trap grade)

Storage: Store Frozen (-25° to -10°C).

ULTRA uses balances calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1 and ISO 9001, and calibrated Class A glassware in the manufacturing of these standards.

John Russo
President

Monica Bourgeois
Director of QA/RA

ISO 9001
Registered
TUV USA, Inc.

250 SMITH STREET ▪ NORTH KINGSTOWN, RHODE ISLAND 02852 ▪ WWW.ULTRASCI.COM

Reagent

MV-STS110N1_00066

Certificate of Analysis

4-Bromofluorobenzene Solution

Product Number: STS-110N **Page:** 1 of 1

Lot Number: CH-3248Z **Lot Issue Date:** 31-Aug-2016 **Expiration Date:** 31-Oct-2019

This ISO Guide 34 Reference Material (RM) was manufactured and verified in accordance with ULTRA's ISO 9001 registered quality system, and the analyte concentrations were verified by our ISO 17025 accredited laboratory. The true value and uncertainty value at the 95% confidence level for each analyte, determined gravimetrically, is listed below.

Analyte	CAS#	Analyte Lot	True Value
4-bromofluorobenzene	000460-00-4	RM03365	2005 ± 10 µg/mL

Matrix: methanol (methyl alcohol)

Storage: Store Frozen (-25° to -10°C).

ULTRA uses balances calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1 and ISO 9001, and calibrated Class A glassware in the manufacturing of these standards.

John Russo
President

Vincent Wang, Ph.D.
Director of QA/RA

ISO 9001
Registered
TUV USA, Inc.

250 SMITH STREET • NORTH KINGSTOWN, RHODE ISLAND 02852 • WWW.ULTRASCI.COM

Reagent

Phenol LCSINT_00028

LabChem
performance through chemistry
Jackson's Pointe Commerce Park - Building 1000
1010 Jackson's Pointe Court, Zelienople, PA 16063
Ph: 412-826-5230 | Fax: 724-473-0647 | www.labchem.com

CERTIFICATE OF ANALYSIS

Description: PHENOL STANDARD, 1000ppm (1mL = 1mg)

Mfg. Date: 08/07/2017

Catalog Number: LC18330

Exp. Date: 08/07/2019

Lot Number: G212-19

ANALYTICAL SECTION

Test	Specification	Test Result
Appearance	clear, colorless solution	Pass Test
Concentration ppm Phenol	1000ppm +/- 10ppm	1009 ppm
Concentration mg Phenol / L	1.000 + / - 0.010 mg/mL	1.009 mg/mL
Traceable to NIST	Potassium Dichromate	136f

Intended Use - Product is intended for use in manufacturing procedures and laboratory procedures and protocols.

Storage Information - Unless otherwise noted on the product label, store the product under normal lab conditions in its tightly closed, original container. Do not pipet directly from the container or return unused portions to the container.

Instructions for Handling and Use - Please refer to the associated product label and Safety Data Sheet (SDS) for information regarding safety and handling of this product.

Preparation - All products are manufactured and tested according to established, documented procedures and methodology. Production documentation records manufacturing data, raw material traceability and testing history on a per lot basis. Balances, thermometers, and glassware are calibrated before first use and on a regular schedule with references traceable to NIST standards.

Submitted by: Greg Albright, Chemist Supervisor

Greg Albright

Reagent

W_1,2,3-Trich_00005

Certificate of Analysis

Product 13939
1,2,3-Trichlorobenzene,99%

General Product Data

Version	2
CAS No	87-61-6
Country of origin	BELGIUM
Molecular weight	181.45
Molecular formula	C6 H3 Cl3
Linear formula	
Flash point (°C)	126

82505
ID: W_1,2,3-Trich_00003
Exp 07/05/16 Prod MR Opn 01/11/11
S_1,2,3-Trichlorobenzene

3024679
ID: W_1,2,3-Trich_00005
Exp 01/11/20 Prod CLJ Opn 07/16/15
S_1,2,3-Trichlorobenzene

Product Specifications

Appearance	WHITE CRYSTALLINE SOLID
Infrared spectrometry	AUTHENTIC
Melting point	50°C to 54°C
Separat. techn. GC	>=98.5 %

Lot Specific Data : A0043055

Appearance	WHITE CRYSTALLINE SOLID
Infrared spectrometry	AUTHENTIC
Melting point	51.8°C to 52.8°C
Separat. techn. GC	99.4 %
Retest date	October 26, 2015

Issued: February 07, 2014
L. Van den Broek, QA Manager

Acros Organics
ENA23, zone 1, nr 1350, Janssen Pharmaceuticalaan 3a, B-2440 Geel, Belgium
Tel +32 14/57.52.11 - Fax +32 14/59.34.34 Internet: http://www.acros.com
1 Reagent Lane, Fair Lawn, NJ 07410,USA
Fax 201-796-1329

Reagent

W_1,2,3-Trich_00007

SIGMA-ALDRICH®

sigma-aldrich.com

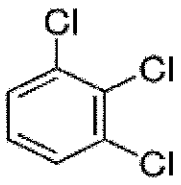
3050 Spruce Street, Saint Louis, MO 63103, USA
Website: www.sigmaaldrich.com
Email USA: techserv@sial.com
Outside USA: eurtechserv@sial.com

Certificate of Analysis

3107187
ID: W_1,2,3-Trich_00007
Exp:06/28/21 Prpd:CLJ Opn:06/28/16
S_1,2,3-Trichlorobenzene

Product Name:
1,2,3-Trichlorobenzene - 99%

Product Number:	**T54402**
Batch Number:	**MKBX7627V**
Brand:	ALDRICH
CAS Number:	87-61-6
MDL Number:	MFCD00000537
Formula:	C6H3Cl3
Formula Weight:	181.45 g/mol
Quality Release Date:	02 MAR 2016



Test	Specification	Result
Appearance (Color)	White	White
Appearance (Form) Crystals or Crystalline Solid	Conforms to Requirements	Crystals
Infrared Spectrum	Conforms to Structure	Conforms
Purity (GC)	≥ 98.5 %	99.8 %

Michael Grady, Manager
Quality Control
Milwaukee, WI US

Sigma-Aldrich warrants, that at the time of the quality release or subsequent retest date this product conformed to the information contained in this publication. The current Specification sheet may be available at Sigma-Aldrich.com. For further inquiries, please contact Technical Service. Purchaser must determine the suitability of the product for its particular use. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Reagent

W_Phenol Std._00029

ERA

A Waters Company

Certificate of Analysis

SL
4/18/17

PRODUCT:	1000 mg/L Phenol
CATALOG NUMBER:	982
LOT NUMBER:	010816
ISSUE DATE:	August 4, 2016
REVISION DATE:	Original
STARTING MATERIAL:	Phenol (C_6H_5OH)
CERTIFIED CONCENTRATION[1]:	1000 mg/L
UNCERTAINTY[2]:	0.6%
MATRIX:	18 megohm deionized water and 1% (v/v) H_2SO_4
DENSITY:	1.0091 ± 0.0010 g/mL at 20.6°C and 770 mm Hg
TRACEABILITY[3]:	NA
NIST/SRM:	SRM not available
VERIFICATION METHOD:	Spectrophotometry
STORAGE:	Store at 4 ± 2°C

1. The **Certified Concentration** is the actual made-to concentration confirmed by ERA analytical verification.

2. The stated **Uncertainty** is the total propagated uncertainty at the 95% confidence interval. The uncertainty is based on the preparation and internal analytical verification of the product by ERA, multiplied by a coverage factor which is equal to the student t factor at a 95% confidence interval at n-1 degrees of freedom. The uncertainty applies to the product as supplied and does not take into account any required or optional dilutions and/or preparations the laboratory may perform while using this product.

3. Traceability Recovery = ((% Recovery certified standard)/(% Recovery NIST SRM))*100.

   The traceability data shown were compiled by analyzing the ERA standards or their associated stock solutions against the applicable NIST SRMs.

This standard **expires 8/2018**. The certified values are monitored and purchasers will be notified of any significant changes resulting in recertification or withdrawal of this certified reference material during the period of validity of this certificate.

This product is intended to be used as either a calibration standard or a quality control check of the entire analytical process for the analytes/matrix included in the standard.

If you have any questions or need technical assistance, please call ERA technical assistance at 1-800-372-0122 or email to info@eraqc.com

Certifying Officer: Brian Miller

ISO/IEC GUIDE 34:2009

ACCREDITED

REFERENCE MATERIAL PRODUCER
CERTIFICATE NO. 1539.03

ISO/IEC 17025:2005

ACCREDITED

CHEMICAL TESTING LABORATORY
CERTIFICATE NO. 1539.02

16341 Table Mtn Pkwy, Golden, CO 80403 800-372-0122 fax: 303-421-0159 www.eraqc.com

Reagent

W_Phenol STD_00001

SL
2/1/18

LabChem
performance through chemistry
Jackson's Pointe Commerce Park - Building 1000
1010 Jackson's Pointe Court, Zelienople, PA 16063
Ph: 412-826-5230 | Fax: 724-473-0647 | www.labchem.com

CERTIFICATE OF ANALYSIS

Description: PHENOL STANDARD, 1000ppm (1mL = 1mg)

Mfg. Date: 08/07/2017

Catalog Number: LC18330

Exp. Date: 08/07/2019

Lot Number: G212-19

ANALYTICAL SECTION

Test	Specification	Test Result
Appearance	clear, colorless solution	Pass Test
Concentration ppm Phenol	1000ppm +/- 10ppm	1009 ppm
Concentration mg Phenol / L	1.000 + / - 0.010 mg/mL	1.009 mg/mL
Traceable to NIST	Potassium Dichromate	136f

Intended Use - Product is intended for use in manufacturing procedures and laboratory procedures and protocols.

Storage Information - Unless otherwise noted on the product label, store the product under normal lab conditions in its tightly closed, original container. Do not pipet directly from the container or return unused portions to the container.

Instructions for Handling and Use - Please refer to the associated product label and Safety Data Sheet (SDS) for information regarding safety and handling of this product.

Preparation - All products are manufactured and tested according to established, documented procedures and methodology. Production documentation records manufacturing data, raw material traceability and testing history on a per lot basis. Balances, thermometers, and glassware are calibrated before first use and on a regular schedule with references traceable to NIST standards.

Submitted by: Greg Albright, Chemist Supervisor

Greg Albright

An ISO9001:2008 certified company. Registration # 0306-01 02/01/2018 8:45 PM

Form #17.13 07/28/2016

SL
2/1/18

Method 8260B

Volatile Organic Compounds (GC/MS) by Method 8260B

FORM II
GC/MS VOA SURROGATE RECOVERY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Matrix: Solid (TCLP) Level: Low

GC Column (1): DB-624 (60. ID: 0.25(mm)

Client Sample ID	Lab Sample ID	DBFM #	DCA #	TOL #	BFB #
CRC-B21-0205	160-29498-2	105	103	107	97
	LB 280-423316/1-A	105	103	107	99
	LCS 280-423316/2-A	103	103	101	94
CRC-B21-0205 MS	160-29498-2 MS	106	101	106	98
CRC-B21-0205 MSD	160-29498-2 MSD	109	109	106	98

	QC LIMITS
DBFM = Dibromofluoromethane (Surr)	79-119
DCA = 1,2-Dichloroethane-d4 (Surr)	64-129
TOL = Toluene-d8 (Surr)	78-120
BFB = 4-Bromofluorobenzene (Surr)	78-121

Column to be used to flag recovery values

FORM II 8260B

FORM III
GC/MS VOA LAB CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Matrix: Solid (TCLP) Level: Low Lab File ID: MS1_5232.D

Lab ID: LCS 280-423316/2-A Client ID:

COMPOUND	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC	QC LIMITS REC	#
Benzene	50.0	48.4	97	74-135	
2-Butanone (MEK)	200	173	87	44-150	
Carbon tetrachloride	50.0	44.7	89	67-135	
Chlorobenzene	50.0	45.6	91	76-135	
Chloroform	50.0	49.1	98	76-120	
1,2-Dichloroethane	50.0	49.3	99	70-135	
1,1-Dichloroethene	50.0	45.9	92	71-136	
Tetrachloroethene	50.0	44.0	88	70-135	
Trichloroethene	50.0	46.7	93	73-135	
Vinyl chloride	50.0	50.0	100	40-144	

Column to be used to flag recovery and RPD values

FORM III 8260B

FORM III
GC/MS VOA MATRIX SPIKE RECOVERY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Matrix: Solid (TCLP) Level: Low Lab File ID: MS1_5235.D

Lab ID: 160-29498-2 MS Client ID: CRC-B21-0205 MS

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC	QC LIMITS REC	#
Benzene	50.0	1.6 U	50.9	102	74-135	
2-Butanone (MEK)	200	18 U	192	96	44-150	
Carbon tetrachloride	50.0	1.9 U	51.5	103	67-135	
Chlorobenzene	50.0	1.7 U	48.2	96	76-135	
Chloroform	50.0	1.6 U	52.1	104	76-120	
1,2-Dichloroethane	50.0	1.3 U	51.6	103	70-135	
1,1-Dichloroethene	50.0	2.3 U	51.3	103	71-136	
Tetrachloroethene	50.0	2.0 U	49.3	99	70-135	
Trichloroethene	50.0	1.6 U	50.9	102	73-135	
Vinyl chloride	50.0	1.0 U	56.4	113	40-144	

Column to be used to flag recovery and RPD values

FORM III 8260B

FORM III
GC/MS VOA MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Matrix: Solid (TCLP) Level: Low Lab File ID: MS1_5236.D

Lab ID: 160-29498-2 MSD Client ID: CRC-B21-0205 MSD

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC	% RPD	QC LIMITS RPD	QC LIMITS REC	#
Benzene	50.0	50.7	101	0	20	74-135	
2-Butanone (MEK)	200	209	105	8	32	44-150	
Carbon tetrachloride	50.0	50.5	101	2	21	67-135	
Chlorobenzene	50.0	47.9	96	1	20	76-135	
Chloroform	50.0	51.5	103	1	20	76-120	
1,2-Dichloroethane	50.0	52.9	106	3	20	70-135	
1,1-Dichloroethene	50.0	51.3	103	0	20	71-136	
Tetrachloroethene	50.0	47.7	95	3	20	70-135	
Trichloroethene	50.0	49.6	99	3	20	73-135	
Vinyl chloride	50.0	57.5	115	2	24	40-144	

Column to be used to flag recovery and RPD values

FORM III 8260B

FORM V
GC/MS VOA INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab File ID: MS1_5072.D BFB Injection Date: 08/02/2018

Instrument ID: VMS_MS1 BFB Injection Time: 07:34

Analysis Batch No.: 424541

M/E	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15.0 - 40.0 % of mass 95	19.1	
75	30.0 - 60.0 % of mass 95	49.8	
95	Base Peak, 100% relative abundance	100.0	
96	5.0 - 9.0 % of mass 95	6.7	
173	Less than 2.0 % of mass 174	0.0	(0.0) 1
174	50.0 - 120.00 % of mass 95	74.3	
175	5.0 - 9.0 % of mass 174	5.9	(7.9) 1
176	95.0 - 101.0 % of mass 174	72.7	(97.9) 1
177	5.0 - 9.0 % of mass 176	5.7	(7.8) 2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS AND STANDARDS:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
	STD003 280-424541/12	MS1_5075.D	08/02/2018	08:53
	STD01 280-424541/13	MS1_5076.D	08/02/2018	09:13
	STD02 280-424541/14	MS1_5077.D	08/02/2018	09:33
	STD05 280-424541/15	MS1_5078.D	08/02/2018	09:53
	STD10 280-424541/16	MS1_5079.D	08/02/2018	10:14
	STD30 280-424541/17	MS1_5080.D	08/02/2018	10:34
	STD60 280-424541/18	MS1_5081.D	08/02/2018	10:54
	ICV 280-424541/19	MS1_5083.D	08/02/2018	11:35
	STD01 280-424541/20	MS1_5084.D	08/02/2018	11:55
	STD02 280-424541/21	MS1_5085.D	08/02/2018	12:15
	STD05 280-424541/22	MS1_5086.D	08/02/2018	12:36
	ICIS 280-424541/23	MS1_5087.D	08/02/2018	12:56
	STD30 280-424541/24	MS1_5088.D	08/02/2018	13:16
	STD60 280-424541/25	MS1_5089.D	08/02/2018	13:37
	ICV 280-424541/26	MS1_5091.D	08/02/2018	14:17

FORM V
GC/MS VOA INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab File ID: MS1_5226.D BFB Injection Date: 08/06/2018

Instrument ID: VMS_MS1 BFB Injection Time: 07:02

Analysis Batch No.: 424938

M/E	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15.0 - 40.0 % of mass 95	20.3	
75	30.0 - 60.0 % of mass 95	50.5	
95	Base Peak, 100% relative abundance	100.0	
96	5.0 - 9.0 % of mass 95	6.9	
173	Less than 2.0 % of mass 174	0.0	(0.0) 1
174	50.0 - 120.00 % of mass 95	77.1	
175	5.0 - 9.0 % of mass 174	5.8	(7.6) 1
176	95.0 - 101.0 % of mass 174	76.4	(99.1) 1
177	5.0 - 9.0 % of mass 176	4.9	(6.4) 2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS AND STANDARDS:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
	CCV 280-424938/2	MS1_5228.D	08/06/2018	07:47
	CCV 280-424938/3	MS1_5229.D	08/06/2018	08:07
	LCS 280-423316/2-A	MS1_5232.D	08/06/2018	09:08
	LB 280-423316/1-A	MS1_5233.D	08/06/2018	09:28
CRC-B21-0205	160-29498-2	MS1_5234.D	08/06/2018	09:48
CRC-B21-0205 MS	160-29498-2 MS	MS1_5235.D	08/06/2018	10:09
CRC-B21-0205 MSD	160-29498-2 MSD	MS1_5236.D	08/06/2018	10:29

FORM VIII
GC/MS VOA INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Sample No.: ICIS 280-424541/23 Date Analyzed: 08/02/2018 12:56

Instrument ID: VMS_MS1 GC Column: DB-624 (60.25) ID: 0.25(mm)

Lab File ID (Standard): MS1_5087.D Heated Purge: (Y/N) N

Calibration ID: 33279

		TBAd9		FB		CBNZd5	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
INITIAL CALIBRATION MID-POINT		201981	5.60	2198487	7.53	442983	9.79
UPPER LIMIT		403962	6.10	4396974	8.03	885966	10.29
LOWER LIMIT		100991	5.10	1099244	7.03	221492	9.29
LAB SAMPLE ID	CLIENT SAMPLE ID						
ICV 280-424541/26		204330	5.59	2158753	7.53	435634	9.79
CCV 280-424938/2		171503	5.58	2111006	7.53	444184	9.79
CCV 280-424938/3		178279	5.59	2172779	7.53	449004	9.79
LCS 280-423316/2-A		163777	5.60	2064361	7.53	439723	9.79
LB 280-423316/1-A		160367	5.60	2105036	7.53	437807	9.79
160-29498-2	CRC-B21-0205	157483	5.60	2082115	7.53	427006	9.79
160-29498-2 MS	CRC-B21-0205 MS	167658	5.60	2097444	7.53	443765	9.79
160-29498-2 MSD	CRC-B21-0205 MSD	168969	5.58	2035773	7.53	433526	9.79

TBAd9 = TBA-d9 (IS)
FB = Fluorobenzene
CBNZd5 = Chlorobenzene-d5

Area Limit = 50%-200% of internal standard area
RT Limit = ± 0.5 minutes of internal standard RT

Column used to flag values outside QC limits

FORM VIII 8260B

FORM VIII
GC/MS VOA INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Sample No.: ICIS 280-424541/23 Date Analyzed: 08/02/2018 12:56

Instrument ID: VMS_MS1 GC Column: DB-624 (60.25) ID: 0.25(mm)

Lab File ID (Standard): MS1_5087.D Heated Purge: (Y/N) N

Calibration ID: 33279

		DCBd4					
		AREA #	RT #	AREA #	RT #	AREA #	RT #
INITIAL CALIBRATION MID-POINT		615228	11.60				
UPPER LIMIT		1230456	12.10				
LOWER LIMIT		307614	11.10				
LAB SAMPLE ID	CLIENT SAMPLE ID						
ICV 280-424541/26		604764	11.60				
CCV 280-424938/2		661102	11.60				
CCV 280-424938/3		628175	11.60				
LCS 280-423316/2-A		632160	11.60				
LB 280-423316/1-A		610235	11.60				
160-29498-2	CRC-B21-0205	596067	11.60				
160-29498-2 MS	CRC-B21-0205 MS	629669	11.60				
160-29498-2 MSD	CRC-B21-0205 MSD	624520	11.60				

DCBd4 = 1,4-Dichlorobenzene-d4

Area Limit = 50%-200% of internal standard area
RT Limit = ± 0.5 minutes of internal standard RT

Column used to flag values outside QC limits

FORM VIII 8260B

FORM I
GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Denver | Job No.: 160-29498-1

SDG No.:

Client Sample ID: CRC-B21-0205 | Lab Sample ID: 160-29498-2

Matrix: Solid (TCLP) | Lab File ID: MS1_5234.D

Analysis Method: 8260B | Date Collected: 07/12/2018 11:40

Sample wt/vol: 2(mL) | Date Analyzed: 08/06/2018 09:48

Soil Aliquot Vol: | Dilution Factor: 1

Soil Extract Vol.: | GC Column: DB-624 (60.25) ID: 0.25(mm)

% Moisture: | Level: (low/med) Low

Analysis Batch No.: 424938 | Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
71-43-2	Benzene	1.6	U	10	1.6
78-93-3	2-Butanone (MEK)	18	U	100	18
56-23-5	Carbon tetrachloride	1.9	U	10	1.9
108-90-7	Chlorobenzene	1.7	U	10	1.7
67-66-3	Chloroform	1.6	U	10	1.6
107-06-2	1,2-Dichloroethane	1.3	U	10	1.3
75-35-4	1,1-Dichloroethene	2.3	U	10	2.3
127-18-4	Tetrachloroethene	2.0	U	10	2.0
79-01-6	Trichloroethene	1.6	U	10	1.6
75-01-4	Vinyl chloride	1.0	U	10	1.0

CAS NO.	SURROGATE	%REC	Q	LIMITS
17060-07-0	1,2-Dichloroethane-d4 (Surr)	103		64-129
2037-26-5	Toluene-d8 (Surr)	107		78-120
460-00-4	4-Bromofluorobenzene (Surr)	97		78-121
1868-53-7	Dibromofluoromethane (Surr)	105		79-119

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5234.D
Lims ID: 160-29498-C-2-A
Client ID: CRC-B21-0205
Sample Type: Client
Inject. Date: 06-Aug-2018 09:48:30 ALS Bottle#: 17 Worklist Smp#: 14
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: 160-29498-C-2-A 2ml
Operator ID: wickhamt Instrument ID: VMS_MS1

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 07-Aug-2018 06:52:59 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0316

First Level Reviewer: wickhamt Date: 06-Aug-2018 10:13:43

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.598	5.584	0.014	35	157483	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2082115	12.5	
* 149 1,4-Dioxane-d8	96	8.727	8.773	-0.046	0	19340	0	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	90	427006	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	596067	12.5	
$ 5 Dibromofluoromethane (Surr	111	6.981	6.981	0.000	92	463624	12.9	
$ 6 1,2-Dichloroethane-d4 (Sur	65	7.274	7.274	0.000	99	385368	12.6	
$ 7 Toluene-d8 (Surr)	98	8.727	8.727	0.000	93	2148028	13.1	
$ 8 4-Bromofluorobenzene (Surr	95	10.654	10.654	0.000	0	629954	11.8	
$ 152 Trifluorotoluene (Surr)	1		0.000				ND	
$ 4 BFB	95		4.591				ND	
24 Dichlorodifluoromethane	85		3.923				ND	
26 Chloromethane	50		4.160				ND	
22 Chlorotrifluoroethene	116		4.248				ND	
27 Vinyl chloride	62		4.286				ND	
25 1,2-Dichloro-1,1,2,2-tetra	85		4.472				ND	
28 Ethylene oxide	43		4.565				ND	U
29 Bromomethane	94		4.635				ND	
31 Chloroethane	64		4.691				ND	
23 2-Chloro-1,1,1-Trifluoroet	118		4.737				ND	
32 Dichlorofluoromethane	67		4.830				ND	
33 Trichlorofluoromethane	101		4.914				ND	
34 Ethanol	45		4.928				ND	
36 Ethyl ether	59		5.096				ND	
38 Propene oxide	58		5.180				ND	
39 Acrolein	56		5.221				ND	
40 Acetone	43		5.319				ND	
42 1,1,2-Trichloro-1,2,2-trif	151		5.333				ND	
41 Isopropyl alcohol	45		5.333				ND	
43 1,1-Dichloroethene	96		5.361				ND	
35 1,2-Dichloro-1,1,2-trifluo	117		5.505				ND	
45 Iodomethane	142		5.529				ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ug/l	Flags
44 Acetonitrile	41		5.529				ND	U
37 1,1,1-Trifluoro-2,2-dichlo	83		5.533				ND	
46 Methyl acetate	43	5.557	5.557	0.000	99	28459	2.86	
47 3-Chloro-1-propene	41		5.612				ND	U
48 Carbon disulfide	76		5.626				ND	U
49 2-Methyl-2-propanol	59		5.654				ND	U
50 Methylene Chloride	84	5.696	5.696	0.000	95	27381	0.2353	
51 Acrylonitrile	53		5.836				ND	
52 Methyl tert-butyl ether	73		5.878				ND	
53 trans-1,2-Dichloroethene	96		5.920				ND	
54 Hexane	57		6.101				ND	
55 Vinyl acetate	43		6.157				ND	
56 Isopropyl ether	87		6.199				ND	
57 1,1-Dichloroethane	63		6.227				ND	
58 2-Chloro-1,3-butadiene	53		6.297				ND	
59 Tert-butyl ethyl ether	59		6.464				ND	
61 2-Butanone (MEK)	43		6.590				ND	
60 Ethyl acetate	43		6.590				ND	U
63 Propionitrile	54		6.632				ND	
62 sec-Butyl Alcohol	45		6.646				ND	U
64 cis-1,2-Dichloroethene	96		6.646				ND	
65 2,2-Dichloropropane	77		6.688				ND	
66 Methacrylonitrile	41		6.772				ND	
67 Chlorobromomethane	128		6.841				ND	
68 Chloroform	83		6.855				ND	
69 Tetrahydrofuran	42		6.883				ND	
70 Isobutyl alcohol	41		7.051				ND	
71 1,1,1-Trichloroethane	97		7.079				ND	
72 Cyclohexane	56		7.163				ND	
73 1,1-Dichloropropene	75		7.177				ND	
74 Carbon tetrachloride	117		7.233				ND	
19 2,2-Dimethylpentane	57		7.251				ND	
17 2,4-Dimethylpentane	43		7.293				ND	
75 1,2-Dichloroethane	62		7.330				ND	
77 Benzene	78		7.358				ND	
76 Tert-amyl methyl ether	73		7.358				ND	
9 n-Heptane	43		7.456				ND	
10 2,2,3-Trimethylbutane	57		7.502				ND	
78 n-Butanol	56		7.554				ND	U
12 3,3-Dimethylpentane	43		7.768				ND	
18 2-Methylhexane	43		7.810				ND	
79 Trichloroethene	95		7.819				ND	
80 2-Pentanone	43		7.847				ND	
81 Methyl methacrylate	100		7.945				ND	
15 3-Methylhexane	43	7.973	7.949	0.024	68	101086	NC	
11 2,3-Dimethylpentane	56		7.949				ND	
82 1,2-Dichloropropane	63		8.001				ND	
83 Methylcyclohexane	55		8.029				ND	
84 1,4-Dioxane	88		8.057				ND	
85 Dibromomethane	93		8.098				ND	
86 Dichlorobromomethane	83		8.168				ND	
20 3-Ethylpentane	43		8.214				ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ug/l	Flags
87 2-Nitropropane	41		8.294				ND	
88 2-Chloroethyl vinyl ether	63		8.308				ND	
89 cis-1,3-Dichloropropene	75		8.489				ND	
90 4-Methyl-2-pentanone (MIBK	43		8.545				ND	
91 Toluene	91		8.769				ND	
92 Ethyl methacrylate	69		8.853				ND	
93 trans-1,3-Dichloropropene	75		8.867				ND	
94 1,1,2-Trichloroethane	97		9.020				ND	
95 2-Hexanone	43		9.132				ND	
96 1,3-Dichloropropane	76		9.160				ND	
97 Tetrachloroethene	164		9.202				ND	
98 Chlorodibromomethane	129		9.341				ND	
13 Dimethyl disulfide	94		9.388				ND	
99 Tetrahydrothiophene	60		9.397				ND	
100 Ethylene Dibromide	107		9.467				ND	
101 1-Chlorohexane	91		9.705				ND	U
102 Chlorobenzene	112		9.816				ND	
103 1,1,1,2-Tetrachloroethane	131		9.844				ND	
104 Ethylbenzene	106		9.858				ND	
105 m-Xylene & p-Xylene	106		9.928				ND	
106 Styrene	104		10.249				ND	
109 o-Xylene	106		10.249				ND	
107 Bromoform	173		10.445				ND	
108 Isopropylbenzene	105		10.515				ND	
110 cis-1,4-Dichloro-2-butene	53		10.515				ND	
111 Cyclohexanone	55		10.626				ND	U
112 1,1,2,2-Tetrachloroethane	83		10.696				ND	
113 trans-1,4-Dichloro-2-buten	53		10.724				ND	
114 1,2,3-Trichloropropane	110		10.766				ND	
116 Bromobenzene	156		10.822				ND	
115 N-Propylbenzene	120		10.822				ND	
120 1,3,5-Trimethylbenzene	105		10.934				ND	
117 2-Chlorotoluene	126		10.948				ND	
118 4-Chlorotoluene	126		11.017				ND	
119 tert-Butylbenzene	119		11.227				ND	
121 1,2,4-Trimethylbenzene	105		11.255				ND	
143 Pentachloroethane	167		11.283				ND	
122 sec-Butylbenzene	134		11.408				ND	
123 4-Isopropyltoluene	119		11.506				ND	
124 1,3-Dichlorobenzene	146		11.562				ND	
126 1,4-Dichlorobenzene	146		11.632				ND	
125 1,2,3-Trimethylbenzene	105		11.632				ND	
127 n-Butylbenzene	91		11.855				ND	
128 1,2-Dichlorobenzene	146		11.981				ND	
129 1,2-Dibromo-3-Chloropropan	157		12.707				ND	
21 1,3,5-Trichlorobenzene	180		12.945				ND	
14 n-Nonyl Aldehyde	57		13.340				ND	
130 1,2,4-Trichlorobenzene	180		13.657				ND	
131 Hexachlorobutadiene	225		13.825				ND	
132 Naphthalene	128		14.006				ND	
133 1,2,3-Trichlorobenzene	180		14.327				ND	
161 n-Nonane TIC	1		0.000				ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ug/l	Flags
158 1-Chlorohexane TIC	1		0.000				ND	
160 Cyclohexane TIC	1		0.000				ND	
159 Methyl cyclohexane TIC	1		0.000				ND	
S 140 1,2-Dichloroethene, Total	96		2.000				ND	
S 136 1,2-Dichloroethene, Total	1		0.000				ND	
S 134 Trihalomethanes, Total	1		0.000				ND	
S 137 Total BTEX	1		0.000				ND	
S 139 Xylenes, Total (URS)	1		0.000				ND	
S 135 1,3-Dichloropropene, Total	1		0.000				ND	
S 153 TAH	1				0		0	
S 138 Xylenes, Total	106		0.000				ND	
T 141 Dichloroacetonitrile TIC	74		1.000				ND	
T 142 2,3-dichloro-1-propene TIC	75		1.000				ND	
T 30 Propene oxide TIC	58		5.334				ND	
T 156 4-Ethyltoluene TIC	1		0.000				ND	
T 157 1,3-Butadiene TIC	1		0.000				ND	
T 16 2-Butoxyethanol TIC	1		0.000				ND	
T 155 Dicyclopentadiene TIC	1		0.000				ND	
T 154 Propene TIC	1		0.000				ND	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

U - Marked Undetected

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL	Run Reagent
MV-ARCH SS A_00101	Amount Added:	0.98	Units: uL	Run Reagent

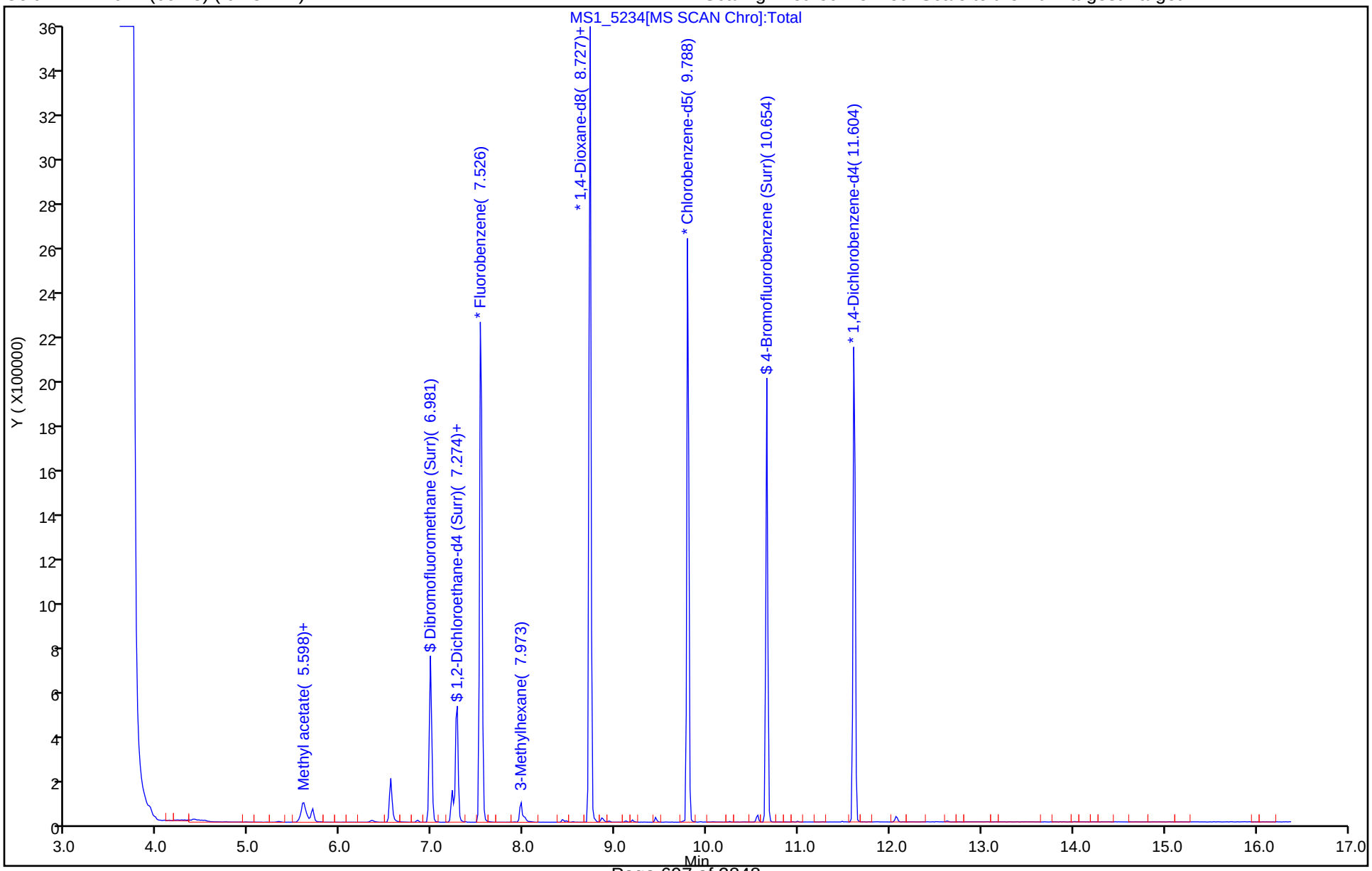
Report Date: 07-Aug-2018 06:54:14 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5234.D

Injection Date:	06-Aug-2018 09:48:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	160-29498-C-2-A	Lab Sample ID:	280-29498-2	Worklist Smp#:	14
Client ID:	CRC-B21-0205				
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	17
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



TestAmerica Denver
Recovery Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5234.D
Lims ID: 160-29498-C-2-A
Client ID: CRC-B21-0205
Sample Type: Client
Inject. Date: 06-Aug-2018 09:48:30 ALS Bottle#: 17 Worklist Smp#: 14
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: 160-29498-C-2-A 2ml
Operator ID: wickhamt Instrument ID: VMS_MS1

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 07-Aug-2018 06:52:59 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0316

First Level Reviewer: wickhamt Date: 06-Aug-2018 10:13:43

Compound	Amount Added	Amount Recovered	% Rec.
$ 5 Dibromofluoromethane (Surr)	12.3	12.9	105.19
$ 6 1,2-Dichloroethane-d4 (Surr)	12.3	12.6	102.91
$ 7 Toluene-d8 (Surr)	12.3	13.1	106.68
$ 8 4-Bromofluorobenzene (Surr)	12.3	11.8	96.54

FORM VI
GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424541

SDG No.:

Instrument ID: VMS_MS1 GC Column: DB-624 (60. ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 08:53 Calibration End Date: 08/02/2018 10:54 Calibration ID: 33278

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD003 280-424541/12	MS1_5075.D
Level 2	STD01 280-424541/13	MS1_5076.D
Level 3	STD02 280-424541/14	MS1_5077.D
Level 4	STD05 280-424541/15	MS1_5078.D
Level 5	STD10 280-424541/16	MS1_5079.D
Level 6	STD30 280-424541/17	MS1_5080.D
Level 7	STD60 280-424541/18	MS1_5081.D

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5		B	M1	M2								
Dichlorodifluoromethane	0.2474 0.3097	0.2548 0.3123	0.2273	0.3086	0.3220	Ave		0.2832				13.6		15.0			
Chloromethane	0.4412 0.3178	0.3234 0.3202	0.3316	0.3383	0.3361	Ave		0.3441			0.1000	12.7		15.0			
Vinyl chloride	0.3351 0.3205	0.3221 0.3106	0.3376	0.3396	0.3457	Ave		0.3302				3.8		30.0			
Bromomethane	0.2341 0.2434	0.2350 0.2357	0.2422	0.2507	0.2471	Ave		0.2412				2.7		15.0			
Chloroethane	0.2572 0.2342	0.2375 0.2245	0.2420	0.2456	0.2446	Ave		0.2408				4.2		15.0			
Dichlorofluoromethane	0.5465 0.5206	0.5108 0.5254	0.5674	0.5419	0.5459	Ave		0.5369				3.6		15.0			
Trichlorofluoromethane	0.4288 0.4203	0.4082 0.4243	0.4255	0.4161	0.4351	Ave		0.4226				2.1		15.0			
Ethyl ether	0.1305 0.1135	0.1203 0.1278	0.1233	0.1284	0.1276	Ave		0.1245				4.8		15.0			
Acrolein	0.0140 0.0145	0.0147 0.0147	0.0160	0.0151	0.0149	Ave		0.0148				4.2		15.0			
Acetone	0.0505 0.0193	0.0276 0.0192	0.0258	0.0216	0.0203	Lin2	0.0371	0.0195							0.9980		0.9900
Freon 113	0.1777 0.1818	0.1891 0.2071	0.1966	0.1862	0.2056	Ave		0.1920				6.0		15.0			
1,1-Dichloroethene	0.2748 0.2465	0.2695 0.2777	0.2760	0.2627	0.2783	Ave		0.2694				4.3		30.0			
Iodomethane	0.3975 0.3885	0.4040 0.4341	0.4148	0.4340	0.4314	Ave		0.4149				4.5		15.0			
Methyl acetate	0.0765 0.0507	0.0632 0.0562	0.0586	0.0566	0.0565	Ave		0.0597				13.8		15.0			

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424541

SDG No.:

Instrument ID: VMS_MS1 GC Column: DB-624 (60. ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 08:53 Calibration End Date: 08/02/2018 10:54 Calibration ID: 33278

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5		B	M1	M2								
Allyl chloride	0.5030 0.4549	0.5191 0.4880	0.5163	0.5204	0.5192	Ave		0.5030				4.8		15.0			
Carbon disulfide	1.2562 1.0916	1.2002 1.1637	1.2385	1.2105	1.2475	Ave		1.2012				4.8		15.0			
Tert-butyl alcohol (2-methyl-2-propanol)	1.0596 1.1813	1.1885 1.3433	1.2293	1.2686	1.2508	Ave		1.2173				7.3		15.0			
Methylene Chloride	0.6068 0.2281	0.3200 0.2539	0.2851	0.2698	0.2591	Lin2	0.1086	0.2372							0.9950		0.9900
Acrylonitrile	0.0296 0.0275	0.0296 0.0304	0.0306	0.0308	0.0305	Ave		0.0299				3.8		15.0			
Methyl tert-butyl ether	0.3239 0.3073	0.3303 0.3450	0.3298	0.3416	0.3347	Ave		0.3304				3.8		15.0			
trans-1,2-Dichloroethene	0.3066 0.2748	0.3083 0.3096	0.3040	0.3032	0.3079	Ave		0.3021				4.0		15.0			
Hexane	3.0378 2.2415	2.4803 2.4360	2.6496	2.3470	2.6427	Ave		2.5478				10.3		15.0			
Vinyl acetate	0.1954 0.2172	0.2122 0.2227	0.2174	0.2260	0.2304	Ave		0.2173				5.3		15.0			
1,1-Dichloroethane	0.5263 0.4788	0.5215 0.5274	0.5382	0.5435	0.5453	Ave		0.5259			0.1000	4.3		15.0			
2-Butanone (MEK)	+++++ 0.0309	0.0411 0.0309	0.0304	0.0296	0.0297	Ave		0.0321				13.9		15.0			
sec-Butyl Alcohol	1.2217 1.1062	1.1785 1.2261	1.0333	1.0942	1.1443	Ave		1.1435				6.2		15.0			
cis-1,2-Dichloroethene	0.3040 0.2780	0.3044 0.3123	0.3116	0.3103	0.3090	Ave		0.3042				3.9		15.0			
2,2-Dichloropropane	0.4490 0.3921	0.4275 0.4367	0.4306	0.4186	0.4346	Ave		0.4270				4.2		15.0			
Chlorobromomethane	0.0874 0.0843	0.0875 0.0966	0.0902	0.0926	0.0925	Ave		0.0901				4.6		15.0			
Chloroform	0.4556 0.4212	0.4560 0.4691	0.4676	0.4726	0.4725	Ave		0.4592				4.0		30.0			
Tetrahydrofuran	+++++ 0.0199	0.0337 0.0222	0.0292	0.0251	0.0228	Lin2	0.0259	0.0215							0.9950		0.9900
Isobutyl alcohol	0.5820 0.4192	0.4699 0.4787	0.4294	0.4417	0.4394	Ave		0.4657				11.9		15.0			
1,1,1-Trichloroethane	0.4303 0.4034	0.4285 0.4489	0.4471	0.4310	0.4525	Ave		0.4345				3.9		15.0			
Cyclohexane	0.6000 0.5306	0.6010 0.5728	0.6222	0.5492	0.6127	Ave		0.5841				5.9		15.0			

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424541

SDG No.:

Instrument ID: VMS_MS1 GC Column: DB-624 (60. ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 08:53 Calibration End Date: 08/02/2018 10:54 Calibration ID: 33278

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5		B	M1	M2								
1,1-Dichloropropene	0.4287 0.3921	0.4216 0.4362	0.4398	0.4121	0.4419	Ave		0.4246				4.2		15.0			
Carbon tetrachloride	0.3862 0.3434	0.3538 0.3882	0.3776	0.3526	0.3801	Ave		0.3689				5.0		15.0			
1,2-Dichloroethane	+++++ 0.2061	0.2285 0.2295	0.2291	0.2296	0.2287	Ave		0.2252				4.2		15.0			
Benzene	1.1751 1.0534	1.1849 1.1263	1.2231	1.1961	1.2018	Ave		1.1658				5.0		15.0			
n-Heptane	0.5720 0.4665	0.5286 0.4971	0.5544	0.5012	0.5432	Ave		0.5233				7.1		15.0			
Trichloroethene	0.2920 0.2726	0.2860 0.3085	0.3030	0.2949	0.3052	Ave		0.2946				4.3		15.0			
2-Pentanone	0.0545 0.0533	0.0509 0.0599	0.0557	0.0572	0.0582	Ave		0.0557				5.5		15.0			
1,2-Dichloropropane	0.2715 0.2401	0.2644 0.2677	0.2649	0.2663	0.2675	Ave		0.2632				4.0		30.0			
Methylcyclohexane	0.4873 0.4247	0.4780 0.4593	0.4918	0.4407	0.4868	Ave		0.4669				5.6		15.0			
1,4-Dioxane	+++++ 0.0008	0.0006 0.0009	0.0006	0.0007	0.0008	Ave		0.0007				14.6		15.0			
Dibromomethane	0.0862 0.0810	0.0862 0.0922	0.0894	0.0909	0.0890	Ave		0.0878				4.3		15.0			
Dichlorobromomethane	0.2769 0.2631	0.2704 0.2968	0.2814	0.2824	0.2871	Ave		0.2797				3.9		15.0			
2-Chloroethyl vinyl ether	+++++ 0.0423	0.0300 0.0484	0.0327	0.0356	0.0375	Lin1	-0.027	0.0461							0.9930		0.9900
cis-1,3-Dichloropropene	1.4543 1.5173	1.5514 1.6887	1.5772	1.6380	1.6562	Ave		1.5833				5.3		15.0			
4-Methyl-2-pentanone (MIBK)	0.0605 0.0736	0.0682 0.0737	0.0715	0.0747	0.0755	Ave		0.0711				7.4		15.0			
Toluene	1.2457 1.0643	1.1971 1.1153	1.2451	1.2024	1.2099	Ave		1.1828				5.8		30.0			
Ethyl methacrylate	0.7147 0.6327	0.6380 0.7262	0.6359	0.6777	0.6900	Ave		0.6736				5.8		15.0			
trans-1,3-Dichloropropene	0.1989 0.2240	0.2109 0.2544	0.2237	0.2346	0.2406	Ave		0.2267				8.2		15.0			
1,1,2-Trichloroethane	0.1131 0.1078	0.1149 0.1208	0.1204	0.1188	0.1183	Ave		0.1163				4.0		15.0			
Methyl n-butyl ketone (MNBK)	0.2119 0.2342	0.2105 0.2340	0.2180	0.2348	0.2415	Ave		0.2264				5.6		15.0			

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424541

SDG No.:

Instrument ID: VMS_MS1 GC Column: DB-624 (60. ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 08:53 Calibration End Date: 08/02/2018 10:54 Calibration ID: 33278

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5		B	M1	M2								
1,3-Dichloropropane	1.0725 1.0273	1.1179 1.1398	1.1355	1.1369	1.1264	Ave		1.1080				3.8		15.0			
Tetrachloroethene	1.1404 1.0353	1.0880 1.1710	1.1186	1.0192	1.1532	Ave		1.1037				5.3		15.0			
Chlorodibromomethane	0.5925 0.6536	0.6210 0.7456	0.6445	0.6700	0.6859	Ave		0.6590				7.4		15.0			
1,2-Dibromoethane	0.4596 0.4897	0.5176 0.5521	0.5275	0.5296	0.5389	Ave		0.5164				6.1		15.0			
1-Chlorohexane	2.1880 1.9326	2.0846 2.1154	2.1378	1.8924	2.1728	Ave		2.0748				5.6		15.0			
Chlorobenzene	3.2818 3.0733	3.3694 3.3399	3.4230	3.3094	3.3934	Ave		3.3129			0.3000	3.5		15.0			
1,1,1,2-Tetrachloroethane	0.9448 0.9984	0.9625 1.1494	0.9839	1.0170	1.0515	Ave		1.0154				6.8		15.0			
Ethylbenzene	2.1109 2.0203	2.0983 2.2108	2.1627	2.0650	2.1800	Ave		2.1211				3.2		30.0			
m-Xylene & p-Xylene	2.6219 2.3858	2.5791 2.5901	2.5850	2.4915	2.6204	Ave		2.5534				3.4		15.0			
o-Xylene	2.2994 2.2757	2.3643 2.4297	2.3865	2.3724	2.4571	Ave		2.3693				2.7		15.0			
Styrene	3.0577 3.4425	3.2492 3.6439	3.4438	3.5799	3.6841	Ave		3.4430				6.5		15.0			
Bromoform	0.2234 0.3042	0.2475 0.3543	0.2738	0.2867	0.3112	Lin2	-0.029	0.3073			0.1000				0.9910		0.9900
Isopropylbenzene	5.0866 4.2873	4.8721 4.3246	4.9832	4.6706	4.9061	Ave		4.7329				6.7		15.0			
Cyclohexanone	0.0076 0.0113	0.0089 0.0118	0.0095	0.0106	0.0108	Ave		0.0101				14.7		15.0			
1,1,2,2-Tetrachloroethane	0.4082 0.3687	0.3877 0.4091	0.4259	0.4193	0.4123	Ave		0.4045			0.3000	4.9		15.0			
trans-1,4-Dichloro-2-butene	0.0897 0.0949	0.0944 0.1083	0.0988	0.0990	0.0997	Ave		0.0978				5.9		15.0			
1,2,3-Trichloropropane	0.0993 0.0994	0.1104 0.1116	0.1079	0.1141	0.1102	Ave		0.1076				5.5		15.0			
Bromobenzene	0.7721 0.8075	0.8448 0.9301	0.8641	0.8665	0.8749	Ave		0.8515				5.9		15.0			
N-Propylbenzene	1.3664 1.2538	1.3231 1.4009	1.3819	1.2715	1.3768	Ave		1.3392				4.3		15.0			
1,3,5-Trimethylbenzene	4.0279 3.6744	3.9519 3.7575	4.0787	3.9182	4.0510	Ave		3.9228				3.9		15.0			

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424541

SDG No.:

Instrument ID: VMS_MS1 GC Column: DB-624 (60. ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 08:53 Calibration End Date: 08/02/2018 10:54 Calibration ID: 33278

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5		B	M1	M2								
2-Chlorotoluene	1.0038 1.0013	1.0331 1.1198	1.0779	1.0486	1.0861	Ave		1.0530				4.2		15.0			
4-Chlorotoluene	1.0349 0.9760	1.0488 1.0793	1.0639	1.0200	1.0545	Ave		1.0396				3.3		15.0			
tert-Butylbenzene	3.8976 3.5732	3.8861 3.8014	4.0172	3.7298	3.9876	Ave		3.8418				4.0		15.0			
1,2,4-Trimethylbenzene	3.9629 3.5429	3.9271 3.7110	4.0963	3.8356	3.9443	Ave		3.8600				4.7		15.0			
sec-Butylbenzene	1.0092 0.9999	1.0674 1.0929	1.0945	0.9810	1.0874	Ave		1.0475				4.7		15.0			
4-Isopropyltoluene	4.4928 3.9938	4.3874 4.0462	4.5347	4.1731	4.4802	Ave		4.3012				5.3		15.0			
1,3-Dichlorobenzene	1.8108 1.7067	1.8416 1.8570	1.8932	1.8361	1.8774	Ave		1.8318				3.4		15.0			
1,4-Dichlorobenzene	1.7428 1.6152	1.7799 1.7668	1.8067	1.7435	1.7741	Ave		1.7470				3.6		15.0			
n-Butylbenzene	4.3936 3.9891	4.4440 3.9665	4.6073	4.1007	4.4732	Ave		4.2821				6.0		15.0			
1,2-Dichlorobenzene	1.3893 1.3156	1.4202 1.4439	1.4589	1.4414	1.4486	Ave		1.4168				3.5		15.0			
1,2-Dibromo-3-Chloropropane	+++++ 0.0498	0.0352 0.0574	0.0480	0.0514	0.0518	Lin2	-0.018	0.0545							0.9960		0.9900
1,2,4-Trichlorobenzene	0.8711 0.8835	0.9195 0.9511	0.9422	0.9638	0.9552	Ave		0.9266				3.9		15.0			
Hexachlorobutadiene	0.7623 0.7394	0.7695 0.7834	0.7934	0.7179	0.7860	Ave		0.7646				3.6		15.0			
Naphthalene	1.0167 1.0639	1.0999 1.1367	1.1331	1.1871	1.1784	Ave		1.1165				5.5		15.0			
1,2,3-Trichlorobenzene	0.6204 0.6394	0.6807 0.6743	0.6878	0.7044	0.7005	Ave		0.6725				4.7		15.0			

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424541

SDG No.:

Instrument ID: VMS_MS1 GC Column: DB-624 (60. ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 08:53 Calibration End Date: 08/02/2018 10:54 Calibration ID: 33278

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD003 280-424541/12	MS1_5075.D
Level 2	STD01 280-424541/13	MS1_5076.D
Level 3	STD02 280-424541/14	MS1_5077.D
Level 4	STD05 280-424541/15	MS1_5078.D
Level 5	STD10 280-424541/16	MS1_5079.D
Level 6	STD30 280-424541/17	MS1_5080.D
Level 7	STD60 280-424541/18	MS1_5081.D

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (UG/L)				
			LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5
Dichlorodifluoromethane	FB	Ave	12700 1607609	44046 3295611	77457	262015	564155	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Chloromethane	FB	Ave	22645 1649433	55899 3378862	113002	287230	588713	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Vinyl chloride	FB	Ave	17197 1663573	55674 3276951	115053	288301	605543	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Bromomethane	FB	Ave	12014 1263233	40617 2487024	82533	212846	432819	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Chloroethane	FB	Ave	13199 1215873	41063 2368826	82454	208499	428415	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Dichlorofluoromethane	FB	Ave	28050 2702237	88299 5543482	193349	460095	956401	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Trichlorofluoromethane	FB	Ave	22007 2181784	70561 4476447	144994	353258	762226	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Ethyl ether	FB	Ave	6697 589044	20792 1348510	42022	109027	223449	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Acrolein	FB	Ave	7177 754395	25428 1545886	54542	128287	261551	3.00 300	10.00 600	20.0	50.0	100.0
Acetone	FB	Lin2	10363 401189	19102 809150	35136	73297	142461	1.20 120	4.00 240	8.00	20.0	40.0
Freon 113	FB	Ave	9123 943667	32680 2185427	67004	158047	360256	0.300 30.0	1.00 60.0	2.00	5.00	10.0
1,1-Dichloroethene	FB	Ave	14103 1279482	46581 2929771	94056	223075	487569	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Iodomethane	FB	Ave	20404 2016771	69836 4580085	141353	368517	755810	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Methyl acetate	FB	Ave	7849 526019	21852 1185621	39913	96138	198097	0.600 60.0	2.00 120	4.00	10.0	20.0
Allyl chloride	FB	Ave	25817 2361056	89729 5148897	175913	441817	909580	0.300 30.0	1.00 60.0	2.00	5.00	10.0

FORM VI
GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424541

SDG No.:

Instrument ID: VMS_MS1 GC Column: DB-624 (60. ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 08:53 Calibration End Date: 08/02/2018 10:54 Calibration ID: 33278

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (UG/L)				
			LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5
Carbon disulfide	FB	Ave	64477 5666306	207465 12279155	422013	1027781	2185345	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Tert-butyl alcohol (2-methyl-2-propanol)	TBAd9	Ave	2294 262033	8512 618695	17233	47895	95029	3.00 300	10.0 600	20.0	50.0	100
Methylene Chloride	FB	Lin2	31143 1184219	55320 2678804	97146	229104	453852	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Acrylonitrile	FB	Ave	15171 1427463	51204 3207740	104191	261884	534223	3.00 300	10.0 600	20.0	50.0	100
Methyl tert-butyl ether	FB	Ave	16623 1594990	57090 3640553	112364	289997	586404	0.300 30.0	1.00 60.0	2.00	5.00	10.0
trans-1,2-Dichloroethene	FB	Ave	15738 1426670	53301 3267087	103588	257423	539385	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Hexane	CBNZ d5	Ave	31098 2356635	85907 5250704	183126	405524	933281	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Vinyl acetate	FB	Ave	20057 2254728	73369 4699784	148146	383823	807364	0.600 60.0	2.00 120	4.00	10.0	20.0
1,1-Dichloroethane	FB	Ave	27015 2485350	90139 5564790	183375	461484	955292	0.300 30.0	1.00 60.0	2.00	5.00	10.0
2-Butanone (MEK)	FB	Ave	+++++ 640657	28429 1302396	41493	100443	208155	+++++ 120	4.00 240	8.00	20.0	40.0
sec-Butyl Alcohol	TBAd9	Ave	7935 736148	25321 1694104	43455	123938	260819	9.00 900	30.0 1800	60.0	150	300
cis-1,2-Dichloroethene	FB	Ave	15605 1443283	52624 3295665	106162	263432	541403	0.300 30.0	1.00 60.0	2.00	5.00	10.0
2,2-Dichloropropane	FB	Ave	23044 2035165	73905 4607883	146736	355420	761324	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Chlorobromomethane	FB	Ave	4486 437412	15128 1019268	30721	78637	161964	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Chloroform	FB	Ave	23384 2186138	78819 4950029	159333	401244	827738	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Tetrahydrofuran	FB	Lin2	+++++ 207066	11644 469376	19913	42560	79975	+++++ 60.0	2.00 120	4.00	10.0	20.0
Isobutyl alcohol	TBAd9	Ave	3150 232449	8413 551153	15048	41687	83466	7.50 750	25.0 1500	50.0	125	250
1,1,1-Trichloroethane	FB	Ave	22085 2094001	74070 4736877	152331	365896	792643	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Cyclohexane	FB	Ave	30794 2754325	103890 6043382	212024	466257	1073292	0.300 30.0	1.00 60.0	2.00	5.00	10.0
1,1-Dichloropropene	FB	Ave	22001 2035350	72878 4602816	149854	349914	774076	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Carbon tetrachloride	FB	Ave	19824 1782446	61167 4095789	128677	299384	665835	0.300 30.0	1.00 60.0	2.00	5.00	10.0

FORM VI
GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424541

SDG No.:

Instrument ID: VMS_MS1 GC Column: DB-624 (60. ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 08:53 Calibration End Date: 08/02/2018 10:54 Calibration ID: 33278

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (UG/L)				
			LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5
1,2-Dichloroethane	FB	Ave	+++++ 1069725	39492 2421140	78066	194972	400706	+++++ 30.0	1.00 60.0	2.00	5.00	10.0
Benzene	FB	Ave	60313 5467947	204816 11883656	416772	1015513	2105308	0.300 30.0	1.00 60.0	2.00	5.00	10.0
n-Heptane	FB	Ave	29357 2421389	91370 5245197	188925	425559	951643	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Trichloroethene	FB	Ave	14989 1414865	49445 3254862	103252	250410	534671	0.300 30.0	1.00 60.0	2.00	5.00	10.0
2-Pentanone	FB	Ave	11194 1107233	35223 2526845	75914	194363	407613	1.20 120	4.00 240	8.00	20.0	40.0
1,2-Dichloropropane	FB	Ave	13937 1246070	45696 2824297	90254	226060	468579	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Methylcyclohexane	FB	Ave	25013 2204443	82622 4846395	167587	374200	852769	0.300 30.0	1.00 60.0	2.00	5.00	10.0
1,4-Dioxane	FB	Ave	+++++ 78499	2195 182854	4025	12733	29075	+++++ 600	20.0 1200	40.0	100	200
Dibromomethane	FB	Ave	4425 420276	14906 972742	30446	77167	155855	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Dichlorobromomethane	FB	Ave	14210 1365855	46734 3131431	95902	239790	502920	0.300 30.0	1.00 60.0	2.00	5.00	10.0
2-Chloroethyl vinyl ether	FB	Lin1	+++++ 219639	5179 510394	11144	30251	65666	+++++ 30.0	1.00 60.0	2.00	5.00	10.0
cis-1,3-Dichloropropene	CBNZ d5	Ave	14888 1595241	53734 3639978	109008	283019	584896	0.300 30.0	1.00 60.0	2.00	5.00	10.0
4-Methyl-2-pentanone (MIBK)	FB	Ave	12417 1528689	47145 3109898	97429	253596	528863	1.20 120	4.00 240	8.00	20.0	40.0
Toluene	FB	Ave	63938 5524520	206925 11767863	424249	1020901	2119622	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Ethyl methacrylate	CBNZ d5	Ave	7316 665198	22096 1565228	43949	117097	243658	0.300 30.0	1.00 60.0	2.00	5.00	10.0
trans-1,3-Dichloropropene	FB	Ave	10211 1162612	36456 2684455	76214	199217	421536	0.300 30.0	1.00 60.0	2.00	5.00	10.0
1,1,2-Trichloroethane	FB	Ave	5807 559577	19857 1274746	41015	100846	207294	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Methyl n-butyl ketone (MNBK)	CBNZ d5	Ave	8677 984750	29170 2017731	60268	162252	341167	1.20 120	4.00 240	8.00	20.0	40.0
1,3-Dichloropropane	CBNZ d5	Ave	10979 1080009	38720 2456863	78479	196436	397780	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Tetrachloroethene	CBNZ d5	Ave	11674 1088504	37682 2524145	77313	176096	407265	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Chlorodibromomethane	CBNZ d5	Ave	6065 687122	21508 1607038	44546	115760	242209	0.300 30.0	1.00 60.0	2.00	5.00	10.0

FORM VI
GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424541

SDG No.:

Instrument ID: VMS_MS1 GC Column: DB-624 (60. ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 08:53 Calibration End Date: 08/02/2018 10:54 Calibration ID: 33278

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (UG/L)				
			LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5
1,2-Dibromoethane	CBNZ d5	Ave	4705 514796	17928 1190133	36459	91506	190306	0.300 30.0	1.00 60.0	2.00	5.00	10.0
1-Chlorohexane	CBNZ d5	Ave	22399 2031866	72202 4559602	147755	326975	767322	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Chlorobenzene	CBNZ d5	Ave	33596 3231093	116700 7199151	236578	571821	1198370	0.300 30.0	1.00 60.0	2.00	5.00	10.0
1,1,1,2-Tetrachloroethane	CBNZ d5	Ave	9672 1049644	33337 2477455	68003	175726	371334	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Ethylbenzene	CBNZ d5	Ave	21609 2124084	72676 4765351	149473	356805	769867	0.300 30.0	1.00 60.0	2.00	5.00	10.0
m-Xylene & p-Xylene	CBNZ d5	Ave	26840 2508264	89330 5582840	178662	430496	925395	0.300 30.0	1.00 60.0	2.00	5.00	10.0
o-Xylene	CBNZ d5	Ave	23539 2392581	81889 5237199	164944	409924	867725	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Styrene	CBNZ d5	Ave	31302 3619275	112539 7854293	238015	618546	1301023	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Bromoform	CBNZ d5	Lin2	2287 319845	8574 763589	18925	49542	109895	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Isopropylbenzene	DCBd 4	Ave	70873 6327757	231347 13051965	467529	1087749	2382186	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Cyclohexanone	CBNZ d5	Ave	3117 476407	12290 1017930	26350	73302	153088	12.0 1200	40.0 2400	80.0	200	400
1,1,2,2-Tetrachloroethane	DCBd 4	Ave	5688 544180	18410 1234693	39960	97663	200198	0.300 30.0	1.00 60.0	2.00	5.00	10.0
trans-1,4-Dichloro-2-butene	DCBd 4	Ave	1250 140039	4483 326861	9267	23057	48429	0.300 30.0	1.00 60.0	2.00	5.00	10.0
1,2,3-Trichloropropane	DCBd 4	Ave	1383 146713	5241 336848	10121	26573	53523	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Bromobenzene	DCBd 4	Ave	10758 1191870	40116 2807153	81075	201811	424825	0.300 30.0	1.00 60.0	2.00	5.00	10.0
N-Propylbenzene	DCBd 4	Ave	19038 1850570	62827 4228117	129652	296132	668508	0.300 30.0	1.00 60.0	2.00	5.00	10.0
1,3,5-Trimethylbenzene	DCBd 4	Ave	56122 5423026	187654 11340451	382672	912523	1966980	0.300 30.0	1.00 60.0	2.00	5.00	10.0
2-Chlorotoluene	DCBd 4	Ave	13986 1477889	49057 3379698	101132	244211	527365	0.300 30.0	1.00 60.0	2.00	5.00	10.0
4-Chlorotoluene	DCBd 4	Ave	14419 1440429	49802 3257500	99812	237560	512020	0.300 30.0	1.00 60.0	2.00	5.00	10.0
tert-Butylbenzene	DCBd 4	Ave	54306 5273697	184528 11472922	376895	868638	1936218	0.300 30.0	1.00 60.0	2.00	5.00	10.0
1,2,4-Trimethylbenzene	DCBd 4	Ave	55217 5229068	186475 11199960	384319	893281	1915213	0.300 30.0	1.00 60.0	2.00	5.00	10.0

FORM VI
GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424541

SDG No.:

Instrument ID: VMS_MS1 GC Column: DB-624 (60. ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 08:53 Calibration End Date: 08/02/2018 10:54 Calibration ID: 33278

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (UG/L)				
			LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5
sec-Butylbenzene	DCBd 4	Ave	14061 1475759	50686 3298491	102684	228466	527982	0.300 30.0	1.00 60.0	2.00	5.00	10.0
4-Isopropyltoluene	DCBd 4	Ave	62600 5894557	208331 12211753	425447	971889	2175391	0.300 30.0	1.00 60.0	2.00	5.00	10.0
1,3-Dichlorobenzene	DCBd 4	Ave	25231 2518936	87445 5604443	177625	427610	911595	0.300 30.0	1.00 60.0	2.00	5.00	10.0
1,4-Dichlorobenzene	DCBd 4	Ave	24283 2383941	84516 5332369	169505	406037	861432	0.300 30.0	1.00 60.0	2.00	5.00	10.0
n-Butylbenzene	DCBd 4	Ave	61218 5887503	211017 11971153	432266	955019	2172024	0.300 30.0	1.00 60.0	2.00	5.00	10.0
1,2-Dichlorobenzene	DCBd 4	Ave	19358 1941765	67437 4357629	136872	335681	703378	0.300 30.0	1.00 60.0	2.00	5.00	10.0
1,2-Dibromo-3-Chloropropane	DCBd 4	Lin2	+++++ 73435	1673 173215	4508	11972	25148	+++++ 30.0	1.00 60.0	2.00	5.00	10.0
1,2,4-Trichlorobenzene	DCBd 4	Ave	12138 1303964	43662 2870406	88397	224468	463813	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Hexachlorobutadiene	DCBd 4	Ave	10622 1091279	36541 2364233	74442	167192	381635	0.300 30.0	1.00 60.0	2.00	5.00	10.0
Naphthalene	DCBd 4	Ave	14166 1570155	52226 3430633	106307	276470	572176	0.300 30.0	1.00 60.0	2.00	5.00	10.0
1,2,3-Trichlorobenzene	DCBd 4	Ave	8644 943710	32321 2035072	64531	164057	340129	0.300 30.0	1.00 60.0	2.00	5.00	10.0

Curve Type Legend:

Ave = Average ISTD
Lin1 = Linear 1/conc ISTD
Lin2 = Linear 1/conc^2 ISTD

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5075.D
Lims ID: std003
Client ID:
Sample Type: IC Calib Level: 1
Inject. Date: 02-Aug-2018 08:53:30 ALS Bottle#: 12 Worklist Smp#: 12
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: std003
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist: chrom-AQ_VMS1_8260*sub66

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 02-Aug-2018 13:04:49 Calib Date: 02-Aug-2018 10:54:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5081.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0314

First Level Reviewer: wickhamt Date: 02-Aug-2018 11:35:23

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.598	5.598	0.000	84	180421	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2138567	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	90	426543	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	580556	12.5	12.5	
24 Dichlorodifluoromethane	85	3.922	3.922	0.000	49	12700	0.3000	0.2621	
26 Chloromethane	50	4.174	4.174	0.000	95	22645	0.3000	0.3847	
27 Vinyl chloride	62	4.299	4.300	-0.001	91	17197	0.3000	0.3045	
29 Bromomethane	94	4.635	4.635	0.000	90	12014	0.3000	0.2912	
31 Chloroethane	64	4.704	4.705	-0.001	98	13199	0.3000	0.3204	
32 Dichlorofluoromethane	67	4.830	4.830	0.000	96	28050	0.3000	0.3053	
33 Trichlorofluoromethane	101	4.914	4.914	0.000	97	22007	0.3000	0.3044	
36 Ethyl ether	59	5.096	5.096	0.000	92	6697	0.3000	0.3145	
39 Acrolein	56	5.221	5.221	0.000	93	7177	3.00	2.83	
40 Acetone	43	5.319	5.319	0.000	98	10363	1.20	1.20	
42 1,1,2-Trichloro-1,2,2-trif	151	5.333	5.347	-0.014	92	9123	0.3000	0.2777	
43 1,1-Dichloroethene	96	5.361	5.361	0.000	97	14103	0.3000	0.3060	
45 Iodomethane	142	5.529	5.529	-0.001	99	20404	0.3000	0.2874	
46 Methyl acetate	43	5.556	5.557	-0.001	96	7849	0.6000	0.7678	
47 3-Chloro-1-propene	41	5.612	5.612	0.000	86	25817	0.3000	0.3000	
48 Carbon disulfide	76	5.626	5.626	0.000	98	64477	0.3000	0.3138	
49 2-Methyl-2-propanol	59	5.668	5.654	0.014	32	2294	3.00	2.61	
50 Methylene Chloride	84	5.696	5.696	0.000	95	31143	0.3000	0.3098	
51 Acrylonitrile	53	5.836	5.836	0.000	96	15171	3.00	2.97	
52 Methyl tert-butyl ether	73	5.892	5.892	0.000	96	16623	0.3000	0.2941	
53 trans-1,2-Dichloroethene	96	5.920	5.920	0.000	96	15738	0.3000	0.3045	
54 Hexane	57	6.101	6.101	0.000	92	31098	0.3000	0.3577	
55 Vinyl acetate	43	6.171	6.157	0.014	96	20057	0.6000	0.5394	
57 1,1-Dichloroethane	63	6.227	6.227	0.000	95	27015	0.3000	0.3003	
61 2-Butanone (MEK)	43		6.590				ND	ND	U
62 sec-Butyl Alcohol	45	6.646	6.646	0.000	47	7935	9.00	9.62	
64 cis-1,2-Dichloroethene	96	6.660	6.660	0.000	80	15605	0.3000	0.2998	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
65 2,2-Dichloropropane	77	6.688	6.688	0.000	90	23044	0.3000	0.3154	
67 Chlorobromomethane	128	6.841	6.841	0.000	90	4486	0.3000	0.2909	
68 Chloroform	83	6.855	6.855	0.000	95	23384	0.3000	0.2976	
69 Tetrahydrofuran	42		6.883				ND	ND	
70 Isobutyl alcohol	41	7.065	7.051	0.014	38	3150	7.50	9.37	
71 1,1,1-Trichloroethane	97	7.093	7.079	0.014	98	22085	0.3000	0.2971	
72 Cyclohexane	56	7.163	7.163	0.000	0	30794	0.3000	0.3082	
73 1,1-Dichloropropene	75	7.190	7.191	-0.001	95	22001	0.3000	0.3028	
74 Carbon tetrachloride	117	7.232	7.232	0.000	95	19824	0.3000	0.3141	
75 1,2-Dichloroethane	62		7.330				ND	ND	
77 Benzene	78	7.358	7.358	0.000	96	60313	0.3000	0.3024	
9 n-Heptane	43	7.456	7.456	0.000	92	29357	0.3000	0.3279	
79 Trichloroethene	95	7.819	7.819	0.000	98	14989	0.3000	0.2974	
80 2-Pentanone	43	7.861	7.847	0.014	97	11194	1.20	1.18	
82 1,2-Dichloropropane	63	8.001	8.001	0.000	94	13937	0.3000	0.3095	
83 Methylcyclohexane	55	8.028	8.029	-0.001	0	25013	0.3000	0.3131	
84 1,4-Dioxane	88		8.056				ND	ND	
85 Dibromomethane	93	8.098	8.098	0.000	93	4425	0.3000	0.2945	
86 Dichlorobromomethane	83	8.168	8.168	0.000	99	14210	0.3000	0.2969	
88 2-Chloroethyl vinyl ether	63		8.308				ND	ND	U
89 cis-1,3-Dichloropropene	75	8.489	8.489	0.000	94	14888	0.3000	0.2756	
90 4-Methyl-2-pentanone (MIBK	43	8.545	8.545	0.000	93	12417	1.20	1.02	
91 Toluene	91	8.783	8.769	0.014	98	63938	0.3000	0.3160	
92 Ethyl methacrylate	69	8.852	8.853	-0.001	55	7316	0.3000	0.3183	
93 trans-1,3-Dichloropropene	75	8.866	8.867	0.000	96	10211	0.3000	0.2632	
94 1,1,2-Trichloroethane	97	9.020	9.020	0.000	86	5807	0.3000	0.2918	
95 2-Hexanone	43	9.146	9.132	0.014	91	8677	1.20	1.12	
96 1,3-Dichloropropane	76	9.160	9.160	0.000	94	10979	0.3000	0.2904	
97 Tetrachloroethene	164	9.202	9.202	0.000	97	11674	0.3000	0.3100	
98 Chlorodibromomethane	129	9.341	9.341	0.000	87	6065	0.3000	0.2697	
100 Ethylene Dibromide	107	9.481	9.467	0.014	94	4705	0.3000	0.2670	
101 1-Chlorohexane	91	9.704	9.704	0.000	0	22399	0.3000	0.3164	
102 Chlorobenzene	112	9.816	9.816	0.000	96	33596	0.3000	0.2972	
103 1,1,1,2-Tetrachloroethane	131	9.844	9.844	0.000	75	9672	0.3000	0.2792	
104 Ethylbenzene	106	9.858	9.858	0.000	98	21609	0.3000	0.2985	
105 m-Xylene & p-Xylene	106	9.928	9.928	0.000	99	26840	0.3000	0.3080	
106 Styrene	104	10.249	10.249	0.000	81	31302	0.3000	0.2664	
109 o-Xylene	106	10.249	10.249	0.000	91	23539	0.3000	0.2911	
107 Bromoform	173	10.445	10.445	0.000	90	2287	0.3000	0.3123	
108 Isopropylbenzene	105	10.514	10.515	-0.001	96	70873	0.3000	0.3224	
111 Cyclohexanone	55	10.626	10.626	0.000	87	3117	12.0	9.06	
112 1,1,2,2-Tetrachloroethane	83	10.696	10.696	0.000	87	5688	0.3000	0.3028	
113 trans-1,4-Dichloro-2-buten	53	10.738	10.724	0.014	1	1250	0.3000	0.2751	
114 1,2,3-Trichloropropane	110	10.766	10.766	0.000	81	1383	0.3000	0.2769	
115 N-Propylbenzene	120	10.822	10.822	0.000	98	19038	0.3000	0.3061	
116 Bromobenzene	156	10.822	10.822	0.000	51	10758	0.3000	0.2720	
120 1,3,5-Trimethylbenzene	105	10.933	10.934	-0.001	94	56122	0.3000	0.3080	
117 2-Chlorotoluene	126	10.947	10.947	0.000	95	13986	0.3000	0.2860	
118 4-Chlorotoluene	126	11.017	11.017	0.000	98	14419	0.3000	0.2986	
119 tert-Butylbenzene	119	11.227	11.227	0.000	93	54306	0.3000	0.3044	
121 1,2,4-Trimethylbenzene	105	11.255	11.255	0.000	96	55217	0.3000	0.3080	
122 sec-Butylbenzene	134	11.408	11.408	0.000	95	14061	0.3000	0.2890	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
123 4-Isopropyltoluene	119	11.506	11.506	0.000	97	62600	0.3000	0.3134	
124 1,3-Dichlorobenzene	146	11.562	11.562	0.000	96	25231	0.3000	0.2966	
126 1,4-Dichlorobenzene	146	11.632	11.632	0.000	93	24283	0.3000	0.2993	
127 n-Butylbenzene	91	11.855	11.855	0.000	98	61218	0.3000	0.3078	
128 1,2-Dichlorobenzene	146	11.981	11.981	0.000	95	19358	0.3000	0.2942	
129 1,2-Dibromo-3-Chloropropan	157		12.707				ND	ND	
130 1,2,4-Trichlorobenzene	180	13.657	13.657	0.000	92	12138	0.3000	0.2820	
131 Hexachlorobutadiene	225	13.824	13.825	-0.001	94	10622	0.3000	0.2991	
132 Naphthalene	128	14.006	14.006	0.000	94	14166	0.3000	0.2732	
133 1,2,3-Trichlorobenzene	180	14.327	14.327	0.000	91	8644	0.3000	0.2768	
S 140 1,2-Dichloroethene, Total	96				0		0.6000	0.6043	
S 134 Trihalomethanes, Total	1				0		1.20	1.18	
S 139 Xylenes, Total (URS)	1				0		0.6000	0.5992	
S 138 Xylenes, Total	106				0		0.6000	0.5992	
S 136 1,2-Dichloroethene, Total	1				0		0.6000	0.6043	
S 135 1,3-Dichloropropene, Total	1				0		0.6000	0.5388	
S 137 Total BTEX	1				0			1.52	

QC Flag Legend

Processing Flags

ND - Not Detected or Marked ND

Review Flags

U - Marked Undetected

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL
MV-Main A_00037	Amount Added:	0.15	Units: uL
MV-2cleve+AVA_00037	Amount Added:	0.15	Units: uL
MV-Gas/Ket A_00076	Amount Added:	0.15	Units: uL

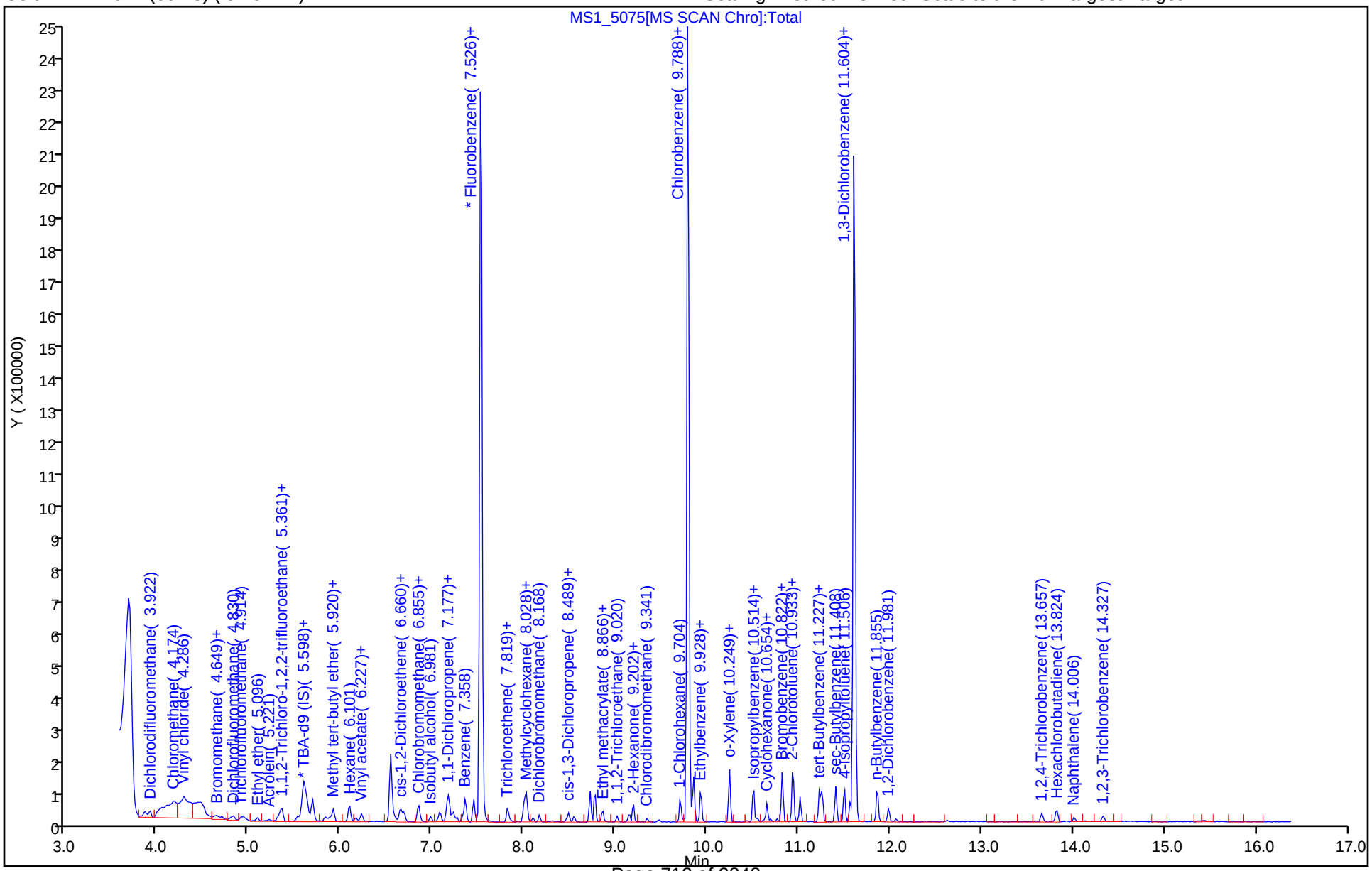
Report Date: 02-Aug-2018 13:04:50 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5075.D

Injection Date:	02-Aug-2018 08:53:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	std003			Worklist Smp#:	12
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	12
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



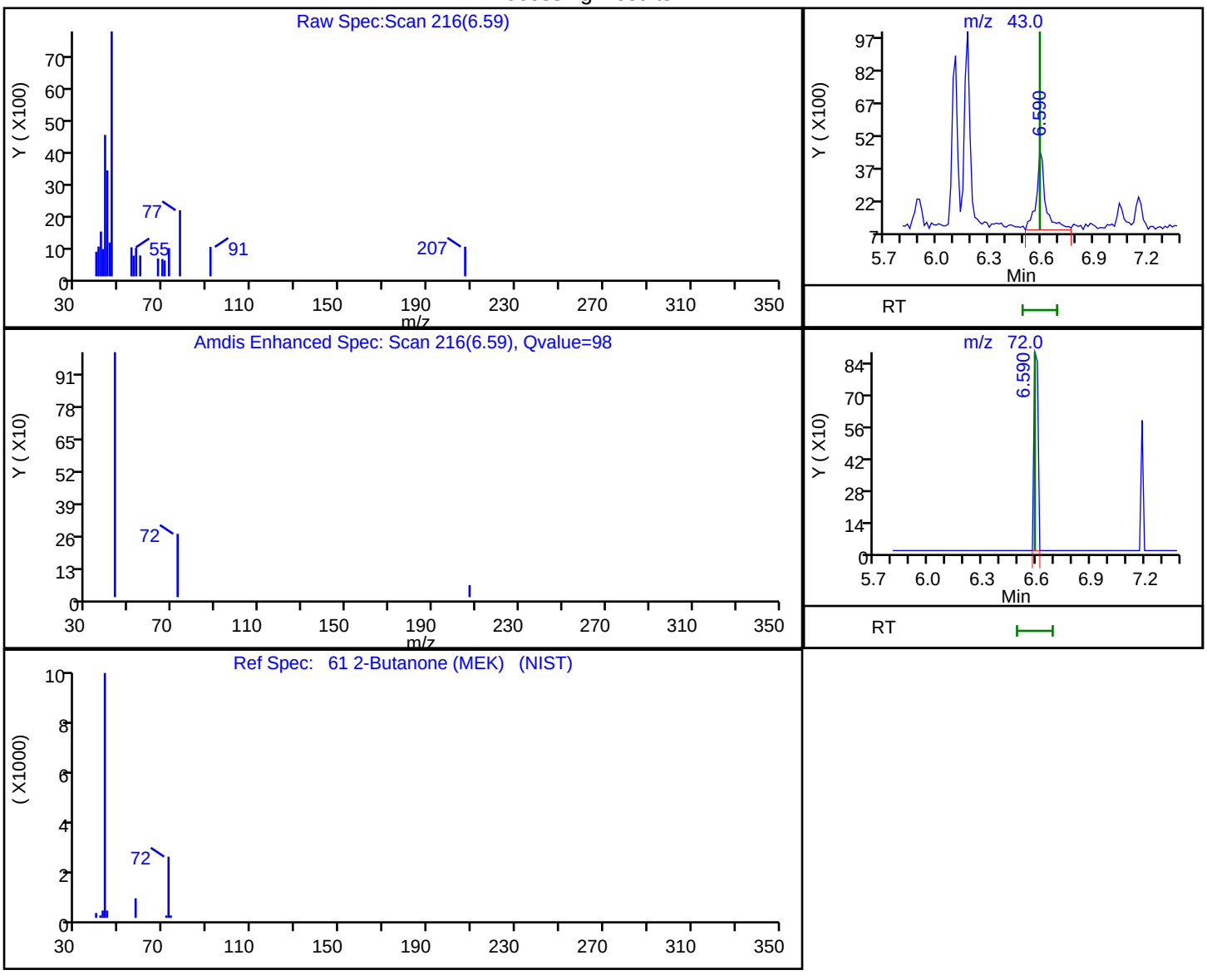
User Disabled Compound Report

TestAmerica Denver

Data File:	\\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5075.D				
Injection Date:	02-Aug-2018 08:53:30	Instrument ID:	VMS_MS1		
Lims ID:	std003				
Client ID:					
Operator ID:	wickhamt	ALS Bottle#:	12	Worklist Smp#:	12
Purge Vol:	20.000 mL	Dil. Factor:	1.0000		
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		
Column:	DB-624 (60.25) (0.25 mm)	Detector	MS SCAN		

61 2-Butanone (MEK), CAS: 78-93-3

Processing Results



RT	Mass	Response	Amount
6.59	43.00	13677	1.212010
6.59	72.00	1454	

Reviewer: wickhamt, 02-Aug-2018 11:48:39

Audit Action: Marked Compound Undetected Audit Reason: Invalid Compound ID

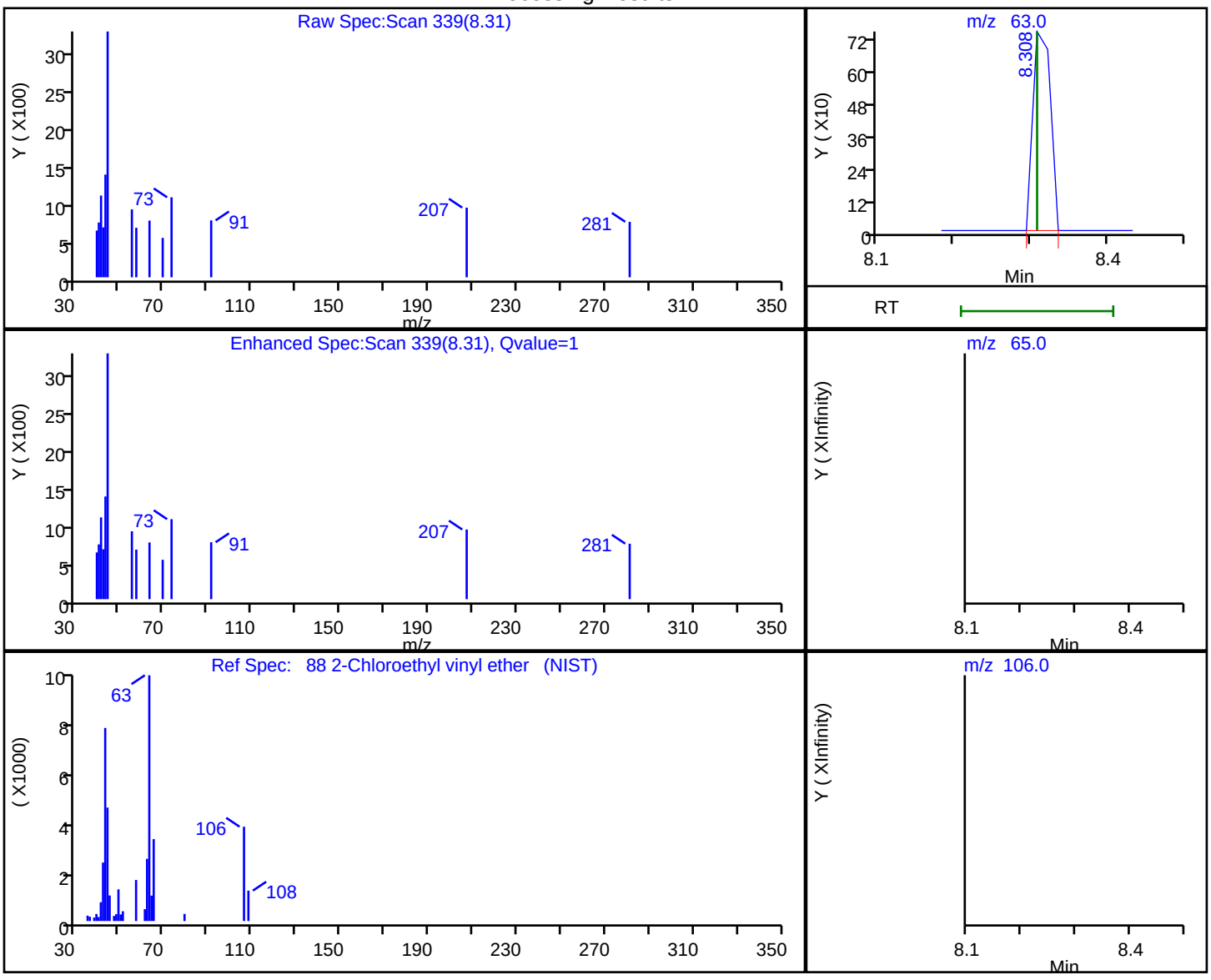
User Disabled Compound Report

TestAmerica Denver

Data File:	\\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5075.D				
Injection Date:	02-Aug-2018 08:53:30	Instrument ID:	VMS_MS1		
Lims ID:	std003				
Client ID:					
Operator ID:	wickhamt	ALS Bottle#:	12	Worklist Smp#:	12
Purge Vol:	20.000 mL	Dil. Factor:	1.0000		
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		
Column:	DB-624 (60.25) (0.25 mm)	Detector	MS SCAN		

88 2-Chloroethyl vinyl ether, CAS: 110-75-8

Processing Results



RT	Mass	Response	Amount
8.31	63.00	1191	0.305634
8.31	65.00	0	
8.31	106.00	0	

Reviewer: wickhamt, 02-Aug-2018 11:34:32

Audit Action: Marked Compound Undetected Audit Reason: Invalid Compound ID

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5076.D
Lims ID: std01
Client ID:
Sample Type: IC Calib Level: 2
Inject. Date: 02-Aug-2018 09:13:30 ALS Bottle#: 13 Worklist Smp#: 13
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: std01
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist: chrom-AQ_VMS1_8260*sub66

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 02-Aug-2018 13:04:51 Calib Date: 02-Aug-2018 10:54:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5081.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0314

First Level Reviewer: wickhamt Date: 02-Aug-2018 11:36:29

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.585	5.598	-0.013	84	179047	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2160770	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	90	432947	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	593551	12.5	12.5	
24 Dichlorodifluoromethane	85	3.909	3.922	-0.013	99	44046	1.00	0.8998	
26 Chloromethane	50	4.160	4.174	-0.014	98	55899	1.00	0.9398	
27 Vinyl chloride	62	4.286	4.300	-0.014	94	55674	1.00	0.9755	
29 Bromomethane	94	4.635	4.635	0.000	91	40617	1.00	0.9743	
31 Chloroethane	64	4.691	4.705	-0.014	99	41063	1.00	0.9865	
32 Dichlorofluoromethane	67	4.830	4.830	0.000	98	88299	1.00	0.9513	
33 Trichlorofluoromethane	101	4.914	4.914	0.000	99	70561	1.00	0.9659	
36 Ethyl ether	59	5.082	5.096	-0.014	93	20792	1.00	0.9663	
39 Acrolein	56	5.221	5.221	0.000	99	25428	10.0	9.91	
40 Acetone	43	5.319	5.319	0.000	99	19102	4.00	3.77	
42 1,1,2-Trichloro-1,2,2-trif	151	5.333	5.347	-0.014	97	32680	1.00	0.9845	
43 1,1-Dichloroethene	96	5.361	5.361	0.000	98	46581	1.00	1.00	
45 Iodomethane	142	5.529	5.529	0.000	99	69836	1.00	0.9737	
46 Methyl acetate	43	5.543	5.557	-0.014	95	21852	2.00	2.12	
47 3-Chloro-1-propene	41	5.599	5.612	-0.013	88	89729	1.00	1.03	
48 Carbon disulfide	76	5.626	5.626	0.000	99	207465	1.00	1.00	
49 2-Methyl-2-propanol	59	5.654	5.654	0.000	91	8512	10.0	9.76	
50 Methylene Chloride	84	5.696	5.696	0.000	94	55320	1.00	0.8916	
51 Acrylonitrile	53	5.836	5.836	0.000	98	51204	10.0	9.92	
52 Methyl tert-butyl ether	73	5.878	5.892	-0.014	96	57090	1.00	1.00	
53 trans-1,2-Dichloroethene	96	5.920	5.920	0.000	97	53301	1.00	1.02	
54 Hexane	57	6.087	6.101	-0.014	93	85907	1.00	0.9735	
55 Vinyl acetate	43	6.157	6.157	0.000	97	73369	2.00	1.95	
57 1,1-Dichloroethane	63	6.227	6.227	0.000	96	90139	1.00	0.99	
61 2-Butanone (MEK)	43	6.590	6.590	0.000	100	28429	4.00	5.12	
62 sec-Butyl Alcohol	45	6.646	6.646	0.000	95	25321	30.0	30.9	
64 cis-1,2-Dichloroethene	96	6.660	6.660	0.000	82	52624	1.00	1.00	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
65 2,2-Dichloropropane	77	6.688	6.688	0.000	88	73905	1.00	1.00	
67 Chlorobromomethane	128	6.842	6.841	0.001	93	15128	1.00	0.9708	
68 Chloroform	83	6.856	6.855	0.001	94	78819	1.00	0.99	
69 Tetrahydrofuran	42	6.883	6.883	0.000	88	11644	2.00	1.93	
70 Isobutyl alcohol	41	7.051	7.051	0.000	92	8413	25.0	25.2	
71 1,1,1-Trichloroethane	97	7.079	7.079	0.000	98	74070	1.00	0.9861	
72 Cyclohexane	56	7.163	7.163	0.000	0	103890	1.00	1.03	
73 1,1-Dichloropropene	75	7.177	7.191	-0.014	97	72878	1.00	0.99	
74 Carbon tetrachloride	117	7.233	7.232	0.001	98	61167	1.00	0.9593	
75 1,2-Dichloroethane	62	7.330	7.330	0.000	97	39492	1.00	1.01	
77 Benzene	78	7.358	7.358	0.000	96	204816	1.00	1.02	
9 n-Heptane	43	7.456	7.456	0.000	91	91370	1.00	1.01	
79 Trichloroethene	95	7.819	7.819	0.000	98	49445	1.00	0.9709	
80 2-Pentanone	43	7.847	7.847	0.000	98	35223	4.00	3.66	
82 1,2-Dichloropropane	63	8.001	8.001	0.000	95	45696	1.00	1.00	
83 Methylcyclohexane	55	8.029	8.029	0.000	0	82622	1.00	1.02	
84 1,4-Dioxane	88	8.057	8.056	0.001	81	2195	20.0	17.2	
85 Dibromomethane	93	8.099	8.098	0.000	94	14906	1.00	0.9818	
86 Dichlorobromomethane	83	8.168	8.168	0.000	99	46734	1.00	0.9665	
88 2-Chloroethyl vinyl ether	63	8.308	8.308	0.000	86	5179	1.00	1.24	
89 cis-1,3-Dichloropropene	75	8.490	8.489	0.001	96	53734	1.00	0.9798	
90 4-Methyl-2-pentanone (MIBK	43	8.545	8.545	0.000	95	47145	4.00	3.84	
91 Toluene	91	8.769	8.769	0.000	98	206925	1.00	1.01	
92 Ethyl methacrylate	69	8.853	8.853	0.000	90	22096	1.00	0.9471	
93 trans-1,3-Dichloropropene	75	8.867	8.867	0.001	97	36456	1.00	0.9301	
94 1,1,2-Trichloroethane	97	9.020	9.020	0.000	90	19857	1.00	0.9877	
95 2-Hexanone	43	9.132	9.132	0.000	95	29170	4.00	3.72	
96 1,3-Dichloropropane	76	9.160	9.160	0.000	95	38720	1.00	1.01	
97 Tetrachloroethene	164	9.202	9.202	0.000	98	37682	1.00	0.9858	
98 Chlorodibromomethane	129	9.342	9.341	0.001	90	21508	1.00	0.9423	
100 Ethylene Dibromide	107	9.467	9.467	0.000	97	17928	1.00	1.00	
101 1-Chlorohexane	91	9.705	9.704	0.001	0	72202	1.00	1.00	
102 Chlorobenzene	112	9.816	9.816	0.000	97	116700	1.00	1.02	
103 1,1,1,2-Tetrachloroethane	131	9.844	9.844	0.000	87	33337	1.00	0.9479	
104 Ethylbenzene	106	9.858	9.858	0.000	99	72676	1.00	0.9892	
105 m-Xylene & p-Xylene	106	9.928	9.928	0.000	100	89330	1.00	1.01	
109 o-Xylene	106	10.249	10.249	0.000	90	81889	1.00	1.00	
106 Styrene	104	10.249	10.249	0.000	84	112539	1.00	0.9437	
107 Bromoform	173	10.445	10.445	0.000	95	8574	1.00	0.8997	
108 Isopropylbenzene	105	10.515	10.515	0.000	96	231347	1.00	1.03	
111 Cyclohexanone	55	10.626	10.626	0.000	92	12290	40.0	35.2	
112 1,1,2,2-Tetrachloroethane	83	10.696	10.696	0.000	91	18410	1.00	0.9586	
113 trans-1,4-Dichloro-2-buten	53	10.724	10.724	0.000	71	4483	1.00	0.9650	
114 1,2,3-Trichloropropane	110	10.766	10.766	0.000	83	5241	1.00	1.03	
116 Bromobenzene	156	10.822	10.822	0.000	52	40116	1.00	0.99	
115 N-Propylbenzene	120	10.822	10.822	0.000	97	62827	1.00	0.9880	
120 1,3,5-Trimethylbenzene	105	10.934	10.934	0.000	94	187654	1.00	1.01	
117 2-Chlorotoluene	126	10.948	10.947	0.001	96	49057	1.00	0.9812	
118 4-Chlorotoluene	126	11.017	11.017	0.000	99	49802	1.00	1.01	
119 tert-Butylbenzene	119	11.227	11.227	0.000	94	184528	1.00	1.01	
121 1,2,4-Trimethylbenzene	105	11.255	11.255	0.000	97	186475	1.00	1.02	
122 sec-Butylbenzene	134	11.409	11.408	0.000	95	50686	1.00	1.02	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
123 4-Isopropyltoluene	119	11.506	11.506	0.000	97	208331	1.00	1.02	
124 1,3-Dichlorobenzene	146	11.562	11.562	0.000	97	87445	1.00	1.01	
126 1,4-Dichlorobenzene	146	11.632	11.632	0.000	94	84516	1.00	1.02	
127 n-Butylbenzene	91	11.855	11.855	0.000	98	211017	1.00	1.04	
128 1,2-Dichlorobenzene	146	11.981	11.981	0.000	96	67437	1.00	1.00	
129 1,2-Dibromo-3-Chloropropan	157	12.707	12.707	0.000	76	1673	1.00	0.9778	
130 1,2,4-Trichlorobenzene	180	13.657	13.657	0.000	94	43662	1.00	0.99	
131 Hexachlorobutadiene	225	13.825	13.825	0.000	98	36541	1.00	1.01	
132 Naphthalene	128	14.020	14.006	0.014	97	52226	1.00	0.9851	
133 1,2,3-Trichlorobenzene	180	14.327	14.327	0.000	95	32321	1.00	1.01	
S 140 1,2-Dichloroethene, Total	96				0		2.00	2.02	
S 135 1,3-Dichloropropene, Total	1				0		2.00	1.91	
S 137 Total BTEX	1				0			5.03	
S 136 1,2-Dichloroethene, Total	1				0		2.00	2.02	
S 134 Trihalomethanes, Total	1				0		4.00	3.80	
S 139 Xylenes, Total (URS)	1				0		2.00	2.01	
S 138 Xylenes, Total	106				0		2.00	2.01	

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL
MV-Main A_00037	Amount Added:	0.50	Units: uL
MV-2cleve+AVA_00037	Amount Added:	0.50	Units: uL
MV-Gas/Ket A_00076	Amount Added:	0.50	Units: uL

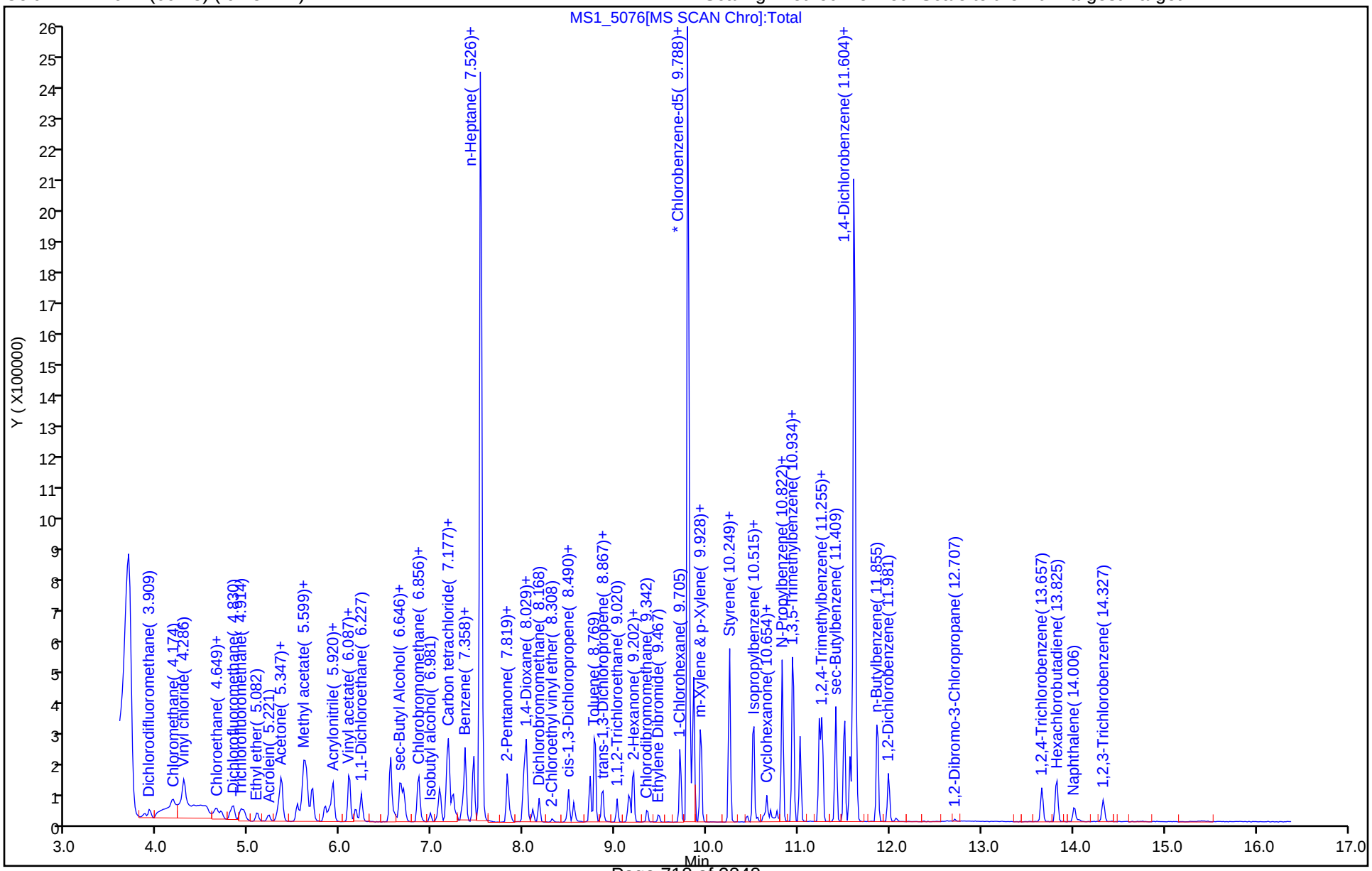
Report Date: 02-Aug-2018 13:04:52 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5076.D

Injection Date:	02-Aug-2018 09:13:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	std01			Worklist Smp#:	13
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	13
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5077.D
Lims ID: std02
Client ID:
Sample Type: IC Calib Level: 3
Inject. Date: 02-Aug-2018 09:33:30 ALS Bottle#: 14 Worklist Smp#: 14
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: std02
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist: chrom-AQ_VMS1_8260*sub66

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 02-Aug-2018 13:04:54 Calib Date: 02-Aug-2018 10:54:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5081.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0314

First Level Reviewer: wickhamt Date: 02-Aug-2018 11:37:25

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.585	5.598	-0.013	85	175228	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2129666	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	90	431963	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	586383	12.5	12.5	
24 Dichlorodifluoromethane	85	3.909	3.922	-0.013	100	77457	2.00	1.61	
26 Chloromethane	50	4.160	4.174	-0.014	99	113002	2.00	1.93	
27 Vinyl chloride	62	4.286	4.300	-0.014	92	115053	2.00	2.05	
29 Bromomethane	94	4.635	4.635	0.000	89	82533	2.00	2.01	
31 Chloroethane	64	4.691	4.705	-0.014	100	82454	2.00	2.01	
32 Dichlorofluoromethane	67	4.816	4.830	-0.014	98	193349	2.00	2.11	
33 Trichlorofluoromethane	101	4.914	4.914	0.000	100	144994	2.00	2.01	
36 Ethyl ether	59	5.082	5.096	-0.014	93	42022	2.00	1.98	
39 Acrolein	56	5.207	5.221	-0.014	99	54542	20.0	21.6	
40 Acetone	43	5.305	5.319	-0.014	100	35136	8.00	8.69	
42 1,1,2-Trichloro-1,2,2-trif	151	5.333	5.347	-0.014	96	67004	2.00	2.05	
43 1,1-Dichloroethene	96	5.347	5.361	-0.014	97	94056	2.00	2.05	
45 Iodomethane	142	5.529	5.529	0.000	99	141353	2.00	2.00	
46 Methyl acetate	43	5.543	5.557	-0.014	95	39913	4.00	3.92	
47 3-Chloro-1-propene	41	5.598	5.612	-0.014	88	175913	2.00	2.05	
48 Carbon disulfide	76	5.626	5.626	0.000	99	422013	2.00	2.06	
49 2-Methyl-2-propanol	59	5.654	5.654	0.000	92	17233	20.0	20.2	
50 Methylene Chloride	84	5.696	5.696	0.000	95	97146	2.00	1.95	
51 Acrylonitrile	53	5.822	5.836	-0.014	99	104191	20.0	20.5	
52 Methyl tert-butyl ether	73	5.878	5.892	-0.014	96	112364	2.00	2.00	
53 trans-1,2-Dichloroethene	96	5.920	5.920	0.000	98	103588	2.00	2.01	
54 Hexane	57	6.087	6.101	-0.014	93	183126	2.00	2.08	
55 Vinyl acetate	43	6.157	6.157	0.000	97	148146	4.00	4.00	
57 1,1-Dichloroethane	63	6.227	6.227	0.000	97	183375	2.00	2.05	
61 2-Butanone (MEK)	43	6.590	6.590	0.000	100	41493	8.00	7.59	M
62 sec-Butyl Alcohol	45	6.632	6.646	-0.014	95	43455	60.0	54.2	
64 cis-1,2-Dichloroethene	96	6.646	6.660	-0.014	83	106162	2.00	2.05	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
65 2,2-Dichloropropane	77	6.688	6.688	0.000	92	146736	2.00	2.02	
67 Chlorobromomethane	128	6.841	6.841	0.000	96	30721	2.00	2.00	
68 Chloroform	83	6.855	6.855	0.000	95	159333	2.00	2.04	
69 Tetrahydrofuran	42	6.883	6.883	0.000	89	19913	4.00	4.23	
70 Isobutyl alcohol	41	7.051	7.051	0.000	94	15048	50.0	46.1	
71 1,1,1-Trichloroethane	97	7.079	7.079	0.000	99	152331	2.00	2.06	
72 Cyclohexane	56	7.163	7.163	0.000	0	212024	2.00	2.13	
73 1,1-Dichloropropene	75	7.177	7.191	-0.014	98	149854	2.00	2.07	
74 Carbon tetrachloride	117	7.233	7.232	0.001	98	128677	2.00	2.05	
75 1,2-Dichloroethane	62	7.330	7.330	0.000	98	78066	2.00	2.03	
77 Benzene	78	7.358	7.358	0.000	96	416772	2.00	2.10	
9 n-Heptane	43	7.456	7.456	0.000	92	188925	2.00	2.12	
79 Trichloroethene	95	7.819	7.819	0.000	98	103252	2.00	2.06	
80 2-Pentanone	43	7.847	7.847	0.000	99	75914	8.00	8.00	
82 1,2-Dichloropropane	63	8.001	8.001	0.000	96	90254	2.00	2.01	
83 Methylcyclohexane	55	8.029	8.029	0.000	0	167587	2.00	2.11	
84 1,4-Dioxane	88	8.057	8.056	0.001	89	4025	40.0	32.0	
85 Dibromomethane	93	8.098	8.098	0.000	95	30446	2.00	2.03	
86 Dichlorobromomethane	83	8.168	8.168	0.000	99	95902	2.00	2.01	
88 2-Chloroethyl vinyl ether	63	8.308	8.308	0.000	88	11144	2.00	2.01	
89 cis-1,3-Dichloropropene	75	8.490	8.489	0.001	96	109008	2.00	1.99	
90 4-Methyl-2-pentanone (MIBK	43	8.545	8.545	0.000	95	97429	8.00	8.04	
91 Toluene	91	8.769	8.769	0.000	98	424249	2.00	2.11	
92 Ethyl methacrylate	69	8.853	8.853	0.000	89	43949	2.00	1.89	
93 trans-1,3-Dichloropropene	75	8.867	8.867	0.001	98	76214	2.00	1.97	
94 1,1,2-Trichloroethane	97	9.020	9.020	0.000	91	41015	2.00	2.07	
95 2-Hexanone	43	9.132	9.132	0.000	97	60268	8.00	7.70	
96 1,3-Dichloropropane	76	9.160	9.160	0.000	94	78479	2.00	2.05	
97 Tetrachloroethene	164	9.202	9.202	0.000	98	77313	2.00	2.03	
98 Chlorodibromomethane	129	9.341	9.341	0.000	90	44546	2.00	1.96	
100 Ethylene Dibromide	107	9.467	9.467	0.000	98	36459	2.00	2.04	
101 1-Chlorohexane	91	9.705	9.704	0.001	0	147755	2.00	2.06	
102 Chlorobenzene	112	9.816	9.816	0.000	96	236578	2.00	2.07	
103 1,1,1,2-Tetrachloroethane	131	9.844	9.844	0.000	91	68003	2.00	1.94	
104 Ethylbenzene	106	9.858	9.858	0.000	98	149473	2.00	2.04	
105 m-Xylene & p-Xylene	106	9.928	9.928	0.000	100	178662	2.00	2.02	
106 Styrene	104	10.249	10.249	0.000	85	238015	2.00	2.00	
109 o-Xylene	106	10.249	10.249	0.000	89	164944	2.00	2.01	
107 Bromoform	173	10.445	10.445	0.000	94	18925	2.00	1.88	
108 Isopropylbenzene	105	10.515	10.515	0.000	96	467529	2.00	2.11	
111 Cyclohexanone	55	10.626	10.626	0.000	93	26350	80.0	75.6	
112 1,1,2,2-Tetrachloroethane	83	10.696	10.696	0.000	93	39960	2.00	2.11	
113 trans-1,4-Dichloro-2-buten	53	10.724	10.724	0.000	82	9267	2.00	2.02	
114 1,2,3-Trichloropropane	110	10.766	10.766	0.000	81	10121	2.00	2.01	
115 N-Propylbenzene	120	10.822	10.822	0.000	98	129652	2.00	2.06	
116 Bromobenzene	156	10.822	10.822	0.000	51	81075	2.00	2.03	
120 1,3,5-Trimethylbenzene	105	10.934	10.934	0.000	94	382672	2.00	2.08	
117 2-Chlorotoluene	126	10.948	10.947	0.001	95	101132	2.00	2.05	
118 4-Chlorotoluene	126	11.017	11.017	0.000	99	99812	2.00	2.05	
119 tert-Butylbenzene	119	11.227	11.227	0.000	92	376895	2.00	2.09	
121 1,2,4-Trimethylbenzene	105	11.255	11.255	0.000	98	384319	2.00	2.12	
122 sec-Butylbenzene	134	11.408	11.408	0.000	94	102684	2.00	2.09	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
123 4-Isopropyltoluene	119	11.506	11.506	0.000	97	425447	2.00	2.11	
124 1,3-Dichlorobenzene	146	11.562	11.562	0.000	97	177625	2.00	2.07	
126 1,4-Dichlorobenzene	146	11.632	11.632	0.000	96	169505	2.00	2.07	
127 n-Butylbenzene	91	11.855	11.855	0.000	98	432266	2.00	2.15	
128 1,2-Dichlorobenzene	146	11.981	11.981	0.000	97	136872	2.00	2.06	
129 1,2-Dibromo-3-Chloropropan	157	12.707	12.707	0.000	79	4508	2.00	2.09	
130 1,2,4-Trichlorobenzene	180	13.657	13.657	0.000	94	88397	2.00	2.03	
131 Hexachlorobutadiene	225	13.825	13.825	0.000	98	74442	2.00	2.08	
132 Naphthalene	128	14.006	14.006	0.000	98	106307	2.00	2.03	
133 1,2,3-Trichlorobenzene	180	14.327	14.327	0.000	94	64531	2.00	2.05	
S 140 1,2-Dichloroethene, Total	96				0		4.00	4.06	
S 134 Trihalomethanes, Total	1				0		8.00	7.88	
S 139 Xylenes, Total (URS)	1				0		4.00	4.04	
S 138 Xylenes, Total	106				0		4.00	4.04	
S 136 1,2-Dichloroethene, Total	1				0		4.00	4.06	
S 135 1,3-Dichloropropene, Total	1				0		4.00	3.97	
S 137 Total BTEX	1				0			10.3	

QC Flag Legend

Review Flags

M - Manually Integrated

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL
MV-Main A_00037	Amount Added:	1.00	Units: uL
MV-2cleve+AVA_00037	Amount Added:	1.00	Units: uL
MV-Gas/Ket A_00076	Amount Added:	1.00	Units: uL

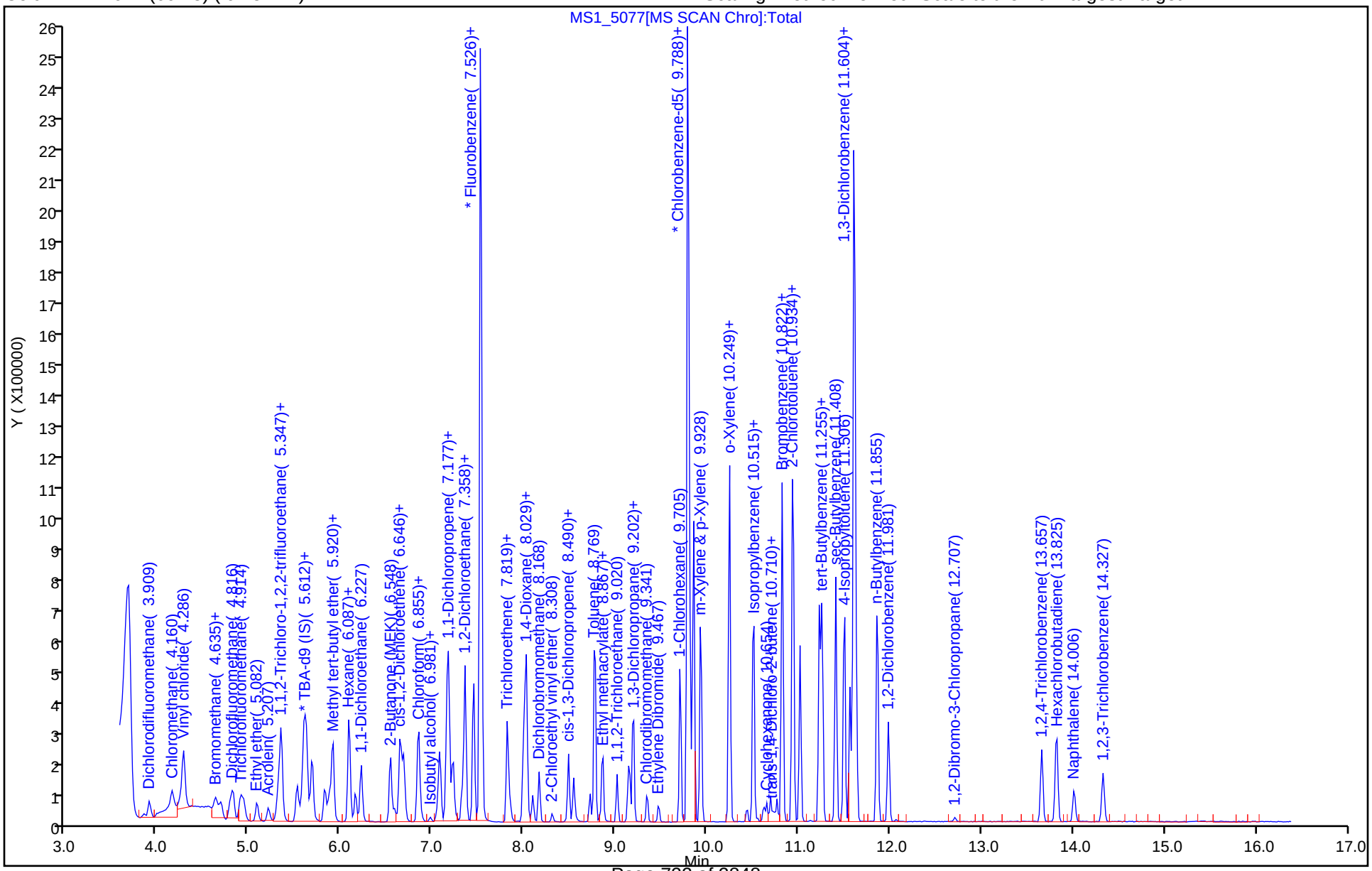
Report Date: 02-Aug-2018 13:04:55 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5077.D

Injection Date:	02-Aug-2018 09:33:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	std02			Worklist Smp#:	14
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	14
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



Manual Integration/User Assign Peak Report

TestAmerica Denver

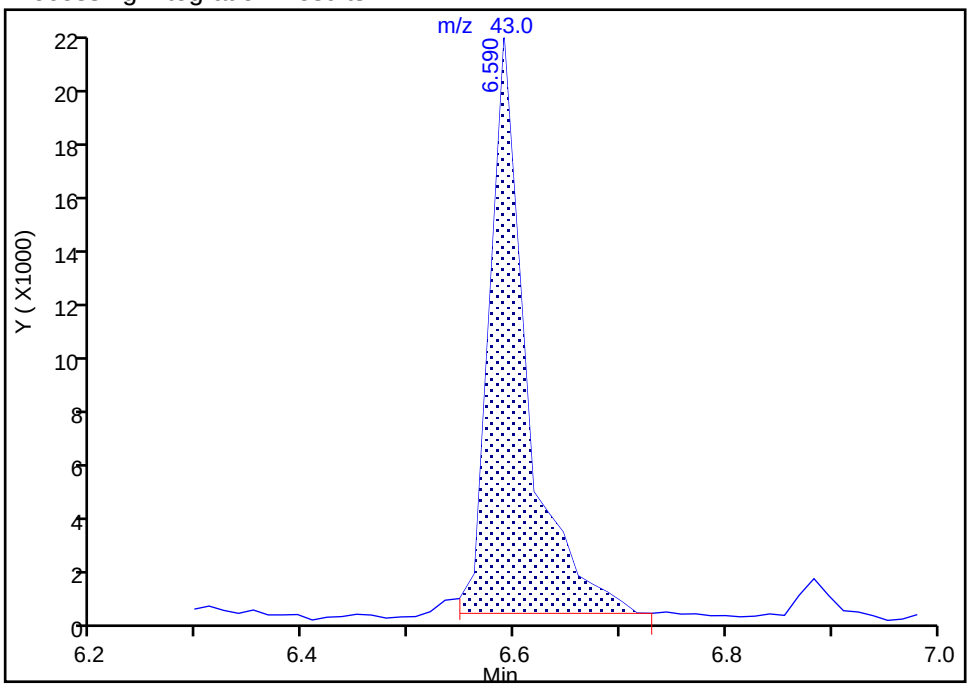
Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5077.D
Injection Date: 02-Aug-2018 09:33:30 Instrument ID: VMS_MS1
Lims ID: std02
Client ID:
Operator ID: wickhamt ALS Bottle#: 14 Worklist Smp#: 14
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Method: AQ_VMS1_8260 Limit Group: MSV - 8260B Water and Solid
Column: DB-624 (60.25) (0.25 mm) Detector MS SCAN

61 2-Butanone (MEK), CAS: 78-93-3

Signal: 1

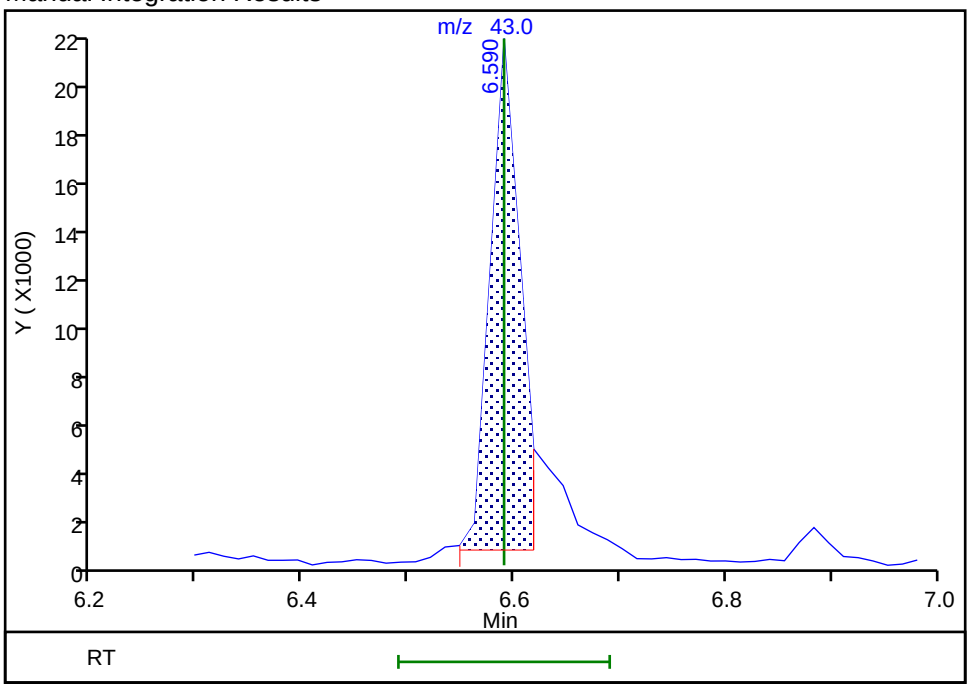
Processing Integration Results

RT: 6.59
Area: 51916
Amount: 8.706078
Amount Units: ug/l



Manual Integration Results

RT: 6.59
Area: 41493
Amount: 7.588832
Amount Units: ug/l



Reviewer: wickhamt, 02-Aug-2018 11:48:12
Audit Action: Assigned New Baseline Audit Reason: Shouldering

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5078.D
Lims ID: std05
Client ID:
Sample Type: IC Calib Level: 4
Inject. Date: 02-Aug-2018 09:53:30 ALS Bottle#: 15 Worklist Smp#: 15
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: std05
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist: chrom-AQ_VMS1_8260*sub66

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 02-Aug-2018 13:04:57 Calib Date: 02-Aug-2018 10:54:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5081.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0314

First Level Reviewer: wickhamt Date: 02-Aug-2018 11:39:16

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.584	5.598	-0.014	88	188777	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2122554	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	89	431963	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	582229	12.5	12.5	
24 Dichlorodifluoromethane	85	3.922	3.922	0.000	100	262015	5.00	5.45	
26 Chloromethane	50	4.160	4.174	-0.014	99	287230	5.00	4.92	
27 Vinyl chloride	62	4.286	4.300	-0.014	92	288301	5.00	5.14	
29 Bromomethane	94	4.635	4.635	0.000	91	212846	5.00	5.20	
31 Chloroethane	64	4.691	4.705	-0.014	100	208499	5.00	5.10	
32 Dichlorofluoromethane	67	4.830	4.830	0.000	98	460095	5.00	5.05	
33 Trichlorofluoromethane	101	4.914	4.914	0.000	99	353258	5.00	4.92	
36 Ethyl ether	59	5.096	5.096	0.000	92	109027	5.00	5.16	
39 Acrolein	56	5.221	5.221	0.000	99	128287	50.0	50.9	
40 Acetone	43	5.319	5.319	0.000	100	73297	20.0	20.3	
42 1,1,2-Trichloro-1,2,2-trif	151	5.333	5.347	-0.014	97	158047	5.00	4.85	
43 1,1-Dichloroethene	96	5.361	5.361	0.000	99	223075	5.00	4.88	
45 Iodomethane	142	5.529	5.529	0.000	99	368517	5.00	5.23	
46 Methyl acetate	43	5.543	5.557	-0.014	96	96138	10.0	9.48	
47 3-Chloro-1-propene	41	5.612	5.612	0.000	85	441817	5.00	5.17	
48 Carbon disulfide	76	5.626	5.626	0.000	99	1027781	5.00	5.04	
49 2-Methyl-2-propanol	59	5.654	5.654	0.000	92	47895	50.0	52.1	
50 Methylene Chloride	84	5.696	5.696	0.000	95	229104	5.00	5.23	
51 Acrylonitrile	53	5.836	5.836	0.000	99	261884	50.0	51.7	
52 Methyl tert-butyl ether	73	5.878	5.892	-0.014	96	289997	5.00	5.17	
53 trans-1,2-Dichloroethene	96	5.920	5.920	0.000	97	257423	5.00	5.02	
54 Hexane	57	6.087	6.101	-0.014	92	405524	5.00	4.61	
55 Vinyl acetate	43	6.157	6.157	0.000	97	383823	10.0	10.4	
57 1,1-Dichloroethane	63	6.227	6.227	0.000	96	461484	5.00	5.17	
61 2-Butanone (MEK)	43	6.590	6.590	0.000	100	100443	20.0	18.4	M
62 sec-Butyl Alcohol	45	6.646	6.646	0.000	96	123938	150.0	143.5	
64 cis-1,2-Dichloroethene	96	6.660	6.660	0.000	82	263432	5.00	5.10	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
65 2,2-Dichloropropane	77	6.688	6.688	0.000	92	355420	5.00	4.90	
67 Chlorobromomethane	128	6.841	6.841	0.000	96	78637	5.00	5.14	
68 Chloroform	83	6.855	6.855	0.000	95	401244	5.00	5.15	
69 Tetrahydrofuran	42	6.883	6.883	0.000	89	42560	10.0	10.5	
70 Isobutyl alcohol	41	7.051	7.051	0.000	94	41687	125.0	118.5	
71 1,1,1-Trichloroethane	97	7.079	7.079	0.000	98	365896	5.00	4.96	
72 Cyclohexane	56	7.163	7.163	0.000	0	466257	5.00	4.70	
73 1,1-Dichloropropene	75	7.177	7.191	-0.014	97	349914	5.00	4.85	
74 Carbon tetrachloride	117	7.232	7.232	0.000	99	299384	5.00	4.78	
75 1,2-Dichloroethane	62	7.330	7.330	0.000	97	194972	5.00	5.10	
77 Benzene	78	7.358	7.358	0.000	96	1015513	5.00	5.13	
9 n-Heptane	43	7.456	7.456	0.000	92	425559	5.00	4.79	
79 Trichloroethene	95	7.819	7.819	0.000	98	250410	5.00	5.01	
80 2-Pentanone	43	7.847	7.847	0.000	99	194363	20.0	20.6	
82 1,2-Dichloropropane	63	8.001	8.001	0.000	97	226060	5.00	5.06	
83 Methylcyclohexane	55	8.029	8.029	0.000	0	374200	5.00	4.72	
84 1,4-Dioxane	88	8.056	8.056	0.000	91	12733	100.0	101.6	
85 Dibromomethane	93	8.098	8.098	0.000	96	77167	5.00	5.17	
86 Dichlorobromomethane	83	8.168	8.168	0.000	100	239790	5.00	5.05	
88 2-Chloroethyl vinyl ether	63	8.308	8.308	0.000	91	30251	5.00	4.45	
89 cis-1,3-Dichloropropene	75	8.489	8.489	0.000	96	283019	5.00	5.17	
90 4-Methyl-2-pentanone (MIBK	43	8.545	8.545	0.000	96	253596	20.0	21.0	
91 Toluene	91	8.769	8.769	0.000	98	1020901	5.00	5.08	
92 Ethyl methacrylate	69	8.853	8.853	0.000	70	117097	5.00	5.03	
93 trans-1,3-Dichloropropene	75	8.867	8.867	0.001	97	199217	5.00	5.17	
94 1,1,2-Trichloroethane	97	9.020	9.020	0.000	92	100846	5.00	5.11	
95 2-Hexanone	43	9.132	9.132	0.000	95	162252	20.0	20.7	
96 1,3-Dichloropropane	76	9.160	9.160	0.000	96	196436	5.00	5.13	
97 Tetrachloroethene	164	9.202	9.202	0.000	98	176096	5.00	4.62	
98 Chlorodibromomethane	129	9.341	9.341	0.000	90	115760	5.00	5.08	
100 Ethylene Dibromide	107	9.467	9.467	0.000	98	91506	5.00	5.13	
101 1-Chlorohexane	91	9.704	9.704	0.000	0	326975	5.00	4.56	
102 Chlorobenzene	112	9.816	9.816	0.000	94	571821	5.00	4.99	
103 1,1,1,2-Tetrachloroethane	131	9.858	9.844	0.014	94	175726	5.00	5.01	
104 Ethylbenzene	106	9.858	9.858	0.000	98	356805	5.00	4.87	
105 m-Xylene & p-Xylene	106	9.928	9.928	0.000	100	430496	5.00	4.88	
109 o-Xylene	106	10.249	10.249	0.000	89	409924	5.00	5.01	
106 Styrene	104	10.249	10.249	0.000	86	618546	5.00	5.20	
107 Bromoform	173	10.445	10.445	0.000	96	49542	5.00	4.76	
108 Isopropylbenzene	105	10.515	10.515	0.000	96	1087749	5.00	4.93	
111 Cyclohexanone	55	10.626	10.626	0.000	92	73302	200.0	210.3	
112 1,1,2,2-Tetrachloroethane	83	10.696	10.696	0.000	94	97663	5.00	5.18	
113 trans-1,4-Dichloro-2-buten	53	10.724	10.724	0.000	86	23057	5.00	5.06	
114 1,2,3-Trichloropropane	110	10.766	10.766	0.000	87	26573	5.00	5.30	
116 Bromobenzene	156	10.822	10.822	0.000	53	201811	5.00	5.09	
115 N-Propylbenzene	120	10.822	10.822	0.000	97	296132	5.00	4.75	
120 1,3,5-Trimethylbenzene	105	10.934	10.934	0.000	94	912523	5.00	4.99	
117 2-Chlorotoluene	126	10.947	10.947	0.000	96	244211	5.00	4.98	
118 4-Chlorotoluene	126	11.017	11.017	0.000	99	237560	5.00	4.91	
119 tert-Butylbenzene	119	11.227	11.227	0.000	93	868638	5.00	4.85	
121 1,2,4-Trimethylbenzene	105	11.255	11.255	0.000	98	893281	5.00	4.97	
122 sec-Butylbenzene	134	11.408	11.408	0.000	95	228466	5.00	4.68	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
123 4-Isopropyltoluene	119	11.506	11.506	0.000	97	971889	5.00	4.85	
124 1,3-Dichlorobenzene	146	11.562	11.562	0.000	97	427610	5.00	5.01	
126 1,4-Dichlorobenzene	146	11.632	11.632	0.000	94	406037	5.00	4.99	
127 n-Butylbenzene	91	11.855	11.855	0.000	98	955019	5.00	4.79	
128 1,2-Dichlorobenzene	146	11.981	11.981	0.000	96	335681	5.00	5.09	
129 1,2-Dibromo-3-Chloropropan	157	12.707	12.707	0.000	79	11972	5.00	5.05	
130 1,2,4-Trichlorobenzene	180	13.657	13.657	0.000	94	224468	5.00	5.20	
131 Hexachlorobutadiene	225	13.825	13.825	0.000	98	167192	5.00	4.69	
132 Naphthalene	128	14.006	14.006	0.000	97	276470	5.00	5.32	
133 1,2,3-Trichlorobenzene	180	14.327	14.327	0.000	95	164057	5.00	5.24	
S 140 1,2-Dichloroethene, Total	96				0		10.0	10.1	
S 135 1,3-Dichloropropene, Total	1				0		10.0	10.3	
S 137 Total BTEX	1				0			25.0	
S 136 1,2-Dichloroethene, Total	1				0		10.0	10.1	
S 134 Trihalomethanes, Total	1				0		20.0	20.0	
S 139 Xylenes, Total (URS)	1				0		10.0	9.89	
S 138 Xylenes, Total	106				0		10.0	9.89	

QC Flag Legend

Review Flags

M - Manually Integrated

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL
MV-Main A_00037	Amount Added:	2.50	Units: uL
MV-2cleve+AVA_00037	Amount Added:	2.50	Units: uL
MV-Gas/Ket A_00076	Amount Added:	2.50	Units: uL

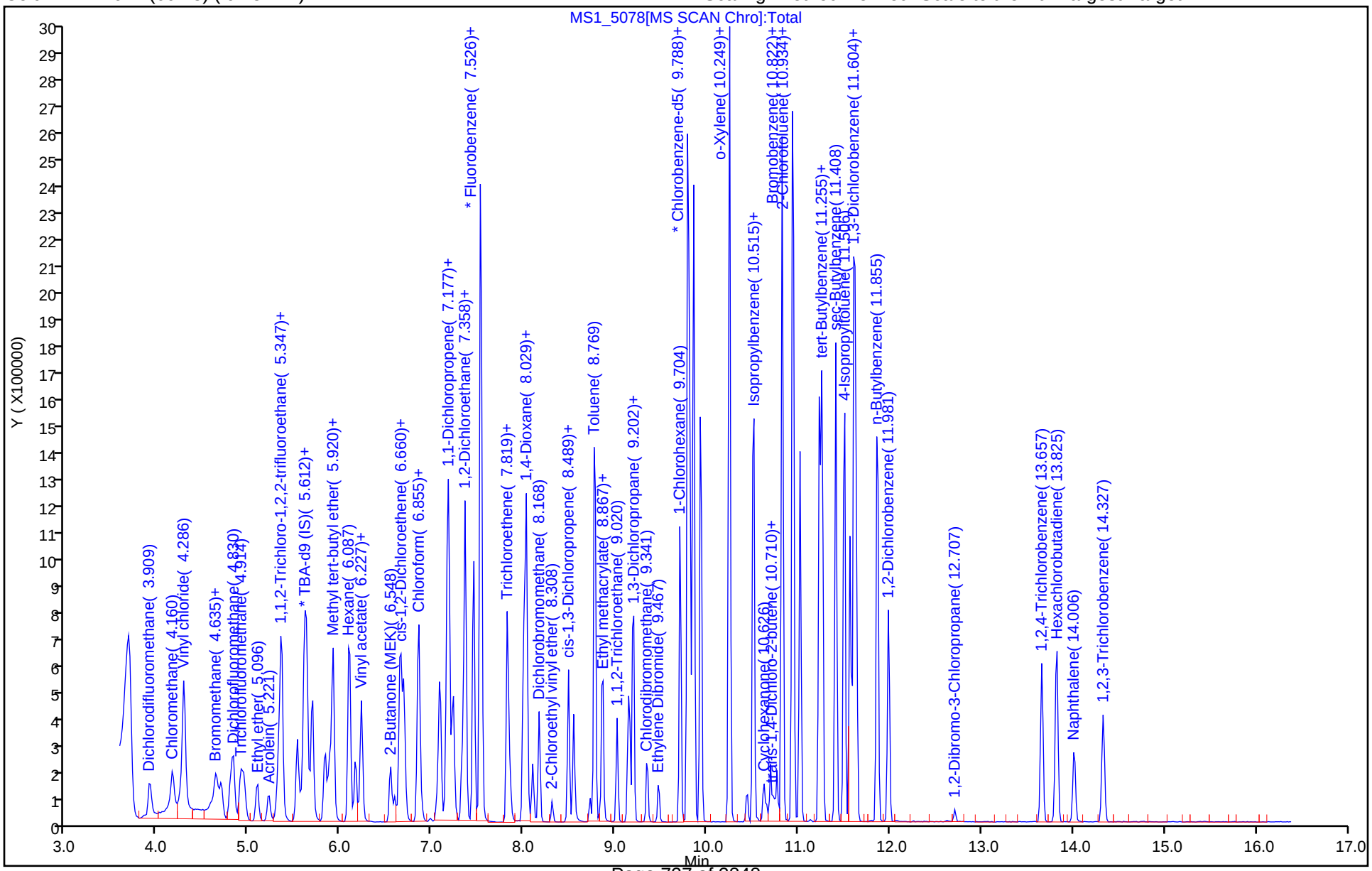
Report Date: 02-Aug-2018 13:04:58 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5078.D

Injection Date:	02-Aug-2018 09:53:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	std05			Worklist Smp#:	15
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	15
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



Manual Integration/User Assign Peak Report

TestAmerica Denver

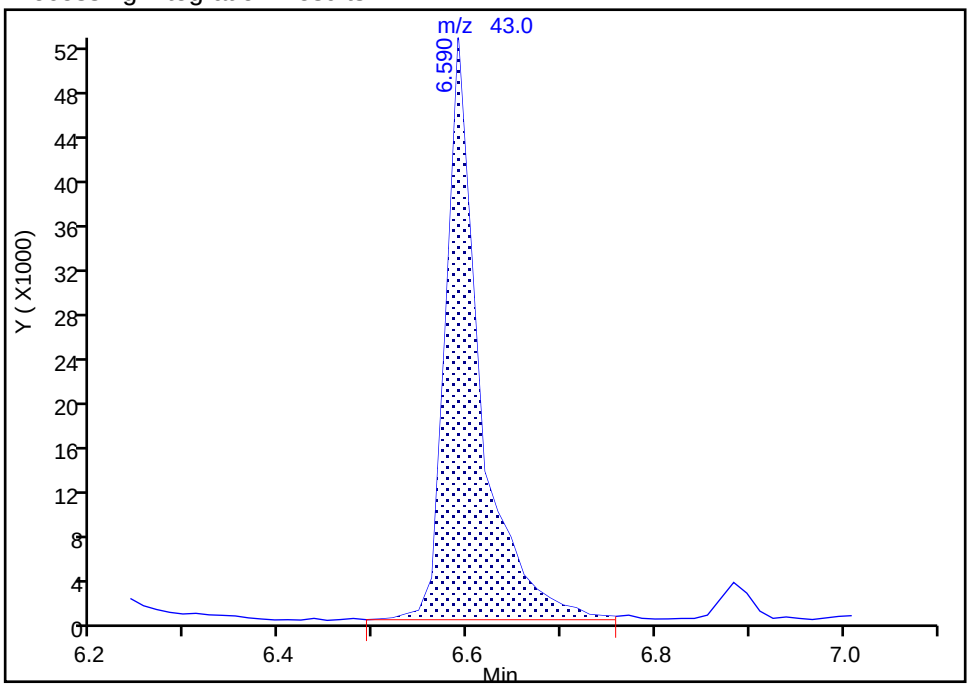
Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5078.D
Injection Date: 02-Aug-2018 09:53:30 Instrument ID: VMS_MS1
Lims ID: std05
Client ID:
Operator ID: wickhamt ALS Bottle#: 15 Worklist Smp#: 15
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Method: AQ_VMS1_8260 Limit Group: MSV - 8260B Water and Solid
Column: DB-624 (60.25) (0.25 mm) Detector MS SCAN

61 2-Butanone (MEK), CAS: 78-93-3

Signal: 1

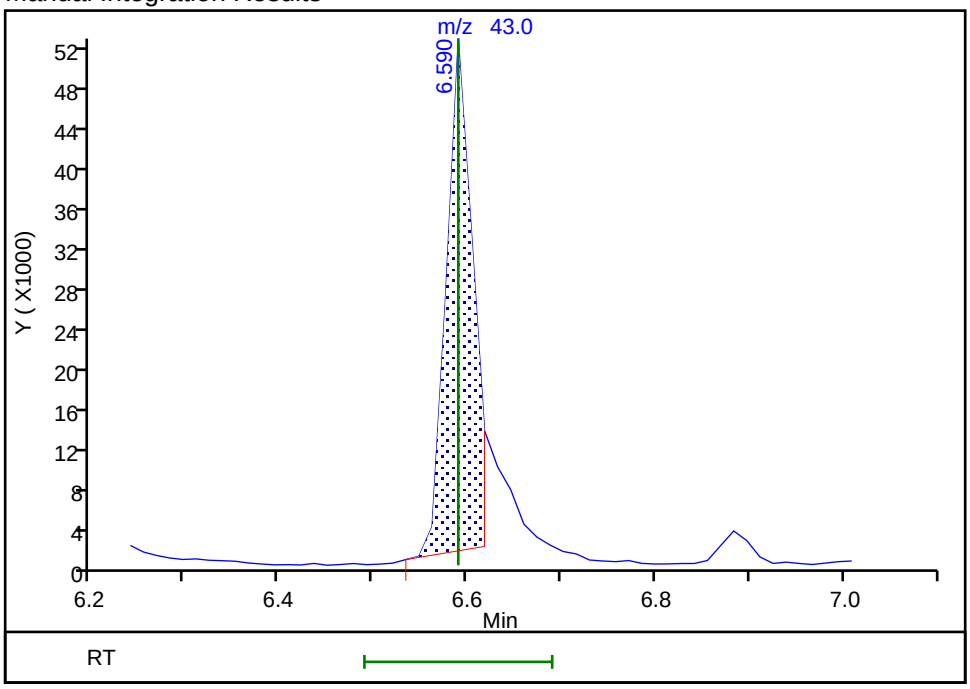
Processing Integration Results

RT: 6.59
Area: 131560
Amount: 23.156389
Amount Units: ug/l



Manual Integration Results

RT: 6.59
Area: 100443
Amount: 18.432002
Amount Units: ug/l



Reviewer: wickhamt, 02-Aug-2018 11:47:46
Audit Action: Assigned New Baseline Audit Reason: Shouldering

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5079.D
Lims ID: std10
Client ID:
Sample Type: IC Calib Level: 5
Inject. Date: 02-Aug-2018 10:14:30 ALS Bottle#: 16 Worklist Smp#: 16
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: std10
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist: chrom-AQ_VMS1_8260*sub66

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 02-Aug-2018 13:05:00 Calib Date: 02-Aug-2018 10:54:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5081.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0314

First Level Reviewer: wickhamt Date: 02-Aug-2018 11:33:36

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.598	5.598	0.000	87	189941	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2189799	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	92	441437	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	606950	12.5	12.5	
24 Dichlorodifluoromethane	85	3.922	3.922	0.000	100	564155	10.0	11.4	
26 Chloromethane	50	4.174	4.174	0.000	99	588713	10.0	9.77	
27 Vinyl chloride	62	4.300	4.300	0.000	97	605543	10.0	10.5	
29 Bromomethane	94	4.635	4.635	0.000	91	432819	10.0	10.2	
31 Chloroethane	64	4.705	4.705	0.000	100	428415	10.0	10.2	
32 Dichlorofluoromethane	67	4.830	4.830	0.000	98	956401	10.0	10.2	
33 Trichlorofluoromethane	101	4.914	4.914	0.000	99	762226	10.0	10.3	
36 Ethyl ether	59	5.096	5.096	0.000	92	223449	10.0	10.2	
39 Acrolein	56	5.221	5.221	0.000	100	261551	100.0	100.5	
40 Acetone	43	5.319	5.319	0.000	100	142461	40.0	39.9	
42 1,1,2-Trichloro-1,2,2-trif	151	5.347	5.347	0.000	96	360256	10.0	10.7	
43 1,1-Dichloroethene	96	5.361	5.361	0.000	98	487569	10.0	10.3	
45 Iodomethane	142	5.529	5.529	0.000	99	755810	10.0	10.4	
46 Methyl acetate	43	5.557	5.557	0.000	97	198097	20.0	18.9	
47 3-Chloro-1-propene	41	5.612	5.612	0.000	87	909580	10.0	10.3	
48 Carbon disulfide	76	5.626	5.626	0.000	99	2185345	10.0	10.4	
49 2-Methyl-2-propanol	59	5.654	5.654	0.000	93	95029	100.0	102.7	
50 Methylene Chloride	84	5.696	5.696	0.000	94	453852	10.0	10.5	
51 Acrylonitrile	53	5.836	5.836	0.000	99	534223	100.0	102.1	
52 Methyl tert-butyl ether	73	5.892	5.892	0.000	96	586404	10.0	10.1	
53 trans-1,2-Dichloroethene	96	5.920	5.920	0.000	98	539385	10.0	10.2	
54 Hexane	57	6.101	6.101	0.000	91	933281	10.0	10.4	
55 Vinyl acetate	43	6.157	6.157	0.000	97	807364	20.0	21.2	
57 1,1-Dichloroethane	63	6.227	6.227	0.000	97	955292	10.0	10.4	
61 2-Butanone (MEK)	43	6.590	6.590	0.000	100	208155	40.0	37.0	M
62 sec-Butyl Alcohol	45	6.646	6.646	0.000	94	260819	300.0	300.2	
64 cis-1,2-Dichloroethene	96	6.660	6.660	0.000	82	541403	10.0	10.2	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
65 2,2-Dichloropropane	77	6.688	6.688	0.000	91	761324	10.0	10.2	
67 Chlorobromomethane	128	6.841	6.841	0.000	92	161964	10.0	10.3	
68 Chloroform	83	6.855	6.855	0.000	95	827738	10.0	10.3	
69 Tetrahydrofuran	42	6.883	6.883	0.000	90	79975	20.0	20.0	
70 Isobutyl alcohol	41	7.051	7.051	0.000	95	83466	250.0	235.9	
71 1,1,1-Trichloroethane	97	7.079	7.079	0.000	98	792643	10.0	10.4	
72 Cyclohexane	56	7.163	7.163	0.000	0	1073292	10.0	10.5	
73 1,1-Dichloropropene	75	7.191	7.191	0.000	98	774076	10.0	10.4	
74 Carbon tetrachloride	117	7.232	7.232	0.000	99	665835	10.0	10.3	
75 1,2-Dichloroethane	62	7.330	7.330	0.000	98	400706	10.0	10.2	
77 Benzene	78	7.358	7.358	0.000	96	2105308	10.0	10.3	
9 n-Heptane	43	7.456	7.456	0.000	92	951643	10.0	10.4	
79 Trichloroethene	95	7.819	7.819	0.000	98	534671	10.0	10.4	
80 2-Pentanone	43	7.847	7.847	0.000	99	407613	40.0	41.8	
82 1,2-Dichloropropane	63	8.001	8.001	0.000	97	468579	10.0	10.2	
83 Methylcyclohexane	55	8.029	8.029	0.000	0	852769	10.0	10.4	
84 1,4-Dioxane	88	8.056	8.056	0.000	90	29075	200.0	224.9	
85 Dibromomethane	93	8.098	8.098	0.000	95	155855	10.0	10.1	
86 Dichlorobromomethane	83	8.168	8.168	0.000	100	502920	10.0	10.3	
88 2-Chloroethyl vinyl ether	63	8.308	8.308	0.000	91	65666	10.0	8.71	
89 cis-1,3-Dichloropropene	75	8.489	8.489	0.000	96	584896	10.0	10.5	
90 4-Methyl-2-pentanone (MIBK	43	8.545	8.545	0.000	96	528863	40.0	42.5	
91 Toluene	91	8.769	8.769	0.000	98	2119622	10.0	10.2	
92 Ethyl methacrylate	69	8.853	8.853	0.000	89	243658	10.0	10.2	
93 trans-1,3-Dichloropropene	75	8.867	8.867	0.000	98	421536	10.0	10.6	
94 1,1,2-Trichloroethane	97	9.020	9.020	0.000	92	207294	10.0	10.2	
95 2-Hexanone	43	9.132	9.132	0.000	96	341167	40.0	42.7	
96 1,3-Dichloropropane	76	9.160	9.160	0.000	96	397780	10.0	10.2	
97 Tetrachloroethene	164	9.202	9.202	0.000	98	407265	10.0	10.4	
98 Chlorodibromomethane	129	9.341	9.341	0.000	90	242209	10.0	10.4	
100 Ethylene Dibromide	107	9.467	9.467	0.000	98	190306	10.0	10.4	
101 1-Chlorohexane	91	9.704	9.704	0.000	0	767322	10.0	10.5	
102 Chlorobenzene	112	9.816	9.816	0.000	95	1198370	10.0	10.2	
103 1,1,1,2-Tetrachloroethane	131	9.844	9.844	0.000	94	371334	10.0	10.4	
104 Ethylbenzene	106	9.858	9.858	0.000	98	769867	10.0	10.3	
105 m-Xylene & p-Xylene	106	9.928	9.928	0.000	100	925395	10.0	10.3	
106 Styrene	104	10.249	10.249	0.000	86	1301023	10.0	10.7	
109 o-Xylene	106	10.249	10.249	0.000	89	867725	10.0	10.4	
107 Bromoform	173	10.445	10.445	0.000	98	109895	10.0	10.2	
108 Isopropylbenzene	105	10.515	10.515	0.000	96	2382186	10.0	10.4	
111 Cyclohexanone	55	10.626	10.626	0.000	92	153088	400.0	429.9	
112 1,1,2,2-Tetrachloroethane	83	10.696	10.696	0.000	95	200198	10.0	10.2	
113 trans-1,4-Dichloro-2-buten	53	10.724	10.724	0.000	93	48429	10.0	10.2	
114 1,2,3-Trichloropropane	110	10.766	10.766	0.000	86	53523	10.0	10.2	
115 N-Propylbenzene	120	10.822	10.822	0.000	98	668508	10.0	10.3	
116 Bromobenzene	156	10.822	10.822	0.000	97	424825	10.0	10.3	
120 1,3,5-Trimethylbenzene	105	10.934	10.934	0.000	94	1966980	10.0	10.3	
117 2-Chlorotoluene	126	10.947	10.947	0.000	96	527365	10.0	10.3	
118 4-Chlorotoluene	126	11.017	11.017	0.000	98	512020	10.0	10.1	
119 tert-Butylbenzene	119	11.227	11.227	0.000	92	1936218	10.0	10.4	
121 1,2,4-Trimethylbenzene	105	11.255	11.255	0.000	98	1915213	10.0	10.2	
122 sec-Butylbenzene	134	11.408	11.408	0.000	94	527982	10.0	10.4	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
123 4-Isopropyltoluene	119	11.506	11.506	0.000	97	2175391	10.0	10.4	
124 1,3-Dichlorobenzene	146	11.562	11.562	0.000	97	911595	10.0	10.2	
126 1,4-Dichlorobenzene	146	11.632	11.632	0.000	95	861432	10.0	10.2	
127 n-Butylbenzene	91	11.855	11.855	0.000	98	2172024	10.0	10.4	
128 1,2-Dichlorobenzene	146	11.981	11.981	0.000	97	703378	10.0	10.2	
129 1,2-Dibromo-3-Chloropropan	157	12.707	12.707	0.000	81	25148	10.0	9.83	
130 1,2,4-Trichlorobenzene	180	13.657	13.657	0.000	94	463813	10.0	10.3	
131 Hexachlorobutadiene	225	13.825	13.825	0.000	98	381635	10.0	10.3	
132 Naphthalene	128	14.006	14.006	0.000	97	572176	10.0	10.6	
133 1,2,3-Trichlorobenzene	180	14.327	14.327	0.000	95	340129	10.0	10.4	
S 140 1,2-Dichloroethene, Total	96				0		20.0	20.4	
S 134 Trihalomethanes, Total	1				0		40.0	41.2	
S 139 Xylenes, Total (URS)	1				0		20.0	20.6	
S 138 Xylenes, Total	106				0		20.0	20.6	
S 136 1,2-Dichloroethene, Total	1				0		20.0	20.4	
S 135 1,3-Dichloropropene, Total	1				0		20.0	21.1	
S 137 Total BTEX	1				0			51.4	

QC Flag Legend

Review Flags

M - Manually Integrated

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL
MV-Main A_00037	Amount Added:	5.00	Units: uL
MV-2cleve+AVA_00037	Amount Added:	5.00	Units: uL
MV-Gas/Ket A_00076	Amount Added:	5.00	Units: uL

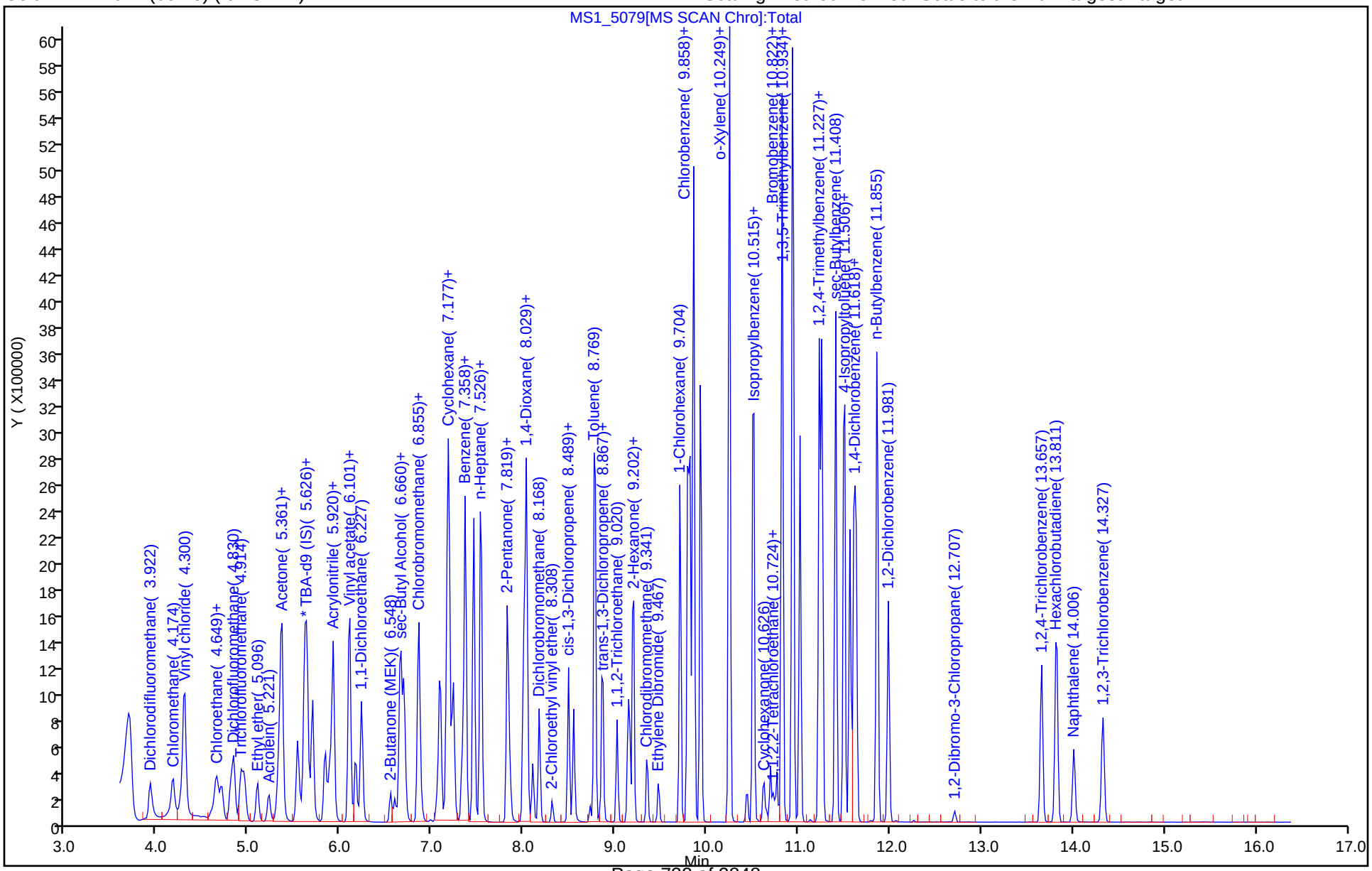
Report Date: 02-Aug-2018 13:05:01 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5079.D

Injection Date:	02-Aug-2018 10:14:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	std10			Worklist Smp#:	16
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	16
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



Manual Integration/User Assign Peak Report

TestAmerica Denver

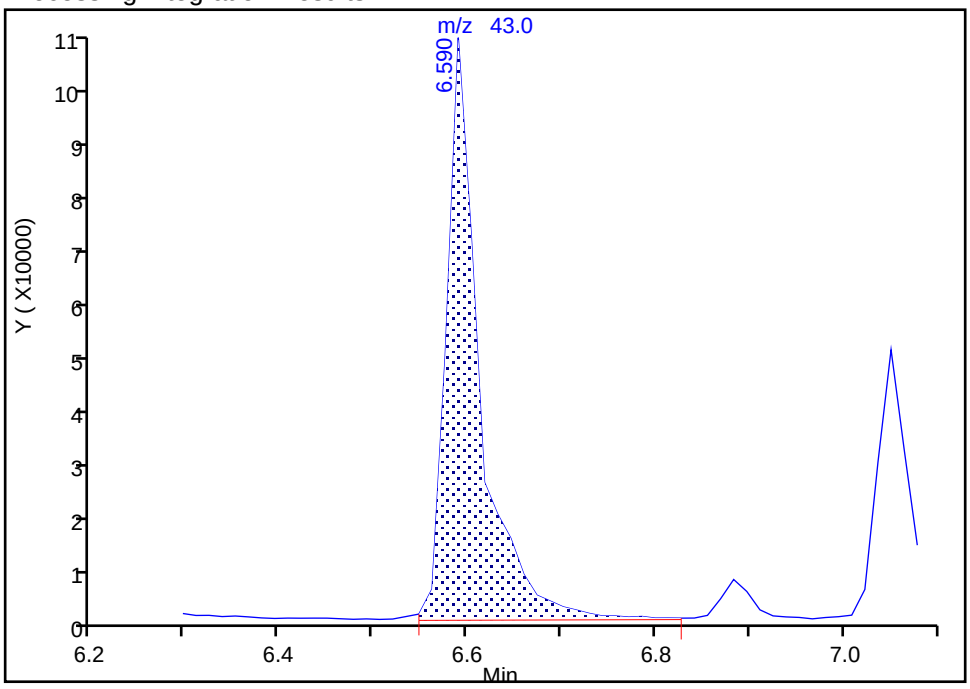
Data File:	\\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5079.D				
Injection Date:	02-Aug-2018 10:14:30	Instrument ID:	VMS_MS1		
Lims ID:	std10				
Client ID:					
Operator ID:	wickhamt	ALS Bottle#:	16	Worklist Smp#:	16
Purge Vol:	20.000 mL	Dil. Factor:	1.0000		
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		
Column:	DB-624 (60.25) (0.25 mm)	Detector	MS SCAN		

61 2-Butanone (MEK), CAS: 78-93-3

Signal: 1

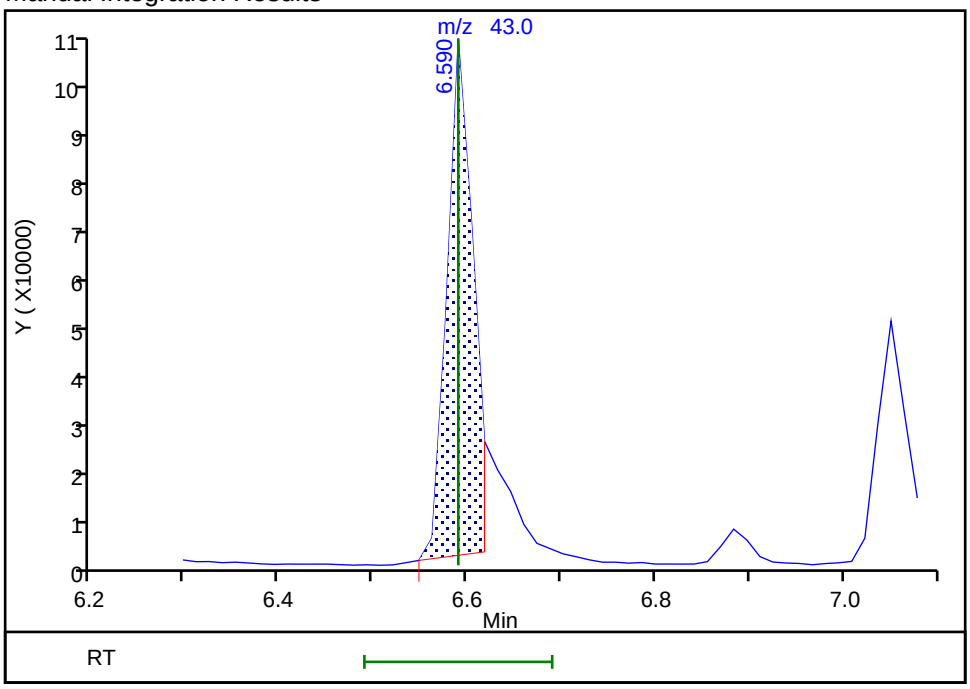
Processing Integration Results

RT: 6.59
Area: 268882
Amount: 44.826127
Amount Units: ug/l



Manual Integration Results

RT: 6.59
Area: 208155
Amount: 37.024924
Amount Units: ug/l



Reviewer: wickhamt, 02-Aug-2018 11:47:00
Audit Action: Assigned New Baseline Audit Reason: Shouldering

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5080.D
Lims ID: std30
Client ID:
Sample Type: IC Calib Level: 6
Inject. Date: 02-Aug-2018 10:34:30 ALS Bottle#: 17 Worklist Smp#: 17
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: std30
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist: chrom-AQ_VMS1_8260*sub66

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 02-Aug-2018 13:05:03 Calib Date: 02-Aug-2018 10:54:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5081.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0314

First Level Reviewer: wickhamt Date: 02-Aug-2018 11:40:43

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.584	5.598	-0.014	90	184853	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2162852	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	91	438061	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	97	614964	12.5	12.5	
24 Dichlorodifluoromethane	85	3.923	3.922	0.000	100	1607609	30.0	32.8	
26 Chloromethane	50	4.160	4.174	-0.014	99	1649433	30.0	27.7	
27 Vinyl chloride	62	4.286	4.300	-0.014	98	1663573	30.0	29.1	
29 Bromomethane	94	4.635	4.635	0.000	90	1263233	30.0	30.3	
31 Chloroethane	64	4.691	4.705	-0.014	100	1215873	30.0	29.2	
32 Dichlorofluoromethane	67	4.830	4.830	0.000	98	2702237	30.0	29.1	
33 Trichlorofluoromethane	101	4.914	4.914	0.000	99	2181784	30.0	29.8	
36 Ethyl ether	59	5.096	5.096	0.000	91	589044	30.0	27.3	
39 Acrolein	56	5.207	5.221	-0.014	100	754395	300.0	293.6	
40 Acetone	43	5.319	5.319	0.000	100	401189	120.0	117.3	
42 1,1,2-Trichloro-1,2,2-trif	151	5.347	5.347	0.000	96	943667	30.0	28.4	
43 1,1-Dichloroethene	96	5.361	5.361	0.000	99	1279482	30.0	27.5	
45 Iodomethane	142	5.529	5.529	0.000	99	2016771	30.0	28.1	
46 Methyl acetate	43	5.543	5.557	-0.014	97	526019	60.0	50.9	
47 3-Chloro-1-propene	41	5.612	5.612	0.000	88	2361056	30.0	27.1	
48 Carbon disulfide	76	5.626	5.626	0.000	99	5666306	30.0	27.3	
49 2-Methyl-2-propanol	59	5.654	5.654	0.000	94	262033	300.0	291.1	
50 Methylene Chloride	84	5.696	5.696	0.000	94	1184219	30.0	28.4	
51 Acrylonitrile	53	5.822	5.836	-0.014	99	1427463	300.0	276.3	
52 Methyl tert-butyl ether	73	5.878	5.892	-0.014	95	1594990	30.0	27.9	
53 trans-1,2-Dichloroethene	96	5.920	5.920	0.000	98	1426670	30.0	27.3	
54 Hexane	57	6.101	6.101	0.000	90	2356635	30.0	26.4	
55 Vinyl acetate	43	6.157	6.157	0.000	97	2254728	60.0	60.0	
57 1,1-Dichloroethane	63	6.227	6.227	0.000	96	2485350	30.0	27.3	
61 2-Butanone (MEK)	43	6.590	6.590	0.000	100	640657	120.0	115.4	M
62 sec-Butyl Alcohol	45	6.632	6.646	-0.014	97	736148	900.0	870.7	
64 cis-1,2-Dichloroethene	96	6.660	6.660	0.000	81	1443283	30.0	27.4	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
65 2,2-Dichloropropane	77	6.688	6.688	0.000	91	2035165	30.0	27.5	
67 Chlorobromomethane	128	6.841	6.841	0.000	93	437412	30.0	28.0	
68 Chloroform	83	6.855	6.855	0.000	95	2186138	30.0	27.5	
69 Tetrahydrofuran	42	6.883	6.883	0.000	89	207066	60.0	54.4	
70 Isobutyl alcohol	41	7.051	7.051	0.000	95	232449	750.0	675.0	
71 1,1,1-Trichloroethane	97	7.079	7.079	0.000	98	2094001	30.0	27.9	
72 Cyclohexane	56	7.163	7.163	0.000	0	2754325	30.0	27.3	
73 1,1-Dichloropropene	75	7.177	7.191	-0.014	98	2035350	30.0	27.7	
74 Carbon tetrachloride	117	7.232	7.232	0.000	99	1782446	30.0	27.9	
75 1,2-Dichloroethane	62	7.330	7.330	0.000	97	1069725	30.0	27.4	
77 Benzene	78	7.358	7.358	0.000	97	5467947	30.0	27.1	
9 n-Heptane	43	7.456	7.456	0.000	91	2421389	30.0	26.7	
79 Trichloroethene	95	7.819	7.819	0.000	99	1414865	30.0	27.8	
80 2-Pentanone	43	7.847	7.847	0.000	99	1107233	120.0	114.9	
82 1,2-Dichloropropane	63	8.001	8.001	0.000	98	1246070	30.0	27.4	
83 Methylcyclohexane	55	8.029	8.029	0.000	0	2204443	30.0	27.3	
84 1,4-Dioxane	88	8.057	8.056	0.000	91	78499	600.0	614.8	
85 Dibromomethane	93	8.098	8.098	0.000	96	420276	30.0	27.7	
86 Dichlorobromomethane	83	8.168	8.168	0.000	100	1365855	30.0	28.2	
88 2-Chloroethyl vinyl ether	63	8.308	8.308	0.000	91	219639	30.0	28.1	
89 cis-1,3-Dichloropropene	75	8.489	8.489	0.000	97	1595241	30.0	28.7	
90 4-Methyl-2-pentanone (MIBK	43	8.545	8.545	0.000	96	1528689	120.0	124.3	
91 Toluene	91	8.769	8.769	0.000	99	5524520	30.0	27.0	
92 Ethyl methacrylate	69	8.853	8.853	0.000	89	665198	30.0	28.2	
93 trans-1,3-Dichloropropene	75	8.867	8.867	0.001	97	1162612	30.0	29.6	
94 1,1,2-Trichloroethane	97	9.020	9.020	0.000	91	559577	30.0	27.8	
95 2-Hexanone	43	9.132	9.132	0.000	96	984750	120.0	124.1	
96 1,3-Dichloropropane	76	9.160	9.160	0.000	95	1080009	30.0	27.8	
97 Tetrachloroethene	164	9.202	9.202	0.000	98	1088504	30.0	28.1	
98 Chlorodibromomethane	129	9.341	9.341	0.000	90	687122	30.0	29.8	
100 Ethylene Dibromide	107	9.467	9.467	0.000	98	514796	30.0	28.4	
101 1-Chlorohexane	91	9.705	9.704	0.001	0	2031866	30.0	27.9	
102 Chlorobenzene	112	9.816	9.816	0.000	94	3231093	30.0	27.8	
103 1,1,1,2-Tetrachloroethane	131	9.844	9.844	0.000	94	1049644	30.0	29.5	
104 Ethylbenzene	106	9.858	9.858	0.000	98	2124084	30.0	28.6	
105 m-Xylene & p-Xylene	106	9.928	9.928	0.000	100	2508264	30.0	28.0	
109 o-Xylene	106	10.249	10.249	0.000	88	2392581	30.0	28.8	
106 Styrene	104	10.249	10.249	0.000	87	3619275	30.0	30.0	
107 Bromoform	173	10.445	10.445	0.000	98	319845	30.0	29.8	
108 Isopropylbenzene	105	10.515	10.515	0.000	96	6327757	30.0	27.2	
111 Cyclohexanone	55	10.612	10.626	-0.014	94	476407	1200.0	1348.0	
112 1,1,2,2-Tetrachloroethane	83	10.696	10.696	0.000	95	544180	30.0	27.3	
113 trans-1,4-Dichloro-2-buten	53	10.724	10.724	0.000	96	140039	30.0	29.1	
114 1,2,3-Trichloropropane	110	10.766	10.766	0.000	86	146713	30.0	27.7	
116 Bromobenzene	156	10.822	10.822	0.000	97	1191870	30.0	28.5	
115 N-Propylbenzene	120	10.822	10.822	0.000	98	1850570	30.0	28.1	
120 1,3,5-Trimethylbenzene	105	10.934	10.934	0.000	95	5423026	30.0	28.1	
117 2-Chlorotoluene	126	10.948	10.947	0.001	96	1477889	30.0	28.5	
118 4-Chlorotoluene	126	11.017	11.017	0.000	98	1440429	30.0	28.2	
119 tert-Butylbenzene	119	11.227	11.227	0.000	92	5273697	30.0	27.9	
121 1,2,4-Trimethylbenzene	105	11.255	11.255	0.000	98	5229068	30.0	27.5	
122 sec-Butylbenzene	134	11.408	11.408	0.000	95	1475759	30.0	28.6	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
123 4-Isopropyltoluene	119	11.506	11.506	0.000	96	5894557	30.0	27.9	
124 1,3-Dichlorobenzene	146	11.562	11.562	0.000	97	2518936	30.0	28.0	
126 1,4-Dichlorobenzene	146	11.632	11.632	0.000	94	2383941	30.0	27.7	
127 n-Butylbenzene	91	11.855	11.855	0.000	98	5887503	30.0	27.9	
128 1,2-Dichlorobenzene	146	11.981	11.981	0.000	97	1941765	30.0	27.9	
129 1,2-Dibromo-3-Chloropropan	157	12.707	12.707	0.000	82	73435	30.0	27.7	
130 1,2,4-Trichlorobenzene	180	13.657	13.657	0.000	94	1303964	30.0	28.6	
131 Hexachlorobutadiene	225	13.825	13.825	0.000	98	1091279	30.0	29.0	
132 Naphthalene	128	14.006	14.006	0.000	97	1570155	30.0	28.6	
133 1,2,3-Trichlorobenzene	180	14.327	14.327	0.000	95	943710	30.0	28.5	
S 140 1,2-Dichloroethene, Total	96				0		60.0	54.7	
S 135 1,3-Dichloropropene, Total	1				0		60.0	58.4	
S 137 Total BTEX	1				0			139.5	
S 136 1,2-Dichloroethene, Total	1				0		60.0	54.7	
S 134 Trihalomethanes, Total	1				0		120.0	115.3	
S 139 Xylenes, Total (URS)	1				0		60.0	56.8	
S 138 Xylenes, Total	106				0		60.0	56.8	

QC Flag Legend

Review Flags

M - Manually Integrated

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL
MV-Main A_00037	Amount Added:	15.00	Units: uL
MV-2cleve+AVA_00037	Amount Added:	15.00	Units: uL
MV-Gas/Ket A_00076	Amount Added:	15.00	Units: uL

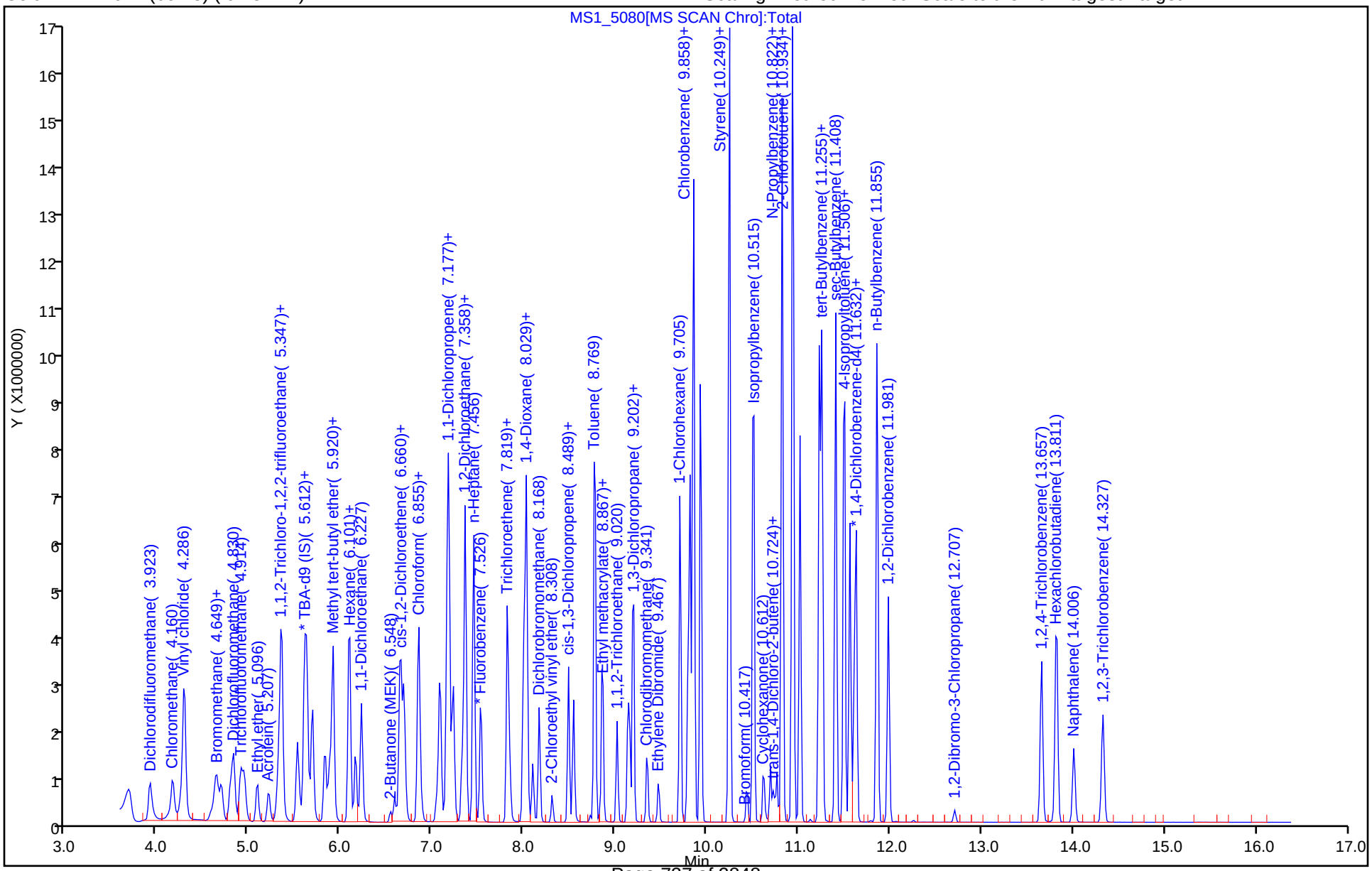
Report Date: 02-Aug-2018 13:05:04 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5080.D

Injection Date:	02-Aug-2018 10:34:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	std30			Worklist Smp#:	17
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	17
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



Manual Integration/User Assign Peak Report

TestAmerica Denver

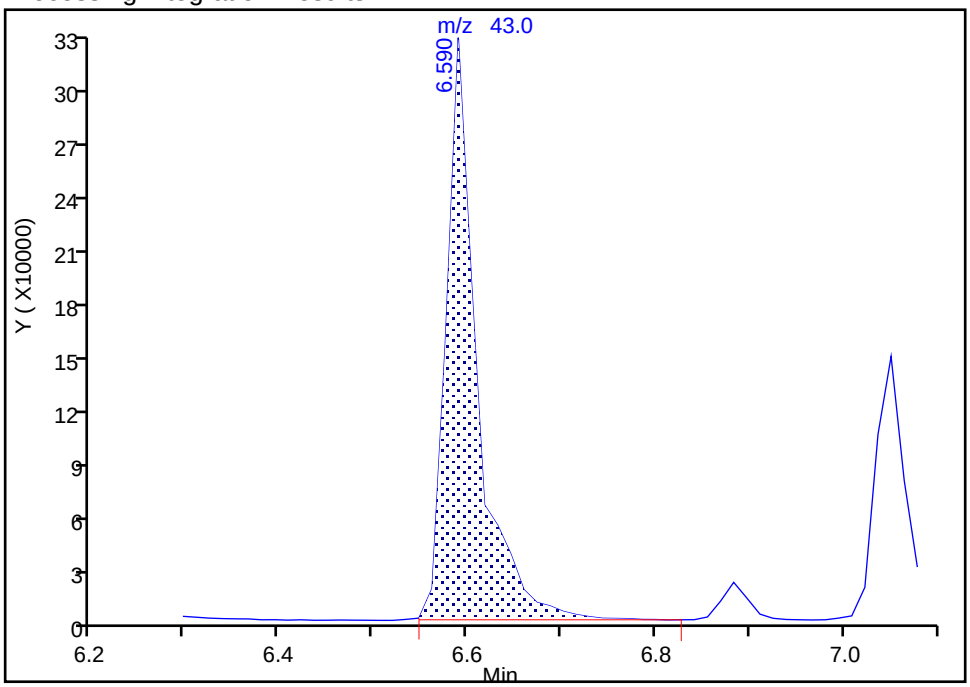
Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5080.D
Injection Date: 02-Aug-2018 10:34:30 Instrument ID: VMS_MS1
Lims ID: std30
Client ID:
Operator ID: wickhamt ALS Bottle#: 17 Worklist Smp#: 17
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Method: AQ_VMS1_8260 Limit Group: MSV - 8260B Water and Solid
Column: DB-624 (60.25) (0.25 mm) Detector MS SCAN

61 2-Butanone (MEK), CAS: 78-93-3

Signal: 1

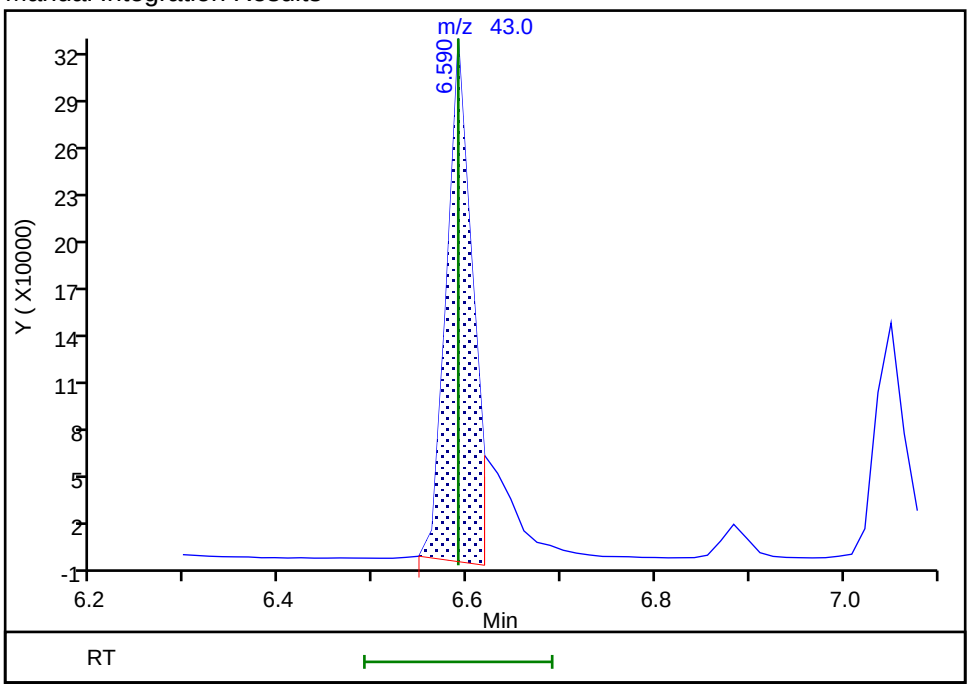
Processing Integration Results

RT: 6.59
Area: 745302
Amount: 124.1607
Amount Units: ug/l



Manual Integration Results

RT: 6.59
Area: 640657
Amount: 115.3746
Amount Units: ug/l



Reviewer: wickhamt, 02-Aug-2018 11:46:19
Audit Action: Assigned New Baseline Audit Reason: Shouldering

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5081.D
Lims ID: std60
Client ID:
Sample Type: IC Calib Level: 7
Inject. Date: 02-Aug-2018 10:54:30 ALS Bottle#: 18 Worklist Smp#: 18
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: std60
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist: chrom-AQ_VMS1_8260*sub66

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 02-Aug-2018 13:05:05 Calib Date: 02-Aug-2018 10:54:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5081.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0314

First Level Reviewer: wickhamt Date: 02-Aug-2018 11:43:48

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.585	5.598	-0.013	86	191906	250.0	250.0	a
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2198213	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	90	449059	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.618	11.604	0.014	96	628762	12.5	12.5	
24 Dichlorodifluoromethane	85	3.923	3.922	0.001	100	3295611	60.0	66.2	
26 Chloromethane	50	4.160	4.174	-0.014	99	3378862	60.0	55.8	
27 Vinyl chloride	62	4.286	4.300	-0.014	98	3276951	60.0	56.4	
29 Bromomethane	94	4.635	4.635	0.000	90	2487024	60.0	58.6	
31 Chloroethane	64	4.691	4.705	-0.014	100	2368826	60.0	55.9	
32 Dichlorofluoromethane	67	4.830	4.830	0.000	98	5543482	60.0	58.7	
33 Trichlorofluoromethane	101	4.914	4.914	0.000	99	4476447	60.0	60.2	
36 Ethyl ether	59	5.096	5.096	0.000	91	1348510	60.0	61.6	
39 Acrolein	56	5.207	5.221	-0.014	100	1545886	599.9	592.0	
40 Acetone	43	5.319	5.319	0.000	100	809150	240.0	234.6	
42 1,1,2-Trichloro-1,2,2-trif	151	5.347	5.347	0.000	97	2185427	60.0	64.7	
43 1,1-Dichloroethene	96	5.361	5.361	0.000	99	2929771	60.0	61.9	
45 Iodomethane	142	5.529	5.529	0.000	99	4580085	60.0	62.8	
46 Methyl acetate	43	5.543	5.557	-0.014	97	1185621	120.0	112.8	
47 3-Chloro-1-propene	41	5.599	5.612	-0.013	89	5148897	60.0	58.2	
48 Carbon disulfide	76	5.626	5.626	0.000	99	12279155	60.0	58.1	
49 2-Methyl-2-propanol	59	5.654	5.654	0.000	94	618695	600.0	662.1	
50 Methylene Chloride	84	5.696	5.696	0.000	97	2678804	60.0	63.8	
51 Acrylonitrile	53	5.836	5.836	0.000	99	3207740	600.0	610.9	
52 Methyl tert-butyl ether	73	5.892	5.892	0.000	95	3640553	60.0	62.7	
53 trans-1,2-Dichloroethene	96	5.920	5.920	0.000	99	3267087	60.0	61.5	
54 Hexane	57	6.101	6.101	0.000	89	5250704	60.0	57.4	
55 Vinyl acetate	43	6.157	6.157	0.000	97	4699784	120.0	123.0	
57 1,1-Dichloroethane	63	6.227	6.227	0.000	96	5564790	60.0	60.2	
61 2-Butanone (MEK)	43	6.590	6.590	0.000	100	1302396	240.0	230.8	M
62 sec-Butyl Alcohol	45	6.632	6.646	-0.014	97	1694104	1800.0	1930.0	
64 cis-1,2-Dichloroethene	96	6.660	6.660	0.000	80	3295665	60.0	61.6	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
65 2,2-Dichloropropane	77	6.688	6.688	0.000	90	4607883	60.0	61.4	
67 Chlorobromomethane	128	6.842	6.841	0.001	95	1019268	60.0	64.3	
68 Chloroform	83	6.855	6.855	0.000	94	4950029	60.0	61.3	
69 Tetrahydrofuran	42	6.883	6.883	0.000	90	469376	120.0	122.9	
70 Isobutyl alcohol	41	7.051	7.051	0.000	95	551153	1500.0	1541.6	
71 1,1,1-Trichloroethane	97	7.079	7.079	0.000	98	4736877	60.0	62.0	
72 Cyclohexane	56	7.163	7.163	0.000	0	6043382	60.0	58.8	
73 1,1-Dichloropropene	75	7.191	7.191	0.000	98	4602816	60.0	61.6	
74 Carbon tetrachloride	117	7.233	7.232	0.001	98	4095789	60.0	63.1	
75 1,2-Dichloroethane	62	7.330	7.330	0.000	98	2421140	60.0	61.1	
77 Benzene	78	7.358	7.358	0.000	98	11883656	60.0	58.0	
9 n-Heptane	43	7.456	7.456	0.000	91	5245197	60.0	57.0	
79 Trichloroethene	95	7.819	7.819	0.000	99	3254862	60.0	62.8	
80 2-Pentanone	43	7.847	7.847	0.000	99	2526845	240.0	258.1	
82 1,2-Dichloropropane	63	8.001	8.001	0.000	96	2824297	60.0	61.0	
83 Methylcyclohexane	55	8.029	8.029	0.000	0	4846395	60.0	59.0	
84 1,4-Dioxane	88	8.057	8.056	0.001	93	182854	1200.0	1409.0	
85 Dibromomethane	93	8.098	8.098	0.000	96	972742	60.0	63.0	
86 Dichlorobromomethane	83	8.168	8.168	0.000	100	3131431	60.0	63.7	
88 2-Chloroethyl vinyl ether	63	8.308	8.308	0.000	91	510394	60.0	63.5	
89 cis-1,3-Dichloropropene	75	8.490	8.489	0.001	97	3639978	60.0	64.0	
90 4-Methyl-2-pentanone (MIBK	43	8.545	8.545	0.000	95	3109898	240.0	248.8	
91 Toluene	91	8.783	8.769	0.014	99	11767863	60.0	56.6	
92 Ethyl methacrylate	69	8.853	8.853	0.000	91	1565228	60.0	64.7	
93 trans-1,3-Dichloropropene	75	8.867	8.867	0.001	97	2684455	60.0	67.3	
94 1,1,2-Trichloroethane	97	9.020	9.020	0.000	91	1274746	60.0	62.3	
95 2-Hexanone	43	9.132	9.132	0.000	95	2017731	240.0	248.1	
96 1,3-Dichloropropane	76	9.160	9.160	0.000	90	2456863	60.0	61.7	
97 Tetrachloroethene	164	9.202	9.202	0.000	98	2524145	60.0	63.7	
98 Chlorodibromomethane	129	9.341	9.341	0.000	90	1607038	60.0	67.9	
100 Ethylene Dibromide	107	9.467	9.467	0.000	98	1190133	60.0	64.1	
101 1-Chlorohexane	91	9.705	9.704	0.001	0	4559602	60.0	61.2	
102 Chlorobenzene	112	9.816	9.816	0.000	93	7199151	60.0	60.5	
103 1,1,1,2-Tetrachloroethane	131	9.858	9.844	0.014	96	2477455	60.0	67.9	
104 Ethylbenzene	106	9.858	9.858	0.000	97	4765351	60.0	62.5	e
105 m-Xylene & p-Xylene	106	9.928	9.928	0.000	97	5582840	60.0	60.9	eM
106 Styrene	104	10.249	10.249	0.000	86	7854293	60.0	63.5	
109 o-Xylene	106	10.249	10.249	0.000	86	5237199	60.0	61.5	
107 Bromoform	173	10.445	10.445	0.000	99	763589	60.0	69.3	
108 Isopropylbenzene	105	10.515	10.515	0.000	96	13051965	60.0	54.8	
111 Cyclohexanone	55	10.626	10.626	0.000	92	1017930	2400.0	2809.7	
112 1,1,2,2-Tetrachloroethane	83	10.696	10.696	0.000	95	1234693	60.0	60.7	
113 trans-1,4-Dichloro-2-buten	53	10.724	10.724	0.000	95	326861	60.0	66.4	
114 1,2,3-Trichloropropane	110	10.766	10.766	0.000	86	336848	60.0	62.3	
115 N-Propylbenzene	120	10.822	10.822	0.000	96	4228117	60.0	62.8	
116 Bromobenzene	156	10.822	10.822	0.000	96	2807153	60.0	65.5	
120 1,3,5-Trimethylbenzene	105	10.934	10.934	0.000	96	11340451	60.0	57.5	
117 2-Chlorotoluene	126	10.948	10.947	0.001	97	3379698	60.0	63.8	
118 4-Chlorotoluene	126	11.017	11.017	0.000	98	3257500	60.0	62.3	
119 tert-Butylbenzene	119	11.227	11.227	0.000	92	11472922	60.0	59.4	
121 1,2,4-Trimethylbenzene	105	11.255	11.255	0.000	96	11199960	60.0	57.7	
122 sec-Butylbenzene	134	11.408	11.408	0.000	95	3298491	60.0	62.6	e

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
123 4-Isopropyltoluene	119	11.506	11.506	0.000	95	12211753	60.0	56.4	
124 1,3-Dichlorobenzene	146	11.562	11.562	0.000	96	5604443	60.0	60.8	
126 1,4-Dichlorobenzene	146	11.632	11.632	0.000	93	5332369	60.0	60.7	
127 n-Butylbenzene	91	11.855	11.855	0.000	96	11971153	60.0	55.6	
128 1,2-Dichlorobenzene	146	11.981	11.981	0.000	96	4357629	60.0	61.1	
129 1,2-Dibromo-3-Chloropropan	157	12.707	12.707	0.000	82	173215	60.0	63.5	
130 1,2,4-Trichlorobenzene	180	13.657	13.657	0.000	94	2870406	60.0	61.6	
131 Hexachlorobutadiene	225	13.825	13.825	0.000	98	2364233	60.0	61.5	
132 Naphthalene	128	14.006	14.006	0.000	98	3430633	60.0	61.1	
133 1,2,3-Trichlorobenzene	180	14.327	14.327	0.000	95	2035072	60.0	60.2	
S 140 1,2-Dichloroethene, Total	96				0		120.0	123.1	
S 134 Trihalomethanes, Total	1				0		240.0	262.1	
S 139 Xylenes, Total (URS)	1				0		120.0	122.4	
S 138 Xylenes, Total	106				0		120.0	122.4	
S 136 1,2-Dichloroethene, Total	1				0		120.0	123.1	
S 135 1,3-Dichloropropene, Total	1				0		120.0	131.3	
S 137 Total BTEX	1				0			299.5	

QC Flag Legend

Processing Flags
e - Potential Peak Saturated
Review Flags
M - Manually Integrated
a - User Assigned ID

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL
MV-Main A_00037	Amount Added:	30.00	Units: uL
MV-2cleve+AVA_00037	Amount Added:	30.00	Units: uL
MV-Gas/Ket A_00076	Amount Added:	30.00	Units: uL

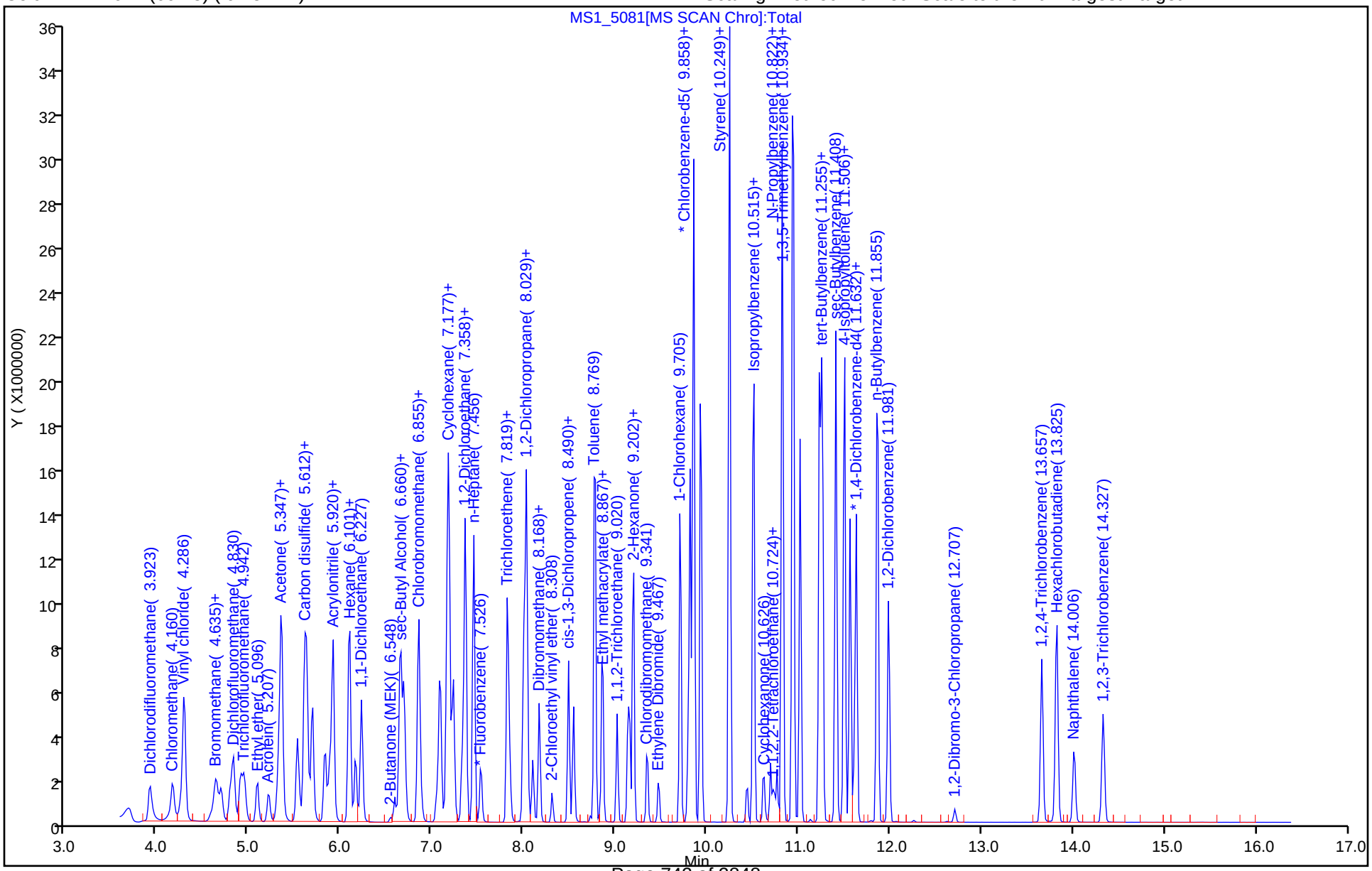
Report Date: 02-Aug-2018 13:05:06 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5081.D

Injection Date:	02-Aug-2018 10:54:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	std60			Worklist Smp#:	18
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	18
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



Manual Integration/User Assign Peak Report

TestAmerica Denver

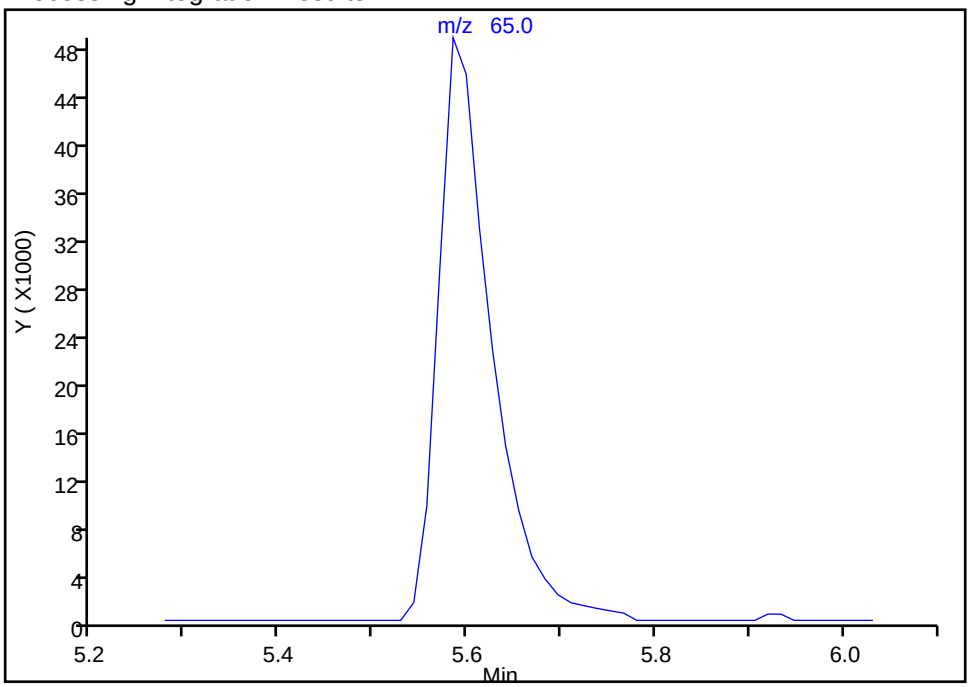
Data File:	\\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5081.D				
Injection Date:	02-Aug-2018 10:54:30	Instrument ID:	VMS_MS1		
Lims ID:	std60				
Client ID:					
Operator ID:	wickhamt	ALS Bottle#:	18	Worklist Smp#:	18
Purge Vol:	20.000 mL	Dil. Factor:	1.0000		
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		
Column:	DB-624 (60.25) (0.25 mm)	Detector	MS SCAN		

* 150 TBA-d9 (IS), CAS: 25725-11-5

Signal: 1

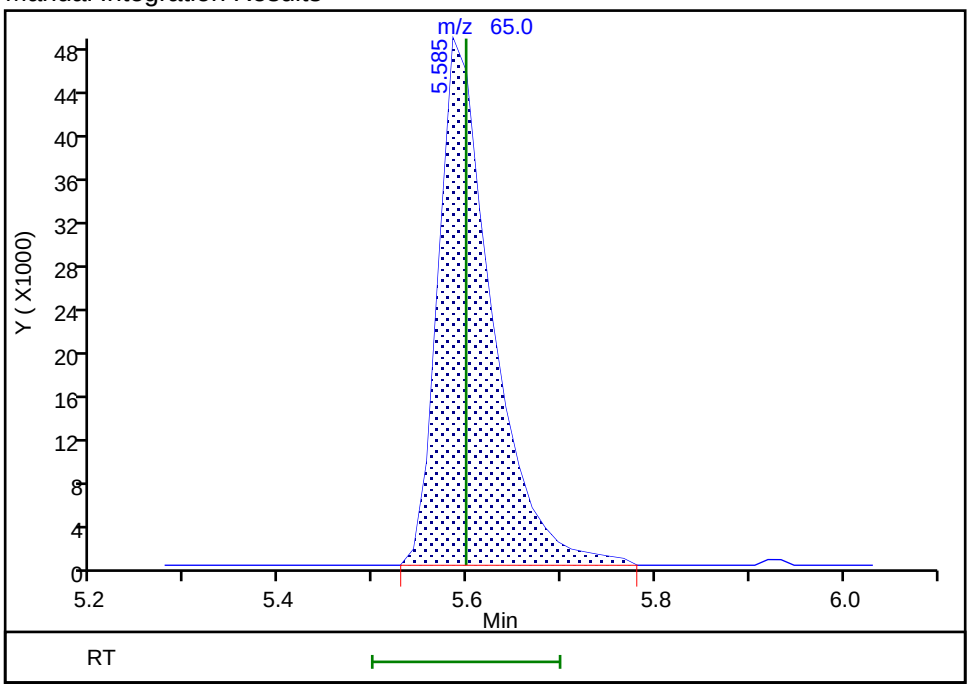
Not Detected
Expected RT: 5.60

Processing Integration Results



Manual Integration Results

RT: 5.58
Area: 191906
Amount: 250.0000
Amount Units: ug/l



Reviewer: wickhamt, 02-Aug-2018 11:40:55
Audit Action: Assigned Compound ID Audit Reason: Assign Peak

Manual Integration/User Assign Peak Report

TestAmerica Denver

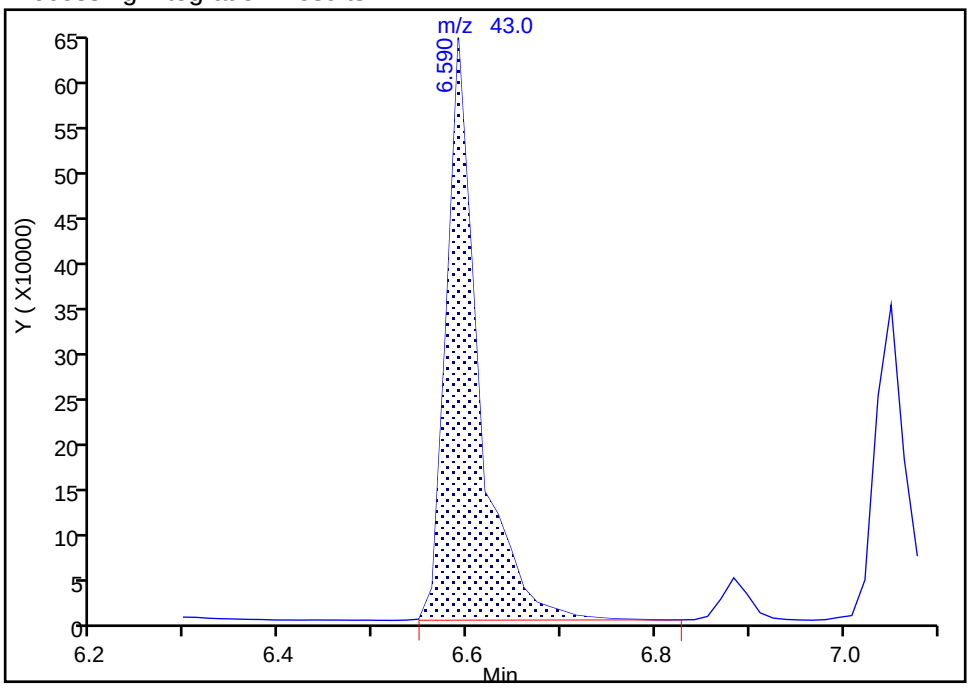
Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5081.D
Injection Date: 02-Aug-2018 10:54:30 Instrument ID: VMS_MS1
Lims ID: std60
Client ID:
Operator ID: wickhamt ALS Bottle#: 18 Worklist Smp#: 18
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Method: AQ_VMS1_8260 Limit Group: MSV - 8260B Water and Solid
Column: DB-624 (60.25) (0.25 mm) Detector MS SCAN

61 2-Butanone (MEK), CAS: 78-93-3

Signal: 1

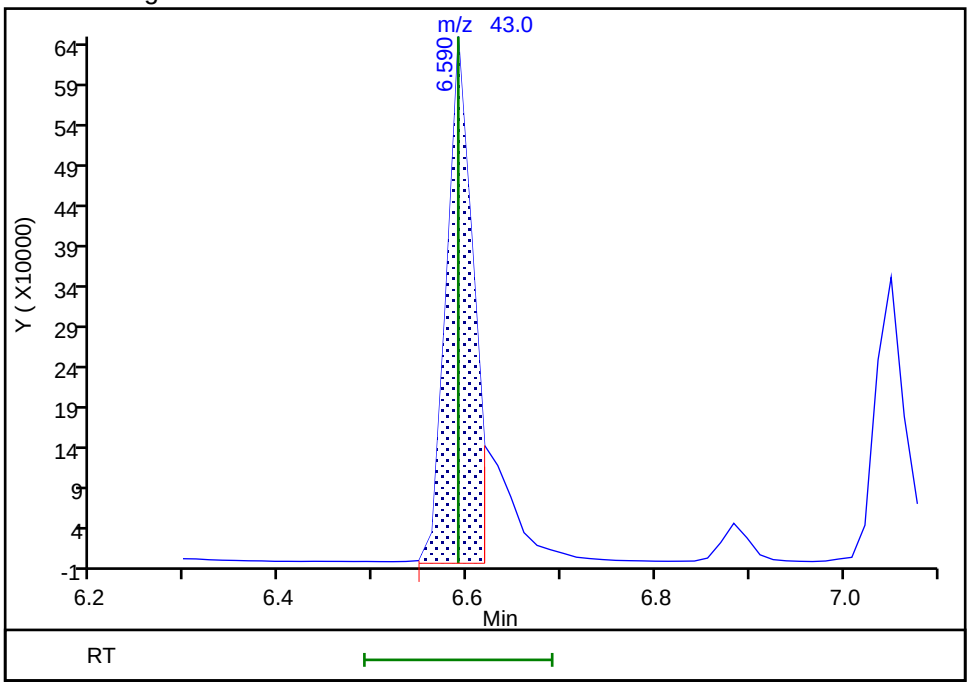
Processing Integration Results

RT: 6.59
Area: 1533988
Amount: 244.6028
Amount Units: ug/l



Manual Integration Results

RT: 6.59
Area: 1302396
Amount: 230.7729
Amount Units: ug/l



Reviewer: wickhamt, 02-Aug-2018 11:45:51
Audit Action: Assigned New Baseline Audit Reason: Shouldering

Manual Integration/User Assign Peak Report

TestAmerica Denver

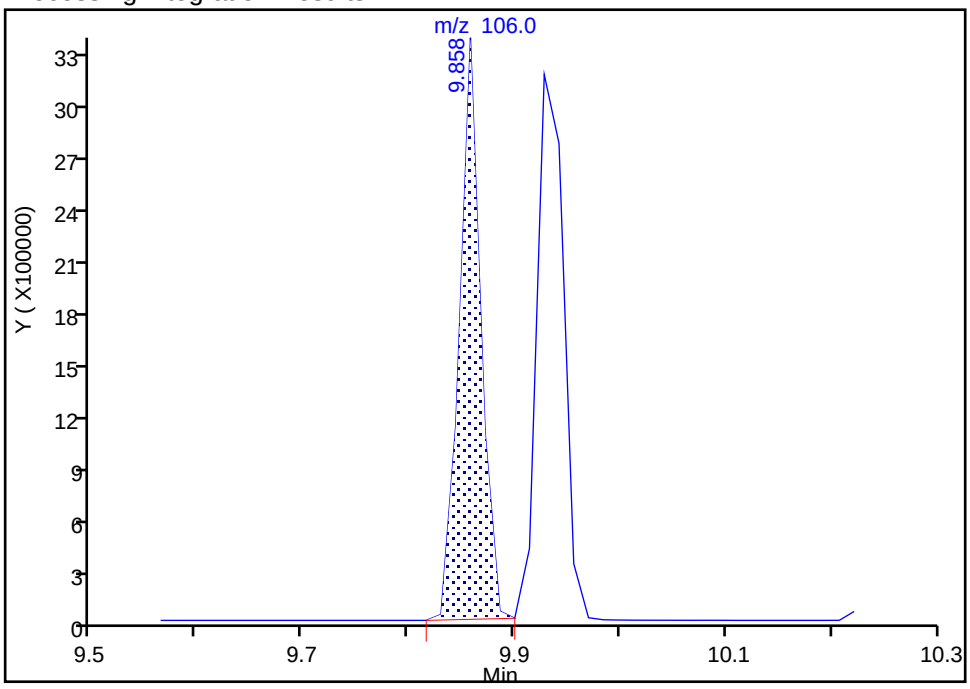
Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5081.D
Injection Date: 02-Aug-2018 10:54:30 Instrument ID: VMS_MS1
Lims ID: std60
Client ID:
Operator ID: wickhamt ALS Bottle#: 18 Worklist Smp#: 18
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Method: AQ_VMS1_8260 Limit Group: MSV - 8260B Water and Solid
Column: DB-624 (60.25) (0.25 mm) Detector MS SCAN

105 m-Xylene & p-Xylene, CAS: 179601-23-1

Signal: 1

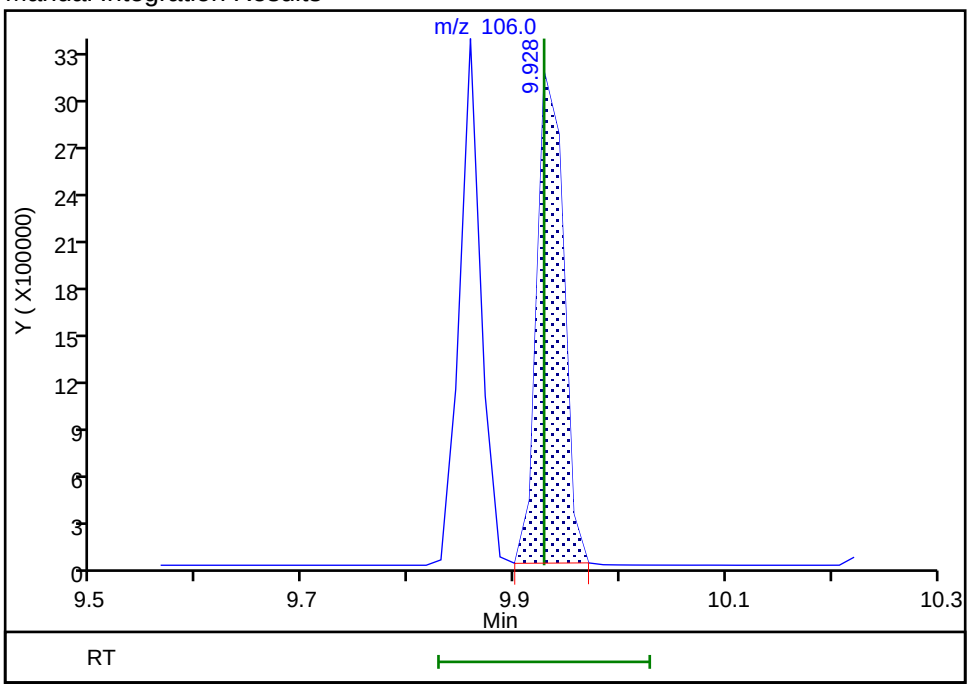
Processing Integration Results

RT: 9.86
Area: 4765351
Amount: 53.076000
Amount Units: ug/l



Manual Integration Results

RT: 9.93
Area: 5582840
Amount: 60.861700
Amount Units: ug/l



Reviewer: wickhamt, 02-Aug-2018 11:42:28
Audit Action: Manually Integrated Audit Reason: Wrong peak

FORM VI
GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424541

SDG No.:

Instrument ID: VMS_MS1 GC Column: DB-624 (60. ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 11:55 Calibration End Date: 08/02/2018 13:37 Calibration ID: 33279

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD01 280-424541/20	MS1_5084.D
Level 2	STD02 280-424541/21	MS1_5085.D
Level 3	STD05 280-424541/22	MS1_5086.D
Level 4	ICIS 280-424541/23	MS1_5087.D
Level 5	STD30 280-424541/24	MS1_5088.D
Level 6	STD60 280-424541/25	MS1_5089.D

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5		B	M1	M2								
Ethanol	0.1761 0.1732	0.1947	0.1836	0.1794	0.1635	Ave		0.1784				5.9		15.0			
Propene oxide	0.0127 0.0126	0.0133	0.0137	0.0142	0.0131	Ave		0.0133				4.6		15.0			
2-Propanol	1.1357 0.9564	1.1385	1.0370	0.9929	0.9104	Ave		1.0285				9.1		15.0			
Acetonitrile	0.0097 0.0095	0.0106	0.0095	0.0096	0.0091	Ave		0.0097				5.1		15.0			
Di-isopropyl ether (DIPE)	0.1730 0.1936	0.1833	0.1866	0.1879	0.1799	Ave		0.1841				3.9		15.0			
Chloroprene	0.4613 0.4653	0.4725	0.4817	0.4267	0.4397	Ave		0.4579				4.5		15.0			
Tert-butyl ethyl ether	0.4749 0.5210	0.4903	0.5101	0.5098	0.4872	Ave		0.4989				3.5		15.0			
Ethyl acetate	0.0890 0.0732	0.0758	0.0755	0.0726	0.0701	Ave		0.0760				8.8		15.0			
Propionitrile	0.0098 0.0109	0.0109	0.0109	0.0107	0.0103	Ave		0.0106				4.1		15.0			
Methacrylonitrile	0.0528 0.0487	0.0510	0.0507	0.0514	0.0483	Ave		0.0505				3.4		15.0			
Tert-amyl methyl ether	0.3396 0.4012	0.3483	0.3750	0.3811	0.3710	Ave		0.3694				6.1		15.0			
n-Butanol	1.0534 0.4667	0.7774	0.5045	0.4699	0.4194	Lin2	16.198	0.4154							0.9910		0.9900
Methyl methacrylate	0.0191 0.0267	0.0224	0.0236	0.0243	0.0244	Ave		0.0234				10.8		15.0			
2-Nitropropane	0.0122 0.0159	0.0129	0.0134	0.0143	0.0145	Ave		0.0139				9.6		15.0			
Tetrahydrothiophene	+++++ 0.0281	0.0228	0.0249	0.0246	0.0246	Ave		0.0250				7.8		15.0			

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424541

SDG No.:

Instrument ID: VMS_MS1 GC Column: DB-624 (60. ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 11:55 Calibration End Date: 08/02/2018 13:37 Calibration ID: 33279

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5		B	M1	M2								
cis-1,4-Dichloro-2-butene	0.0666 0.0814	0.0680	0.0718	0.0748	0.0751	Ave		0.0730				7.4		15.0			
1,2,3-Trimethylbenzene	3.5072 3.5102	3.5992	3.6257	3.5036	3.3945	Ave		3.5234				2.3		15.0			
1,3,5-Trichlorobenzene	1.3836 1.5292	1.4471	1.4232	1.3712	1.3736	Ave		1.4213				4.3		15.0			
Dibromofluoromethane (Surr)	0.2283 0.2184	0.2188	0.2082	0.2141	0.2083	Ave		0.2160				3.5		15.0			
1,2-Dichloroethane-d4 (Surr)	0.2001 0.1770	0.1912	0.1799	0.1803	0.1726	Ave		0.1835				5.6		15.0			
Toluene-d8 (Surr)	5.3744 4.5645	5.0531	4.6361	4.6967	4.5442	Ave		4.8115				6.9		15.0			
4-Bromofluorobenzene (Surr)	1.2428 1.1066	1.1602	1.0758	1.0665	1.0507	Ave		1.1171				6.5		15.0			

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424541

SDG No.:

Instrument ID: VMS_MS1 GC Column: DB-624 (60. ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 11:55 Calibration End Date: 08/02/2018 13:37 Calibration ID: 33279

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD01 280-424541/20	MS1_5084.D
Level 2	STD02 280-424541/21	MS1_5085.D
Level 3	STD05 280-424541/22	MS1_5086.D
Level 4	ICIS 280-424541/23	MS1_5087.D
Level 5	STD30 280-424541/24	MS1_5088.D
Level 6	STD60 280-424541/25	MS1_5089.D

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (UG/L)				
			LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5
Ethanol	TBAd9	Ave	7876 521255	16598	44942	86986	239384	60.0 3600	120	300	600	1800
Propene oxide	FB	Ave	217253 13322770	455271	1200509	2494080	6890500	100 6000	200	500	1000	3000
2-Propanol	TBAd9	Ave	8468 479753	16176	42304	80218	222176	10.0 600	20.0	50.0	100	300
Acetonitrile	FB	Ave	16579 1006766	36113	83525	168947	475795	10.0 600	20.0	50.0	100	300
Di-isopropyl ether (DIPE)	FB	Ave	29611 2053371	62657	164088	330511	944084	1.00 60.0	2.00	5.00	10.0	30.0
Chloroprene	FB	Ave	78937 4935095	161516	423473	750446	2307309	1.00 60.0	2.00	5.00	10.0	30.0
Tert-butyl ethyl ether	FB	Ave	81263 5526566	167600	448448	896554	2556087	1.00 60.0	2.00	5.00	10.0	30.0
Ethyl acetate	FB	Ave	30469 1552943	51805	132681	255301	735645	2.00 120	4.00	10.0	20.0	60.0
Propionitrile	FB	Ave	16819 1155098	37155	95680	189066	539219	10.0 600	20.0	50.0	100	300
Methacrylonitrile	FB	Ave	90296 5163340	174367	445708	903897	2531824	10.0 600	20.0	50.0	100	300
Tert-amyl methyl ether	FB	Ave	58110 4255749	119060	329720	670325	1946776	1.00 60.0	2.00	5.00	10.0	30.0
n-Butanol	TBAd9	Lin2	19635 585244	27613	51457	94916	255873	25.0 1500	50.0	125	250	750
Methyl methacrylate	FB	Ave	6544 566315	15342	41466	85370	255604	2.00 120	4.00	10.0	20.0	60.0
2-Nitropropane	FB	Ave	4161 338106	8831	23572	50306	152333	2.00 120	4.00	10.0	20.0	60.0
Tetrahydrothiophene	CBNZd5	Ave	+++++ 120809	3106	8740	17446	52212	+++++ 120	4.00	10.0	20.0	60.0
cis-1,4-Dichloro-2-butene	DCBd4	Ave	6258 488257	12662	34897	73667	220875	2.00 120	4.00	10.0	20.0	60.0

FORM VI
GC/MS VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424541

SDG No.:

Instrument ID: VMS_MS1 GC Column: DB-624 (60. ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/02/2018 11:55 Calibration End Date: 08/02/2018 13:37 Calibration ID: 33279

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (UG/L)				
			LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5
1,2,3-Trimethylbenzene	DCBd 4	Ave	164753 10529378	334872	881111	1724400	4990319	1.00 60.0	2.00	5.00	10.0	30.0
1,3,5-Trichlorobenzene	DCBd 4	Ave	64997 4587055	134637	345854	674856	2019354	1.00 60.0	2.00	5.00	10.0	30.0
Dibromofluoromethane (Surr)	FB	Ave	39061 2316592	74790	183009	376542	1092910	1.00 60.0	2.00	5.00	10.0	30.0
1,2-Dichloroethane-d4 (Surr)	FB	Ave	34250 1876880	65375	158176	317167	905428	1.00 60.0	2.00	5.00	10.0	30.0
Toluene-d8 (Surr)	CBNZ d5	Ave	183279 9802890	344888	813774	1664432	4817041	1.00 60.0	2.00	5.00	10.0	30.0
4-Bromofluorobenzene (Surr)	DCBd 4	Ave	58379 3319369	107948	261441	524912	1544602	1.00 60.0	2.00	5.00	10.0	30.0

Curve Type Legend:
Ave = Average ISTD
Lin2 = Linear 1/conc^2 ISTD

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5084.D
Lims ID: std01
Client ID:
Sample Type: IC Calib Level: 2
Inject. Date: 02-Aug-2018 11:55:30 ALS Bottle#: 21 Worklist Smp#: 20
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: std01
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist: chrom-AQ_VMS1_8260*sub107

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 03-Aug-2018 06:40:50 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0304

First Level Reviewer: wickhamt Date: 02-Aug-2018 13:23:37

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.584	5.598	-0.014	70	186397	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2139093	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	90	426277	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	587188	12.5	12.5	
$ 5 Dibromofluoromethane (Surr	111	6.981	6.981	0.000	93	39061	1.00	1.06	
$ 6 1,2-Dichloroethane-d4 (Sur	65	7.260	7.274	-0.014	98	34250	1.00	1.09	
$ 7 Toluene-d8 (Surr)	98	8.727	8.727	0.000	93	183279	1.00	1.12	
$ 8 4-Bromofluorobenzene (Surr	95	10.654	10.654	0.000	0	58379	1.00	1.11	
28 Ethylene oxide	43	4.565	4.565	0.000	99	54632	100.0	109.3	
34 Ethanol	45	4.928	4.928	0.000	47	7876	60.0	59.2	
38 Propene oxide	58	5.179	5.179	0.000	0	217253	100.0	95.8	
41 Isopropyl alcohol	45	5.333	5.333	0.000	96	8468	10.0	11.0	
44 Acetonitrile	41	5.529	5.529	0.000	98	16579	10.0	10.0	
56 Isopropyl ether	87	6.199	6.199	0.000	95	29611	1.00	0.9401	
58 2-Chloro-1,3-butadiene	53	6.297	6.297	0.000	91	78937	1.00	1.01	
59 Tert-butyl ethyl ether	59	6.464	6.464	0.000	97	81263	1.00	0.9519	
60 Ethyl acetate	43	6.590	6.590	0.000	96	30469	2.00	2.34	
63 Propionitrile	54	6.632	6.632	0.000	98	16819	10.0	9.29	
66 Methacrylonitrile	41	6.772	6.772	0.000	91	90296	10.0	10.5	
76 Tert-amyl methyl ether	73	7.358	7.358	0.000	96	58110	1.00	0.9193	
78 n-Butanol	56	7.526	7.554	-0.028	83	19635	25.0	24.4	
81 Methyl methacrylate	100	7.959	7.945	0.014	93	6544	2.00	1.63	
87 2-Nitropropane	41	8.294	8.294	0.000	96	4161	2.00	1.75	
99 Tetrahydrothiophene	60		9.397				ND	ND	
110 cis-1,4-Dichloro-2-butene	53	10.515	10.515	0.001	89	6258	2.00	1.83	
125 1,2,3-Trimethylbenzene	105	11.632	11.632	0.000	98	164753	1.00	1.00	
21 1,3,5-Trichlorobenzene	180	12.945	12.945	0.000	97	64997	1.00	0.9735	

QC Flag Legend

Processing Flags

ND - Not Detected or Marked ND

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL
MV-ARCH SS A_00101	Amount Added:	0.08	Units: uL
MV-Supp A_00031	Amount Added:	0.50	Units: uL

Report Date: 03-Aug-2018 06:40:51 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5084.D

Injection Date:	02-Aug-2018 11:55:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	std01			Worklist Smp#:	20
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	21
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5085.D
Lims ID: std02
Client ID:
Sample Type: IC Calib Level: 3
Inject. Date: 02-Aug-2018 12:15:30 ALS Bottle#: 22 Worklist Smp#: 21
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: std02
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist: chrom-AQ_VMS1_8260*sub107

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 03-Aug-2018 06:40:51 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0304

First Level Reviewer: wickhamt Date: 02-Aug-2018 13:23:59

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.585	5.598	-0.013	70	177596	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2136526	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	89	426580	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	581501	12.5	12.5	
$ 5 Dibromofluoromethane (Surr	111	6.981	6.981	0.000	93	74790	2.00	2.03	
$ 6 1,2-Dichloroethane-d4 (Sur	65	7.274	7.274	0.000	98	65375	2.00	2.08	
$ 7 Toluene-d8 (Surr)	98	8.727	8.727	0.000	93	344888	2.00	2.10	
$ 8 4-Bromofluorobenzene (Surr	95	10.654	10.654	0.000	0	107948	2.00	2.08	
28 Ethylene oxide	43	4.565	4.565	0.000	99	112843	200.0	210.2	
34 Ethanol	45	4.928	4.928	0.000	96	16598	120.0	131.0	
38 Propene oxide	58	5.180	5.179	0.001	0	455271	200.0	200.9	
41 Isopropyl alcohol	45	5.333	5.333	0.000	94	16176	20.0	22.1	
44 Acetonitrile	41	5.529	5.529	0.000	99	36113	20.0	21.9	
56 Isopropyl ether	87	6.199	6.199	0.000	95	62657	2.00	1.99	
58 2-Chloro-1,3-butadiene	53	6.297	6.297	0.000	91	161516	2.00	2.06	
59 Tert-butyl ethyl ether	59	6.464	6.464	0.000	97	167600	2.00	1.97	
60 Ethyl acetate	43	6.590	6.590	0.000	96	51805	4.00	3.99	
63 Propionitrile	54	6.632	6.632	0.000	98	37155	20.0	20.5	
66 Methacrylonitrile	41	6.772	6.772	0.000	91	174367	20.0	20.2	
76 Tert-amyl methyl ether	73	7.358	7.358	0.000	96	119060	2.00	1.89	
78 n-Butanol	56	7.540	7.554	-0.014	86	27613	50.0	54.6	
81 Methyl methacrylate	100	7.959	7.945	0.014	91	15342	4.00	3.83	
87 2-Nitropropane	41	8.294	8.294	0.000	98	8831	4.00	3.72	
99 Tetrahydrothiophene	60	9.397	9.397	0.000	85	3106	4.00	3.64	
110 cis-1,4-Dichloro-2-butene	53	10.515	10.515	0.001	88	12662	4.00	3.73	
125 1,2,3-Trimethylbenzene	105	11.646	11.632	0.014	97	334872	2.00	2.04	
21 1,3,5-Trichlorobenzene	180	12.945	12.945	0.000	97	134637	2.00	2.04	

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL
MV-ARCH SS A_00101	Amount Added:	0.16	Units: uL
MV-Supp A_00031	Amount Added:	1.00	Units: uL

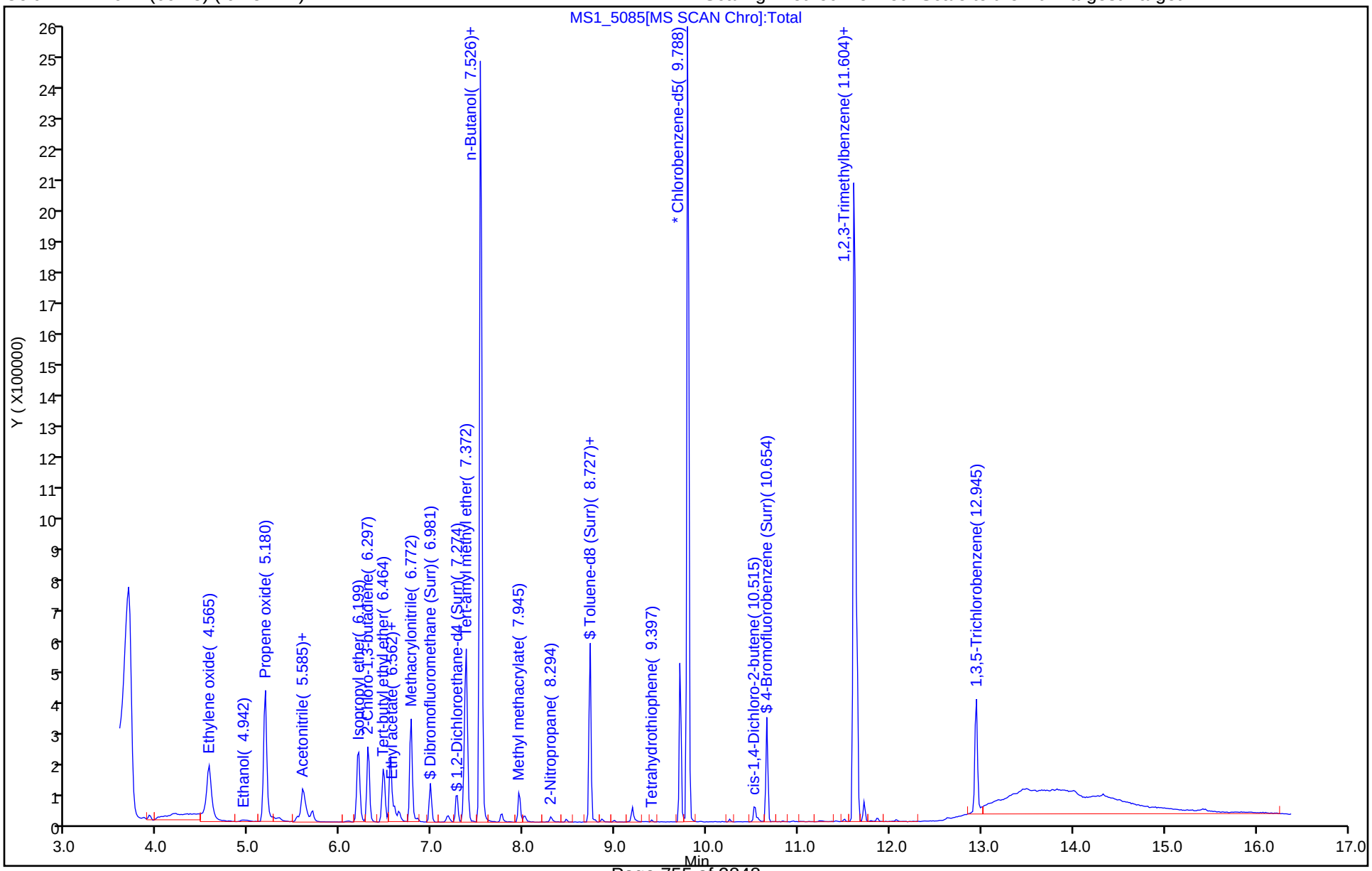
Report Date: 03-Aug-2018 06:40:52 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5085.D

Injection Date:	02-Aug-2018 12:15:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	std02			Worklist Smp#:	21
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	22
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5086.D
Lims ID: std05
Client ID:
Sample Type: IC Calib Level: 4
Inject. Date: 02-Aug-2018 12:36:30 ALS Bottle#: 23 Worklist Smp#: 22
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: std05
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist: chrom-AQ_VMS1_8260*sub107

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 03-Aug-2018 06:40:52 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0304

First Level Reviewer: wickhamt Date: 02-Aug-2018 13:24:26

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.584	5.598	-0.014	68	203979	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2197853	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	89	438825	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	607539	12.5	12.5	
$ 5 Dibromofluoromethane (Surr	111	6.981	6.981	0.000	93	183009	5.00	4.82	
$ 6 1,2-Dichloroethane-d4 (Sur	65	7.274	7.274	0.000	98	158176	5.00	4.90	
$ 7 Toluene-d8 (Surr)	98	8.727	8.727	0.000	93	813774	5.00	4.82	
$ 8 4-Bromofluorobenzene (Surr	95	10.654	10.654	0.000	0	261441	5.00	4.82	
28 Ethylene oxide	43	4.565	4.565	0.000	99	279639	500.0	488.1	
34 Ethanol	45	4.928	4.928	0.000	99	44942	300.0	308.7	
38 Propene oxide	58	5.179	5.179	0.000	0	1200509	500.0	515.0	
41 Isopropyl alcohol	45	5.333	5.333	0.000	98	42304	50.0	50.4	
44 Acetonitrile	41	5.529	5.529	0.000	99	83525	50.0	49.2	
56 Isopropyl ether	87	6.199	6.199	0.000	95	164088	5.00	5.07	
58 2-Chloro-1,3-butadiene	53	6.297	6.297	0.000	92	423473	5.00	5.26	
59 Tert-butyl ethyl ether	59	6.464	6.464	0.000	98	448448	5.00	5.11	
60 Ethyl acetate	43	6.590	6.590	0.000	99	132681	10.0	9.93	
63 Propionitrile	54	6.632	6.632	0.000	99	95680	50.0	51.4	
66 Methacrylonitrile	41	6.772	6.772	0.000	91	445708	50.0	50.2	
76 Tert-amyl methyl ether	73	7.358	7.358	0.000	97	329720	5.00	5.08	
78 n-Butanol	56	7.554	7.554	0.000	87	51457	125.0	112.8	
81 Methyl methacrylate	100	7.945	7.945	0.000	91	41466	10.0	10.1	
87 2-Nitropropane	41	8.294	8.294	0.000	98	23572	10.0	9.66	
99 Tetrahydrothiophene	60	9.397	9.397	0.000	93	8740	10.0	9.96	
110 cis-1,4-Dichloro-2-butene	53	10.514	10.515	0.000	85	34897	10.0	9.84	
125 1,2,3-Trimethylbenzene	105	11.632	11.632	0.000	99	881111	5.00	5.15	
21 1,3,5-Trichlorobenzene	180	12.945	12.945	0.000	98	345854	5.00	5.01	

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL
MV-ARCH SS A_00101	Amount Added:	0.40	Units: uL
MV-Supp A_00031	Amount Added:	2.50	Units: uL

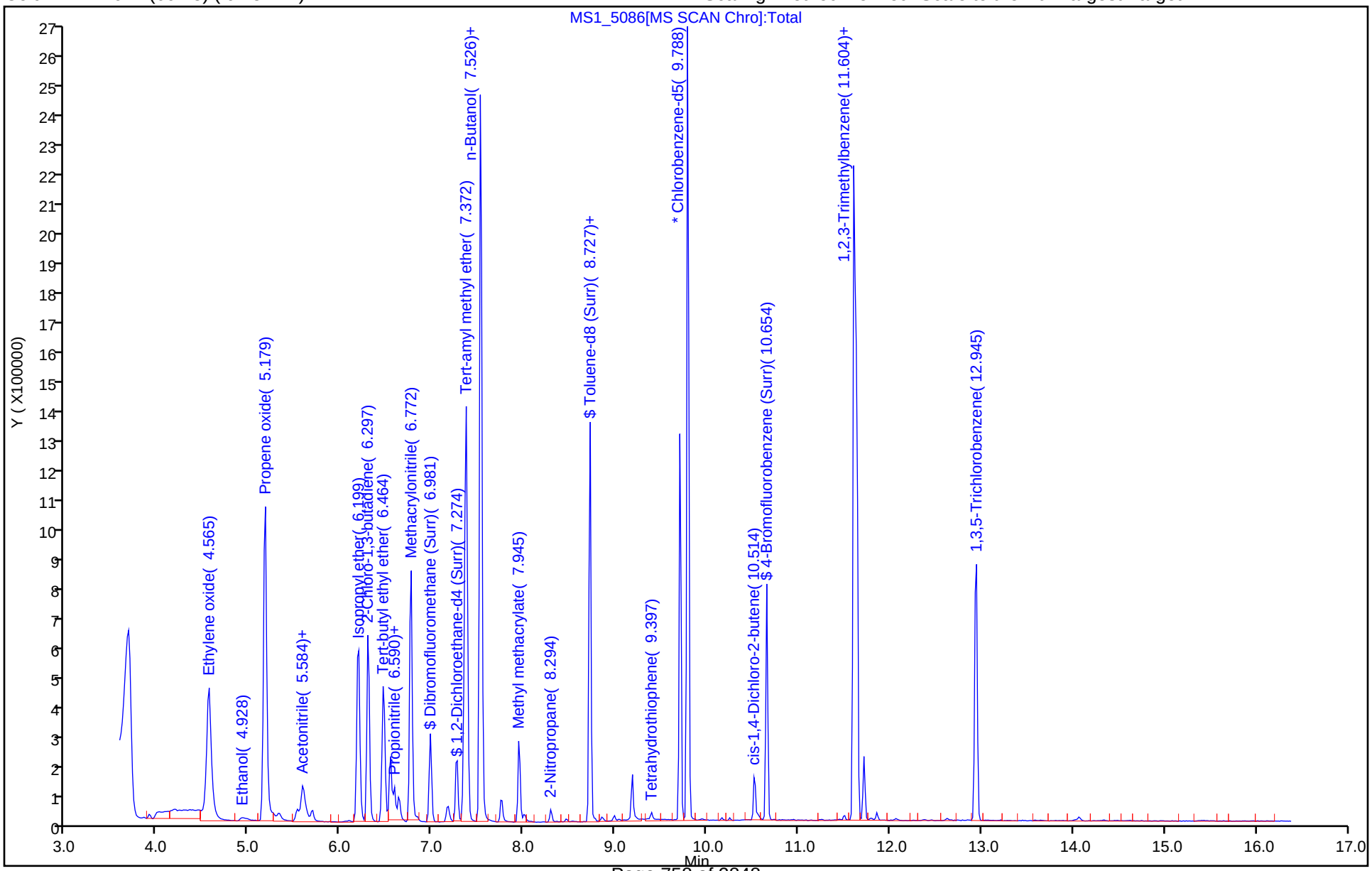
Report Date: 03-Aug-2018 06:40:53 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5086.D

Injection Date:	02-Aug-2018 12:36:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	std05			Worklist Smp#:	22
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	23
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5087.D
Lims ID: icis
Client ID:
Sample Type: ICIS Calib Level: 5
Inject. Date: 02-Aug-2018 12:56:30 ALS Bottle#: 24 Worklist Smp#: 23
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: icis
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist: chrom-AQ_VMS1_8260*sub107

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 03-Aug-2018 06:40:53 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0304

First Level Reviewer: wickhamt Date: 02-Aug-2018 13:23:13

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.598	5.598	0.000	74	201981	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2198487	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	89	442983	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	615228	12.5	12.5	
$ 5 Dibromofluoromethane (Surr	111	6.981	6.981	0.000	93	376542	10.0	9.91	
$ 6 1,2-Dichloroethane-d4 (Sur	65	7.274	7.274	0.000	98	317167	10.0	9.83	
$ 7 Toluene-d8 (Surr)	98	8.727	8.727	0.000	93	1664432	10.0	9.76	
$ 8 4-Bromofluorobenzene (Surr	95	10.654	10.654	0.000	0	524912	10.0	9.55	
28 Ethylene oxide	43	4.565	4.565	0.000	99	550287	1000.0	986.0	
34 Ethanol	45	4.928	4.928	0.000	99	86986	600.0	603.5	
38 Propene oxide	58	5.179	5.179	0.000	0	2494080	1000.0	1069.7	
41 Isopropyl alcohol	45	5.333	5.333	0.000	97	80218	100.0	96.5	
44 Acetonitrile	41	5.529	5.529	0.000	99	168947	100.0	99.5	
56 Isopropyl ether	87	6.199	6.199	0.000	95	330511	10.0	10.2	
58 2-Chloro-1,3-butadiene	53	6.297	6.297	0.000	92	750446	10.0	9.32	
59 Tert-butyl ethyl ether	59	6.464	6.464	0.000	98	896554	10.0	10.2	
60 Ethyl acetate	43	6.590	6.590	0.000	99	255301	20.0	19.1	
63 Propionitrile	54	6.632	6.632	0.000	99	189066	100.0	101.6	
66 Methacrylonitrile	41	6.772	6.772	0.000	91	903897	100.0	101.8	
76 Tert-amyl methyl ether	73	7.358	7.358	0.000	97	670325	10.0	10.3	
78 n-Butanol	56	7.554	7.554	0.000	87	94916	250.0	243.8	
81 Methyl methacrylate	100	7.945	7.945	0.000	91	85370	20.0	20.7	
87 2-Nitropropane	41	8.294	8.294	0.000	99	50306	20.0	20.6	
99 Tetrahydrothiophene	60	9.397	9.397	0.000	93	17446	20.0	19.7	
110 cis-1,4-Dichloro-2-butene	53	10.515	10.515	0.000	85	73667	20.0	20.5	
125 1,2,3-Trimethylbenzene	105	11.632	11.632	0.000	99	1724400	10.0	9.94	
21 1,3,5-Trichlorobenzene	180	12.945	12.945	0.000	97	674856	10.0	9.65	

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL
MV-ARCH SS A_00101	Amount Added:	0.80	Units: uL
MV-Supp A_00031	Amount Added:	5.00	Units: uL

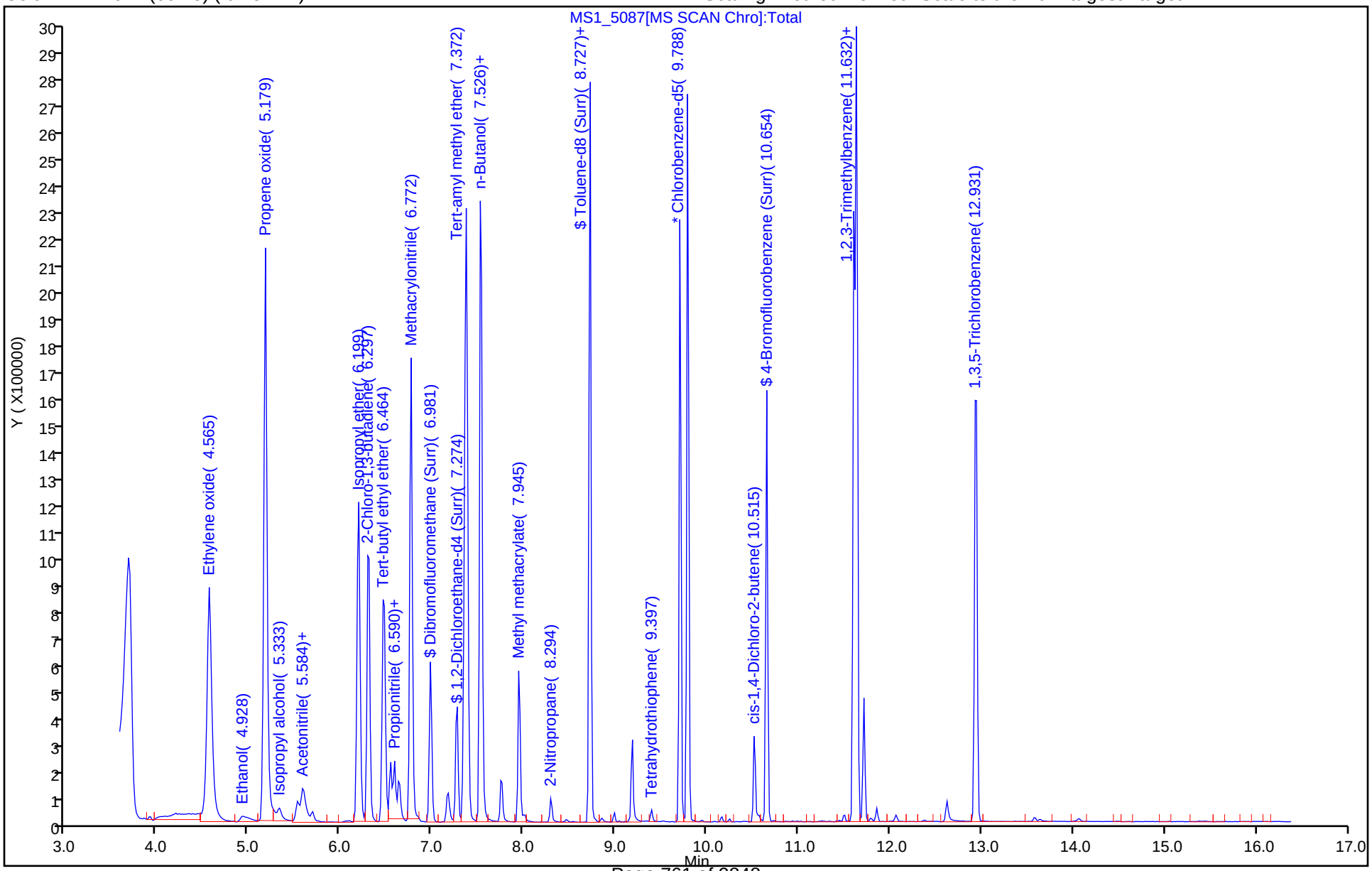
Report Date: 03-Aug-2018 06:40:54 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5087.D

Injection Date:	02-Aug-2018 12:56:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	icis			Worklist Smp#:	23
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	24
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5088.D
Lims ID: std30
Client ID:
Sample Type: IC Calib Level: 6
Inject. Date: 02-Aug-2018 13:16:30 ALS Bottle#: 25 Worklist Smp#: 24
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: std30
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist: chrom-AQ_VMS1_8260*sub107

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 03-Aug-2018 06:40:54 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0304

First Level Reviewer: wickhamt Date: 02-Aug-2018 14:05:32

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.584	5.598	-0.014	69	203378	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2186225	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	89	441685	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	612555	12.5	12.5	
$ 5 Dibromofluoromethane (Surr	111	6.981	6.981	0.000	93	1092910	30.0	28.9	
$ 6 1,2-Dichloroethane-d4 (Sur	65	7.260	7.274	-0.014	99	905428	30.0	28.2	
$ 7 Toluene-d8 (Surr)	98	8.727	8.727	0.000	93	4817041	30.0	28.3	
$ 8 4-Bromofluorobenzene (Surr	95	10.654	10.654	0.000	0	1544602	30.0	28.2	
28 Ethylene oxide	43	4.551	4.565	-0.014	99	1419157	3000.0	3061.6	
34 Ethanol	45	4.928	4.928	0.000	99	239384	1800.0	1649.3	
38 Propene oxide	58	5.179	5.179	0.000	0	6890500	3000.0	2971.8	
41 Isopropyl alcohol	45	5.333	5.333	0.000	99	222176	300.0	265.5	
44 Acetonitrile	41	5.529	5.529	0.000	99	475795	300.0	281.8	
56 Isopropyl ether	87	6.199	6.199	0.000	94	944084	30.0	29.3	
58 2-Chloro-1,3-butadiene	53	6.297	6.297	0.000	91	2307309	30.0	28.8	
59 Tert-butyl ethyl ether	59	6.464	6.464	0.000	98	2556087	30.0	29.3	
60 Ethyl acetate	43	6.590	6.590	0.000	99	735645	60.0	55.3	
63 Propionitrile	54	6.632	6.632	0.000	99	539219	300.0	291.3	
66 Methacrylonitrile	41	6.772	6.772	0.000	90	2531824	300.0	286.8	
76 Tert-amyl methyl ether	73	7.358	7.358	0.000	98	1946776	30.0	30.1	
78 n-Butanol	56	7.540	7.554	-0.014	87	255873	750.0	718.1	
81 Methyl methacrylate	100	7.945	7.945	0.000	91	255604	60.0	62.4	
87 2-Nitropropane	41	8.294	8.294	0.000	97	152333	60.0	62.8	
99 Tetrahydrothiophene	60	9.397	9.397	0.000	92	52212	60.0	59.1	
110 cis-1,4-Dichloro-2-butene	53	10.515	10.515	0.000	81	220875	60.0	61.8	
125 1,2,3-Trimethylbenzene	105	11.632	11.632	0.000	99	4990319	30.0	28.9	
21 1,3,5-Trichlorobenzene	180	12.945	12.945	0.000	98	2019354	30.0	29.0	

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL
MV-ARCH SS A_00101	Amount Added:	2.40	Units: uL
MV-Supp A_00031	Amount Added:	15.00	Units: uL

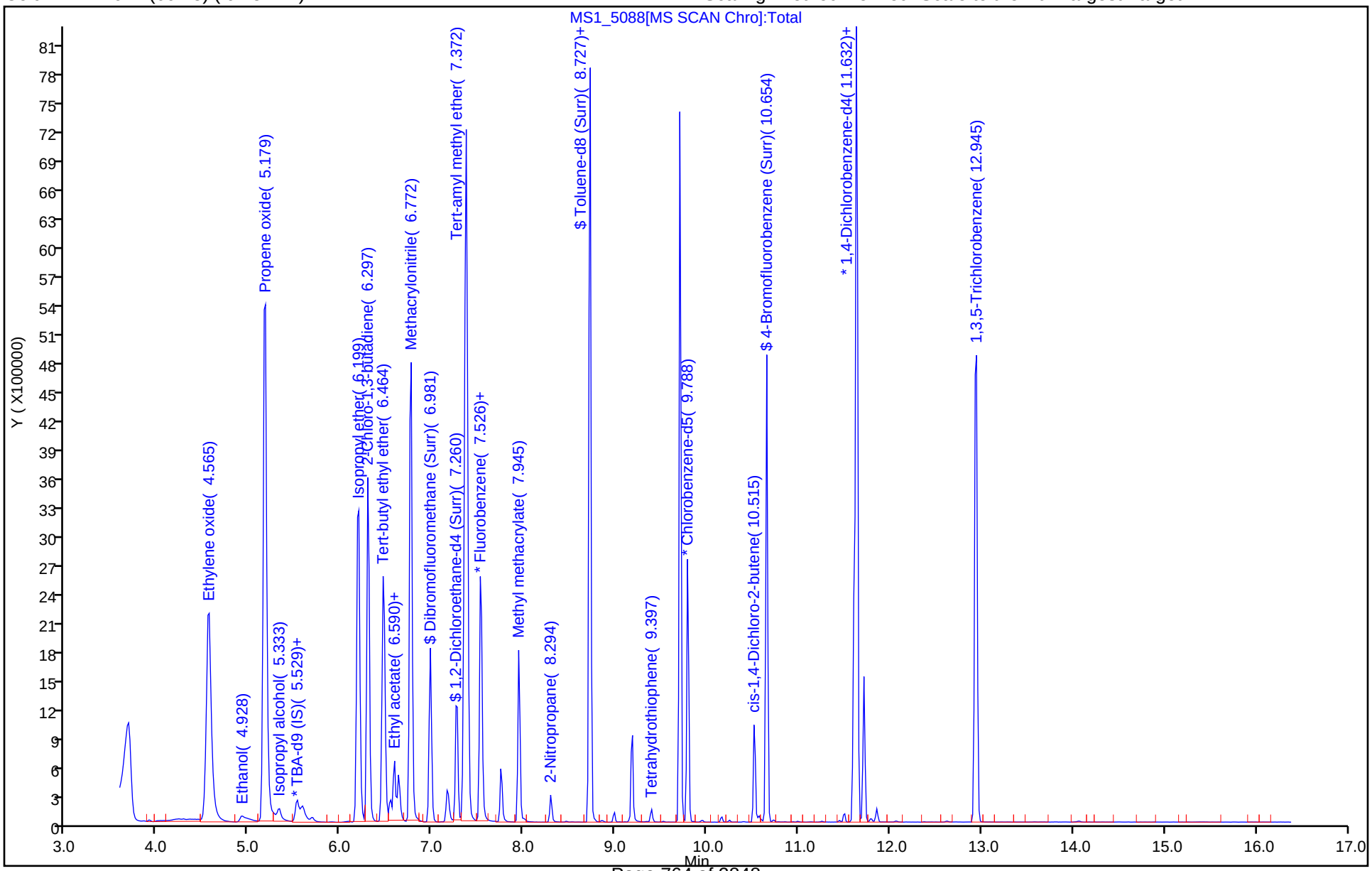
Report Date: 03-Aug-2018 06:40:55 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5088.D

Injection Date:	02-Aug-2018 13:16:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	std30			Worklist Smp#:	24
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	25
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D
Lims ID: std60
Client ID:
Sample Type: IC Calib Level: 7
Inject. Date: 02-Aug-2018 13:37:30 ALS Bottle#: 26 Worklist Smp#: 25
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: std60
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist: chrom-AQ_VMS1_8260*sub107

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 03-Aug-2018 06:40:55 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0304

First Level Reviewer: wickhamt Date: 02-Aug-2018 14:08:59

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.585	5.598	-0.013	68	209015	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2209748	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	89	447426	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	624935	12.5	12.5	
$ 5 Dibromofluoromethane (Surr	111	6.981	6.981	0.000	93	2316592	60.0	60.7	
$ 6 1,2-Dichloroethane-d4 (Sur	65	7.261	7.274	-0.013	99	1876880	60.0	57.9	
$ 7 Toluene-d8 (Surr)	98	8.727	8.727	0.000	92	9802890	60.0	56.9	
$ 8 4-Bromofluorobenzene (Surr	95	10.654	10.654	0.000	0	3319369	60.0	59.4	
28 Ethylene oxide	43	4.565	4.565	0.000	100	2087025	6000.0	3806.4	
34 Ethanol	45	4.928	4.928	0.000	100	521255	3600.0	3494.5	
38 Propene oxide	58	5.166	5.179	-0.013	0	13322770	6000.0	5684.8	
41 Isopropyl alcohol	45	5.333	5.333	0.000	99	479753	600.0	557.9	
44 Acetonitrile	41	5.529	5.529	0.000	99	1006766	600.0	590.0	
56 Isopropyl ether	87	6.199	6.199	0.000	94	2053371	60.0	63.1	
58 2-Chloro-1,3-butadiene	53	6.297	6.297	0.000	91	4935095	60.0	61.0	
59 Tert-butyl ethyl ether	59	6.464	6.464	0.000	97	5526566	60.0	62.7	
60 Ethyl acetate	43	6.590	6.590	0.000	99	1552943	120.0	115.6	
63 Propionitrile	54	6.632	6.632	0.000	99	1155098	600.0	617.4	
66 Methacrylonitrile	41	6.772	6.772	0.000	90	5163340	600.0	578.8	
76 Tert-amyl methyl ether	73	7.358	7.358	0.000	98	4255749	60.0	65.2	
78 n-Butanol	56	7.540	7.554	-0.014	87	585244	1500.0	1646.0	
81 Methyl methacrylate	100	7.945	7.945	0.000	90	566315	120.0	136.8	
87 2-Nitropropane	41	8.294	8.294	0.000	97	338106	120.0	137.9	
99 Tetrahydrothiophene	60	9.397	9.397	0.000	92	120809	120.0	135.0	
110 cis-1,4-Dichloro-2-butene	53	10.515	10.515	0.001	79	488257	120.0	133.8	
125 1,2,3-Trimethylbenzene	105	11.632	11.632	0.000	98	10529378	60.0	59.8	
21 1,3,5-Trichlorobenzene	180	12.945	12.945	0.000	98	4587055	60.0	64.6	

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL
MV-ARCH SS A_00101	Amount Added:	4.80	Units: uL
MV-Supp A_00031	Amount Added:	30.00	Units: uL

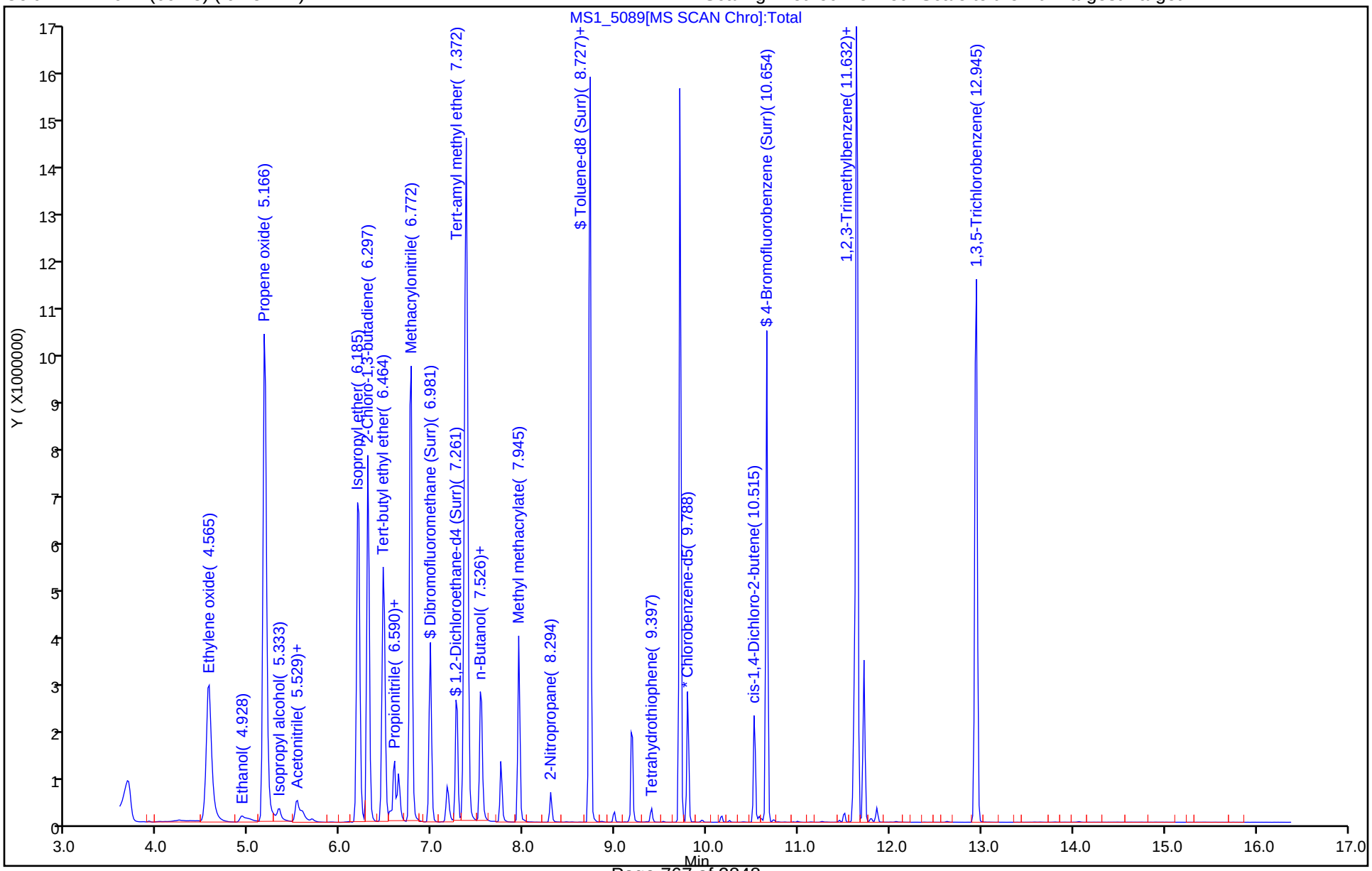
Report Date: 03-Aug-2018 06:40:56 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Injection Date:	02-Aug-2018 13:37:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	std60			Worklist Smp#:	25
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	26
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



FORM VII
GC/MS VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424541/19 Calibration Date: 08/02/2018 11:35

Instrument ID: VMS_MS1 Calib Start Date: 08/02/2018 08:53

GC Column: DB-624 (60.25) ID: 0.25(mm) Calib End Date: 08/02/2018 10:54

Lab File ID: MS1_5083.D Conc. Units: mg/L Heated Purge: (Y/N) N

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Dichlorodifluoromethane	Ave	0.2832	0.2893		0.0102	0.0100	2.2	55.0
Chloromethane	Ave	0.3441	0.3273	0.1000	0.00951	0.0100	-4.9	35.0
Vinyl chloride	Ave	0.3302	0.3312		0.0100	0.0100	0.3	20.0
Bromomethane	Ave	0.2412	0.2524		0.0105	0.0100	4.6	35.0
Chloroethane	Ave	0.2408	0.2412		0.0100	0.0100	0.2	35.0
Dichlorofluoromethane	Ave	0.5369	0.5421		0.0101	0.0100	1.0	55.0
Trichlorofluoromethane	Ave	0.4226	0.4192		0.00992	0.0100	-0.8	50.0
Ethyl ether	Ave	0.1245	0.1347		0.0108	0.0100	8.2	35.0
Acrolein	Ave	0.0148	0.0151		0.101	0.100	1.4	55.0
Acetone	Lin2		0.0220		0.0433	0.0400	8.2	55.0
Freon 113	Ave	0.1920	0.1987		0.0103	0.0100	3.5	55.0
1,1-Dichloroethene	Ave	0.2694	0.2730		0.0101	0.0100	1.4	20.0
Iodomethane	Ave	0.4149	0.4343		0.0105	0.0100	4.7	35.0
Methyl acetate	Ave	0.0597	0.0575		0.0192	0.0200	-3.8	55.0
Allyl chloride	Ave	0.5030	0.5090		0.0101	0.0100	1.2	35.0
Carbon disulfide	Ave	1.201	1.229		0.0102	0.0100	2.3	55.0
Tert-butyl alcohol (2-methyl-2-propanol)	Ave	1.217	1.320		0.108	0.100	8.4	35.0
Methylene Chloride	Lin2		0.2581		0.0104	0.0100	4.3	35.0
Acrylonitrile	Ave	0.0299	0.0310		0.104	0.100	3.8	55.0
Methyl tert-butyl ether	Ave	0.3304	0.3416		0.0103	0.0100	3.4	35.0
trans-1,2-Dichloroethene	Ave	0.3021	0.3108		0.0103	0.0100	2.9	35.0
Hexane	Ave	2.548	2.406		0.00944	0.0100	-5.6	35.0
Vinyl acetate	Ave	0.2173	0.2336		0.0215	0.0200	7.5	35.0
1,1-Dichloroethane	Ave	0.5259	0.5285	0.1000	0.0101	0.0100	0.5	35.0
2-Butanone (MEK)	Ave	0.0321	0.0323		0.0402	0.0400	0.5	55.0
cis-1,2-Dichloroethene	Ave	0.3042	0.3056		0.0100	0.0100	0.4	35.0
2,2-Dichloropropane	Ave	0.4270	0.4062		0.00951	0.0100	-4.9	35.0
Chlorobromomethane	Ave	0.0901	0.0935		0.0104	0.0100	3.7	35.0
Chloroform	Ave	0.4592	0.4605		0.0100	0.0100	0.3	20.0
Tetrahydrofuran	Lin2		0.0226		0.0198	0.0200	-0.8	55.0
Isobutyl alcohol	Ave	0.4657	0.4483		0.241	0.250	-3.7	55.0
1,1,1-Trichloroethane	Ave	0.4345	0.4358		0.0100	0.0100	0.3	35.0
Cyclohexane	Ave	0.5841	0.5736		0.00982	0.0100	-1.8	35.0
1,1-Dichloropropene	Ave	0.4246	0.4173		0.00983	0.0100	-1.7	35.0
Carbon tetrachloride	Ave	0.3689	0.3614		0.00980	0.0100	-2.0	35.0
1,2-Dichloroethane	Ave	0.2252	0.2276		0.0101	0.0100	1.0	35.0
Benzene	Ave	1.166	1.162		0.00997	0.0100	-0.3	35.0
Trichloroethene	Ave	0.2946	0.2935		0.00996	0.0100	-0.4	35.0
2-Pentanone	Ave	0.0557	0.0593		0.0426	0.0400	6.5	55.0
1,2-Dichloropropane	Ave	0.2632	0.2689		0.0102	0.0100	2.2	20.0

FORM VII
GC/MS VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424541/19 Calibration Date: 08/02/2018 11:35

Instrument ID: VMS_MS1 Calib Start Date: 08/02/2018 08:53

GC Column: DB-624 (60.25) ID: 0.25(mm) Calib End Date: 08/02/2018 10:54

Lab File ID: MS1_5083.D Conc. Units: mg/L Heated Purge: (Y/N) N

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Methylcyclohexane	Ave	0.4669	0.4477		0.00959	0.0100	-4.1	35.0
1,4-Dioxane	Ave	0.0007	0.0009		0.235	0.200	17.4	55.0
Dibromomethane	Ave	0.0878	0.0878		0.0100	0.0100	-0.0	35.0
Dichlorobromomethane	Ave	0.2797	0.2826		0.0101	0.0100	1.0	35.0
2-Chloroethyl vinyl ether	Lin1		0.0360		0.00840	0.0100	-16.0	55.0
cis-1,3-Dichloropropene	Ave	1.583	1.638		0.0103	0.0100	3.4	35.0
4-Methyl-2-pentanone (MIBK)	Ave	0.0711	0.0752		0.0423	0.0400	5.7	55.0
Toluene	Ave	1.183	1.187		0.0100	0.0100	0.4	20.0
Ethyl methacrylate	Ave	0.6736	0.6539		0.00971	0.0100	-2.9	35.0
trans-1,3-Dichloropropene	Ave	0.2267	0.2362		0.0104	0.0100	4.2	35.0
1,1,2-Trichloroethane	Ave	0.1163	0.1221		0.0105	0.0100	5.0	35.0
Methyl n-butyl ketone (MNBK)	Ave	0.2264	0.2319		0.0410	0.0400	2.4	55.0
1,3-Dichloropropane	Ave	1.108	1.100		0.00993	0.0100	-0.7	35.0
Tetrachloroethene	Ave	1.104	1.048		0.00950	0.0100	-5.0	35.0
Chlorodibromomethane	Ave	0.6590	0.6782		0.0103	0.0100	2.9	35.0
1,2-Dibromoethane	Ave	0.5164	0.5181		0.0100	0.0100	0.3	35.0
1-Chlorohexane	Ave	2.075	1.986		0.00957	0.0100	-4.3	35.0
Chlorobenzene	Ave	3.313	3.237	0.3000	0.00977	0.0100	-2.3	35.0
1,1,1,2-Tetrachloroethane	Ave	1.015	1.006		0.00991	0.0100	-0.9	35.0
Ethylbenzene	Ave	2.121	2.036		0.00960	0.0100	-4.0	20.0
m-Xylene & p-Xylene	Ave	2.553	2.464		0.00965	0.0100	-3.5	35.0
o-Xylene	Ave	2.369	2.347		0.00990	0.0100	-1.0	35.0
Styrene	Ave	3.443	3.435		0.00998	0.0100	-0.2	35.0
Bromoform	Lin2		0.3042	0.1000	0.00999	0.0100	-0.0	35.0
Isopropylbenzene	Ave	4.733	4.700		0.00993	0.0100	-0.7	35.0
Cyclohexanone	Ave	0.0101	0.0108		0.428	0.400	7.0	35.0
1,1,2,2-Tetrachloroethane	Ave	0.4045	0.4101	0.3000	0.0101	0.0100	1.4	35.0
trans-1,4-Dichloro-2-butene	Ave	0.0978	0.1002		0.0102	0.0100	2.4	35.0
1,2,3-Trichloropropane	Ave	0.1076	0.1122		0.0104	0.0100	4.3	35.0
Bromobenzene	Ave	0.8515	0.8615		0.0101	0.0100	1.2	35.0
N-Propylbenzene	Ave	1.339	1.322		0.00987	0.0100	-1.3	35.0
1,3,5-Trimethylbenzene	Ave	3.923	3.888		0.00991	0.0100	-0.9	35.0
2-Chlorotoluene	Ave	1.053	1.060		0.0101	0.0100	0.7	35.0
4-Chlorotoluene	Ave	1.040	1.035		0.00996	0.0100	-0.4	35.0
tert-Butylbenzene	Ave	3.842	3.823		0.00995	0.0100	-0.5	35.0
1,2,4-Trimethylbenzene	Ave	3.860	3.794		0.00983	0.0100	-1.7	35.0
sec-Butylbenzene	Ave	1.047	1.042		0.00995	0.0100	-0.5	35.0
4-Isopropyltoluene	Ave	4.301	4.356		0.0101	0.0100	1.3	35.0
1,3-Dichlorobenzene	Ave	1.832	1.826		0.00997	0.0100	-0.3	35.0
1,4-Dichlorobenzene	Ave	1.747	1.754		0.0100	0.0100	0.4	35.0
n-Butylbenzene	Ave	4.282	4.270		0.00997	0.0100	-0.3	35.0

FORM VII
GC/MS VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424541/19 Calibration Date: 08/02/2018 11:35

Instrument ID: VMS_MS1 Calib Start Date: 08/02/2018 08:53

GC Column: DB-624 (60.25) ID: 0.25(mm) Calib End Date: 08/02/2018 10:54

Lab File ID: MS1_5083.D Conc. Units: mg/L Heated Purge: (Y/N) N

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
1,2-Dichlorobenzene	Ave	1.417	1.444		0.0102	0.0100	1.9	35.0
1,2-Dibromo-3-Chloropropane	Lin2		0.0521		0.00990	0.0100	-1.0	55.0
1,2,4-Trichlorobenzene	Ave	0.9266	0.9672		0.0104	0.0100	4.4	35.0
Hexachlorobutadiene	Ave	0.7646	0.7847		0.0103	0.0100	2.6	35.0
Naphthalene	Ave	1.117	1.189		0.0107	0.0100	6.5	35.0
1,2,3-Trichlorobenzene	Ave	0.6725	0.7213		0.0107	0.0100	7.3	35.0

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5083.D
Lims ID: icv
Client ID:
Sample Type: ICV
Inject. Date: 02-Aug-2018 11:35:30 ALS Bottle#: 20 Worklist Smp#: 19
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: icv
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist:

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 02-Aug-2018 13:05:05 Calib Date: 02-Aug-2018 10:54:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5081.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0314

First Level Reviewer: wickhamt Date: 02-Aug-2018 13:02:55

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.584	5.598	-0.014	87	182490	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2135348	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	90	447202	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	606158	12.5	12.5	
24 Dichlorodifluoromethane	85	3.908	3.922	-0.014	100	494150	10.0	10.2	
26 Chloromethane	50	4.160	4.174	-0.014	99	559100	10.0	9.51	
27 Vinyl chloride	62	4.285	4.300	-0.015	94	565776	10.0	10.0	
29 Bromomethane	94	4.635	4.635	0.000	90	431102	10.0	10.5	
31 Chloroethane	64	4.691	4.705	-0.015	100	412090	10.0	10.0	
32 Dichlorofluoromethane	67	4.830	4.830	0.000	98	925993	10.0	10.1	
33 Trichlorofluoromethane	101	4.914	4.914	0.000	99	716143	10.0	9.92	
36 Ethyl ether	59	5.082	5.096	-0.014	92	230025	10.0	10.8	
39 Acrolein	56	5.207	5.221	-0.014	99	257081	100.0	101.4	
40 Acetone	43	5.305	5.319	-0.014	100	150132	40.0	43.3	
42 1,1,2-Trichloro-1,2,2-trif	151	5.333	5.347	-0.014	97	339498	10.0	10.3	
43 1,1-Dichloroethene	96	5.361	5.361	0.000	99	466401	10.0	10.1	
45 Iodomethane	142	5.528	5.529	-0.001	99	741869	10.0	10.5	
46 Methyl acetate	43	5.542	5.557	-0.015	96	196328	20.0	19.2	
47 3-Chloro-1-propene	41	5.598	5.612	-0.014	90	869466	10.0	10.1	
48 Carbon disulfide	76	5.626	5.626	0.000	99	2099622	10.0	10.2	
49 2-Methyl-2-propanol	59	5.654	5.654	0.000	92	96340	100.0	108.4	
50 Methylene Chloride	84	5.696	5.696	0.000	94	440946	10.0	10.4	
51 Acrylonitrile	53	5.822	5.836	-0.014	99	529376	100.0	103.8	
52 Methyl tert-butyl ether	73	5.878	5.892	-0.014	95	583471	10.0	10.3	
53 trans-1,2-Dichloroethene	96	5.920	5.920	0.000	98	531006	10.0	10.3	
54 Hexane	57	6.087	6.101	-0.014	92	860633	10.0	9.44	
55 Vinyl acetate	43	6.157	6.157	0.000	97	798195	20.0	21.5	
57 1,1-Dichloroethane	63	6.227	6.227	0.000	96	902873	10.0	10.1	
61 2-Butanone (MEK)	43	6.590	6.590	0.000	100	220477	40.0	40.2	M
62 sec-Butyl Alcohol	45	6.632	6.646	-0.014	96	263963	300.0	316.2	
64 cis-1,2-Dichloroethene	96	6.646	6.660	-0.014	83	522062	10.0	10.0	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
65 2,2-Dichloropropane	77	6.688	6.688	0.000	91	693863	10.0	9.51	
67 Chlorobromomethane	128	6.841	6.841	0.000	92	159698	10.0	10.4	
68 Chloroform	83	6.855	6.855	0.000	94	786654	10.0	10.0	
69 Tetrahydrofuran	42	6.883	6.883	0.000	89	77292	20.0	19.8	
70 Isobutyl alcohol	41	7.051	7.051	0.000	95	81809	250.0	240.6	
71 1,1,1-Trichloroethane	97	7.079	7.079	0.000	99	744391	10.0	10.0	
72 Cyclohexane	56	7.163	7.163	0.000	0	979795	10.0	9.82	
73 1,1-Dichloropropene	75	7.176	7.191	-0.015	98	712922	10.0	9.83	
74 Carbon tetrachloride	117	7.232	7.232	0.000	99	617447	10.0	9.80	
75 1,2-Dichloroethane	62	7.330	7.330	0.000	98	388734	10.0	10.1	
77 Benzene	78	7.358	7.358	0.000	96	1984918	10.0	9.97	
9 n-Heptane	43	7.456	7.456	0.000	92	868947	10.0	9.72	
79 Trichloroethene	95	7.819	7.819	0.000	99	501351	10.0	9.96	
80 2-Pentanone	43	7.847	7.847	0.000	99	405088	40.0	42.6	
82 1,2-Dichloropropane	63	8.001	8.001	0.000	97	459404	10.0	10.2	
83 Methylcyclohexane	55	8.028	8.029	-0.001	0	764786	10.0	9.59	
84 1,4-Dioxane	88	8.056	8.056	0.000	90	29592	200.0	234.7	
85 Dibromomethane	93	8.098	8.098	0.000	96	149999	10.0	10.0	
86 Dichlorobromomethane	83	8.168	8.168	0.000	100	482794	10.0	10.1	
88 2-Chloroethyl vinyl ether	63	8.308	8.308	0.000	90	61539	10.0	8.40	
89 cis-1,3-Dichloropropene	75	8.489	8.489	0.000	96	585903	10.0	10.3	
90 4-Methyl-2-pentanone (MIBK	43	8.545	8.545	0.000	96	513651	40.0	42.3	
91 Toluene	91	8.769	8.769	0.000	98	2027918	10.0	10.0	
92 Ethyl methacrylate	69	8.852	8.853	-0.001	89	233923	10.0	9.71	
93 trans-1,3-Dichloropropene	75	8.866	8.867	0.000	98	403557	10.0	10.4	
94 1,1,2-Trichloroethane	97	9.020	9.020	0.000	91	208619	10.0	10.5	
95 2-Hexanone	43	9.132	9.132	0.000	96	331914	40.0	41.0	
96 1,3-Dichloropropane	76	9.160	9.160	0.000	96	393671	10.0	9.93	
97 Tetrachloroethene	164	9.202	9.202	0.000	98	375067	10.0	9.50	
98 Chlorodibromomethane	129	9.341	9.341	0.000	90	242626	10.0	10.3	
100 Ethylene Dibromide	107	9.467	9.467	0.000	99	185356	10.0	10.0	
101 1-Chlorohexane	91	9.704	9.704	0.000	0	710381	10.0	9.57	
102 Chlorobenzene	112	9.816	9.816	0.000	95	1157917	10.0	9.77	
103 1,1,1,2-Tetrachloroethane	131	9.844	9.844	0.000	95	360044	10.0	9.91	
104 Ethylbenzene	106	9.858	9.858	0.000	98	728496	10.0	9.60	
105 m-Xylene & p-Xylene	106	9.928	9.928	0.000	100	881658	10.0	9.65	
109 o-Xylene	106	10.249	10.249	0.000	89	839497	10.0	9.90	
106 Styrene	104	10.249	10.249	0.000	86	1228878	10.0	9.98	
107 Bromoform	173	10.445	10.445	0.000	98	108814	10.0	10.0	
108 Isopropylbenzene	105	10.514	10.515	-0.001	96	2279065	10.0	9.93	
111 Cyclohexanone	55	10.626	10.626	0.000	92	154381	400.0	427.9	
112 1,1,2,2-Tetrachloroethane	83	10.696	10.696	0.000	95	198881	10.0	10.1	
113 trans-1,4-Dichloro-2-buten	53	10.724	10.724	0.000	91	48567	10.0	10.2	
114 1,2,3-Trichloropropane	110	10.766	10.766	0.000	87	54407	10.0	10.4	
116 Bromobenzene	156	10.822	10.822	0.000	52	417777	10.0	10.1	
115 N-Propylbenzene	120	10.822	10.822	0.000	97	641075	10.0	9.87	
120 1,3,5-Trimethylbenzene	105	10.933	10.934	-0.001	94	1885323	10.0	9.91	
117 2-Chlorotoluene	126	10.947	10.947	0.000	96	514155	10.0	10.1	
118 4-Chlorotoluene	126	11.017	11.017	0.000	98	501949	10.0	9.96	
119 tert-Butylbenzene	119	11.227	11.227	0.000	93	1853726	10.0	9.95	
121 1,2,4-Trimethylbenzene	105	11.255	11.255	0.000	98	1839857	10.0	9.83	
122 sec-Butylbenzene	134	11.408	11.408	0.000	95	505286	10.0	9.95	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
123 4-Isopropyltoluene	119	11.506	11.506	0.000	97	2112568	10.0	10.1	
124 1,3-Dichlorobenzene	146	11.562	11.562	0.000	97	885401	10.0	9.97	
126 1,4-Dichlorobenzene	146	11.632	11.632	0.000	95	850676	10.0	10.0	
127 n-Butylbenzene	91	11.855	11.855	0.000	98	2070706	10.0	9.97	
128 1,2-Dichlorobenzene	146	11.981	11.981	0.000	97	700455	10.0	10.2	
129 1,2-Dibromo-3-Chloropropan	157	12.707	12.707	0.000	80	25286	10.0	9.90	
130 1,2,4-Trichlorobenzene	180	13.657	13.657	0.000	94	469002	10.0	10.4	
131 Hexachlorobutadiene	225	13.824	13.825	-0.001	98	380537	10.0	10.3	
132 Naphthalene	128	14.006	14.006	0.000	97	576787	10.0	10.7	
133 1,2,3-Trichlorobenzene	180	14.327	14.327	0.000	95	349791	10.0	10.7	
S 140 1,2-Dichloroethene, Total	96				0		20.0	20.3	
S 135 1,3-Dichloropropene, Total	1				0		20.0	20.8	
S 136 1,2-Dichloroethene, Total	1				0		20.0	20.3	
S 134 Trihalomethanes, Total	1				0		40.0	40.4	
S 139 Xylenes, Total (URS)	1				0		20.0	19.6	
S 138 Xylenes, Total	106				0		20.0	19.6	

QC Flag Legend

Review Flags

M - Manually Integrated

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL
MV-Main B_00022	Amount Added:	5.00	Units: uL
MV-SS 2-Cleve_00046	Amount Added:	5.00	Units: uL
MV-Gas/Ket B_00044	Amount Added:	5.00	Units: uL

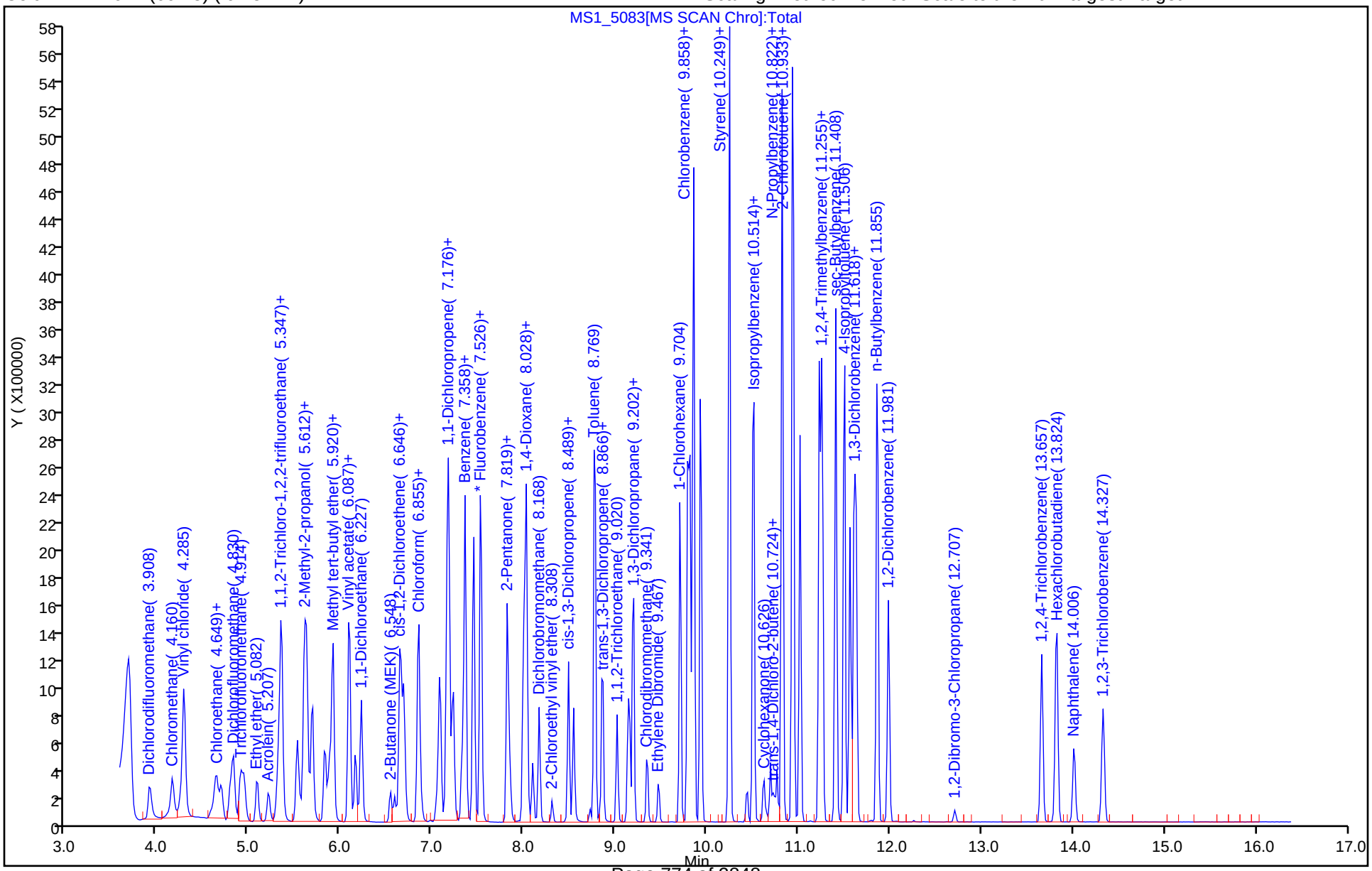
Report Date: 02-Aug-2018 13:05:08 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5083.D

Injection Date:	02-Aug-2018 11:35:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	icv			Worklist Smp#:	19
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	20
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



Manual Integration/User Assign Peak Report

TestAmerica Denver

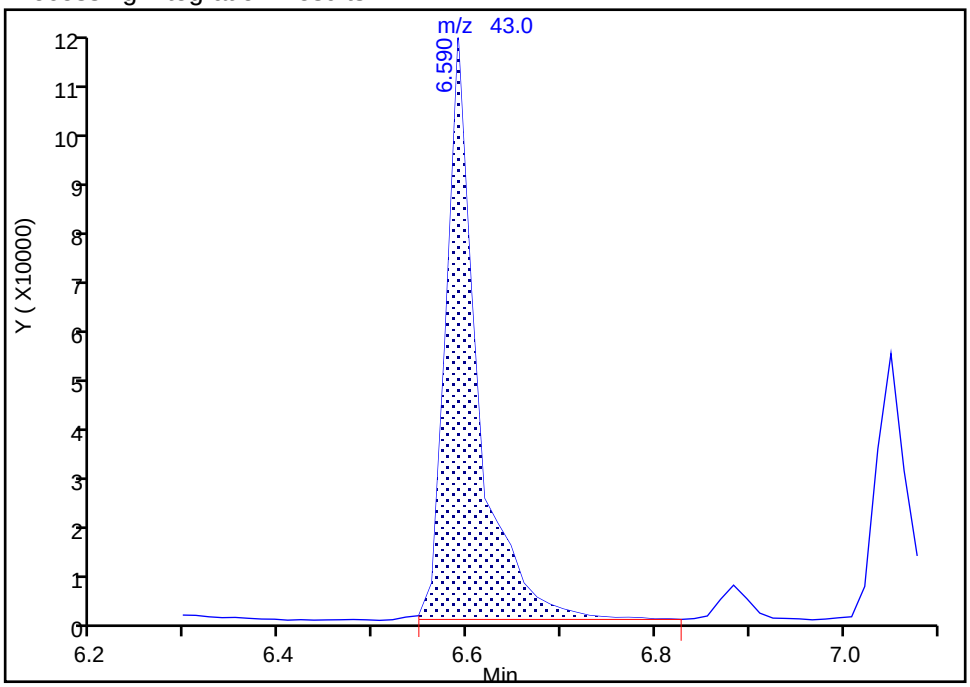
Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5083.D
Injection Date: 02-Aug-2018 11:35:30 Instrument ID: VMS_MS1
Lims ID: icv
Client ID:
Operator ID: wickhamt ALS Bottle#: 20 Worklist Smp#: 19
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Method: AQ_VMS1_8260 Limit Group: MSV - 8260B Water and Solid
Column: DB-624 (60.25) (0.25 mm) Detector MS SCAN

61 2-Butanone (MEK), CAS: 78-93-3

Signal: 1

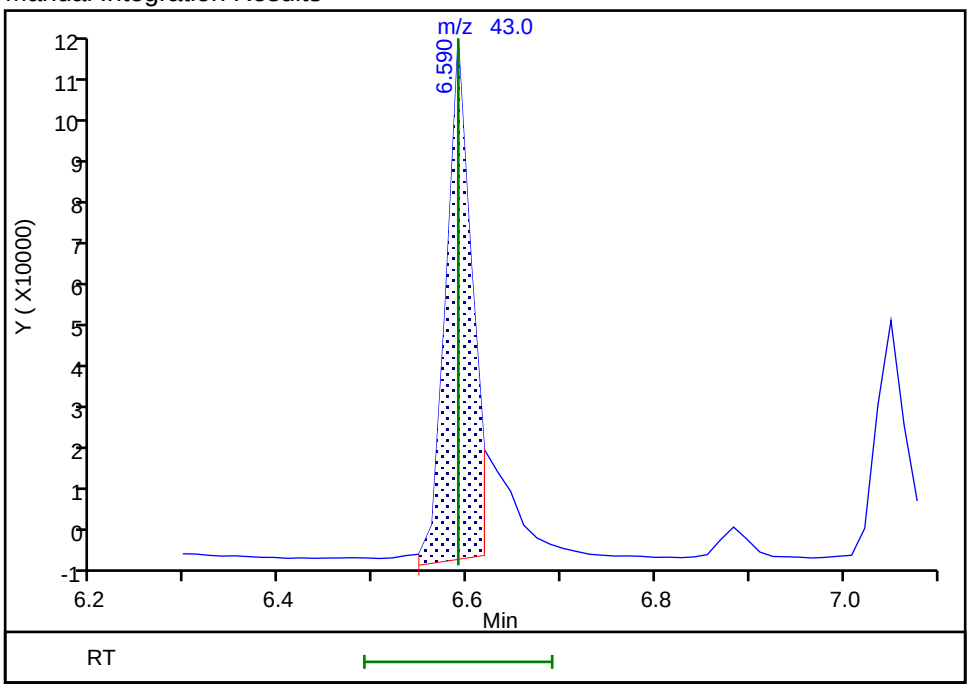
Processing Integration Results

RT: 6.59
Area: 261759
Amount: 47.746829
Amount Units: ug/l



Manual Integration Results

RT: 6.59
Area: 220477
Amount: 40.216679
Amount Units: ug/l



Reviewer: wickhamt, 02-Aug-2018 12:31:17
Audit Action: Assigned New Baseline Audit Reason: Shouldering

FORM VII
GC/MS VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424541/26 Calibration Date: 08/02/2018 14:17

Instrument ID: VMS_MS1 Calib Start Date: 03/27/2018 13:20

GC Column: DB-624 (60.25) ID: 0.25(mm) Calib End Date: 03/27/2018 15:02

Lab File ID: MS1_5091.D Conc. Units: mg/L Heated Purge: (Y/N) N

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Ethylene oxide	Lin		0.0024		0.782	1.00	-21.8	55.0

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5091.D
Lims ID: icv
Client ID:
Sample Type: ICV
Inject. Date: 02-Aug-2018 14:17:30 ALS Bottle#: 28 Worklist Smp#: 26
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: icv
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist:

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 03-Aug-2018 06:59:44 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0304

First Level Reviewer: wickhamt Date: 03-Aug-2018 06:59:44

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.585	5.598	-0.013	68	204330	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2158753	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	89	435634	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	604764	12.5	12.5	
$ 5 Dibromofluoromethane (Surr	111	6.981	6.981	0.000	93	366138	10.0	9.82	
$ 6 1,2-Dichloroethane-d4 (Sur	65	7.274	7.274	0.000	98	311263	10.0	9.82	
$ 7 Toluene-d8 (Surr)	98	8.727	8.727	0.000	93	1603998	10.0	9.57	
$ 8 4-Bromofluorobenzene (Surr	95	10.654	10.654	0.000	0	507044	10.0	9.38	
28 Ethylene oxide	43	4.565	4.565	0.000	99	418930	1000.0	782.1	
34 Ethanol	45	4.928	4.928	0.000	99	80313	600.0	550.8	
38 Propene oxide	58	5.180	5.179	0.001	0	2099052	1000.0	916.8	
41 Isopropyl alcohol	45	5.333	5.333	0.000	97	77926	100.0	92.7	
44 Acetonitrile	41	5.529	5.529	0.000	100	164780	100.0	98.8	
56 Isopropyl ether	87	6.199	6.199	0.000	95	321338	10.0	10.1	
58 2-Chloro-1,3-butadiene	53	6.297	6.297	0.000	92	742315	10.0	9.39	
59 Tert-butyl ethyl ether	59	6.464	6.464	0.000	98	850127	10.0	9.87	
60 Ethyl acetate	43	6.590	6.590	0.000	98	233894	20.0	17.8	
63 Propionitrile	54	6.632	6.632	0.000	99	183020	100.0	100.1	
66 Methacrylonitrile	41	6.772	6.772	0.000	91	881952	100.0	101.2	
76 Tert-amyl methyl ether	73	7.358	7.358	0.000	97	629405	10.0	9.87	
78 n-Butanol	56	7.554	7.554	0.000	86	89197	250.0	223.7	
81 Methyl methacrylate	100	7.945	7.945	0.000	91	81358	20.0	20.1	
87 2-Nitropropane	41	8.294	8.294	0.000	98	43315	20.0	18.1	
99 Tetrahydrothiophene	60	9.397	9.397	0.000	92	23181	20.0	26.6	
110 cis-1,4-Dichloro-2-butene	53	10.515	10.515	0.001	86	51703	20.0	14.6	
125 1,2,3-Trimethylbenzene	105	11.632	11.632	0.000	99	1607264	10.0	9.43	
21 1,3,5-Trichlorobenzene	180	12.945	12.945	0.000	97	616227	10.0	8.96	

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL
MV-ARCH SS A_00101	Amount Added:	0.80	Units: uL
MV-Supp B_00021	Amount Added:	5.00	Units: uL

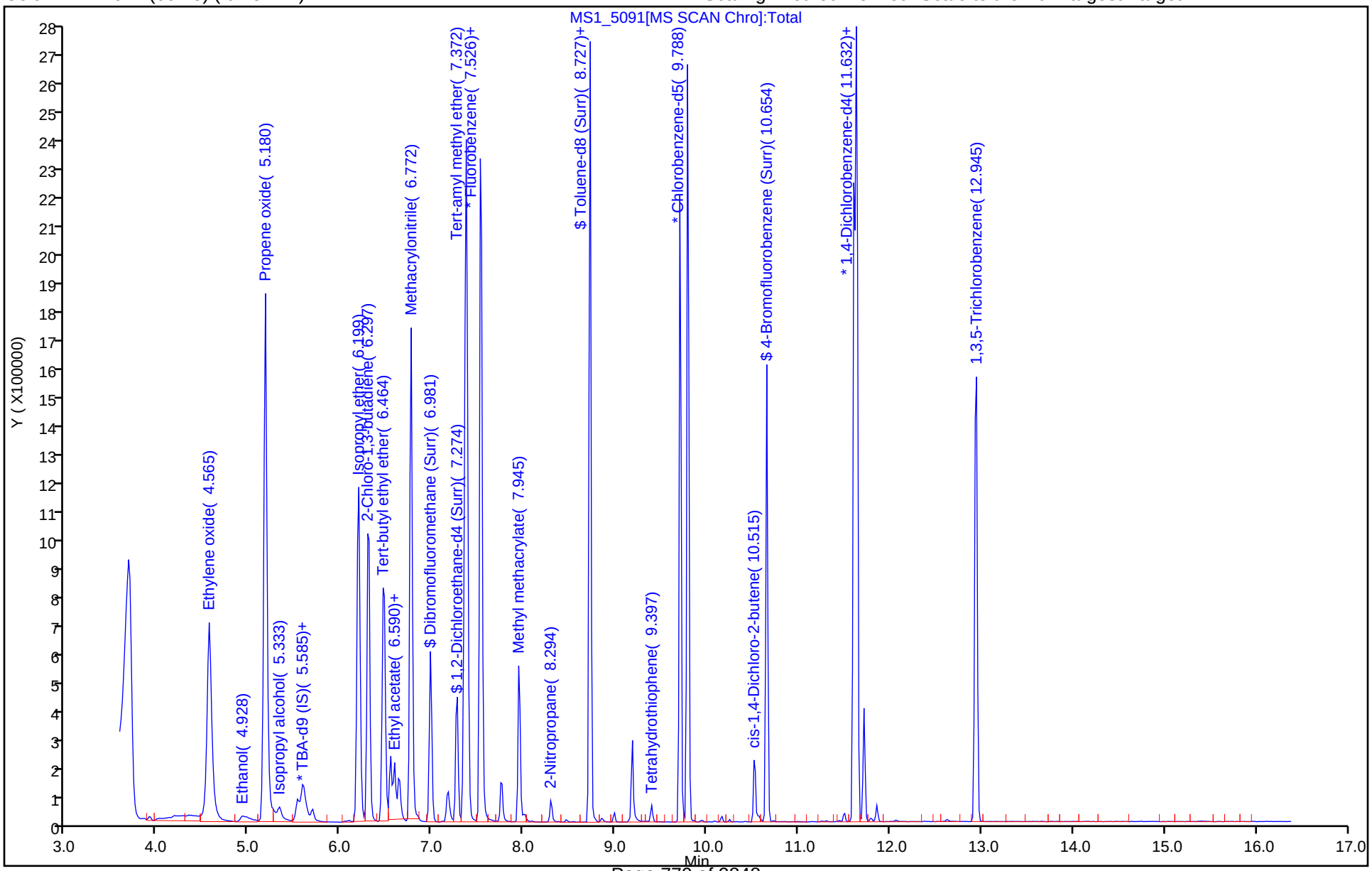
Report Date: 03-Aug-2018 06:59:45 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5091.D

Injection Date:	02-Aug-2018 14:17:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	icv			Worklist Smp#:	26
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	28
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



FORM VII
GC/MS VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424541/26 Calibration Date: 08/02/2018 14:17

Instrument ID: VMS_MS1 Calib Start Date: 08/02/2018 11:55

GC Column: DB-624 (60.25) ID: 0.25(mm) Calib End Date: 08/02/2018 13:37

Lab File ID: MS1_5091.D Conc. Units: mg/L Heated Purge: (Y/N) N

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Ethanol	Ave	0.1784	0.1638		0.551	0.600	-8.2	55.0
2-Propanol	Ave	1.028	0.9534		0.0927	0.100	-7.3	55.0
Acetonitrile	Ave	0.0097	0.0095		0.0988	0.100	-1.2	55.0
Di-isopropyl ether (DIPE)	Ave	0.1841	0.1861		0.0101	0.0100	1.1	35.0
Chloroprene	Ave	0.4579	0.4298		0.00939	0.0100	-6.1	35.0
Tert-butyl ethyl ether	Ave	0.4989	0.4923		0.00987	0.0100	-1.3	35.0
Ethyl acetate	Ave	0.0760	0.0677		0.0178	0.0200	-10.9	55.0
Propionitrile	Ave	0.0106	0.0106		0.100	0.100	0.1	55.0
Methacrylonitrile	Ave	0.0505	0.0511		0.101	0.100	1.2	55.0
Tert-amyl methyl ether	Ave	0.3694	0.3645		0.00987	0.0100	-1.3	35.0
n-Butanol	Lin2		0.4365		0.224	0.250	-10.5	55.0
Methyl methacrylate	Ave	0.0234	0.0236		0.0201	0.0200	0.6	35.0
2-Nitropropane	Ave	0.0139	0.0125		0.0181	0.0200	-9.6	55.0
cis-1,4-Dichloro-2-butene	Ave	0.0730	0.0534		0.0146	0.0200	-26.8	55.0
1,2,3-Trimethylbenzene	Ave	3.523	3.322		0.00943	0.0100	-5.7	35.0
Dibromofluoromethane (Surr)	Ave	0.2160	0.2120		0.00982	0.0100	-1.8	35.0
1,2-Dichloroethane-d4 (Surr)	Ave	0.1835	0.1802		0.00982	0.0100	-1.8	35.0
Toluene-d8 (Surr)	Ave	4.811	4.602		0.00957	0.0100	-4.3	35.0
4-Bromofluorobenzene (Surr)	Ave	1.117	1.048		0.00938	0.0100	-6.2	35.0

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5091.D
Lims ID: icv
Client ID:
Sample Type: ICV
Inject. Date: 02-Aug-2018 14:17:30 ALS Bottle#: 28 Worklist Smp#: 26
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: icv
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist:

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 03-Aug-2018 06:59:44 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0304

First Level Reviewer: wickhamt Date: 03-Aug-2018 06:59:44

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.585	5.598	-0.013	68	204330	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2158753	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	89	435634	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	604764	12.5	12.5	
$ 5 Dibromofluoromethane (Surr	111	6.981	6.981	0.000	93	366138	10.0	9.82	
$ 6 1,2-Dichloroethane-d4 (Sur	65	7.274	7.274	0.000	98	311263	10.0	9.82	
$ 7 Toluene-d8 (Surr)	98	8.727	8.727	0.000	93	1603998	10.0	9.57	
$ 8 4-Bromofluorobenzene (Surr	95	10.654	10.654	0.000	0	507044	10.0	9.38	
28 Ethylene oxide	43	4.565	4.565	0.000	99	418930	1000.0	782.1	
34 Ethanol	45	4.928	4.928	0.000	99	80313	600.0	550.8	
38 Propene oxide	58	5.180	5.179	0.001	0	2099052	1000.0	916.8	
41 Isopropyl alcohol	45	5.333	5.333	0.000	97	77926	100.0	92.7	
44 Acetonitrile	41	5.529	5.529	0.000	100	164780	100.0	98.8	
56 Isopropyl ether	87	6.199	6.199	0.000	95	321338	10.0	10.1	
58 2-Chloro-1,3-butadiene	53	6.297	6.297	0.000	92	742315	10.0	9.39	
59 Tert-butyl ethyl ether	59	6.464	6.464	0.000	98	850127	10.0	9.87	
60 Ethyl acetate	43	6.590	6.590	0.000	98	233894	20.0	17.8	
63 Propionitrile	54	6.632	6.632	0.000	99	183020	100.0	100.1	
66 Methacrylonitrile	41	6.772	6.772	0.000	91	881952	100.0	101.2	
76 Tert-amyl methyl ether	73	7.358	7.358	0.000	97	629405	10.0	9.87	
78 n-Butanol	56	7.554	7.554	0.000	86	89197	250.0	223.7	
81 Methyl methacrylate	100	7.945	7.945	0.000	91	81358	20.0	20.1	
87 2-Nitropropane	41	8.294	8.294	0.000	98	43315	20.0	18.1	
99 Tetrahydrothiophene	60	9.397	9.397	0.000	92	23181	20.0	26.6	
110 cis-1,4-Dichloro-2-butene	53	10.515	10.515	0.001	86	51703	20.0	14.6	
125 1,2,3-Trimethylbenzene	105	11.632	11.632	0.000	99	1607264	10.0	9.43	
21 1,3,5-Trichlorobenzene	180	12.945	12.945	0.000	97	616227	10.0	8.96	

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL
MV-ARCH SS A_00101	Amount Added:	0.80	Units: uL
MV-Supp B_00021	Amount Added:	5.00	Units: uL

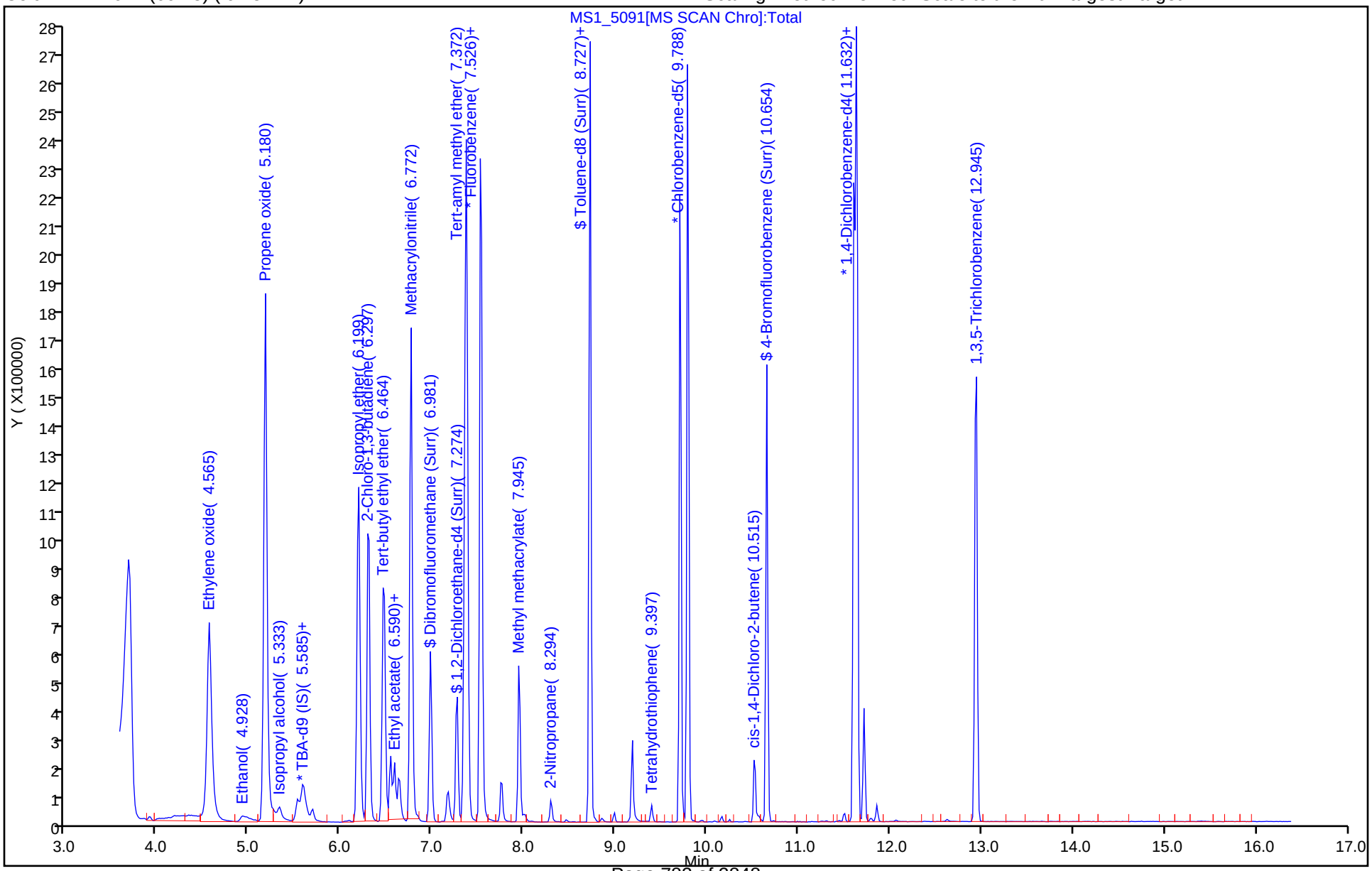
Report Date: 03-Aug-2018 06:59:45 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5091.D

Injection Date:	02-Aug-2018 14:17:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	icv			Worklist Smp#:	26
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	28
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



FORM VII
GC/MS VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-424938/2 Calibration Date: 08/06/2018 07:47

Instrument ID: VMS_MS1 Calib Start Date: 08/02/2018 08:53

GC Column: DB-624 (60.25) ID: 0.25(mm) Calib End Date: 08/02/2018 10:54

Lab File ID: MS1_5228.D Conc. Units: mg/L Heated Purge: (Y/N) N

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Dichlorodifluoromethane	Ave	0.2832	0.2938		0.0104	0.0100	3.7	50.0
Chloromethane	Ave	0.3441	0.3398	0.1000	0.00987	0.0100	-1.3	35.0
Vinyl chloride	Ave	0.3302	0.3497		0.0106	0.0100	5.9	20.0
Bromomethane	Ave	0.2412	0.2374		0.00985	0.0100	-1.5	35.0
Chloroethane	Ave	0.2408	0.2355		0.00978	0.0100	-2.2	35.0
Dichlorofluoromethane	Ave	0.5369	0.5599		0.0104	0.0100	4.3	50.0
Trichlorofluoromethane	Ave	0.4226	0.4215		0.00997	0.0100	-0.3	50.0
Ethyl ether	Ave	0.1245	0.1161		0.00933	0.0100	-6.7	35.0
Acrolein	Ave	0.0148	0.0143		0.0963	0.100	-3.7	50.0
Acetone	Lin2		0.0213		0.0418	0.0400	4.5	50.0
Freon 113	Ave	0.1920	0.1947		0.0101	0.0100	1.4	50.0
1,1-Dichloroethene	Ave	0.2694	0.2628		0.00976	0.0100	-2.4	20.0
Iodomethane	Ave	0.4149	0.4112		0.00991	0.0100	-0.9	35.0
Methyl acetate	Ave	0.0597	0.0528		0.0177	0.0200	-11.6	50.0
Allyl chloride	Ave	0.5030	0.4995		0.00993	0.0100	-0.7	35.0
Carbon disulfide	Ave	1.201	1.185		0.00986	0.0100	-1.4	50.0
Tert-butyl alcohol (2-methyl-2-propanol)	Ave	1.217	1.246		0.102	0.100	2.3	35.0
Methylene Chloride	Lin2		0.2558		0.0103	0.0100	3.3	35.0
Acrylonitrile	Ave	0.0299	0.0289		0.0967	0.100	-3.3	50.0
Methyl tert-butyl ether	Ave	0.3304	0.3183		0.00963	0.0100	-3.7	35.0
trans-1,2-Dichloroethene	Ave	0.3021	0.3011		0.00997	0.0100	-0.3	35.0
Hexane	Ave	2.548	2.323		0.00912	0.0100	-8.8	35.0
Vinyl acetate	Ave	0.2173	0.2199		0.0202	0.0200	1.2	35.0
1,1-Dichloroethane	Ave	0.5259	0.5394	0.1000	0.0103	0.0100	2.6	35.0
2-Butanone (MEK)	Ave	0.0321	0.0308		0.0384	0.0400	-4.1	50.0
cis-1,2-Dichloroethene	Ave	0.3042	0.3034		0.00997	0.0100	-0.3	35.0
2,2-Dichloropropane	Ave	0.4270	0.4380		0.0103	0.0100	2.6	35.0
Chlorobromomethane	Ave	0.0901	0.0902		0.0100	0.0100	0.0	35.0
Chloroform	Ave	0.4592	0.4747		0.0103	0.0100	3.4	20.0
Tetrahydrofuran	Lin2		0.0192		0.0166	0.0200	-17.0	50.0
Isobutyl alcohol	Ave	0.4657	0.4968		0.267	0.250	6.7	50.0
1,1,1-Trichloroethane	Ave	0.4345	0.4519		0.0104	0.0100	4.0	35.0
Cyclohexane	Ave	0.5841	0.5696		0.00975	0.0100	-2.5	35.0
1,1-Dichloropropene	Ave	0.4246	0.4344		0.0102	0.0100	2.3	35.0
Carbon tetrachloride	Ave	0.3689	0.3752		0.0102	0.0100	1.7	35.0
1,2-Dichloroethane	Ave	0.2252	0.2297		0.0102	0.0100	2.0	35.0
Benzene	Ave	1.166	1.188		0.0102	0.0100	1.9	35.0
Trichloroethene	Ave	0.2946	0.3004		0.0102	0.0100	2.0	35.0
2-Pentanone	Ave	0.0557	0.0499		0.0358	0.0400	-10.5	50.0
1,2-Dichloropropane	Ave	0.2632	0.2627		0.00998	0.0100	-0.2	20.0

FORM VII
GC/MS VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-424938/2 Calibration Date: 08/06/2018 07:47

Instrument ID: VMS_MS1 Calib Start Date: 08/02/2018 08:53

GC Column: DB-624 (60.25) ID: 0.25(mm) Calib End Date: 08/02/2018 10:54

Lab File ID: MS1_5228.D Conc. Units: mg/L Heated Purge: (Y/N) N

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Methylcyclohexane	Ave	0.4669	0.4673		0.0100	0.0100	0.0	35.0
1,4-Dioxane	Ave	0.0007	0.0007		0.201	0.200	0.7	50.0
Dibromomethane	Ave	0.0878	0.0880		0.0100	0.0100	0.1	35.0
Dichlorobromomethane	Ave	0.2797	0.2868		0.0103	0.0100	2.5	35.0
2-Chloroethyl vinyl ether	Lin1		0.0445		0.0102	0.0100	2.3	50.0
cis-1,3-Dichloropropene	Ave	1.583	1.528		0.00965	0.0100	-3.5	35.0
4-Methyl-2-pentanone (MIBK)	Ave	0.0711	0.0741		0.0417	0.0400	4.2	50.0
Toluene	Ave	1.183	1.226		0.0104	0.0100	3.6	20.0
Ethyl methacrylate	Ave	0.6736	0.5754		0.00854	0.0100	-14.6	35.0
trans-1,3-Dichloropropene	Ave	0.2267	0.2315		0.0102	0.0100	2.1	35.0
1,1,2-Trichloroethane	Ave	0.1163	0.1119		0.00962	0.0100	-3.8	35.0
Methyl n-butyl ketone (MNBK)	Ave	0.2264	0.2221		0.0392	0.0400	-1.9	50.0
1,3-Dichloropropane	Ave	1.108	1.054		0.00951	0.0100	-4.9	35.0
Tetrachloroethene	Ave	1.104	1.091		0.00989	0.0100	-1.1	35.0
Chlorodibromomethane	Ave	0.6590	0.6342		0.00962	0.0100	-3.8	35.0
1,2-Dibromoethane	Ave	0.5164	0.4893		0.00947	0.0100	-5.3	35.0
1-Chlorohexane	Ave	2.075	1.987		0.00957	0.0100	-4.3	35.0
Chlorobenzene	Ave	3.313	3.270	0.3000	0.00987	0.0100	-1.3	35.0
1,1,1,2-Tetrachloroethane	Ave	1.015	1.020		0.0100	0.0100	0.5	35.0
Ethylbenzene	Ave	2.121	2.124		0.0100	0.0100	0.1	50.0
m-Xylene & p-Xylene	Ave	2.553	2.530		0.00991	0.0100	-0.9	35.0
o-Xylene	Ave	2.369	2.372		0.0100	0.0100	0.1	35.0
Styrene	Ave	3.443	3.504		0.0102	0.0100	1.8	35.0
Bromoform	Lin2		0.2723	0.1000	0.00895	0.0100	-10.5	35.0
Isopropylbenzene	Ave	4.733	4.443		0.00939	0.0100	-6.1	35.0
Cyclohexanone	Ave	0.0101	0.0098		0.387	0.400	-3.3	35.0
1,1,2,2-Tetrachloroethane	Ave	0.4045	0.3564	0.3000	0.00881	0.0100	-11.9	35.0
trans-1,4-Dichloro-2-butene	Ave	0.0978	0.0771		0.00788	0.0100	-21.2	35.0
1,2,3-Trichloropropane	Ave	0.1076	0.0993		0.00923	0.0100	-7.7	35.0
Bromobenzene	Ave	0.8515	0.8019		0.00942	0.0100	-5.8	35.0
N-Propylbenzene	Ave	1.339	1.254		0.00936	0.0100	-6.4	35.0
1,3,5-Trimethylbenzene	Ave	3.923	3.755		0.00957	0.0100	-4.3	35.0
2-Chlorotoluene	Ave	1.053	1.019		0.00968	0.0100	-3.2	35.0
4-Chlorotoluene	Ave	1.040	0.9768		0.00940	0.0100	-6.0	35.0
tert-Butylbenzene	Ave	3.842	3.635		0.00946	0.0100	-5.4	35.0
1,2,4-Trimethylbenzene	Ave	3.860	3.711		0.00961	0.0100	-3.9	35.0
sec-Butylbenzene	Ave	1.047	1.002		0.00957	0.0100	-4.3	35.0
4-Isopropyltoluene	Ave	4.301	4.131		0.00960	0.0100	-4.0	35.0
1,3-Dichlorobenzene	Ave	1.832	1.754		0.00958	0.0100	-4.2	35.0
1,4-Dichlorobenzene	Ave	1.747	1.669		0.00955	0.0100	-4.5	35.0
n-Butylbenzene	Ave	4.282	4.185		0.00977	0.0100	-2.3	35.0

FORM VII
GC/MS VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-424938/2 Calibration Date: 08/06/2018 07:47

Instrument ID: VMS_MS1 Calib Start Date: 08/02/2018 08:53

GC Column: DB-624 (60.25) ID: 0.25(mm) Calib End Date: 08/02/2018 10:54

Lab File ID: MS1_5228.D Conc. Units: mg/L Heated Purge: (Y/N) N

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
1,2-Dichlorobenzene	Ave	1.417	1.325		0.00935	0.0100	-6.5	35.0
1,2-Dibromo-3-Chloropropane	Lin2		0.0390		0.00748	0.0100	-25.2	50.0
1,2,4-Trichlorobenzene	Ave	0.9266	0.8603		0.00928	0.0100	-7.2	35.0
Hexachlorobutadiene	Ave	0.7646	0.7272		0.00951	0.0100	-4.9	35.0
Naphthalene	Ave	1.117	0.9174		0.00822	0.0100	-17.8	35.0
1,2,3-Trichlorobenzene	Ave	0.6725	0.6110		0.00909	0.0100	-9.1	35.0

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5228.D
Lims ID: CCV
Client ID:
Sample Type: CCV
Inject. Date: 06-Aug-2018 07:47:30 ALS Bottle#: 11 Worklist Smp#: 2
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: ccv m
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist: chrom-AQ_VMS1_8260*sub76

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 07-Aug-2018 06:54:53 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0316

First Level Reviewer: wickhamt Date: 06-Aug-2018 08:25:12

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.584	5.584	0.000	88	171503	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2111006	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	90	444184	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	661102	12.5	12.5	
$ 5 Dibromofluoromethane (Surr	111	6.981	6.981	0.000	93	476672	12.3	13.1	
$ 6 1,2-Dichloroethane-d4 (Sur	65	7.260	7.260	0.000	99	387600	12.3	12.5	
$ 7 Toluene-d8 (Surr)	98	8.727	8.727	0.000	93	2264865	12.3	13.2	
$ 8 4-Bromofluorobenzene (Surr	95	10.654	10.654	0.000	0	693735	12.3	11.7	
24 Dichlorodifluoromethane	85	3.909	3.909	0.000	100	496092	10.0	10.4	
26 Chloromethane	50	4.160	4.160	0.000	99	573788	10.0	9.87	
27 Vinyl chloride	62	4.286	4.286	0.000	98	590524	10.0	10.6	
29 Bromomethane	94	4.635	4.635	0.000	91	400976	10.0	9.85	
31 Chloroethane	64	4.691	4.691	0.000	100	397736	10.0	9.78	
32 Dichlorofluoromethane	67	4.816	4.816	0.000	98	945530	10.0	10.4	
33 Trichlorofluoromethane	101	4.914	4.914	0.000	99	711834	10.0	9.97	
36 Ethyl ether	59	5.082	5.082	0.000	93	196079	10.0	9.33	
39 Acrolein	56	5.207	5.207	0.000	100	241564	100.0	96.3	
40 Acetone	43	5.305	5.305	0.000	100	143541	40.0	41.8	
42 1,1,2-Trichloro-1,2,2-trif	151	5.333	5.333	0.000	98	328761	10.0	10.1	
43 1,1-Dichloroethene	96	5.361	5.361	0.000	99	443883	10.0	9.76	
45 Iodomethane	142	5.529	5.529	0.000	99	694406	10.0	9.91	
46 Methyl acetate	43	5.543	5.543	0.000	97	178489	20.0	17.7	
47 3-Chloro-1-propene	41	5.598	5.598	0.000	89	843598	10.0	9.93	
48 Carbon disulfide	76	5.626	5.626	0.000	99	2000747	10.0	9.86	
49 2-Methyl-2-propanol	59	5.654	5.654	0.000	94	85461	100.0	102.3	
50 Methylene Chloride	84	5.696	5.696	0.000	94	431987	10.0	10.3	
51 Acrylonitrile	53	5.822	5.822	0.000	98	487561	100.0	96.7	
52 Methyl tert-butyl ether	73	5.878	5.878	0.000	96	537458	10.0	9.63	
53 trans-1,2-Dichloroethene	96	5.920	5.920	0.000	97	508525	10.0	9.97	
54 Hexane	57	6.087	6.087	0.000	93	825593	10.0	9.12	
55 Vinyl acetate	43	6.157	6.157	0.000	97	742773	20.0	20.2	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
57 1,1-Dichloroethane	63	6.227	6.227	0.000	97	910979	10.0	10.3	
61 2-Butanone (MEK)	43	6.590	6.590	0.000	100	207966	40.0	38.4	M
62 sec-Butyl Alcohol	45	6.632	6.632	0.000	96	222530	300.0	283.7	
64 cis-1,2-Dichloroethene	96	6.646	6.646	0.000	84	512445	10.0	9.97	
65 2,2-Dichloropropane	77	6.688	6.688	0.000	92	739687	10.0	10.3	
67 Chlorobromomethane	128	6.841	6.841	0.000	92	152372	10.0	10.0	
68 Chloroform	83	6.855	6.855	0.000	95	801691	10.0	10.3	
69 Tetrahydrofuran	42	6.883	6.883	0.000	87	64680	20.0	16.6	
70 Isobutyl alcohol	41	7.051	7.051	0.000	92	85206	250.0	266.7	
71 1,1,1-Trichloroethane	97	7.079	7.079	0.000	98	763220	10.0	10.4	
72 Cyclohexane	56	7.163	7.163	0.000	0	961860	10.0	9.75	
73 1,1-Dichloropropene	75	7.177	7.177	0.000	97	733650	10.0	10.2	
74 Carbon tetrachloride	117	7.232	7.232	0.000	98	633689	10.0	10.2	
75 1,2-Dichloroethane	62	7.330	7.330	0.000	97	387841	10.0	10.2	
77 Benzene	78	7.358	7.358	0.000	97	2006543	10.0	10.2	
9 n-Heptane	43	7.456	7.456	0.000	92	873851	10.0	9.89	
79 Trichloroethene	95	7.819	7.819	0.000	97	507283	10.0	10.2	
80 2-Pentanone	43	7.847	7.847	0.000	99	336778	40.0	35.8	
82 1,2-Dichloropropane	63	8.001	8.001	0.000	96	443603	10.0	9.98	
83 Methylcyclohexane	55	8.029	8.029	0.000	0	789142	10.0	10.0	
84 1,4-Dioxane	88	8.056	8.056	0.000	90	25092	200.0	201.3	
85 Dibromomethane	93	8.098	8.098	0.000	95	148536	10.0	10.0	
86 Dichlorobromomethane	83	8.168	8.168	0.000	100	484308	10.0	10.3	
88 2-Chloroethyl vinyl ether	63	8.308	8.308	0.000	91	75103	10.0	10.2	
89 cis-1,3-Dichloropropene	75	8.489	8.489	0.000	96	543062	10.0	9.65	
90 4-Methyl-2-pentanone (MIBK	43	8.545	8.545	0.000	97	500343	40.0	41.7	
91 Toluene	91	8.769	8.769	0.000	99	2069771	10.0	10.4	
92 Ethyl methacrylate	69	8.853	8.853	0.000	89	204468	10.0	8.54	
93 trans-1,3-Dichloropropene	75	8.867	8.867	0.000	98	391016	10.0	10.2	
94 1,1,2-Trichloroethane	97	9.020	9.020	0.000	92	188995	10.0	9.62	
95 2-Hexanone	43	9.132	9.132	0.000	96	315754	40.0	39.2	
96 1,3-Dichloropropane	76	9.160	9.160	0.000	96	374388	10.0	9.51	
97 Tetrachloroethene	164	9.202	9.202	0.000	98	387826	10.0	9.89	
98 Chlorodibromomethane	129	9.341	9.341	0.000	90	225354	10.0	9.62	
100 Ethylene Dibromide	107	9.467	9.467	0.000	98	173874	10.0	9.47	
101 1-Chlorohexane	91	9.705	9.705	0.000	0	705938	10.0	9.57	
102 Chlorobenzene	112	9.816	9.816	0.000	94	1162123	10.0	9.87	
103 1,1,1,2-Tetrachloroethane	131	9.844	9.844	0.000	95	362598	10.0	10.0	
104 Ethylbenzene	106	9.858	9.858	0.000	98	754848	10.0	10.0	
105 m-Xylene & p-Xylene	106	9.928	9.928	0.000	100	899170	10.0	9.91	
106 Styrene	104	10.249	10.249	0.000	85	1245265	10.0	10.2	
109 o-Xylene	106	10.249	10.249	0.000	89	843028	10.0	10.0	
107 Bromoform	173	10.445	10.445	0.000	97	96747	10.0	8.95	
108 Isopropylbenzene	105	10.515	10.515	0.000	96	2349978	10.0	9.39	
111 Cyclohexanone	55	10.626	10.626	0.000	92	138604	400.0	386.8	
112 1,1,2,2-Tetrachloroethane	83	10.696	10.696	0.000	95	188492	10.0	8.81	
113 trans-1,4-Dichloro-2-buten	53	10.724	10.724	0.000	89	40785	10.0	7.88	
114 1,2,3-Trichloropropane	110	10.766	10.766	0.000	87	52504	10.0	9.23	
116 Bromobenzene	156	10.822	10.822	0.000	52	424088	10.0	9.42	
115 N-Propylbenzene	120	10.822	10.822	0.000	97	663012	10.0	9.36	
120 1,3,5-Trimethylbenzene	105	10.934	10.934	0.000	94	1985764	10.0	9.57	
117 2-Chlorotoluene	126	10.948	10.948	0.000	96	538914	10.0	9.68	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
118 4-Chlorotoluene	126	11.017	11.017	0.000	99	516605	10.0	9.40	
119 tert-Butylbenzene	119	11.227	11.227	0.000	93	1922580	10.0	9.46	
121 1,2,4-Trimethylbenzene	105	11.255	11.255	0.000	98	1962735	10.0	9.61	
122 sec-Butylbenzene	134	11.408	11.408	0.000	95	529908	10.0	9.57	
123 4-Isopropyltoluene	119	11.506	11.506	0.000	96	2184939	10.0	9.60	
124 1,3-Dichlorobenzene	146	11.562	11.562	0.000	97	927667	10.0	9.58	
126 1,4-Dichlorobenzene	146	11.632	11.632	0.000	95	882694	10.0	9.55	
127 n-Butylbenzene	91	11.855	11.855	0.000	98	2213244	10.0	9.77	
128 1,2-Dichlorobenzene	146	11.981	11.981	0.000	97	700843	10.0	9.35	
129 1,2-Dibromo-3-Chloropropan	157	12.707	12.707	0.000	77	20601	10.0	7.48	
130 1,2,4-Trichlorobenzene	180	13.657	13.657	0.000	94	454991	10.0	9.28	
131 Hexachlorobutadiene	225	13.825	13.825	0.000	98	384624	10.0	9.51	
132 Naphthalene	128	14.006	14.006	0.000	97	485187	10.0	8.22	
133 1,2,3-Trichlorobenzene	180	14.327	14.327	0.000	95	323133	10.0	9.09	
S 140 1,2-Dichloroethene, Total	96				0		20.0	19.9	
S 136 1,2-Dichloroethene, Total	1				0		20.0	19.9	
S 134 Trihalomethanes, Total	1				0		40.0	39.2	
S 139 Xylenes, Total (URS)	1				0		20.0	19.9	
S 135 1,3-Dichloropropene, Total	1				0		20.0	19.9	
S 138 Xylenes, Total	106				0		20.0	19.9	

QC Flag Legend

Review Flags

M - Manually Integrated

Reagents:

MV-2cleve+AVA_00036	Amount Added:	5.00	Units: uL	
MV-Main A_00037	Amount Added:	5.00	Units: uL	
MV-Gas/Ket A_00075	Amount Added:	5.00	Units: uL	
MV-568718-D_00014	Amount Added:	1.00	Units: uL	Run Reagent
MV-ARCH SS A_00101	Amount Added:	0.98	Units: uL	Run Reagent

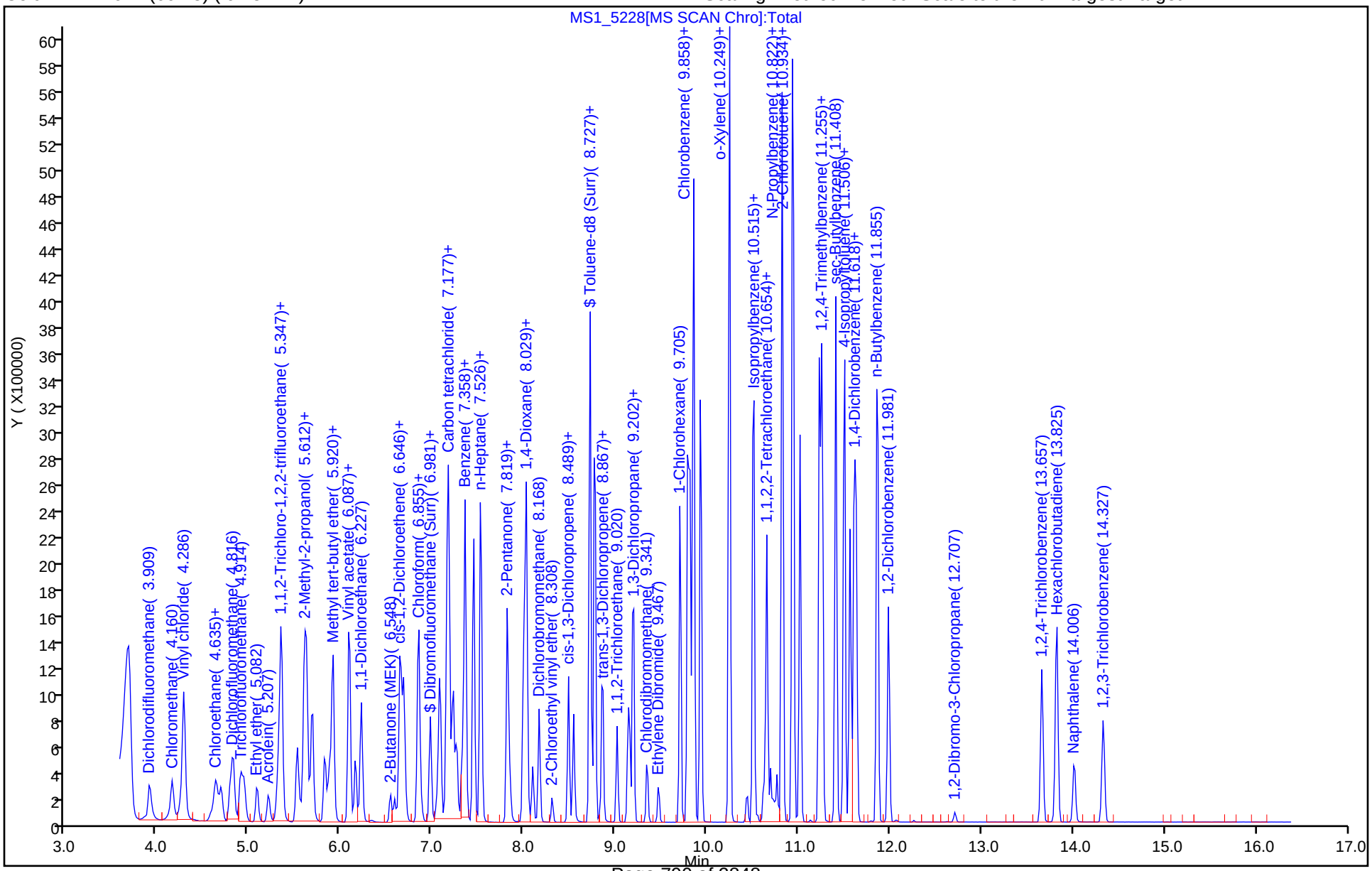
Report Date: 07-Aug-2018 06:54:54 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5228.D

Injection Date:	06-Aug-2018 07:47:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	CCV			Worklist Smp#:	2
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	11
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



Manual Integration/User Assign Peak Report

TestAmerica Denver

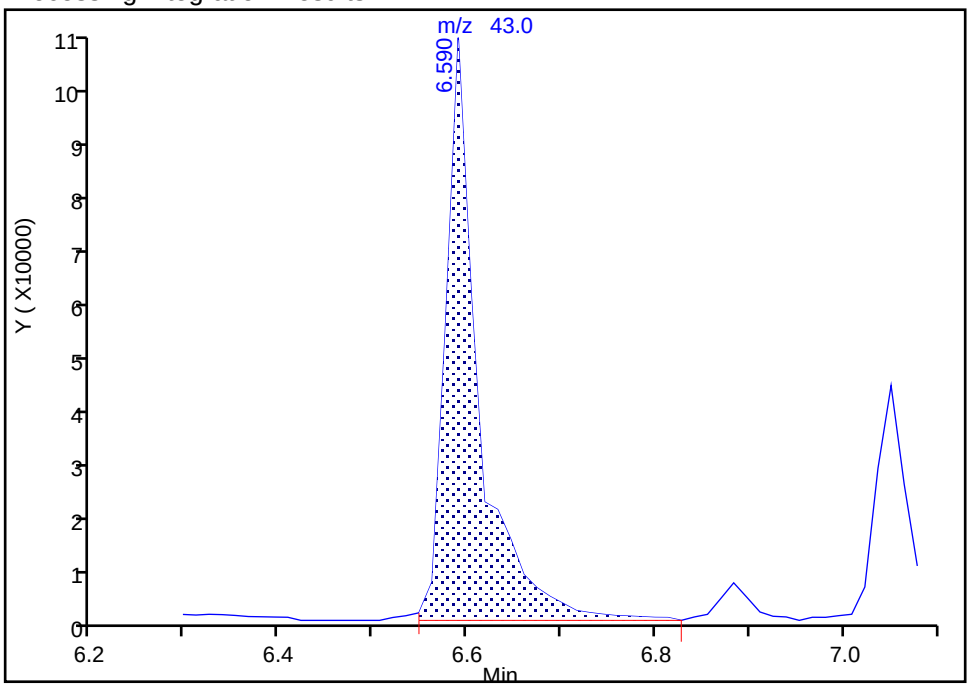
Data File:	\\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5228.D				
Injection Date:	06-Aug-2018 07:47:30	Instrument ID:	VMS_MS1		
Lims ID:	CCV				
Client ID:					
Operator ID:	wickhamt	ALS Bottle#:	11	Worklist Smp#:	2
Purge Vol:	20.000 mL	Dil. Factor:	1.0000		
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		
Column:	DB-624 (60.25) (0.25 mm)	Detector	MS SCAN		

61 2-Butanone (MEK), CAS: 78-93-3

Signal: 1

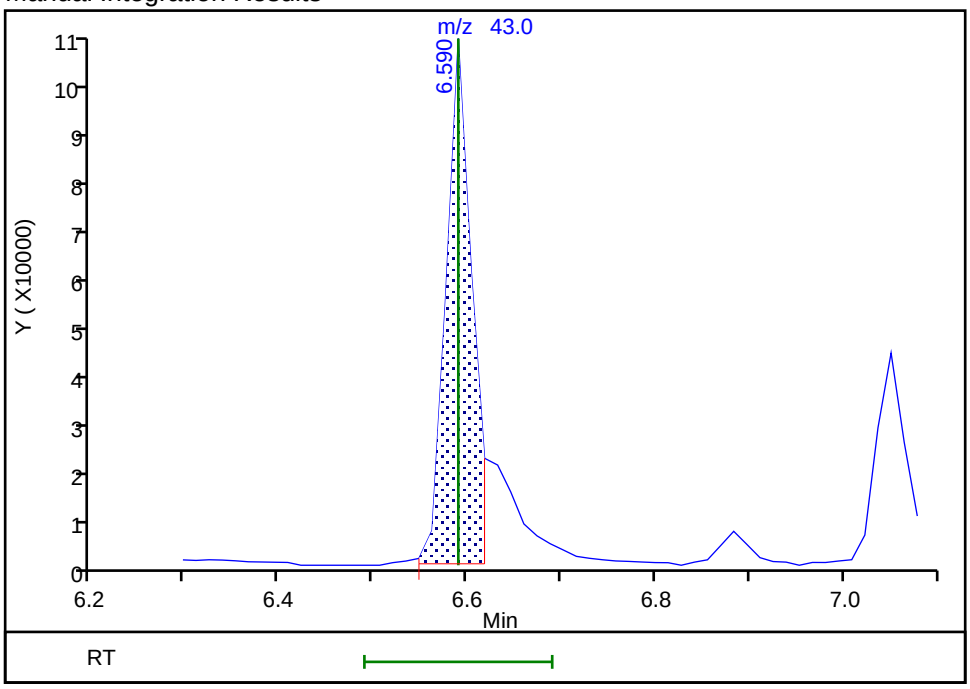
Processing Integration Results

RT: 6.59
Area: 263926
Amount: 48.697233
Amount Units: ug/l



Manual Integration Results

RT: 6.59
Area: 207966
Amount: 38.372001
Amount Units: ug/l



Reviewer: wickhamt, 06-Aug-2018 08:08:25
Audit Action: Assigned New Baseline Audit Reason: Shouldering

FORM VII
GC/MS VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-424938/2 Calibration Date: 08/06/2018 07:47

Instrument ID: VMS_MS1 Calib Start Date: 08/02/2018 11:55

GC Column: DB-624 (60.25) ID: 0.25(mm) Calib End Date: 08/02/2018 13:37

Lab File ID: MS1_5228.D Conc. Units: mg/L Heated Purge: (Y/N) N

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Dibromofluoromethane (Surr)	Ave	0.2160	0.2304		0.0131	0.0123	6.7	35.0
1,2-Dichloroethane-d4 (Surr)	Ave	0.1835	0.1874		0.0125	0.0123	2.1	35.0
Toluene-d8 (Surr)	Ave	4.811	5.203		0.0132	0.0123	8.1	35.0
4-Bromofluorobenzene (Surr)	Ave	1.117	1.071		0.0117	0.0123	-4.1	35.0

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5228.D
Lims ID: CCV
Client ID:
Sample Type: CCV
Inject. Date: 06-Aug-2018 07:47:30 ALS Bottle#: 11 Worklist Smp#: 2
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: ccv m
Operator ID: wickhamt Instrument ID: VMS_MS1
Sublist: chrom-AQ_VMS1_8260*sub76

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 07-Aug-2018 06:54:53 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0316

First Level Reviewer: wickhamt Date: 06-Aug-2018 08:25:12

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.584	5.584	0.000	88	171503	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2111006	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	90	444184	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	661102	12.5	12.5	
$ 5 Dibromofluoromethane (Surr	111	6.981	6.981	0.000	93	476672	12.3	13.1	
$ 6 1,2-Dichloroethane-d4 (Sur	65	7.260	7.260	0.000	99	387600	12.3	12.5	
$ 7 Toluene-d8 (Surr)	98	8.727	8.727	0.000	93	2264865	12.3	13.2	
$ 8 4-Bromofluorobenzene (Surr	95	10.654	10.654	0.000	0	693735	12.3	11.7	
24 Dichlorodifluoromethane	85	3.909	3.909	0.000	100	496092	10.0	10.4	
26 Chloromethane	50	4.160	4.160	0.000	99	573788	10.0	9.87	
27 Vinyl chloride	62	4.286	4.286	0.000	98	590524	10.0	10.6	
29 Bromomethane	94	4.635	4.635	0.000	91	400976	10.0	9.85	
31 Chloroethane	64	4.691	4.691	0.000	100	397736	10.0	9.78	
32 Dichlorofluoromethane	67	4.816	4.816	0.000	98	945530	10.0	10.4	
33 Trichlorofluoromethane	101	4.914	4.914	0.000	99	711834	10.0	9.97	
36 Ethyl ether	59	5.082	5.082	0.000	93	196079	10.0	9.33	
39 Acrolein	56	5.207	5.207	0.000	100	241564	100.0	96.3	
40 Acetone	43	5.305	5.305	0.000	100	143541	40.0	41.8	
42 1,1,2-Trichloro-1,2,2-trif	151	5.333	5.333	0.000	98	328761	10.0	10.1	
43 1,1-Dichloroethene	96	5.361	5.361	0.000	99	443883	10.0	9.76	
45 Iodomethane	142	5.529	5.529	0.000	99	694406	10.0	9.91	
46 Methyl acetate	43	5.543	5.543	0.000	97	178489	20.0	17.7	
47 3-Chloro-1-propene	41	5.598	5.598	0.000	89	843598	10.0	9.93	
48 Carbon disulfide	76	5.626	5.626	0.000	99	2000747	10.0	9.86	
49 2-Methyl-2-propanol	59	5.654	5.654	0.000	94	85461	100.0	102.3	
50 Methylene Chloride	84	5.696	5.696	0.000	94	431987	10.0	10.3	
51 Acrylonitrile	53	5.822	5.822	0.000	98	487561	100.0	96.7	
52 Methyl tert-butyl ether	73	5.878	5.878	0.000	96	537458	10.0	9.63	
53 trans-1,2-Dichloroethene	96	5.920	5.920	0.000	97	508525	10.0	9.97	
54 Hexane	57	6.087	6.087	0.000	93	825593	10.0	9.12	
55 Vinyl acetate	43	6.157	6.157	0.000	97	742773	20.0	20.2	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
57 1,1-Dichloroethane	63	6.227	6.227	0.000	97	910979	10.0	10.3	
61 2-Butanone (MEK)	43	6.590	6.590	0.000	100	207966	40.0	38.4	M
62 sec-Butyl Alcohol	45	6.632	6.632	0.000	96	222530	300.0	283.7	
64 cis-1,2-Dichloroethene	96	6.646	6.646	0.000	84	512445	10.0	9.97	
65 2,2-Dichloropropane	77	6.688	6.688	0.000	92	739687	10.0	10.3	
67 Chlorobromomethane	128	6.841	6.841	0.000	92	152372	10.0	10.0	
68 Chloroform	83	6.855	6.855	0.000	95	801691	10.0	10.3	
69 Tetrahydrofuran	42	6.883	6.883	0.000	87	64680	20.0	16.6	
70 Isobutyl alcohol	41	7.051	7.051	0.000	92	85206	250.0	266.7	
71 1,1,1-Trichloroethane	97	7.079	7.079	0.000	98	763220	10.0	10.4	
72 Cyclohexane	56	7.163	7.163	0.000	0	961860	10.0	9.75	
73 1,1-Dichloropropene	75	7.177	7.177	0.000	97	733650	10.0	10.2	
74 Carbon tetrachloride	117	7.232	7.232	0.000	98	633689	10.0	10.2	
75 1,2-Dichloroethane	62	7.330	7.330	0.000	97	387841	10.0	10.2	
77 Benzene	78	7.358	7.358	0.000	97	2006543	10.0	10.2	
9 n-Heptane	43	7.456	7.456	0.000	92	873851	10.0	9.89	
79 Trichloroethene	95	7.819	7.819	0.000	97	507283	10.0	10.2	
80 2-Pentanone	43	7.847	7.847	0.000	99	336778	40.0	35.8	
82 1,2-Dichloropropane	63	8.001	8.001	0.000	96	443603	10.0	9.98	
83 Methylcyclohexane	55	8.029	8.029	0.000	0	789142	10.0	10.0	
84 1,4-Dioxane	88	8.056	8.056	0.000	90	25092	200.0	201.3	
85 Dibromomethane	93	8.098	8.098	0.000	95	148536	10.0	10.0	
86 Dichlorobromomethane	83	8.168	8.168	0.000	100	484308	10.0	10.3	
88 2-Chloroethyl vinyl ether	63	8.308	8.308	0.000	91	75103	10.0	10.2	
89 cis-1,3-Dichloropropene	75	8.489	8.489	0.000	96	543062	10.0	9.65	
90 4-Methyl-2-pentanone (MIBK	43	8.545	8.545	0.000	97	500343	40.0	41.7	
91 Toluene	91	8.769	8.769	0.000	99	2069771	10.0	10.4	
92 Ethyl methacrylate	69	8.853	8.853	0.000	89	204468	10.0	8.54	
93 trans-1,3-Dichloropropene	75	8.867	8.867	0.000	98	391016	10.0	10.2	
94 1,1,2-Trichloroethane	97	9.020	9.020	0.000	92	188995	10.0	9.62	
95 2-Hexanone	43	9.132	9.132	0.000	96	315754	40.0	39.2	
96 1,3-Dichloropropane	76	9.160	9.160	0.000	96	374388	10.0	9.51	
97 Tetrachloroethene	164	9.202	9.202	0.000	98	387826	10.0	9.89	
98 Chlorodibromomethane	129	9.341	9.341	0.000	90	225354	10.0	9.62	
100 Ethylene Dibromide	107	9.467	9.467	0.000	98	173874	10.0	9.47	
101 1-Chlorohexane	91	9.705	9.705	0.000	0	705938	10.0	9.57	
102 Chlorobenzene	112	9.816	9.816	0.000	94	1162123	10.0	9.87	
103 1,1,1,2-Tetrachloroethane	131	9.844	9.844	0.000	95	362598	10.0	10.0	
104 Ethylbenzene	106	9.858	9.858	0.000	98	754848	10.0	10.0	
105 m-Xylene & p-Xylene	106	9.928	9.928	0.000	100	899170	10.0	9.91	
106 Styrene	104	10.249	10.249	0.000	85	1245265	10.0	10.2	
109 o-Xylene	106	10.249	10.249	0.000	89	843028	10.0	10.0	
107 Bromoform	173	10.445	10.445	0.000	97	96747	10.0	8.95	
108 Isopropylbenzene	105	10.515	10.515	0.000	96	2349978	10.0	9.39	
111 Cyclohexanone	55	10.626	10.626	0.000	92	138604	400.0	386.8	
112 1,1,2,2-Tetrachloroethane	83	10.696	10.696	0.000	95	188492	10.0	8.81	
113 trans-1,4-Dichloro-2-buten	53	10.724	10.724	0.000	89	40785	10.0	7.88	
114 1,2,3-Trichloropropane	110	10.766	10.766	0.000	87	52504	10.0	9.23	
116 Bromobenzene	156	10.822	10.822	0.000	52	424088	10.0	9.42	
115 N-Propylbenzene	120	10.822	10.822	0.000	97	663012	10.0	9.36	
120 1,3,5-Trimethylbenzene	105	10.934	10.934	0.000	94	1985764	10.0	9.57	
117 2-Chlorotoluene	126	10.948	10.948	0.000	96	538914	10.0	9.68	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
118 4-Chlorotoluene	126	11.017	11.017	0.000	99	516605	10.0	9.40	
119 tert-Butylbenzene	119	11.227	11.227	0.000	93	1922580	10.0	9.46	
121 1,2,4-Trimethylbenzene	105	11.255	11.255	0.000	98	1962735	10.0	9.61	
122 sec-Butylbenzene	134	11.408	11.408	0.000	95	529908	10.0	9.57	
123 4-Isopropyltoluene	119	11.506	11.506	0.000	96	2184939	10.0	9.60	
124 1,3-Dichlorobenzene	146	11.562	11.562	0.000	97	927667	10.0	9.58	
126 1,4-Dichlorobenzene	146	11.632	11.632	0.000	95	882694	10.0	9.55	
127 n-Butylbenzene	91	11.855	11.855	0.000	98	2213244	10.0	9.77	
128 1,2-Dichlorobenzene	146	11.981	11.981	0.000	97	700843	10.0	9.35	
129 1,2-Dibromo-3-Chloropropan	157	12.707	12.707	0.000	77	20601	10.0	7.48	
130 1,2,4-Trichlorobenzene	180	13.657	13.657	0.000	94	454991	10.0	9.28	
131 Hexachlorobutadiene	225	13.825	13.825	0.000	98	384624	10.0	9.51	
132 Naphthalene	128	14.006	14.006	0.000	97	485187	10.0	8.22	
133 1,2,3-Trichlorobenzene	180	14.327	14.327	0.000	95	323133	10.0	9.09	
S 140 1,2-Dichloroethene, Total	96				0		20.0	19.9	
S 136 1,2-Dichloroethene, Total	1				0		20.0	19.9	
S 134 Trihalomethanes, Total	1				0		40.0	39.2	
S 139 Xylenes, Total (URS)	1				0		20.0	19.9	
S 135 1,3-Dichloropropene, Total	1				0		20.0	19.9	
S 138 Xylenes, Total	106				0		20.0	19.9	

QC Flag Legend

Review Flags

M - Manually Integrated

Reagents:

MV-2cleve+AVA_00036	Amount Added:	5.00	Units: uL	
MV-Main A_00037	Amount Added:	5.00	Units: uL	
MV-Gas/Ket A_00075	Amount Added:	5.00	Units: uL	
MV-568718-D_00014	Amount Added:	1.00	Units: uL	Run Reagent
MV-ARCH SS A_00101	Amount Added:	0.98	Units: uL	Run Reagent

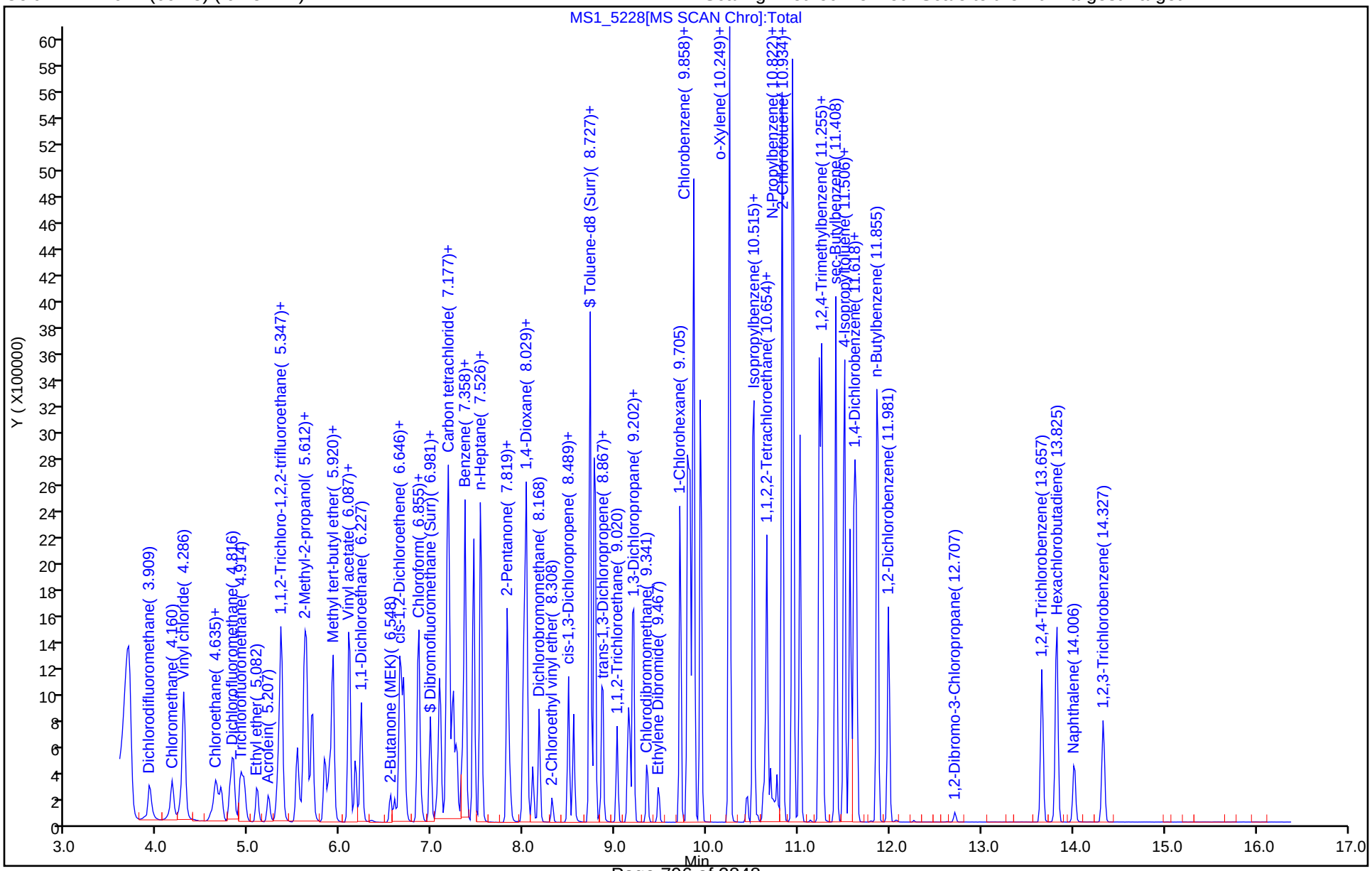
Report Date: 07-Aug-2018 06:54:54 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5228.D

Injection Date:	06-Aug-2018 07:47:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	CCV			Worklist Smp#:	2
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	11
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



TestAmerica Denver
Target Compound Quantitation Report

Data File:	\\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5072.D				
Lims ID:	BFB				
Client ID:					
Sample Type:	BFB				
Inject. Date:	02-Aug-2018 07:34:30	ALS Bottle#:	100	Worklist Smp#:	1
Injection Vol:	1.0 uL	Dil. Factor:	1.0000		
Sample Info:	bfb				
Operator ID:	wickhamt	Instrument ID:	VMS_MS1		
Method:	\\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\AQ_VMS1_8260.m				
Limit Group:	MSV - 8260B Water and Solid				
Last Update:	02-Aug-2018 13:05:09	Calib Date:	02-Aug-2018 10:54:30		
Integrator:	RTE	ID Type:	Deconvolution ID		
Quant Method:	Internal Standard	Quant By:	Initial Calibration		
Last ICal File:	\\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5081.D				
Column 1 :	DB-624 (60.25) (0.25 mm)		Det: MS SCAN		
Process Host:	CTX0314				
First Level Reviewer: wickhamt		Date:	02-Aug-2018 08:13:23		

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
$ 4 BFB	95	4.597	4.597	0.000	93	59992	NR	NR	

QC Flag Legend

Processing Flags

NR - Missing Quant Standard

Reagents:

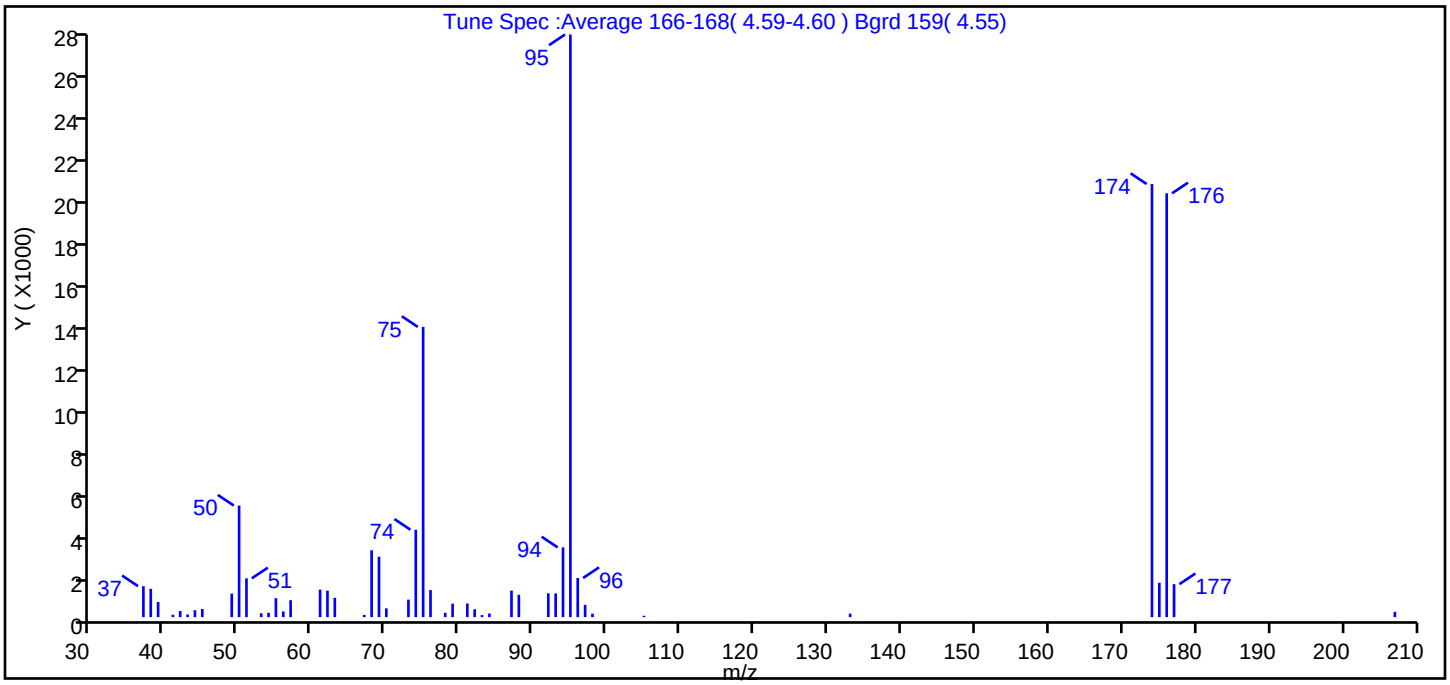
MV-BFB_00026 Amount Added: 1.00 Units: uL

MS Tune Report

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5072.D
Injection Date: 02-Aug-2018 07:34:30 Instrument ID: VMS_MS1
Lims ID: BFB
Client ID:
Operator ID: wickhamt ALS Bottle#: 100 Worklist Smp#: 1
Injection Vol: 1.0 uL Dil. Factor: 1.0000
Method: AQ_VMS1_8260 Limit Group: MSV - 8260B Water and Solid
Tune Method: BFB Method 8260

$ 4 BFB



m/z	Ion Abundance Criteria	% Relative Abundance
95	Base peak, 100% relative abundance	100.0
50	15 to 40% of m/z 95	19.1
75	30 to 60% of m/z 95	49.8
96	5 to 9% of m/z 95	6.7
173	Less than 2% of m/z 174	0.0 (0.0)
174	50 to 120% of m/z 95	74.3
175	5 to 9% of m/z 174	5.9 (7.9)
176	Greater than 95% but less than 101% of m/z 174	72.7 (97.9)
177	5 to 9% of m/z 176	5.7 (7.8)

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5072.D\AQ_VMS1_8260.rslt\spectra.
Injection Date: 02-Aug-2018 07:34:30
Spectrum: Tune Spec :Average 166-168(4.59-4.60) Bgrd 159(4.55)
Base Peak: 95.00
Minimum % Base Peak: 0
Number of Points: 49

m/z	Y	m/z	Y	m/z	Y	m/z	Y
37.00	1467	55.00	899	76.00	1282	96.00	1855
38.00	1341	56.00	270	78.00	207	97.00	581
39.00	717	57.00	804	79.00	640	98.00	167
41.00	114	61.00	1304	81.00	647	105.00	66
42.00	291	62.00	1258	82.00	372	133.00	167
43.00	126	63.00	917	83.00	97	174.00	20528
44.00	332	67.00	105	84.00	171	175.00	1629
45.00	389	68.00	3170	87.00	1260	176.00	20088
49.00	1116	69.00	2866	88.00	1060	177.00	1563
50.00	5288	70.00	416	92.00	1131	207.00	252
51.00	1839	73.00	831	93.00	1124		
53.00	184	74.00	4142	94.00	3305		
54.00	207	75.00	13756	95.00	27616		

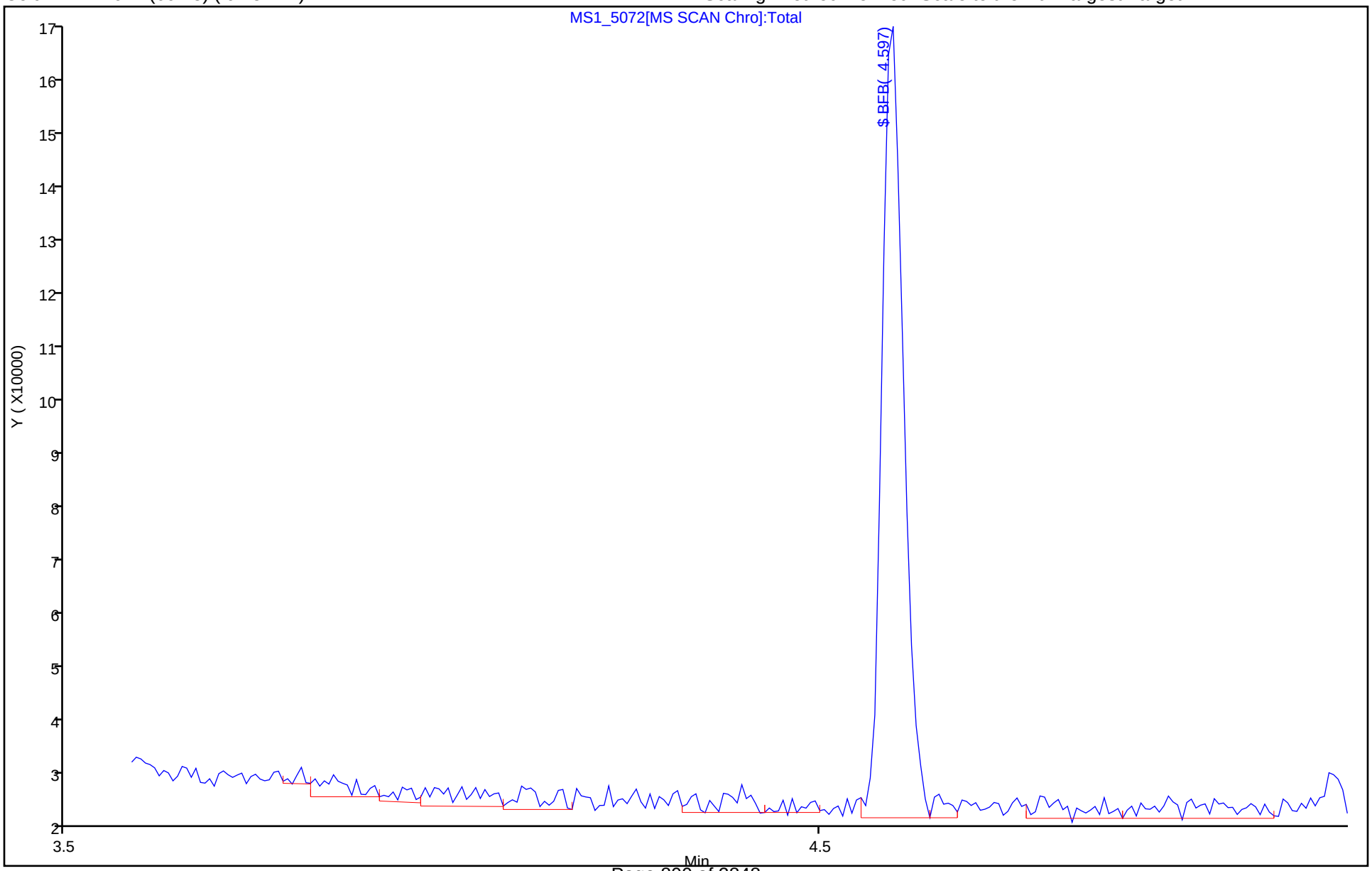
Report Date: 02-Aug-2018 13:05:10 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5072.D

Injection Date:	02-Aug-2018 07:34:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	BFB			Worklist Smp#:	1
Client ID:					
Injection Vol:	1.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	100
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5226.D
Lims ID: BFB
Client ID:
Sample Type: BFB
Inject. Date: 06-Aug-2018 07:02:30 ALS Bottle#: 100 Worklist Smp#: 1
Injection Vol: 1.0 uL Dil. Factor: 1.0000
Sample Info: bfb
Operator ID: wickhamt Instrument ID: VMS_MS1

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 07-Aug-2018 06:54:52 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0316

First Level Reviewer: wickhamt Date: 06-Aug-2018 08:06:48

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
$ 4 BFB	95	4.591	4.591	0.000	92	118858	NR	NR	

QC Flag Legend

Processing Flags
NR - Missing Quant Standard

Reagents:

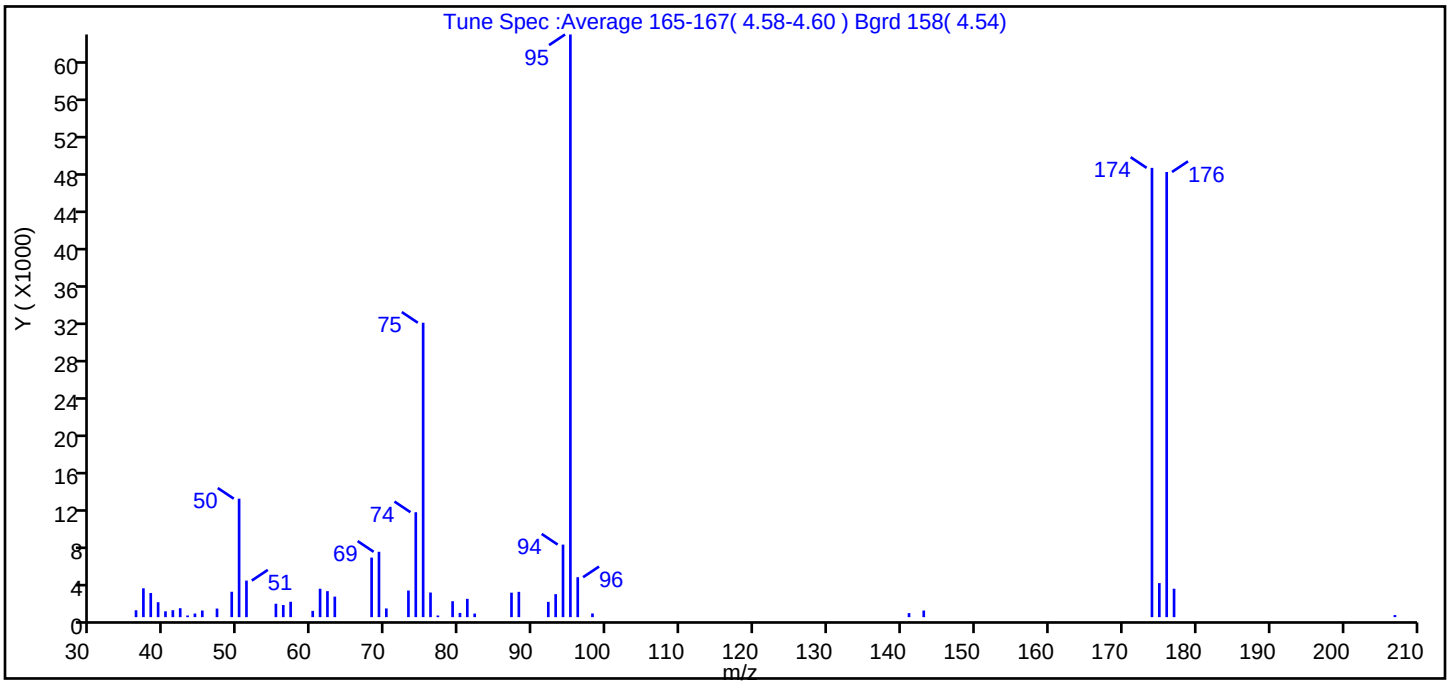
MV-BFB_00026 Amount Added: 1.00 Units: uL

MS Tune Report

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5226.D
Injection Date: 06-Aug-2018 07:02:30 Instrument ID: VMS_MS1
Lims ID: BFB
Client ID:
Operator ID: wickhamt ALS Bottle#: 100 Worklist Smp#: 1
Injection Vol: 1.0 uL Dil. Factor: 1.0000
Method: AQ_VMS1_8260 Limit Group: MSV - 8260B Water and Solid
Tune Method: BFB Method 8260

$ 4 BFB



m/z	Ion Abundance Criteria	% Relative Abundance
95	Base peak, 100% relative abundance	100.0
50	15 to 40% of m/z 95	20.3
75	30 to 60% of m/z 95	50.5
96	5 to 9% of m/z 95	6.9
173	Less than 2% of m/z 174	0.0 (0.0)
174	50 to 120% of m/z 95	77.1
175	5 to 9% of m/z 174	5.8 (7.6)
176	Greater than 95% but less than 101% of m/z 174	76.4 (99.1)
177	5 to 9% of m/z 176	4.9 (6.4)

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5226.D\AQ_VMS1_8260.rslt\spectra.
Injection Date: 06-Aug-2018 07:02:30
Spectrum: Tune Spec :Average 165-167(4.58-4.60) Bgrd 158(4.54)
Base Peak: 95.00
Minimum % Base Peak: 0
Number of Points: 48

m/z	Y	m/z	Y	m/z	Y	m/z	Y
36.00	733	50.00	12618	73.00	2836	93.00	2449
37.00	3070	51.00	3895	74.00	11177	94.00	7728
38.00	2572	55.00	1428	75.00	31360	95.00	62064
39.00	1589	56.00	1292	76.00	2623	96.00	4254
40.00	623	57.00	1637	77.00	174	98.00	393
41.00	740	60.00	668	79.00	1697	141.00	427
42.00	949	61.00	3023	80.00	448	143.00	703
43.00	177	62.00	2768	81.00	1949	174.00	47856
44.00	384	63.00	2184	82.00	381	175.00	3624
45.00	707	68.00	6343	87.00	2607	176.00	47416
47.00	913	69.00	6962	88.00	2695	177.00	3028
49.00	2704	70.00	926	92.00	1628	207.00	222

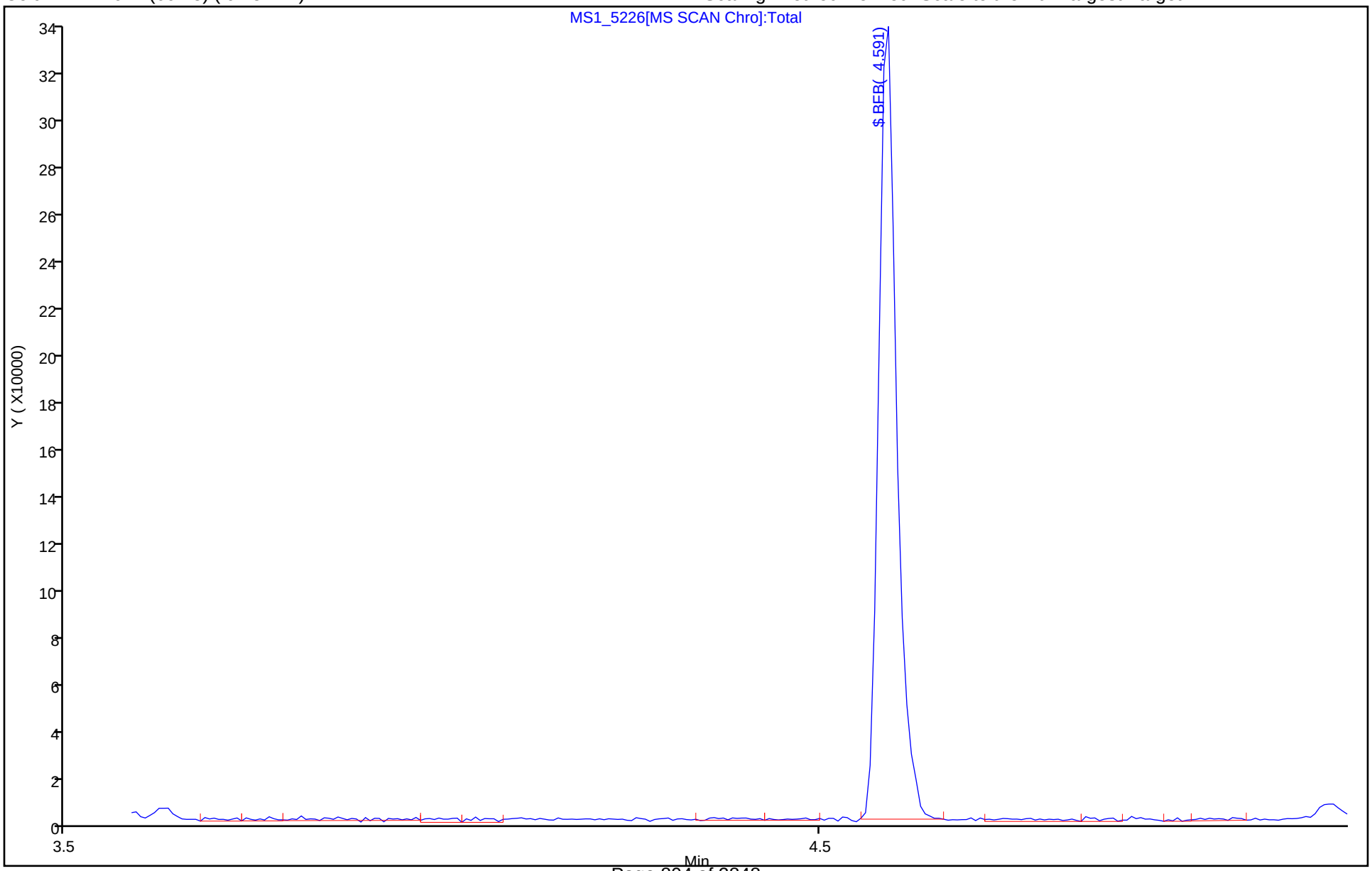
Report Date: 07-Aug-2018 06:54:52 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5226.D

Injection Date:	06-Aug-2018 07:02:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	BFB			Worklist Smp#:	1
Client ID:					
Injection Vol:	1.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	100
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180821-73278.b\MS1_5960.D
Lims ID: BFB
Client ID:
Sample Type: BFB
Inject. Date: 21-Aug-2018 16:38:30 ALS Bottle#: 100 Worklist Smp#: 1
Injection Vol: 1.0 uL Dil. Factor: 1.0000
Sample Info: bfb
Operator ID: McDonaldM Instrument ID: VMS_MS1

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180821-73278.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 22-Aug-2018 10:42:05 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: XAWRK013

First Level Reviewer: mcdonaldm Date: 22-Aug-2018 10:42:05

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
$ 4 BFB	95	4.597	4.597	0.000	0	28073	NR	NR	

QC Flag Legend

Processing Flags
NR - Missing Quant Standard

Reagents:

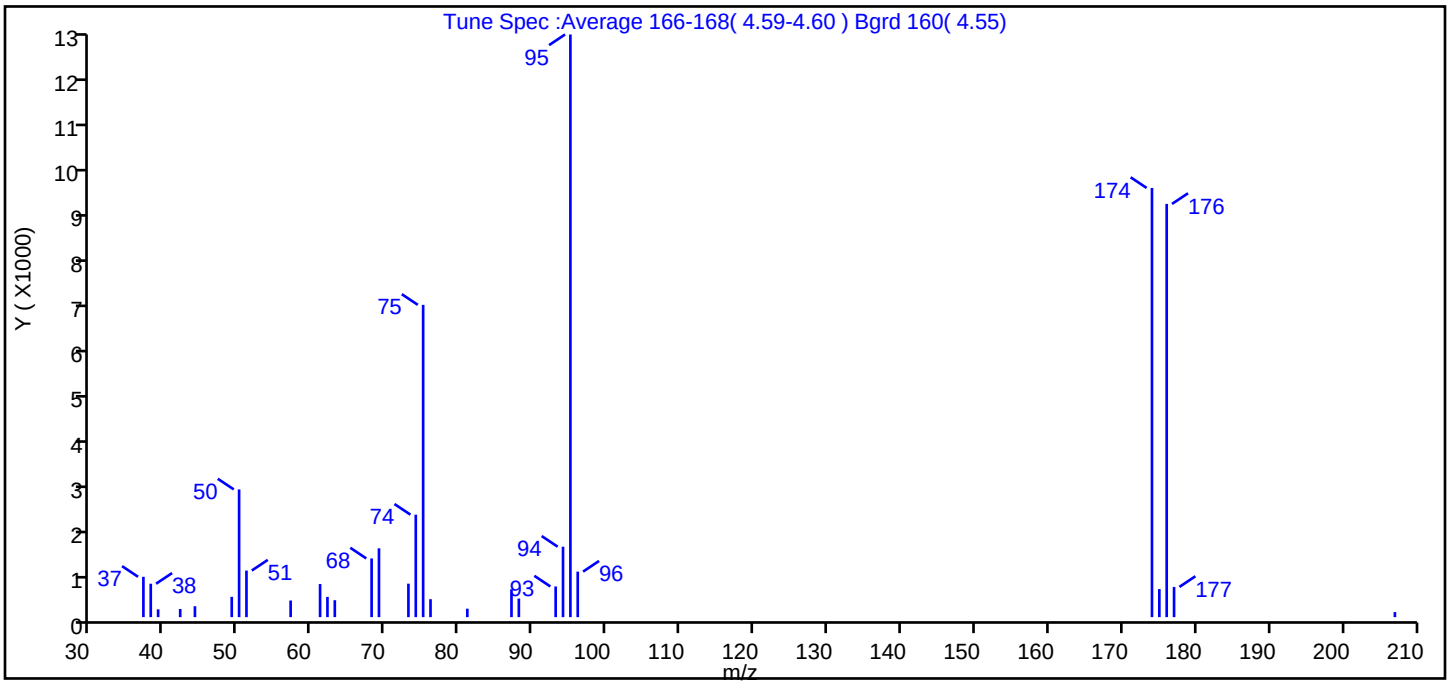
MV-BFB_00026 Amount Added: 1.00 Units: uL

MS Tune Report

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180821-73278.b\MS1_5960.D
Injection Date: 21-Aug-2018 16:38:30 Instrument ID: VMS_MS1
Lims ID: BFB
Client ID:
Operator ID: McDonaldM ALS Bottle#: 100 Worklist Smp#: 1
Injection Vol: 1.0 uL Dil. Factor: 1.0000
Method: AQ_VMS1_8260 Limit Group: MSV - 8260B Water and Solid
Tune Method: BFB Method 8260

$ 4 BFB



m/z	Ion Abundance Criteria	% Relative Abundance
95	Base peak, 100% relative abundance	100.0
50	15 to 40% of m/z 95	21.9
75	30 to 60% of m/z 95	53.6
96	5 to 9% of m/z 95	7.8
173	Less than 2% of m/z 174	0.0 (0.0)
174	50 to 120% of m/z 95	73.7
175	5 to 9% of m/z 174	4.8 (6.5)
176	Greater than 95% but less than 101% of m/z 174	70.9 (96.3)
177	5 to 9% of m/z 176	5.2 (7.3)

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180821-73278.b\MS1_5960.D\AQ_VMS1_8260.rslt\spectra.
Injection Date: 21-Aug-2018 16:38:30
Spectrum: Tune Spec :Average 166-168(4.59-4.60) Bgrd 160(4.55)
Base Peak: 95.00
Minimum % Base Peak: 0
Number of Points: 30

m/z	Y	m/z	Y	m/z	Y	m/z	Y
37.00	867	57.00	357	75.00	6709	96.00	978
38.00	718	61.00	711	76.00	386	174.00	9220
39.00	168	62.00	435	81.00	182	175.00	603
42.00	175	63.00	364	87.00	598	176.00	8877
44.00	234	68.00	1261	88.00	399	177.00	649
49.00	436	69.00	1479	93.00	659	207.00	109
50.00	2744	73.00	719	94.00	1513		
51.00	1001	74.00	2201	95.00	12517		

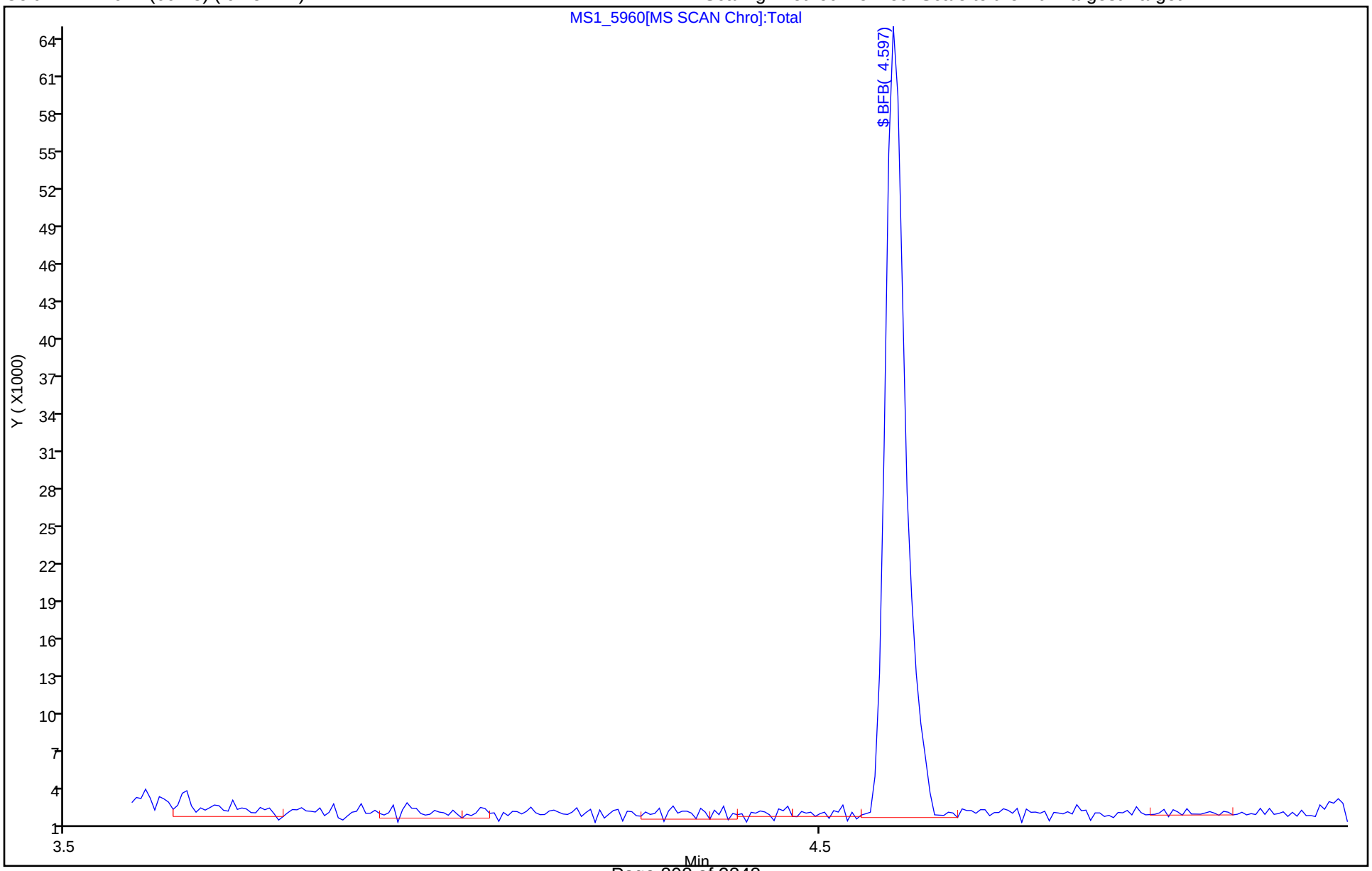
Report Date: 22-Aug-2018 10:42:06 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180821-73278.b\MS1_5960.D

Injection Date:	21-Aug-2018 16:38:30	Instrument ID:	VMS_MS1	Operator ID:	McDonaldM
Lims ID:	BFB			Worklist Smp#:	1
Client ID:					
Injection Vol:	1.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	100
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180822-73315.b\MS1_6004.D
Lims ID: BFB
Client ID:
Sample Type: BFB
Inject. Date: 22-Aug-2018 15:58:30 ALS Bottle#: 100 Worklist Smp#: 1
Injection Vol: 1.0 uL Dil. Factor: 1.0000
Sample Info: bfb
Operator ID: McDonaldM Instrument ID: VMS_MS1

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180822-73315.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 23-Aug-2018 09:55:49 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: XAWRK012

First Level Reviewer: mcdonaldm Date: 23-Aug-2018 09:55:49

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
$ 4 BFB	95	4.591	4.591	0.000	91	60359	NR	NR	

QC Flag Legend

Processing Flags
NR - Missing Quant Standard

Reagents:

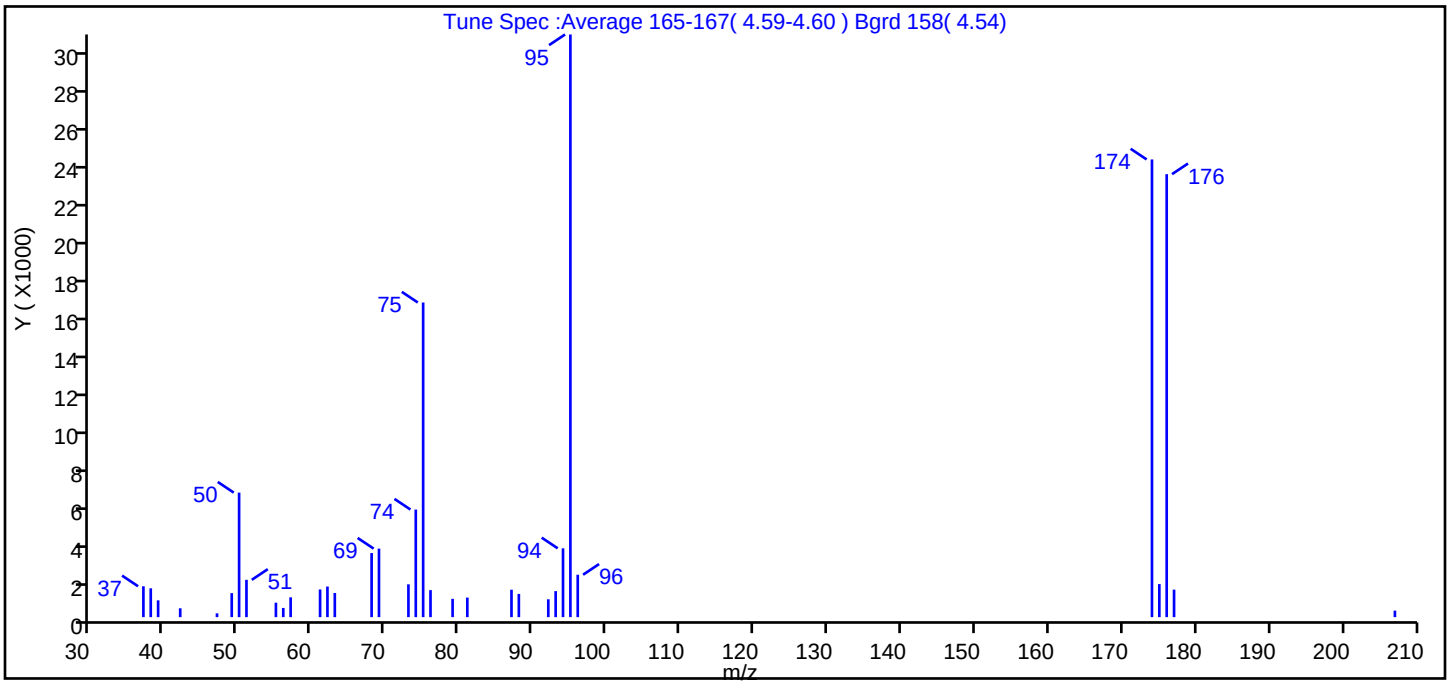
MV-BFB_00026 Amount Added: 1.00 Units: uL

MS Tune Report

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180822-73315.b\MS1_6004.D
Injection Date: 22-Aug-2018 15:58:30 Instrument ID: VMS_MS1
Lims ID: BFB
Client ID:
Operator ID: McDonaldM ALS Bottle#: 100 Worklist Smp#: 1
Injection Vol: 1.0 uL Dil. Factor: 1.0000
Method: AQ_VMS1_8260 Limit Group: MSV - 8260B Water and Solid
Tune Method: BFB Method 8260

$ 4 BFB



m/z	Ion Abundance Criteria	% Relative Abundance
95	Base peak, 100% relative abundance	100.0
50	15 to 40% of m/z 95	21.4
75	30 to 60% of m/z 95	54.0
96	5 to 9% of m/z 95	7.3
173	Less than 2% of m/z 174	0.0 (0.0)
174	50 to 120% of m/z 95	78.6
175	5 to 9% of m/z 174	5.7 (7.2)
176	Greater than 95% but less than 101% of m/z 174	76.0 (96.8)
177	5 to 9% of m/z 176	4.7 (6.2)

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180822-73315.b\MS1_6004.D\AQ_VMS1_8260.rslt\spectra.
Injection Date: 22-Aug-2018 15:58:30
Spectrum: Tune Spec :Average 165-167(4.59-4.60) Bgrd 158(4.54)
Base Peak: 95.00
Minimum % Base Peak: 0
Number of Points: 34

m/z	Y	m/z	Y	m/z	Y	m/z	Y
37.00	1611	56.00	480	75.00	16416	95.00	30400
38.00	1504	57.00	1034	76.00	1410	96.00	2213
39.00	876	61.00	1443	79.00	956	174.00	23880
42.00	462	62.00	1598	81.00	1021	175.00	1725
47.00	198	63.00	1262	87.00	1431	176.00	23112
49.00	1253	68.00	3343	88.00	1211	177.00	1436
50.00	6497	69.00	3575	92.00	932	207.00	341
51.00	1947	73.00	1711	93.00	1358		
55.00	754	74.00	5613	94.00	3591		

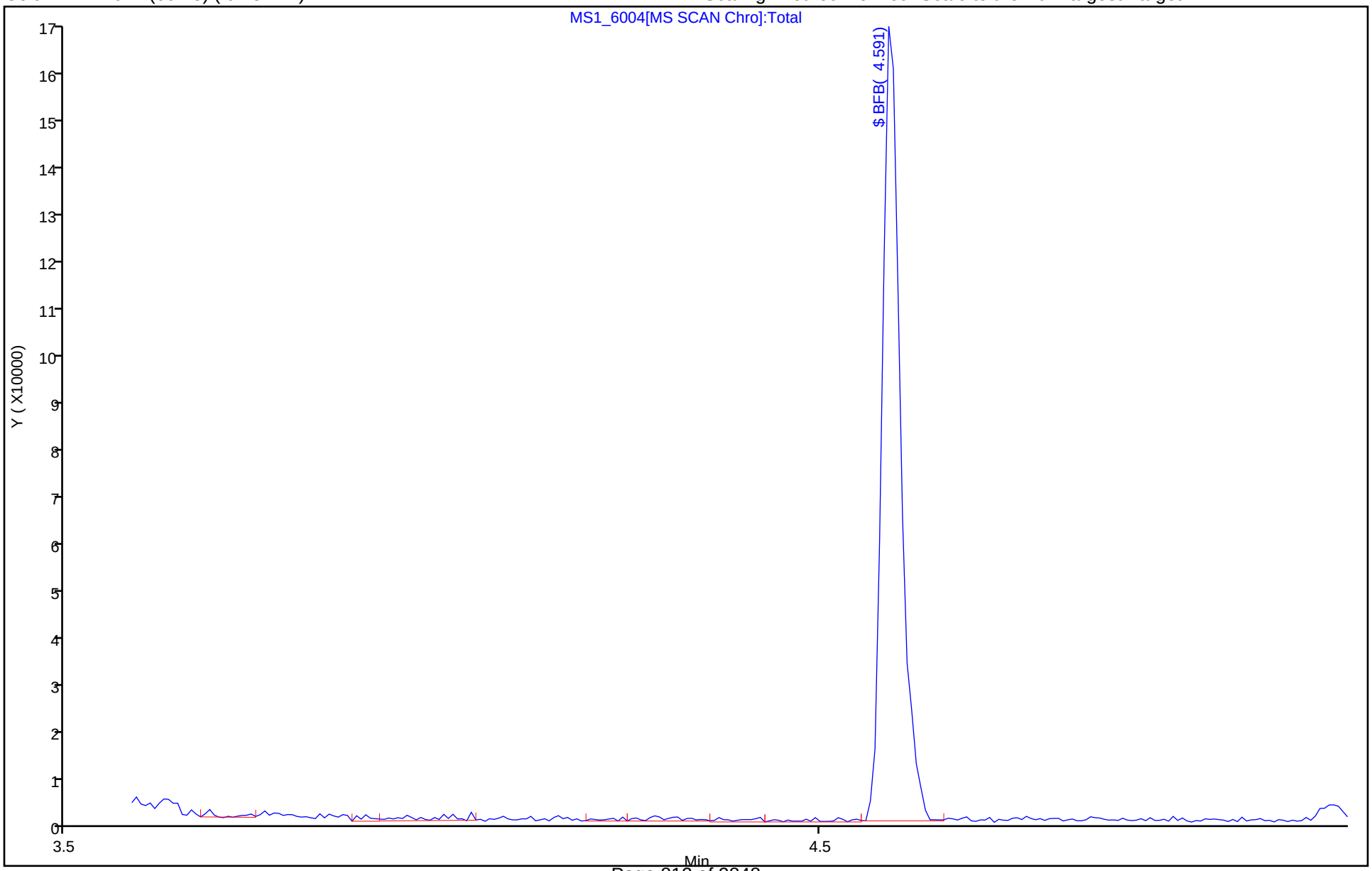
Report Date: 23-Aug-2018 09:55:50 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180822-73315.b\MS1_6004.D

Injection Date:	22-Aug-2018 15:58:30	Instrument ID:	VMS_MS1	Operator ID:	McDonaldM
Lims ID:	BFB			Worklist Smp#:	1
Client ID:					
Injection Vol:	1.0 uL	Dil. Factor:	1.0000	ALS Bottle#:	100
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



FORM I
GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Denver | Job No.: 160-29498-1

SDG No.:

Client Sample ID: | Lab Sample ID: LB 280-423316/1-A

Matrix: Solid (TCLP) | Lab File ID: MS1_5233.D

Analysis Method: 8260B | Date Collected:

Sample wt/vol: 2(mL) | Date Analyzed: 08/06/2018 09:28

Soil Aliquot Vol: | Dilution Factor: 1

Soil Extract Vol.: | GC Column: DB-624 (60.25) ID: 0.25(mm)

% Moisture: | Level: (low/med) Low

Analysis Batch No.: 424938 | Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
71-43-2	Benzene	1.6	U	10	1.6
78-93-3	2-Butanone (MEK)	18	U	100	18
56-23-5	Carbon tetrachloride	1.9	U	10	1.9
108-90-7	Chlorobenzene	1.7	U	10	1.7
67-66-3	Chloroform	1.6	U	10	1.6
107-06-2	1,2-Dichloroethane	1.3	U	10	1.3
75-35-4	1,1-Dichloroethene	2.3	U	10	2.3
127-18-4	Tetrachloroethene	2.0	U	10	2.0
79-01-6	Trichloroethene	1.6	U	10	1.6
75-01-4	Vinyl chloride	1.0	U	10	1.0

CAS NO.	SURROGATE	%REC	Q	LIMITS
17060-07-0	1,2-Dichloroethane-d4 (Surr)	103		64-129
2037-26-5	Toluene-d8 (Surr)	107		78-120
460-00-4	4-Bromofluorobenzene (Surr)	99		78-121
1868-53-7	Dibromofluoromethane (Surr)	105		79-119

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5233.D
Lims ID: LB 280-423316/1-A
Client ID:
Sample Type: LB
Inject. Date: 06-Aug-2018 09:28:30 ALS Bottle#: 16 Worklist Smp#: 13
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: LB 280-423316/1-A 2ml af
Operator ID: wickhamt Instrument ID: VMS_MS1

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 07-Aug-2018 06:52:59 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0316

First Level Reviewer: wickhamt Date: 06-Aug-2018 10:12:54

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.599	5.584	0.015	35	160367	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2105036	12.5	12.5	
* 149 1,4-Dioxane-d8	96	8.727	8.773	-0.046	0	18424		0	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	89	437807	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	610235	12.5	12.5	
$ 5 Dibromofluoromethane (Surr	111	6.981	6.981	0.000	93	467625	12.3	12.9	
$ 6 1,2-Dichloroethane-d4 (Sur	65	7.274	7.274	0.000	98	390499	12.3	12.6	
$ 7 Toluene-d8 (Surr)	98	8.727	8.727	0.000	93	2217102	12.3	13.2	
$ 8 4-Bromofluorobenzene (Surr	95	10.654	10.654	0.000	0	661310	12.3	12.1	
$ 152 Trifluorotoluene (Surr)	1		0.000					ND	
$ 4 BFB	95		4.591					ND	
24 Dichlorodifluoromethane	85		3.923					ND	
26 Chloromethane	50		4.160					ND	
22 Chlorotrifluoroethene	116		4.248					ND	
27 Vinyl chloride	62		4.286					ND	
25 1,2-Dichloro-1,1,2,2-tetra	85		4.472					ND	
28 Ethylene oxide	43		4.565					ND	
29 Bromomethane	94		4.635					ND	
31 Chloroethane	64		4.691					ND	
23 2-Chloro-1,1,1-Trifluoroet	118		4.737					ND	
32 Dichlorofluoromethane	67		4.830					ND	
33 Trichlorofluoromethane	101		4.914					ND	
34 Ethanol	45		4.928					ND	
36 Ethyl ether	59		5.096					ND	
38 Propene oxide	58		5.180					ND	
39 Acrolein	56		5.221					ND	
40 Acetone	43		5.319					ND	
42 1,1,2-Trichloro-1,2,2-trif	151		5.333					ND	
41 Isopropyl alcohol	45		5.333					ND	
43 1,1-Dichloroethene	96		5.361					ND	
35 1,2-Dichloro-1,1,2-trifluo	117		5.505					ND	
45 Iodomethane	142		5.529					ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
44 Acetonitrile	41		5.529					ND	U
37 1,1,1-Trifluoro-2,2-dichlo	83		5.533					ND	
46 Methyl acetate	43	5.557	5.557	0.000	98	28327		2.82	
47 3-Chloro-1-propene	41		5.612					ND	U
48 Carbon disulfide	76		5.626					ND	U
49 2-Methyl-2-propanol	59		5.654					ND	U
50 Methylene Chloride	84		5.696					ND	
51 Acrylonitrile	53		5.836					ND	
52 Methyl tert-butyl ether	73		5.878					ND	
53 trans-1,2-Dichloroethene	96		5.920					ND	
54 Hexane	57		6.101					ND	
55 Vinyl acetate	43		6.157					ND	
56 Isopropyl ether	87		6.199					ND	
57 1,1-Dichloroethane	63		6.227					ND	
58 2-Chloro-1,3-butadiene	53		6.297					ND	
59 Tert-butyl ethyl ether	59		6.464					ND	
61 2-Butanone (MEK)	43		6.590					ND	
60 Ethyl acetate	43		6.590					ND	U
63 Propionitrile	54		6.632					ND	
62 sec-Butyl Alcohol	45		6.646					ND	U
64 cis-1,2-Dichloroethene	96		6.646					ND	
65 2,2-Dichloropropane	77		6.688					ND	
66 Methacrylonitrile	41		6.772					ND	
67 Chlorobromomethane	128		6.841					ND	
68 Chloroform	83		6.855					ND	
69 Tetrahydrofuran	42		6.883					ND	
70 Isobutyl alcohol	41		7.051					ND	
71 1,1,1-Trichloroethane	97		7.079					ND	
72 Cyclohexane	56		7.163					ND	
73 1,1-Dichloropropene	75		7.177					ND	
74 Carbon tetrachloride	117		7.233					ND	
19 2,2-Dimethylpentane	57		7.251					ND	
17 2,4-Dimethylpentane	43		7.293					ND	
75 1,2-Dichloroethane	62		7.330					ND	
77 Benzene	78		7.358					ND	
76 Tert-amyl methyl ether	73		7.358					ND	
9 n-Heptane	43		7.456					ND	
10 2,2,3-Trimethylbutane	57		7.502					ND	
78 n-Butanol	56		7.554					ND	U
12 3,3-Dimethylpentane	43		7.768					ND	
18 2-Methylhexane	43		7.810					ND	
79 Trichloroethene	95		7.819					ND	
80 2-Pentanone	43		7.847					ND	
81 Methyl methacrylate	100		7.945					ND	
15 3-Methylhexane	43	7.973	7.949	0.024	68	116148		NC	
11 2,3-Dimethylpentane	56		7.949					ND	
82 1,2-Dichloropropane	63		8.001					ND	
83 Methylcyclohexane	55		8.029					ND	
84 1,4-Dioxane	88		8.057					ND	
85 Dibromomethane	93		8.098					ND	
86 Dichlorobromomethane	83		8.168					ND	
20 3-Ethylpentane	43		8.214					ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
87 2-Nitropropane	41		8.294					ND	
88 2-Chloroethyl vinyl ether	63		8.308					ND	
89 cis-1,3-Dichloropropene	75		8.489					ND	
90 4-Methyl-2-pentanone (MIBK	43		8.545					ND	
91 Toluene	91		8.769					ND	
92 Ethyl methacrylate	69		8.853					ND	
93 trans-1,3-Dichloropropene	75		8.867					ND	
94 1,1,2-Trichloroethane	97		9.020					ND	
95 2-Hexanone	43		9.132					ND	
96 1,3-Dichloropropane	76		9.160					ND	
97 Tetrachloroethene	164		9.202					ND	
98 Chlorodibromomethane	129		9.341					ND	
13 Dimethyl disulfide	94		9.388					ND	
99 Tetrahydrothiophene	60		9.397					ND	
100 Ethylene Dibromide	107		9.467					ND	
101 1-Chlorohexane	91		9.705					ND	U
102 Chlorobenzene	112		9.816					ND	
103 1,1,1,2-Tetrachloroethane	131		9.844					ND	
104 Ethylbenzene	106		9.858					ND	U
105 m-Xylene & p-Xylene	106		9.928					ND	
106 Styrene	104		10.249					ND	
109 o-Xylene	106		10.249					ND	
107 Bromoform	173		10.445					ND	
108 Isopropylbenzene	105		10.515					ND	U
110 cis-1,4-Dichloro-2-butene	53		10.515					ND	
111 Cyclohexanone	55		10.626					ND	U
112 1,1,2,2-Tetrachloroethane	83		10.696					ND	
113 trans-1,4-Dichloro-2-buten	53		10.724					ND	
114 1,2,3-Trichloropropane	110		10.766					ND	
116 Bromobenzene	156		10.822					ND	
115 N-Propylbenzene	120		10.822					ND	
120 1,3,5-Trimethylbenzene	105		10.934					ND	
117 2-Chlorotoluene	126		10.948					ND	
118 4-Chlorotoluene	126		11.017					ND	
119 tert-Butylbenzene	119		11.227					ND	
121 1,2,4-Trimethylbenzene	105		11.255					ND	
143 Pentachloroethane	167		11.283					ND	
122 sec-Butylbenzene	134		11.408					ND	
123 4-Isopropyltoluene	119		11.506					ND	
124 1,3-Dichlorobenzene	146		11.562					ND	
126 1,4-Dichlorobenzene	146		11.632					ND	
125 1,2,3-Trimethylbenzene	105		11.632					ND	
127 n-Butylbenzene	91		11.855					ND	
128 1,2-Dichlorobenzene	146		11.981					ND	
129 1,2-Dibromo-3-Chloropropan	157		12.707					ND	
21 1,3,5-Trichlorobenzene	180		12.945					ND	
14 n-Nonyl Aldehyde	57		13.340					ND	
130 1,2,4-Trichlorobenzene	180		13.657					ND	
131 Hexachlorobutadiene	225		13.825					ND	
132 Naphthalene	128		14.006					ND	
133 1,2,3-Trichlorobenzene	180		14.327					ND	
161 n-Nonane TIC	1		0.000					ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
158 1-Chlorohexane TIC	1		0.000				ND		
160 Cyclohexane TIC	1		0.000				ND		
159 Methyl cyclohexane TIC	1		0.000				ND		
S 140 1,2-Dichloroethene, Total	96		2.000				ND		
S 136 1,2-Dichloroethene, Total	1		0.000				ND		
S 134 Trihalomethanes, Total	1		0.000				ND		
S 137 Total BTEX	1		0.000				ND		
S 139 Xylenes, Total (URS)	1		0.000				ND		
S 135 1,3-Dichloropropene, Total	1		0.000				ND		
S 153 TAH	1				0			0	
S 138 Xylenes, Total	106		0.000				ND		
T 141 Dichloroacetonitrile TIC	74		1.000				ND		
T 142 2,3-dichloro-1-propene TIC	75		1.000				ND		
T 30 Propene oxide TIC	58		5.334				ND		
T 156 4-Ethyltoluene TIC	1		0.000				ND		
T 157 1,3-Butadiene TIC	1		0.000				ND		
T 16 2-Butoxyethanol TIC	1		0.000				ND		
T 155 Dicyclopentadiene TIC	1		0.000				ND		
T 154 Propene TIC	1		0.000				ND		

QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

U - Marked Undetected

Reagents:

MV-568718-D_00014	Amount Added:	1.00	Units: uL	Run Reagent
MV-ARCH SS A_00101	Amount Added:	0.98	Units: uL	Run Reagent

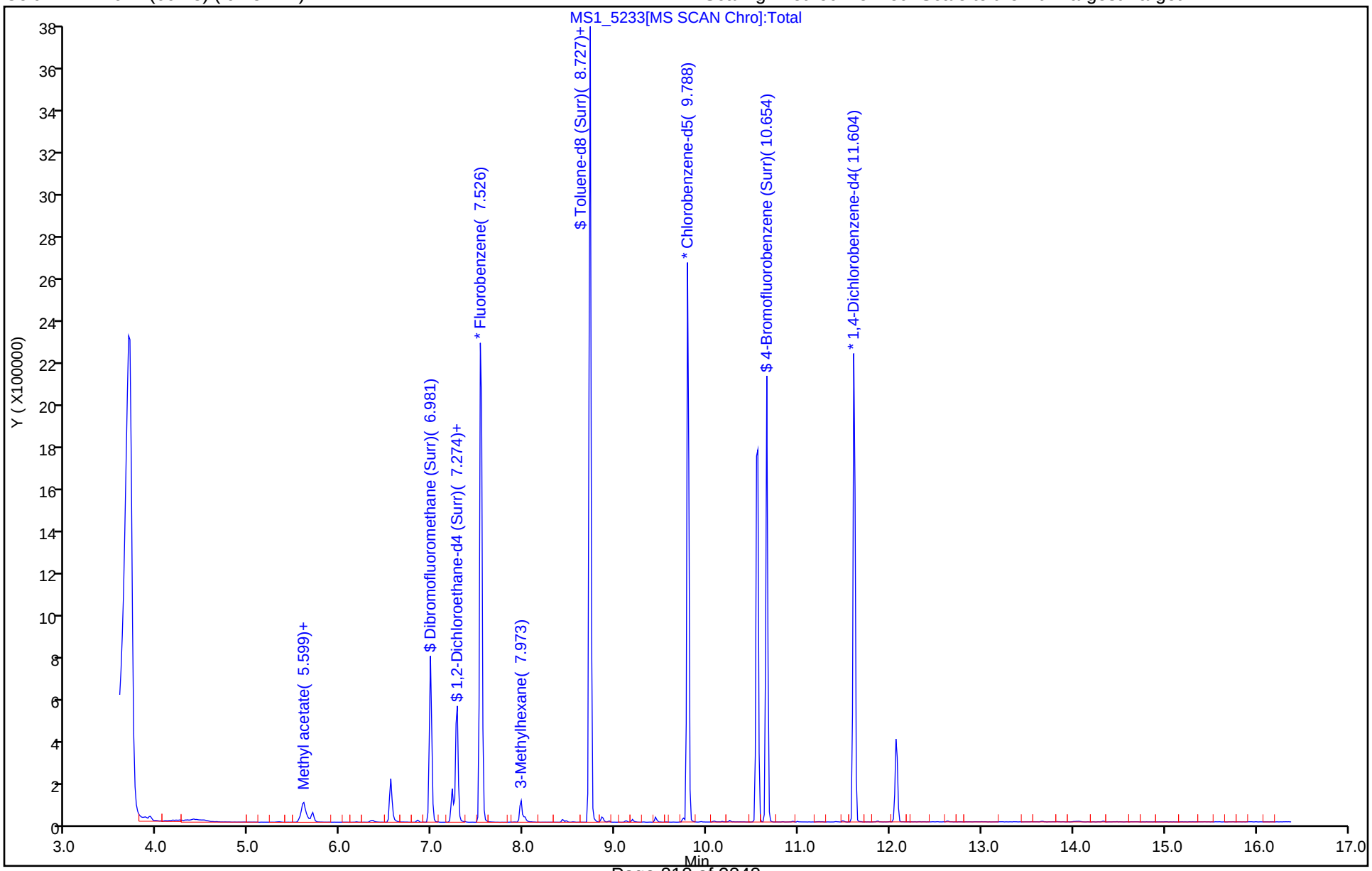
Report Date: 07-Aug-2018 06:54:12 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5233.D

Injection Date:	06-Aug-2018 09:28:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	LB 280-423316/1-A			Worklist Smp#:	13
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	16
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



TestAmerica Denver
Recovery Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5233.D
Lims ID: LB 280-423316/1-A
Client ID:
Sample Type: LB
Inject. Date: 06-Aug-2018 09:28:30 ALS Bottle#: 16 Worklist Smp#: 13
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: LB 280-423316/1-A 2ml af
Operator ID: wickhamt Instrument ID: VMS_MS1

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 07-Aug-2018 06:52:59 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0316

First Level Reviewer: wickhamt Date: 06-Aug-2018 10:12:54

Compound	Amount Added	Amount Recovered	% Rec.
$ 5 Dibromofluoromethane (Surr)	12.3	12.9	104.94
$ 6 1,2-Dichloroethane-d4 (Surr)	12.3	12.6	103.14
$ 7 Toluene-d8 (Surr)	12.3	13.2	107.40
$ 8 4-Bromofluorobenzene (Surr)	12.3	12.1	98.99

FORM I
GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Denver | Job No.: 160-29498-1

SDG No.:

Client Sample ID: | Lab Sample ID: LCS 280-423316/2-A

Matrix: Solid (TCLP) | Lab File ID: MS1_5232.D

Analysis Method: 8260B | Date Collected:

Sample wt/vol: 2(mL) | Date Analyzed: 08/06/2018 09:08

Soil Aliquot Vol: | Dilution Factor: 1

Soil Extract Vol.: | GC Column: DB-624 (60.25) ID: 0.25(mm)

% Moisture: | Level: (low/med) Low

Analysis Batch No.: 424938 | Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
71-43-2	Benzene	48.4		10	1.6
78-93-3	2-Butanone (MEK)	173		100	18
56-23-5	Carbon tetrachloride	44.7		10	1.9
108-90-7	Chlorobenzene	45.6		10	1.7
67-66-3	Chloroform	49.1		10	1.6
107-06-2	1,2-Dichloroethane	49.3		10	1.3
75-35-4	1,1-Dichloroethene	45.9		10	2.3
127-18-4	Tetrachloroethene	44.0		10	2.0
79-01-6	Trichloroethene	46.7		10	1.6
75-01-4	Vinyl chloride	50.0		10	1.0

CAS NO.	SURROGATE	%REC	Q	LIMITS
17060-07-0	1,2-Dichloroethane-d4 (Surr)	103		64-129
2037-26-5	Toluene-d8 (Surr)	101		78-120
460-00-4	4-Bromofluorobenzene (Surr)	94		78-121
1868-53-7	Dibromofluoromethane (Surr)	103		79-119

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5232.D
Lims ID: LCS 280-423316/2-A
Client ID:
Sample Type: LCS
Inject. Date: 06-Aug-2018 09:08:30 ALS Bottle#: 15 Worklist Smp#: 12
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: LCS 280-423316/2-A 2ml af
Operator ID: wickhamt Instrument ID: VMS_MS1

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 07-Aug-2018 06:52:59 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0316

First Level Reviewer: wickhamt Date: 06-Aug-2018 10:05:41

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.598	5.584	0.014	88	163777	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2064361	12.5	12.5	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	90	439723	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	632160	12.5	12.5	
$ 5 Dibromofluoromethane (Surr	111	6.981	6.981	0.000	93	451652	12.3	12.7	
$ 6 1,2-Dichloroethane-d4 (Sur	65	7.274	7.274	0.000	98	380608	12.3	12.6	
$ 7 Toluene-d8 (Surr)	98	8.727	8.727	0.000	93	2092015	12.3	12.4	
$ 8 4-Bromofluorobenzene (Surr	95	10.654	10.654	0.000	0	653213	12.3	11.6	
24 Dichlorodifluoromethane	85	3.922	3.923	0.000	100	213223	5.00	4.56	
26 Chloromethane	50	4.174	4.160	0.014	99	265029	5.00	4.66	
27 Vinyl chloride	62	4.300	4.286	0.014	98	272426	5.00	5.00	
29 Bromomethane	94	4.649	4.635	0.014	91	191040	5.00	4.80	
31 Chloroethane	64	4.705	4.691	0.014	100	182310	5.00	4.58	
32 Dichlorofluoromethane	67	4.830	4.830	0.000	98	448730	5.00	5.06	
33 Trichlorofluoromethane	101	4.914	4.914	0.000	100	324629	5.00	4.65	
36 Ethyl ether	59	5.096	5.096	0.000	92	99472	5.00	4.84	
39 Acrolein	56	5.221	5.221	0.000	100	113480	50.0	46.3	
40 Acetone	43	5.319	5.319	0.000	100	69169	20.0	19.6	
42 1,1,2-Trichloro-1,2,2-trif	151	5.347	5.333	0.014	98	143104	5.00	4.51	
43 1,1-Dichloroethene	96	5.361	5.361	0.000	97	204378	5.00	4.59	
45 Iodomethane	142	5.529	5.529	0.000	100	332806	5.00	4.86	
46 Methyl acetate	43	5.557	5.557	0.000	97	116544	10.0	11.8	
47 3-Chloro-1-propene	41	5.612	5.612	0.000	86	396014	5.00	4.77	
48 Carbon disulfide	76	5.626	5.626	0.000	99	938084	5.00	4.73	
49 2-Methyl-2-propanol	59	5.654	5.654	0.000	93	41393	50.0	51.9	
50 Methylene Chloride	84	5.696	5.696	0.000	94	218106	5.00	5.11	
51 Acrylonitrile	53	5.836	5.836	0.000	99	238548	50.0	48.4	
52 Methyl tert-butyl ether	73	5.892	5.878	0.014	97	261453	5.00	4.79	
53 trans-1,2-Dichloroethene	96	5.920	5.920	0.000	97	239975	5.00	4.81	
54 Hexane	57	6.101	6.101	0.000	92	340647	5.00	3.80	
55 Vinyl acetate	43	6.171	6.157	0.014	97	352048	10.0	9.81	
57 1,1-Dichloroethane	63	6.227	6.227	0.000	97	423803	5.00	4.88	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
61 2-Butanone (MEK)	43	6.590	6.590	0.000	100	91804	20.0	17.3	M
62 sec-Butyl Alcohol	45	6.646	6.646	0.000	95	103640	150.0	138.4	
64 cis-1,2-Dichloroethene	96	6.660	6.646	0.014	83	236447	5.00	4.71	
65 2,2-Dichloropropane	77	6.688	6.688	0.000	93	325400	5.00	4.61	
67 Chlorobromomethane	128	6.841	6.841	0.000	95	72065	5.00	4.84	
68 Chloroform	83	6.855	6.855	0.000	95	372140	5.00	4.91	
69 Tetrahydrofuran	42	6.883	6.883	0.000	88	32326	10.0	7.90	
70 Isobutyl alcohol	41	7.051	7.051	0.000	90	40376	125.0	132.3	
71 1,1,1-Trichloroethane	97	7.079	7.079	0.000	98	339056	5.00	4.72	
72 Cyclohexane	56	7.163	7.163	0.000	0	404279	5.00	4.19	
73 1,1-Dichloropropene	75	7.191	7.177	0.014	98	317264	5.00	4.52	
74 Carbon tetrachloride	117	7.232	7.233	0.000	96	272358	5.00	4.47	
75 1,2-Dichloroethane	62	7.330	7.330	0.000	97	183298	5.00	4.93	
77 Benzene	78	7.358	7.358	0.000	97	932590	5.00	4.84	
9 n-Heptane	43	7.456	7.456	0.000	92	351512	5.00	4.07	
79 Trichloroethene	95	7.819	7.819	0.000	97	227128	5.00	4.67	
80 2-Pentanone	43	7.847	7.847	0.000	99	149580	20.0	16.3	
82 1,2-Dichloropropane	63	8.001	8.001	0.000	95	209713	5.00	4.83	
83 Methylcyclohexane	55	8.029	8.029	0.000	0	309969	5.00	4.02	
84 1,4-Dioxane	88	8.056	8.057	-0.001	88	11420	100.0	93.7	
85 Dibromomethane	93	8.098	8.098	0.000	94	70257	5.00	4.84	
86 Dichlorobromomethane	83	8.168	8.168	0.000	99	214520	5.00	4.64	
88 2-Chloroethyl vinyl ether	63	8.308	8.308	0.000	89	29172	5.00	4.42	
89 cis-1,3-Dichloropropene	75	8.489	8.489	0.000	96	252830	5.00	4.54	
90 4-Methyl-2-pentanone (MIBK	43	8.545	8.545	0.000	97	222516	20.0	19.0	
91 Toluene	91	8.783	8.769	0.014	98	950960	5.00	4.87	
92 Ethyl methacrylate	69	8.853	8.853	0.000	89	89596	5.00	3.78	
93 trans-1,3-Dichloropropene	75	8.867	8.867	0.000	98	175348	5.00	4.68	
94 1,1,2-Trichloroethane	97	9.020	9.020	0.000	93	94004	5.00	4.89	
95 2-Hexanone	43	9.132	9.132	0.000	97	136824	20.0	17.2	
96 1,3-Dichloropropane	76	9.160	9.160	0.000	95	178242	5.00	4.57	
97 Tetrachloroethene	164	9.202	9.202	0.000	99	170741	5.00	4.40	
98 Chlorodibromomethane	129	9.341	9.341	0.000	90	102929	5.00	4.44	
100 Ethylene Dibromide	107	9.467	9.467	0.000	99	82033	5.00	4.52	
101 1-Chlorohexane	91	9.705	9.705	-0.001	0	295001	5.00	4.04	
102 Chlorobenzene	112	9.816	9.816	0.000	96	531843	5.00	4.56	
103 1,1,1,2-Tetrachloroethane	131	9.844	9.844	0.000	93	160200	5.00	4.49	
104 Ethylbenzene	106	9.858	9.858	0.000	98	327575	5.00	4.39	
105 m-Xylene & p-Xylene	106	9.928	9.928	0.000	99	389295	5.00	4.33	
106 Styrene	104	10.249	10.249	0.000	84	514086	5.00	4.24	
109 o-Xylene	106	10.249	10.249	0.000	90	375099	5.00	4.50	
107 Bromoform	173	10.445	10.445	0.000	96	42954	5.00	4.07	
108 Isopropylbenzene	105	10.515	10.515	0.000	96	1036780	5.00	4.33	
111 Cyclohexanone	55	10.626	10.626	0.000	93	60133	200.0	169.5	
112 1,1,2,2-Tetrachloroethane	83	10.696	10.696	0.000	95	89971	5.00	4.40	
113 trans-1,4-Dichloro-2-buten	53	10.724	10.724	0.000	82	19490	5.00	3.94	
114 1,2,3-Trichloropropane	110	10.766	10.766	0.000	86	24455	5.00	4.50	
116 Bromobenzene	156	10.822	10.822	0.000	52	190357	5.00	4.42	
115 N-Propylbenzene	120	10.822	10.822	0.000	97	287508	5.00	4.25	
120 1,3,5-Trimethylbenzene	105	10.934	10.934	0.000	94	855518	5.00	4.31	
117 2-Chlorotoluene	126	10.947	10.948	-0.001	96	237669	5.00	4.46	
118 4-Chlorotoluene	126	11.017	11.017	0.000	98	232929	5.00	4.43	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
119 tert-Butylbenzene	119	11.227	11.227	0.000	93	829180	5.00	4.27	
121 1,2,4-Trimethylbenzene	105	11.255	11.255	0.000	98	854637	5.00	4.38	
122 sec-Butylbenzene	134	11.408	11.408	0.000	95	220904	5.00	4.17	
123 4-Isopropyltoluene	119	11.506	11.506	0.000	97	951594	5.00	4.37	
124 1,3-Dichlorobenzene	146	11.562	11.562	0.000	97	418279	5.00	4.52	
126 1,4-Dichlorobenzene	146	11.632	11.632	0.000	94	397520	5.00	4.50	
127 n-Butylbenzene	91	11.855	11.855	0.000	98	946167	5.00	4.37	
128 1,2-Dichlorobenzene	146	11.981	11.981	0.000	96	327921	5.00	4.58	
129 1,2-Dibromo-3-Chloropropan	157	12.707	12.707	0.000	76	9570	5.00	3.80	
130 1,2,4-Trichlorobenzene	180	13.657	13.657	0.000	95	206346	5.00	4.40	
131 Hexachlorobutadiene	225	13.825	13.825	0.000	98	167234	5.00	4.33	
132 Naphthalene	128	14.006	14.006	0.000	97	222635	5.00	3.94	
133 1,2,3-Trichlorobenzene	180	14.327	14.327	0.000	95	154276	5.00	4.54	
S 140 1,2-Dichloroethene, Total	96				0		10.0	9.52	
S 136 1,2-Dichloroethene, Total	1				0		10.0	9.52	
S 134 Trihalomethanes, Total	1				0		20.0	18.1	
S 139 Xylenes, Total (URS)	1				0		10.0	8.83	
S 135 1,3-Dichloropropene, Total	1				0		10.0	9.22	
S 138 Xylenes, Total	106				0		10.0	8.83	

QC Flag Legend

Review Flags

M - Manually Integrated

Reagents:

MV-Main B_00022	Amount Added:	2.50	Units: uL	
MV-SS 2-Cleve_00046	Amount Added:	2.50	Units: uL	
MV-Gas/Ket B_00043	Amount Added:	2.50	Units: uL	
MV-568718-D_00014	Amount Added:	1.00	Units: uL	Run Reagent
MV-ARCH SS A_00101	Amount Added:	0.98	Units: uL	Run Reagent

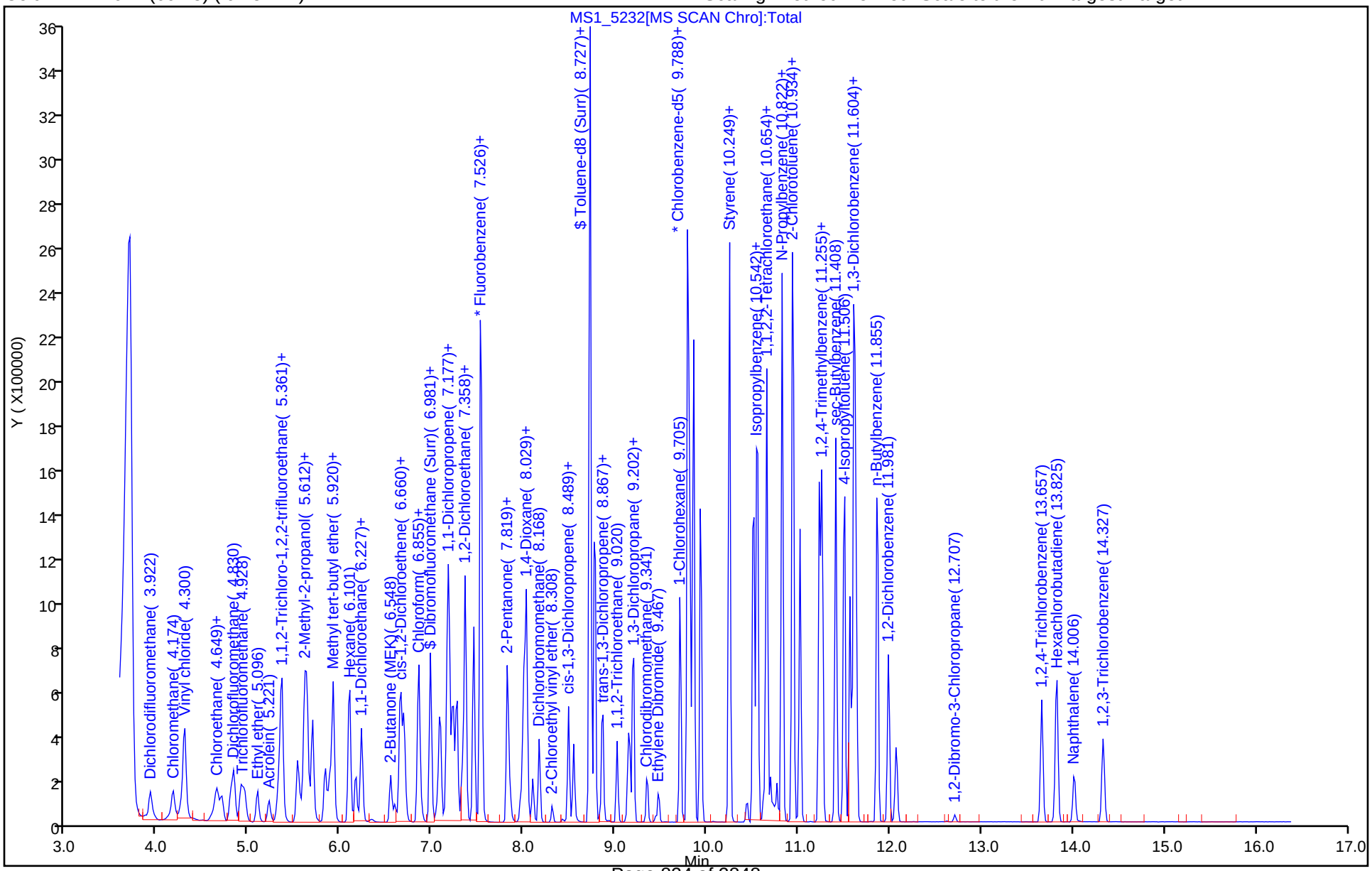
Report Date: 07-Aug-2018 06:54:11 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5232.D

Injection Date:	06-Aug-2018 09:08:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	LCS 280-423316/2-A			Worklist Smp#:	12
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	15
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



TestAmerica Denver
Recovery Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5232.D
Lims ID: LCS 280-423316/2-A
Client ID:
Sample Type: LCS
Inject. Date: 06-Aug-2018 09:08:30 ALS Bottle#: 15 Worklist Smp#: 12
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: LCS 280-423316/2-A 2ml af
Operator ID: wickhamt Instrument ID: VMS_MS1

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 07-Aug-2018 06:52:59 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0316

First Level Reviewer: wickhamt Date: 06-Aug-2018 10:05:41

Compound	Amount Added	Amount Recovered	% Rec.
$ 5 Dibromofluoromethane (Surr)	12.3	12.7	103.36
$ 6 1,2-Dichloroethane-d4 (Surr)	12.3	12.6	102.51
$ 7 Toluene-d8 (Surr)	12.3	12.4	100.90
$ 8 4-Bromofluorobenzene (Surr)	12.3	11.6	94.39

Manual Integration/User Assign Peak Report

TestAmerica Denver

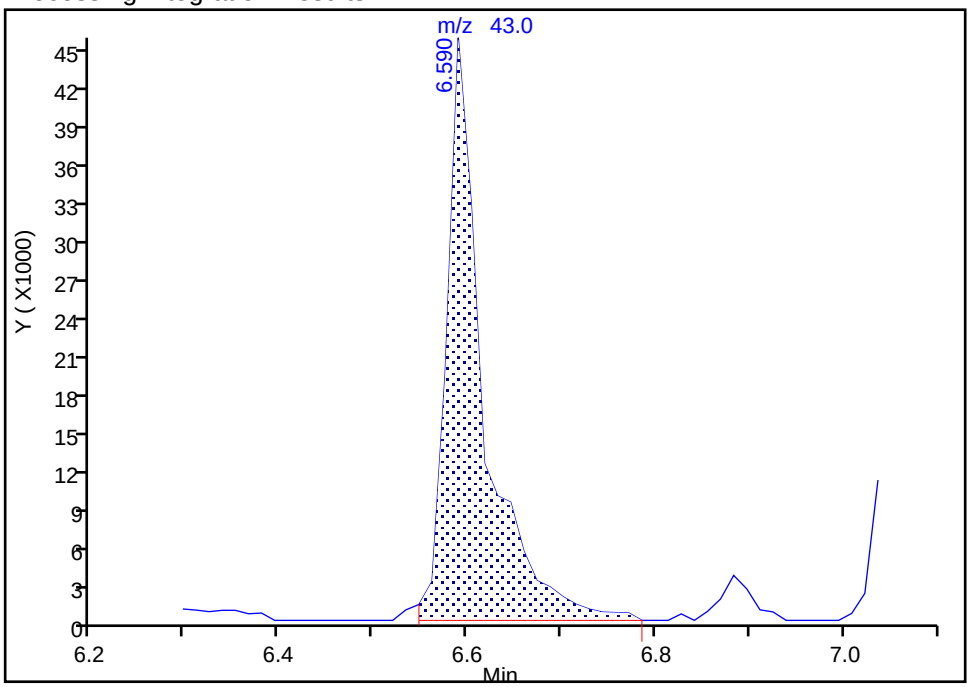
Data File:	\\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5232.D				
Injection Date:	06-Aug-2018 09:08:30	Instrument ID:	VMS_MS1		
Lims ID:	LCS 280-423316/2-A				
Client ID:					
Operator ID:	wickhamt	ALS Bottle#:	15	Worklist Smp#:	12
Purge Vol:	20.000 mL	Dil. Factor:	1.0000		
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		
Column:	DB-624 (60.25) (0.25 mm)	Detector	MS SCAN		

61 2-Butanone (MEK), CAS: 78-93-3

Signal: 1

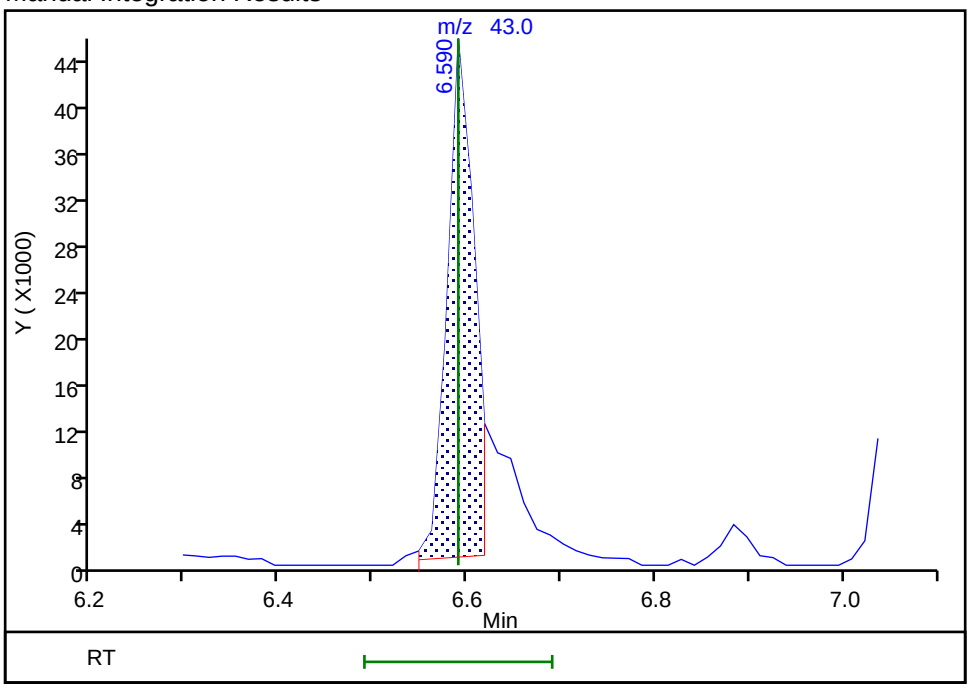
Processing Integration Results

RT: 6.59
Area: 125171
Amount: 23.617268
Amount Units: ug/l



Manual Integration Results

RT: 6.59
Area: 91804
Amount: 17.321581
Amount Units: ug/l



Reviewer: wickhamt, 06-Aug-2018 09:27:52
Audit Action: Assigned New Baseline Audit Reason: Shouldering

FORM I
GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Denver | Job No.: 160-29498-1

SDG No.:

Client Sample ID: CRC-B21-0205 MS | Lab Sample ID: 160-29498-2 MS

Matrix: Solid (TCLP) | Lab File ID: MS1_5235.D

Analysis Method: 8260B | Date Collected: 07/12/2018 11:40

Sample wt/vol: 2(mL) | Date Analyzed: 08/06/2018 10:09

Soil Aliquot Vol: | Dilution Factor: 1

Soil Extract Vol.: | GC Column: DB-624 (60.25) ID: 0.25(mm)

% Moisture: | Level: (low/med) Low

Analysis Batch No.: 424938 | Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
71-43-2	Benzene	50.9		10	1.6
78-93-3	2-Butanone (MEK)	192		100	18
56-23-5	Carbon tetrachloride	51.5		10	1.9
108-90-7	Chlorobenzene	48.2		10	1.7
67-66-3	Chloroform	52.1		10	1.6
107-06-2	1,2-Dichloroethane	51.6		10	1.3
75-35-4	1,1-Dichloroethene	51.3		10	2.3
127-18-4	Tetrachloroethene	49.3		10	2.0
79-01-6	Trichloroethene	50.9		10	1.6
75-01-4	Vinyl chloride	56.4		10	1.0

CAS NO.	SURROGATE	%REC	Q	LIMITS
17060-07-0	1,2-Dichloroethane-d4 (Surr)	101		64-129
2037-26-5	Toluene-d8 (Surr)	106		78-120
460-00-4	4-Bromofluorobenzene (Surr)	98		78-121
1868-53-7	Dibromofluoromethane (Surr)	106		79-119

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5235.D
Lims ID: 160-29498-C-2-A MS
Client ID:
Sample Type: MS
Inject. Date: 06-Aug-2018 10:09:30 ALS Bottle#: 18 Worklist Smp#: 15
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: 160-29498-C-2-A ms 2ml
Operator ID: wickhamt Instrument ID: VMS_MS1

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 07-Aug-2018 06:52:59 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0316

First Level Reviewer: wickhamt Date: 06-Aug-2018 11:49:30

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.598	5.584	0.014	87	167658	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2097444	12.5	12.5	
* 149 1,4-Dioxane-d8	96	8.727	8.773	-0.046	0	18656		0	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	90	443765	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	629669	12.5	12.5	
$ 5 Dibromofluoromethane (Surr	111	6.981	6.981	0.000	92	468474	12.3	12.9	
$ 6 1,2-Dichloroethane-d4 (Sur	65	7.274	7.274	0.000	98	382270	12.3	12.4	
$ 7 Toluene-d8 (Surr)	98	8.727	8.727	0.000	93	2208015	12.3	12.9	
$ 8 4-Bromofluorobenzene (Surr	95	10.654	10.654	0.000	0	673005	12.3	12.0	
$ 152 Trifluorotoluene (Surr)	1		0.000					ND	
$ 4 BFB	95	4.649	4.591	0.058	0	27553		NR	
24 Dichlorodifluoromethane	85	3.923	3.923	0.001	100	241513	5.00	5.08	
26 Chloromethane	50	4.174	4.160	0.014	99	299166	5.00	5.18	
22 Chlorotrifluoroethene	116		4.248					ND	
27 Vinyl chloride	62	4.300	4.286	0.014	96	312173	5.00	5.64	
25 1,2-Dichloro-1,1,2,2-tetra	85		4.472					ND	
28 Ethylene oxide	43		4.565					ND	U
29 Bromomethane	94	4.649	4.635	0.014	91	207635	5.00	5.13	
31 Chloroethane	64	4.705	4.691	0.014	100	204198	5.00	5.05	
23 2-Chloro-1,1,1-Trifluoroet	118		4.737					ND	
32 Dichlorofluoromethane	67	4.830	4.830	0.000	98	499173	5.00	5.54	
33 Trichlorofluoromethane	101	4.914	4.914	0.000	100	384317	5.00	5.42	
34 Ethanol	45		4.928					ND	
36 Ethyl ether	59	5.096	5.096	0.000	93	103370	5.00	4.95	
38 Propene oxide	58		5.180					ND	
39 Acrolein	56	5.221	5.221	0.000	100	113371	50.0	45.5	
40 Acetone	43	5.319	5.319	0.000	100	78017	20.0	22.0	
42 1,1,2-Trichloro-1,2,2-trif	151	5.347	5.333	0.014	98	177772	5.00	5.52	
41 Isopropyl alcohol	45		5.333					ND	U
43 1,1-Dichloroethene	96	5.361	5.361	0.000	97	231978	5.00	5.13	
35 1,2-Dichloro-1,1,2-trifluo	117		5.505					ND	
45 Iodomethane	142	5.529	5.529	0.000	100	353666	5.00	5.08	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
44 Acetonitrile	41		5.529					ND	U
37 1,1,1-Trifluoro-2,2-dichlo	83		5.533					ND	
46 Methyl acetate	43	5.557	5.557	0.000	96	120262	10.0	12.0	
47 3-Chloro-1-propene	41	5.612	5.612	0.000	87	423906	5.00	5.02	
48 Carbon disulfide	76	5.640	5.626	0.014	99	1039984	5.00	5.16	
49 2-Methyl-2-propanol	59	5.654	5.654	0.000	92	42518	50.0	52.1	
50 Methylene Chloride	84	5.696	5.696	0.000	95	236101	5.00	5.48	
51 Acrylonitrile	53	5.836	5.836	0.000	99	247032	50.0	49.3	
52 Methyl tert-butyl ether	73	5.892	5.878	0.014	97	263556	5.00	4.75	
53 trans-1,2-Dichloroethene	96	5.920	5.920	0.000	97	262039	5.00	5.17	
54 Hexane	57	6.101	6.101	0.000	92	434484	5.00	4.80	
55 Vinyl acetate	43	6.171	6.157	0.014	97	360920	10.0	9.90	
56 Isopropyl ether	87		6.199					ND	U
57 1,1-Dichloroethane	63	6.227	6.227	0.000	97	450230	5.00	5.10	
58 2-Chloro-1,3-butadiene	53		6.297					ND	
59 Tert-butyl ethyl ether	59		6.464					ND	
61 2-Butanone (MEK)	43	6.590	6.590	0.000	100	103490	20.0	19.2	M
60 Ethyl acetate	43		6.590					ND	U
63 Propionitrile	54		6.632					ND	
62 sec-Butyl Alcohol	45	6.646	6.646	0.000	96	106349	150.0	138.7	
64 cis-1,2-Dichloroethene	96	6.660	6.646	0.014	82	255935	5.00	5.01	
65 2,2-Dichloropropane	77	6.688	6.688	0.000	93	354074	5.00	4.94	
66 Methacrylonitrile	41		6.772					ND	
67 Chlorobromomethane	128	6.841	6.841	0.000	95	76474	5.00	5.06	
68 Chloroform	83	6.855	6.855	0.000	95	401675	5.00	5.21	
69 Tetrahydrofuran	42	6.883	6.883	0.000	88	32436	10.0	7.78	
70 Isobutyl alcohol	41	7.051	7.051	0.000	93	39459	125.0	126.3	
71 1,1,1-Trichloroethane	97	7.079	7.079	0.000	98	383390	5.00	5.26	
72 Cyclohexane	56	7.163	7.163	0.000	0	498012	5.00	5.08	
73 1,1-Dichloropropene	75	7.191	7.177	0.014	97	367420	5.00	5.16	
74 Carbon tetrachloride	117	7.233	7.233	0.001	96	318907	5.00	5.15	
19 2,2-Dimethylpentane	57	7.163	7.251	-0.088	33	23468		NC	
17 2,4-Dimethylpentane	43		7.293					ND	
75 1,2-Dichloroethane	62	7.330	7.330	0.000	98	194990	5.00	5.16	
77 Benzene	78	7.358	7.358	0.000	97	995270	5.00	5.09	
76 Tert-amyl methyl ether	73		7.358					ND	
9 n-Heptane	43	7.456	7.456	0.000	92	455281	5.00	5.19	
10 2,2,3-Trimethylbutane	57	7.456	7.502	-0.046	63	245752		NC	
78 n-Butanol	56		7.554					ND	U
12 3,3-Dimethylpentane	43	7.847	7.768	0.079	75	156449		NC	
18 2-Methylhexane	43	7.847	7.810	0.037	73	156449		NC	
79 Trichloroethene	95	7.819	7.819	0.000	98	251538	5.00	5.09	
80 2-Pentanone	43	7.847	7.847	0.000	99	156449	20.0	16.7	
81 Methyl methacrylate	100		7.945					ND	
15 3-Methylhexane	43	7.973	7.949	0.024	65	103788		NC	
11 2,3-Dimethylpentane	56	8.029	7.949	0.080	43	127130		NC	
82 1,2-Dichloropropane	63	8.001	8.001	0.000	95	225112	5.00	5.10	
83 Methylcyclohexane	55	8.029	8.029	0.000	0	394257	5.00	5.03	
84 1,4-Dioxane	88	8.057	8.057	0.000	85	11822	100.0	95.5	
85 Dibromomethane	93	8.098	8.098	0.000	94	72872	5.00	4.94	
86 Dichlorobromomethane	83	8.168	8.168	0.000	100	228316	5.00	4.86	
20 3-Ethylpentane	43		8.214					ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
87 2-Nitropropane	41		8.294					ND	U
88 2-Chloroethyl vinyl ether	63	8.308	8.308	0.000	90	30292	5.00	4.50	
89 cis-1,3-Dichloropropene	75	8.490	8.489	0.001	95	267950	5.00	4.77	
90 4-Methyl-2-pentanone (MIBK	43	8.545	8.545	0.000	97	244564	20.0	20.5	
91 Toluene	91	8.783	8.769	0.014	98	1035077	5.00	5.22	
92 Ethyl methacrylate	69	8.853	8.853	0.000	89	96356	5.00	4.03	
93 trans-1,3-Dichloropropene	75	8.867	8.867	0.000	98	182426	5.00	4.79	
94 1,1,2-Trichloroethane	97	9.020	9.020	0.000	92	97928	5.00	5.02	
95 2-Hexanone	43	9.132	9.132	0.000	96	146335	20.0	18.2	
96 1,3-Dichloropropane	76	9.160	9.160	0.000	96	183847	5.00	4.67	
97 Tetrachloroethene	164	9.202	9.202	0.000	98	193110	5.00	4.93	
98 Chlorodibromomethane	129	9.341	9.341	0.000	90	106689	5.00	4.56	
13 Dimethyl disulfide	94	9.341	9.388	-0.047	1	4146		NC	
99 Tetrahydrothiophene	60		9.397					ND	
100 Ethylene Dibromide	107	9.467	9.467	0.000	97	85900	5.00	4.69	
101 1-Chlorohexane	91	9.705	9.705	0.000	0	342010	5.00	4.64	
102 Chlorobenzene	112	9.816	9.816	0.000	95	567005	5.00	4.82	
103 1,1,1,2-Tetrachloroethane	131	9.858	9.844	0.014	94	167963	5.00	4.66	
104 Ethylbenzene	106	9.858	9.858	0.000	99	357694	5.00	4.75	
105 m-Xylene & p-Xylene	106	9.928	9.928	0.000	100	432491	5.00	4.77	
106 Styrene	104	10.249	10.249	0.000	84	549819	5.00	4.50	
109 o-Xylene	106	10.249	10.249	0.000	90	402698	5.00	4.79	
107 Bromoform	173	10.445	10.445	0.000	95	43563	5.00	4.09	
108 Isopropylbenzene	105	10.515	10.515	0.000	96	1124286	5.00	4.72	
110 cis-1,4-Dichloro-2-butene	53		10.515					ND	U
111 Cyclohexanone	55	10.626	10.626	0.000	94	63836	200.0	178.3	
112 1,1,2,2-Tetrachloroethane	83	10.696	10.696	0.000	95	94265	5.00	4.63	
113 trans-1,4-Dichloro-2-buten	53	10.724	10.724	0.000	81	20964	5.00	4.25	
114 1,2,3-Trichloropropane	110	10.766	10.766	0.000	87	25785	5.00	4.76	
116 Bromobenzene	156	10.822	10.822	0.000	52	198911	5.00	4.64	
115 N-Propylbenzene	120	10.822	10.822	0.000	97	318299	5.00	4.72	
120 1,3,5-Trimethylbenzene	105	10.934	10.934	0.000	94	922742	5.00	4.67	
117 2-Chlorotoluene	126	10.948	10.948	0.000	96	253885	5.00	4.79	
118 4-Chlorotoluene	126	11.017	11.017	0.000	99	246123	5.00	4.70	
119 tert-Butylbenzene	119	11.227	11.227	0.000	93	915576	5.00	4.73	
121 1,2,4-Trimethylbenzene	105	11.255	11.255	0.000	98	911936	5.00	4.69	
143 Pentachloroethane	167		11.283					ND	
122 sec-Butylbenzene	134	11.408	11.408	0.000	95	246536	5.00	4.67	
123 4-Isopropyltoluene	119	11.506	11.506	0.000	97	1042039	5.00	4.81	
124 1,3-Dichlorobenzene	146	11.562	11.562	0.000	97	437731	5.00	4.74	
126 1,4-Dichlorobenzene	146	11.632	11.632	0.000	94	416101	5.00	4.73	
125 1,2,3-Trimethylbenzene	105		11.632					ND	
127 n-Butylbenzene	91	11.855	11.855	0.000	98	1032330	5.00	4.79	
128 1,2-Dichlorobenzene	146	11.981	11.981	0.000	96	335122	5.00	4.70	
129 1,2-Dibromo-3-Chloropropan	157	12.707	12.707	0.000	75	9419	5.00	3.76	
21 1,3,5-Trichlorobenzene	180		12.945					ND	
14 n-Nonyl Aldehyde	57		13.340					ND	
130 1,2,4-Trichlorobenzene	180	13.657	13.657	0.000	94	215035	5.00	4.61	
131 Hexachlorobutadiene	225	13.825	13.825	0.000	98	181831	5.00	4.72	
132 Naphthalene	128	14.020	14.006	0.014	97	235276	5.00	4.18	
133 1,2,3-Trichlorobenzene	180	14.327	14.327	0.000	95	159428	5.00	4.71	
161 n-Nonane TIC	1		0.000					ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
158 1-Chlorohexane TIC	1		0.000					ND	
160 Cyclohexane TIC	1		0.000					ND	
159 Methyl cyclohexane TIC	1		0.000					ND	
S 140 1,2-Dichloroethene, Total	96				0		10.0	10.2	
S 136 1,2-Dichloroethene, Total	1				0		10.0	10.2	
S 134 Trihalomethanes, Total	1				0		20.0	18.7	
S 137 Total BTEX	1				0			24.6	
S 139 Xylenes, Total (URS)	1				0		10.0	9.56	
S 135 1,3-Dichloropropene, Total	1				0		10.0	9.56	
S 153 TAH	1				0			0	
S 138 Xylenes, Total	106				0		10.0	9.56	
T 141 Dichloroacetonitrile TIC	74		1.000					ND	
T 142 2,3-dichloro-1-propene TIC	75	8.490	1.000	7.490	94	267950		7.55	
T 30 Propene oxide TIC	58	5.319	5.334	-0.015	10	23374		0.6584	
T 156 4-Ethyltoluene TIC	1	10.934	0.000	10.934	90	929262		26.2	
T 157 1,3-Butadiene TIC	1		0.000					ND	
T 16 2-Butoxyethanol TIC	1		0.000					ND	
T 155 Dicyclopentadiene TIC	1		0.000					ND	
T 154 Propene TIC	1		0.000					ND	

QC Flag Legend

Processing Flags
- NR - Missing Quant Standard
- NC - Not Calibrated

Review Flags
- M - Manually Integrated
- U - Marked Undetected

Reagents:

MV-Main B_00022	Amount Added:	2.50	Units: uL	
MV-SS 2-Cleve_00046	Amount Added:	2.50	Units: uL	
MV-Gas/Ket B_00043	Amount Added:	2.50	Units: uL	
MV-568718-D_00014	Amount Added:	1.00	Units: uL	Run Reagent
MV-ARCH SS A_00101	Amount Added:	0.98	Units: uL	Run Reagent

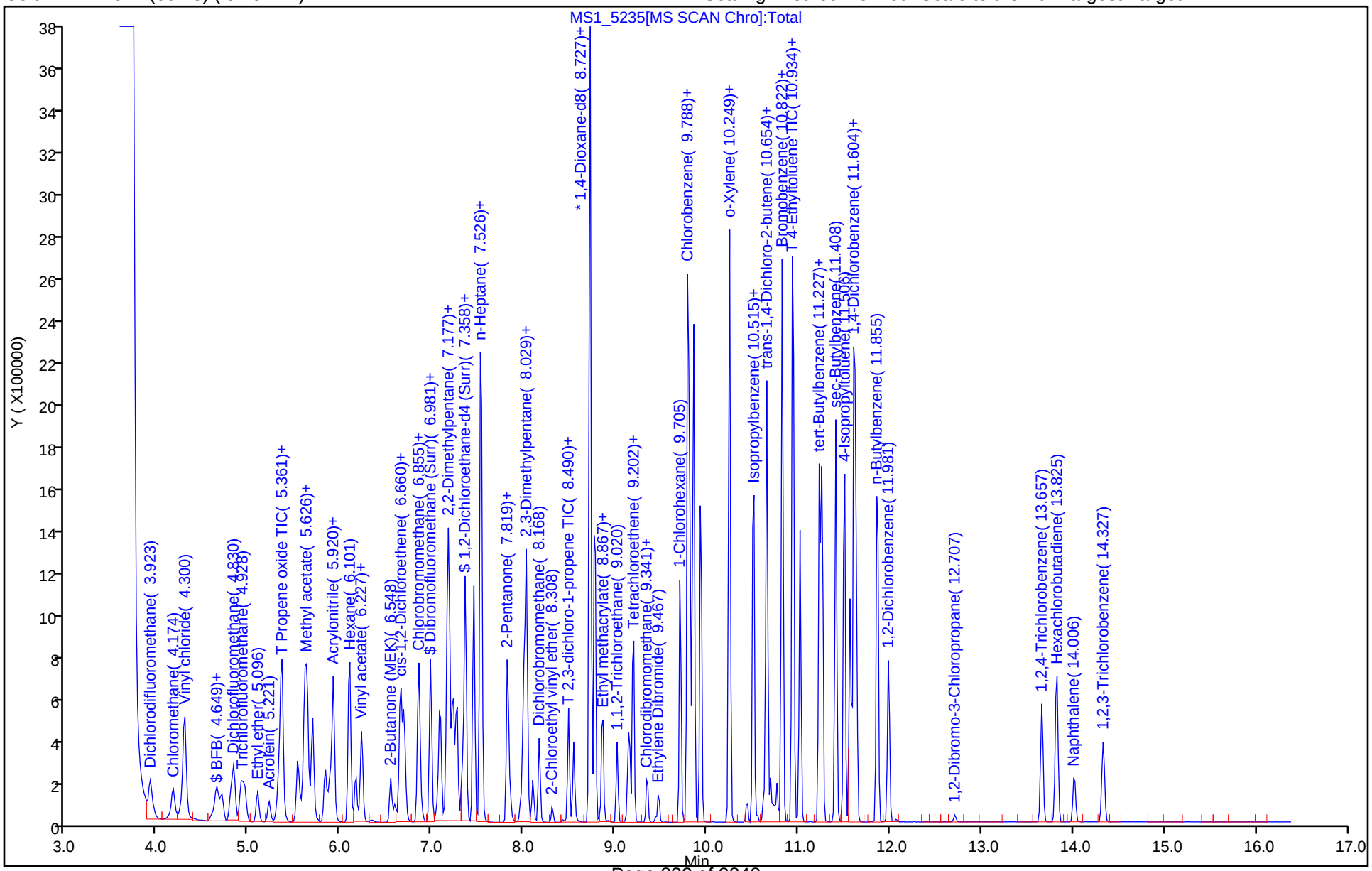
Report Date: 07-Aug-2018 06:54:17 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5235.D

Injection Date:	06-Aug-2018 10:09:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	160-29498-C-2-A MS			Worklist Smp#:	15
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	18
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



TestAmerica Denver
Recovery Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5235.D
Lims ID: 160-29498-C-2-A MS
Client ID:
Sample Type: MS
Inject. Date: 06-Aug-2018 10:09:30 ALS Bottle#: 18 Worklist Smp#: 15
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: 160-29498-C-2-A ms 2ml
Operator ID: wickhamt Instrument ID: VMS_MS1

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 07-Aug-2018 06:52:59 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0316

First Level Reviewer: wickhamt Date: 06-Aug-2018 11:49:30

Compound	Amount Added	Amount Recovered	% Rec.
$ 5 Dibromofluoromethane (Surr)	12.3	12.9	105.52
$ 6 1,2-Dichloroethane-d4 (Surr)	12.3	12.4	101.33
$ 7 Toluene-d8 (Surr)	12.3	12.9	105.52
$ 8 4-Bromofluorobenzene (Surr)	12.3	12.0	97.63
$ 4 BFB	0	0	0.00

Manual Integration/User Assign Peak Report

TestAmerica Denver

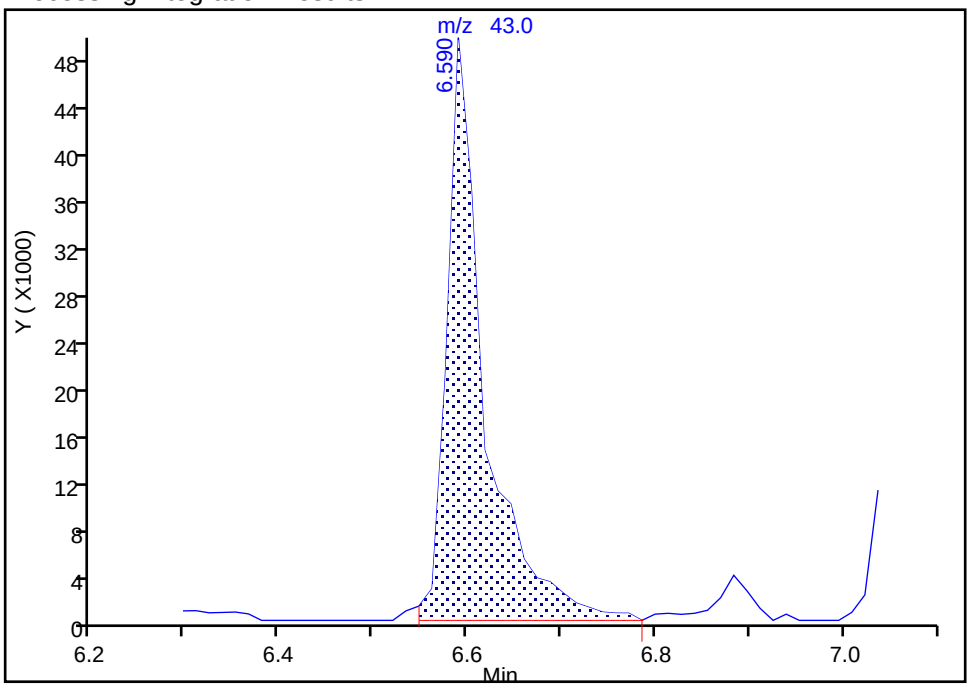
Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5235.D
Injection Date: 06-Aug-2018 10:09:30 Instrument ID: VMS_MS1
Lims ID: 160-29498-C-2-A MS
Client ID:
Operator ID: wickhamt ALS Bottle#: 18 Worklist Smp#: 15
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Method: AQ_VMS1_8260 Limit Group: MSV - 8260B Water and Solid
Column: DB-624 (60.25) (0.25 mm) Detector MS SCAN

61 2-Butanone (MEK), CAS: 78-93-3

Signal: 1

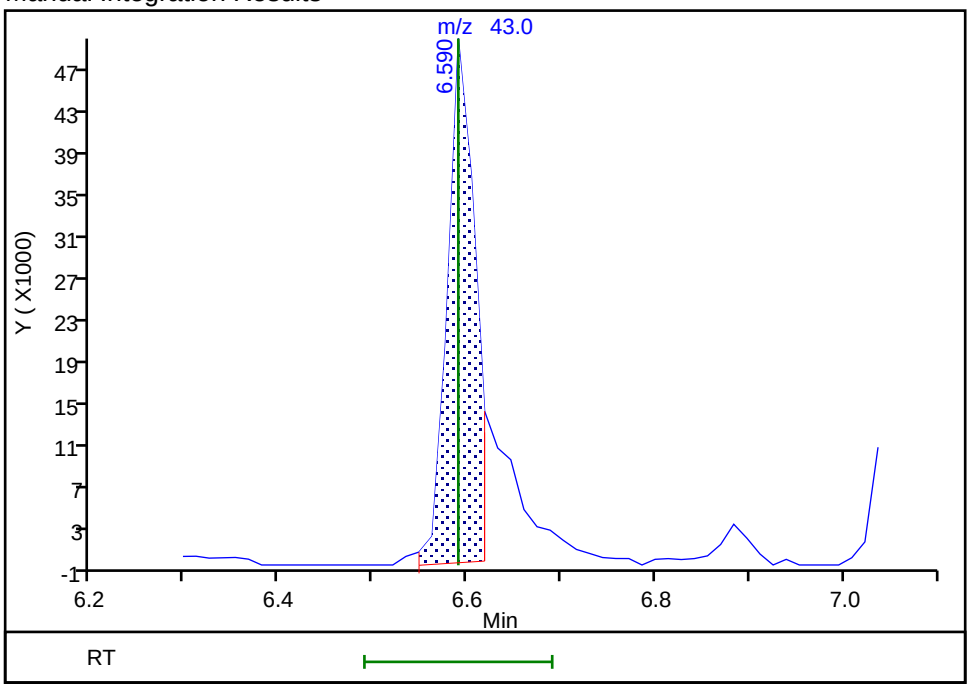
Processing Integration Results

RT: 6.59
Area: 137533
Amount: 25.540425
Amount Units: ug/l



Manual Integration Results

RT: 6.59
Area: 103490
Amount: 19.218504
Amount Units: ug/l



Reviewer: wickhamt, 06-Aug-2018 11:48:46
Audit Action: Assigned New Baseline Audit Reason: Shouldering

FORM I
GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Denver | Job No.: 160-29498-1

SDG No.:

Client Sample ID: CRC-B21-0205 MSD | Lab Sample ID: 160-29498-2 MSD

Matrix: Solid (TCLP) | Lab File ID: MS1_5236.D

Analysis Method: 8260B | Date Collected: 07/12/2018 11:40

Sample wt/vol: 2(mL) | Date Analyzed: 08/06/2018 10:29

Soil Aliquot Vol: | Dilution Factor: 1

Soil Extract Vol.: | GC Column: DB-624 (60.25) ID: 0.25(mm)

% Moisture: | Level: (low/med) Low

Analysis Batch No.: 424938 | Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
71-43-2	Benzene	50.7		10	1.6
78-93-3	2-Butanone (MEK)	209		100	18
56-23-5	Carbon tetrachloride	50.5		10	1.9
108-90-7	Chlorobenzene	47.9		10	1.7
67-66-3	Chloroform	51.5		10	1.6
107-06-2	1,2-Dichloroethane	52.9		10	1.3
75-35-4	1,1-Dichloroethene	51.3		10	2.3
127-18-4	Tetrachloroethene	47.7		10	2.0
79-01-6	Trichloroethene	49.6		10	1.6
75-01-4	Vinyl chloride	57.5		10	1.0

CAS NO.	SURROGATE	%REC	Q	LIMITS
17060-07-0	1,2-Dichloroethane-d4 (Surr)	109		64-129
2037-26-5	Toluene-d8 (Surr)	106		78-120
460-00-4	4-Bromofluorobenzene (Surr)	98		78-121
1868-53-7	Dibromofluoromethane (Surr)	109		79-119

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5236.D
Lims ID: 160-29498-C-2-A MSD
Client ID:
Sample Type: MSD
Inject. Date: 06-Aug-2018 10:29:30 ALS Bottle#: 19 Worklist Smp#: 16
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: 160-29498-C-2-A msd 2ml
Operator ID: wickhamt Instrument ID: VMS_MS1

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 07-Aug-2018 06:52:59 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0316

First Level Reviewer: wickhamt Date: 06-Aug-2018 12:02:58

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
* 150 TBA-d9 (IS)	65	5.584	5.584	0.000	89	168969	250.0	250.0	
* 1 Fluorobenzene	96	7.526	7.526	0.000	98	2035773	12.5	12.5	
* 149 1,4-Dioxane-d8	96	8.727	8.773	-0.046	0	18504		0	
* 2 Chlorobenzene-d5	119	9.788	9.788	0.000	93	433526	12.5	12.5	
* 3 1,4-Dichlorobenzene-d4	152	11.604	11.604	0.000	98	624520	12.5	12.5	
$ 5 Dibromofluoromethane (Surr	111	6.981	6.981	0.000	93	468068	12.3	13.3	
$ 6 1,2-Dichloroethane-d4 (Sur	65	7.274	7.274	0.000	98	399145	12.3	13.4	
$ 7 Toluene-d8 (Surr)	98	8.727	8.727	0.000	93	2167935	12.3	13.0	
$ 8 4-Bromofluorobenzene (Surr	95	10.654	10.654	0.000	0	671067	12.3	12.0	
$ 152 Trifluorotoluene (Surr)	1		0.000					ND	
$ 4 BFB	95	4.635	4.591	0.044	0	28950		NR	
24 Dichlorodifluoromethane	85	3.922	3.923	0.000	100	258456	5.00	5.60	
26 Chloromethane	50	4.174	4.160	0.014	99	286826	5.00	5.12	
22 Chlorotrifluoroethene	116		4.248					ND	
27 Vinyl chloride	62	4.286	4.286	0.000	95	309131	5.00	5.75	
25 1,2-Dichloro-1,1,2,2-tetra	85		4.472					ND	
28 Ethylene oxide	43		4.565					ND	U
29 Bromomethane	94	4.635	4.635	0.000	91	208561	5.00	5.31	
31 Chloroethane	64	4.705	4.691	0.013	100	205355	5.00	5.24	
23 2-Chloro-1,1,1-Trifluoroet	118		4.737					ND	
32 Dichlorofluoromethane	67	4.830	4.830	0.000	98	488681	5.00	5.59	
33 Trichlorofluoromethane	101	4.914	4.914	0.000	100	386016	5.00	5.61	
34 Ethanol	45		4.928					ND	
36 Ethyl ether	59	5.096	5.096	0.000	93	108224	5.00	5.34	
38 Propene oxide	58		5.180					ND	
39 Acrolein	56	5.221	5.221	0.000	100	119191	50.0	49.3	
40 Acetone	43	5.319	5.319	0.000	100	79554	20.0	23.2	
42 1,1,2-Trichloro-1,2,2-trif	151	5.347	5.333	0.014	98	172068	5.00	5.50	
41 Isopropyl alcohol	45		5.333					ND	U
43 1,1-Dichloroethene	96	5.361	5.361	0.000	97	224941	5.00	5.13	
35 1,2-Dichloro-1,1,2-trifluo	117		5.505					ND	
45 Iodomethane	142	5.529	5.529	0.000	99	343909	5.00	5.09	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
44 Acetonitrile	41		5.529					ND	U
37 1,1,1-Trifluoro-2,2-dichlo	83		5.533					ND	
46 Methyl acetate	43	5.556	5.557	-0.001	97	126721	10.0	13.0	
47 3-Chloro-1-propene	41	5.612	5.612	0.000	85	412143	5.00	5.03	
48 Carbon disulfide	76	5.626	5.626	0.000	99	1006937	5.00	5.15	
49 2-Methyl-2-propanol	59	5.654	5.654	0.000	93	44574	50.0	54.2	
50 Methylene Chloride	84	5.696	5.696	0.000	95	233303	5.00	5.58	
51 Acrylonitrile	53	5.836	5.836	0.000	100	254289	50.0	52.3	
52 Methyl tert-butyl ether	73	5.892	5.878	0.014	97	272583	5.00	5.07	
53 trans-1,2-Dichloroethene	96	5.920	5.920	0.000	97	252877	5.00	5.14	
54 Hexane	57	6.101	6.101	0.000	92	423341	5.00	4.79	
55 Vinyl acetate	43	6.171	6.157	0.014	97	373631	10.0	10.6	
56 Isopropyl ether	87	6.227	6.199	0.028	30	5289		0.1764	
57 1,1-Dichloroethane	63	6.227	6.227	0.000	97	440656	5.00	5.15	
58 2-Chloro-1,3-butadiene	53		6.297					ND	
59 Tert-butyl ethyl ether	59		6.464					ND	
61 2-Butanone (MEK)	43	6.590	6.590	0.000	100	109297	20.0	20.9	M
60 Ethyl acetate	43		6.590					ND	U
63 Propionitrile	54		6.632					ND	
62 sec-Butyl Alcohol	45	6.646	6.646	0.000	96	113311	150.0	146.6	
64 cis-1,2-Dichloroethene	96	6.660	6.646	0.014	83	245517	5.00	4.95	
65 2,2-Dichloropropane	77	6.688	6.688	0.000	93	335925	5.00	4.83	
66 Methacrylonitrile	41		6.772					ND	
67 Chlorobromomethane	128	6.841	6.841	0.000	97	75937	5.00	5.17	
68 Chloroform	83	6.855	6.855	0.000	95	385259	5.00	5.15	
69 Tetrahydrofuran	42	6.883	6.883	0.000	89	34612	10.0	8.68	
70 Isobutyl alcohol	41	7.051	7.051	0.000	91	42814	125.0	136.0	
71 1,1,1-Trichloroethane	97	7.079	7.079	0.000	99	365223	5.00	5.16	
72 Cyclohexane	56	7.163	7.163	0.000	0	481667	5.00	5.06	
73 1,1-Dichloropropene	75	7.191	7.177	0.013	97	351416	5.00	5.08	
74 Carbon tetrachloride	117	7.232	7.233	0.000	96	303109	5.00	5.05	
19 2,2-Dimethylpentane	57	7.163	7.251	-0.088	33	21837		NC	
17 2,4-Dimethylpentane	43		7.293					ND	
75 1,2-Dichloroethane	62	7.330	7.330	0.000	97	194182	5.00	5.29	
77 Benzene	78	7.358	7.358	0.000	97	961889	5.00	5.07	
76 Tert-amyl methyl ether	73		7.358					ND	
9 n-Heptane	43	7.456	7.456	0.000	92	436205	5.00	5.12	
10 2,2,3-Trimethylbutane	57	7.456	7.502	-0.046	64	237775		NC	
78 n-Butanol	56		7.554					ND	U
12 3,3-Dimethylpentane	43	7.847	7.768	0.079	75	163208		NC	
18 2-Methylhexane	43	7.847	7.810	0.037	73	163208		NC	
79 Trichloroethene	95	7.819	7.819	0.000	98	237910	5.00	4.96	
80 2-Pentanone	43	7.847	7.847	0.000	99	163208	20.0	18.0	
81 Methyl methacrylate	100		7.945					ND	
15 3-Methylhexane	43	7.973	7.949	0.024	65	111898		NC	
11 2,3-Dimethylpentane	56	8.028	7.949	0.079	43	121798		NC	
82 1,2-Dichloropropane	63	8.001	8.001	0.000	96	219655	5.00	5.12	
83 Methylcyclohexane	55	8.028	8.029	-0.001	0	377639	5.00	4.97	
84 1,4-Dioxane	88	8.056	8.057	-0.001	93	12700	100.0	105.7	
85 Dibromomethane	93	8.098	8.098	0.000	95	73664	5.00	5.15	
86 Dichlorobromomethane	83	8.168	8.168	0.000	99	228716	5.00	5.02	
20 3-Ethylpentane	43		8.214					ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
87 2-Nitropropane	41		8.294					ND	U
88 2-Chloroethyl vinyl ether	63	8.308	8.308	0.000	91	31330	5.00	4.76	
89 cis-1,3-Dichloropropene	75	8.489	8.489	0.000	96	267797	5.00	4.88	
90 4-Methyl-2-pentanone (MIBK	43	8.545	8.545	0.000	97	249403	20.0	21.5	
91 Toluene	91	8.783	8.769	0.014	98	990023	5.00	5.14	
92 Ethyl methacrylate	69	8.852	8.853	-0.001	88	99317	5.00	4.25	
93 trans-1,3-Dichloropropene	75	8.866	8.867	-0.001	98	181192	5.00	4.91	
94 1,1,2-Trichloroethane	97	9.020	9.020	0.000	92	100425	5.00	5.30	
95 2-Hexanone	43	9.132	9.132	0.000	96	152477	20.0	19.4	
96 1,3-Dichloropropane	76	9.160	9.160	0.000	95	186367	5.00	4.85	
97 Tetrachloroethene	164	9.202	9.202	0.000	98	182476	5.00	4.77	
98 Chlorodibromomethane	129	9.341	9.341	0.000	91	107064	5.00	4.68	
13 Dimethyl disulfide	94	9.467	9.388	0.079	33	877		NC	
99 Tetrahydrothiophene	60		9.397					ND	
100 Ethylene Dibromide	107	9.467	9.467	0.000	97	88248	5.00	4.93	
101 1-Chlorohexane	91	9.704	9.705	-0.001	0	332688	5.00	4.62	
102 Chlorobenzene	112	9.816	9.816	0.000	95	550231	5.00	4.79	
103 1,1,1,2-Tetrachloroethane	131	9.844	9.844	0.000	93	165714	5.00	4.71	
104 Ethylbenzene	106	9.858	9.858	0.000	98	343068	5.00	4.66	
105 m-Xylene & p-Xylene	106	9.928	9.928	0.000	100	412481	5.00	4.66	
106 Styrene	104	10.249	10.249	0.000	84	541671	5.00	4.54	
109 o-Xylene	106	10.249	10.249	0.000	90	386861	5.00	4.71	
107 Bromoform	173	10.445	10.445	0.000	95	45799	5.00	4.39	
108 Isopropylbenzene	105	10.514	10.515	-0.001	96	1076171	5.00	4.55	
110 cis-1,4-Dichloro-2-butene	53		10.515					ND	U
111 Cyclohexanone	55	10.626	10.626	0.000	93	68152	200.0	194.9	
112 1,1,2,2-Tetrachloroethane	83	10.696	10.696	0.000	96	95728	5.00	4.74	
113 trans-1,4-Dichloro-2-buten	53	10.724	10.724	0.000	86	21885	5.00	4.48	
114 1,2,3-Trichloropropane	110	10.766	10.766	0.000	87	26003	5.00	4.84	
116 Bromobenzene	156	10.822	10.822	0.000	97	198177	5.00	4.66	
115 N-Propylbenzene	120	10.822	10.822	0.000	99	301015	5.00	4.50	
120 1,3,5-Trimethylbenzene	105	10.933	10.934	-0.001	94	876525	5.00	4.47	
117 2-Chlorotoluene	126	10.947	10.948	-0.001	96	242493	5.00	4.61	
118 4-Chlorotoluene	126	11.017	11.017	0.000	99	234329	5.00	4.51	
119 tert-Butylbenzene	119	11.227	11.227	0.000	93	871333	5.00	4.54	
121 1,2,4-Trimethylbenzene	105	11.255	11.255	0.000	98	877611	5.00	4.55	
143 Pentachloroethane	167		11.283					ND	
122 sec-Butylbenzene	134	11.408	11.408	0.000	95	236342	5.00	4.52	
123 4-Isopropyltoluene	119	11.506	11.506	0.000	97	998300	5.00	4.65	
124 1,3-Dichlorobenzene	146	11.562	11.562	0.000	97	427881	5.00	4.68	
126 1,4-Dichlorobenzene	146	11.632	11.632	0.000	94	408301	5.00	4.68	
125 1,2,3-Trimethylbenzene	105		11.632					ND	
127 n-Butylbenzene	91	11.855	11.855	0.000	98	991517	5.00	4.63	
128 1,2-Dichlorobenzene	146	11.981	11.981	0.000	97	338567	5.00	4.78	
129 1,2-Dibromo-3-Chloropropan	157	12.707	12.707	0.000	78	10710	5.00	4.26	
21 1,3,5-Trichlorobenzene	180		12.945					ND	
14 n-Nonyl Aldehyde	57		13.340					ND	
130 1,2,4-Trichlorobenzene	180	13.657	13.657	0.000	94	219641	5.00	4.74	
131 Hexachlorobutadiene	225	13.824	13.825	-0.001	98	178469	5.00	4.67	
132 Naphthalene	128	14.006	14.006	0.000	97	246043	5.00	4.41	
133 1,2,3-Trichlorobenzene	180	14.327	14.327	0.000	95	166711	5.00	4.96	
161 n-Nonane TIC	1		0.000					ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/l	OnCol Amt ug/l	Flags
158 1-Chlorohexane TIC	1		0.000					ND	
160 Cyclohexane TIC	1		0.000					ND	
159 Methyl cyclohexane TIC	1		0.000					ND	
S 140 1,2-Dichloroethene, Total	96				0		10.0	10.1	
S 136 1,2-Dichloroethene, Total	1				0		10.0	10.1	
S 134 Trihalomethanes, Total	1				0		20.0	19.2	
S 137 Total BTEX	1				0			24.2	
S 139 Xylenes, Total (URS)	1				0		10.0	9.37	
S 135 1,3-Dichloropropene, Total	1				0		10.0	9.78	
S 153 TAH	1				0			0	
S 138 Xylenes, Total	106				0		10.0	9.37	
T 141 Dichloroacetonitrile TIC	74		1.000					ND	
T 142 2,3-dichloro-1-propene TIC	75	7.191	1.000	6.190	95	351416		10.1	
T 30 Propene oxide TIC	58	5.319	5.334	-0.015	11	24975		0.7201	
T 156 4-Ethyltoluene TIC	1	10.933	0.000	10.933	90	876525		25.3	
T 157 1,3-Butadiene TIC	1		0.000					ND	
T 16 2-Butoxyethanol TIC	1		0.000					ND	
T 155 Dicyclopentadiene TIC	1		0.000					ND	
T 154 Propene TIC	1		0.000					ND	

QC Flag Legend

Processing Flags
- NR - Missing Quant Standard
- NC - Not Calibrated

Review Flags
- M - Manually Integrated
- U - Marked Undetected

Reagents:

MV-Main B_00022	Amount Added:	2.50	Units: uL	
MV-SS 2-Cleve_00046	Amount Added:	2.50	Units: uL	
MV-Gas/Ket B_00043	Amount Added:	2.50	Units: uL	
MV-568718-D_00014	Amount Added:	1.00	Units: uL	Run Reagent
MV-ARCH SS A_00101	Amount Added:	0.98	Units: uL	Run Reagent

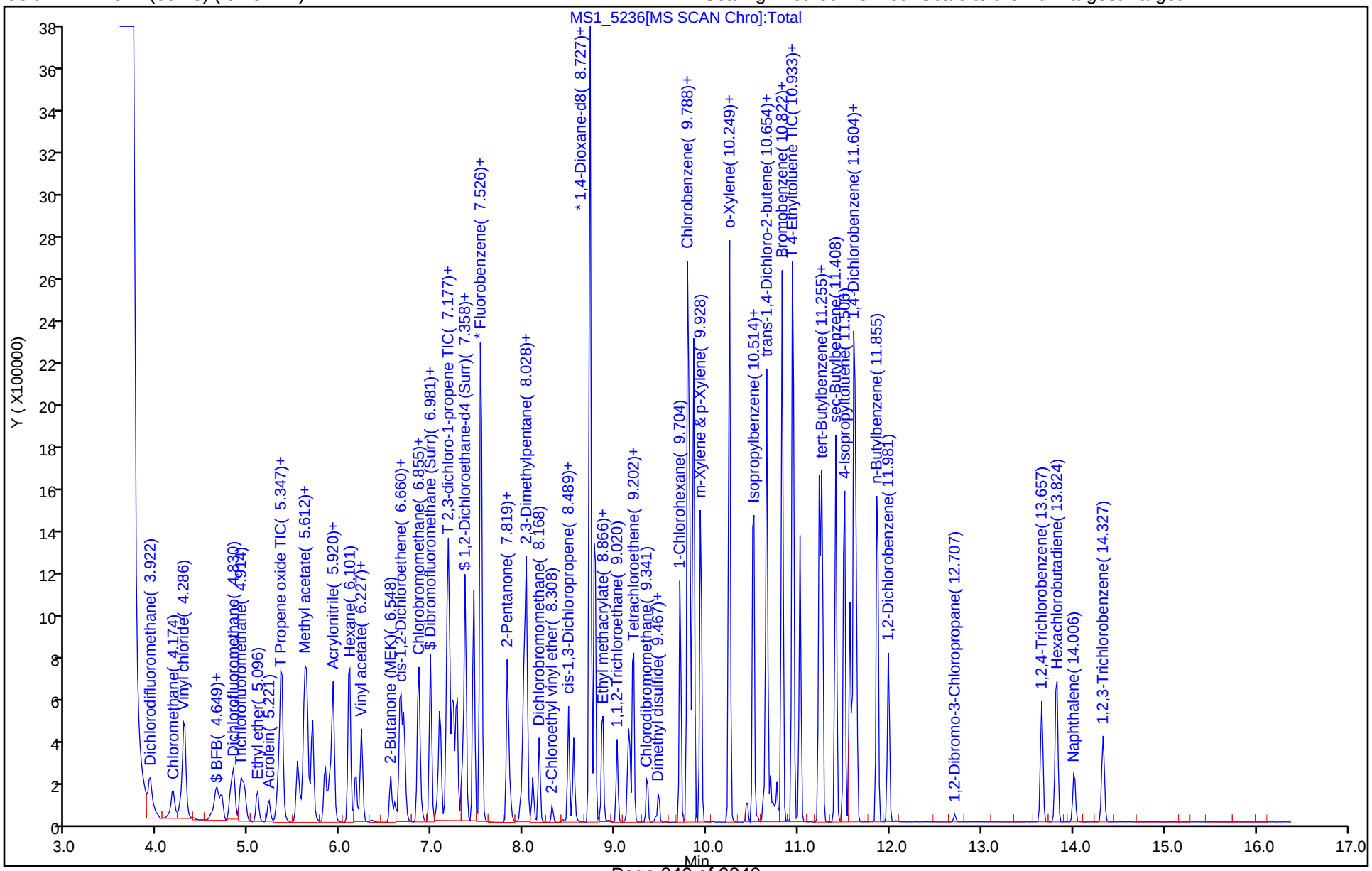
Report Date: 07-Aug-2018 06:54:20 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5236.D

Injection Date:	06-Aug-2018 10:29:30	Instrument ID:	VMS_MS1	Operator ID:	wickhamt
Lims ID:	160-29498-C-2-A MSD			Worklist Smp#:	16
Client ID:					
Purge Vol:	20.000 mL	Dil. Factor:	1.0000	ALS Bottle#:	19
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		

Column: DB-624 (60.25) (0.25 mm) Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



TestAmerica Denver
Recovery Report

Data File: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5236.D
Lims ID: 160-29498-C-2-A MSD
Client ID:
Sample Type: MSD
Inject. Date: 06-Aug-2018 10:29:30 ALS Bottle#: 19 Worklist Smp#: 16
Purge Vol: 20.000 mL Dil. Factor: 1.0000
Sample Info: 160-29498-C-2-A msd 2ml
Operator ID: wickhamt Instrument ID: VMS_MS1

Method: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\AQ_VMS1_8260.m
Limit Group: MSV - 8260B Water and Solid
Last Update: 07-Aug-2018 06:52:59 Calib Date: 02-Aug-2018 13:37:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b\MS1_5089.D

Column 1 : DB-624 (60.25) (0.25 mm) Det: MS SCAN
Process Host: CTX0316

First Level Reviewer: wickhamt Date: 06-Aug-2018 12:02:58

Compound	Amount Added	Amount Recovered	% Rec.
$ 5 Dibromofluoromethane (Surr)	12.3	13.3	108.62
$ 6 1,2-Dichloroethane-d4 (Surr)	12.3	13.4	109.01
$ 7 Toluene-d8 (Surr)	12.3	13.0	106.05
$ 8 4-Bromofluorobenzene (Surr)	12.3	12.0	98.15
$ 4 BFB	0	0	0.00

Manual Integration/User Assign Peak Report

TestAmerica Denver

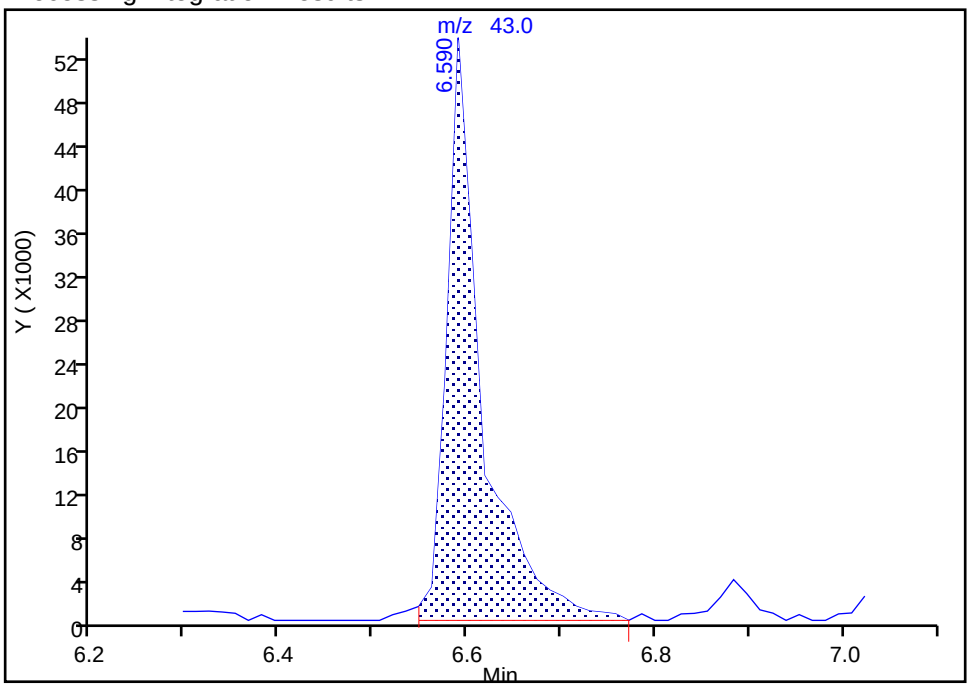
Data File:	\\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b\MS1_5236.D				
Injection Date:	06-Aug-2018 10:29:30	Instrument ID:	VMS_MS1		
Lims ID:	160-29498-C-2-A MSD				
Client ID:					
Operator ID:	wickhamt	ALS Bottle#:	19	Worklist Smp#:	16
Purge Vol:	20.000 mL	Dil. Factor:	1.0000		
Method:	AQ_VMS1_8260	Limit Group:	MSV - 8260B Water and Solid		
Column:	DB-624 (60.25) (0.25 mm)	Detector	MS SCAN		

61 2-Butanone (MEK), CAS: 78-93-3

Signal: 1

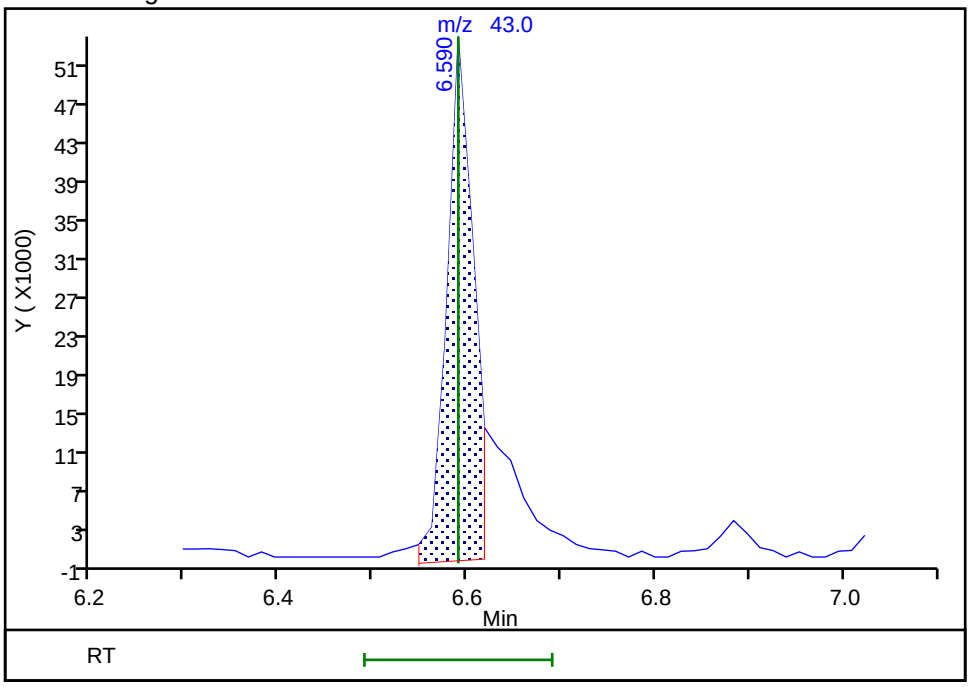
Processing Integration Results

RT: 6.59
Area: 140174
Amount: 26.819439
Amount Units: ug/l



Manual Integration Results

RT: 6.59
Area: 109297
Amount: 20.911754
Amount Units: ug/l



Reviewer: wickhamt, 06-Aug-2018 12:01:44
Audit Action: Assigned New Baseline Audit Reason: Shouldering

ANALYSIS RUN LOG

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: VMS_MS1 Start Date: 08/22/2018 15:58

Analysis Batch Number: 427176 End Date: 08/23/2018 02:02

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
BFB 280-427176/1		08/22/2018 15:58	1	MS1_6004.D	DB-624 (60.25) 0.25(mm)
CCV 280-427176/2		08/22/2018 16:31	1		DB-624 (60.25) 0.25(mm)
CCV 280-427176/3		08/22/2018 17:06	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 18:07	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 18:27	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 18:48	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 19:36	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 19:56	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 20:16	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 20:37	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 20:57	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 21:17	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 21:38	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 21:58	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 22:18	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 22:39	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 22:59	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 23:19	4		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 23:40	40		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/23/2018 00:00	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/23/2018 00:20	2		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/23/2018 00:41	10		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/23/2018 01:01	100		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/23/2018 01:21	4		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/23/2018 01:42	40		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/23/2018 02:02	1		DB-624 (60.25) 0.25(mm)

GC/MS VOA ANALYSIS RUN LOG

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: VMS_MS1 Start Date: 08/02/2018 07:34

Analysis Batch Number: 424541 End Date: 08/02/2018 19:01

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
BFB 280-424541/1		08/02/2018 07:34	1	MS1_5072.D	DB-624 (60.25) 0.25(mm)
ZZZZZ		08/02/2018 08:32	1		DB-624 (60.25) 0.25(mm)
STD003 280-424541/12 IC		08/02/2018 08:53	1	MS1_5075.D	DB-624 (60.25) 0.25(mm)
STD01 280-424541/13 IC		08/02/2018 09:13	1	MS1_5076.D	DB-624 (60.25) 0.25(mm)
STD02 280-424541/14 IC		08/02/2018 09:33	1	MS1_5077.D	DB-624 (60.25) 0.25(mm)
STD05 280-424541/15 IC		08/02/2018 09:53	1	MS1_5078.D	DB-624 (60.25) 0.25(mm)
STD10 280-424541/16 IC		08/02/2018 10:14	1	MS1_5079.D	DB-624 (60.25) 0.25(mm)
STD30 280-424541/17 IC		08/02/2018 10:34	1	MS1_5080.D	DB-624 (60.25) 0.25(mm)
STD60 280-424541/18 IC		08/02/2018 10:54	1	MS1_5081.D	DB-624 (60.25) 0.25(mm)
ICV 280-424541/19		08/02/2018 11:35	1	MS1_5083.D	DB-624 (60.25) 0.25(mm)
STD01 280-424541/20 IC		08/02/2018 11:55	1	MS1_5084.D	DB-624 (60.25) 0.25(mm)
STD02 280-424541/21 IC		08/02/2018 12:15	1	MS1_5085.D	DB-624 (60.25) 0.25(mm)
STD05 280-424541/22 IC		08/02/2018 12:36	1	MS1_5086.D	DB-624 (60.25) 0.25(mm)
ICIS 280-424541/23		08/02/2018 12:56	1	MS1_5087.D	DB-624 (60.25) 0.25(mm)
STD30 280-424541/24 IC		08/02/2018 13:16	1	MS1_5088.D	DB-624 (60.25) 0.25(mm)
STD60 280-424541/25 IC		08/02/2018 13:37	1	MS1_5089.D	DB-624 (60.25) 0.25(mm)
ICV 280-424541/26		08/02/2018 14:17	1	MS1_5091.D	DB-624 (60.25) 0.25(mm)
ZZZZZ		08/02/2018 15:17	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/02/2018 15:37	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/02/2018 15:57	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/02/2018 16:18	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/02/2018 16:38	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/02/2018 16:58	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/02/2018 17:19	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/02/2018 17:39	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/02/2018 18:00	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/02/2018 18:20	1		DB-624 (60.25) 0.25(mm)
CCVC 280-424541/43		08/02/2018 18:40	1		DB-624 (60.25) 0.25(mm)
CCVC 280-424541/44		08/02/2018 19:01	1		DB-624 (60.25) 0.25(mm)

GC/MS VOA ANALYSIS RUN LOG

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: VMS_MS1 Start Date: 08/06/2018 07:02

Analysis Batch Number: 424938 End Date: 08/06/2018 16:15

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
BFB 280-424938/1		08/06/2018 07:02	1	MS1_5226.D	DB-624 (60.25) 0.25(mm)
CCV 280-424938/2		08/06/2018 07:47	1	MS1_5228.D	DB-624 (60.25) 0.25(mm)
CCV 280-424938/3		08/06/2018 08:07	1	MS1_5229.D	DB-624 (60.25) 0.25(mm)
LCS 280-423316/2-A		08/06/2018 09:08	1	MS1_5232.D	DB-624 (60.25) 0.25(mm)
LB 280-423316/1-A		08/06/2018 09:28	1	MS1_5233.D	DB-624 (60.25) 0.25(mm)
160-29498-2		08/06/2018 09:48	1	MS1_5234.D	DB-624 (60.25) 0.25(mm)
160-29498-2 MS		08/06/2018 10:09	1	MS1_5235.D	DB-624 (60.25) 0.25(mm)
160-29498-2 MSD		08/06/2018 10:29	1	MS1_5236.D	DB-624 (60.25) 0.25(mm)
ZZZZZ		08/06/2018 10:49	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/06/2018 11:10	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/06/2018 11:30	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/06/2018 11:50	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/06/2018 12:11	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/06/2018 12:31	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/06/2018 12:51	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/06/2018 13:12	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/06/2018 13:32	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/06/2018 13:52	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/06/2018 14:13	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/06/2018 14:33	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/06/2018 14:53	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/06/2018 15:14	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/06/2018 15:34	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/06/2018 15:54	1		DB-624 (60.25) 0.25(mm)
CCVC 280-424938/33		08/06/2018 16:15	1		DB-624 (60.25) 0.25(mm)

GC/MS VOA ANALYSIS RUN LOG

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: VMS_MS1 Start Date: 08/21/2018 16:38

Analysis Batch Number: 427031 End Date: 08/22/2018 01:28

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
BFB 280-427031/1		08/21/2018 16:38	1	MS1_5960.D	DB-624 (60.25) 0.25(mm)
CCV 280-427031/2		08/21/2018 17:04	1		DB-624 (60.25) 0.25(mm)
CCV 280-427031/3		08/21/2018 17:44	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/21/2018 18:07	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/21/2018 18:27	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/21/2018 19:20	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/21/2018 19:40	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/21/2018 20:01	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/21/2018 20:44	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/21/2018 21:05	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/21/2018 21:25	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/21/2018 21:45	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/21/2018 22:05	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/21/2018 22:25	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/21/2018 22:46	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/21/2018 23:06	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/21/2018 23:26	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/21/2018 23:46	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 00:07	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 00:27	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 00:47	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 01:07	1		DB-624 (60.25) 0.25(mm)
ZZZZZ		08/22/2018 01:28	400		DB-624 (60.25) 0.25(mm)

Sequence Name: C:\msdchem\1\sequence\080618am.s
Comment:
Operator: wickhamt
Data Path: C:\MSDCHEM\1\DATA\080618am\
Instrument Control Pre-Seq Cmd:
Data Analysis Pre-Seq Cmd:

Instrument Control Post-Seq Cmd:
Data Analysis Post-Seq Cmd:

Test America Denver
Instrument: MS1
DV-MS-0010 (8260B/624) (Circle)
Purge Volume: (20mL/5mL/5g) (Circle)
Tune Time: 07:02-16:15
Lims Batch: 424938

Method Sections To Run
(X) Full Method
( ) Reprocessing Only

Sequence Barcode Options
(X) On Mismatch, Inject Anyway
( ) On Mismatch, Don't Inject
( ) Barcode Disabled

8-7-18 Tam

Line			Sample Name/Misc Info	
1)	Sample	100	MS1_5226 BFB	bfb 07:02
2)	Sample	10	MS1_5227 8260	blank
3)	Pause			
4)	Sample	11	MS1_5228 8260	ccv m
5)	Sample	12	MS1_5229 8260	ccv s
6)	Sample	13	MS1_5230 8260	lcs af
7)	Sample	14	MS1_5231 8260	mb af
8)	Sample	15	MS1_5232 8260	LCS 280-423316/2-A 2ml af
9)	Sample	16	MS1_5233 8260	LB 280-423316/1-A 2ml af
10)	Sample	17	MS1_5234 8260	160-29498-C-2-A 2ml
11)	Sample	18	MS1_5235 8260	160-29498-C-2-A ms 2ml
12)	Sample	19	MS1_5236 8260	160-29498-C-2-A msd 2ml
13)	Sample	20	MS1_5237 8260	280-112230-C-1-A 2ml
14)	Sample	21	MS1_5238 8260	280-112289-E-1-A 2ml
15)	Sample	22	MS1_5239 8260	320-41149-A-36-A 2ml
16)	Sample	23	MS1_5240 8260	LCS 280-423614/2-A 2ml af
17)	Sample	24	MS1_5241 8260	LB3 280-423614/1-A 2ml af
18)	Sample	25	MS1_5242 8260	320-41333-A-15-A 2ml af
19)	Sample	26	MS1_5243 8260	320-41333-A-15-A ms 2ml af
20)	Sample	27	MS1_5244 8260	320-41333-A-15-A msd 2ml af
21)	Sample	28	MS1_5245 8260	280-112146-U-2-A 2ml af
22)	Sample	29	MS1_5246 8260	LCS 280-424099/2-A 2ml af
23)	Sample	30	MS1_5247 8260	LB 280-424099/1-A 2ml af
24)	Sample	31	MS1_5248 8260	280-112363-A-1-A 2ml
25)	Sample	32	MS1_5249 8260	320-41401-a-1-a 2ml
26)	Sample	33	MS1_5250 8260	320-41401-a-1-a ms 2ml
27)	Sample	34	MS1_5251 8260	320-41401-a-1-a msd 2ml
28)	Sample	35	MS1_5252 8260	320-41554-A-9-A 2ml
29)	Sample	36	MS1_5253 8260	ccvc 16:15

TestAmerica Laboratories
Worklist Report

Worklist Name: 080618am
Instrument Name: VMS_MS1
Purge Volume: 20.00
Analysis Type: VOA
Batch Directory: \\ChromNA\Denver\ChromData\VMS_MS1\20180806-72706.b
Upload Directory: \\CorpTALSAPP16\280-DN-RawData\Organics\MS\VMS_MS1
Run Reagent: MV-568718-D_00014
Run Reagent: MV-ARCH SS A_00101

Worklist Number: 72706
Chrom Method: AQ_VMS1_8260
Units: mL
Amount Added: 1.000, Units: uL
Amount Added: 0.980, Units: uL

Worklist ID	Lims ID	Sample Reagents	Smp Type	Fract	Initial Vol/Wt	Vol/Wt Units	Dil Fact
280-0072706-001	# 1 BFB	MV-BFB_00026	BFB	voaWater	1.000	uL	1.000
280-0072706-002	# 2 CCV	MV-2cleve+AVA_00036 MV-Main A_00037 MV-Gas/Ket A_00075	CCV	voaWater	20.00	mL	1.000
280-0072706-003	# 3 CCV	MV-Supp A_00031 MV-568718-D_00014	CCV	voaWater	20.00	mL	1.000
280-0072706-004	# 4 LCS	MV-Gas/Ket B_00043 MV-Main B_00022 MV-SS 2-Cleve_00046	LCS	voaWater	20.00	mL	1.000
280-0072706-005	# 5 LCSD	MV-Gas/Ket B_00043 MV-Main B_00022 MV-SS 2-Cleve_00046	LCSD	voaWater	20.00	mL	1.000
280-0072706-006	# 6 LCS	MV-Supp B_00021	LCS	voaWater	20.00	mL	1.000
280-0072706-007	# 7 LCSD	MV-Supp B_00021	LCSD	voaWater	20.00	mL	1.000
280-0072706-008	# 8 MB		MB	voaWater	20.00	mL	1.000
280-0072706-009	# 9 280-108595-A-1		Client	voaWater	20.00	mL	1.000
280-0072706-010	#10 280-108595-A-2		Client	voaWater	20.00	mL	1.000
280-0072706-011	#11 280-108595-A-3		Client	voaWater	20.00	mL	1.000
280-0072706-012	#12 LCS 280-423316/2-A	MV-Main B_00022 MV-SS 2-Cleve_00046 MV-Gas/Ket B_00043	LCS	voaWater	2.000	mL	1.000
280-0072706-013	#13 LB 280-423316/1-A		LB	voaWater	2.000	mL	1.000

Worklist ID	Lims ID	Sample Reagents	Smp Type	Fract	Initial Vol/Wt	Vol/Wt Units	Dil Fact
280-0072706-014	#14 160-29498-C-2-A		Client	voaWater	2.000	mL	1.000
280-0072706-015	#15 160-29498-C-2-A MS	MV-Main B_00022 MV-SS 2-Cleve_00046 MV-Gas/Ket B_00043	MS	voaWater	2.000	mL	1.000
280-0072706-016	#16 160-29498-C-2-A MSD	MV-Main B_00022 MV-SS 2-Cleve_00046 MV-Gas/Ket B_00043	MSD	voaWater	2.000	mL	1.000
280-0072706-017	#17 280-112230-C-1-A		Client	voaWater	2.000	mL	1.000
280-0072706-018	#18 280-112289-E-1-A		Client	voaWater	2.000	mL	1.000
280-0072706-019	#19 320-41149-A-36-A		Client	voaWater	2.000	mL	1.000
280-0072706-020	#20 LCS 280-423614/2-A	MV-Main B_00022 MV-SS 2-Cleve_00046 MV-Gas/Ket B_00043	LCS	voaWater	2.000	mL	1.000
280-0072706-021	#21 LB3 280-423614/1-A		LB3	voaWater	2.000	mL	1.000
280-0072706-022	#22 320-41333-A-15-A		Client	voaWater	2.000	mL	1.000
280-0072706-023	#23 320-41333-A-15-A MS	MV-Main B_00022 MV-SS 2-Cleve_00046 MV-Gas/Ket B_00043	MS	voaWater	2.000	mL	1.000
280-0072706-024	#24 320-41333-A-15-A MSD	MV-Main B_00022 MV-SS 2-Cleve_00046 MV-Gas/Ket B_00043	MSD	voaWater	2.000	mL	1.000
280-0072706-025	#25 280-112146-U-2-A		Client	voaWater	2.000	mL	1.000
280-0072706-026	#26 LCS 280-424099/2-A	MV-Main B_00022 MV-Gas/Ket B_00043 MV-SS 2-Cleve_00046	LCS	voaWater	2.000	mL	1.000
280-0072706-027	#27 LB 280-424099/1-A		LB	voaWater	2.000	mL	1.000
280-0072706-028	#28 280-112363-A-1-A		Client	voaWater	2.000	mL	1.000
280-0072706-029	#29 320-41401-A-1-A		Client	voaWater	2.000	mL	1.000
280-0072706-030	#30 320-41401-A-1-A MS	MV-Main B_00022 MV-Gas/Ket B_00043 MV-SS 2-Cleve_00046	MS	voaWater	2.000	mL	1.000
280-0072706-031	#31 320-41401-A-1-A MSD	MV-Main B_00022 MV-Gas/Ket B_00043 MV-SS 2-Cleve_00046	MSD	voaWater	2.000	mL	1.000

Worklist ID	Lims ID	Sample Reagents	Smp Type	Fract	Initial Vol/Wt	Vol/Wt Units	Dil Fact
280-0072706-032	#32 320-41554-A-9-A		Client	voaWater	2.000	mL	1.000
280-0072706-033	#33 ccvc	MV-Main A_00037 MV-Gas/Ket A_00075 MV-2cleve+AVA_00036	CCVC	voaWater	20.00	mL	1.000
280-0072706-034	#34 Samp 34		Client	voaWater	2.000	mL	1.000

MS1

Sample Request Form: 49334

den_msvoa_totalbacklog 8/6/2018 1:14:47 PM Assigned to: Wickham, Tom A

Sample	Client Sample ID	Container	Method	Analytical Method	Hold Time	Due	PM	State Code	Storage	Hazard Level
160-29498-2 2	CRC-B21-0205		8260B	TCLP 8260B	07/26 23:59	08/07/18	CYLS	IL	180	Level 1 radioactive
M RAD SCREEENS REQUIRED PRIOR TO SHIPPING!										
280-112146-2 2	Outfall 001	5mL Lab	8260B	TCLP 8260B	08/08 23:59	08/06/18	DMH	AR	WC Dpt & 96 & MS-Strge & Mtls-Strge	Unconfirmed
280-112230-1 2	SD052-04_0718_IDW		8260B_DOD5	TCLP 8260B_DOD5	08/06 23:59	08/07/18	SKR	NY	103 & WC Dpt & OP Dpt	Unconfirmed
M Q5/DIL3										
280-112289-1 2	IDW-1-0718		8260B_DOD5	TCLP 8260B_DOD5	08/06 23:59	08/13/18	PJM	IA	114	Unconfirmed
320-41149-36 2	GRE-IDW-S-01		8260B_DOD5	TCLP 8260B_DOD5	08/06 23:59	08/01/18	DRA	VA	178	Unconfirmed
320-41333-15 2	GRE-IDW-W-01	5mL Lab	8260B_DOD5	TCLP 8260B_DOD5	08/08 23:59	08/05/18	DRA	VA	MS-Strge	Unconfirmed
320-41401-1 2	IDW-Soil-01		8260B_DOD5	TCLP 8260B_DOD5	08/12 23:59	08/09/18	DRA	VA	Quarantine 4	Unconfirmed
320-41554-9 2	IDW-SOIL		8260B_DOD5	TCLP 8260B_DOD5	08/12 23:59	08/12/18	DRA	VA	158	Unconfirmed

1311_Z Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 280-423316

Analyst: Bourgery, David F

Batch Open: 7/23/2018 5:36:00PM

Batch End: 7/24/2018 9:54:00AM

TCLP Extraction 8-6-18 TAW

HT 8-6

	Input Sample Lab ID (Analytical Method)	SDG (Job #)	Matrix	Initial Amount	Final Amount	Due Date	Analytical TAT	Dlv Rank	Comments	Output Sample Lab ID
1	LB~280-423316/1 N/A	N/A		2		N/A	N/A	N/A	ImLat	
2	LCS~280-423316/2 N/A	N/A		2		N/A	N/A	N/A	ImLat	
3	160-29498-C-2 (8260B)	N/A (160-29498-1)	Solid	2		8/7/18	25_Days	4		
4	280-112230-C-1 (8260B_DOD5)	N/A (280-112230-1)	Solid	2		8/7/18	12_Days	4		
5	280-112289-E-1 (8260B_DOD5)	N/A (280-112289-1)	Solid	2		8/13/18	15_Days	4		
6	320-41149-A-36 (8260B_DOD5)	N/A (320-41149-1)	Solid	2		8/1/18	16_Days	4		
7	N/A	N/A				N/A	N/A	N/A		
8	N/A	N/A				N/A	N/A	N/A		
9	N/A	N/A				N/A	N/A	N/A		
10	N/A	N/A				N/A	N/A	N/A		
11	N/A	N/A				N/A	N/A	N/A		
12	N/A	N/A				N/A	N/A	N/A		
13	N/A	N/A				N/A	N/A	N/A		
14	N/A	N/A				N/A	N/A	N/A		

MAY CONTAIN RADIOACTIVE MATERIALS

CAT-1

Return all empty sample containers to their original storage location

1311_Z Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 280-423614

Analyst: Bourgery, David F

Batch Open: 7/25/2018 11:55:00AM

Batch End: 7/25/2018 12:55:00PM

TCLP Extraction 8-6-18 Taw

HT 8-8

	Input Sample Lab ID (Analytical Method)	SDG (Job #)	Matrix	Initial Amount	Final Amount	Due Date	Analytical TAT	Dlv Rank	Comments	Output Sample Lab ID
1	LB3~280-423614/1 N/A	N/A		2		N/A	N/A	N/A	1mL af	LB3 280-423614/1-A
2	LCS~280-423614/2 N/A	N/A		2		N/A	N/A	N/A	1mL af	LCS 280-423614/2-A
3	280-112146-U-2 (8260B)	N/A (280-112146-1)	Water	2		8/6/18	12_Day_Rush	2	used V too 5mL af	280-112146-U-2-A
4	320-41333-A-15 (8260B_DOD5)	N/A (320-41333-1)	Water	2		8/5/18	16_Days	4	used B too 5mL af	320-41333-A-15-A

1311_Z Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 280-424099

Analyst: Bourgery, David F

Batch Open: 7/29/2018 3:42:00PM

Batch End: 7/30/2018 9:30:00AM

TCLP Extraction

HT 872

	Input Sample Lab ID (Analytical Method)	SDG (Job #)	Matrix	Initial Amount	Final Amount	Due Date	Analytical TAT	Dlv Rank	Comments	Output Sample Lab ID
1	LB~280-424099/1 N/A	N/A		2		N/A	N/A	N/A	+ 8-6-18 TMW SmLaf	LB 280-424099/1-A
2	LCS~280-424099/2 N/A	N/A		2		N/A	N/A	N/A	SmLaC	LCS 280-424099/2-A
3	280-112363-A-1 N/A	N/A		2		N/A	N/A	N/A		280-112363-A-1-A
4	320-41401-A-1 (8260B_DOD5)	N/A (320-41401-1)	Solid	2		8/9/18	16_Days	4		320-41401-A-1-A
5	320-41554-A-9 (8260B_DOD5)	N/A (320-41554-1)	Solid	2		8/12/18	16_Days	4		320-41554-A-9-A

Sequence Name: C:\msdchem\1\sequence\080218am.s
Comment:
Operator: wickhamt
Data Path: C:\MSDCHEM\1\DATA\080218am\
Instrument Control Pre-Seq Cmd:
Data Analysis Pre-Seq Cmd:

Instrument Control Post-Seq Cmd:
Data Analysis Post-Seq Cmd:

Test America Denver
Instrument: MS1
DV-MS-0010 (8260/624) (Circle)
Purge Volume: (20mL/5mL/5g) (Circle)
Tune Time: 07:34 - 19:01
Lims Batch: 424541

Method Sections To Run
(X) Full Method
( ) Reprocessing Only

Sequence Barcode Options
(X) On Mismatch, Inject Anyway
( ) On Mismatch, Don't Inject
( ) Barcode Disabled

8-3-18 Taw

Line			Sample Name/Misc Info		
1)	Sample	51	MS1_5070	8260	primer
2)	Sample	100	MS1_5071	BFB	bfb
3)	Sample	100	MS1_5072	BFB	bfb 07:34
4)	Sample	10	MS1_5073	8260	blank
5)	Sample	11	MS1_5074	8260	blank
6)	Sample	12	MS1_5075	8260	std003
7)	Sample	13	MS1_5076	8260	std01
8)	Sample	14	MS1_5077	8260	std02
9)	Sample	15	MS1_5078	8260	std05
10)	Sample	16	MS1_5079	8260	std10
11)	Sample	17	MS1_5080	8260	std30
12)	Sample	18	MS1_5081	8260	std60
13)	Sample	19	MS1_5082	8260	blank
14)	Sample	20	MS1_5083	8260	icv
15)	Sample	21	MS1_5084	8260	std01
16)	Sample	22	MS1_5085	8260	std02
17)	Sample	23	MS1_5086	8260	std05
18)	Sample	24	MS1_5087	8260	icis
19)	Sample	25	MS1_5088	8260	std30
20)	Sample	26	MS1_5089	8260	std60
21)	Sample	27	MS1_5090	8260	blank
22)	Sample	28	MS1_5091	8260	icv
23)	Sample	29	MS1_5092	8260	lcs m
24)	Sample	30	MS1_5093	8260	lcsd m
25)	Sample	31	MS1_5094	8260	lcs s
26)	Sample	32	MS1_5095	8260	lcsd s
27)	Sample	33	MS1_5096	8260	280-112244-C-1 E, DNR, RR dil @2mL
28)	Sample	34	MS1_5097	8260	280-112244-D-2
29)	Sample	35	MS1_5098	8260	280-112244-B-7
30)	Sample	36	MS1_5099	8260	280-112244-D-8
31)	Sample	37	MS1_5100	8260	280-112225-e-2 pH2
32)	Sample	38	MS1_5101	8260	280-112225-d-3 pH2
33)	Sample	39	MS1_5102	8260	ccvc m
34)	Sample	40	MS1_5103	8260	ccvc s 19:01

main ICAL

Supp ICAL

MAIN ICAL
calib ID: 33278
WL: 72600
Icv: 19
good for Q4/Q5

1st level: Taw 8-3-18
2nd level: [signature] 8/3/18

SUPP ICAL
calib ID: 33279
WL: 72600
ICIS: 23
Icv: 26
good for Q4/Q5 EXCEPT: ethylene oxide -21.8%
tetrahydrothiophene 33%
cis-1,4-dichloro-2-butene -26.8%

Last Modified: Thu Aug 02 15:24:44 2018 Page: 1

TestAmerica Laboratories
Worklist Report

Worklist Name: 080218am
Worklist Number: 72600
Instrument Name: VMS_MS1
Chrom Method: AQ_VMS1_8260
Purge Volume: 20.00
Units: mL
Analysis Type: VOA
Batch Directory: \\ChromNA\Denver\ChromData\VMS_MS1\20180802-72600.b
Upload Directory: \\CorpTALSAPP16\280-DN-RawData\Organics\MS\VMS_MS1
Run Reagent: MV-568718-D_00014 Amount Added: 1.000, Units: uL
Run Reagent: MV-ARCH SS A_00101 Amount Added: 0.980, Units: uL

Worklist ID	Lims ID	Sample Reagents	Smp Type	Cal Lvl	Fract	Initial Vol/Wt	Vol/Wt Units	Dil Fact
280-0072600-001	# 1 BFB	MV-BFB_00026	BFB		voaWater	1.000	uL	1.000
280-0072600-002	# 2 CCV	MV-2cleve+AVA_00036 MV-Main A_00037 MV-Gas/Ket A_00075	CCV		voaWater	20.00	mL	1.000
280-0072600-003	# 3 CCV	MV-Supp A_00031 MV-568718-D_00014	CCV		voaWater	20.00	mL	1.000
280-0072600-004	# 4 LCS	MV-2cleve+AVA_00036 MV-Gas/Ket B_00043	LCS		voaWater	20.00	mL	1.000
280-0072600-005	# 5 LCSD	MV-2cleve+AVA_00036 MV-Gas/Ket B_00043	LCSD		voaWater	20.00	mL	1.000
280-0072600-006	# 6 LCS	MV-Supp B_00021 mv-pentachloB_00008	LCS		voaWater	20.00	mL	1.000
280-0072600-007	# 7 LCSD	MV-Supp B_00021 mv-pentachloB_00008	LCSD		voaWater	20.00	mL	1.000
280-0072600-008	# 8 MB		MB		voaWater	20.00	mL	1.000
280-0072600-009	# 9 280-108595-A-1		Client		voaWater	20.00	mL	1.000
280-0072600-010	#10 280-108595-A-2		Client		voaWater	20.00	mL	1.000
280-0072600-011	#11 280-108595-A-3		Client		voaWater	20.00	mL	1.000
280-0072600-012	#12 std003	MV-568718-D_00014 MV-Main A_00037 MV-2cleve+AVA_00037 MV-Gas/Ket A_00076	IC	1	voaWater	20.00	mL	1.000

Worklist ID	Lims ID	Sample Reagents	Smp Type	Cal Lvl	Fract	Initial Vol/Wt	Vol/Wt Units	Dil Fact
280-0072600-013	#13 std01	MV-568718-D_00014 MV-Main A_00037 MV-2cleve+AVA_00037 MV-Gas/Ket A_00076	IC	2	voaWater	20.00	mL	1.000
280-0072600-014	#14 std02	MV-568718-D_00014 MV-Main A_00037 MV-2cleve+AVA_00037 MV-Gas/Ket A_00076	IC	3	voaWater	20.00	mL	1.000
280-0072600-015	#15 std05	MV-568718-D_00014 MV-Main A_00037 MV-2cleve+AVA_00037 MV-Gas/Ket A_00076	IC	4	voaWater	20.00	mL	1.000
280-0072600-016	#16 std10	MV-568718-D_00014 MV-Main A_00037 MV-2cleve+AVA_00037 MV-Gas/Ket A_00076	IC	5	voaWater	20.00	mL	1.000
280-0072600-017	#17 std30	MV-568718-D_00014 MV-Main A_00037 MV-2cleve+AVA_00037 MV-Gas/Ket A_00076	IC	6	voaWater	20.00	mL	1.000
280-0072600-018	#18 std60	MV-568718-D_00014 MV-Main A_00037 MV-2cleve+AVA_00037 MV-Gas/Ket A_00076	IC	7	voaWater	20.00	mL	1.000
280-0072600-019	#19 icv	MV-568718-D_00014 MV-Main B_00022 MV-SS 2-Cleve_00046 MV-Gas/Ket B_00044	ICV		voaWater	20.00	mL	1.000
280-0072600-020	#20 std01	MV-568718-D_00014 MV-ARCH SS A_00101 MV-Supp A_00031	IC	2	voaWater	20.00	mL	1.000
280-0072600-021	#21 std02	MV-568718-D_00014 MV-ARCH SS A_00101 MV-Supp A_00031	IC	3	voaWater	20.00	mL	1.000
280-0072600-022	#22 std05	MV-568718-D_00014 MV-ARCH SS A_00101 MV-Supp A_00031	IC	4	voaWater	20.00	mL	1.000
280-0072600-023	#23 icis	MV-568718-D_00014 MV-ARCH SS A_00101 MV-Supp A_00031	ICIS	5	voaWater	20.00	mL	1.000
280-0072600-024	#24 std30	MV-568718-D_00014 MV-ARCH SS A_00101 MV-Supp A_00031	IC	6	voaWater	20.00	mL	1.000
280-0072600-025	#25 std60	MV-568718-D_00014 MV-ARCH SS A_00101 MV-Supp A_00031	IC	7	voaWater	20.00	mL	1.000
280-0072600-026	#26 icv	MV-568718-D_00014 MV-ARCH SS A_00101 MV-Supp B_00021	ICV		voaWater	20.00	mL	1.000
280-0072600-033	#33 lcs	MV-Gas/Ket B_00044 MV-SS 2-Cleve_00046 MV-Main B_00022	LCS		voaWater	20.00	mL	1.000
280-0072600-034	#34 lcsd	MV-Gas/Ket B_00044 MV-SS 2-Cleve_00046 MV-Main B_00022	LCSD		voaWater	20.00	mL	1.000

Worklist ID	Lims ID	Sample Reagents	Smp Type	Cal Lvl	Fract	Initial Vol/Wt	Vol/Wt Units	Dil Fact
280-0072600-035	#35 lcs	MV-Supp B_00021	LCS		voaWater	20.00	mL	1.000
280-0072600-036	#36 lcsd	MV-Supp B_00021	LCSD		voaWater	20.00	mL	1.000
280-0072600-037	#37 280-112244-C-1		Client		voaWater	20.00	mL	1.000
280-0072600-038	#38 280-112244-D-2		Client		voaWater	20.00	mL	1.000
280-0072600-039	#39 280-112244-B-7		Client		voaWater	20.00	mL	1.000
280-0072600-040	#40 280-112244-D-8		Client		voaWater	20.00	mL	1.000
280-0072600-041	#41 280-112225-E-2		Client		voaWater	20.00	mL	1.000
280-0072600-042	#42 280-112225-D-3		Client		voaWater	20.00	mL	1.000
280-0072600-043	#43 ccvc	MV-2cleve+AVA_00036 MV-Main A_00037 MV-Gas/Ket A_00075	CCVC		voaWater	20.00	mL	1.000
280-0072600-044	#44 ccvc	MV-Supp A_00031	CCVC		voaWater	20.00	mL	1.000
280-0072600-045	#45 Samp 45		Client		voaWater	20.00	mL	1.000

GC/MS VOA BATCH WORKSHEET

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Batch Number: 423316 Batch Start Date: 07/23/18 17:36 Batch Analyst: Bourgery, David F

Batch Method: 1311 Batch End Date: 07/24/18 09:54

Lab Sample ID	Client Sample ID	Method Chain	Basis	ExtractFluid					
LB 280-423316/1		1311, 8260B		t1					
LCS 280-423316/2		1311, 8260B		t1					
160-29498-C-2	CRC-B21-0205	1311, 8260B	P	t1					

Batch Notes	
First End time	07/24/18 09:54
First Start time	07/23/18 17:36

Basis	Basis Description
P	TCLP

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Analyst: DB

Date: 7.23.18

DV-IP-0012

TCLP/SPLP Worksheet No. 1

Sample Description

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Login No.	160-29498	160-29498	112151	112151	112230	112289	112289	320-41149	550-106063	LB
Sample No.	2	3	1	2	1	1	2	36	1	
A. Sample Description										
Number of phases	1	1	1	1	1	1	1	1	1	
1. Solid	X	X	X	X	X	X	X	X	X	
2. Liquid										
a. lighter than water										
b. water										
c. heavier than water										
B. Percent Solid Phase										
Balance ID										
1. Weight of filter (g)										
2. Weight of subsample										
a. gross weight (g)										
b. tare weight (g)										
c. net weight (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3. Weight of filtrate										
a. gross weight (g)										
b. tare weight (g)										
c. net weight (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d. density of filtrate (g/mL)										
4. Total weight wet solids (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Weight percent solids (wet) (%)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
6. Weight percent solids (dry)										
a. gross dry weight 1 (g)										
b. gross dry weight 2 (g)										
c. percent dry solids (%)										
d. Oven Temp (observed) (^{o}C)										
Thermometer Correction Factor	0									
Oven Temp Actual (^{o}C)	0	0	0	0	0	0	0	0	0	0
7. Vol. of initial aqueous filtrate (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
8. Vol. of initial organic filtrate (mL)										

Comments:

$$(\text{Weight percent dry solids, B.6.c}) = 100 \times \frac{(\text{Gross dry weight 2 or 1, B.6.b or B.6.a if B.6.a is blank}) - (\text{Weight of filter, B.1})}{(\text{Weight of subsample .B.2.c})}$$

(Net Weight of Subsample, B.2.c) = (gross weight, B.2.a) - (tare weight, B.2.b)

(Net Weight of Filtrate, B.3.c) = (gross weight, B.3.a) - (tare weight, B.3.b)

(Total weight wet solids, B.4) = (Weight subsample, B.2.c) - (Weight filtrate, B.3.c)

(Vol of initail filtrate, B.7) = (Weight of filtrate, B.3.c) / (Denisity of filtrate, B.3.d)

(Weight percent wet solids, B.5.) = 100 X (Total weight wet solids, B.4.) / (Weight of subsample, B.2.c.)

Analyst: DB

DV-IP-0012
TCLP Worksheet No. 2
Selection of Leach Fluid

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Login No.	160-29498	160-29498	112151	112151	112230	112289	112289	320-41149	550-106063	LB
Sample No.	2	3	1	2	1	1	2	36	1	
C. Leach Fluid Determination- Does not apply to determination of volatile organic components or SPLP.										
1. Particle size reduction? (<1mm) Yes/No		**N**	**N**	**N**	**N**	**N**			**N**	
If yes, write NCM descibing how.										
2. Balance ID		24950431	24950431	24950431	24950431	24950431			24950431	
3. Sample weight, 5.0 +/- 0.1g		4.92	5.04	4.93	4.97	5.06			5.01	
4. Add 96.5 (+/- 2% or 94.57mL to 98.43mL)										
a. Pipette ID or Grad Cylinder ID		TCLP BT	TCLP BT	TCLP BT	TCLP BT	TCLP BT			TCLP BT	
5. Initial pH (after 5 min. mixing time)										
a. Start Time for Mixing		11:27	11:27	11:27	11:27	11:27			11:27	
b. Stop Time for Mixing		11:32	11:32	11:32	11:32	11:32			11:32	
c. pH reading after mixing		8.77	9.65	9.68	11.62	9.26			7.85	
6. If pH > 5.0, then add 3.5 mL 1N HCL & mark **"X"**		X	X	X	X	X			X	
a. HCL Lot# used		1N HCl_00037	1N HCl_00037	1N HCl_00037	1N HCl_00037	1N HCl_00037			1N HCl_00037	
b. Pipette ID		TCLP#2	TCLP#2	TCLP#2	TCLP#2	TCLP#2			TCLP#2	
7. Secondary pH (after 10min at 50C to 55C)										
a. Thermometer ID		311846	311846	311846	311846	311846			311846	
Termometer Correction Factor		0	0	0	0	0			0	
b. Start Time		11:56	11:56	11:56	11:56	11:56			11:56	
c. Start Temperature (Observed)		50	50	50	50	50			50	
Start Temperature (Actual)	0	50	50	50	50	50	0	0	50	0
d. Finish Time		12:06	12:06	12:06	12:06	12:06			12:06	
e. Finish Temperature (Observed)		53	53	53	53	53			53	
Finish Temperature (Actual)	0	53	53	53	53	53	0	0	53	0
f. pH reading after heating (temperature corrected)		1.83	5.83	5.88	2.15	1.65			1.99	
D. Selection of Leach Fluid										
1. If pH from C.5. or C.7.f. is <5.0 use Leach Fluid #1		Fluid 1			Fluid 1	Fluid 1			Fluid 1	
2. If pH from C.7.f is > 5.0, use Leach Fluid #2			Fluid 2	Fluid 2						
3. SPLP Fluid 1: Soils- East of the Mississippi River; Wastewates; or Wastewaters										
4. SPLP Fluid 2: Soils- West of Mississippi River										
5. SPLP Fluid 3: If VOCs or Cyanide containing wastes.										
6. **X** if filtrate and fluid are miscible										

Analyst: DB

DV-IP-0012

TCLP/SPLP Worksheet No. 3

Bottle Leach Procedure for Metals and Semi-Volatile Organic Components

Login No.	160-29498	160-29498	112151	112151	112230	112289	112289	320-41149	550-106063	LB
Sample No.	2	3	1	2	1	1	2	36	1	
E. Determination of Sample Size										
1. Particle size reduction? Yes/no		N	N	N	N	N			N	
If yes, write NCM descibing how.										
2. Balance ID		24950431	24950431	24950431	24950431	24950431			24950431	
3. Weight of wet solids after filtration (g)		100.02	100.23	102.23	100.76	102.32			101.95	
F. Determination of Amount of Leach Fluid										
Fluid Type from Wksht 2	**#VALUE!**	**TCLP 1**	**TCLP 2**	**TCLP 2**	**TCLP 1**	**TCLP 1**	**#VALUE!**	**#VALUE!**	**TCLP 1**	**#VALUE!**
1. TCLP Fluid 1 Lot #	T1_00251	T1_00256	T1_00251	T1_00251	T1_00256	T1_00256			T1_00256	
2. TCLP Fluid 2 Lot #			T2_00105	T2_00105						
3. SPLP 1 (East) Lot #										
4. SPLP 2 (West) Lot #										
5. pH of leach fluid		4.94	2.89	2.89	4.94	4.94			4.94	2.89/4.94
6. Vol of Fluid = wet solids x 20 (mL)		2000	2005	2045	2015	2046			2039	
G. Record of Leach - leach period is 16 to 20 hours										
1. Rotator checked to be rotating between 28 and 32 RPM?		Y	Y	Y	Y	Y			Y	Y
2. Leach start date and time		7/23/18 14:57	7/23/18 14:57	7/23/18 14:57	7/23/18 14:57	7/23/18 14:57			7/23/18 14:57	7/23/18 14:57
3. Leach stop date and time		7/24/18 9:54	7/24/18 9:54	7/24/18 9:54	7/24/18 9:54	7/24/18 9:54			7/24/18 9:54	7/24/18 9:54
4. Room temperature										
Thermometer Correction Factor		0.0	0.0	0.0	0.0	0.0			0.0	0.0
a.Temp Min (Observed) (^oC)		23.4	23.4	23.4	23.4	23.4			23.4	23.4
b.Temp Max (Observed) (^oC)		24.4	24.4	24.4	24.4	24.4			24.4	24.4
c.Temp Min (Actual) (^oC)	0.0	23.4	23.4	23.4	23.4	23.4	0.0	0.0	23.4	23.4
d.Temp Max (Actual) (^oC)	0.0	24.4	24.4	24.4	24.4	24.4	0.0	0.0	24.4	24.4
5. pH of leachate		5.38	5.85	5.85	6.12	5.33			5.40	2.88/4.94
Was the sample multiphasic?	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
6. Volume of leachate (mL)										
a. Oil recovered from leachate (mL)										
7. Volume of initial filtrate for recombination (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
8. Combined initial filtrate + leachate (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
COMMENTS:										

(Volume of Fluid, F.4) = (Weight of wet solids, E.3) X 20

(Vol. of Combined Filtrate and Leachate, G.8) = (Vol of Leachate, G.6) + (Vol of Filtrate, G.7)

$$(\text{Vol. of Inital Filtrate for Recombinat ion, G.7}) = \frac{(\text{Solids Leachated, E.3})}{(\text{Tot. Wet Solids, B.4})} \times \frac{(\text{LeachateRe covered, G.6})}{(\text{FluidAdded , F.6})} \times (\text{InitialFil trat, B.7})$$

Analyst: DB

DV-IP-0012
TCLP/SPLP Worksheet No. 4
ZHE Leach

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Login No.	160-29498	160-29498	112151	112151	112230	112289	112289	320-41149	550-106063	LB
Sample No.	2	3	1	2	1	1	2	36	1	
H.Determination of Amount of Leach Fluid										
1. Balance ID	24950431				24950431	24950431		24950431		
2. ZHE vessel number	Verona				Don	EEE		Rachael		AAA
3. Weight of material added to ZHE (g)	25.00				25.19	25.07		25.14		
"X" if there was headspace in container.	X									
4. Weight of filtrate in syringe										
a. gross weight (g)										
b. tare weight (g)										
c. net weight (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Volume of filtrate in syringe (mL)										
6. Wet solids in ZHE (g)	25				25	25		25		
7. Weight of fluid to add (g)	500	0	0	0	504	501	0	503	0	0
a. TCLP Fluid 1 Lot #	T1_00255				T1_00255	T1_00255		T1_00255		T1_00255
b. SPLP Fluid 3 Lot #										
c. pH of Blank Fluid	4.92				4.92	4.92		4.92		4.92
8. Percent Wet Solids (%)	100	#DIV/0!	#DIV/0!	#DIV/0!	100	100	#DIV/0!	100	#DIV/0!	#DIV/0!
I. Record of ZHE Leach - the Leach period is 16 to 20 hours.										
1. Leak Check										
a. Reading #1 (psi)	40				40	40		40		40
b. Reading #2 (psi)	40				40	40		40		40
2. Rotator checked to be rotating between 28 and 32 RPM?	Y				Y	Y		Y		Y
3. Leach start date & time	7/23/18 17:36				7/23/18 17:36	7/23/18 17:36		7/23/18 17:36		7/23/18 17:36
4. Leach stop date & time					7/24/18 9:54	7/24/18 9:54		7/24/18 9:54		7/24/18 9:54
5. Room temperature										
Thermometer Correction Factor										
a.Temp Min (Observed) (^oC)										
b.Temp Max (Observed) (^oC)										
c.Temp Min (Actual) (^oC)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
d. Temp Max (Actual) (^oC)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. **X** if still under positive pressure after leaching										
7. Volume of leachate recovered (mL)										
a. Volume of oil recovered after leaching										
8. Vol. of initial aqueous filtrate for recombination										
a. Calculated from Worksheet 1 (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
b. Calculated from Worksheet 4 (mL)	0.0	#DIV/0!	#DIV/0!	#DIV/0!	0.0	0.0	#DIV/0!	0.0	#DIV/0!	#DIV/0!

(Net Weight of Filtrate, H.4.c) = (Gross weight, H.4.a.) - (Tare weight, H.4.b.)

(Percent Wet Solids, H.8.) = 100 X **[** (Wet Solids in ZHE, H.6) / (Weight of material added to ZHE, H.3) **]**

(Wet Solids in ZHE, H.6) = (Weight of material added to ZHE, H.3.) - (net weight of filtrate, H.4.c.)

(Vol of Filtrate for recombination, I.7.b) = (Vol of Leachate Recvd, I.6) X (Weight of Filtrate, H.4.c) / (Vol Fluid Added, H.7.)

(Weight of Fluid to add, H.7.) = (Wet Solids in ZHE, H.6) X 20

(Vol of Filtrate for recombination, I.7.a) = **[** (Wet Solids in ZHE, H.6.) / (Tot Wet Solids, B.4) **]** X **[** (Vol Leachate Recvd, I.6.) / (Vol Fluid Add, H.7.) **]** X (Vol Filtrate, B.7.)

COMMENTS:

LogTag ID 1000645053
User ID TCLP (+0.0)
First reading 7/23/2018 2:55:27 PM
Last reading 7/24/2018 12:45:27 PM
Name of file TCLP (+0.0)1000645053 Started 7-23-2018, Finished 7-24-2018.ltd
File location C:\Users\DenOrgPrep\Documents\My LogTag Data\

LogTag ID	1000645053
User ID	TCLP (+0.0)
LogTag battery	OK
Non alert range	21.0 to 25.0 °C
Time zone	UTC -07:00, daylight time
Number of readings	728
Reading interval	10 Minutes
Number of starts	231
First reading	7/23/2018 2:55:27 PM
Last reading	7/24/2018 12:45:27 PM
Elapsed Time	21 Hours, 50 Minutes
Reading range	23.4 to 24.4 °C
Average reading	23.9 °C
Standard Deviation (S)	0.2 °C
Degree Minutes below lower alert	0.00 °C-Minutes
Degree Minutes above upper alert	0.00 °C-Minutes
Mean Kinetic Temperature	23.94 °C
Time below lower alert	None
Time above upper alert	None
Time not in alert	21 Hours, 50 Minutes
Statistics for between the first reading and inspection mark #1:	
First reading	7/23/2018 2:55:27 PM
Last reading	7/23/2018 5:25:27 PM
Elapsed Time	2 Hours, 30 Minutes
Reading range	23.4 to 24.0 °C
Average reading	23.8 °C
Standard Deviation (S)	0.2 °C
Degree Minutes below lower alert	0.00 °C-Minutes
Degree Minutes above upper alert	0.00 °C-Minutes
Mean Kinetic Temperature	23.78 °C
Time below lower alert	None
Time above upper alert	None
Time not in alert	2 Hours, 30 Minutes
Statistics for between inspection mark #1 and inspection mark #2:	
First reading	7/23/2018 5:35:27 PM
Last reading	7/23/2018 8:05:27 PM
Elapsed Time	2 Hours, 30 Minutes
Reading range	23.6 to 24.1 °C
Average reading	23.9 °C
Standard Deviation (S)	0.2 °C
Degree Minutes below lower alert	0.00 °C-Minutes
Degree Minutes above upper alert	0.00 °C-Minutes

LogTag ID 1000645053
User ID TCLP (+0.0)
First reading 7/23/2018 2:55:27 PM
Last reading 7/24/2018 12:45:27 PM
Name of file TCLP (+0.0)1000645053 Started 7-23-2018, Finished 7-24-2018.ltd
File location C:\Users\DenOrgPrep\Documents\My LogTag Data\

Mean Kinetic Temperature	23.93 °C
Time below lower alert	None
Time above upper alert	None
Time not in alert	2 Hours, 30 Minutes
Statistics for between inspection mark #2 and the last reading:	
First reading	7/23/2018 8:15:27 PM
Last reading	7/24/2018 12:45:27 PM
Elapsed Time	16 Hours, 30 Minutes
Reading range	23.6 to 24.4 °C
Average reading	24.0 °C
Standard Deviation (S)	0.2 °C
Degree Minutes below lower alert	0.00 °C-Minutes
Degree Minutes above upper alert	0.00 °C-Minutes
Mean Kinetic Temperature	23.96 °C
Time below lower alert	None
Time above upper alert	None
Time not in alert	16 Hours, 30 Minutes

GC/MS VOA BATCH WORKSHEET

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Batch Number: 424541 Batch Start Date: 08/02/18 07:34 Batch Analyst: Wickham, Tom A

Batch Method: 8260B Batch End Date:

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	MV-2cleve+AVA 00037	MV-568718-D 00014	MV-ARCH SS A 00101	MV-BFB 00026
BFB 280-424541/1		8260B		1 uL	1 uL				1 uL
STD003 280-424541/12 IC		8260B		20 mL	20 mL	0.15 uL	1 uL		
STD01 280-424541/13 IC		8260B		20 mL	20 mL	0.5 uL	1 uL		
STD02 280-424541/14 IC		8260B		20 mL	20 mL	1 uL	1 uL		
STD05 280-424541/15 IC		8260B		20 mL	20 mL	2.5 uL	1 uL		
STD10 280-424541/16 IC		8260B		20 mL	20 mL	5 uL	1 uL		
STD30 280-424541/17 IC		8260B		20 mL	20 mL	15 uL	1 uL		
STD60 280-424541/18 IC		8260B		20 mL	20 mL	30 uL	1 uL		
ICV 280-424541/19		8260B		20 mL	20 mL		1 uL		
STD01 280-424541/20 IC		8260B		20 mL	20 mL		1 uL	0.08 uL	
STD02 280-424541/21 IC		8260B		20 mL	20 mL		1 uL	0.16 uL	
STD05 280-424541/22 IC		8260B		20 mL	20 mL		1 uL	0.4 uL	
ICIS 280-424541/23		8260B		20 mL	20 mL		1 uL	0.8 uL	
STD30 280-424541/24 IC		8260B		20 mL	20 mL		1 uL	2.4 uL	
STD60 280-424541/25 IC		8260B		20 mL	20 mL		1 uL	4.8 uL	

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GC/MS VOA BATCH WORKSHEET

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Batch Number: 424541 Batch Start Date: 08/02/18 07:34 Batch Analyst: Wickham, Tom A

Batch Method: 8260B Batch End Date:

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	MV-2cleve+AVA 00037	MV-568718-D 00014	MV-ARCH SS A 00101	MV-BFB 00026
ICV 280-424541/26		8260B		20 mL	20 mL		1 uL	0.8 uL	

Lab Sample ID	Client Sample ID	Method Chain	Basis	MV-Gas/Ket A 00076	MV-Gas/Ket B 00044	MV-Main A 00037	MV-Main B 00022	MV-SS 2-Cleve 00046	MV-Supp A 00031
BFB 280-424541/1		8260B							
STD003 280-424541/12 IC		8260B		0.15 uL		0.15 uL			
STD01 280-424541/13 IC		8260B		0.5 uL		0.5 uL			
STD02 280-424541/14 IC		8260B		1 uL		1 uL			
STD05 280-424541/15 IC		8260B		2.5 uL		2.5 uL			
STD10 280-424541/16 IC		8260B		5 uL		5 uL			
STD30 280-424541/17 IC		8260B		15 uL		15 uL			
STD60 280-424541/18 IC		8260B		30 uL		30 uL			
ICV 280-424541/19		8260B			5 uL		5 uL	5 uL	
STD01 280-424541/20 IC		8260B							0.5 uL
STD02 280-424541/21 IC		8260B							1 uL
STD05 280-424541/22 IC		8260B							2.5 uL
ICIS 280-424541/23		8260B							5 uL

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GC/MS VOA BATCH WORKSHEET

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Batch Number: 424541 Batch Start Date: 08/02/18 07:34 Batch Analyst: Wickham, Tom A

Batch Method: 8260B Batch End Date:

Lab Sample ID	Client Sample ID	Method Chain	Basis	MV-Gas/Ket A 00076	MV-Gas/Ket B 00044	MV-Main A 00037	MV-Main B 00022	MV-SS 2-Cleve 00046	MV-Supp A 00031
STD30 280-424541/24 IC		8260B							15 uL
STD60 280-424541/25 IC		8260B							30 uL
ICV 280-424541/26		8260B							

Lab Sample ID	Client Sample ID	Method Chain	Basis	MV-Supp B 00021					
BFB 280-424541/1		8260B							
STD003 280-424541/12 IC		8260B							
STD01 280-424541/13 IC		8260B							
STD02 280-424541/14 IC		8260B							
STD05 280-424541/15 IC		8260B							
STD10 280-424541/16 IC		8260B							
STD30 280-424541/17 IC		8260B							
STD60 280-424541/18 IC		8260B							
ICV 280-424541/19		8260B							
STD01 280-424541/20 IC		8260B							
STD02 280-424541/21 IC		8260B							

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GC/MS VOA BATCH WORKSHEET

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Batch Number: 424541 Batch Start Date: 08/02/18 07:34 Batch Analyst: Wickham, Tom A

Batch Method: 8260B Batch End Date:

Lab Sample ID	Client Sample ID	Method Chain	Basis	MV-Supp B 00021					
STD05 280-424541/22 IC		8260B							
ICIS 280-424541/23		8260B							
STD30 280-424541/24 IC		8260B							
STD60 280-424541/25 IC		8260B							
ICV 280-424541/26		8260B		5 uL					

Batch Notes	

Basis	Basis Description

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GC/MS VOA BATCH WORKSHEET

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Batch Number: 424938 Batch Start Date: 08/06/18 07:02 Batch Analyst: Wickham, Tom A

Batch Method: 8260B Batch End Date:

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	MV-2cleve+AVA 00036	MV-568718-D 00014	MV-ARCH SS A 00101	MV-BFB 00026
BFB 280-424938/1		8260B		1 uL	1 uL				1 uL
CCV 280-424938/2		8260B		20 mL	20 mL	5 uL	1 uL	0.98 uL	
CCV 280-424938/3		8260B		20 mL	20 mL		1 uL		
LCS 280-423316/2-A		8260B		2 mL	20 mL		1 uL	0.98 uL	
LB 280-423316/1-A		8260B		2 mL	20 mL		1 uL	0.98 uL	
160-29498-C-2-A	CRC-B21-0205	8260B	P	2 mL	20 mL		1 uL	0.98 uL	
160-29498-C-2-A MS	CRC-B21-0205	8260B	P	2 mL	20 mL		1 uL	0.98 uL	
160-29498-C-2-A MSD	CRC-B21-0205	8260B	P	2 mL	20 mL		1 uL	0.98 uL	

Lab Sample ID	Client Sample ID	Method Chain	Basis	MV-Gas/Ket A 00075	MV-Gas/Ket B 00043	MV-Main A 00037	MV-Main B 00022	MV-SS 2-Cleve 00046	MV-Supp A 00031
BFB 280-424938/1		8260B							
CCV 280-424938/2		8260B		5 uL		5 uL			
CCV 280-424938/3		8260B							5 uL
LCS 280-423316/2-A		8260B			2.5 uL		2.5 uL	2.5 uL	
LB 280-423316/1-A		8260B							
160-29498-C-2-A	CRC-B21-0205	8260B	P						
160-29498-C-2-A MS	CRC-B21-0205	8260B	P		2.5 uL		2.5 uL	2.5 uL	
160-29498-C-2-A MSD	CRC-B21-0205	8260B	P		2.5 uL		2.5 uL	2.5 uL	

Batch Notes	

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GC/MS VOA BATCH WORKSHEET

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Batch Number: 424938 Batch Start Date: 08/06/18 07:02 Batch Analyst: Wickham, Tom A

Batch Method: 8260B Batch End Date:

Basis	Basis Description
P	TCLP

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GC/MS VOA BATCH WORKSHEET

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Batch Number: 427031 Batch Start Date: 08/21/18 16:38 Batch Analyst: McDonald, Melvin R

Batch Method: 8260B Batch End Date:

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	MV-BFB 00026			
BFB 280-427031/1		8260B		1 uL	1 uL	1 uL			

Batch Notes	

Basis	Basis Description

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Method 8270C

Semivolatile Organic Compounds (GC/MS) by Method 8270C

FORM II
GC/MS SEMI VOA SURROGATE RECOVERY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Matrix: Solid (TCLP) Level: Low

GC Column (1): Rxi-5Sil MS ID: 0.25(mm)

Client Sample ID	Lab Sample ID	2FP #	PHL #	NBZ #	FBP #	TBP #	TPHL #
CRC-B22-0105	160-29498-3	87	73	79	79	82	84
	LB 280-423271/1-F	70	62	74	75	80	73
	LCS 280-423271/3-B	72	66	77	74	82	78
CRC-B22-0105 MS	160-29498-3 MS	77	70	81	72	80	80
CRC-B22-0105 MSD	160-29498-3 MSD	75	66	78	71	77	75

	QC LIMITS
2FP = 2-Fluorophenol	46-135
PHL = Phenol-d5	40-135
NBZ = Nitrobenzene-d5	49-135
FBP = 2-Fluorobiphenyl	50-135
TBP = 2,4,6-Tribromophenol	50-135
TPHL = Terphenyl-d14	52-135

Column to be used to flag recovery values

FORM II 8270C

FORM III
GC/MS SEMI VOA LAB CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Matrix: Solid (TCLP) Level: Low Lab File ID: G6_34940.D

Lab ID: LCS 280-423271/3-B Client ID:

COMPOUND	SPIKE ADDED (mg/L)	LCS CONCENTRATION (mg/L)	LCS % REC	QC LIMITS REC	#
2-Methylphenol	0.250	0.196	78	51-135	
3 & 4 Methylphenol	0.500	0.395	79	50-135	
1,4-Dichlorobenzene	0.250	0.186	74	44-135	
2,4-Dinitrotoluene	0.100	0.0667	67	37-135	
Hexachlorobenzene	0.100	0.0761	76	60-135	
Hexachlorobutadiene	0.250	0.189	76	41-135	
Hexachloroethane	0.250	0.184	74	41-135	
Nitrobenzene	0.250	0.200	80	50-135	
Pentachlorophenol	0.500	0.370	74	33-135	
Pyridine	0.250	0.167	67	10-135	
2,4,6-Trichlorophenol	0.250	0.194	78	53-135	
2,4,5-Trichlorophenol	0.250	0.197	79	56-135	

Column to be used to flag recovery and RPD values

FORM III 8270C

FORM III
GC/MS SEMI VOA MATRIX SPIKE RECOVERY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Matrix: Solid (TCLP) Level: Low Lab File ID: G6_34955.D

Lab ID: 160-29498-3 MS Client ID: CRC-B22-0105 MS

COMPOUND	SPIKE ADDED (mg/L)	SAMPLE CONCENTRATION (mg/L)	MS CONCENTRATION (mg/L)	MS % REC	QC LIMITS REC	#
2-Methylphenol	0.250	0.0049 U	0.198	79	51-135	
3 & 4 Methylphenol	0.500	0.0013 U	0.398	80	50-135	
1,4-Dichlorobenzene	0.250	0.0016 U	0.186	74	44-135	
2,4-Dinitrotoluene	0.100	0.0083 U	0.0680	68	37-135	
Hexachlorobenzene	0.100	0.0033 U	0.0758	76	60-135	
Hexachlorobutadiene	0.250	0.017 U	0.187	75	41-135	
Hexachloroethane	0.250	0.011 U	0.181	72	41-135	
Nitrobenzene	0.250	0.0041 U	0.211	85	50-135	
Pentachlorophenol	0.500	0.10 U	0.377	75	33-135	
Pyridine	0.250	0.0057 U	0.165	66	10-135	
2,4,6-Trichlorophenol	0.250	0.0014 U	0.189	76	53-135	
2,4,5-Trichlorophenol	0.250	0.0022 U	0.202	81	56-135	

Column to be used to flag recovery and RPD values

FORM III 8270C

FORM III
GC/MS SEMI VOA MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Matrix: Solid (TCLP) Level: Low Lab File ID: G6_34956.D

Lab ID: 160-29498-3 MSD Client ID: CRC-B22-0105 MSD

COMPOUND	SPIKE ADDED (mg/L)	MSD CONCENTRATION (mg/L)	MSD % REC	% RPD	QC LIMITS RPD	QC LIMITS REC	#
2-Methylphenol	0.250	0.192	77	3	30	51-135	
3 & 4 Methylphenol	0.500	0.379	76	5	30	50-135	
1,4-Dichlorobenzene	0.250	0.156	63	17	30	44-135	
2,4-Dinitrotoluene	0.100	0.0641	64	6	30	37-135	
Hexachlorobenzene	0.100	0.0728	73	4	30	60-135	
Hexachlorobutadiene	0.250	0.145	58	26	30	41-135	
Hexachloroethane	0.250	0.140	56	25	30	41-135	
Nitrobenzene	0.250	0.204	82	3	30	50-135	
Pentachlorophenol	0.500	0.365	73	3	30	33-135	
Pyridine	0.250	0.178	71	8	30	10-135	
2,4,6-Trichlorophenol	0.250	0.187	75	1	30	53-135	
2,4,5-Trichlorophenol	0.250	0.198	79	2	30	56-135	

Column to be used to flag recovery and RPD values

FORM III 8270C

FORM V
GC/MS SEMI VOA INSTRUMENT PERFORMANCE CHECK
DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab File ID: G6_34331.D DFTPP Injection Date: 06/28/2018

Instrument ID: SMS_G6 DFTPP Injection Time: 12:05

Analysis Batch No.: 420416

M/E	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
51	30.0 - 60.0 % of mass 198	36.7	
68	Less than 2.0 % of mass 69	0.6	(1.7) 1
69	Mass 69 relative abundance	38.6	
70	Less than 2.0 % of mass 69	0.1	(0.2) 1
127	40.0 - 60.0 % of mass 198	49.1	
197	Less than 1.0 % of mass 198	0.6	
198	Base Peak, 100 % relative abundance	100.0	
199	5.0- 9.0 % of mass 198	6.9	
275	10.0 - 30.0 % of mass 198	21.1	
365	Greater than 1.0 % of mass 198	2.1	
441	Present but less than mass 443	9.0	(72.5) 3
442	Greater than 40.0 % of mass 198	63.1	
443	17.0 - 23.0 % of mass 442	12.4	(19.6) 2

1-Value is % mass 69 2-Value is % mass 442 3-Value is % mass 443

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS AND STANDARDS:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
	ICIS 280-420416/3	G6_34332.D	06/28/2018	12:16
	STD004 280-420416/4	G6_34333.D	06/28/2018	12:43
	STD010 280-420416/5	G6_34334.D	06/28/2018	13:10
	STD020 280-420416/6	G6_34335.D	06/28/2018	13:37
	STD050 280-420416/7	G6_34336.D	06/28/2018	14:05
	STD120 280-420416/8	G6_34337.D	06/28/2018	14:32
	STD160 280-420416/9	G6_34338.D	06/28/2018	14:59
	STD200 280-420416/10	G6_34339.D	06/28/2018	15:26

FORM V
GC/MS SEMI VOA INSTRUMENT PERFORMANCE CHECK
DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab File ID: G6_34932.D DFTPP Injection Date: 07/27/2018

Instrument ID: SMS_G6 DFTPP Injection Time: 15:27

Analysis Batch No.: 423979

M/E	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
51	30.0 - 60.0 % of mass 198	37.5	
68	Less than 2.0 % of mass 69	0.6	(1.4) 1
69	Mass 69 relative abundance	39.4	
70	Less than 2.0 % of mass 69	0.1	(0.3) 1
127	40.0 - 60.0 % of mass 198	50.4	
197	Less than 1.0 % of mass 198	0.7	
198	Base Peak, 100 % relative abundance	100.0	
199	5.0- 9.0 % of mass 198	6.3	
275	10.0 - 30.0 % of mass 198	19.6	
365	Greater than 1.0 % of mass 198	2.0	
441	Present but less than mass 443	7.4	(75.6) 3
442	Greater than 40.0 % of mass 198	52.1	
443	17.0 - 23.0 % of mass 442	9.8	(18.9) 2

1-Value is % mass 69 2-Value is % mass 442 3-Value is % mass 443

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS AND STANDARDS:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
	CCV 280-423979/3	G6_34933.D	07/27/2018	15:39
	CCV 280-423979/4	G6_34934.D	07/27/2018	16:18
	CCV 280-423979/5	G6_34935.D	07/27/2018	16:41
	LB 280-423271/1-F	G6_34939.D	07/27/2018	18:23
	LCS 280-423271/3-B	G6_34940.D	07/27/2018	18:50
CRC-B22-0105	160-29498-3	G6_34954.D	07/28/2018	01:03
CRC-B22-0105 MS	160-29498-3 MS	G6_34955.D	07/28/2018	01:30
CRC-B22-0105 MSD	160-29498-3 MSD	G6_34956.D	07/28/2018	01:57

FORM I
GC/MS SEMI VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Denver | Job No.: 160-29498-1

SDG No.:

Client Sample ID: CRC-B22-0105 | Lab Sample ID: 160-29498-3

Matrix: Solid (TCLP) | Lab File ID: G6_34954.D

Analysis Method: 8270C | Date Collected: 07/12/2018 11:50

Extract. Method: 3510C | Date Extracted: 07/25/2018 10:50

Sample wt/vol: 200(mL) | Date Analyzed: 07/28/2018 01:03

Con. Extract Vol.: 1(mL) | Dilution Factor: 1

Injection Volume: 0.5(uL) | Level: (low/med) Low

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 423979 | Units: mg/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
95-48-7	2-Methylphenol	0.0049	U	0.050	0.0049
15831-10-4	3 & 4 Methylphenol	0.0013	U	0.050	0.0013
1319-77-3	Total Cresols	0.0013	U	0.050	0.0013
106-46-7	1,4-Dichlorobenzene	0.0016	U	0.020	0.0016
121-14-2	2,4-Dinitrotoluene	0.0083	U	0.050	0.0083
118-74-1	Hexachlorobenzene	0.0033	U	0.050	0.0033
87-68-3	Hexachlorobutadiene	0.017	U	0.050	0.017
67-72-1	Hexachloroethane	0.011	U	0.050	0.011
98-95-3	Nitrobenzene	0.0041	U	0.050	0.0041
87-86-5	Pentachlorophenol	0.10	U	0.25	0.10
110-86-1	Pyridine	0.0057	U	0.10	0.0057
88-06-2	2,4,6-Trichlorophenol	0.0014	U	0.025	0.0014
95-95-4	2,4,5-Trichlorophenol	0.0022	U	0.050	0.0022

CAS NO.	SURROGATE	%REC	Q	LIMITS
321-60-8	2-Fluorobiphenyl	79		50-135
367-12-4	2-Fluorophenol	87		46-135
4165-62-2	Phenol-d5	73		40-135
118-79-6	2,4,6-Tribromophenol	82		50-135
1718-51-0	Terphenyl-d14	84		52-135
4165-60-0	Nitrobenzene-d5	79		49-135

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34954.D
Lims ID: 160-29498-A-3-E
Client ID: CRC-B22-0105
Sample Type: Client
Inject. Date: 28-Jul-2018 01:03:30 ALS Bottle#: 23 Worklist Smp#: 39
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: 160-29498-A-3-E
Operator ID: KIEKELD Instrument ID: SMS_G6

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 30-Jul-2018 10:11:03 Calib Date: 02-Jul-2018 17:31:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180702-71573.b\G6_34396.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0312

First Level Reviewer: kiekeld Date: 30-Jul-2018 10:07:51

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ug/ml	Flags
* 1 1,4-Dichlorobenzene-d4	152	4.575	4.575	0.000	95	60347	40.0	
* 2 Naphthalene-d8	136	5.798	5.798	0.000	99	242879	40.0	
* 3 Acenaphthene-d10	164	7.539	7.539	0.000	94	133393	40.0	
* 4 Phenanthrene-d10	188	9.016	9.022	-0.006	97	238462	40.0	
* 5 Chrysene-d12	240	12.957	12.969	-0.012	98	213254	40.0	
* 6 Perylene-d12	264	16.798	16.809	-0.011	98	199270	40.0	
$ 7 2-Fluorophenol	112	3.393	3.387	0.006	89	189608	86.6	
$ 8 Phenol-d5	99	4.204	4.204	0.000	97	201970	73.4	
$ 9 Nitrobenzene-d5	82	5.087	5.093	-0.006	88	195612	79.3	
$ 10 2,4,6-Trichlorophenol-d2	198		6.745				ND	
$ 11 2-Fluorobiphenyl	172	6.857	6.857	0.000	99	384173	78.5	
$ 12 2,4,6-Tribromophenol	330	8.322	8.328	-0.006	93	54712	81.9	
$ 13 Terphenyl-d14	244	10.916	10.922	-0.006	99	428658	83.9	
18 Triethyl amine	86		2.022				ND	
19 2-Ethoxyethanol	59		2.169				ND	
20 1,4-Dioxane	88		2.011				ND	U
21 N-Nitrosodimethylamine	74		2.234				ND	
22 Pyridine	79		2.287				ND	
23 Dimethylformamide	73		2.652				ND	
24 2-Picoline	93		2.893				ND	
25 N-Nitrosomethylethylamine	88		2.963				ND	
26 Acrylamide	71		3.169				ND	
27 Methyl methanesulfonate	80		3.210				ND	
28 N-Nitrosodiethylamine	102		3.563				ND	
29 Pentachlorophenol_T	266		3.734				ND	
30 Ethyl methanesulfonate	79		3.810				ND	
32 Benzaldehyde	106		4.163				ND	
33 Phenylmercaptan	110		4.222				ND	
34 Phenol	94		4.222				ND	
35 Aniline	93		4.263				ND	
36 Alpha Methyl Styrene	118		4.316				ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ug/ml	Flags
37 Bis(2-chloroethyl)ether	93		4.304				ND	
38 Pentachloroethane	117		4.293				ND	
39 n-Decane	43		4.416				ND	
40 Methyl styrene	118		4.359				ND	
41 2-Chlorophenol	128		4.381				ND	
42 1,3-Dichlorobenzene	146		4.528				ND	
43 1,4-Dichlorobenzene	146		4.593				ND	
44 Benzyl alcohol	108		4.687				ND	
45 1,2-Dichlorobenzene	146		4.740				ND	
46 2-Methylphenol	108		4.787				ND	
47 2,2'-oxybis[1-chloropropan	45		4.816				ND	
48 Indene	116		4.822				ND	
49 3 & 4 Methylphenol	108		4.934				ND	
50 3-Methylphenol	108		4.934				ND	
51 N-Nitrosodi-n-propylamine	70		4.940				ND	
52 4-Methylphenol	108		4.934				ND	
53 N-Nitrosopyrrolidine	100		4.875				ND	
54 Benzidine_T	184		4.892				ND	
55 Acetophenone	105		4.940				ND	
56 N-Nitrosomorpholine	116		4.910				ND	
57 2-Toluidine	106		4.946				ND	
58 Hexachloroethane	117		5.069				ND	
60 Nitrobenzene	77		5.110				ND	
61 Triethyl phosphate	99		5.193				ND	
62 N-Nitrosopiperidine	114		5.210				ND	
63 Isophorone	82		5.340				ND	
65 2-Nitrophenol	139		5.416				ND	
66 2,4-Dimethylphenol	107		5.446				ND	
67 Benzyl dichloride	125		5.446				ND	
68 o,o',o''-Triethylphosphoro	198		5.475				ND	
69 Bis(2-chloroethoxy)methane	93		5.534				ND	
70 Benzoic acid	105		5.551				ND	
71 3,5-Dimethylphenol	107		5.575				ND	
72 alpha,alpha-Dimethyl phene	58		5.581				ND	
73 2,4-Xylidine	121		5.598				ND	
75 2,4-Dichlorophenol	162		5.657				ND	
76 o-Anisidine	80		5.639				ND	
77 1,2,4-Trichlorobenzene	180		5.746				ND	
78 Alpha-Terpineol	59		5.798				ND	
79 Naphthalene	128		5.822				ND	
80 4-Chloroaniline	127		5.857				ND	
81 2,6-Dichlorophenol	162		5.875				ND	
82 Hexachloropropene	213		5.881				ND	
83 Hexachlorobutadiene	225		5.946				ND	
84 4-chlorobenzenethiol	144		6.036				ND	
85 Quinoline	129		6.104				ND	
86 N-Nitrosodi-n-butylamine	84		6.145				ND	
87 Caprolactam	55		6.181				ND	
88 p-Phenylene diamine	108		6.163				ND	
89 5-Methyl-o-Anisidine	122		6.245				ND	
90 4-Chloro-3-methylphenol	107		6.334				ND	
91 Safrole, Total	162		6.363				ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ug/ml	Flags
92 Carbofuran phenol	164		6.398				ND	
93 1,3-phenylenediamine	108		6.363				ND	
94 2-Methylnaphthalene	142		6.498				ND	
95 Phthalic anhydride	76		6.510				ND	
96 1-Methylnaphthalene	142		6.598				ND	
97 Hexachlorocyclopentadiene	237		6.669				ND	
98 1,2,4,5-Tetrachlorobenzene	216		6.675				ND	
99 Isosafrole Peak 1	162		6.651				ND	
100 Methyl 4-chlorophenyl sulf	158	6.857	6.753	0.104	48	677		NC
101 2,4,6-Trichlorophenol	196		6.775				ND	
102 2,3-Dichlorobenzenamine	161		6.775				ND	
103 2,4,5-Trichlorophenol	196		6.816				ND	
104 Isosafrole Peak 2	104		6.875				ND	
105 1,1'-Biphenyl	154		6.957				ND	
106 Toluene diamine (2,4- + 2,	122		6.916				ND	
107 2-Chloronaphthalene	162		6.987				ND	
108 1-Chloronaphthalene	162		6.969				ND	
109 2-Nitroaniline	65		7.075				ND	
110 1,4-Naphthoquinone	158		7.104				ND	
111 1,4-Dinitrobenzene	168		7.157				ND	
112 Dimethyl phthalate	163		7.245				ND	
113 1,3-Dinitrobenzene	168		7.275				ND	
114 2,6-Dinitrotoluene	165		7.304				ND	
115 Acenaphthylene	152		7.398				ND	
116 3-Nitroaniline	138		7.481				ND	
117 Acenaphthene	153		7.575				ND	
118 2,4-Dinitrophenol	184		7.581				ND	
119 1,3-Dimethyl-2,4-Dinitrobe	77		7.645				ND	
120 4-Nitrophenol	109		7.645				ND	
121 Pentachlorobenzene	250		7.675				ND	
122 2,4-Dinitrotoluene	165		7.710				ND	
123 Dibenzofuran	168		7.745				ND	
124 1,3-Dimethyl-2,5-Dinitrobe	179		7.751				ND	
125 1-Naphthylamine	143		7.775				ND	
126 n-hydroxymethylphthalimide	147		7.698				ND	
127 2,3,4,6-Tetrachlorophenol	232		7.869				ND	
128 Hexadecane	57		7.969				ND	
129 2-Naphthylamine	143		7.851				ND	
130 Diethyl phthalate	149		7.945				ND	
131 1,4-Dimethyl-2,6-Dinitrobe	179		7.933				ND	
132 1,4-Dimethyl-2,3-Dinitrobe	77		7.963				ND	
133 Thionazin	97		7.987				ND	
134 1,2-Dimethyl-3,6-Dinitrobe	179		8.039				ND	
135 4-Chlorophenyl phenyl ethe	204		8.075				ND	
136 Fluorene	166		8.087				ND	
137 N-Nitro-o-toluidine	152		8.039				ND	
138 Tributyl phosphate	99		8.128				ND	
139 4-Nitroaniline	138		8.092				ND	
140 4,6-Dinitro-2-methylphenol	198		8.128				ND	
141 1,5-Dimethyl-2,4-Dinitrobe	179		8.180				ND	
142 Diphenylamine	169		8.187				ND	
143 N-Nitrosodiphenylamine	169		8.187				ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ug/ml	Flags
144 Azobenzene	77		8.234				ND	
145 1,2-Diphenylhydrazine	77		8.234				ND	
146 1,5-Dimethyl-2,3-Dinitrobe	179		8.275				ND	
147 Sulfotepp	97		8.292				ND	
148 2,4,6 - Tribromophenol	330		8.328				ND	U
149 1,2-Dimethyl-3,5-Dinitrobe	179		8.380				ND	
150 Diallate Peak 1	86		8.439				ND	
151 1,3,5-Trinitrobenzene	213		8.387				ND	
152 Phorate	121		8.445				ND	
153 Phenyl sulfide	186		8.475				ND	
154 Phenacetin	108		8.445				ND	
155 1,2-Dimethyl-3,4-Dinitrobe	179		8.522				ND	
156 Diallate Peak 2	86		8.528				ND	
157 4-Bromophenyl phenyl ether	248		8.563				ND	
158 Hexachlorobenzene	284		8.651				ND	
159 Dimethoate	87		8.610				ND	
160 Atrazine	200		8.710				ND	
161 1,2-Dimethyl-4,5-Dinitrobe	91		8.745				ND	
162 n-Octadecane	85		8.887				ND	
163 4-Aminobiphenyl	169		8.781				ND	
164 Pentachlorophenol	266		8.839				ND	
165 Pentachloronitrobenzene	237		8.810				ND	
166 Pronamide	173		8.839				ND	
167 Disulfoton	88		8.963				ND	
168 Dinoseb	211		8.969				ND	
169 Phenanthrene	178		9.051				ND	
170 Anthracene	178		9.098				ND	
171 Carbazole	167		9.251				ND	
172 Alachlor	188		9.387				ND	
173 Methyl parathion	109		9.339				ND	
174 Phenyl disulfide	109		9.515				ND	
175 Di-n-butyl phthalate	149		9.586				ND	
176 Ethyl Parathion	109		9.751				ND	
177 Diphenylsulfone	125		9.844				ND	
178 4-Nitroquinoline-1-oxide	190		9.792				ND	
179 Methapyrilene	97		9.881				ND	
180 Isodrin	193		10.139				ND	
181 Octachlorostyrene	308		10.220				ND	
182 Fluoranthene	202		10.386				ND	
183 4,4-Dichlorobenzil	139		10.602				ND	
184 Benzidine	184		10.545				ND	
185 Pyrene	202		10.704				ND	
187 Aramite Peak 1	185		10.822				ND	
188 p-chlorophenyl sulfone	159	10.916	10.896	0.020	43	5533		NC
189 Aramite Peak 2	185		10.945				ND	
190 p-Dimethylamino azobenzene	120		11.092				ND	
191 Chlorobenzilate	251		11.169				ND	
192 Famphur	218		11.663				ND	
193 Butyl benzyl phthalate	149		11.786				ND	
194 3,3'-Dimethylbenzidine	212		11.686				ND	
195 2-Acetylaminofluorene	181		12.186				ND	
196 4,4'-Methylene bis(2-chlor	231		12.833				ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	OnCol Amt ug/ml	Flags
197 3,3'-Dichlorobenzidine	252		12.910				ND	
198 Benzo[a]anthracene	228		12.951				ND	
199 Bis(2-ethylhexyl) phthalat	149		13.116				ND	
200 Chrysene	228		13.033				ND	
201 6-Methylchrysene	242		14.074				ND	
202 Di-n-octyl phthalate	149		14.880				ND	
203 7,12-Dimethylbenz(a)anthra	256		15.645				ND	
204 Benzo[b]fluoranthene	252		15.745				ND	
205 Benzo[k]fluoranthene	252		15.827				ND	
206 Hexachlorophene	196		16.556				ND	
207 Benzo[e]pyrene	252		16.510				ND	
208 Benzo[a]pyrene	252		16.657				ND	
209 Perylene	252		16.845				ND	
210 3-Methylcholanthrene	268		17.604				ND	
211 Tris(2,3-dibromopropyl)pho	119		18.298				ND	
212 Dibenz[a,h]acridine	279		19.145				ND	
213 Dibenz[a,j]acridine	279		19.298				ND	
214 Indeno[1,2,3-cd]pyrene	276		19.886				ND	
215 Dibenz(a,h)anthracene	278		19.974				ND	
216 Benzo[g,h,i]perylene	276		20.615				ND	
217 Dibenzo[a,e]pyrene	302		24.703				ND	
S 218 Total Cresols	108		15.496				ND	
S 219 Methyl Phenols,Total	108		15.496				ND	
S 220 Isosafrole	162		15.496				ND	
S 221 Diallate	86		15.496				ND	
S 222 Aramite, Total	185		15.496				ND	
S 223 Phthalic acid	148		19.689				ND	
14 2-Butoxyethanol	1		0.000				ND	
15 1,2,3,4-Tetrahydronaphthal	1		0.000				ND	
16 2-Phenoxyethanol	1		0.000				ND	
17 1,4-Dimethyl-2,5-Dinitrobe	1		0.000				ND	
59 4,4'-DDE	246		5.053				ND	
64 4,4'-DDD	235		5.369				ND	
74 4,4'-DDT	235		5.598				ND	
T 224 Hexachlorodibenzofurans TI	1		0.000				ND	
T 225 Pentachlorodibenzo-p-dioxi	1		0.000				ND	
T 226 Tetrachlorodibenzofurans T	1		0.000				ND	
T 227 2,6-Dimethylphenol	1		0.000				ND	
T 228 Pentachlorodibenzofurans T	1		0.000				ND	
T 229 Tetrachlorodibenzo-p-dioxi	1		0.000				ND	
T 230 Octadecane (TIC)	1		0.000				ND	
T 231 Hexachlorodibenzo-p-dioxin	1		0.000				ND	
S 232 TPAH	1		0.000				ND	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

U - Marked Undetected

Reagents:

MS-IS_00014 Amount Added: 20.00 Units: uL Run Reagent

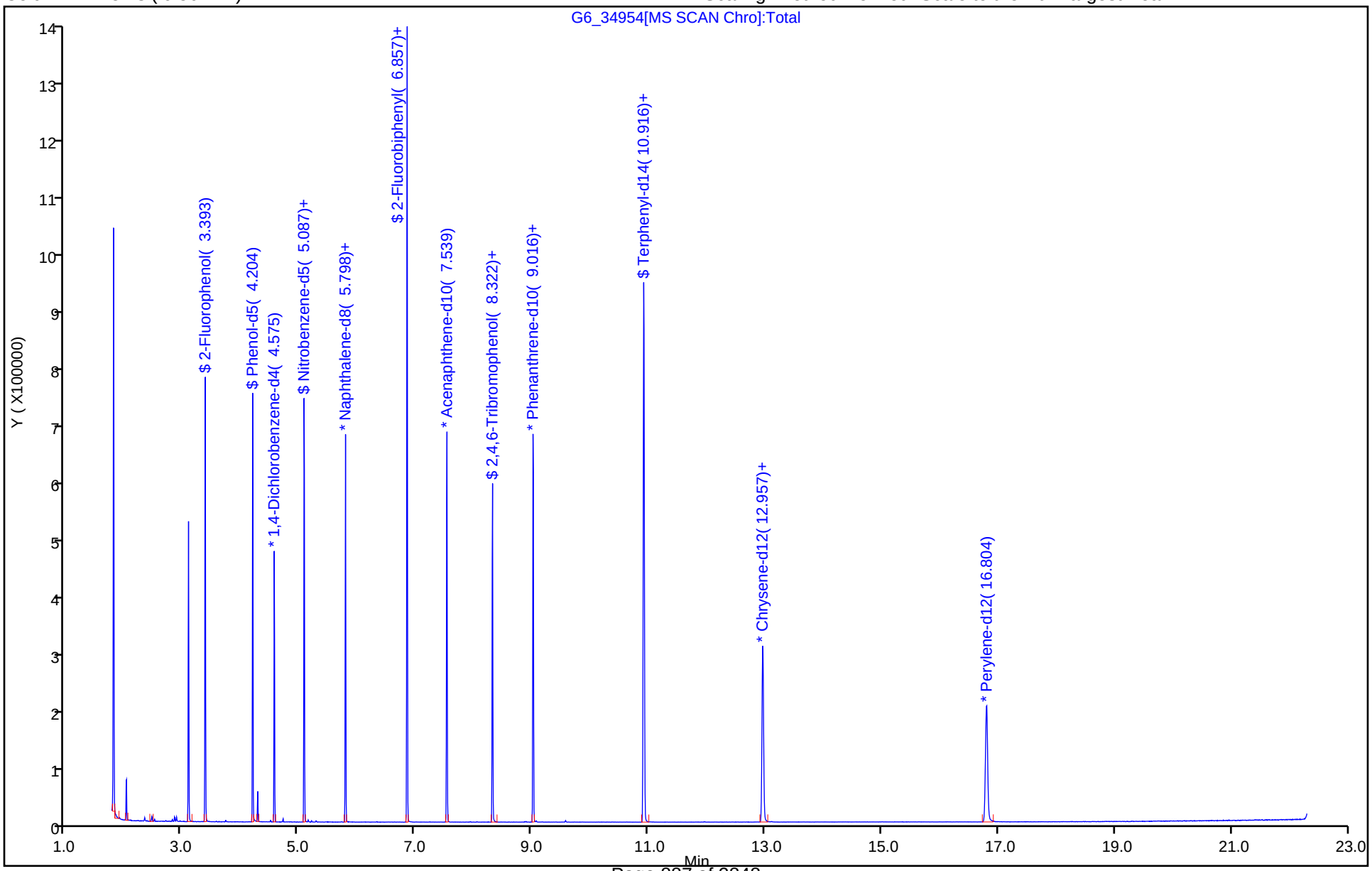
Report Date: 30-Jul-2018 10:11:06 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34954.D

Injection Date:	28-Jul-2018 01:03:30	Instrument ID:	SMS_G6	Operator ID:	KIEKELD
Lims ID:	160-29498-A-3-E	Lab Sample ID:	280-29498-3	Worklist Smp#:	39
Client ID:	CRC-B22-0105				
Injection Vol:	0.5 ul	Dil. Factor:	1.0000	ALS Bottle#:	23
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		

Column: VF-5ms (0.50 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1



TestAmerica Denver
Recovery Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34954.D
Lims ID: 160-29498-A-3-E
Client ID: CRC-B22-0105
Sample Type: Client
Inject. Date: 28-Jul-2018 01:03:30 ALS Bottle#: 23 Worklist Smp#: 39
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: 160-29498-A-3-E
Operator ID: KIEKELD Instrument ID: SMS_G6

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 30-Jul-2018 10:11:03 Calib Date: 02-Jul-2018 17:31:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180702-71573.b\G6_34396.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0312

First Level Reviewer: kiekeld Date: 30-Jul-2018 10:07:51

Compound	Amount Added	Amount Recovered	% Rec.
$ 7 2-Fluorophenol	100.0	86.6	86.59
$ 8 Phenol-d5	100.0	73.4	73.42
$ 9 Nitrobenzene-d5	100.0	79.3	79.32
$ 11 2-Fluorobiphenyl	100.0	78.5	78.51
$ 12 2,4,6-Tribromophenol	100.0	81.9	81.94
$ 13 Terphenyl-d14	100.0	83.9	83.90

FORM VI
GC/MS SEMI VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 420416

SDG No.:

Instrument ID: SMS_G6 GC Column: Rxi-5Sil MS ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 06/28/2018 12:16 Calibration End Date: 06/28/2018 15:26 Calibration ID: 32870

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD004 280-420416/4	G6_34333.D
Level 2	STD010 280-420416/5	G6_34334.D
Level 3	STD020 280-420416/6	G6_34335.D
Level 4	STD050 280-420416/7	G6_34336.D
Level 5	ICIS 280-420416/3	G6_34332.D
Level 6	STD120 280-420416/8	G6_34337.D
Level 7	STD160 280-420416/9	G6_34338.D
Level 8	STD200 280-420416/10	G6_34339.D

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5		B	M1	M2								
1,4-Dioxane	0.6369 0.6027	0.5647 0.5880	0.5783 0.5857	0.6073	0.6142	Ave		0.5972				3.8		15.0			
N-Nitrosodimethylamine	0.9277 0.9076	0.9086 0.9162	0.8814 0.9294	0.9242	0.9345	Ave		0.9162				1.9		15.0			
Pyridine	1.6881 1.5335	1.5475 1.5425	1.5375 1.5401	1.5930	1.6025	Ave		1.5731				3.4		15.0			
Phenol	1.9973 1.8718	1.8653 1.8582	1.8422 1.8544	1.8823	1.9427	Ave		1.8893				2.8		15.0			
Aniline	2.3942 2.2844	2.3135 2.3069	2.2875 2.3086	2.3532	2.3778	Ave		2.3283				1.8		15.0			
Bis(2-chloroethyl)ether	1.5320 1.4412	1.4494 1.4387	1.4583 1.4090	1.4794	1.4900	Ave		1.4623				2.6		15.0			
Alpha Methyl Styrene	1.6460 1.4992	1.5109 1.4850	1.5008 1.4833	1.5448	1.5389	Ave		1.5261				3.5		15.0			
2-Chlorophenol	1.6313 1.5395	1.5125 1.5262	1.4913 1.5201	1.5572	1.5905	Ave		1.5461				3.0		15.0			
n-Decane	1.5307 1.3783	1.4171 1.3461	1.3941 1.3338	1.4319	1.4410	Ave		1.4091				4.4		15.0			
1,3-Dichlorobenzene	1.7812 1.6990	1.7338 1.6902	1.6824 1.6758	1.7170	1.7386	Ave		1.7148				2.1		15.0			
1,4-Dichlorobenzene	1.7964 1.7197	1.6981 1.6823	1.6968 1.6837	1.7408	1.7523	Ave		1.7212				2.3		15.0			
Benzyl alcohol	1.0128 1.0183	1.0451 1.0318	1.0356 1.0291	1.0459	1.0593	Ave		1.0347				1.5		15.0			
1,2-Dichlorobenzene	1.6941 1.6152	1.6203 1.6144	1.6354 1.5999	1.6541	1.6820	Ave		1.6394				2.1		15.0			
2-Methylphenol	1.5250 1.3955	1.4315 1.4113	1.3954 1.4009	1.4169	1.4596	Ave		1.4295				3.1		15.0			

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
GC/MS SEMI VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 420416

SDG No.:

Instrument ID: SMS_G6 GC Column: Rxi-5Sil MS ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 06/28/2018 12:16 Calibration End Date: 06/28/2018 15:26 Calibration ID: 32870

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5		B	M1	M2								
bis (2-chloroisopropyl) ether	2.2204 1.9192	2.0581 1.8800	2.0549 1.8380	2.0325	2.0493	Ave		2.0066				6.1		15.0			
Indene	2.6903 2.4065	2.4990 2.3398	2.4676 2.2716	2.5276	2.5402	Ave		2.4678				5.3		15.0			
3 & 4 Methylphenol	1.5369 1.4588	1.4828 1.4539	1.4677 1.4500	1.5081	1.5159	Ave		1.4843				2.2		15.0			
3-Methylphenol	1.5369 1.4588	1.4828 1.4539	1.4677 1.4500	1.5081	1.5159	Ave		1.4843				2.2		15.0			
4-Methylphenol	1.5369 1.4588	1.4828 1.4539	1.4677 1.4500	1.5081	1.5159	Ave		1.4843				2.2		15.0			
N-Nitrosodi-n-propylamine	1.1383 0.9837	1.0346 0.9723	1.0462 0.9577	1.0367	1.0482	Ave		1.0272			0.0500	5.6		15.0			
Acetophenone	2.2729 1.9381	2.0720 1.9311	2.0065 1.9000	2.0598	2.0472	Ave		2.0285				5.8		15.0			
Hexachloroethane	0.7101 0.6534	0.6601 0.6451	0.6681 0.6444	0.6771	0.6838	Ave		0.6678				3.3		15.0			
Nitrobenzene	0.4187 0.3900	0.3718 0.3777	0.3801 0.3709	0.3849	0.3990	Ave		0.3866				4.1		15.0			
Isophorone	0.7684 0.7155	0.7053 0.7017	0.7139 0.6862	0.7119	0.7305	Ave		0.7167				3.4		15.0			
2-Nitrophenol	0.2159 0.2160	0.2007 0.2189	0.2100 0.2143	0.2124	0.2219	Ave		0.2138				3.0		15.0			
2,4-Dimethylphenol	0.3970 0.3750	0.3771 0.3706	0.3775 0.3613	0.3800	0.3840	Ave		0.3778				2.7		15.0			
Bis(2-chloroethoxy)methane	0.4865 0.4512	0.4470 0.4419	0.4460 0.4310	0.4538	0.4592	Ave		0.4521				3.6		15.0			
Benzoic acid	+++++ 0.3091	0.2136 0.3113	0.2420 0.3151	0.2763	0.2902	Lin2	-2.121	0.3103							0.9980		0.9900
3,5-Dimethylphenol	0.3863 0.3797	0.3681 0.3681	0.3681 0.3589	0.3746	0.3894	Ave		0.3742				2.8		15.0			
2,4-Dichlorophenol	0.3252 0.3363	0.3209 0.3296	0.3277 0.3231	0.3267	0.3395	Ave		0.3286				1.9		15.0			
1,2,4-Trichlorobenzene	0.3465 0.3464	0.3409 0.3378	0.3408 0.3318	0.3461	0.3475	Ave		0.3422				1.6		15.0			
Naphthalene	1.1463 1.1038	1.0987 1.0856	1.0906 1.0542	1.1038	1.1185	Ave		1.1002				2.4		15.0			
4-Chloroaniline	0.4927 0.4929	0.4859 0.4861	0.4891 0.4715	0.4984	0.5028	Ave		0.4899				1.9		15.0			
2,6-Dichlorophenol	0.3401 0.3287	0.3267 0.3228	0.3197 0.3198	0.3303	0.3321	Ave		0.3275				2.1		15.0			

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
GC/MS SEMI VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 420416

SDG No.:

Instrument ID: SMS_G6 GC Column: Rxi-5Sil MS ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 06/28/2018 12:16 Calibration End Date: 06/28/2018 15:26 Calibration ID: 32870

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5		B	M1	M2								
Hexachlorobutadiene	0.1878 0.1810	0.1801 0.1759	0.1831 0.1712	0.1834	0.1845	Ave		0.1809				2.9		15.0			
Caprolactam	0.1730 0.1702	0.1631 0.1773	0.1845 0.1762	0.1711	0.1744	Ave		0.1737				3.5		15.0			
4-Chloro-3-methylphenol	0.3264 0.3242	0.3251 0.3206	0.3212 0.3086	0.3252	0.3351	Ave		0.3233				2.3		15.0			
2-Methylnaphthalene	0.7992 0.7582	0.7563 0.7458	0.7537 0.7289	0.7664	0.7781	Ave		0.7608				2.8		15.0			
1-Methylnaphthalene	0.7708 0.7219	0.7093 0.7088	0.7244 0.6835	0.7206	0.7380	Ave		0.7222				3.5		15.0			
Hexachlorocyclopentadiene	0.3917 0.4129	0.3981 0.3967	0.3893 0.3852	0.4174	0.4255	Ave		0.4021			0.0500	3.6		15.0			
1,2,4,5-Tetrachlorobenzene	0.3431 0.3143	0.3246 0.3057	0.3197 0.2958	0.3208	0.3221	Ave		0.3183				4.4		15.0			
2,3-Dichloroaniline	0.7901 0.7307	0.7383 0.7183	0.7534 0.6978	0.7620	0.7594	Ave		0.7437				3.9		15.0			
2,4,6-Trichlorophenol	0.4394 0.4283	0.4117 0.4229	0.4236 0.4055	0.4344	0.4387	Ave		0.4256				2.9		15.0			
2,4,5-Trichlorophenol	0.4599 0.4670	0.4324 0.4626	0.4510 0.4566	0.4685	0.4744	Ave		0.4591				2.8		15.0			
1,1'-Biphenyl	1.8210 1.6831	1.6760 1.6410	1.6454 1.5960	1.6912	1.7072	Ave		1.6826				3.9		15.0			
2-Chloronaphthalene	1.4224 1.3337	1.3344 1.3129	1.3038 1.2958	1.3439	1.3582	Ave		1.3381				3.0		15.0			
2-Nitroaniline	0.3960 0.3968	0.3772 0.3917	0.3848 0.3840	0.3992	0.4084	Ave		0.3923				2.5		15.0			
Dimethyl phthalate	1.6294 1.4920	1.5254 1.4743	1.5267 1.4297	1.5125	1.5148	Ave		1.5131				3.8		15.0			
1,3-Dinitrobenzene	0.2170 0.2732	0.2367 0.2715	0.2440 0.2715	0.2649	0.2752	Ave		0.2567				8.4		15.0			
2,6-Dinitrotoluene	0.3435 0.3608	0.3364 0.3609	0.3499 0.3556	0.3636	0.3674	Ave		0.3548				3.0		15.0			
Acenaphthylene	2.1391 2.0335	2.0255 2.0038	2.0039 1.9626	2.0567	2.0753	Ave		2.0375				2.6		15.0			
3-Nitroaniline	0.4291 0.4453	0.4240 0.4483	0.4320 0.4392	0.4481	0.4585	Ave		0.4405				2.6		15.0			
Acenaphthene	1.4200 1.3008	1.3202 1.2552	1.3141 1.2328	1.3329	1.3317	Ave		1.3135				4.3		15.0			
2,4-Dinitrophenol	+++++ 0.2447	0.1811 0.2481	0.2044 0.2470	0.2289	0.2408	Lin2	-1.441	0.2486			0.0500				0.9990		0.9900

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
GC/MS SEMI VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 420416

SDG No.:

Instrument ID: SMS_G6 GC Column: Rxi-5Sil MS ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 06/28/2018 12:16 Calibration End Date: 06/28/2018 15:26 Calibration ID: 32870

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5		B	M1	M2								
4-Nitrophenol	0.2156 0.2152	0.2110 0.2123	0.2148 0.2073	0.2213	0.2281	Ave		0.2157			0.0500	3.0		15.0			
2,4-Dinitrotoluene	0.4690 0.4812	0.4524 0.4806	0.4651 0.4778	0.4863	0.4980	Ave		0.4763				2.9		15.0			
Dibenzofuran	2.0166 1.8782	1.9050 1.8521	1.9006 1.7990	1.9219	1.8983	Ave		1.8965				3.3		15.0			
2,3,4,6-Tetrachlorophenol	0.3459 0.3776	0.3648 0.3710	0.3717 0.3726	0.3822	0.3785	Ave		0.3706				3.1		15.0			
Diethyl phthalate	1.6517 1.4978	1.5283 1.4643	1.5090 1.4221	1.5222	1.5243	Ave		1.5150				4.4		15.0			
Hexadecane	0.9927 0.8955	0.9242 0.8712	0.9122 0.8313	0.9180	0.9131	Ave		0.9073				5.1		15.0			
4-Chlorophenyl phenyl ether	0.7475 0.6910	0.7138 0.6722	0.7019 0.6608	0.7067	0.7054	Ave		0.6999				3.8		15.0			
Fluorene	1.6853 1.4823	1.5375 1.4497	1.5062 1.3938	1.5054	1.5187	Ave		1.5099				5.6		15.0			
4-Nitroaniline	0.4587 0.4692	0.4402 0.4635	0.4582 0.4636	0.4682	0.4762	Ave		0.4622				2.3		15.0			
4,6-Dinitro-2-methylphenol	+++++ 0.1544	0.1260 0.1515	0.1335 0.1530	0.1500	0.1513	Lin2	-0.618	0.1546							0.9990		0.9900
Diphenylamine	1.4402 1.2913	1.3445 1.2723	1.3066 1.2427	1.3172	1.3255	Ave		1.3175				4.5		15.0			
n-Nitrosodiphenylamine(as diphenylamine)	0.6648 0.6208	0.6405 0.6109	0.6129 0.5962	0.6301	0.6431	Ave		0.6274				3.5		15.0			
1,2-Diphenylhydrazine(as Azobenzene)	1.5862 1.4558	1.5271 1.4384	1.4977 1.3990	1.5025	1.5130	Ave		1.4900				3.9		15.0			
Azobenzene	1.6037 1.4718	1.5439 1.4542	1.5141 1.4144	1.5190	1.5296	Ave		1.5063				3.9		15.0			
2,4,6 - Tribromophenol	0.1890 0.2041	0.1962 0.2021	0.1975 0.1996	0.2084	0.2062	Ave		0.2004				3.1		15.0			
4-Bromophenyl phenyl ether	0.2326 0.2243	0.2268 0.2221	0.2173 0.2151	0.2240	0.2307	Ave		0.2241				2.7		15.0			
Hexachlorobenzene	0.2534 0.2397	0.2412 0.2351	0.2459 0.2294	0.2447	0.2427	Ave		0.2415				3.0		15.0			
Atrazine	0.2163 0.1964	0.2061 0.1904	0.2072 0.1815	0.2074	0.2053	Ave		0.2013				5.5		15.0			
Pentachlorophenol	+++++ 0.1671	0.1477 0.1622	0.1562 0.1591	0.1679	0.1723	Lin2	-0.380	0.1673							0.9990		0.9900
Phenanthrene	1.3107 1.2268	1.2709 1.2005	1.2109 1.1732	1.2597	1.2710	Ave		1.2405				3.6		15.0			

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
GC/MS SEMI VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 420416

SDG No.:

Instrument ID: SMS_G6 GC Column: Rxi-5Sil MS ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 06/28/2018 12:16 Calibration End Date: 06/28/2018 15:26 Calibration ID: 32870

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5		B	M1	M2								
Anthracene	1.3539 1.2850	1.3112 1.2556	1.2878 1.2192	1.3270	1.3382	Ave		1.2972				3.5		15.0			
Carbazole	1.3126 1.2155	1.2372 1.1981	1.2244 1.1698	1.2525	1.2702	Ave		1.2350				3.6		15.0			
Alachlor	0.1742 0.1595	0.1568 0.1546	0.1571 0.1531	0.1605	0.1628	Ave		0.1598				4.1		15.0			
Di-n-butyl phthalate	1.5728 1.4868	1.4670 1.4501	1.4526 1.4132	1.5020	1.5286	Ave		1.4841				3.4		15.0			
Fluoranthene	1.3715 1.3020	1.2936 1.2820	1.2942 1.2563	1.3359	1.3441	Ave		1.3099				2.9		15.0			
Pyrene	1.4624 1.4334	1.4339 1.4178	1.4092 1.3983	1.4521	1.4850	Ave		1.4365				2.0		15.0			
Famphur	0.4998 0.4823	0.5039 0.4558	0.5104 0.4211	0.5218	0.5162	Ave		0.4889				7.1		15.0			
Butyl benzyl phthalate	0.7216 0.7358	0.7043 0.7301	0.7022 0.7243	0.7352	0.7562	Ave		0.7262				2.4		15.0			
3,3'-Dichlorobenzidine	0.4318 0.4763	0.4406 0.4624	0.4501 0.4451	0.4692	0.4918	Ave		0.4584				4.4		15.0			
Benzo[a]anthracene	1.3818 1.3487	1.2912 1.3404	1.2955 1.3365	1.3360	1.3643	Ave		1.3368				2.3		15.0			
Chrysene	1.2947 1.2873	1.2602 1.2790	1.2284 1.2751	1.2737	1.3027	Ave		1.2751				1.8		15.0			
Bis(2-ethylhexyl) phthalate	0.9831 0.9771	0.9239 0.9658	0.9216 0.9586	0.9613	0.9999	Ave		0.9614				2.8		15.0			
Di-n-octyl phthalate	1.6413 1.7469	1.6269 1.7350	1.6029 1.7407	1.7163	1.7966	Ave		1.7008				4.0		15.0			
Benzo[b]fluoranthene	1.2104 1.2636	1.1533 1.2597	1.1824 1.2736	1.2050	1.2379	Ave		1.2232				3.5		15.0			
Benzo[k]fluoranthene	1.2720 1.2845	1.2330 1.2848	1.2202 1.2699	1.2838	1.2944	Ave		1.2678				2.1		15.0			
Benzo[e]pyrene	1.1107 1.1607	1.0889 1.1573	1.1045 1.1567	1.1445	1.1551	Ave		1.1348				2.5		15.0			
Benzo[a]pyrene	1.2158 1.2564	1.1352 1.2582	1.2020 1.2462	1.2362	1.2546	Ave		1.2256				3.4		15.0			
Indeno[1,2,3-cd]pyrene	1.0270 1.1034	1.0317 1.1295	1.0179 1.1248	1.0693	1.1156	Ave		1.0774				4.3		15.0			
Dibenz(a,h)anthracene	1.0217 1.1291	0.9660 1.1359	1.0133 1.1114	1.0885	1.1033	Ave		1.0711				5.8		15.0			
Benzo[g,h,i]perylene	1.1176 1.2000	1.0978 1.1938	1.1271 1.1913	1.1747	1.1700	Ave		1.1590				3.4		15.0			

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
GC/MS SEMI VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 420416

SDG No.:

Instrument ID: SMS_G6 GC Column: Rxi-5Sil MS ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 06/28/2018 12:16 Calibration End Date: 06/28/2018 15:26 Calibration ID: 32870

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5		B	M1	M2								
2-Fluorophenol	1.4896 1.4473	1.4000 1.4426	1.4023 1.4459	1.4789	1.5047	Ave		1.4514				2.6		15.0			
Phenol-d5	1.9241 1.8004	1.7816 1.8104	1.7775 1.8059	1.8342	1.8520	Ave		1.8233				2.6		15.0			
Nitrobenzene-d5	0.4347 0.4014	0.4230 0.3953	0.4145 0.3775	0.3976	0.4053	Ave		0.4062				4.4		15.0			
2-Fluorobiphenyl	1.5184 1.4676	1.4936 1.4406	1.4418 1.4004	1.4814	1.4944	Ave		1.4673				2.6		15.0			
2,4,6-Tribromophenol	0.1890 0.2041	0.1962 0.2021	0.1975 0.1996	0.2071	0.2062	Ave		0.2002				3.0		15.0			
Terphenyl-d14	0.9687 0.9546	0.9574 0.9568	0.9392 0.9415	0.9650	0.9830	Ave		0.9583				1.5		15.0			

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
GC/MS SEMI VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 420416

SDG No.:

Instrument ID: SMS_G6 GC Column: Rxi-5Sil MS ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 06/28/2018 12:16 Calibration End Date: 06/28/2018 15:26 Calibration ID: 32870

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD004 280-420416/4	G6_34333.D
Level 2	STD010 280-420416/5	G6_34334.D
Level 3	STD020 280-420416/6	G6_34335.D
Level 4	STD050 280-420416/7	G6_34336.D
Level 5	ICIS 280-420416/3	G6_34332.D
Level 6	STD120 280-420416/8	G6_34337.D
Level 7	STD160 280-420416/9	G6_34338.D
Level 8	STD200 280-420416/10	G6_34339.D

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (UG/ML)				
			LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5
1,4-Dioxane	DCBd 4	Ave	2558 83645	5966 104663	12379 130860	34132	56111	4.00 120	10.0 160	20.0 200	50.0	80.0
N-Nitrosodimethylamine	DCBd 4	Ave	3726 125961	9599 163086	18868 207646	51943	85367	4.00 120	10.0 160	20.0 200	50.0	80.0
Pyridine	DCBd 4	Ave	13560 425666	32698 549151	65827 688127	179067	292771	8.00 240	20.0 320	40.0 400	100	160
Phenol	DCBd 4	Ave	8022 259789	19706 330778	39437 414298	105793	177464	4.00 120	10.0 160	20.0 200	50.0	80.0
Aniline	DCBd 4	Ave	9616 317063	24441 410646	48969 515755	132259	217209	4.00 120	10.0 160	20.0 200	50.0	80.0
Bis(2-chloroethyl)ether	DCBd 4	Ave	6153 200032	15312 256103	31218 314792	83151	136110	4.00 120	10.0 160	20.0 200	50.0	80.0
Alpha Methyl Styrene	DCBd 4	Ave	6611 208076	15962 264344	32128 331391	86827	140574	4.00 120	10.0 160	20.0 200	50.0	80.0
2-Chlorophenol	DCBd 4	Ave	6552 213671	15979 271682	31925 339605	87521	145294	4.00 120	10.0 160	20.0 200	50.0	80.0
n-Decane	DCBd 4	Ave	6148 191301	14971 239608	29843 297980	80479	131639	4.00 120	10.0 160	20.0 200	50.0	80.0
1,3-Dichlorobenzene	DCBd 4	Ave	7154 235801	18317 300867	36016 374394	96505	158818	4.00 120	10.0 160	20.0 200	50.0	80.0
1,4-Dichlorobenzene	DCBd 4	Ave	7215 238674	17940 299454	36324 376150	97839	160071	4.00 120	10.0 160	20.0 200	50.0	80.0
Benzyl alcohol	DCBd 4	Ave	4068 141334	11041 183668	22169 229909	58784	96764	4.00 120	10.0 160	20.0 200	50.0	80.0
1,2-Dichlorobenzene	DCBd 4	Ave	6804 224179	17118 287372	35010 357424	92967	153653	4.00 120	10.0 160	20.0 200	50.0	80.0
2-Methylphenol	DCBd 4	Ave	6125 193689	15123 251220	29872 312968	79637	133331	4.00 120	10.0 160	20.0 200	50.0	80.0
bis (2-chloroisopropyl) ether	DCBd 4	Ave	8918 266365	21743 334651	43989 410633	114238	187207	4.00 120	10.0 160	20.0 200	50.0	80.0

FORM VI
GC/MS SEMI VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 420416

SDG No.:

Instrument ID: SMS_G6 GC Column: Rxi-5Sil MS ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 06/28/2018 12:16 Calibration End Date: 06/28/2018 15:26 Calibration ID: 32870

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (UG/ML)				
			LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5
Indene	DCBd 4	Ave	21611 667998	52801 833021	105646 1014988	284130	464101	8.00 240	20.0 320	40.0 400	100	160
3 & 4 Methylphenol	DCBd 4	Ave	6173 202472	15665 258799	31418 323944	84762	138476	4.00 120	10.0 160	20.0 200	50.0	80.0
3-Methylphenol	DCBd 4	Ave	6173 202472	15665 258799	31418 323944	84762	138476	4.00 120	10.0 160	20.0 200	50.0	80.0
4-Methylphenol	DCBd 4	Ave	6173 202472	15665 258799	31418 323944	84762	138476	4.00 120	10.0 160	20.0 200	50.0	80.0
N-Nitrosodi-n-propylamine	DCBd 4	Ave	4572 136527	10930 173070	22395 213952	58266	95754	4.00 120	10.0 160	20.0 200	50.0	80.0
Acetophenone	DCBd 4	Ave	9129 268990	21890 343756	42953 424479	115769	187010	4.00 120	10.0 160	20.0 200	50.0	80.0
Hexachloroethane	DCBd 4	Ave	2852 90693	6974 114829	14301 143976	38059	62464	4.00 120	10.0 160	20.0 200	50.0	80.0
Nitrobenzene	NPT	Ave	6763 205276	15692 260418	32486 325964	85557	142561	4.00 120	10.0 160	20.0 200	50.0	80.0
Isophorone	NPT	Ave	12413 376619	29766 483779	61017 603117	158216	261007	4.00 120	10.0 160	20.0 200	50.0	80.0
2-Nitrophenol	NPT	Ave	3487 113708	8471 150921	17953 188378	47201	79271	4.00 120	10.0 160	20.0 200	50.0	80.0
2,4-Dimethylphenol	NPT	Ave	6413 197399	15915 255529	32271 317535	84469	137206	4.00 120	10.0 160	20.0 200	50.0	80.0
Bis(2-chloroethoxy)methane	NPT	Ave	7859 237471	18864 304700	38119 378857	100860	164080	4.00 120	10.0 160	20.0 200	50.0	80.0
Benzoic acid	NPT	Lin2	+++++ 325365	18029 429215	41375 553943	122837	207358	+++++ 240	20.0 320	40.0 400	100	160
3,5-Dimethylphenol	NPT	Ave	6240 199866	15536 253815	31467 315411	83266	139123	4.00 120	10.0 160	20.0 200	50.0	80.0
2,4-Dichlorophenol	NPT	Ave	5253 177013	13542 227265	28012 283989	72602	121299	4.00 120	10.0 160	20.0 200	50.0	80.0
1,2,4-Trichlorobenzene	NPT	Ave	5597 182324	14386 232931	29129 291669	76916	124151	4.00 120	10.0 160	20.0 200	50.0	80.0
Naphthalene	NPT	Ave	18517 580958	46368 748510	93221 926566	245341	399650	4.00 120	10.0 160	20.0 200	50.0	80.0
4-Chloroaniline	NPT	Ave	7959 259422	20506 335148	41805 414407	110766	179666	4.00 120	10.0 160	20.0 200	50.0	80.0
2,6-Dichlorophenol	NPT	Ave	5494 173021	13786 222581	27329 281118	73403	118681	4.00 120	10.0 160	20.0 200	50.0	80.0
Hexachlorobutadiene	NPT	Ave	3033 95280	7602 121283	15647 150506	40772	65910	4.00 120	10.0 160	20.0 200	50.0	80.0
Caprolactam	NPT	Ave	2795 89593	6885 122273	15766 154894	38039	62309	4.00 120	10.0 160	20.0 200	50.0	80.0

FORM VI
GC/MS SEMI VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 420416

SDG No.:

Instrument ID: SMS_G6 GC Column: Rxi-5Sil MS ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 06/28/2018 12:16 Calibration End Date: 06/28/2018 15:26 Calibration ID: 32870

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (UG/ML)				
			LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5
4-Chloro-3-methylphenol	NPT	Ave	5273 170631	13718 221025	27452 271214	72282	119730	4.00 120	10.0 160	20.0 200	50.0	80.0
2-Methylnaphthalene	NPT	Ave	12910 399097	31915 514185	64420 640689	170339	278024	4.00 120	10.0 160	20.0 200	50.0	80.0
1-Methylnaphthalene	NPT	Ave	12451 379971	29934 488709	61916 600731	160165	263690	4.00 120	10.0 160	20.0 200	50.0	80.0
Hexachlorocyclopentadiene	ANT	Ave	3383 114542	8904 143777	17814 177010	48537	80287	4.00 120	10.0 160	20.0 200	50.0	80.0
1,2,4,5-Tetrachlorobenzene	NPT	Ave	5543 165436	13699 210764	27327 259975	71293	115108	4.00 120	10.0 160	20.0 200	50.0	80.0
2,3-Dichloroaniline	ANT	Ave	6823 202670	16514 260344	34479 320645	88614	143288	4.00 120	10.0 160	20.0 200	50.0	80.0
2,4,6-Trichlorophenol	ANT	Ave	3795 118789	9209 153265	19386 186335	50519	82770	4.00 120	10.0 160	20.0 200	50.0	80.0
2,4,5-Trichlorophenol	ANT	Ave	3972 129548	9673 167647	20640 209846	54484	89522	4.00 120	10.0 160	20.0 200	50.0	80.0
1,1'-Biphenyl	ANT	Ave	15726 466853	37490 594734	75298 733439	196678	322133	4.00 120	10.0 160	20.0 200	50.0	80.0
2-Chloronaphthalene	ANT	Ave	12284 369938	29848 475839	59666 595447	156288	256276	4.00 120	10.0 160	20.0 200	50.0	80.0
2-Nitroaniline	ANT	Ave	3420 110072	8437 141970	17610 176478	46428	77058	4.00 120	10.0 160	20.0 200	50.0	80.0
Dimethyl phthalate	ANT	Ave	14071 413845	34121 534319	69863 656979	175895	285835	4.00 120	10.0 160	20.0 200	50.0	80.0
1,3-Dinitrobenzene	ANT	Ave	1874 75773	5295 98382	11164 124771	30811	51923	4.00 120	10.0 160	20.0 200	50.0	80.0
2,6-Dinitrotoluene	ANT	Ave	2966 100069	7525 130806	16012 163418	42284	69323	4.00 120	10.0 160	20.0 200	50.0	80.0
Acenaphthylene	ANT	Ave	18473 564044	45307 726221	91704 901886	239189	391584	4.00 120	10.0 160	20.0 200	50.0	80.0
3-Nitroaniline	ANT	Ave	3706 123508	9484 162462	19769 201810	52107	86510	4.00 120	10.0 160	20.0 200	50.0	80.0
Acenaphthene	ANT	Ave	12263 360819	29530 454918	60136 566504	155015	251272	4.00 120	10.0 160	20.0 200	50.0	80.0
2,4-Dinitrophenol	ANT	Lin2	+++++ 135733	8104 179819	18708 227029	53241	90856	+++++ 240	20.0 320	40.0 400	100	160
4-Nitrophenol	ANT	Ave	3723 119388	9440 153913	19661 190500	51480	86097	8.00 240	20.0 320	40.0 400	100	160
2,4-Dinitrotoluene	ANT	Ave	4050 133466	10119 174172	21286 219556	56557	93977	4.00 120	10.0 160	20.0 200	50.0	80.0
Dibenzofuran	ANT	Ave	17415 520965	42613 671243	86974 826710	223512	358196	4.00 120	10.0 160	20.0 200	50.0	80.0

FORM VI
GC/MS SEMI VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 420416

SDG No.:

Instrument ID: SMS_G6 GC Column: Rxi-5Sil MS ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 06/28/2018 12:16 Calibration End Date: 06/28/2018 15:26 Calibration ID: 32870

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (UG/ML)				
			LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5
2,3,4,6-Tetrachlorophenol	ANT	Ave	2987 104739	8161 134476	17010 171240	44447	71422	4.00 120	10.0 160	20.0 200	50.0	80.0
Diethyl phthalate	ANT	Ave	14264 415465	34185 530706	69055 653510	177021	287616	4.00 120	10.0 160	20.0 200	50.0	80.0
Hexadecane	ANT	Ave	8573 248389	20672 315740	41743 382032	106758	172304	4.00 120	10.0 160	20.0 200	50.0	80.0
4-Chlorophenyl phenyl ether	ANT	Ave	6455 191661	15967 243631	32121 303639	82188	133108	4.00 120	10.0 160	20.0 200	50.0	80.0
Fluorene	ANT	Ave	14554 411169	34391 525408	68928 640507	175072	286569	4.00 120	10.0 160	20.0 200	50.0	80.0
4-Nitroaniline	ANT	Ave	3961 130142	9846 167973	20969 213028	54447	89855	4.00 120	10.0 160	20.0 200	50.0	80.0
4,6-Dinitro-2-methylphenol	PHN	Lin2	+++++ 151398	10059 194443	22138 249144	61974	100047	+++++ 240	20.0 320	40.0 400	100	160
Diphenylamine	ANT	Ave	10572 304443	25563 391952	50824 485393	130209	212597	3.40 102	8.50 136	17.0 170	42.5	68.0
n-Nitrosodiphenylamine(as diphenylamine)	PHN	Ave	10572 304443	25563 391952	50824 485393	130209	212597	4.00 120	10.0 160	20.0 200	50.0	80.0
1,2-Diphenylhydrazine(as Azobenzene)	ANT	Ave	13849 408238	34534 527050	69288 649965	176649	288623	4.04 121	10.1 162	20.2 202	50.5	80.9
Azobenzene	ANT	Ave	13849 408238	34534 527050	69288 649965	176649	288623	4.00 120	10.0 160	20.0 200	50.0	80.0
2,4,6 - Tribromophenol	ANT	Ave	1632 56625	4389 73260	9037 91707	24233	38917	4.00 120	10.0 160	20.0 200	50.0	80.0
4-Bromophenyl phenyl ether	PHN	Ave	3699 110004	9052 142506	18024 175117	46289	76256	4.00 120	10.0 160	20.0 200	50.0	80.0
Hexachlorobenzene	PHN	Ave	4030 117521	9625 150833	20390 186761	50555	80250	4.00 120	10.0 160	20.0 200	50.0	80.0
Atrazine	PHN	Ave	3440 96286	8225 122159	17182 147783	42862	67867	4.00 120	10.0 160	20.0 200	50.0	80.0
Pentachlorophenol	PHN	Lin2	+++++ 163911	11794 208083	25904 259064	69381	113901	+++++ 240	20.0 320	40.0 400	100	160
Phenanthrene	PHN	Ave	20844 601594	50724 770161	100421 955230	260298	420190	4.00 120	10.0 160	20.0 200	50.0	80.0
Anthracene	PHN	Ave	21531 630147	52333 805542	106793 992684	274198	442402	4.00 120	10.0 160	20.0 200	50.0	80.0
Carbazole	PHN	Ave	20874 596037	49380 768654	101536 952442	258808	419922	4.00 120	10.0 160	20.0 200	50.0	80.0
Alachlor	PHN	Ave	2771 78211	6259 99171	13032 124624	33155	53817	4.00 120	10.0 160	20.0 200	50.0	80.0
Di-n-butyl phthalate	PHN	Ave	25011 729086	58551 930295	120462 1150620	310377	505351	4.00 120	10.0 160	20.0 200	50.0	80.0

FORM VI
GC/MS SEMI VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 420416

SDG No.:

Instrument ID: SMS_G6 GC Column: Rxi-5Sil MS ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 06/28/2018 12:16 Calibration End Date: 06/28/2018 15:26 Calibration ID: 32870

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (UG/ML)				
			LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5
Fluoranthene	PHN	Ave	21810 638465	51631 822453	107322 1022876	276048	444331	4.00 120	10.0 160	20.0 200	50.0	80.0
Pyrene	CRY	Ave	22398 660961	53527 851762	110940 1059927	286242	460203	4.00 120	10.0 160	20.0 200	50.0	80.0
Famphur	CRY	Ave	7655 222407	18809 273839	40185 319161	102855	159958	4.00 120	10.0 160	20.0 200	50.0	80.0
Butyl benzyl phthalate	CRY	Ave	11052 339279	26290 438602	55285 548996	144930	234341	4.00 120	10.0 160	20.0 200	50.0	80.0
3,3'-Dichlorobenzidine	CRY	Ave	6613 219632	16446 277798	35431 337416	92493	152394	4.00 120	10.0 160	20.0 200	50.0	80.0
Benzo[a]anthracene	CRY	Ave	21163 621908	48200 805248	101991 1013026	263350	422811	4.00 120	10.0 160	20.0 200	50.0	80.0
Chrysene	CRY	Ave	19829 593628	47043 768388	96708 966516	251063	403695	4.00 120	10.0 160	20.0 200	50.0	80.0
Bis(2-ethylhexyl) phthalate	CRY	Ave	15057 450575	34491 580228	72553 726619	189498	309863	4.00 120	10.0 160	20.0 200	50.0	80.0
Di-n-octyl phthalate	CRY	Ave	25138 805570	60733 1042309	126189 1319433	338311	556756	4.00 120	10.0 160	20.0 200	50.0	80.0
Benzo[b]fluoranthene	PRY	Ave	18379 574938	43524 752699	92713 956142	237066	387789	4.00 120	10.0 160	20.0 200	50.0	80.0
Benzo[k]fluoranthene	PRY	Ave	19315 584428	46532 767736	95679 953337	252569	405510	4.00 120	10.0 160	20.0 200	50.0	80.0
Benzo[e]pyrene	PRY	Ave	16865 528104	41094 691528	86604 868391	225162	361867	4.00 120	10.0 160	20.0 200	50.0	80.0
Benzo[a]pyrene	PRY	Ave	18462 571670	42841 751808	94254 935573	243194	393031	4.00 120	10.0 160	20.0 200	50.0	80.0
Indeno[1,2,3-cd]pyrene	CRY	Ave	15729 508822	38512 678576	80132 852609	210774	345726	4.00 120	10.0 160	20.0 200	50.0	80.0
Dibenz(a,h)anthracene	PRY	Ave	15514 513720	36456 678712	79459 834367	214143	345630	4.00 120	10.0 160	20.0 200	50.0	80.0
Benzo[g,h,i]perylene	PRY	Ave	16970 545986	41432 713337	88380 894367	231100	366544	4.00 120	10.0 160	20.0 200	50.0	80.0
2-Fluorophenol	DCBd 4	Ave	5983 200872	14790 256802	30019 323033	83123	137451	4.00 120	10.0 160	20.0 200	50.0	80.0
Phenol-d5	DCBd 4	Ave	7728 249888	18822 322270	38050 403456	103090	169177	4.00 120	10.0 160	20.0 200	50.0	80.0
Nitrobenzene-d5	NPT	Ave	7022 211259	17853 272550	35433 331780	88373	144819	4.00 120	10.0 160	20.0 200	50.0	80.0
2-Fluorobiphenyl	ANT	Ave	13113 407089	33409 522100	65979 643549	172274	281986	4.00 120	10.0 160	20.0 200	50.0	80.0
2,4,6-Tribromophenol	ANT	Ave	1632 56625	4389 73260	9037 91707	24085	38917	4.00 120	10.0 160	20.0 200	50.0	80.0

FORM VI
GC/MS SEMI VOA BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 420416

SDG No.:

Instrument ID: SMS_G6 GC Column: Rxi-5Sil MS ID: 0.25(mm) Heated Purge: (Y/N) N

Calibration Start Date: 06/28/2018 12:16 Calibration End Date: 06/28/2018 15:26 Calibration ID: 32870

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (UG/ML)				
			LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3 LVL 8	LVL 4	LVL 5
Terphenyl-d14	CRY	Ave	14836 440210	35739 574780	73938 713659	190224	304640	4.00 120	10.0 160	20.0 200	50.0	80.0

Curve Type Legend:

Ave = Average ISTD
Lin2 = Linear 1/conc^2 ISTD

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34332.D
Lims ID: ICIS HSL
Client ID:
Sample Type: ICIS Calib Level: 5
Inject. Date: 28-Jun-2018 12:16:30 ALS Bottle#: 2 Worklist Smp#: 3
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: ICIS HSL
Operator ID: KIEKELD Instrument ID: SMS_G6
Sublist: chrom-SMSG6_8270C*sub25

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 29-Jun-2018 08:22:49 Calib Date: 28-Jun-2018 19:58:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34349.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0303

First Level Reviewer: kiekeld Date: 28-Jun-2018 13:15:46

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
* 1 1,4-Dichlorobenzene-d4	152	4.575	4.575	0.000	96	45675	40.0	40.0	
* 2 Naphthalene-d8	136	5.786	5.786	0.000	99	178657	40.0	40.0	
* 3 Acenaphthene-d10	164	7.522	7.522	0.000	94	94346	40.0	40.0	
* 4 Phenanthrene-d10	188	9.010	9.010	0.000	97	165295	40.0	40.0	
* 5 Chrysene-d12	240	12.957	12.957	0.000	99	154950	40.0	40.0	
* 6 Perylene-d12	264	16.792	16.792	0.000	98	156638	40.0	40.0	
$ 7 2-Fluorophenol	112	3.428	3.428	0.000	90	137451	80.0	82.9	
$ 8 Phenol-d5	99	4.204	4.204	0.000	96	169177	80.0	81.3	
$ 9 Nitrobenzene-d5	82	5.081	5.081	0.000	88	144819	80.0	79.8	
$ 11 2-Fluorobiphenyl	172	6.839	6.839	0.000	99	281986	80.0	81.5	
$ 12 2,4,6-Tribromophenol	330	8.310	8.310	0.000	93	38917	80.0	82.4	
$ 13 Terphenyl-d14	244	10.910	10.910	0.000	98	304640	80.0	82.1	
20 1,4-Dioxane	88	2.175	2.175	0.000	95	56111	80.0	82.3	
21 N-Nitrosodimethylamine	74	2.369	2.369	0.000	93	85367	80.0	81.6	
22 Pyridine	79	2.422	2.422	0.000	95	292771	160.0	163.0	
34 Phenol	94	4.222	4.222	0.000	97	177464	80.0	82.3	
35 Aniline	93	4.269	4.269	0.000	99	217209	80.0	81.7	
36 Alpha Methyl Styrene	118	4.322	4.322	0.000	92	140574	80.0	80.7	
37 Bis(2-chloroethyl)ether	93	4.310	4.310	0.000	99	136110	80.0	81.5	
39 n-Decane	43	4.422	4.422	0.000	91	131639	80.0	81.8	
41 2-Chlorophenol	128	4.387	4.387	0.000	96	145294	80.0	82.3	
42 1,3-Dichlorobenzene	146	4.534	4.534	0.000	99	158818	80.0	81.1	
43 1,4-Dichlorobenzene	146	4.592	4.592	0.000	96	160071	80.0	81.4	
44 Benzyl alcohol	108	4.681	4.681	0.000	95	96764	80.0	81.9	
45 1,2-Dichlorobenzene	146	4.739	4.739	0.000	98	153653	80.0	82.1	
46 2-Methylphenol	108	4.775	4.775	0.000	94	133331	80.0	81.7	
47 2,2'-oxybis[1-chloropropan	45	4.810	4.810	0.000	95	187207	80.0	81.7	
48 Indene	116	4.822	4.822	0.000	91	464101	160.0	164.7	
49 3 & 4 Methylphenol	108	4.922	4.922	0.000	87	138476	80.0	81.7	
50 3-Methylphenol	108	4.922	4.922	0.000	93	138476	80.0	81.7	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
51 N-Nitrosodi-n-propylamine	70	4.934	4.934	0.000	90	95754	80.0	81.6	
52 4-Methylphenol	108	4.922	4.922	0.000	95	138476	80.0	81.7	
55 Acetophenone	105	4.934	4.934	0.000	95	187010	80.0	80.7	
58 Hexachloroethane	117	5.063	5.063	0.000	96	62464	80.0	81.9	
60 Nitrobenzene	77	5.098	5.098	0.000	89	142561	80.0	82.6	
63 Isophorone	82	5.328	5.328	0.000	99	261007	80.0	81.5	
65 2-Nitrophenol	139	5.410	5.410	0.000	90	79271	80.0	83.0	
66 2,4-Dimethylphenol	107	5.434	5.434	0.000	93	137206	80.0	81.3	
69 Bis(2-chloroethoxy)methane	93	5.522	5.522	0.000	99	164080	80.0	81.3	
70 Benzoic acid	105	5.534	5.534	0.000	94	207358	160.0	156.5	
71 3,5-Dimethylphenol	107	5.557	5.557	0.000	91	139123	80.0	83.2	
75 2,4-Dichlorophenol	162	5.639	5.639	0.000	92	121299	80.0	82.6	
77 1,2,4-Trichlorobenzene	180	5.728	5.728	0.000	94	124151	80.0	81.2	
79 Naphthalene	128	5.804	5.804	0.000	97	399650	80.0	81.3	
80 4-Chloroaniline	127	5.839	5.839	0.000	97	179666	80.0	82.1	
81 2,6-Dichlorophenol	162	5.857	5.857	0.000	98	118681	80.0	81.1	
83 Hexachlorobutadiene	225	5.933	5.933	0.000	97	65910	80.0	81.6	
87 Caprolactam	55	6.163	6.163	0.000	81	62309	80.0	80.3	M
90 4-Chloro-3-methylphenol	107	6.310	6.310	0.000	96	119730	80.0	82.9	
94 2-Methylnaphthalene	142	6.486	6.486	0.000	94	278024	80.0	81.8	
96 1-Methylnaphthalene	142	6.586	6.586	0.000	94	263690	80.0	81.8	
97 Hexachlorocyclopentadiene	237	6.651	6.651	0.000	97	80287	80.0	84.7	
98 1,2,4,5-Tetrachlorobenzene	216	6.657	6.657	0.000	97	115108	80.0	81.0	
101 2,4,6-Trichlorophenol	196	6.757	6.757	0.000	79	82770	80.0	82.5	
102 2,3-Dichlorobenzenamine	161	6.757	6.757	0.000	92	143288	80.0	81.7	
103 2,4,5-Trichlorophenol	196	6.792	6.792	0.000	96	89522	80.0	82.7	
105 1,1'-Biphenyl	154	6.945	6.945	0.000	94	322133	80.0	81.2	
107 2-Chloronaphthalene	162	6.969	6.969	0.000	95	256276	80.0	81.2	
109 2-Nitroaniline	65	7.051	7.051	0.000	89	77058	80.0	83.3	
112 Dimethyl phthalate	163	7.233	7.233	0.000	100	285835	80.0	80.1	
113 1,3-Dinitrobenzene	168	7.257	7.257	0.000	90	51923	80.0	85.7	
114 2,6-Dinitrotoluene	165	7.286	7.286	0.000	97	69323	80.0	82.8	
115 Acenaphthylene	152	7.380	7.380	0.000	98	391584	80.0	81.5	
116 3-Nitroaniline	138	7.457	7.457	0.000	97	86510	80.0	83.3	
117 Acenaphthene	153	7.557	7.557	0.000	91	251272	80.0	81.1	
118 2,4-Dinitrophenol	184	7.563	7.563	0.000	83	90856	160.0	160.7	
120 4-Nitrophenol	109	7.622	7.622	0.000	87	86097	160.0	169.2	
122 2,4-Dinitrotoluene	165	7.692	7.692	0.000	95	93977	80.0	83.7	
123 Dibenzofuran	168	7.727	7.727	0.000	97	358196	80.0	80.1	
127 2,3,4,6-Tetrachlorophenol	232	7.845	7.845	0.000	80	71422	80.0	81.7	
128 Hexadecane	57	7.957	7.957	0.000	93	172304	80.0	80.5	
130 Diethyl phthalate	149	7.933	7.933	0.000	98	287616	80.0	80.5	
135 4-Chlorophenyl phenyl ethe	204	8.057	8.057	0.000	93	133108	80.0	80.6	
136 Fluorene	166	8.069	8.069	0.000	95	286569	80.0	80.5	
139 4-Nitroaniline	138	8.075	8.075	0.000	91	89855	80.0	82.4	
140 4,6-Dinitro-2-methylphenol	198	8.110	8.110	0.000	87	100047	160.0	160.6	
142 Diphenylamine	169	8.175	8.175	0.000	96	212597	68.0	68.4	
143 N-Nitrosodiphenylamine	169	8.175	8.175	0.000	61	212597	80.0	82.0	
144 Azobenzene	77	8.216	8.216	0.000	99	288623	80.0	81.2	
145 1,2-Diphenylhydrazine	77	8.216	8.216	0.000	100	288623	80.9	82.1	
148 2,4,6 - Tribromophenol	330	8.310	8.310	0.000	0	38917	80.0	82.3	a
157 4-Bromophenyl phenyl ether	248	8.551	8.551	0.000	65	76256	80.0	82.3	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
158 Hexachlorobenzene	284	8.633	8.633	0.000	94	80250	80.0	80.4	
160 Atrazine	200	8.698	8.698	0.000	92	67867	80.0	81.6	
162 n-Octadecane	85	8.880	8.880	0.000	97	79253	80.0	81.8	
164 Pentachlorophenol	266	8.822	8.822	0.000	98	113901	160.0	167.1	
169 Phenanthrene	178	9.033	9.033	0.000	98	420190	80.0	82.0	
170 Anthracene	178	9.086	9.086	0.000	97	442402	80.0	82.5	
171 Carbazole	167	9.233	9.233	0.000	95	419922	80.0	82.3	
172 Alachlor	188	9.374	9.374	0.000	98	53817	80.0	81.5	
175 Di-n-butyl phthalate	149	9.580	9.580	0.000	100	505351	80.0	82.4	
182 Fluoranthene	202	10.369	10.369	0.000	98	444331	80.0	82.1	
185 Pyrene	202	10.692	10.692	0.000	97	460203	80.0	82.7	
192 Famphur	218	11.651	11.651	0.000	85	159958	80.0	84.5	
193 Butyl benzyl phthalate	149	11.774	11.774	0.000	96	234341	80.0	83.3	
197 3,3'-Dichlorobenzidine	252	12.886	12.886	0.000	74	152394	80.0	85.8	
198 Benzo[a]anthracene	228	12.933	12.933	0.000	99	422811	80.0	81.6	
199 Bis(2-ethylhexyl) phthalat	149	13.110	13.110	0.000	96	309863	80.0	83.2	
200 Chrysene	228	13.015	13.015	0.000	97	403695	80.0	81.7	
202 Di-n-octyl phthalate	149	14.868	14.868	0.000	99	556756	80.0	84.5	
204 Benzo[b]fluoranthene	252	15.721	15.721	0.000	98	387789	80.0	81.0	
205 Benzo[k]fluoranthene	252	15.803	15.803	0.000	99	405510	80.0	81.7	
207 Benzo[e]pyrene	252	16.486	16.486	0.000	97	361867	80.0	81.4	
208 Benzo[a]pyrene	252	16.627	16.627	0.000	78	393031	80.0	81.9	
214 Indeno[1,2,3-cd]pyrene	276	19.862	19.862	0.000	98	345726	80.0	82.8	
215 Dibenz(a,h)anthracene	278	19.956	19.956	0.000	94	345630	80.0	82.4	
216 Benzo[g,h,i]perylene	276	20.585	20.585	0.000	97	366544	80.0	80.8	

QC Flag Legend

Review Flags

M - Manually Integrated

a - User Assigned ID

Reagents:

MS-HSLA080_00036 Amount Added: 200.00 Units: uL

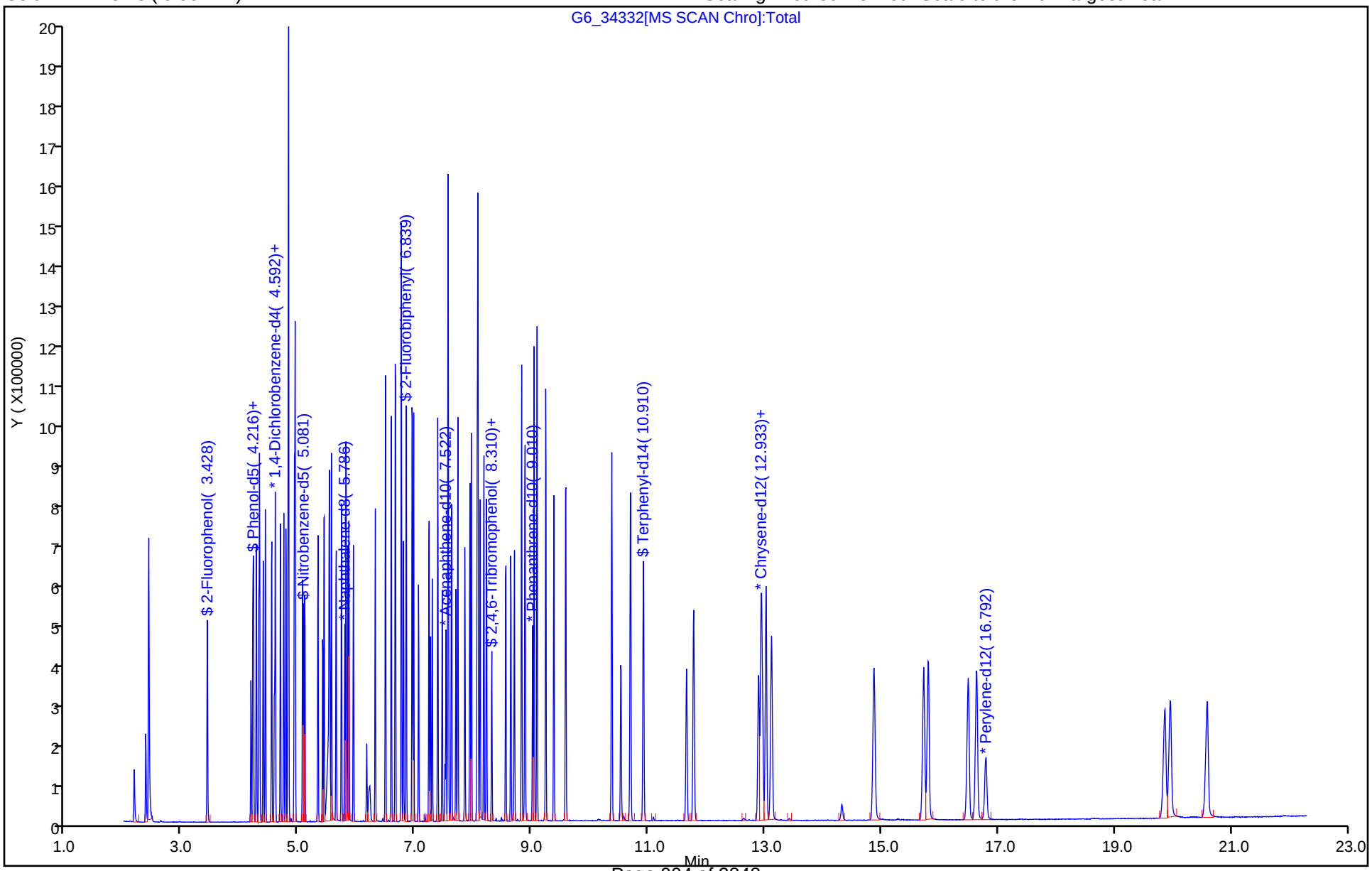
Report Date: 29-Jun-2018 08:22:51 Chrom Revision: 2.2 07-Jun-2018 07:41:54

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34332.D

Injection Date:	28-Jun-2018 12:16:30	Instrument ID:	SMS_G6	Operator ID:	KIEKELD
Lims ID:	ICIS HSL			Worklist Smp#:	3
Client ID:					
Injection Vol:	0.5 ul	Dil. Factor:	1.0000	ALS Bottle#:	2
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		

Column: VF-5ms (0.50 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1



Manual Integration/User Assign Peak Report

TestAmerica Denver

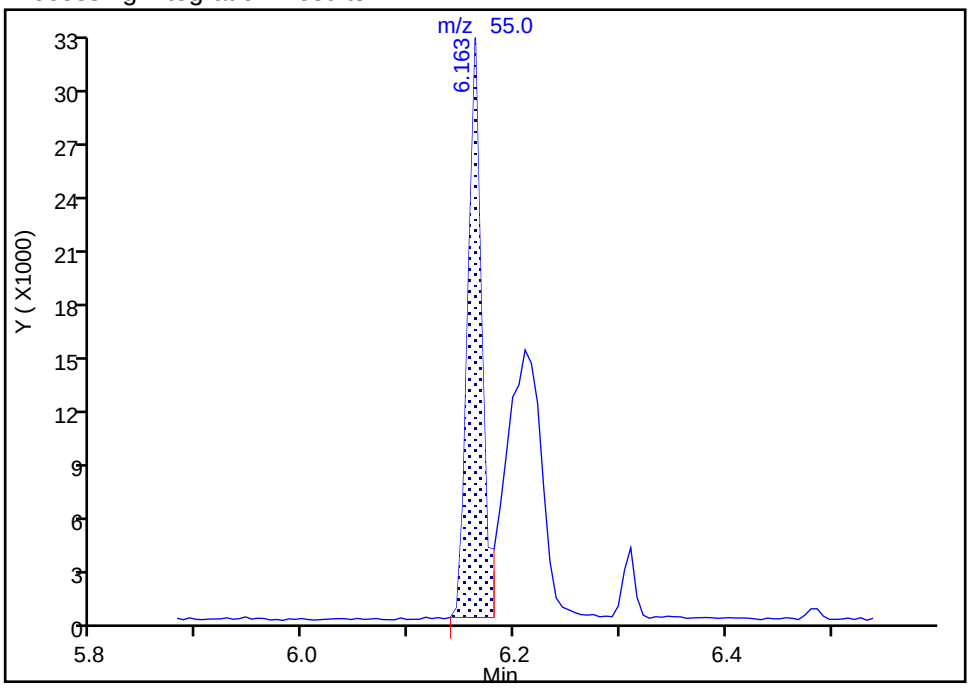
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34332.D
Injection Date: 28-Jun-2018 12:16:30 Instrument ID: SMS_G6
Lims ID: ICIS HSL
Client ID:
Operator ID: KIEKELD ALS Bottle#: 2 Worklist Smp#: 3
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625
Column: VF-5ms (0.50 mm) Detector MS SCAN

87 Caprolactam, CAS: 105-60-2

Signal: 1

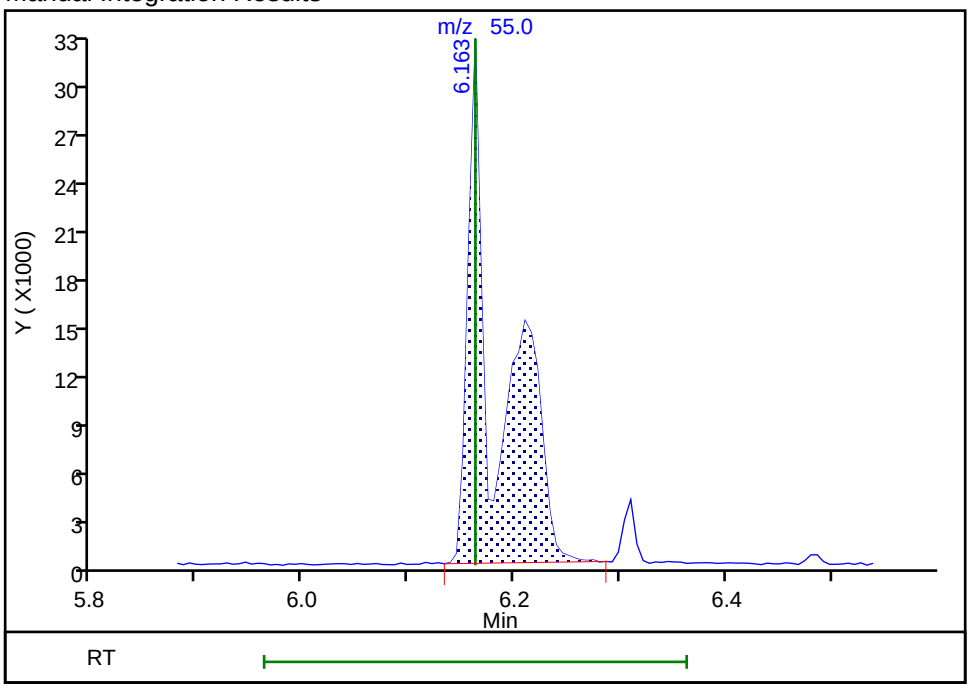
Processing Integration Results

RT: 6.16
Area: 29299
Amount: 80.000000
Amount Units: ug/ml



Manual Integration Results

RT: 6.16
Area: 62309
Amount: 80.294384
Amount Units: ug/ml



Reviewer: kiekeld, 28-Jun-2018 13:18:05
Audit Action: Manually Integrated Audit Reason: Split Peak

Manual Integration/User Assign Peak Report

TestAmerica Denver

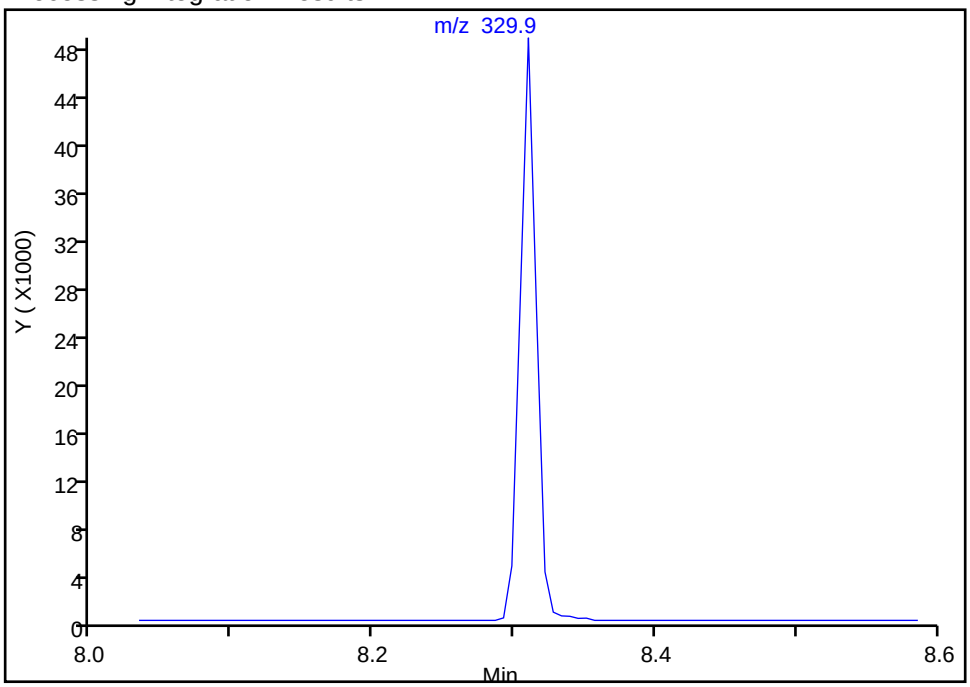
Data File:	\\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34332.D				
Injection Date:	28-Jun-2018 12:16:30	Instrument ID:	SMS_G6		
Lims ID:	ICIS HSL				
Client ID:					
Operator ID:	KIEKELD	ALS Bottle#:	2	Worklist Smp#:	3
Injection Vol:	0.5 ul	Dil. Factor:	1.0000		
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		
Column:	VF-5ms (0.50 mm)	Detector	MS SCAN		

148 2,4,6 - Tribromophenol, CAS: 118-79-6

Signal: 1

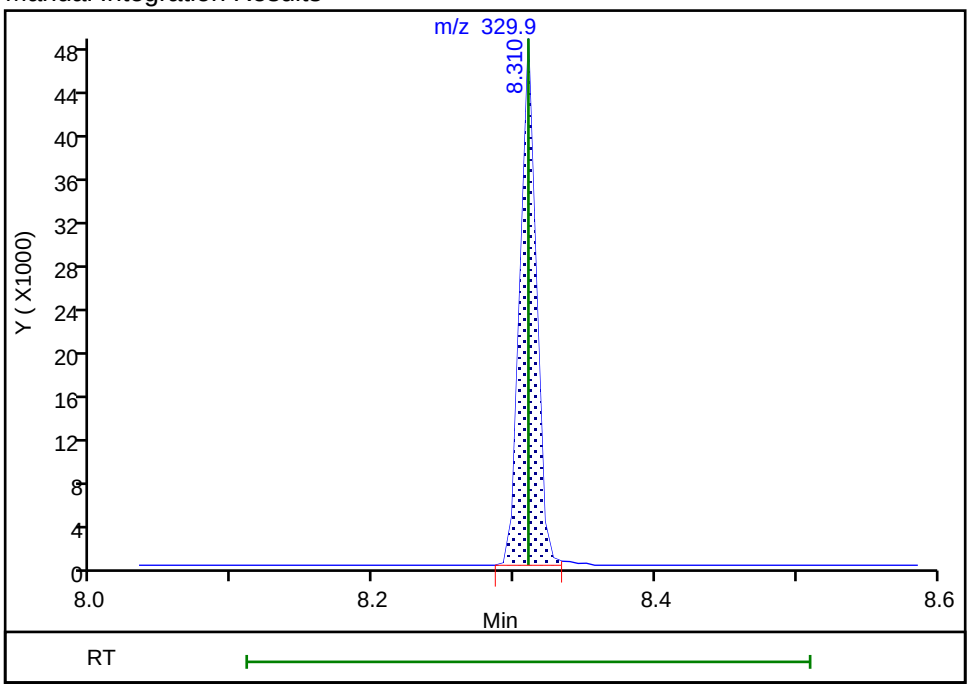
Not Detected
Expected RT: 8.31

Processing Integration Results



Manual Integration Results

RT: 8.31
Area: 38917
Amount: 82.336882
Amount Units: ug/ml



Reviewer: kiekeld, 28-Jun-2018 13:17:34
Audit Action: Assigned Compound ID Audit Reason: Peak assignment corrected

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34333.D
Lims ID: STD004 HSL
Client ID:
Sample Type: IC Calib Level: 1
Inject. Date: 28-Jun-2018 12:43:30 ALS Bottle#: 3 Worklist Smp#: 4
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: STD004 HSL
Operator ID: KIEKELD Instrument ID: SMS_G6
Sublist: chrom-SMSG6_8270C*sub25

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 29-Jun-2018 08:22:56 Calib Date: 28-Jun-2018 19:58:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34349.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0303

First Level Reviewer: kiekeld Date: 28-Jun-2018 14:42:26

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
* 1 1,4-Dichlorobenzene-d4	152	4.575	4.575	0.000	96	40164	40.0	40.0	
* 2 Naphthalene-d8	136	5.781	5.786	-0.005	99	161537	40.0	40.0	
* 3 Acenaphthene-d10	164	7.522	7.522	0.000	94	86359	40.0	40.0	
* 4 Phenanthrene-d10	188	9.004	9.010	-0.006	98	159027	40.0	40.0	
* 5 Chrysene-d12	240	12.939	12.957	-0.018	99	153158	40.0	40.0	
* 6 Perylene-d12	264	16.774	16.792	-0.018	98	151848	40.0	40.0	
$ 7 2-Fluorophenol	112	3.428	3.428	0.000	90	5983	4.00	4.11	
$ 8 Phenol-d5	99	4.204	4.204	0.000	96	7728	4.00	4.22	
$ 9 Nitrobenzene-d5	82	5.075	5.081	-0.006	87	7022	4.00	4.28	
$ 11 2-Fluorobiphenyl	172	6.839	6.839	0.000	99	13113	4.00	4.14	
$ 12 2,4,6-Tribromophenol	330	8.304	8.310	-0.006	90	1632	4.00	3.78	
$ 13 Terphenyl-d14	244	10.904	10.910	-0.006	97	14836	4.00	4.04	
20 1,4-Dioxane	88	2.169	2.175	-0.006	95	2558	4.00	4.27	
21 N-Nitrosodimethylamine	74	2.369	2.369	0.000	94	3726	4.00	4.05	
22 Pyridine	79	2.416	2.422	-0.006	96	13560	8.00	8.58	
34 Phenol	94	4.216	4.222	-0.006	98	8022	4.00	4.23	
35 Aniline	93	4.263	4.269	-0.006	98	9616	4.00	4.11	
36 Alpha Methyl Styrene	118	4.322	4.322	0.000	92	6611	4.00	4.31	
37 Bis(2-chloroethyl)ether	93	4.304	4.310	-0.006	97	6153	4.00	4.19	
39 n-Decane	43	4.422	4.422	0.000	90	6148	4.00	4.35	
41 2-Chlorophenol	128	4.381	4.387	-0.006	95	6552	4.00	4.22	
42 1,3-Dichlorobenzene	146	4.528	4.534	-0.006	98	7154	4.00	4.16	
43 1,4-Dichlorobenzene	146	4.592	4.592	0.000	94	7215	4.00	4.17	
44 Benzyl alcohol	108	4.675	4.681	-0.006	93	4068	4.00	3.92	
45 1,2-Dichlorobenzene	146	4.740	4.739	0.001	96	6804	4.00	4.13	
46 2-Methylphenol	108	4.775	4.775	0.000	94	6125	4.00	4.27	
47 2,2'-oxybis[1-chloropropan	45	4.810	4.810	0.000	95	8918	4.00	4.43	
48 Indene	116	4.816	4.822	-0.006	91	21611	8.00	8.72	
49 3 & 4 Methylphenol	108	4.916	4.922	-0.006	83	6173	4.00	4.14	
50 3-Methylphenol	108	4.916	4.922	-0.006	90	6173	4.00	4.14	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
51 N-Nitrosodi-n-propylamine	70	4.922	4.934	-0.012	90	4572	4.00	4.43	
52 4-Methylphenol	108	4.916	4.922	-0.006	92	6173	4.00	4.14	
55 Acetophenone	105	4.934	4.934	0.000	96	9129	4.00	4.48	
58 Hexachloroethane	117	5.057	5.063	-0.006	94	2852	4.00	4.25	
60 Nitrobenzene	77	5.098	5.098	0.000	87	6763	4.00	4.33	
63 Isophorone	82	5.322	5.328	-0.006	99	12413	4.00	4.29	
65 2-Nitrophenol	139	5.404	5.410	-0.006	91	3487	4.00	4.04	
66 2,4-Dimethylphenol	107	5.428	5.434	-0.006	94	6413	4.00	4.20	
69 Bis(2-chloroethoxy)methane	93	5.516	5.522	-0.006	99	7859	4.00	4.30	
70 Benzoic acid	105	5.451	5.534	-0.083	87	6320	8.00	11.9	
71 3,5-Dimethylphenol	107	5.551	5.557	-0.006	86	6240	4.00	4.13	
75 2,4-Dichlorophenol	162	5.634	5.639	-0.005	92	5253	4.00	3.96	
77 1,2,4-Trichlorobenzene	180	5.728	5.728	0.000	94	5597	4.00	4.05	
79 Naphthalene	128	5.804	5.804	0.000	97	18517	4.00	4.17	
80 4-Chloroaniline	127	5.839	5.839	0.000	96	7959	4.00	4.02	
81 2,6-Dichlorophenol	162	5.851	5.857	-0.006	97	5494	4.00	4.15	
83 Hexachlorobutadiene	225	5.934	5.933	0.001	96	3033	4.00	4.15	
87 Caprolactam	55	6.139	6.163	-0.024	80	2795	4.00	3.98	
90 4-Chloro-3-methylphenol	107	6.298	6.310	-0.012	95	5273	4.00	4.04	
94 2-Methylnaphthalene	142	6.481	6.486	-0.005	92	12910	4.00	4.20	
96 1-Methylnaphthalene	142	6.581	6.586	-0.005	95	12451	4.00	4.27	
97 Hexachlorocyclopentadiene	237	6.651	6.651	0.000	94	3383	4.00	3.90	
98 1,2,4,5-Tetrachlorobenzene	216	6.651	6.657	-0.006	97	5543	4.00	4.31	
101 2,4,6-Trichlorophenol	196	6.751	6.757	-0.006	76	3795	4.00	4.13	
102 2,3-Dichlorobenzenamine	161	6.751	6.757	-0.006	92	6823	4.00	4.25	
103 2,4,5-Trichlorophenol	196	6.786	6.792	-0.006	95	3972	4.00	4.01	
105 1,1'-Biphenyl	154	6.939	6.945	-0.006	94	15726	4.00	4.33	
107 2-Chloronaphthalene	162	6.963	6.969	-0.006	95	12284	4.00	4.25	
109 2-Nitroaniline	65	7.045	7.051	-0.006	87	3420	4.00	4.04	
112 Dimethyl phthalate	163	7.222	7.233	-0.011	99	14071	4.00	4.31	
113 1,3-Dinitrobenzene	168	7.251	7.257	-0.006	86	1874	4.00	3.38	
114 2,6-Dinitrotoluene	165	7.281	7.286	-0.005	96	2966	4.00	3.87	
115 Acenaphthylene	152	7.375	7.380	-0.005	98	18473	4.00	4.20	
116 3-Nitroaniline	138	7.451	7.457	-0.006	96	3706	4.00	3.90	
117 Acenaphthene	153	7.551	7.557	-0.006	93	12263	4.00	4.32	
118 2,4-Dinitrophenol	184	7.557	7.563	-0.006	83	2615	8.00	10.7	
120 4-Nitrophenol	109	7.604	7.622	-0.018	91	3723	8.00	7.99	
122 2,4-Dinitrotoluene	165	7.686	7.692	-0.006	93	4050	4.00	3.94	
123 Dibenzofuran	168	7.722	7.727	-0.005	97	17415	4.00	4.25	
127 2,3,4,6-Tetrachlorophenol	232	7.839	7.845	-0.006	75	2987	4.00	3.73	
128 Hexadecane	57	7.951	7.957	-0.006	93	8573	4.00	4.38	
130 Diethyl phthalate	149	7.928	7.933	-0.005	99	14264	4.00	4.36	
135 4-Chlorophenyl phenyl ethe	204	8.057	8.057	0.000	92	6455	4.00	4.27	
136 Fluorene	166	8.063	8.069	-0.006	95	14554	4.00	4.46	
139 4-Nitroaniline	138	8.057	8.075	-0.018	86	3961	4.00	3.97	
140 4,6-Dinitro-2-methylphenol	198	8.098	8.110	-0.012	81	3322	8.00	9.40	
142 Diphenylamine	169	8.163	8.175	-0.012	96	10572	3.40	3.72	
143 N-Nitrosodiphenylamine	169	8.163	8.175	-0.012	60	10572	4.00	4.24	
144 Azobenzene	77	8.210	8.216	-0.006	98	13849	4.00	4.26	
145 1,2-Diphenylhydrazine	77	8.210	8.216	-0.006	99	13849	4.04	4.31	
148 2,4,6 - Tribromophenol	330	8.304	8.310	-0.006	0	1632	4.00	3.77	a
157 4-Bromophenyl phenyl ether	248	8.545	8.551	-0.006	67	3699	4.00	4.15	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
158 Hexachlorobenzene	284	8.628	8.633	-0.005	93	4030	4.00	4.20	
160 Atrazine	200	8.686	8.698	-0.012	91	3440	4.00	4.30	
162 n-Octadecane	85	8.875	8.880	-0.005	97	3989	4.00	4.28	
164 Pentachlorophenol	266	8.816	8.822	-0.006	94	4298	8.00	8.73	
169 Phenanthrene	178	9.027	9.033	-0.006	96	20844	4.00	4.23	
170 Anthracene	178	9.080	9.086	-0.006	97	21531	4.00	4.17	
171 Carbazole	167	9.227	9.233	-0.006	95	20874	4.00	4.25	
172 Alachlor	188	9.369	9.374	-0.005	97	2771	4.00	4.36	
175 Di-n-butyl phthalate	149	9.569	9.580	-0.011	100	25011	4.00	4.24	
182 Fluoranthene	202	10.357	10.369	-0.011	98	21810	4.00	4.19	
185 Pyrene	202	10.680	10.692	-0.012	97	22398	4.00	4.07	
192 Famphur	218	11.639	11.651	-0.012	85	7655	4.00	4.09	
193 Butyl benzyl phthalate	149	11.763	11.774	-0.011	96	11052	4.00	3.97	
197 3,3'-Dichlorobenzidine	252	12.868	12.886	-0.018	73	6613	4.00	3.77	
198 Benzo[a]anthracene	228	12.915	12.933	-0.018	98	21163	4.00	4.13	
199 Bis(2-ethylhexyl) phthalat	149	13.098	13.110	-0.012	95	15057	4.00	4.09	
200 Chrysene	228	12.998	13.015	-0.017	97	19829	4.00	4.06	
202 Di-n-octyl phthalate	149	14.857	14.868	-0.011	98	25138	4.00	3.86	
204 Benzo[b]fluoranthene	252	15.698	15.721	-0.023	97	18379	4.00	3.96	
205 Benzo[k]fluoranthene	252	15.774	15.803	-0.029	99	19315	4.00	4.01	
207 Benzo[e]pyrene	252	16.462	16.486	-0.024	97	16865	4.00	3.91	
208 Benzo[a]pyrene	252	16.598	16.627	-0.029	78	18462	4.00	3.97	
214 Indeno[1,2,3-cd]pyrene	276	19.821	19.862	-0.041	97	15729	4.00	3.81	
215 Dibenz(a,h)anthracene	278	19.927	19.956	-0.029	94	15514	4.00	3.82	
216 Benzo[g,h,i]perylene	276	20.544	20.585	-0.041	97	16970	4.00	3.86	
S 218 Total Cresols	108				0			8.41	
S 219 Methyl Phenols,Total	108				0			8.41	

QC Flag Legend

Review Flags

a - User Assigned ID

Reagents:

MS-HSLA004_00036 Amount Added: 200.00 Units: uL

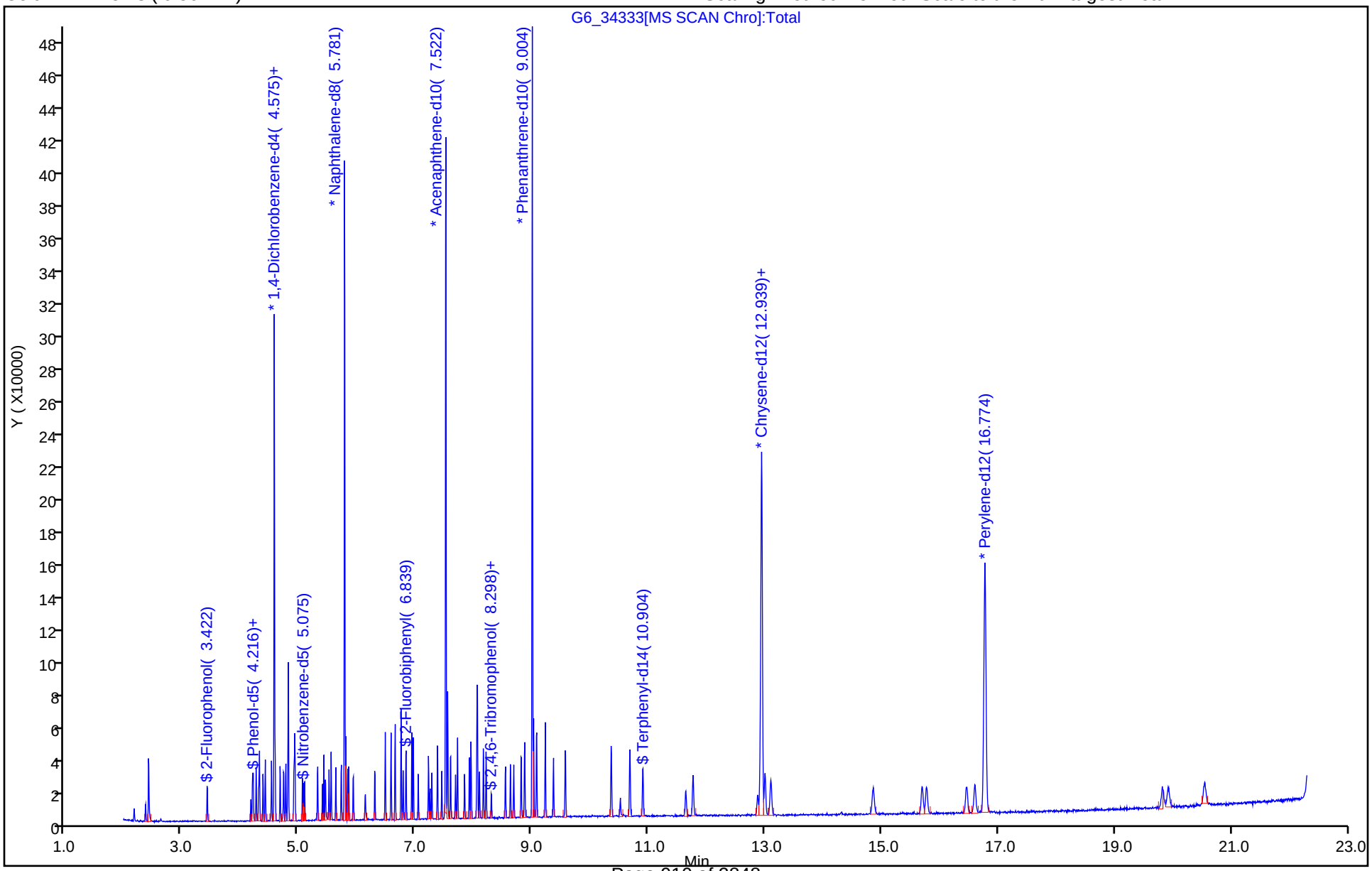
Report Date: 29-Jun-2018 08:22:57 Chrom Revision: 2.2 07-Jun-2018 07:41:54

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34333.D

Injection Date:	28-Jun-2018 12:43:30	Instrument ID:	SMS_G6	Operator ID:	KIEKELD
Lims ID:	STD004 HSL			Worklist Smp#:	4
Client ID:					
Injection Vol:	0.5 ul	Dil. Factor:	1.0000	ALS Bottle#:	3
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		

Column: VF-5ms (0.50 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1



Manual Integration/User Assign Peak Report

TestAmerica Denver

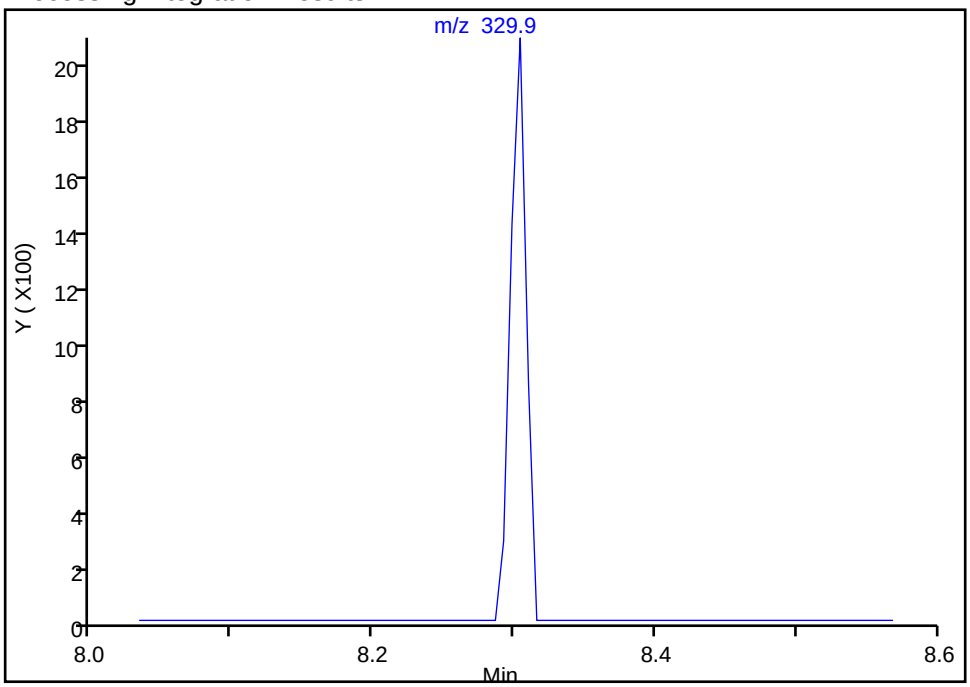
Data File:	\\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34333.D				
Injection Date:	28-Jun-2018 12:43:30	Instrument ID:	SMS_G6		
Lims ID:	STD004 HSL				
Client ID:					
Operator ID:	KIEKELD	ALS Bottle#:	3	Worklist Smp#:	4
Injection Vol:	0.5 ul	Dil. Factor:	1.0000		
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		
Column:	VF-5ms (0.50 mm)	Detector	MS SCAN		

148 2,4,6 - Tribromophenol, CAS: 118-79-6

Signal: 1

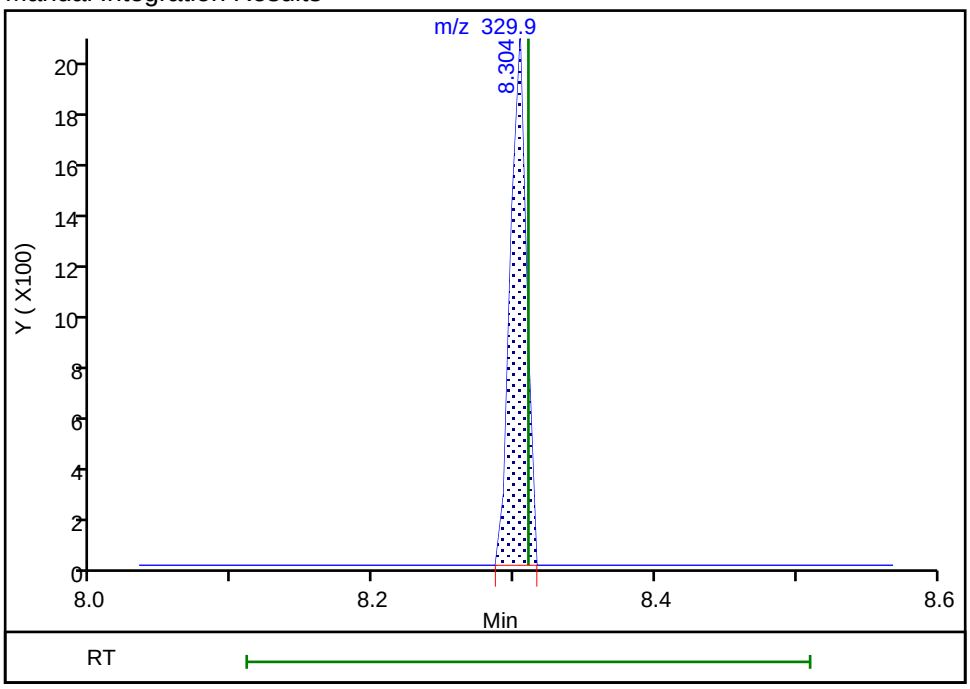
Not Detected
Expected RT: 8.31

Processing Integration Results



Manual Integration Results

RT: 8.30
Area: 1632
Amount: 3.772169
Amount Units: ug/ml



Reviewer: kiekeld, 28-Jun-2018 13:20:38
Audit Action: Assigned Compound ID Audit Reason: Assign Peak

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34334.D
Lims ID: STD010 HSL
Client ID:
Sample Type: IC Calib Level: 2
Inject. Date: 28-Jun-2018 13:10:30 ALS Bottle#: 4 Worklist Smp#: 5
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: STD010 HSL
Operator ID: KIEKELD Instrument ID: SMS_G6
Sublist: chrom-SMSG6_8270C*sub25

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 29-Jun-2018 08:22:59 Calib Date: 28-Jun-2018 19:58:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34349.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0303

First Level Reviewer: kiekeld Date: 28-Jun-2018 14:43:32

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
* 1 1,4-Dichlorobenzene-d4	152	4.575	4.575	0.000	95	42258	40.0	40.0	
* 2 Naphthalene-d8	136	5.781	5.786	-0.005	99	168803	40.0	40.0	
* 3 Acenaphthene-d10	164	7.522	7.522	0.000	93	89474	40.0	40.0	
* 4 Phenanthrene-d10	188	9.004	9.010	-0.006	98	159651	40.0	40.0	
* 5 Chrysene-d12	240	12.939	12.957	-0.018	99	149321	40.0	40.0	
* 6 Perylene-d12	264	16.774	16.792	-0.018	98	150961	40.0	40.0	
$ 7 2-Fluorophenol	112	3.428	3.428	0.000	91	14790	10.0	9.65	
$ 8 Phenol-d5	99	4.204	4.204	0.000	98	18822	10.0	9.77	
$ 9 Nitrobenzene-d5	82	5.081	5.081	0.000	88	17853	10.0	10.4	
$ 11 2-Fluorobiphenyl	172	6.839	6.839	0.000	99	33409	10.0	10.2	
$ 12 2,4,6-Tribromophenol	330	8.304	8.310	-0.006	93	4389	10.0	9.80	
$ 13 Terphenyl-d14	244	10.904	10.910	-0.006	98	35739	10.0	10.0	
20 1,4-Dioxane	88	2.169	2.175	-0.006	97	5966	10.0	9.46	
21 N-Nitrosodimethylamine	74	2.363	2.369	-0.006	93	9599	10.0	9.92	
22 Pyridine	79	2.416	2.422	-0.006	95	32698	20.0	19.7	
34 Phenol	94	4.216	4.222	-0.006	97	19706	10.0	9.87	
35 Aniline	93	4.263	4.269	-0.006	99	24441	10.0	9.94	
36 Alpha Methyl Styrene	118	4.322	4.322	0.000	92	15962	10.0	9.90	
37 Bis(2-chloroethyl)ether	93	4.304	4.310	-0.006	98	15312	10.0	9.91	
39 n-Decane	43	4.422	4.422	0.000	89	14971	10.0	10.1	
41 2-Chlorophenol	128	4.381	4.387	-0.006	96	15979	10.0	9.78	
42 1,3-Dichlorobenzene	146	4.528	4.534	-0.006	99	18317	10.0	10.1	
43 1,4-Dichlorobenzene	146	4.593	4.592	0.001	97	17940	10.0	9.87	
44 Benzyl alcohol	108	4.675	4.681	-0.006	95	11041	10.0	10.1	
45 1,2-Dichlorobenzene	146	4.740	4.739	0.001	97	17118	10.0	9.88	
46 2-Methylphenol	108	4.775	4.775	0.000	93	15123	10.0	10.0	
47 2,2'-oxybis[1-chloropropan	45	4.810	4.810	0.000	95	21743	10.0	10.3	
48 Indene	116	4.816	4.822	-0.006	90	52801	20.0	20.3	
49 3 & 4 Methylphenol	108	4.916	4.922	-0.006	87	15665	10.0	10.0	
50 3-Methylphenol	108	4.916	4.922	-0.006	92	15665	10.0	10.0	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
51 N-Nitrosodi-n-propylamine	70	4.922	4.934	-0.012	91	10930	10.0	10.1	
52 4-Methylphenol	108	4.916	4.922	-0.006	93	15665	10.0	10.0	
55 Acetophenone	105	4.934	4.934	0.000	97	21890	10.0	10.2	
58 Hexachloroethane	117	5.057	5.063	-0.006	95	6974	10.0	9.89	
60 Nitrobenzene	77	5.098	5.098	0.000	88	15692	10.0	9.62	
63 Isophorone	82	5.322	5.328	-0.006	99	29766	10.0	9.84	
65 2-Nitrophenol	139	5.404	5.410	-0.006	92	8471	10.0	9.39	
66 2,4-Dimethylphenol	107	5.428	5.434	-0.006	94	15915	10.0	9.98	
69 Bis(2-chloroethoxy)methane	93	5.516	5.522	-0.006	99	18864	10.0	9.89	
70 Benzoic acid	105	5.463	5.534	-0.071	88	18029	20.0	20.6	a
71 3,5-Dimethylphenol	107	5.551	5.557	-0.006	86	15536	10.0	9.84	
75 2,4-Dichlorophenol	162	5.634	5.639	-0.005	92	13542	10.0	9.76	
77 1,2,4-Trichlorobenzene	180	5.728	5.728	0.000	94	14386	10.0	9.96	
79 Naphthalene	128	5.804	5.804	0.000	96	46368	10.0	9.99	
80 4-Chloroaniline	127	5.840	5.839	0.001	97	20506	10.0	9.92	
81 2,6-Dichlorophenol	162	5.851	5.857	-0.006	98	13786	10.0	9.97	
83 Hexachlorobutadiene	225	5.934	5.933	0.001	98	7602	10.0	9.96	
87 Caprolactam	55	6.140	6.163	-0.023	80	6885	10.0	9.39	
90 4-Chloro-3-methylphenol	107	6.304	6.310	-0.006	95	13718	10.0	10.1	
94 2-Methylnaphthalene	142	6.481	6.486	-0.005	93	31915	10.0	9.94	
96 1-Methylnaphthalene	142	6.581	6.586	-0.005	94	29934	10.0	9.82	
97 Hexachlorocyclopentadiene	237	6.651	6.651	0.000	97	8904	10.0	9.90	
98 1,2,4,5-Tetrachlorobenzene	216	6.651	6.657	-0.006	97	13699	10.0	10.2	
101 2,4,6-Trichlorophenol	196	6.751	6.757	-0.006	76	9209	10.0	9.67	
102 2,3-Dichlorobenzenamine	161	6.751	6.757	-0.006	93	16514	10.0	9.93	
103 2,4,5-Trichlorophenol	196	6.787	6.792	-0.005	94	9673	10.0	9.42	
105 1,1'-Biphenyl	154	6.939	6.945	-0.006	94	37490	10.0	9.96	
107 2-Chloronaphthalene	162	6.963	6.969	-0.006	96	29848	10.0	9.97	
109 2-Nitroaniline	65	7.045	7.051	-0.006	88	8437	10.0	9.62	
112 Dimethyl phthalate	163	7.222	7.233	-0.011	99	34121	10.0	10.1	
113 1,3-Dinitrobenzene	168	7.251	7.257	-0.006	86	5295	10.0	9.22	
114 2,6-Dinitrotoluene	165	7.281	7.286	-0.005	96	7525	10.0	9.48	
115 Acenaphthylene	152	7.375	7.380	-0.005	98	45307	10.0	9.94	
116 3-Nitroaniline	138	7.451	7.457	-0.006	98	9484	10.0	9.62	
117 Acenaphthene	153	7.551	7.557	-0.006	90	29530	10.0	10.1	
118 2,4-Dinitrophenol	184	7.557	7.563	-0.006	83	8104	20.0	20.4	
120 4-Nitrophenol	109	7.604	7.622	-0.018	89	9440	20.0	19.6	
122 2,4-Dinitrotoluene	165	7.686	7.692	-0.006	94	10119	10.0	9.50	
123 Dibenzofuran	168	7.722	7.727	-0.005	97	42613	10.0	10.0	
127 2,3,4,6-Tetrachlorophenol	232	7.839	7.845	-0.006	73	8161	10.0	9.85	
128 Hexadecane	57	7.951	7.957	-0.006	93	20672	10.0	10.2	
130 Diethyl phthalate	149	7.928	7.933	-0.005	99	34185	10.0	10.1	
135 4-Chlorophenyl phenyl ethe	204	8.057	8.057	0.000	91	15967	10.0	10.2	
136 Fluorene	166	8.063	8.069	-0.006	96	34391	10.0	10.2	
139 4-Nitroaniline	138	8.057	8.075	-0.018	87	9846	10.0	9.52	
140 4,6-Dinitro-2-methylphenol	198	8.098	8.110	-0.012	86	10059	20.0	20.3	
142 Diphenylamine	169	8.163	8.175	-0.012	96	25563	8.50	8.67	
143 N-Nitrosodiphenylamine	169	8.163	8.175	-0.012	61	25563	10.0	10.2	
144 Azobenzene	77	8.210	8.216	-0.006	98	34534	10.0	10.2	
145 1,2-Diphenylhydrazine	77	8.210	8.216	-0.006	99	34534	10.1	10.4	
148 2,4,6 - Tribromophenol	330	8.304	8.310	-0.006	0	4389	10.0	9.79	a
157 4-Bromophenyl phenyl ether	248	8.545	8.551	-0.006	66	9052	10.0	10.1	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
158 Hexachlorobenzene	284	8.628	8.633	-0.005	94	9625	10.0	9.99	
160 Atrazine	200	8.686	8.698	-0.012	92	8225	10.0	10.2	
162 n-Octadecane	85	8.875	8.880	-0.005	97	9397	10.0	10.0	
164 Pentachlorophenol	266	8.816	8.822	-0.006	98	11794	20.0	19.9	
169 Phenanthrene	178	9.028	9.033	-0.005	96	50724	10.0	10.2	
170 Anthracene	178	9.081	9.086	-0.006	97	52333	10.0	10.1	
171 Carbazole	167	9.228	9.233	-0.005	95	49380	10.0	10.0	
172 Alachlor	188	9.369	9.374	-0.005	98	6259	10.0	9.81	
175 Di-n-butyl phthalate	149	9.569	9.580	-0.011	100	58551	10.0	9.88	
182 Fluoranthene	202	10.357	10.369	-0.011	98	51631	10.0	9.88	
185 Pyrene	202	10.680	10.692	-0.012	97	53527	10.0	9.98	
192 Famphur	218	11.639	11.651	-0.012	86	18809	10.0	10.3	
193 Butyl benzyl phthalate	149	11.763	11.774	-0.011	96	26290	10.0	9.70	
197 3,3'-Dichlorobenzidine	252	12.868	12.886	-0.018	74	16446	10.0	9.61	
198 Benzo[a]anthracene	228	12.916	12.933	-0.017	98	48200	10.0	9.66	
199 Bis(2-ethylhexyl) phthalat	149	13.098	13.110	-0.012	96	34491	10.0	9.61	
200 Chrysene	228	12.998	13.015	-0.017	97	47043	10.0	9.88	
202 Di-n-octyl phthalate	149	14.851	14.868	-0.017	99	60733	10.0	9.57	
204 Benzo[b]fluoranthene	252	15.698	15.721	-0.023	97	43524	10.0	9.43	
205 Benzo[k]fluoranthene	252	15.774	15.803	-0.029	98	46532	10.0	9.72	
207 Benzo[e]pyrene	252	16.456	16.486	-0.030	98	41094	10.0	9.60	
208 Benzo[a]pyrene	252	16.604	16.627	-0.023	78	42841	10.0	9.26	
214 Indeno[1,2,3-cd]pyrene	276	19.827	19.862	-0.035	98	38512	10.0	9.58	
215 Dibenz(a,h)anthracene	278	19.921	19.956	-0.035	94	36456	10.0	9.02	
216 Benzo[g,h,i]perylene	276	20.544	20.585	-0.041	97	41432	10.0	9.47	
S 218 Total Cresols	108				0			20.0	
S 219 Methyl Phenols,Total	108				0			20.0	

QC Flag Legend

Review Flags

a - User Assigned ID

Reagents:

MS-HSLA010_00036 Amount Added: 200.00 Units: uL

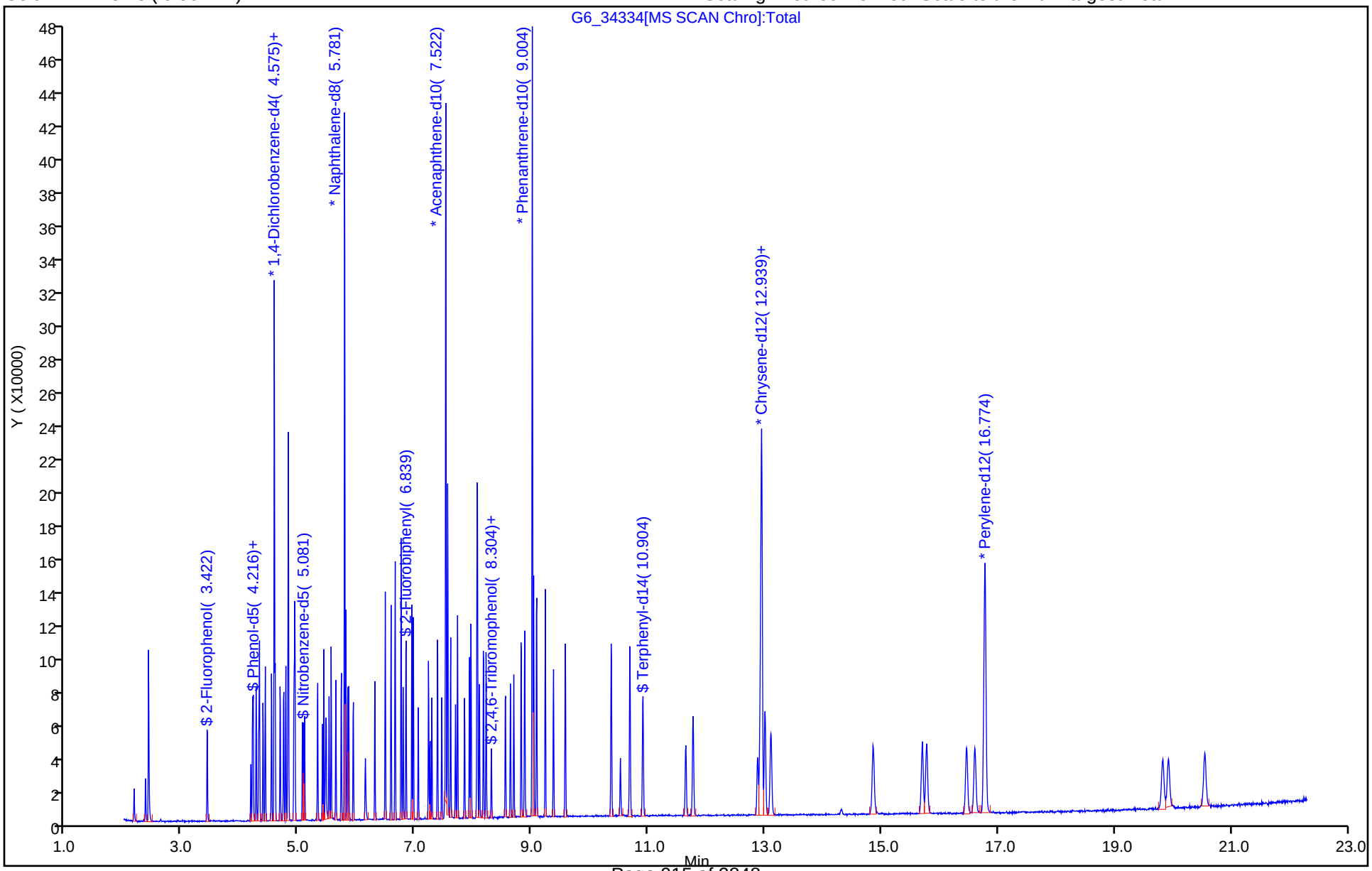
Report Date: 29-Jun-2018 08:23:00 Chrom Revision: 2.2 07-Jun-2018 07:41:54

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34334.D

Injection Date:	28-Jun-2018 13:10:30	Instrument ID:	SMS_G6	Operator ID:	KIEKELD
Lims ID:	STD010 HSL			Worklist Smp#:	5
Client ID:					
Injection Vol:	0.5 ul	Dil. Factor:	1.0000	ALS Bottle#:	4
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		

Column: VF-5ms (0.50 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1



Manual Integration/User Assign Peak Report

TestAmerica Denver

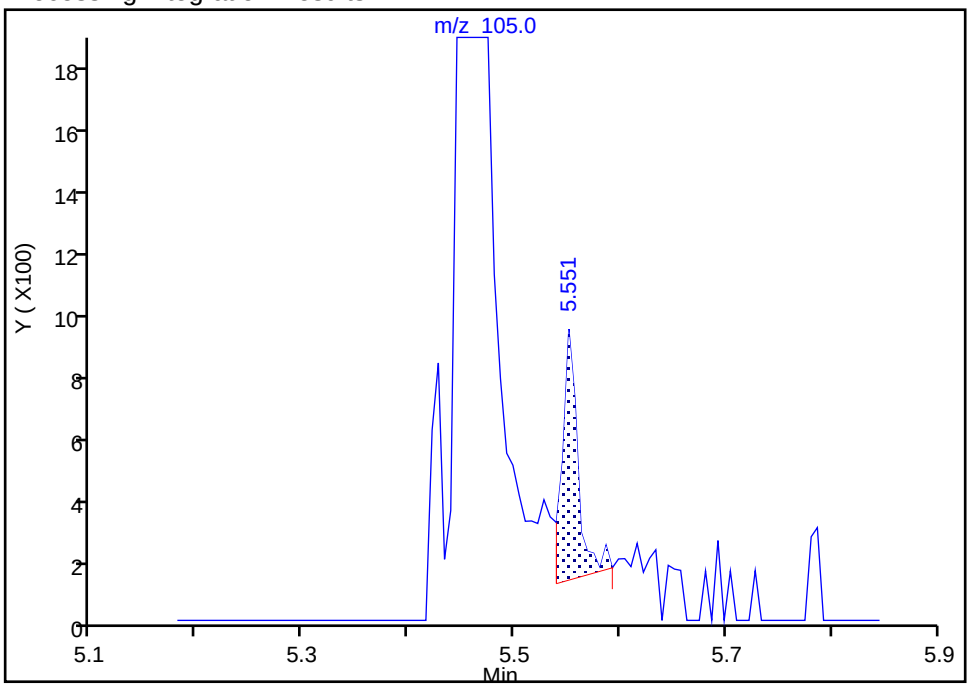
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34334.D
Injection Date: 28-Jun-2018 13:10:30 Instrument ID: SMS_G6
Lims ID: STD010 HSL
Client ID:
Operator ID: KIEKELD ALS Bottle#: 4 Worklist Smp#: 5
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625
Column: VF-5ms (0.50 mm) Detector MS SCAN

70 Benzoic acid, CAS: 65-85-0

Signal: 1

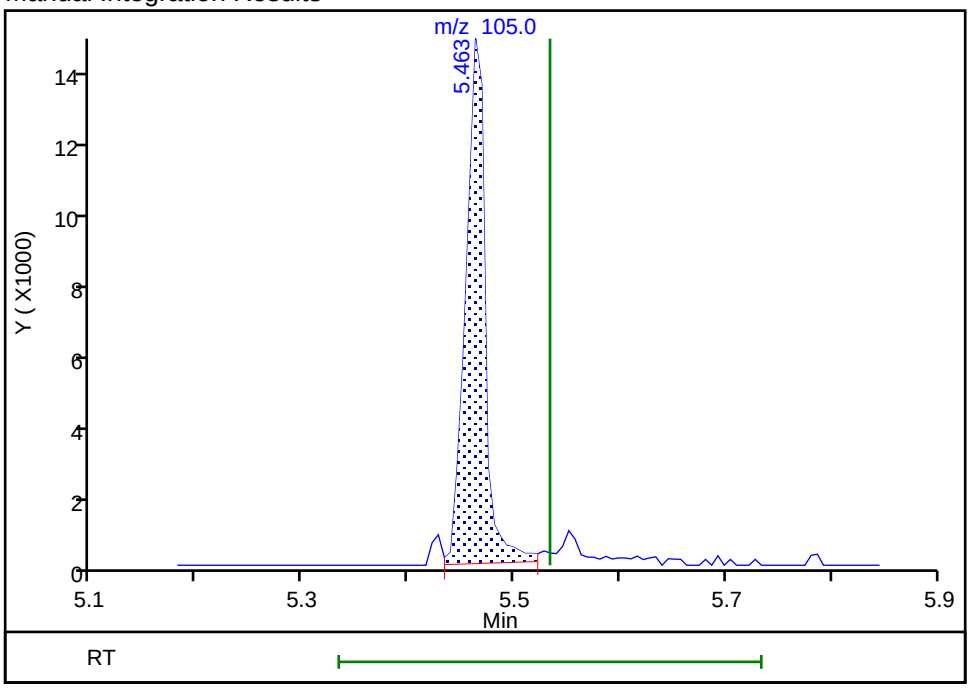
Processing Integration Results

RT: 5.55
Area: 810
Amount: 1.860923
Amount Units: ug/ml



Manual Integration Results

RT: 5.46
Area: 18029
Amount: 20.605268
Amount Units: ug/ml



Reviewer: kiekeld, 28-Jun-2018 14:43:11
Audit Action: Assigned Compound ID Audit Reason: Wrong peak

Manual Integration/User Assign Peak Report

TestAmerica Denver

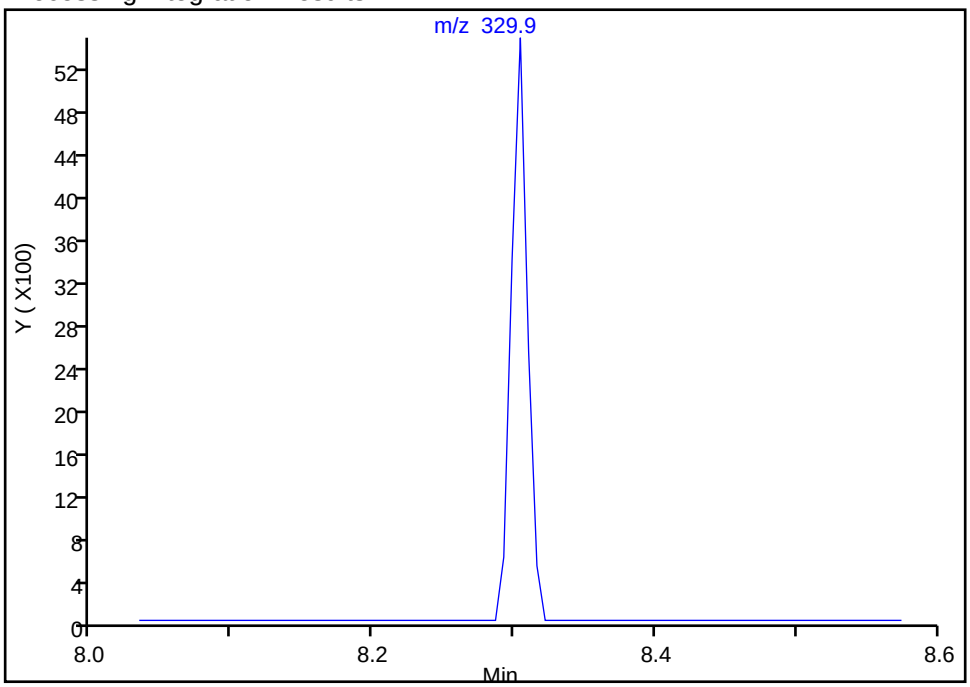
Data File:	\\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34334.D				
Injection Date:	28-Jun-2018 13:10:30	Instrument ID:	SMS_G6		
Lims ID:	STD010 HSL				
Client ID:					
Operator ID:	KIEKELD	ALS Bottle#:	4	Worklist Smp#:	5
Injection Vol:	0.5 ul	Dil. Factor:	1.0000		
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		
Column:	VF-5ms (0.50 mm)	Detector	MS SCAN		

148 2,4,6 - Tribromophenol, CAS: 118-79-6

Signal: 1

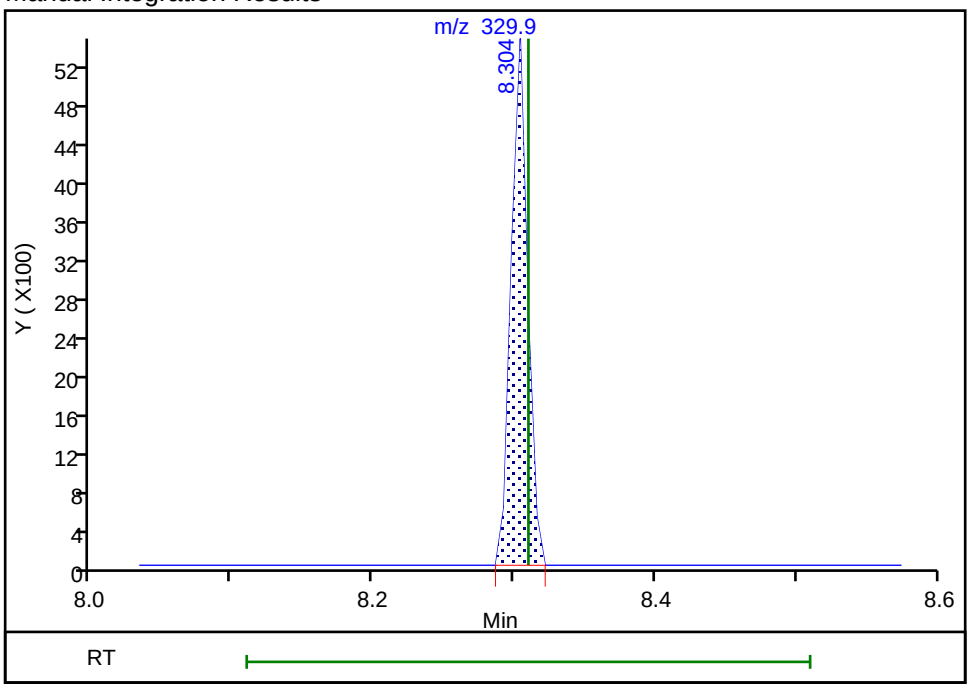
Not Detected
Expected RT: 8.31

Processing Integration Results



Manual Integration Results

RT: 8.30
Area: 4389
Amount: 9.791456
Amount Units: ug/ml



Reviewer: kiekeld, 28-Jun-2018 14:42:40
Audit Action: Assigned Compound ID Audit Reason: Assign Peak

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34335.D
Lims ID: STD020 HSL
Client ID:
Sample Type: IC Calib Level: 3
Inject. Date: 28-Jun-2018 13:37:30 ALS Bottle#: 5 Worklist Smp#: 6
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: STD020 HSL
Operator ID: KIEKELD Instrument ID: SMS_G6
Sublist: chrom-SMSG6_8270C*sub25

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 29-Jun-2018 08:23:03 Calib Date: 28-Jun-2018 19:58:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34349.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0303

First Level Reviewer: kiekeld Date: 28-Jun-2018 14:44:45

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
* 1 1,4-Dichlorobenzene-d4	152	4.575	4.575	0.000	95	42814	40.0	40.0	
* 2 Naphthalene-d8	136	5.781	5.786	-0.005	99	170950	40.0	40.0	
* 3 Acenaphthene-d10	164	7.516	7.522	-0.006	94	91524	40.0	40.0	
* 4 Phenanthrene-d10	188	9.004	9.010	-0.006	97	165857	40.0	40.0	
* 5 Chrysene-d12	240	12.939	12.957	-0.018	99	157452	40.0	40.0	
* 6 Perylene-d12	264	16.768	16.792	-0.024	97	156825	40.0	40.0	
$ 7 2-Fluorophenol	112	3.428	3.428	0.000	91	30019	20.0	19.3	
$ 8 Phenol-d5	99	4.204	4.204	0.000	98	38050	20.0	19.5	
$ 9 Nitrobenzene-d5	82	5.075	5.081	-0.006	89	35433	20.0	20.4	
$ 11 2-Fluorobiphenyl	172	6.834	6.839	-0.005	99	65979	20.0	19.7	
$ 12 2,4,6-Tribromophenol	330	8.304	8.310	-0.006	92	9037	20.0	19.7	
$ 13 Terphenyl-d14	244	10.898	10.910	-0.012	97	73938	20.0	19.6	
20 1,4-Dioxane	88	2.175	2.175	0.000	96	12379	20.0	19.4	
21 N-Nitrosodimethylamine	74	2.369	2.369	0.000	93	18868	20.0	19.2	
22 Pyridine	79	2.422	2.422	0.000	96	65827	40.0	39.1	
34 Phenol	94	4.216	4.222	-0.006	98	39437	20.0	19.5	
35 Aniline	93	4.263	4.269	-0.006	99	48969	20.0	19.7	
36 Alpha Methyl Styrene	118	4.322	4.322	0.000	92	32128	20.0	19.7	
37 Bis(2-chloroethyl)ether	93	4.304	4.310	-0.006	98	31218	20.0	19.9	
39 n-Decane	43	4.422	4.422	0.000	91	29843	20.0	19.8	
41 2-Chlorophenol	128	4.381	4.387	-0.006	96	31925	20.0	19.3	
42 1,3-Dichlorobenzene	146	4.528	4.534	-0.006	99	36016	20.0	19.6	
43 1,4-Dichlorobenzene	146	4.592	4.592	0.000	95	36324	20.0	19.7	
44 Benzyl alcohol	108	4.675	4.681	-0.006	95	22169	20.0	20.0	
45 1,2-Dichlorobenzene	146	4.734	4.739	-0.005	98	35010	20.0	20.0	
46 2-Methylphenol	108	4.775	4.775	0.000	93	29872	20.0	19.5	
47 2,2'-oxybis[1-chloropropan	45	4.804	4.810	-0.006	95	43989	20.0	20.5	
48 Indene	116	4.816	4.822	-0.006	91	105646	40.0	40.0	
49 3 & 4 Methylphenol	108	4.910	4.922	-0.012	79	31418	20.0	19.8	
50 3-Methylphenol	108	4.910	4.922	-0.012	91	31418	20.0	19.8	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
51 N-Nitrosodi-n-propylamine	70	4.922	4.934	-0.012	92	22395	20.0	20.4	
52 4-Methylphenol	108	4.910	4.922	-0.012	93	31418	20.0	19.8	
55 Acetophenone	105	4.928	4.934	-0.006	96	42953	20.0	19.8	
58 Hexachloroethane	117	5.057	5.063	-0.006	96	14301	20.0	20.0	
60 Nitrobenzene	77	5.092	5.098	-0.006	88	32486	20.0	19.7	
63 Isophorone	82	5.316	5.328	-0.012	100	61017	20.0	19.9	
65 2-Nitrophenol	139	5.404	5.410	-0.006	89	17953	20.0	19.7	
66 2,4-Dimethylphenol	107	5.428	5.434	-0.006	94	32271	20.0	20.0	
69 Bis(2-chloroethoxy)methane	93	5.516	5.522	-0.006	99	38119	20.0	19.7	
70 Benzoic acid	105	5.475	5.534	-0.059	88	41375	40.0	38.0	a
71 3,5-Dimethylphenol	107	5.551	5.557	-0.006	86	31467	20.0	19.7	
75 2,4-Dichlorophenol	162	5.634	5.639	-0.005	92	28012	20.0	19.9	
77 1,2,4-Trichlorobenzene	180	5.722	5.728	-0.006	94	29129	20.0	19.9	
79 Naphthalene	128	5.804	5.804	0.000	97	93221	20.0	19.8	
80 4-Chloroaniline	127	5.834	5.839	-0.005	97	41805	20.0	20.0	
81 2,6-Dichlorophenol	162	5.851	5.857	-0.006	98	27329	20.0	19.5	
83 Hexachlorobutadiene	225	5.928	5.933	-0.005	97	15647	20.0	20.2	
87 Caprolactam	55	6.139	6.163	-0.024	80	15766	20.0	21.2	
90 4-Chloro-3-methylphenol	107	6.298	6.310	-0.012	95	27452	20.0	19.9	
94 2-Methylnaphthalene	142	6.481	6.486	-0.005	94	64420	20.0	19.8	
96 1-Methylnaphthalene	142	6.581	6.586	-0.005	94	61916	20.0	20.1	
97 Hexachlorocyclopentadiene	237	6.645	6.651	-0.006	97	17814	20.0	19.4	
98 1,2,4,5-Tetrachlorobenzene	216	6.651	6.657	-0.006	98	27327	20.0	20.1	
101 2,4,6-Trichlorophenol	196	6.751	6.757	-0.006	76	19386	20.0	19.9	
102 2,3-Dichlorobenzenamine	161	6.751	6.757	-0.006	93	34479	20.0	20.3	
103 2,4,5-Trichlorophenol	196	6.786	6.792	-0.006	95	20640	20.0	19.6	
105 1,1'-Biphenyl	154	6.933	6.945	-0.012	95	75298	20.0	19.6	
107 2-Chloronaphthalene	162	6.963	6.969	-0.006	95	59666	20.0	19.5	
109 2-Nitroaniline	65	7.045	7.051	-0.006	88	17610	20.0	19.6	
112 Dimethyl phthalate	163	7.222	7.233	-0.011	99	69863	20.0	20.2	
113 1,3-Dinitrobenzene	168	7.245	7.257	-0.012	87	11164	20.0	19.0	
114 2,6-Dinitrotoluene	165	7.281	7.286	-0.005	96	16012	20.0	19.7	
115 Acenaphthylene	152	7.375	7.380	-0.005	98	91704	20.0	19.7	
116 3-Nitroaniline	138	7.451	7.457	-0.006	98	19769	20.0	19.6	
117 Acenaphthene	153	7.551	7.557	-0.006	91	60136	20.0	20.0	
118 2,4-Dinitrophenol	184	7.551	7.563	-0.012	83	18708	40.0	38.7	
120 4-Nitrophenol	109	7.604	7.622	-0.018	87	19661	40.0	39.8	
122 2,4-Dinitrotoluene	165	7.686	7.692	-0.006	95	21286	20.0	19.5	
123 Dibenzofuran	168	7.722	7.727	-0.005	97	86974	20.0	20.0	
127 2,3,4,6-Tetrachlorophenol	232	7.839	7.845	-0.006	73	17010	20.0	20.1	
128 Hexadecane	57	7.951	7.957	-0.006	93	41743	20.0	20.1	
130 Diethyl phthalate	149	7.922	7.933	-0.011	99	69055	20.0	19.9	
135 4-Chlorophenyl phenyl ethe	204	8.051	8.057	-0.006	92	32121	20.0	20.1	
136 Fluorene	166	8.063	8.069	-0.006	96	68928	20.0	20.0	
139 4-Nitroaniline	138	8.057	8.075	-0.018	87	20969	20.0	19.8	
140 4,6-Dinitro-2-methylphenol	198	8.098	8.110	-0.012	89	22138	40.0	38.5	
142 Diphenylamine	169	8.163	8.175	-0.012	96	50824	17.0	16.9	
143 N-Nitrosodiphenylamine	169	8.163	8.175	-0.012	61	50824	20.0	19.5	
144 Azobenzene	77	8.210	8.216	-0.006	98	69288	20.0	20.1	
145 1,2-Diphenylhydrazine	77	8.210	8.216	-0.006	99	69288	20.2	20.3	
148 2,4,6 - Tribromophenol	330	8.304	8.310	-0.006	0	9037	20.0	19.7	a
157 4-Bromophenyl phenyl ether	248	8.539	8.551	-0.012	66	18024	20.0	19.4	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
158 Hexachlorobenzene	284	8.628	8.633	-0.005	94	20390	20.0	20.4	
160 Atrazine	200	8.686	8.698	-0.012	92	17182	20.0	20.6	
162 n-Octadecane	85	8.869	8.880	-0.011	97	19502	20.0	20.1	
164 Pentachlorophenol	266	8.810	8.822	-0.012	98	25904	40.0	39.6	
169 Phenanthrene	178	9.027	9.033	-0.006	97	100421	20.0	19.5	
170 Anthracene	178	9.075	9.086	-0.011	97	106793	20.0	19.9	
171 Carbazole	167	9.227	9.233	-0.006	95	101536	20.0	19.8	
172 Alachlor	188	9.369	9.374	-0.005	98	13032	20.0	19.7	
175 Di-n-butyl phthalate	149	9.569	9.580	-0.011	100	120462	20.0	19.6	
182 Fluoranthene	202	10.357	10.369	-0.011	98	107322	20.0	19.8	
185 Pyrene	202	10.674	10.692	-0.018	97	110940	20.0	19.6	
192 Famphur	218	11.639	11.651	-0.012	84	40185	20.0	20.9	
193 Butyl benzyl phthalate	149	11.763	11.774	-0.011	96	55285	20.0	19.3	
197 3,3'-Dichlorobenzidine	252	12.868	12.886	-0.018	74	35431	20.0	19.6	
198 Benzo[a]anthracene	228	12.915	12.933	-0.018	99	101991	20.0	19.4	
199 Bis(2-ethylhexyl) phthalat	149	13.098	13.110	-0.012	96	72553	20.0	19.2	
200 Chrysene	228	12.998	13.015	-0.017	97	96708	20.0	19.3	
202 Di-n-octyl phthalate	149	14.851	14.868	-0.017	99	126189	20.0	18.8	
204 Benzo[b]fluoranthene	252	15.692	15.721	-0.029	98	92713	20.0	19.3	
205 Benzo[k]fluoranthene	252	15.768	15.803	-0.035	99	95679	20.0	19.2	
207 Benzo[e]pyrene	252	16.456	16.486	-0.030	98	86604	20.0	19.5	
208 Benzo[a]pyrene	252	16.598	16.627	-0.029	78	94254	20.0	19.6	
214 Indeno[1,2,3-cd]pyrene	276	19.821	19.862	-0.041	98	80132	20.0	18.9	
215 Dibenz(a,h)anthracene	278	19.921	19.956	-0.035	93	79459	20.0	18.9	
216 Benzo[g,h,i]perylene	276	20.544	20.585	-0.041	97	88380	20.0	19.4	
S 218 Total Cresols	108				0			39.3	
S 219 Methyl Phenols,Total	108				0			39.3	

QC Flag Legend

Review Flags

a - User Assigned ID

Reagents:

MS-HSLA020_00036 Amount Added: 200.00 Units: uL

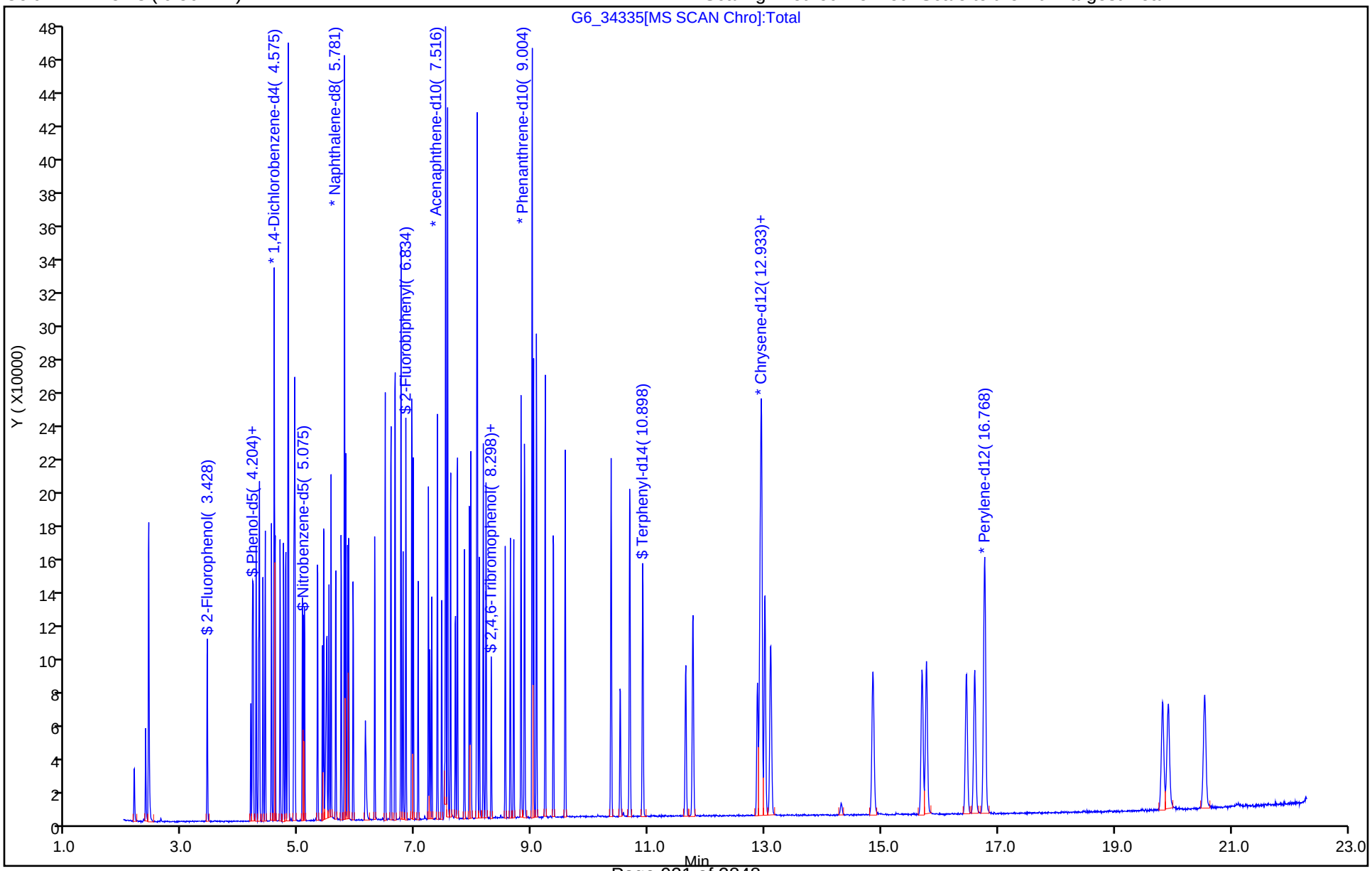
Report Date: 29-Jun-2018 08:23:04 Chrom Revision: 2.2 07-Jun-2018 07:41:54

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34335.D

Injection Date:	28-Jun-2018 13:37:30	Instrument ID:	SMS_G6	Operator ID:	KIEKELD
Lims ID:	STD020 HSL			Worklist Smp#:	6
Client ID:					
Injection Vol:	0.5 ul	Dil. Factor:	1.0000	ALS Bottle#:	5
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		

Column: VF-5ms (0.50 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1



Manual Integration/User Assign Peak Report

TestAmerica Denver

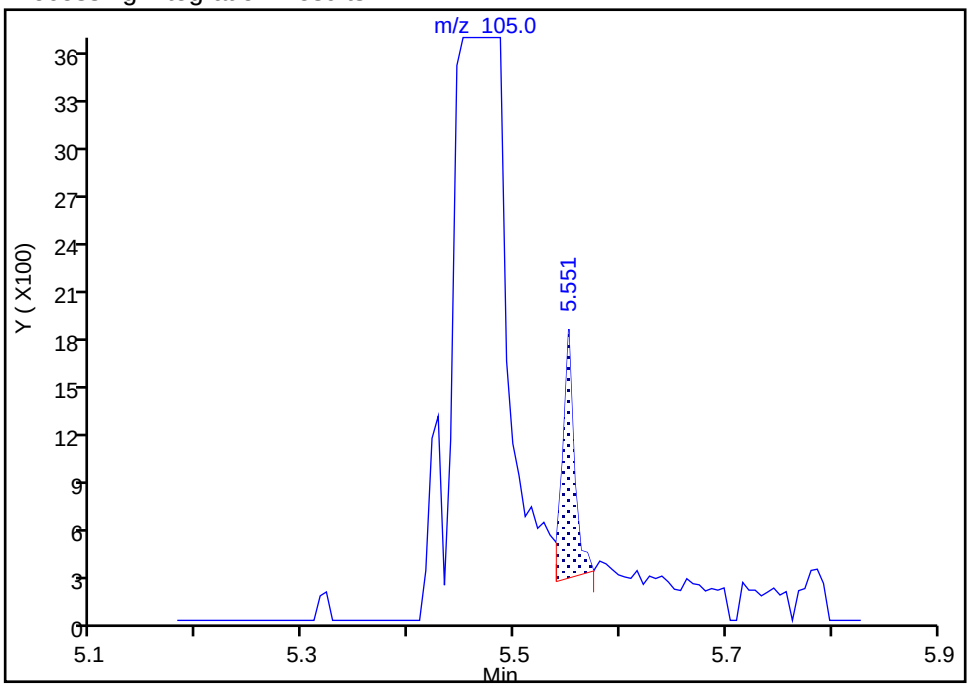
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34335.D
Injection Date: 28-Jun-2018 13:37:30 Instrument ID: SMS_G6
Lims ID: STD020 HSL
Client ID:
Operator ID: KIEKELD ALS Bottle#: 5 Worklist Smp#: 6
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625
Column: VF-5ms (0.50 mm) Detector MS SCAN

70 Benzoic acid, CAS: 65-85-0

Signal: 1

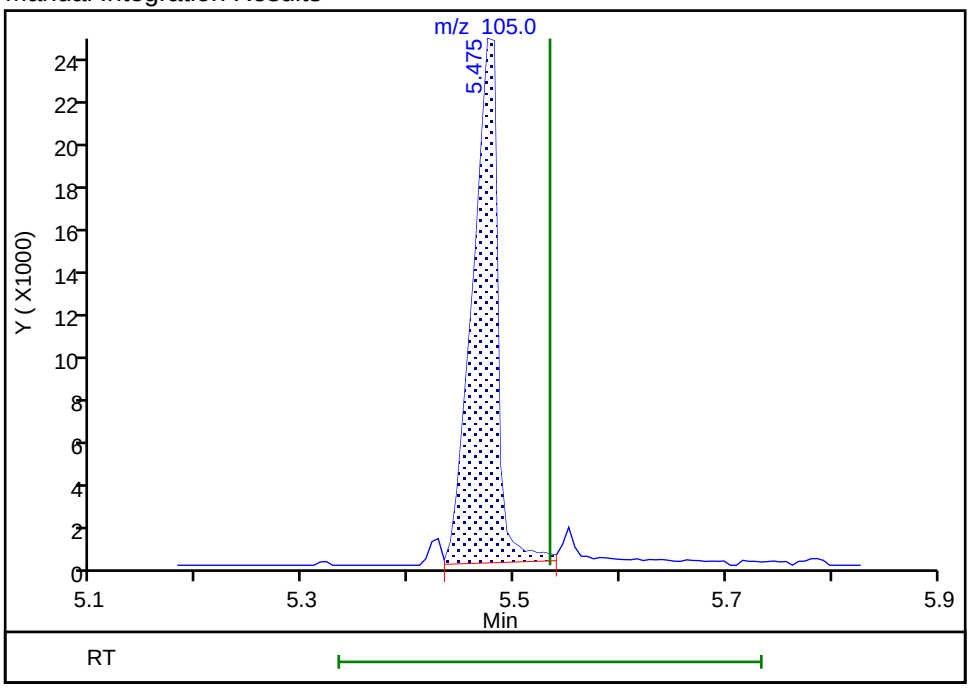
Processing Integration Results

RT: 5.55
Area: 1192
Amount: 1.937632
Amount Units: ug/ml



Manual Integration Results

RT: 5.47
Area: 41375
Amount: 38.038296
Amount Units: ug/ml



Reviewer: kiekeld, 28-Jun-2018 14:43:57
Audit Action: Assigned Compound ID Audit Reason: Wrong peak

Manual Integration/User Assign Peak Report

TestAmerica Denver

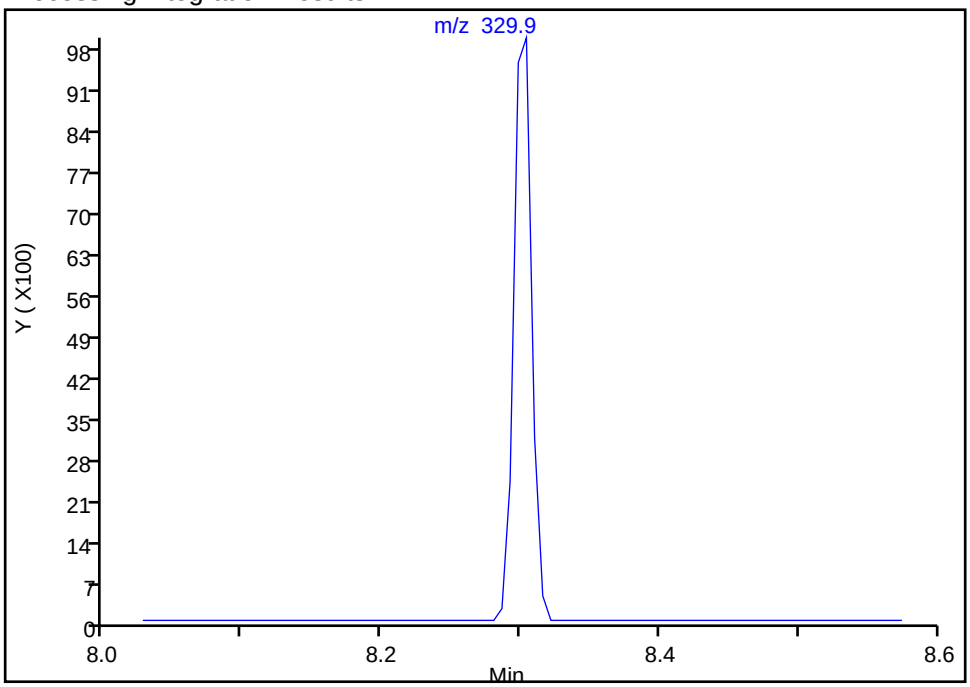
Data File:	\\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34335.D				
Injection Date:	28-Jun-2018 13:37:30	Instrument ID:	SMS_G6		
Lims ID:	STD020 HSL				
Client ID:					
Operator ID:	KIEKELD	ALS Bottle#:	5	Worklist Smp#:	6
Injection Vol:	0.5 ul	Dil. Factor:	1.0000		
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		
Column:	VF-5ms (0.50 mm)	Detector	MS SCAN		

148 2,4,6 - Tribromophenol, CAS: 118-79-6

Signal: 1

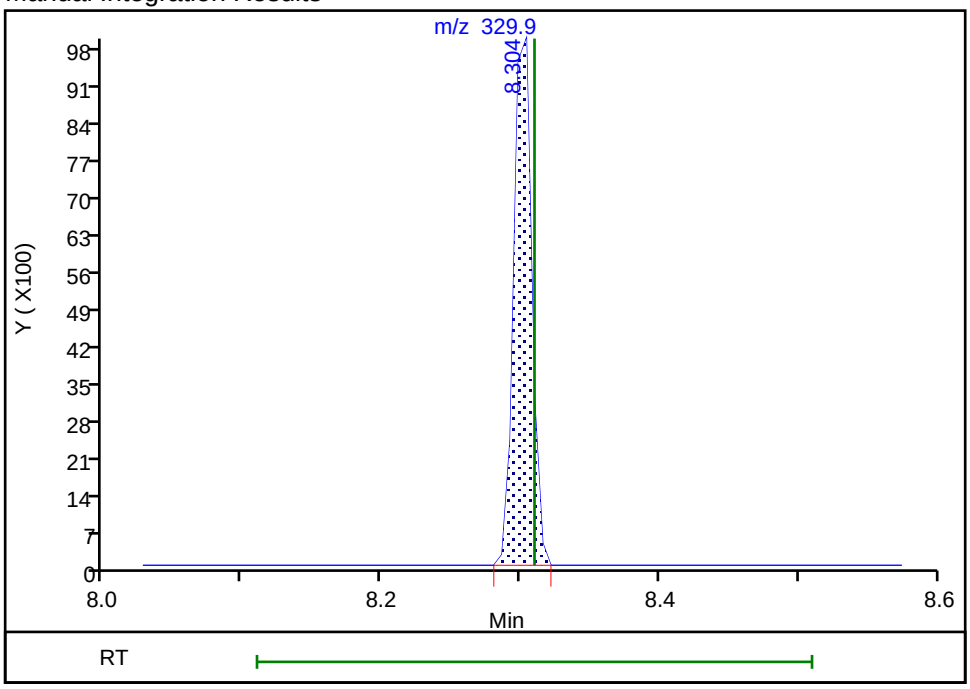
Not Detected
Expected RT: 8.31

Processing Integration Results



Manual Integration Results

RT: 8.30
Area: 9037
Amount: 19.709148
Amount Units: ug/ml



Reviewer: kiekeld, 28-Jun-2018 14:44:19
Audit Action: Assigned Compound ID Audit Reason: Assign Peak

Manual Integration/User Assign Peak Report

TestAmerica Denver

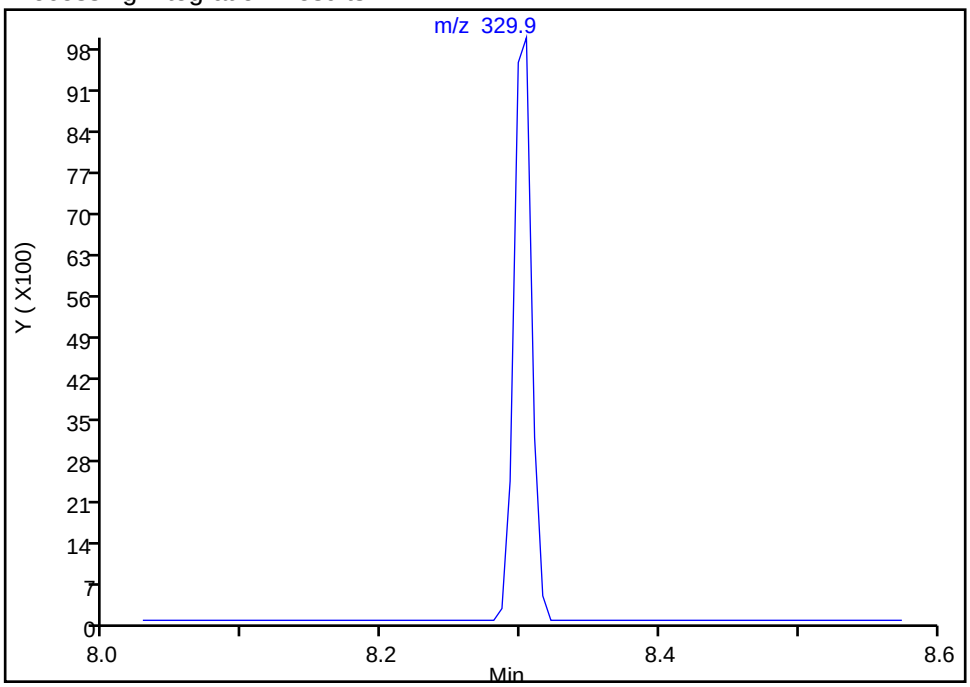
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34335.D
Injection Date: 28-Jun-2018 13:37:30 Instrument ID: SMS_G6
Lims ID: STD020 HSL
Client ID:
Operator ID: KIEKELD ALS Bottle#: 5 Worklist Smp#: 6
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625
Column: VF-5ms (0.50 mm) Detector MS SCAN

148 2,4,6 - Tribromophenol, CAS: 118-79-6

Signal: 1

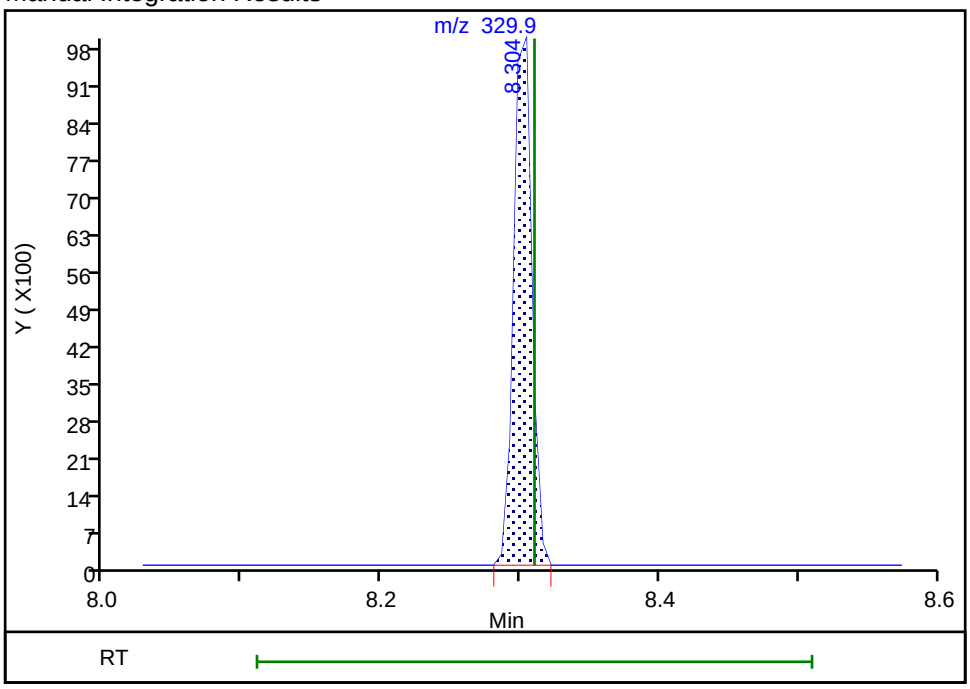
Not Detected
Expected RT: 8.31

Processing Integration Results



Manual Integration Results

RT: 8.30
Area: 9037
Amount: 19.709148
Amount Units: ug/ml



Reviewer: kiekeld, 28-Jun-2018 14:44:43
Audit Action: New Ref Spectrum Audit Reason:

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34336.D
Lims ID: STD050 HSL
Client ID:
Sample Type: IC Calib Level: 4
Inject. Date: 28-Jun-2018 14:05:30 ALS Bottle#: 6 Worklist Smp#: 7
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: STD050 HSL
Operator ID: KIEKELD Instrument ID: SMS_G6
Sublist: chrom-SMSG6_8270C*sub25

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 29-Jun-2018 08:23:10 Calib Date: 28-Jun-2018 19:58:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34349.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0303

First Level Reviewer: kiekeld Date: 28-Jun-2018 14:46:06

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
* 1 1,4-Dichlorobenzene-d4	152	4.575	4.575	0.000	94	44964	40.0	40.0	
* 2 Naphthalene-d8	136	5.781	5.786	-0.005	99	177808	40.0	40.0	
* 3 Acenaphthene-d10	164	7.516	7.522	-0.006	94	93036	40.0	40.0	
* 4 Phenanthrene-d10	188	9.004	9.010	-0.006	97	165310	40.0	40.0	
* 5 Chrysene-d12	240	12.939	12.957	-0.018	99	157694	40.0	40.0	
* 6 Perylene-d12	264	16.768	16.792	-0.024	98	157385	40.0	40.0	
$ 7 2-Fluorophenol	112	3.422	3.428	-0.006	90	83123	50.0	50.9	
$ 8 Phenol-d5	99	4.204	4.204	0.000	98	103090	50.0	50.3	
$ 9 Nitrobenzene-d5	82	5.075	5.081	-0.006	88	88373	50.0	48.9	
$ 11 2-Fluorobiphenyl	172	6.834	6.839	-0.005	99	172274	50.0	50.5	
$ 12 2,4,6-Tribromophenol	330	8.304	8.310	-0.006	92	24085	50.0	51.7	
$ 13 Terphenyl-d14	244	10.898	10.910	-0.012	98	190224	50.0	50.4	
20 1,4-Dioxane	88	2.169	2.175	-0.006	96	34132	50.0	50.8	
21 N-Nitrosodimethylamine	74	2.369	2.369	0.000	94	51943	50.0	50.4	
22 Pyridine	79	2.416	2.422	-0.006	96	179067	100.0	101.3	
34 Phenol	94	4.216	4.222	-0.006	98	105793	50.0	49.8	
35 Aniline	93	4.263	4.269	-0.006	99	132259	50.0	50.5	
36 Alpha Methyl Styrene	118	4.322	4.322	0.000	92	86827	50.0	50.6	
37 Bis(2-chloroethyl)ether	93	4.304	4.310	-0.006	98	83151	50.0	50.6	
39 n-Decane	43	4.422	4.422	0.000	91	80479	50.0	50.8	
41 2-Chlorophenol	128	4.381	4.387	-0.006	96	87521	50.0	50.4	
42 1,3-Dichlorobenzene	146	4.528	4.534	-0.006	99	96505	50.0	50.1	
43 1,4-Dichlorobenzene	146	4.593	4.592	0.001	96	97839	50.0	50.6	
44 Benzyl alcohol	108	4.675	4.681	-0.006	95	58784	50.0	50.5	
45 1,2-Dichlorobenzene	146	4.734	4.739	-0.005	98	92967	50.0	50.4	
46 2-Methylphenol	108	4.775	4.775	0.000	93	79637	50.0	49.6	
47 2,2'-oxybis[1-chloropropan	45	4.804	4.810	-0.006	95	114238	50.0	50.6	
48 Indene	116	4.816	4.822	-0.006	91	284130	100.0	102.4	
49 3 & 4 Methylphenol	108	4.916	4.922	-0.006	86	84762	50.0	50.8	
50 3-Methylphenol	108	4.916	4.922	-0.006	93	84762	50.0	50.8	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
51 N-Nitrosodi-n-propylamine	70	4.928	4.934	-0.006	91	58266	50.0	50.5	
52 4-Methylphenol	108	4.916	4.922	-0.006	95	84762	50.0	50.8	
55 Acetophenone	105	4.928	4.934	-0.006	95	115769	50.0	50.8	
58 Hexachloroethane	117	5.057	5.063	-0.006	96	38059	50.0	50.7	
60 Nitrobenzene	77	5.098	5.098	0.000	87	85557	50.0	49.8	
63 Isophorone	82	5.322	5.328	-0.006	99	158216	50.0	49.7	
65 2-Nitrophenol	139	5.404	5.410	-0.006	91	47201	50.0	49.7	
66 2,4-Dimethylphenol	107	5.428	5.434	-0.006	93	84469	50.0	50.3	
69 Bis(2-chloroethoxy)methane	93	5.516	5.522	-0.006	99	100860	50.0	50.2	
70 Benzoic acid	105	5.504	5.534	-0.030	90	122837	100.0	95.9	a
71 3,5-Dimethylphenol	107	5.551	5.557	-0.006	86	83266	50.0	50.1	
75 2,4-Dichlorophenol	162	5.634	5.639	-0.005	92	72602	50.0	49.7	
77 1,2,4-Trichlorobenzene	180	5.722	5.728	-0.006	94	76916	50.0	50.6	
79 Naphthalene	128	5.804	5.804	0.000	97	245341	50.0	50.2	
80 4-Chloroaniline	127	5.840	5.839	0.001	98	110766	50.0	50.9	
81 2,6-Dichlorophenol	162	5.851	5.857	-0.006	98	73403	50.0	50.4	
83 Hexachlorobutadiene	225	5.928	5.933	-0.005	98	40772	50.0	50.7	
87 Caprolactam	55	6.145	6.163	-0.018	81	38039	50.0	49.3	M
90 4-Chloro-3-methylphenol	107	6.304	6.310	-0.006	96	72282	50.0	50.3	
94 2-Methylnaphthalene	142	6.481	6.486	-0.005	93	170339	50.0	50.4	
96 1-Methylnaphthalene	142	6.581	6.586	-0.005	94	160165	50.0	49.9	
97 Hexachlorocyclopentadiene	237	6.645	6.651	-0.006	96	48537	50.0	51.9	
98 1,2,4,5-Tetrachlorobenzene	216	6.651	6.657	-0.006	97	71293	50.0	50.4	
101 2,4,6-Trichlorophenol	196	6.751	6.757	-0.006	78	50519	50.0	51.0	
102 2,3-Dichlorobenzenamine	161	6.751	6.757	-0.006	93	88614	50.0	51.2	
103 2,4,5-Trichlorophenol	196	6.787	6.792	-0.005	95	54484	50.0	51.0	
105 1,1'-Biphenyl	154	6.934	6.945	-0.011	95	196678	50.0	50.3	
107 2-Chloronaphthalene	162	6.963	6.969	-0.006	95	156288	50.0	50.2	
109 2-Nitroaniline	65	7.045	7.051	-0.006	89	46428	50.0	50.9	
112 Dimethyl phthalate	163	7.222	7.233	-0.011	99	175895	50.0	50.0	
113 1,3-Dinitrobenzene	168	7.251	7.257	-0.006	94	30811	50.0	51.6	
114 2,6-Dinitrotoluene	165	7.281	7.286	-0.005	97	42284	50.0	51.2	
115 Acenaphthylene	152	7.375	7.380	-0.005	98	239189	50.0	50.5	
116 3-Nitroaniline	138	7.451	7.457	-0.006	98	52107	50.0	50.9	
117 Acenaphthene	153	7.551	7.557	-0.006	90	155015	50.0	50.7	
118 2,4-Dinitrophenol	184	7.557	7.563	-0.006	83	53241	100.0	97.9	
120 4-Nitrophenol	109	7.604	7.622	-0.018	90	51480	100.0	102.6	
122 2,4-Dinitrotoluene	165	7.687	7.692	-0.005	95	56557	50.0	51.1	
123 Dibenzofuran	168	7.722	7.727	-0.005	97	223512	50.0	50.7	
127 2,3,4,6-Tetrachlorophenol	232	7.839	7.845	-0.006	73	44447	50.0	51.6	
128 Hexadecane	57	7.951	7.957	-0.006	92	106758	50.0	50.6	
130 Diethyl phthalate	149	7.928	7.933	-0.005	99	177021	50.0	50.2	
135 4-Chlorophenyl phenyl ethe	204	8.051	8.057	-0.006	92	82188	50.0	50.5	
136 Fluorene	166	8.063	8.069	-0.006	95	175072	50.0	49.9	
139 4-Nitroaniline	138	8.063	8.075	-0.012	64	54447	50.0	50.6	
140 4,6-Dinitro-2-methylphenol	198	8.098	8.110	-0.012	87	61974	100.0	101.0	
142 Diphenylamine	169	8.163	8.175	-0.012	96	130209	42.5	42.5	
143 N-Nitrosodiphenylamine	169	8.163	8.175	-0.012	61	130209	50.0	50.2	
144 Azobenzene	77	8.210	8.216	-0.006	98	176649	50.0	50.4	
145 1,2-Diphenylhydrazine	77	8.210	8.216	-0.006	100	176649	50.5	51.0	
148 2,4,6 - Tribromophenol	330	8.304	8.310	-0.006	91	24233	50.0	52.0	a
157 4-Bromophenyl phenyl ether	248	8.539	8.551	-0.012	66	46289	50.0	50.0	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
158 Hexachlorobenzene	284	8.628	8.633	-0.005	94	50555	50.0	50.7	
160 Atrazine	200	8.686	8.698	-0.012	93	42862	50.0	51.5	
162 n-Octadecane	85	8.869	8.880	-0.011	97	49260	50.0	50.8	
164 Pentachlorophenol	266	8.810	8.822	-0.012	98	69381	100.0	102.6	
169 Phenanthrene	178	9.028	9.033	-0.005	97	260298	50.0	50.8	
170 Anthracene	178	9.075	9.086	-0.011	97	274198	50.0	51.1	
171 Carbazole	167	9.228	9.233	-0.005	95	258808	50.0	50.7	
172 Alachlor	188	9.369	9.374	-0.005	98	33155	50.0	50.2	
175 Di-n-butyl phthalate	149	9.569	9.580	-0.011	100	310377	50.0	50.6	
182 Fluoranthene	202	10.357	10.369	-0.011	98	276048	50.0	51.0	
185 Pyrene	202	10.675	10.692	-0.017	98	286242	50.0	50.5	
192 Famphur	218	11.639	11.651	-0.012	84	102855	50.0	53.4	
193 Butyl benzyl phthalate	149	11.763	11.774	-0.011	96	144930	50.0	50.6	
197 3,3'-Dichlorobenzidine	252	12.869	12.886	-0.017	74	92493	50.0	51.2	
198 Benzo[a]anthracene	228	12.916	12.933	-0.017	99	263350	50.0	50.0	
199 Bis(2-ethylhexyl) phthalat	149	13.092	13.110	-0.018	96	189498	50.0	50.0	
200 Chrysene	228	12.998	13.015	-0.017	97	251063	50.0	49.9	
202 Di-n-octyl phthalate	149	14.851	14.868	-0.017	99	338311	50.0	50.5	
204 Benzo[b]fluoranthene	252	15.698	15.721	-0.023	98	237066	50.0	49.3	
205 Benzo[k]fluoranthene	252	15.774	15.803	-0.029	99	252569	50.0	50.6	
207 Benzo[e]pyrene	252	16.462	16.486	-0.024	97	225162	50.0	50.4	
208 Benzo[a]pyrene	252	16.604	16.627	-0.023	79	243194	50.0	50.4	
214 Indeno[1,2,3-cd]pyrene	276	19.833	19.862	-0.029	98	210774	50.0	49.6	
215 Dibenz(a,h)anthracene	278	19.927	19.956	-0.029	94	214143	50.0	50.8	
216 Benzo[g,h,i]perylene	276	20.556	20.585	-0.029	97	231100	50.0	50.7	
S 218 Total Cresols	108				0			100.4	
S 219 Methyl Phenols,Total	108				0			100.4	

QC Flag Legend

Review Flags

M - Manually Integrated

a - User Assigned ID

Reagents:

MS-HSLA050_00037 Amount Added: 200.00 Units: uL

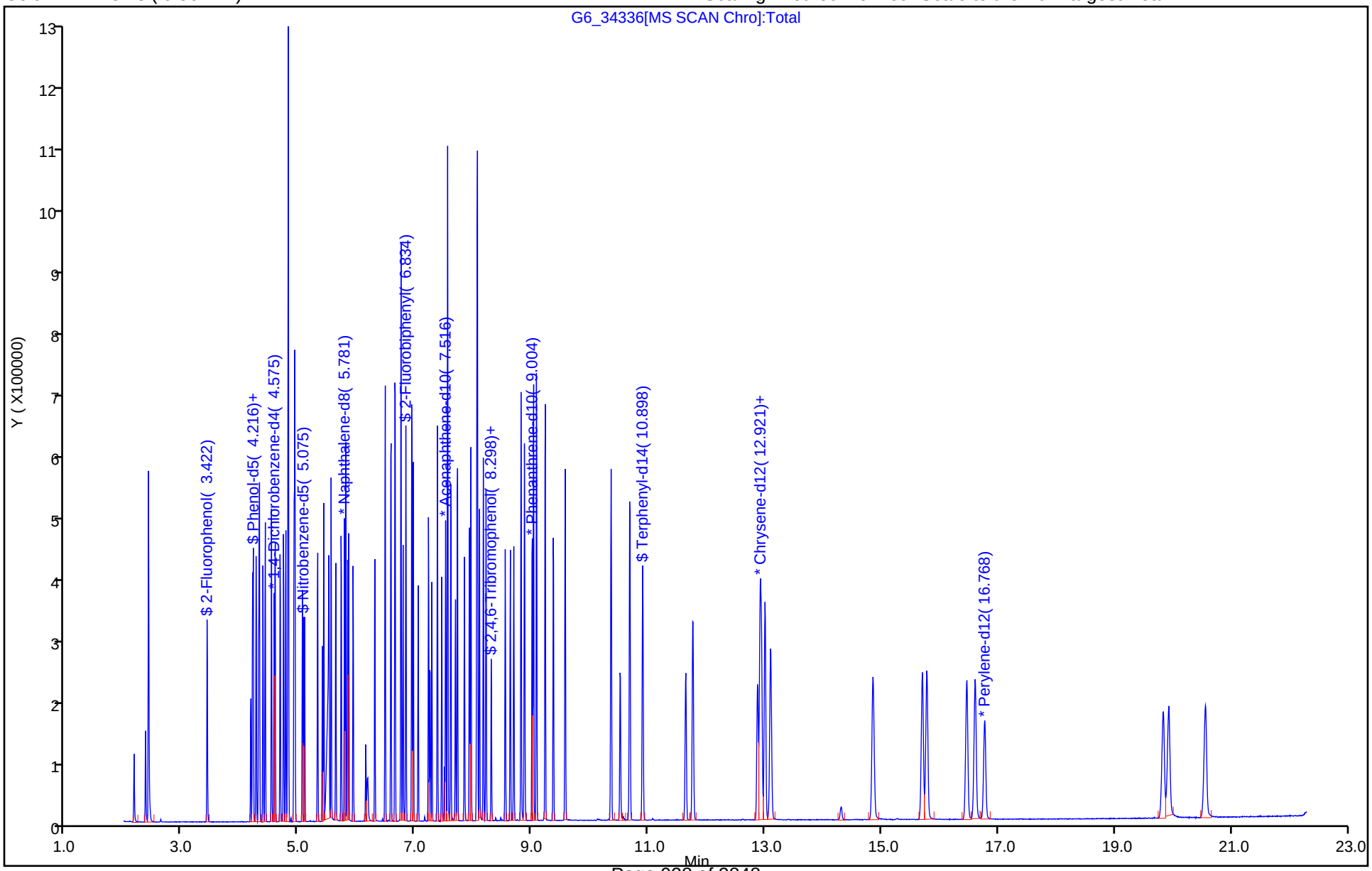
Report Date: 29-Jun-2018 08:23:11 Chrom Revision: 2.2 07-Jun-2018 07:41:54

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34336.D

Injection Date:	28-Jun-2018 14:05:30	Instrument ID:	SMS_G6	Operator ID:	KIEKELD
Lims ID:	STD050 HSL			Worklist Smp#:	7
Client ID:					
Injection Vol:	0.5 ul	Dil. Factor:	1.0000	ALS Bottle#:	6
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		

Column: VF-5ms (0.50 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1



Manual Integration/User Assign Peak Report

TestAmerica Denver

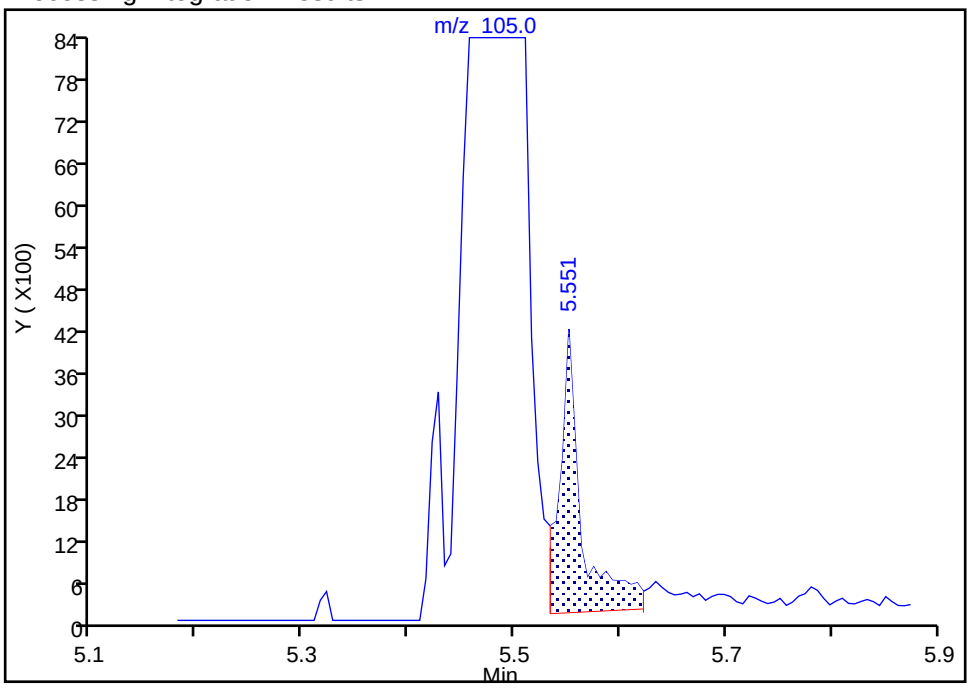
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34336.D
Injection Date: 28-Jun-2018 14:05:30 Instrument ID: SMS_G6
Lims ID: STD050 HSL
Client ID:
Operator ID: KIEKELD ALS Bottle#: 6 Worklist Smp#: 7
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625
Column: VF-5ms (0.50 mm) Detector MS SCAN

70 Benzoic acid, CAS: 65-85-0

Signal: 1

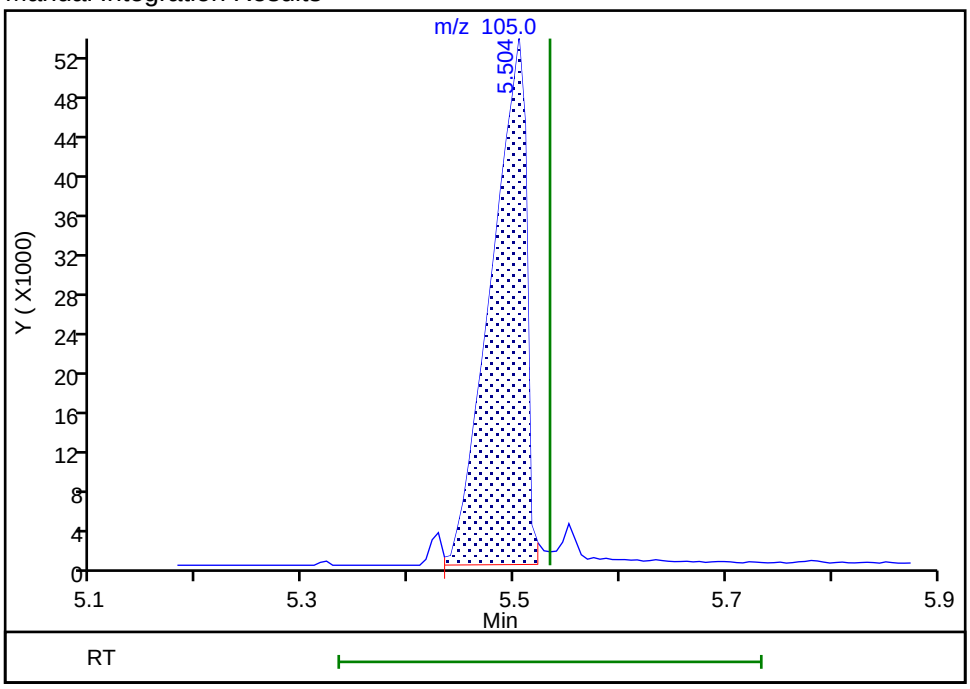
Processing Integration Results

RT: 5.55
Area: 5938
Amount: 6.995442
Amount Units: ug/ml



Manual Integration Results

RT: 5.50
Area: 122837
Amount: 95.898456
Amount Units: ug/ml



Reviewer: kiekeld, 28-Jun-2018 14:45:27
Audit Action: Assigned Compound ID Audit Reason: Wrong peak

Manual Integration/User Assign Peak Report

TestAmerica Denver

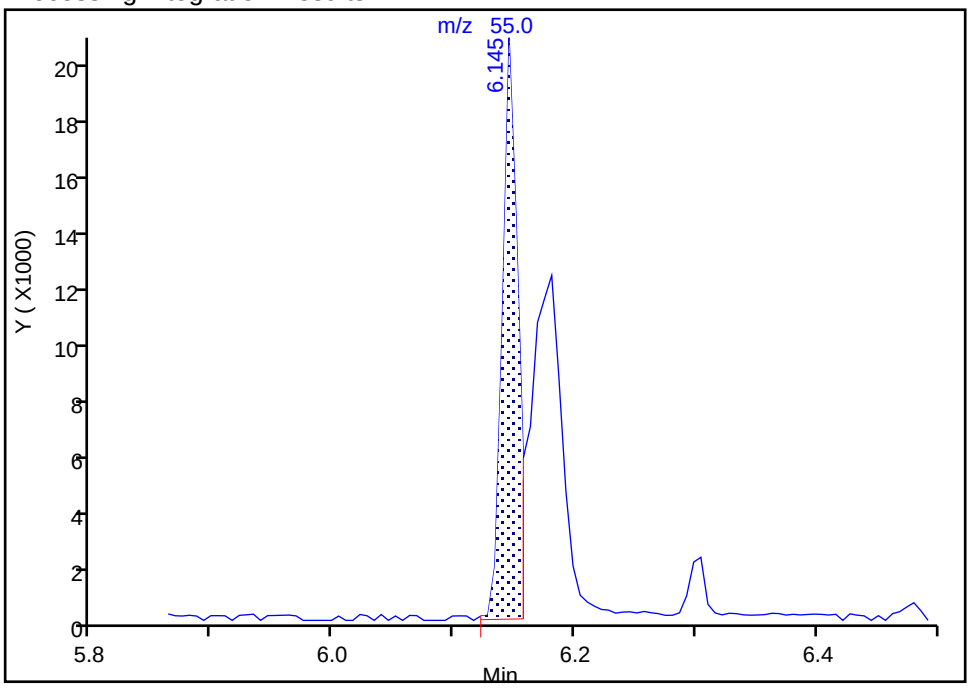
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34336.D
Injection Date: 28-Jun-2018 14:05:30 Instrument ID: SMS_G6
Lims ID: STD050 HSL
Client ID:
Operator ID: KIEKELD ALS Bottle#: 6 Worklist Smp#: 7
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625
Column: VF-5ms (0.50 mm) Detector MS SCAN

87 Caprolactam, CAS: 105-60-2

Signal: 1

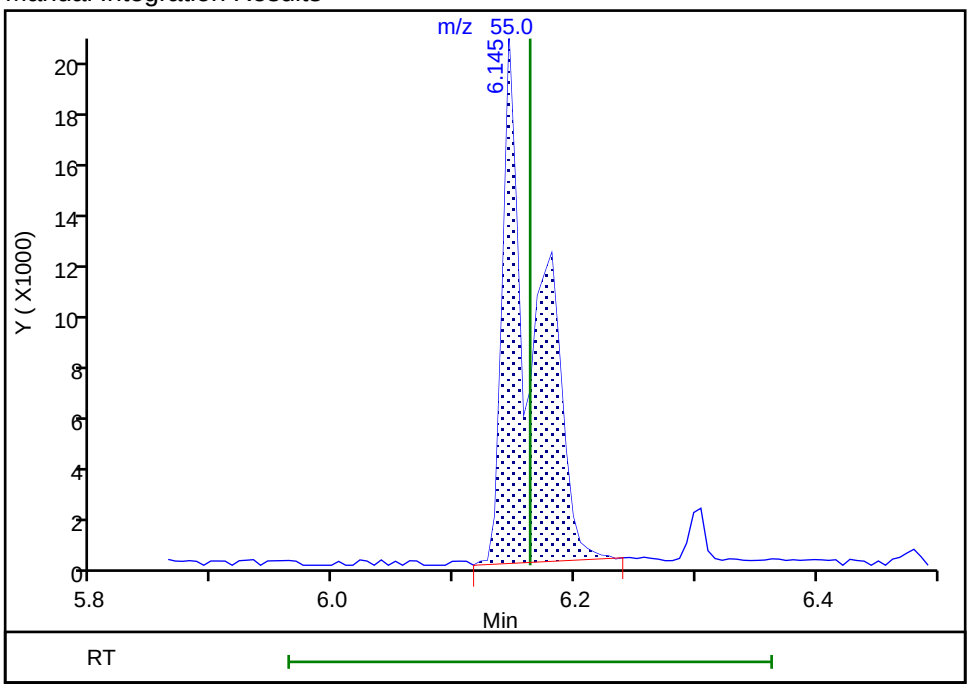
Processing Integration Results

RT: 6.15
Area: 18346
Amount: 26.539429
Amount Units: ug/ml



Manual Integration Results

RT: 6.15
Area: 38039
Amount: 49.252947
Amount Units: ug/ml



Reviewer: kiekeld, 28-Jun-2018 14:45:45
Audit Action: Manually Integrated Audit Reason: Split Peak

Manual Integration/User Assign Peak Report

TestAmerica Denver

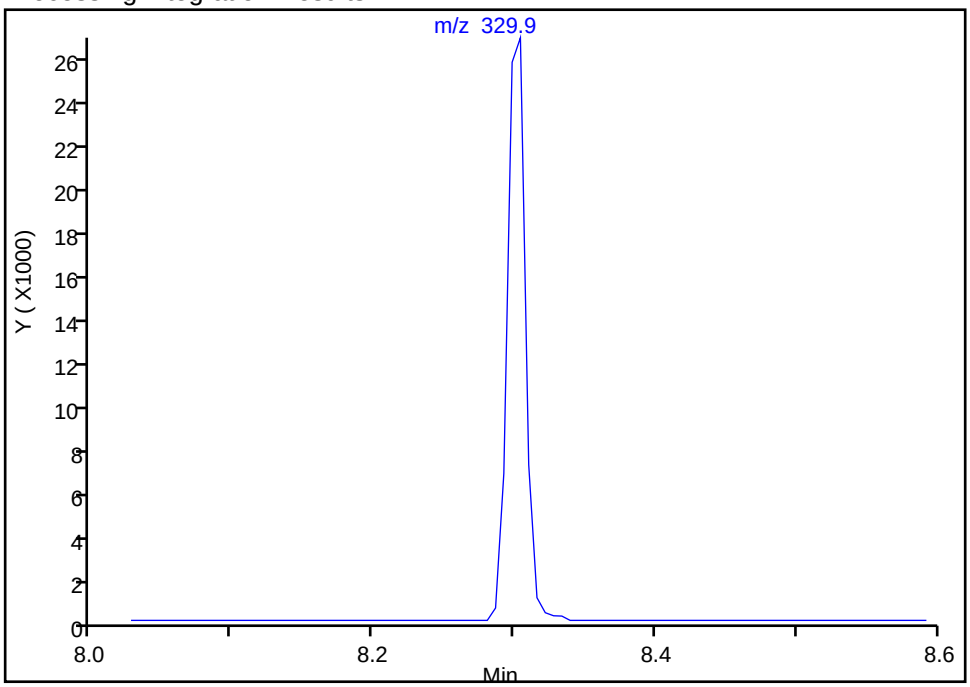
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34336.D
Injection Date: 28-Jun-2018 14:05:30 Instrument ID: SMS_G6
Lims ID: STD050 HSL
Client ID:
Operator ID: KIEKELD ALS Bottle#: 6 Worklist Smp#: 7
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625
Column: VF-5ms (0.50 mm) Detector MS SCAN

148 2,4,6 - Tribromophenol, CAS: 118-79-6

Signal: 1

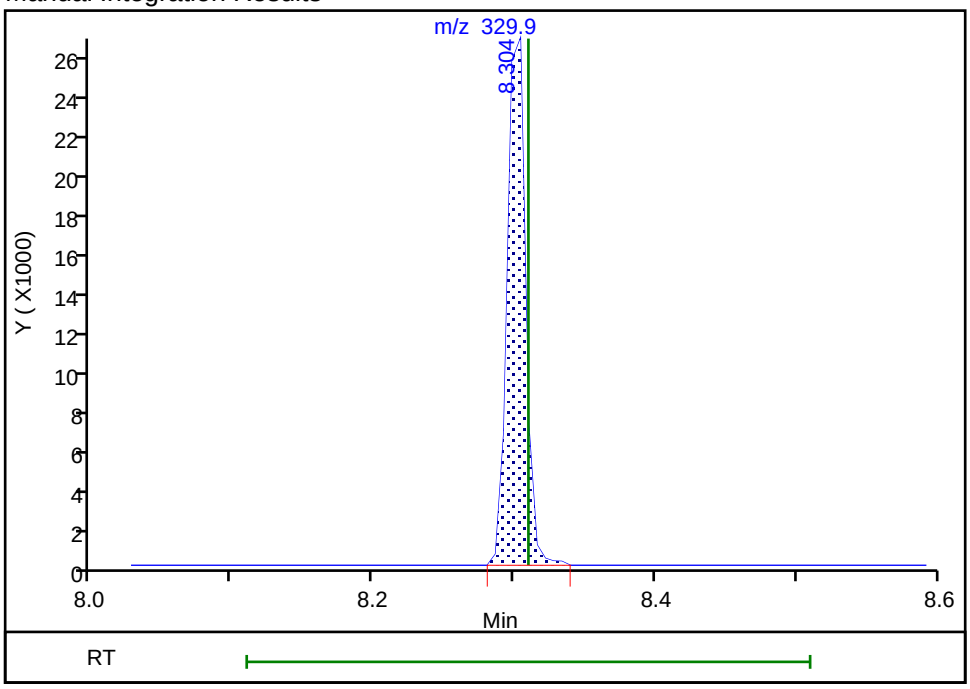
Not Detected
Expected RT: 8.31

Processing Integration Results



Manual Integration Results

RT: 8.30
Area: 24233
Amount: 51.991782
Amount Units: ug/ml



Reviewer: kiekeld, 28-Jun-2018 14:45:03
Audit Action: Assigned Compound ID Audit Reason: Assign Peak

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34337.D
Lims ID: STD120 HSL
Client ID:
Sample Type: IC Calib Level: 6
Inject. Date: 28-Jun-2018 14:32:30 ALS Bottle#: 7 Worklist Smp#: 8
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: STD120 HSL
Operator ID: KIEKELD Instrument ID: SMS_G6
Sublist: chrom-SMSG6_8270C*sub25

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 29-Jun-2018 08:23:15 Calib Date: 28-Jun-2018 19:58:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34349.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0303

First Level Reviewer: kiekeld Date: 29-Jun-2018 07:36:52

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
* 1 1,4-Dichlorobenzene-d4	152	4.575	4.575	0.000	94	46264	40.0	40.0	
* 2 Naphthalene-d8	136	5.781	5.786	-0.005	99	175448	40.0	40.0	
* 3 Acenaphthene-d10	164	7.516	7.522	-0.006	93	92459	40.0	40.0	
* 4 Phenanthrene-d10	188	9.004	9.010	-0.006	97	163456	40.0	40.0	
* 5 Chrysene-d12	240	12.945	12.957	-0.012	99	153710	40.0	40.0	
* 6 Perylene-d12	264	16.774	16.792	-0.018	98	151665	40.0	40.0	
$ 7 2-Fluorophenol	112	3.428	3.428	0.000	90	200872	120.0	119.7	
$ 8 Phenol-d5	99	4.204	4.204	0.000	97	249888	120.0	118.5	
$ 9 Nitrobenzene-d5	82	5.081	5.081	0.000	88	211259	120.0	118.6	
$ 11 2-Fluorobiphenyl	172	6.840	6.839	0.001	99	407089	120.0	120.0	
$ 12 2,4,6-Tribromophenol	330	8.304	8.310	-0.006	93	56625	120.0	122.3	
$ 13 Terphenyl-d14	244	10.904	10.910	-0.006	98	440210	120.0	119.5	
20 1,4-Dioxane	88	2.169	2.175	-0.006	95	83645	120.0	121.1	
21 N-Nitrosodimethylamine	74	2.369	2.369	0.000	94	125961	120.0	118.9	
22 Pyridine	79	2.416	2.422	-0.006	96	425666	240.0	234.0	
34 Phenol	94	4.222	4.222	0.000	99	259789	120.0	118.9	
35 Aniline	93	4.269	4.269	0.000	99	317063	120.0	117.7	
36 Alpha Methyl Styrene	118	4.322	4.322	0.000	91	208076	120.0	117.9	
37 Bis(2-chloroethyl)ether	93	4.310	4.310	0.000	98	200032	120.0	118.3	
39 n-Decane	43	4.422	4.422	0.000	91	191301	120.0	117.4	
41 2-Chlorophenol	128	4.387	4.387	0.000	96	213671	120.0	119.5	
42 1,3-Dichlorobenzene	146	4.528	4.534	-0.006	99	235801	120.0	118.9	
43 1,4-Dichlorobenzene	146	4.593	4.592	0.001	96	238674	120.0	119.9	
44 Benzyl alcohol	108	4.681	4.681	0.000	95	141334	120.0	118.1	
45 1,2-Dichlorobenzene	146	4.734	4.739	-0.005	99	224179	120.0	118.2	
46 2-Methylphenol	108	4.775	4.775	0.000	93	193689	120.0	117.1	
47 2,2'-oxybis[1-chloropropan	45	4.810	4.810	0.000	96	266365	120.0	114.8	
48 Indene	116	4.822	4.822	0.000	91	667998	240.0	234.0	
49 3 & 4 Methylphenol	108	4.922	4.922	0.000	89	202472	120.0	117.9	
50 3-Methylphenol	108	4.922	4.922	0.000	91	202472	120.0	117.9	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
51 N-Nitrosodi-n-propylamine	70	4.928	4.934	-0.006	91	136527	120.0	114.9	
52 4-Methylphenol	108	4.922	4.922	0.000	91	202472	120.0	117.9	
55 Acetophenone	105	4.934	4.934	0.000	97	268990	120.0	114.7	
58 Hexachloroethane	117	5.057	5.063	-0.006	96	90693	120.0	117.4	
60 Nitrobenzene	77	5.099	5.098	0.001	87	205276	120.0	121.0	
63 Isophorone	82	5.328	5.328	0.000	99	376619	120.0	119.8	
65 2-Nitrophenol	139	5.404	5.410	-0.006	91	113708	120.0	121.3	
66 2,4-Dimethylphenol	107	5.428	5.434	-0.006	94	197399	120.0	119.1	
69 Bis(2-chloroethoxy)methane	93	5.516	5.522	-0.006	99	237471	120.0	119.8	
70 Benzoic acid	105	5.546	5.534	0.012	85	325365	240.0	245.9	
71 3,5-Dimethylphenol	107	5.557	5.557	0.000	87	199866	120.0	121.8	
75 2,4-Dichlorophenol	162	5.634	5.639	-0.005	92	177013	120.0	122.8	
77 1,2,4-Trichlorobenzene	180	5.728	5.728	0.000	94	182324	120.0	121.5	
79 Naphthalene	128	5.804	5.804	0.000	97	580958	120.0	120.4	
80 4-Chloroaniline	127	5.840	5.839	0.001	98	259422	120.0	120.7	
81 2,6-Dichlorophenol	162	5.857	5.857	0.000	96	173021	120.0	120.4	
83 Hexachlorobutadiene	225	5.928	5.933	-0.005	97	95280	120.0	120.1	
87 Caprolactam	55	6.169	6.163	0.006	81	89593	120.0	117.6	M
90 4-Chloro-3-methylphenol	107	6.304	6.310	-0.006	96	170631	120.0	120.3	
94 2-Methylnaphthalene	142	6.481	6.486	-0.005	93	399097	120.0	119.6	
96 1-Methylnaphthalene	142	6.581	6.586	-0.005	94	379971	120.0	120.0	
97 Hexachlorocyclopentadiene	237	6.651	6.651	0.000	95	114542	120.0	123.2	
98 1,2,4,5-Tetrachlorobenzene	216	6.651	6.657	-0.006	97	165436	120.0	118.5	
101 2,4,6-Trichlorophenol	196	6.757	6.757	0.000	92	118789	120.0	120.8	
102 2,3-Dichlorobenzenamine	161	6.751	6.757	-0.006	97	202670	120.0	117.9	
103 2,4,5-Trichlorophenol	196	6.793	6.792	0.001	96	129548	120.0	122.1	
105 1,1'-Biphenyl	154	6.940	6.945	-0.005	94	466853	120.0	120.0	
107 2-Chloronaphthalene	162	6.963	6.969	-0.006	95	369938	120.0	119.6	
109 2-Nitroaniline	65	7.051	7.051	0.000	91	110072	120.0	121.4	
112 Dimethyl phthalate	163	7.228	7.233	-0.005	99	413845	120.0	118.3	
113 1,3-Dinitrobenzene	168	7.257	7.257	0.000	97	75773	120.0	127.7	
114 2,6-Dinitrotoluene	165	7.287	7.286	0.001	97	100069	120.0	122.0	
115 Acenaphthylene	152	7.381	7.380	0.001	98	564044	120.0	119.8	
116 3-Nitroaniline	138	7.457	7.457	0.000	98	123508	120.0	121.3	
117 Acenaphthene	153	7.551	7.557	-0.006	93	360819	120.0	118.8	
118 2,4-Dinitrophenol	184	7.563	7.563	0.000	86	135733	240.0	242.0	
120 4-Nitrophenol	109	7.616	7.622	-0.006	88	119388	240.0	239.4	
122 2,4-Dinitrotoluene	165	7.692	7.692	0.000	95	133466	120.0	121.2	
123 Dibenzofuran	168	7.722	7.727	-0.005	97	520965	120.0	118.8	
127 2,3,4,6-Tetrachlorophenol	232	7.845	7.845	0.000	73	104739	120.0	122.3	
128 Hexadecane	57	7.951	7.957	-0.006	92	248389	120.0	118.4	
130 Diethyl phthalate	149	7.928	7.933	-0.005	99	415465	120.0	118.6	
135 4-Chlorophenyl phenyl ethe	204	8.051	8.057	-0.006	92	191661	120.0	118.5	
136 Fluorene	166	8.063	8.069	-0.006	96	411169	120.0	117.8	
139 4-Nitroaniline	138	8.075	8.075	0.000	93	130142	120.0	121.8	
140 4,6-Dinitro-2-methylphenol	198	8.104	8.110	-0.006	87	151398	240.0	243.7	
142 Diphenylamine	169	8.169	8.175	-0.006	96	304443	102.0	100.0	
143 N-Nitrosodiphenylamine	169	8.169	8.175	-0.006	61	304443	120.0	118.7	
144 Azobenzene	77	8.210	8.216	-0.006	99	408238	120.0	117.2	
145 1,2-Diphenylhydrazine	77	8.210	8.216	-0.006	100	408238	121.3	118.5	
148 2,4,6 - Tribromophenol	330	8.304	8.310	-0.006	93	56625	120.0	122.2	
157 4-Bromophenyl phenyl ether	248	8.545	8.551	-0.006	65	110004	120.0	120.1	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
158 Hexachlorobenzene	284	8.628	8.633	-0.005	94	117521	120.0	119.1	
160 Atrazine	200	8.692	8.698	-0.006	93	96286	120.0	117.0	
162 n-Octadecane	85	8.869	8.880	-0.011	96	113715	120.0	118.6	
164 Pentachlorophenol	266	8.816	8.822	-0.006	99	163911	240.0	242.1	
169 Phenanthrene	178	9.028	9.033	-0.005	98	601594	120.0	118.7	
170 Anthracene	178	9.081	9.086	-0.005	97	630147	120.0	118.9	
171 Carbazole	167	9.228	9.233	-0.005	95	596037	120.0	118.1	
172 Alachlor	188	9.369	9.374	-0.005	98	78211	120.0	119.8	
175 Di-n-butyl phthalate	149	9.569	9.580	-0.011	99	729086	120.0	120.2	
182 Fluoranthene	202	10.363	10.369	-0.005	98	638465	120.0	119.3	
185 Pyrene	202	10.681	10.692	-0.012	97	660961	120.0	119.7	
192 Famphur	218	11.645	11.651	-0.006	84	222407	120.0	118.4	
193 Butyl benzyl phthalate	149	11.763	11.774	-0.011	96	339279	120.0	121.6	
197 3,3'-Dichlorobenzidine	252	12.880	12.886	-0.006	74	219632	120.0	124.7	
198 Benzo[a]anthracene	228	12.922	12.933	-0.011	99	621908	120.0	121.1	
199 Bis(2-ethylhexyl) phthalat	149	13.098	13.110	-0.012	96	450575	120.0	122.0	
200 Chrysene	228	13.010	13.015	-0.005	98	593628	120.0	121.1	
202 Di-n-octyl phthalate	149	14.857	14.868	-0.011	99	805570	120.0	123.3	
204 Benzo[b]fluoranthene	252	15.715	15.721	-0.006	98	574938	120.0	124.0	
205 Benzo[k]fluoranthene	252	15.792	15.803	-0.011	99	584428	120.0	121.6	
207 Benzo[e]pyrene	252	16.474	16.486	-0.012	98	528104	120.0	122.7	
208 Benzo[a]pyrene	252	16.621	16.627	-0.006	78	571670	120.0	123.0	
214 Indeno[1,2,3-cd]pyrene	276	19.856	19.862	-0.006	98	508822	120.0	122.9	
215 Dibenz(a,h)anthracene	278	19.951	19.956	-0.006	94	513720	120.0	126.5	
216 Benzo[g,h,i]perylene	276	20.580	20.585	-0.005	97	545986	120.0	124.2	
S 218 Total Cresols	108				0			235.1	
S 219 Methyl Phenols,Total	108				0			235.1	

QC Flag Legend

Review Flags

M - Manually Integrated

Reagents:

MS-HSLA120_00036 Amount Added: 200.00 Units: uL

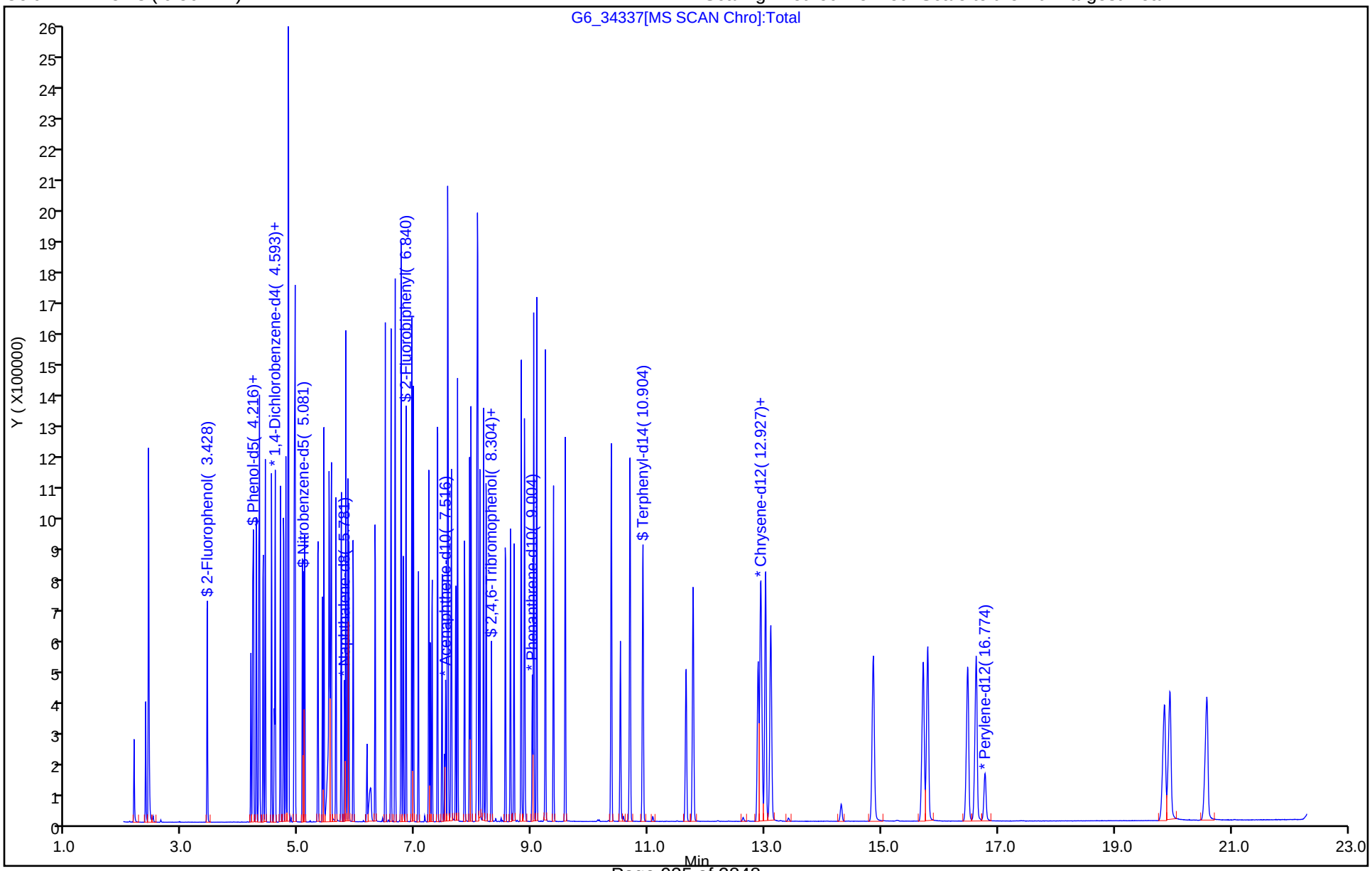
Report Date: 29-Jun-2018 08:23:16 Chrom Revision: 2.2 07-Jun-2018 07:41:54

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34337.D

Injection Date:	28-Jun-2018 14:32:30	Instrument ID:	SMS_G6	Operator ID:	KIEKELD
Lims ID:	STD120 HSL			Worklist Smp#:	8
Client ID:					
Injection Vol:	0.5 ul	Dil. Factor:	1.0000	ALS Bottle#:	7
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		

Column: VF-5ms (0.50 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1



Manual Integration/User Assign Peak Report

TestAmerica Denver

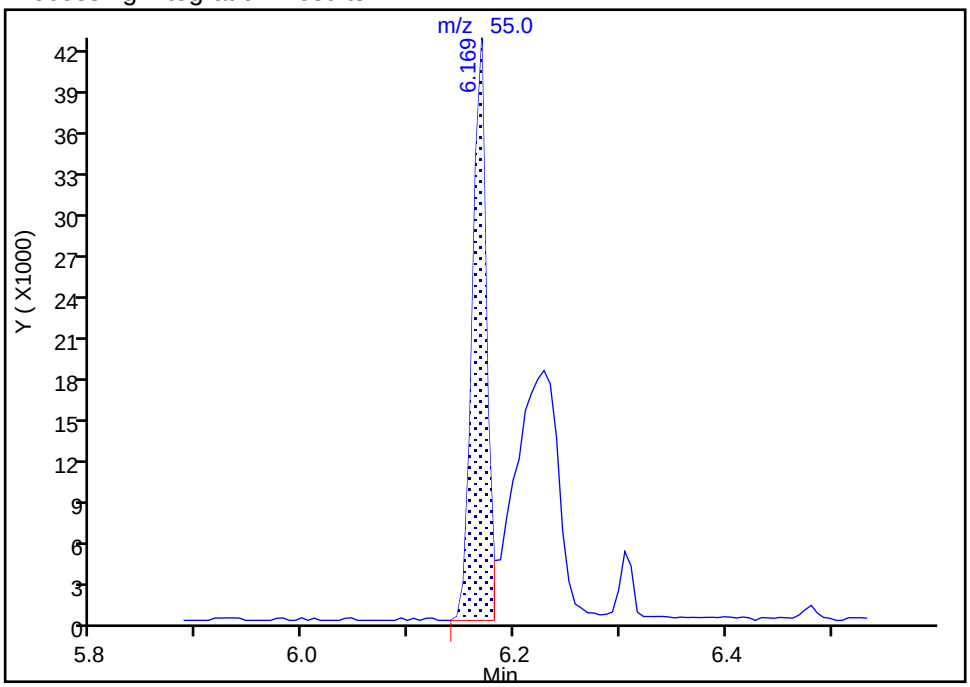
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34337.D
Injection Date: 28-Jun-2018 14:32:30 Instrument ID: SMS_G6
Lims ID: STD120 HSL
Client ID:
Operator ID: KIEKELD ALS Bottle#: 7 Worklist Smp#: 8
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625
Column: VF-5ms (0.50 mm) Detector MS SCAN

87 Caprolactam, CAS: 105-60-2

Signal: 1

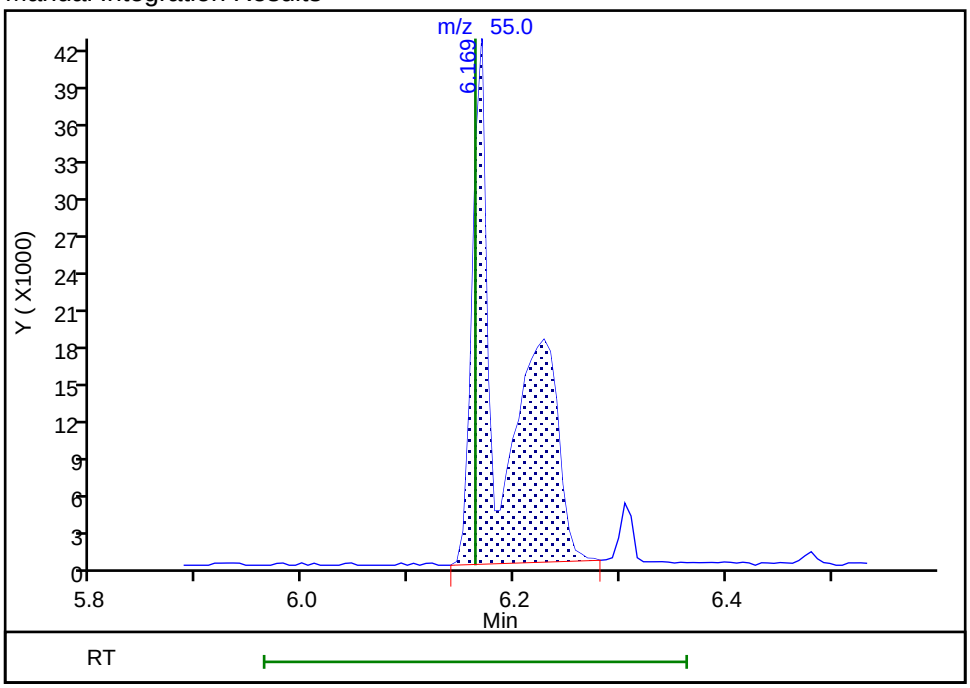
Processing Integration Results

RT: 6.17
Area: 39853
Amount: 66.410939
Amount Units: ug/ml



Manual Integration Results

RT: 6.17
Area: 89593
Amount: 117.5656
Amount Units: ug/ml



Reviewer: kiekeld, 29-Jun-2018 07:35:43
Audit Action: Manually Integrated Audit Reason: Split Peak

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34338.D
Lims ID: STD160 HSL
Client ID:
Sample Type: IC Calib Level: 7
Inject. Date: 28-Jun-2018 14:59:30 ALS Bottle#: 8 Worklist Smp#: 9
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: STD160 HSL
Operator ID: KIEKELD Instrument ID: SMS_G6
Sublist: chrom-SMSG6_8270C*sub25

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 29-Jun-2018 08:23:19 Calib Date: 28-Jun-2018 19:58:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34349.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0303

First Level Reviewer: kiekeld Date: 29-Jun-2018 07:38:37

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
* 1 1,4-Dichlorobenzene-d4	152	4.575	4.575	0.000	95	44502	40.0	40.0	
* 2 Naphthalene-d8	136	5.781	5.786	-0.005	99	172371	40.0	40.0	
* 3 Acenaphthene-d10	164	7.516	7.522	-0.006	95	90606	40.0	40.0	
* 4 Phenanthrene-d10	188	9.004	9.010	-0.006	98	160387	40.0	40.0	
* 5 Chrysene-d12	240	12.951	12.957	-0.006	99	150188	40.0	40.0	
* 6 Perylene-d12	264	16.780	16.792	-0.012	98	149384	40.0	40.0	
$ 7 2-Fluorophenol	112	3.428	3.428	0.000	90	256802	160.0	159.0	
$ 8 Phenol-d5	99	4.210	4.204	0.006	99	322270	160.0	158.9	
$ 9 Nitrobenzene-d5	82	5.081	5.081	0.000	88	272550	160.0	155.7	
$ 11 2-Fluorobiphenyl	172	6.839	6.839	0.000	99	522100	160.0	157.1	
$ 12 2,4,6-Tribromophenol	330	8.304	8.310	-0.006	93	73260	160.0	161.5	
$ 13 Terphenyl-d14	244	10.904	10.910	-0.006	98	574780	160.0	159.7	
20 1,4-Dioxane	88	2.175	2.175	0.000	95	104663	160.0	157.5	
21 N-Nitrosodimethylamine	74	2.375	2.369	0.006	94	163086	160.0	160.0	
22 Pyridine	79	2.422	2.422	0.000	96	549151	320.0	313.8	
34 Phenol	94	4.222	4.222	0.000	98	330778	160.0	157.4	
35 Aniline	93	4.269	4.269	0.000	99	410646	160.0	158.5	
36 Alpha Methyl Styrene	118	4.322	4.322	0.000	91	264344	160.0	155.7	
37 Bis(2-chloroethyl)ether	93	4.310	4.310	0.000	98	256103	160.0	157.4	
39 n-Decane	43	4.422	4.422	0.000	91	239608	160.0	152.8	
41 2-Chlorophenol	128	4.387	4.387	0.000	96	271682	160.0	157.9	
42 1,3-Dichlorobenzene	146	4.534	4.534	0.000	99	300867	160.0	157.7	
43 1,4-Dichlorobenzene	146	4.593	4.592	0.001	95	299454	160.0	156.4	
44 Benzyl alcohol	108	4.681	4.681	0.000	95	183668	160.0	159.5	
45 1,2-Dichlorobenzene	146	4.740	4.739	0.001	99	287372	160.0	157.6	
46 2-Methylphenol	108	4.775	4.775	0.000	93	251220	160.0	158.0	
47 2,2'-oxybis[1-chloropropan	45	4.810	4.810	0.000	95	334651	160.0	149.9	
48 Indene	116	4.822	4.822	0.000	91	833021	320.0	303.4	
49 3 & 4 Methylphenol	108	4.922	4.922	0.000	85	258799	160.0	156.7	
50 3-Methylphenol	108	4.922	4.922	0.000	91	258799	160.0	156.7	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
51 N-Nitrosodi-n-propylamine	70	4.934	4.934	0.000	90	173070	160.0	151.4	
52 4-Methylphenol	108	4.922	4.922	0.000	92	258799	160.0	156.7	
55 Acetophenone	105	4.934	4.934	0.000	94	343756	160.0	152.3	
58 Hexachloroethane	117	5.057	5.063	-0.006	95	114829	160.0	154.6	
60 Nitrobenzene	77	5.098	5.098	0.000	88	260418	160.0	156.3	
63 Isophorone	82	5.328	5.328	0.000	99	483779	160.0	156.6	
65 2-Nitrophenol	139	5.404	5.410	-0.006	92	150921	160.0	163.8	
66 2,4-Dimethylphenol	107	5.428	5.434	-0.006	94	255529	160.0	156.9	
69 Bis(2-chloroethoxy)methane	93	5.522	5.522	0.000	99	304700	160.0	156.4	
70 Benzoic acid	105	5.557	5.534	0.023	65	429215	320.0	327.9	
71 3,5-Dimethylphenol	107	5.557	5.557	0.000	93	253815	160.0	157.4	
75 2,4-Dichlorophenol	162	5.634	5.639	-0.005	93	227265	160.0	160.5	
77 1,2,4-Trichlorobenzene	180	5.728	5.728	0.000	94	232931	160.0	157.9	
79 Naphthalene	128	5.804	5.804	0.000	97	748510	160.0	157.9	
80 4-Chloroaniline	127	5.840	5.839	0.001	97	335148	160.0	158.7	
81 2,6-Dichlorophenol	162	5.857	5.857	0.000	97	222581	160.0	157.7	
83 Hexachlorobutadiene	225	5.934	5.933	0.001	97	121283	160.0	155.6	
87 Caprolactam	55	6.175	6.163	0.012	83	122273	160.0	163.3	M
90 4-Chloro-3-methylphenol	107	6.310	6.310	0.000	95	221025	160.0	158.7	
94 2-Methylnaphthalene	142	6.481	6.486	-0.005	93	514185	160.0	156.8	
96 1-Methylnaphthalene	142	6.581	6.586	-0.005	94	488709	160.0	157.0	
97 Hexachlorocyclopentadiene	237	6.651	6.651	0.000	95	143777	160.0	157.9	
98 1,2,4,5-Tetrachlorobenzene	216	6.651	6.657	-0.006	97	210764	160.0	153.7	
101 2,4,6-Trichlorophenol	196	6.757	6.757	0.000	81	153265	160.0	159.0	
102 2,3-Dichlorobenzenamine	161	6.751	6.757	-0.006	93	260344	160.0	154.5	
103 2,4,5-Trichlorophenol	196	6.792	6.792	0.000	96	167647	160.0	161.2	
105 1,1'-Biphenyl	154	6.939	6.945	-0.006	94	594734	160.0	156.0	
107 2-Chloronaphthalene	162	6.963	6.969	-0.006	96	475839	160.0	157.0	
109 2-Nitroaniline	65	7.051	7.051	0.000	90	141970	160.0	159.8	
112 Dimethyl phthalate	163	7.234	7.233	0.001	100	534319	160.0	155.9	
113 1,3-Dinitrobenzene	168	7.257	7.257	0.000	91	98382	160.0	169.2	
114 2,6-Dinitrotoluene	165	7.286	7.286	0.000	97	130806	160.0	162.8	
115 Acenaphthylene	152	7.381	7.380	0.001	98	726221	160.0	157.3	
116 3-Nitroaniline	138	7.457	7.457	0.000	98	162462	160.0	162.8	
117 Acenaphthene	153	7.551	7.557	-0.006	93	454918	160.0	152.9	
118 2,4-Dinitrophenol	184	7.563	7.563	0.000	88	179819	320.0	325.1	
120 4-Nitrophenol	109	7.622	7.622	0.000	86	153913	320.0	315.0	
122 2,4-Dinitrotoluene	165	7.692	7.692	0.000	95	174172	160.0	161.4	
123 Dibenzofuran	168	7.722	7.727	-0.005	97	671243	160.0	156.3	
127 2,3,4,6-Tetrachlorophenol	232	7.845	7.845	0.000	73	134476	160.0	160.2	
128 Hexadecane	57	7.951	7.957	-0.006	93	315740	160.0	153.6	
130 Diethyl phthalate	149	7.934	7.933	0.001	99	530706	160.0	154.7	
135 4-Chlorophenyl phenyl ethe	204	8.057	8.057	0.000	89	243631	160.0	153.7	
136 Fluorene	166	8.069	8.069	0.000	96	525408	160.0	153.6	
139 4-Nitroaniline	138	8.075	8.075	0.000	93	167973	160.0	160.4	
140 4,6-Dinitro-2-methylphenol	198	8.110	8.110	0.000	89	194443	320.0	317.7	
142 Diphenylamine	169	8.169	8.175	-0.006	96	391952	136.0	131.3	
143 N-Nitrosodiphenylamine	169	8.169	8.175	-0.006	61	391952	160.0	155.8	
144 Azobenzene	77	8.216	8.216	0.000	97	527050	160.0	154.5	
145 1,2-Diphenylhydrazine	77	8.216	8.216	0.000	99	527050	161.8	156.2	
148 2,4,6 - Tribromophenol	330	8.304	8.310	-0.006	91	73260	160.0	161.4	
157 4-Bromophenyl phenyl ether	248	8.545	8.551	-0.006	65	142506	160.0	158.6	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
158 Hexachlorobenzene	284	8.633	8.633	0.000	94	150833	160.0	155.8	
160 Atrazine	200	8.692	8.698	-0.006	93	122159	160.0	151.3	
162 n-Octadecane	85	8.875	8.880	-0.005	96	145322	160.0	154.5	
164 Pentachlorophenol	266	8.816	8.822	-0.006	99	208083	320.0	312.5	
169 Phenanthrene	178	9.033	9.033	0.000	97	770161	160.0	154.8	
170 Anthracene	178	9.080	9.086	-0.006	98	805542	160.0	154.9	
171 Carbazole	167	9.233	9.233	0.000	95	768654	160.0	155.2	
172 Alachlor	188	9.369	9.374	-0.005	98	99171	160.0	154.8	
175 Di-n-butyl phthalate	149	9.575	9.580	-0.005	99	930295	160.0	156.3	
182 Fluoranthene	202	10.363	10.369	-0.005	98	822453	160.0	156.6	
185 Pyrene	202	10.686	10.692	-0.006	97	851762	160.0	157.9	
192 Famphur	218	11.645	11.651	-0.006	84	273839	160.0	149.2	
193 Butyl benzyl phthalate	149	11.769	11.774	-0.005	96	438602	160.0	160.9	
197 3,3'-Dichlorobenzidine	252	12.886	12.886	0.000	74	277798	160.0	161.4	
198 Benzo[a]anthracene	228	12.927	12.933	-0.006	99	805248	160.0	160.4	
199 Bis(2-ethylhexyl) phthalat	149	13.098	13.110	-0.012	96	580228	160.0	160.7	
200 Chrysene	228	13.016	13.015	0.001	98	768388	160.0	160.5	
202 Di-n-octyl phthalate	149	14.857	14.868	-0.011	98	1042309	160.0	163.2	
204 Benzo[b]fluoranthene	252	15.721	15.721	0.000	98	752699	160.0	164.8	
205 Benzo[k]fluoranthene	252	15.804	15.803	0.001	99	767736	160.0	162.1	
207 Benzo[e]pyrene	252	16.486	16.486	0.000	98	691528	160.0	163.2	
208 Benzo[a]pyrene	252	16.633	16.627	0.006	78	751808	160.0	164.3	
214 Indeno[1,2,3-cd]pyrene	276	19.862	19.862	0.000	98	678576	160.0	167.7	
215 Dibenz(a,h)anthracene	278	19.956	19.956	0.000	93	678712	160.0	169.7	
216 Benzo[g,h,i]perylene	276	20.592	20.585	0.007	97	713337	160.0	164.8	
S 218 Total Cresols	108				0			314.7	
S 219 Methyl Phenols,Total	108				0			314.7	

QC Flag Legend

Review Flags

M - Manually Integrated

Reagents:

MS-HSLA160_00036 Amount Added: 200.00 Units: uL

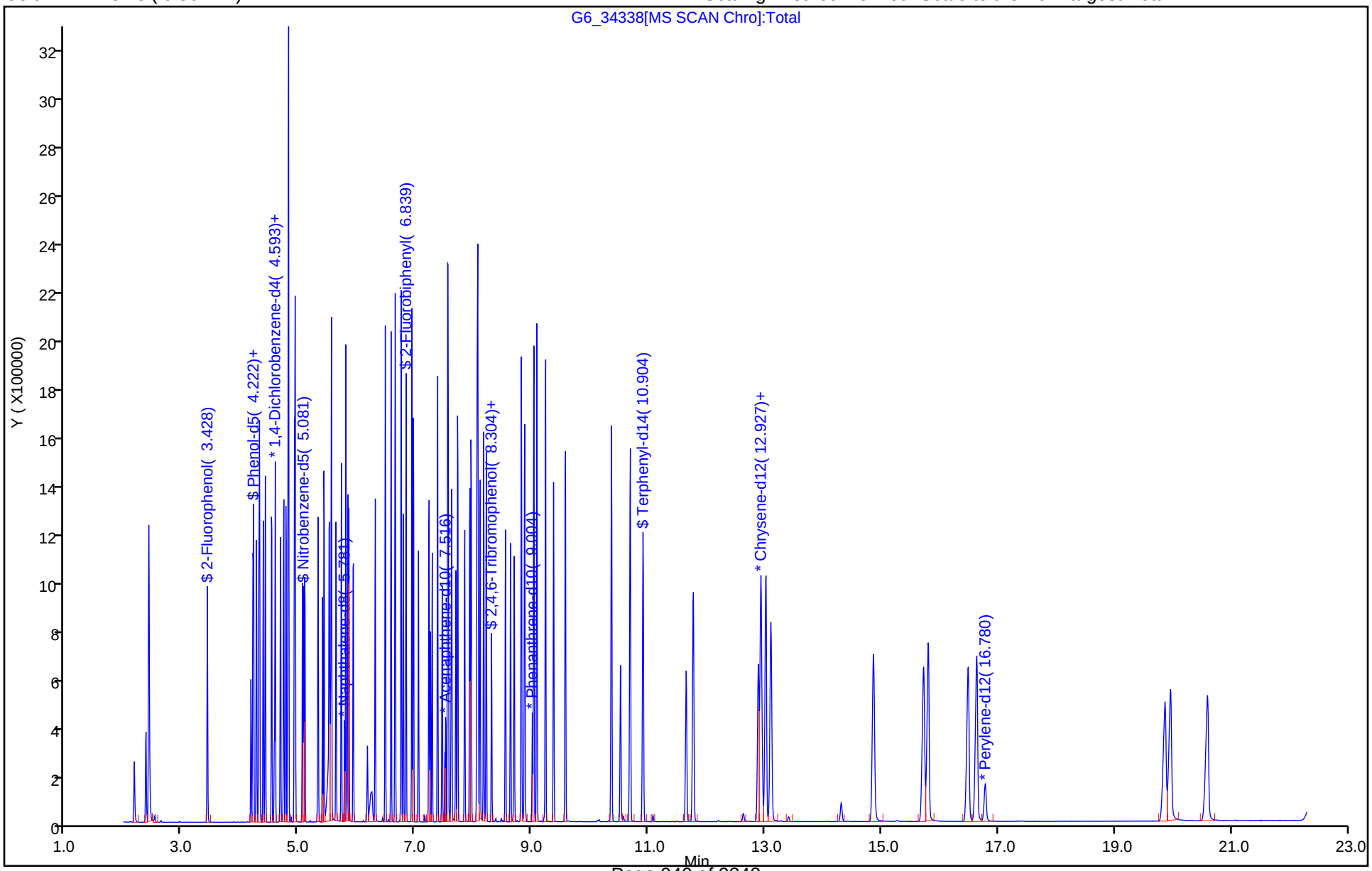
Report Date: 29-Jun-2018 08:23:21 Chrom Revision: 2.2 07-Jun-2018 07:41:54

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34338.D

Injection Date:	28-Jun-2018 14:59:30	Instrument ID:	SMS_G6	Operator ID:	KIEKELD
Lims ID:	STD160 HSL			Worklist Smp#:	9
Client ID:					
Injection Vol:	0.5 ul	Dil. Factor:	1.0000	ALS Bottle#:	8
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		

Column: VF-5ms (0.50 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1



Manual Integration/User Assign Peak Report

TestAmerica Denver

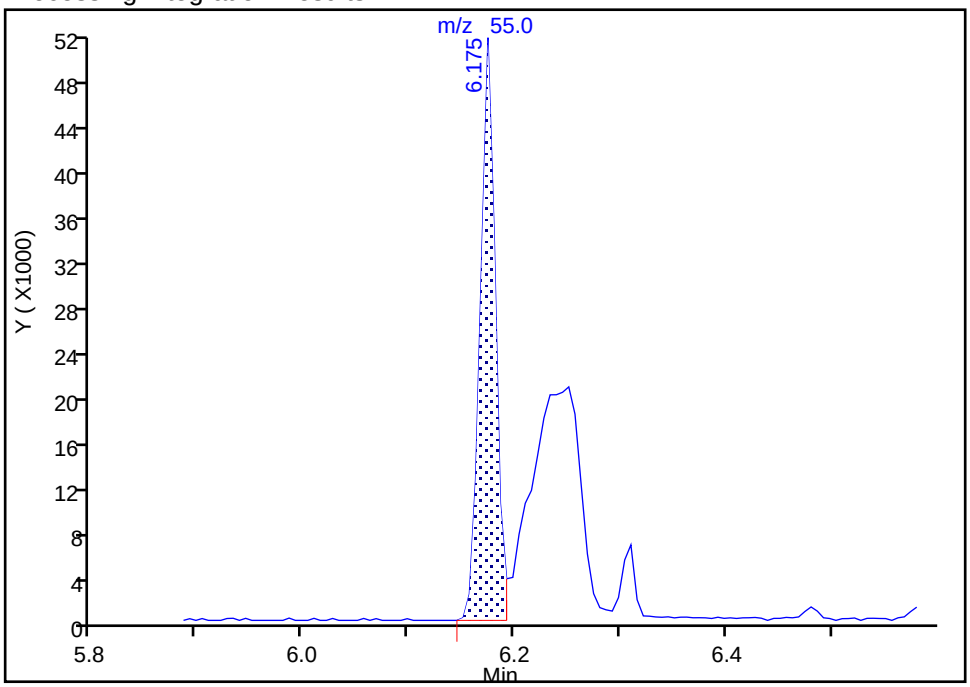
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34338.D
Injection Date: 28-Jun-2018 14:59:30 Instrument ID: SMS_G6
Lims ID: STD160 HSL
Client ID:
Operator ID: KIEKELD ALS Bottle#: 8 Worklist Smp#: 9
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625
Column: VF-5ms (0.50 mm) Detector MS SCAN

87 Caprolactam, CAS: 105-60-2

Signal: 1

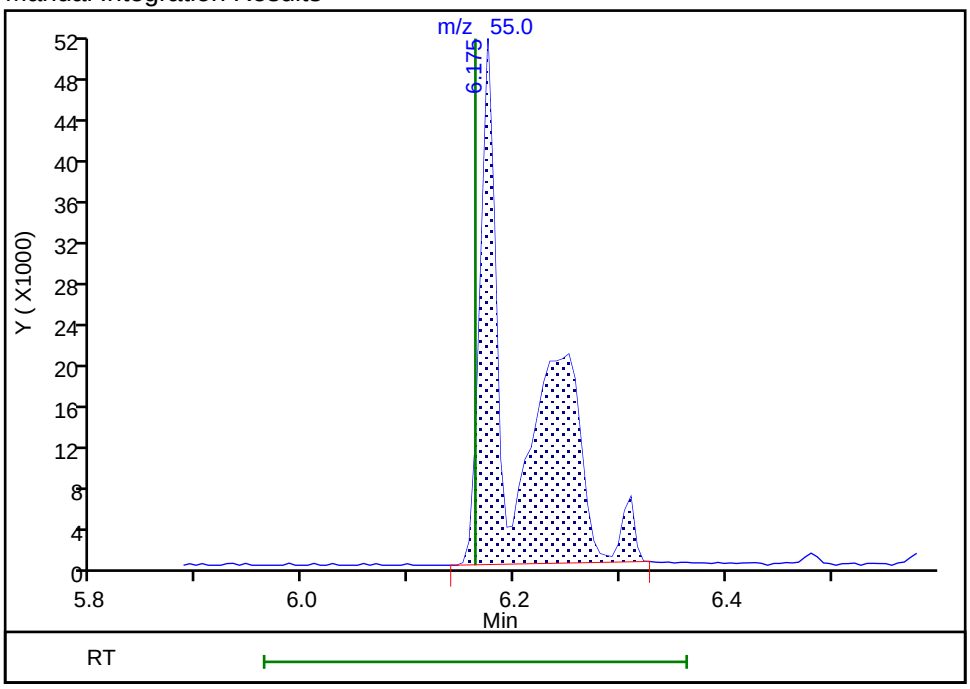
Processing Integration Results

RT: 6.17
Area: 52062
Amount: 81.286385
Amount Units: ug/ml



Manual Integration Results

RT: 6.17
Area: 122273
Amount: 163.3130
Amount Units: ug/ml



Reviewer: kiekeld, 29-Jun-2018 07:37:37
Audit Action: Manually Integrated Audit Reason: Split Peak

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34339.D
Lims ID: STD200 HSL
Client ID:
Sample Type: IC Calib Level: 8
Inject. Date: 28-Jun-2018 15:26:30 ALS Bottle#: 9 Worklist Smp#: 10
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: STD200 HSL
Operator ID: KIEKELD Instrument ID: SMS_G6
Sublist: chrom-SMSG6_8270C*sub25

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 29-Jun-2018 08:23:25 Calib Date: 28-Jun-2018 19:58:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34349.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0303

First Level Reviewer: kiekeld Date: 29-Jun-2018 07:43:41

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
* 1 1,4-Dichlorobenzene-d4	152	4.575	4.575	0.000	92	44682	40.0	40.0	a
* 2 Naphthalene-d8	136	5.787	5.786	0.001	99	175789	40.0	40.0	
* 3 Acenaphthene-d10	164	7.516	7.522	-0.006	94	91907	40.0	40.0	
* 4 Phenanthrene-d10	188	9.004	9.010	-0.006	98	162839	40.0	40.0	
* 5 Chrysene-d12	240	12.951	12.957	-0.006	99	151599	40.0	40.0	
* 6 Perylene-d12	264	16.780	16.792	-0.012	98	150144	40.0	40.0	
$ 7 2-Fluorophenol	112	3.428	3.428	0.000	90	323033	200.0	199.2	
$ 8 Phenol-d5	99	4.210	4.204	0.006	98	403456	200.0	198.1	
$ 9 Nitrobenzene-d5	82	5.081	5.081	0.000	88	331780	200.0	185.9	
$ 11 2-Fluorobiphenyl	172	6.840	6.839	0.001	99	643549	200.0	190.9	
$ 12 2,4,6-Tribromophenol	330	8.304	8.310	-0.006	93	91707	200.0	199.3	
$ 13 Terphenyl-d14	244	10.904	10.910	-0.006	98	713659	200.0	196.5	
20 1,4-Dioxane	88	2.175	2.175	0.000	95	130860	200.0	196.2	
21 N-Nitrosodimethylamine	74	2.375	2.369	0.006	95	207646	200.0	202.9	
22 Pyridine	79	2.422	2.422	0.000	96	688127	400.0	391.6	
34 Phenol	94	4.222	4.222	0.000	98	414298	200.0	196.3	
35 Aniline	93	4.269	4.269	0.000	99	515755	200.0	198.3	
36 Alpha Methyl Styrene	118	4.322	4.322	0.000	91	331391	200.0	194.4	
37 Bis(2-chloroethyl)ether	93	4.310	4.310	0.000	98	314792	200.0	192.7	
39 n-Decane	43	4.422	4.422	0.000	91	297980	200.0	189.3	
41 2-Chlorophenol	128	4.387	4.387	0.000	96	339605	200.0	196.6	
42 1,3-Dichlorobenzene	146	4.534	4.534	0.000	99	374394	200.0	195.5	
43 1,4-Dichlorobenzene	146	4.593	4.592	0.001	96	376150	200.0	195.6	
44 Benzyl alcohol	108	4.687	4.681	0.006	96	229909	200.0	198.9	
45 1,2-Dichlorobenzene	146	4.740	4.739	0.001	99	357424	200.0	195.2	
46 2-Methylphenol	108	4.781	4.775	0.006	92	312968	200.0	196.0	
47 2,2'-oxybis[1-chloropropan	45	4.810	4.810	0.000	96	410633	200.0	183.2	
48 Indene	116	4.822	4.822	0.000	92	1014988	400.0	368.2	
49 3 & 4 Methylphenol	108	4.922	4.922	0.000	83	323944	200.0	195.4	
50 3-Methylphenol	108	4.922	4.922	0.000	92	323944	200.0	195.4	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
51 N-Nitrosodi-n-propylamine	70	4.934	4.934	0.000	90	213952	200.0	186.5	
52 4-Methylphenol	108	4.922	4.922	0.000	94	323944	200.0	195.4	
55 Acetophenone	105	4.940	4.934	0.006	97	424479	200.0	187.3	
58 Hexachloroethane	117	5.063	5.063	0.000	95	143976	200.0	193.0	
60 Nitrobenzene	77	5.104	5.098	0.006	86	325964	200.0	191.8	
63 Isophorone	82	5.334	5.328	0.006	99	603117	200.0	191.5	
65 2-Nitrophenol	139	5.404	5.410	-0.006	92	188378	200.0	200.5	
66 2,4-Dimethylphenol	107	5.434	5.434	0.000	93	317535	200.0	191.2	
69 Bis(2-chloroethoxy)methane	93	5.522	5.522	0.000	98	378857	200.0	190.7	
70 Benzoic acid	105	5.575	5.534	0.041	89	553943	400.0	413.1	
71 3,5-Dimethylphenol	107	5.557	5.557	0.000	94	315411	200.0	191.8	
75 2,4-Dichlorophenol	162	5.640	5.639	0.001	91	283989	200.0	196.6	
77 1,2,4-Trichlorobenzene	180	5.728	5.728	0.000	94	291669	200.0	193.9	
79 Naphthalene	128	5.804	5.804	0.000	97	926566	200.0	191.6	
80 4-Chloroaniline	127	5.846	5.839	0.007	98	414407	200.0	192.5	
81 2,6-Dichlorophenol	162	5.857	5.857	0.000	97	281118	200.0	195.3	
83 Hexachlorobutadiene	225	5.934	5.933	0.001	97	150506	200.0	189.3	
87 Caprolactam	55	6.181	6.163	0.018	83	154894	200.0	202.9	M
90 4-Chloro-3-methylphenol	107	6.310	6.310	0.000	95	271214	200.0	190.9	
94 2-Methylnaphthalene	142	6.481	6.486	-0.005	94	640689	200.0	191.6	
96 1-Methylnaphthalene	142	6.581	6.586	-0.005	94	600731	200.0	189.3	
97 Hexachlorocyclopentadiene	237	6.651	6.651	0.000	95	177010	200.0	191.6	
98 1,2,4,5-Tetrachlorobenzene	216	6.657	6.657	0.000	97	259975	200.0	185.9	
101 2,4,6-Trichlorophenol	196	6.757	6.757	0.000	92	186335	200.0	190.6	
102 2,3-Dichlorobenzenamine	161	6.751	6.757	-0.006	97	320645	200.0	187.6	
103 2,4,5-Trichlorophenol	196	6.793	6.792	0.001	96	209846	200.0	198.9	
105 1,1'-Biphenyl	154	6.940	6.945	-0.005	94	733439	200.0	189.7	
107 2-Chloronaphthalene	162	6.969	6.969	0.000	94	595447	200.0	193.7	
109 2-Nitroaniline	65	7.051	7.051	0.000	90	176478	200.0	195.8	
112 Dimethyl phthalate	163	7.234	7.233	0.001	99	656979	200.0	189.0	
113 1,3-Dinitrobenzene	168	7.257	7.257	0.000	90	124771	200.0	211.5	
114 2,6-Dinitrotoluene	165	7.287	7.286	0.001	97	163418	200.0	200.5	
115 Acenaphthylene	152	7.381	7.380	0.001	98	901886	200.0	192.6	
116 3-Nitroaniline	138	7.463	7.457	0.006	97	201810	200.0	199.4	
117 Acenaphthene	153	7.551	7.557	-0.006	94	566504	200.0	187.7	
118 2,4-Dinitrophenol	184	7.569	7.563	0.006	91	227029	400.0	403.2	
120 4-Nitrophenol	109	7.628	7.622	0.006	85	190500	400.0	384.4	
122 2,4-Dinitrotoluene	165	7.698	7.692	0.006	96	219556	200.0	200.6	
123 Dibenzofuran	168	7.722	7.727	-0.005	97	826710	200.0	189.7	
127 2,3,4,6-Tetrachlorophenol	232	7.845	7.845	0.000	72	171240	200.0	201.1	
128 Hexadecane	57	7.951	7.957	-0.006	93	382032	200.0	183.3	
130 Diethyl phthalate	149	7.934	7.933	0.001	99	653510	200.0	187.7	
135 4-Chlorophenyl phenyl ethe	204	8.057	8.057	0.000	89	303639	200.0	188.8	
136 Fluorene	166	8.069	8.069	0.000	94	640507	200.0	184.6	
139 4-Nitroaniline	138	8.081	8.075	0.006	92	213028	200.0	200.6	
140 4,6-Dinitro-2-methylphenol	198	8.110	8.110	0.000	89	249144	400.0	399.9	
142 Diphenylamine	169	8.169	8.175	-0.006	96	485393	170.0	160.3	
143 N-Nitrosodiphenylamine	169	8.169	8.175	-0.006	61	485393	200.0	190.0	
144 Azobenzene	77	8.216	8.216	0.000	97	649965	200.0	187.8	
145 1,2-Diphenylhydrazine	77	8.216	8.216	0.000	99	649965	202.2	189.9	
148 2,4,6 - Tribromophenol	330	8.304	8.310	-0.006	91	91707	200.0	199.2	
157 4-Bromophenyl phenyl ether	248	8.545	8.551	-0.006	65	175117	200.0	191.9	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
158 Hexachlorobenzene	284	8.634	8.633	0.001	94	186761	200.0	190.0	
160 Atrazine	200	8.698	8.698	0.000	93	147783	200.0	180.3	
162 n-Octadecane	85	8.875	8.880	-0.005	96	177913	200.0	186.3	
164 Pentachlorophenol	266	8.822	8.822	0.000	99	259064	400.0	382.7	
169 Phenanthrene	178	9.034	9.033	0.001	97	955230	200.0	189.2	
170 Anthracene	178	9.087	9.086	0.001	97	992684	200.0	188.0	
171 Carbazole	167	9.234	9.233	0.001	95	952442	200.0	189.4	
172 Alachlor	188	9.369	9.374	-0.005	99	124624	200.0	191.5	
175 Di-n-butyl phthalate	149	9.575	9.580	-0.005	99	1150620	200.0	190.4	
182 Fluoranthene	202	10.363	10.369	-0.005	98	1022876	200.0	191.8	
185 Pyrene	202	10.686	10.692	-0.006	97	1059927	200.0	194.7	
192 Famphur	218	11.645	11.651	-0.006	84	319161	200.0	172.2	
193 Butyl benzyl phthalate	149	11.769	11.774	-0.005	96	548996	200.0	199.5	
197 3,3'-Dichlorobenzidine	252	12.886	12.886	0.000	74	337416	200.0	194.2	
198 Benzo[a]anthracene	228	12.933	12.933	0.000	99	1013026	200.0	199.9	
199 Bis(2-ethylhexyl) phthalat	149	13.098	13.110	-0.012	96	726619	200.0	199.4	
200 Chrysene	228	13.016	13.015	0.001	98	966516	200.0	200.0	
202 Di-n-octyl phthalate	149	14.863	14.868	-0.005	99	1319433	200.0	204.7	
204 Benzo[b]fluoranthene	252	15.727	15.721	0.006	98	956142	200.0	208.2	
205 Benzo[k]fluoranthene	252	15.804	15.803	0.001	99	953337	200.0	200.3	
207 Benzo[e]pyrene	252	16.492	16.486	0.006	98	868391	200.0	203.9	
208 Benzo[a]pyrene	252	16.639	16.627	0.012	78	935573	200.0	203.4	
214 Indeno[1,2,3-cd]pyrene	276	19.874	19.862	0.012	98	852609	200.0	208.8	
215 Dibenz(a,h)anthracene	278	19.968	19.956	0.012	94	834367	200.0	207.5	
216 Benzo[g,h,i]perylene	276	20.603	20.585	0.018	97	894367	200.0	205.6	
S 218 Total Cresols	108				0			391.4	
S 219 Methyl Phenols,Total	108				0			391.4	

QC Flag Legend

Review Flags

M - Manually Integrated

a - User Assigned ID

Reagents:

MS-HSLA200_00036 Amount Added: 200.00 Units: uL

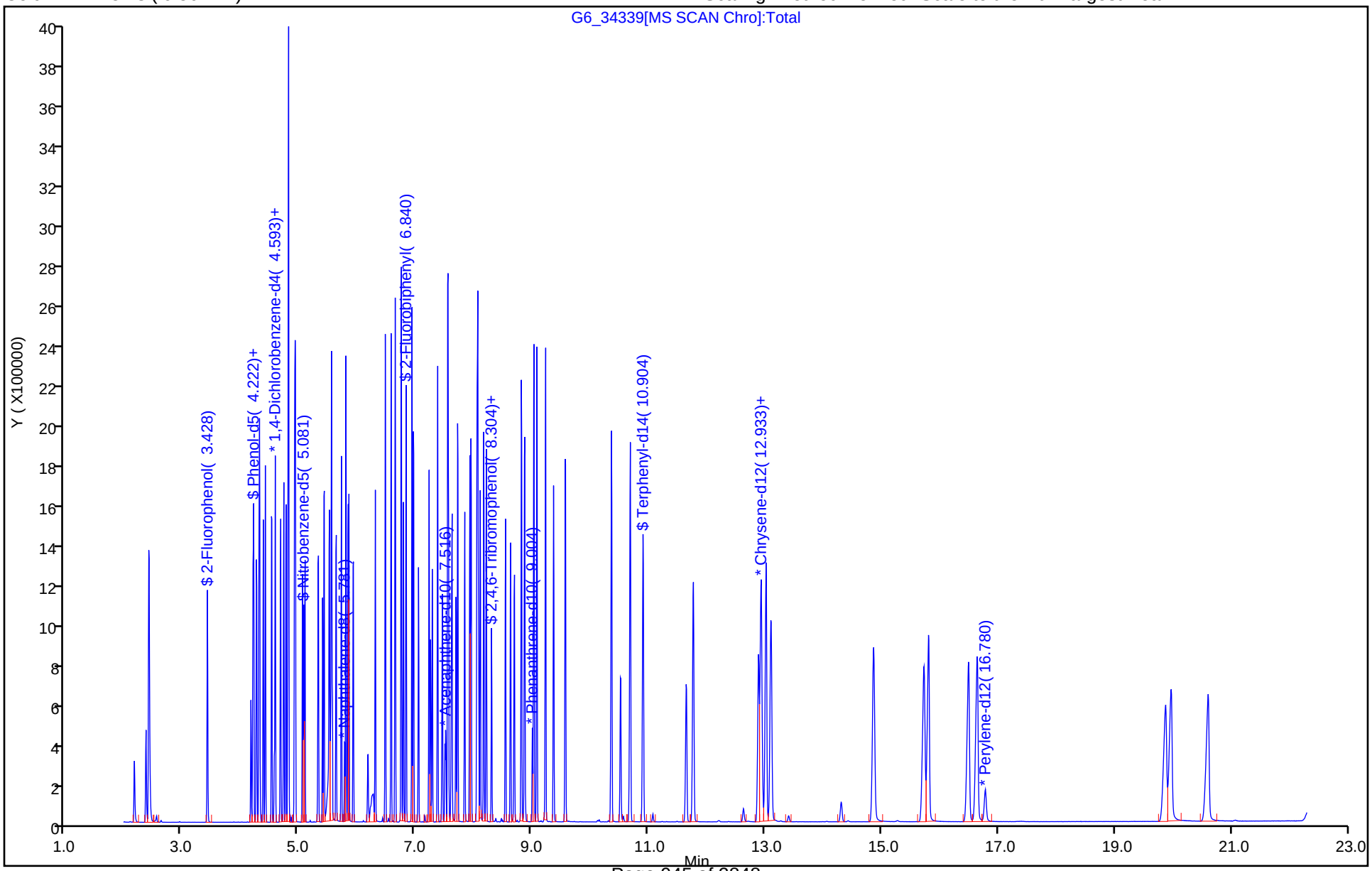
Report Date: 29-Jun-2018 08:23:26 Chrom Revision: 2.2 07-Jun-2018 07:41:54

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34339.D

Injection Date:	28-Jun-2018 15:26:30	Instrument ID:	SMS_G6	Operator ID:	KIEKELD
Lims ID:	STD200 HSL			Worklist Smp#:	10
Client ID:					
Injection Vol:	0.5 ul	Dil. Factor:	1.0000	ALS Bottle#:	9
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		

Column: VF-5ms (0.50 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1



Manual Integration/User Assign Peak Report

TestAmerica Denver

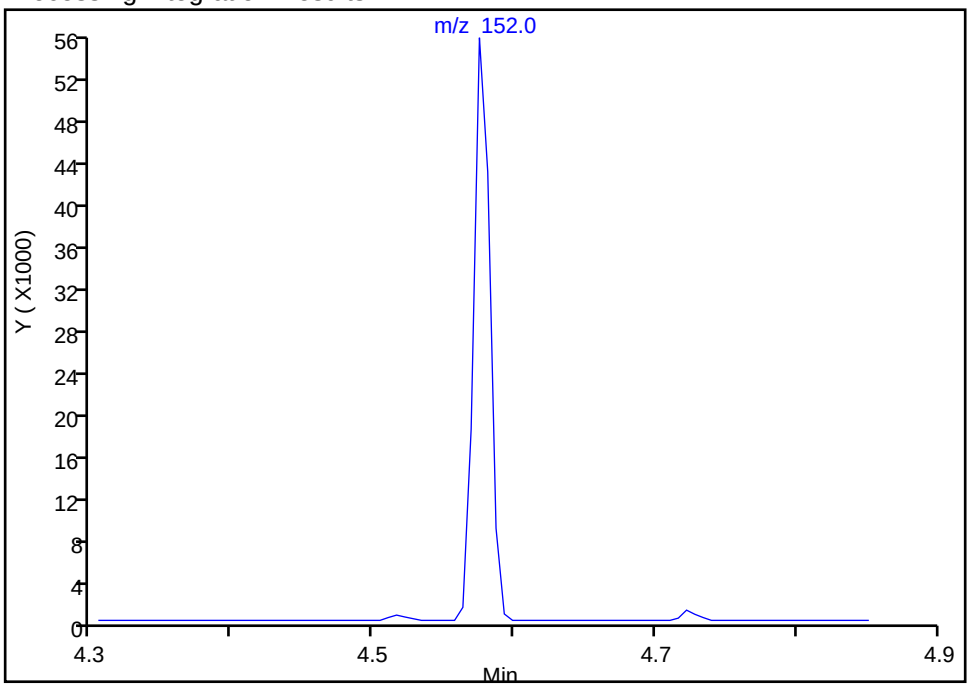
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34339.D
Injection Date: 28-Jun-2018 15:26:30 Instrument ID: SMS_G6
Lims ID: STD200 HSL
Client ID:
Operator ID: KIEKELD ALS Bottle#: 9 Worklist Smp#: 10
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625
Column: VF-5ms (0.50 mm) Detector MS SCAN

* 1 1,4-Dichlorobenzene-d4, CAS: 3855-82-1

Signal: 1

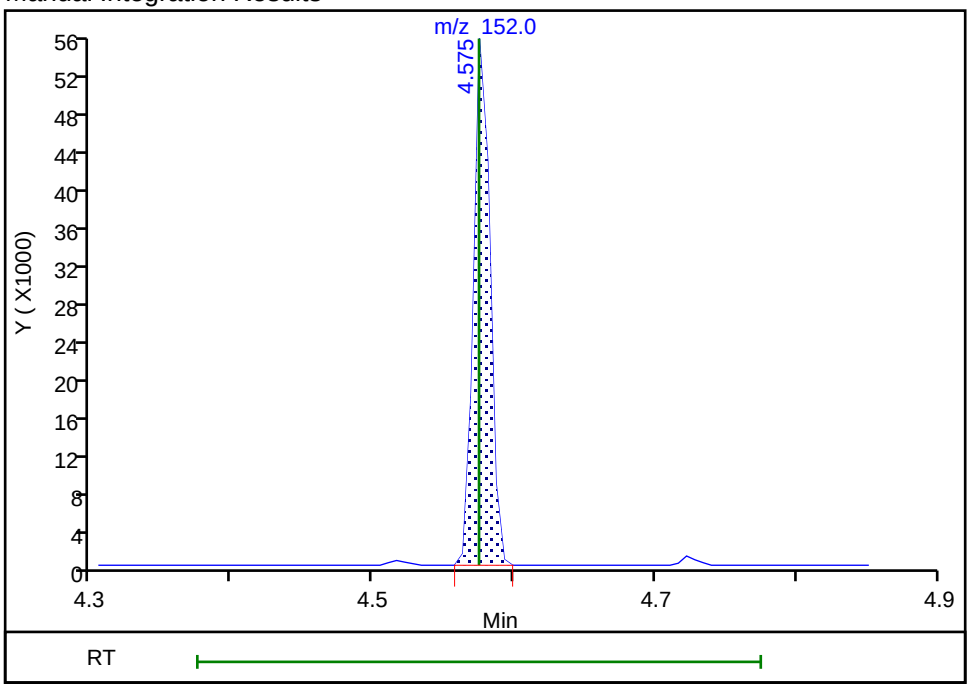
Not Detected
Expected RT: 4.57

Processing Integration Results



Manual Integration Results

RT: 4.58
Area: 44682
Amount: 40.000000
Amount Units: ug/ml



Reviewer: kiekeld, 29-Jun-2018 07:38:54
Audit Action: Assigned Compound ID Audit Reason: Wrong peak

Manual Integration/User Assign Peak Report

TestAmerica Denver

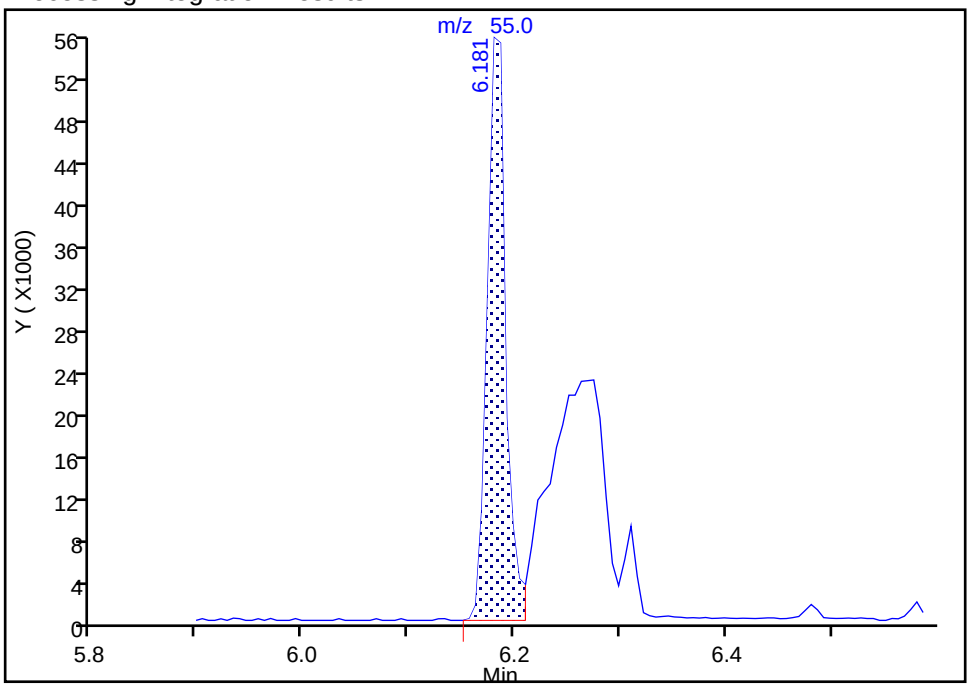
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34339.D
Injection Date: 28-Jun-2018 15:26:30 Instrument ID: SMS_G6
Lims ID: STD200 HSL
Client ID:
Operator ID: KIEKELD ALS Bottle#: 9 Worklist Smp#: 10
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625
Column: VF-5ms (0.50 mm) Detector MS SCAN

87 Caprolactam, CAS: 105-60-2

Signal: 1

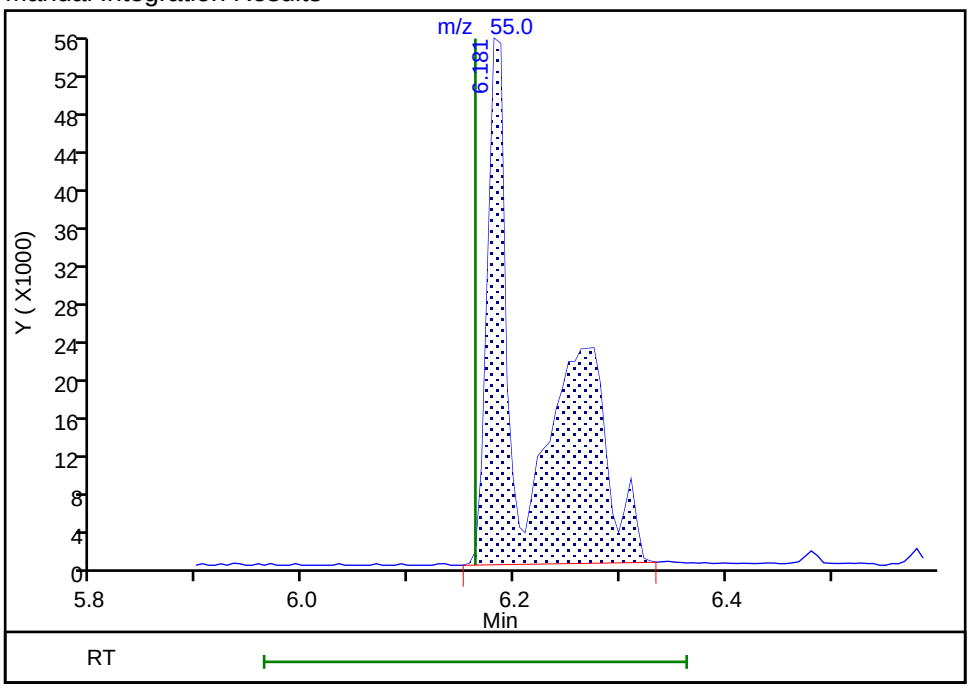
Processing Integration Results

RT: 6.18
Area: 67801
Amount: 95.613344
Amount Units: ug/ml



Manual Integration Results

RT: 6.18
Area: 154894
Amount: 202.8604
Amount Units: ug/ml



Reviewer: kiekeld, 29-Jun-2018 07:39:39
Audit Action: Manually Integrated Audit Reason: Split Peak

FORM VII
GC/MS SEMI VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-423979/3 Calibration Date: 07/27/2018 15:39

Instrument ID: SMS_G6 Calib Start Date: 06/28/2018 12:16

GC Column: Rxi-5Sil MS ID: 0.25(mm) Calib End Date: 06/28/2018 15:26

Lab File ID: G6_34933.D Conc. Units: ug/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
1,4-Dioxane	Ave	0.5972	0.6277		84.1	80.0	5.1	35.0
N-Nitrosodimethylamine	Ave	0.9162	0.9518		83.1	80.0	3.9	35.0
Pyridine	Ave	1.573	1.615		164	160	2.7	35.0
Phenol	Ave	1.889	1.937		82.0	80.0	2.5	20.0
Aniline	Ave	2.328	2.337		80.3	80.0	0.4	35.0
Bis(2-chloroethyl)ether	Ave	1.462	1.479		80.9	80.0	1.2	35.0
2-Chlorophenol	Ave	1.546	1.543		79.8	80.0	-0.2	35.0
1,3-Dichlorobenzene	Ave	1.715	1.696		79.1	80.0	-1.1	35.0
1,4-Dichlorobenzene	Ave	1.721	1.741		80.9	80.0	1.1	20.0
Benzyl alcohol	Ave	1.035	1.029		79.6	80.0	-0.5	35.0
1,2-Dichlorobenzene	Ave	1.639	1.646		80.3	80.0	0.4	35.0
2-Methylphenol	Ave	1.430	1.433		80.2	80.0	0.2	35.0
bis (2-chloroisopropyl) ether	Ave	2.007	1.987		79.2	80.0	-1.0	35.0
Indene	Ave	2.468	2.456		159	160	-0.5	35.0
3 & 4 Methylphenol	Ave	1.484	1.458		78.6	80.0	-1.7	35.0
3-Methylphenol	Ave	1.484	1.458		78.6	80.0	-1.7	35.0
4-Methylphenol	Ave	1.484	1.458		78.6	80.0	-1.7	35.0
Acetophenone	Ave	2.028	1.990		78.5	80.0	-1.9	35.0
N-Nitrosodi-n-propylamine	Ave	1.027	1.018	0.0500	79.3	80.0	-0.9	35.0
Hexachloroethane	Ave	0.6678	0.6789		81.3	80.0	1.7	35.0
Nitrobenzene	Ave	0.3866	0.3761		77.8	80.0	-2.7	35.0
Isophorone	Ave	0.7167	0.6886		76.9	80.0	-3.9	35.0
2-Nitrophenol	Ave	0.2138	0.2042		76.4	80.0	-4.5	20.0
2,4-Dimethylphenol	Ave	0.3778	0.3605		76.3	80.0	-4.6	35.0
Bis(2-chloroethoxy)methane	Ave	0.4521	0.4386		77.6	80.0	-3.0	35.0
Benzoic acid	Lin2		0.2641		143	160	-10.6	35.0
2,4-Dichlorophenol	Ave	0.3286	0.3160		76.9	80.0	-3.8	20.0
1,2,4-Trichlorobenzene	Ave	0.3422	0.3384		79.1	80.0	-1.1	35.0
Naphthalene	Ave	1.100	1.102		80.1	80.0	0.2	35.0
4-Chloroaniline	Ave	0.4899	0.4914		80.2	80.0	0.3	35.0
2,6-Dichlorophenol	Ave	0.3275	0.3233		79.0	80.0	-1.3	35.0
Hexachlorobutadiene	Ave	0.1809	0.1768		78.2	80.0	-2.2	20.0
Caprolactam	Ave	0.1737	0.1756		80.9	80.0	1.1	35.0
4-Chloro-3-methylphenol	Ave	0.3233	0.3229		79.9	80.0	-0.1	20.0
2-Methylnaphthalene	Ave	0.7608	0.7488		78.7	80.0	-1.6	35.0
1-Methylnaphthalene	Ave	0.7222	0.7162		79.3	80.0	-0.8	35.0
Hexachlorocyclopentadiene	Ave	0.4021	0.3740	0.0500	74.4	80.0	-7.0	35.0
1,2,4,5-Tetrachlorobenzene	Ave	0.3183	0.3007		75.6	80.0	-5.5	50.0
2,4,6-Trichlorophenol	Ave	0.4256	0.4149		78.0	80.0	-2.5	20.0
2,4,5-Trichlorophenol	Ave	0.4591	0.4659		81.2	80.0	1.5	35.0

FORM VII
GC/MS SEMI VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-423979/3 Calibration Date: 07/27/2018 15:39

Instrument ID: SMS_G6 Calib Start Date: 06/28/2018 12:16

GC Column: Rxi-5Sil MS ID: 0.25(mm) Calib End Date: 06/28/2018 15:26

Lab File ID: G6_34933.D Conc. Units: ug/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
1,1'-Biphenyl	Ave	1.683	1.649		78.4	80.0	-2.0	50.0
2-Chloronaphthalene	Ave	1.338	1.327		79.3	80.0	-0.9	35.0
2-Nitroaniline	Ave	0.3923	0.4038		82.4	80.0	2.9	35.0
Dimethyl phthalate	Ave	1.513	1.489		78.7	80.0	-1.6	35.0
1,3-Dinitrobenzene	Ave	0.2567	0.2669		83.1	80.0	3.9	50.0
2,6-Dinitrotoluene	Ave	0.3548	0.3587		80.9	80.0	1.1	35.0
Acenaphthylene	Ave	2.038	2.038		80.0	80.0	0.0	35.0
3-Nitroaniline	Ave	0.4405	0.4367		79.3	80.0	-0.9	35.0
Acenaphthene	Ave	1.313	1.237		75.3	80.0	-5.9	20.0
2,4-Dinitrophenol	Lin2		0.2168	0.0500	145	160	-9.2	35.0
4-Nitrophenol	Ave	0.2157	0.2088	0.0500	155	160	-3.2	35.0
2,4-Dinitrotoluene	Ave	0.4763	0.4558		76.6	80.0	-4.3	35.0
Dibenzofuran	Ave	1.896	1.791		75.5	80.0	-5.6	35.0
2,3,4,6-Tetrachlorophenol	Ave	0.3706	0.3500		75.6	80.0	-5.5	35.0
Diethyl phthalate	Ave	1.515	1.401		74.0	80.0	-7.5	35.0
Hexadecane	Ave	0.9073	0.8466		74.6	80.0	-6.7	35.0
4-Chlorophenyl phenyl ether	Ave	0.6999	0.6483		74.1	80.0	-7.4	35.0
Fluorene	Ave	1.510	1.383		73.3	80.0	-8.4	35.0
4-Nitroaniline	Ave	0.4622	0.4291		74.3	80.0	-7.2	35.0
4,6-Dinitro-2-methylphenol	Lin2		0.1563		166	160	3.6	35.0
Diphenylamine	Ave	1.318	1.216		62.7	68.0	-7.7	50.0
n-Nitrosodiphenylamine(as diphenylamine)	Ave	0.6274	0.6490		82.8	80.0	3.4	20.0
1,2-Diphenylhydrazine(as Azobenzene)	Ave	1.490	1.356		73.6	80.9	-9.0	35.0
Azobenzene	Ave	1.506	1.371		72.8	80.0	-9.0	35.0
4-Bromophenyl phenyl ether	Ave	0.2241	0.2305		82.3	80.0	2.8	35.0
Hexachlorobenzene	Ave	0.2415	0.2347		77.7	80.0	-2.8	35.0
Atrazine	Ave	0.2013	0.2041		81.1	80.0	1.4	35.0
Pentachlorophenol	Lin2		0.1637		159	160	-0.7	20.0
Phenanthrene	Ave	1.240	1.273		82.1	80.0	2.6	35.0
Anthracene	Ave	1.297	1.328		81.9	80.0	2.3	35.0
Carbazole	Ave	1.235	1.326		85.9	80.0	7.3	35.0
Alachlor	Ave	0.1598	0.1710		85.6	80.0	7.0	35.0
Di-n-butyl phthalate	Ave	1.484	1.631		87.9	80.0	9.9	35.0
Fluoranthene	Ave	1.310	1.390		84.9	80.0	6.1	20.0
Pyrene	Ave	1.437	1.452		80.9	80.0	1.1	35.0
Famphur	Ave	0.4889	0.5081		83.1	80.0	3.9	35.0
Butyl benzyl phthalate	Ave	0.7262	0.7678		84.6	80.0	5.7	35.0
3,3'-Dichlorobenzidine	Ave	0.4584	0.4546		79.3	80.0	-0.8	35.0
Benzo[a]anthracene	Ave	1.337	1.345		80.5	80.0	0.6	35.0
Chrysene	Ave	1.275	1.309		82.1	80.0	2.7	35.0

FORM VII
GC/MS SEMI VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-423979/3 Calibration Date: 07/27/2018 15:39

Instrument ID: SMS_G6 Calib Start Date: 06/28/2018 12:16

GC Column: Rxi-5Sil MS ID: 0.25(mm) Calib End Date: 06/28/2018 15:26

Lab File ID: G6_34933.D Conc. Units: ug/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Bis(2-ethylhexyl) phthalate	Ave	0.9614	1.009		84.0	80.0	5.0	35.0
Di-n-octyl phthalate	Ave	1.701	1.602		75.4	80.0	-5.8	20.0
Benzo[b]fluoranthene	Ave	1.223	1.262		82.5	80.0	3.2	35.0
Benzo[k]fluoranthene	Ave	1.268	1.314		82.9	80.0	3.7	35.0
Benzo[a]pyrene	Ave	1.226	1.271		83.0	80.0	3.7	20.0
Indeno[1,2,3-cd]pyrene	Ave	1.077	1.061		78.7	80.0	-1.6	35.0
Dibenz(a,h)anthracene	Ave	1.071	1.117		83.4	80.0	4.3	35.0
Benzo[g,h,i]perylene	Ave	1.159	1.208		83.4	80.0	4.2	35.0
2-Fluorophenol	Ave	1.451	1.501		82.7	80.0	3.4	35.0
Phenol-d5	Ave	1.823	1.861		81.7	80.0	2.1	35.0
Nitrobenzene-d5	Ave	0.4062	0.3750		73.9	80.0	-7.7	35.0
2-Fluorobiphenyl	Ave	1.467	1.438		78.4	80.0	-2.0	35.0
2,4,6-Tribromophenol	Ave	0.2002	0.1718		68.7	80.0	-14.2	35.0
Terphenyl-d14	Ave	0.9583	0.9687		80.9	80.0	1.1	35.0

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34933.D
Lims ID: CCV HSL
Client ID:
Sample Type: CCV
Inject. Date: 27-Jul-2018 15:39:30 ALS Bottle#: 2 Worklist Smp#: 3
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: CCV HSL
Operator ID: KIEKELD Instrument ID: SMS_G6
Sublist: chrom-SMSG6_8270C*sub25

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 30-Jul-2018 10:08:59 Calib Date: 02-Jul-2018 17:31:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180702-71573.b\G6_34396.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0312

First Level Reviewer: kiekeld Date: 27-Jul-2018 16:03:02

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
* 1 1,4-Dichlorobenzene-d4	152	4.575	4.575	0.000	95	57079	40.0	40.0	
* 2 Naphthalene-d8	136	5.798	5.798	0.000	99	238795	40.0	40.0	
* 3 Acenaphthene-d10	164	7.540	7.540	0.000	94	124142	40.0	40.0	
* 4 Phenanthrene-d10	188	9.022	9.022	0.000	98	197668	40.0	40.0	
* 5 Chrysene-d12	240	12.975	12.975	0.000	98	196184	40.0	40.0	
* 6 Perylene-d12	264	16.815	16.815	0.000	97	190573	40.0	40.0	
$ 7 2-Fluorophenol	112	3.387	3.387	0.000	90	171345	80.0	82.7	
$ 8 Phenol-d5	99	4.204	4.204	0.000	96	212501	80.0	81.7	
$ 9 Nitrobenzene-d5	82	5.093	5.093	0.000	87	179093	80.0	73.9	
$ 11 2-Fluorobiphenyl	172	6.857	6.857	0.000	99	357136	80.0	78.4	
$ 12 2,4,6-Tribromophenol	330	8.328	8.328	0.000	93	42662	80.0	68.7	
$ 13 Terphenyl-d14	244	10.922	10.922	0.000	98	380080	80.0	80.9	
20 1,4-Dioxane	88	2.011	2.011	0.000	95	71662	80.0	84.1	
21 N-Nitrosodimethylamine	74	2.234	2.234	0.000	95	108653	80.0	83.1	
22 Pyridine	79	2.287	2.287	0.000	96	368676	160.0	164.2	
34 Phenol	94	4.222	4.222	0.000	97	221076	80.0	82.0	
35 Aniline	93	4.263	4.263	0.000	99	266801	80.0	80.3	
36 Alpha Methyl Styrene	118	4.316	4.316	0.000	91	175194	80.0	80.4	
37 Bis(2-chloroethyl)ether	93	4.304	4.304	0.000	98	168894	80.0	80.9	
39 n-Decane	43	4.416	4.416	0.000	91	162863	80.0	81.0	
41 2-Chlorophenol	128	4.381	4.381	0.000	97	176128	80.0	79.8	
42 1,3-Dichlorobenzene	146	4.528	4.528	0.000	99	193584	80.0	79.1	
43 1,4-Dichlorobenzene	146	4.593	4.593	0.000	95	198728	80.0	80.9	
44 Benzyl alcohol	108	4.687	4.687	0.000	95	117503	80.0	79.6	
45 1,2-Dichlorobenzene	146	4.740	4.740	0.000	98	187890	80.0	80.3	
46 2-Methylphenol	108	4.787	4.787	0.000	94	163536	80.0	80.2	
47 2,2'-oxybis[1-chloropropan	45	4.816	4.816	0.000	95	226872	80.0	79.2	
48 Indene	116	4.822	4.822	0.000	90	560652	160.0	159.2	
49 3 & 4 Methylphenol	108	4.934	4.934	0.000	91	166486	80.0	78.6	
50 3-Methylphenol	108	4.934	4.934	0.000	93	166486	80.0	78.6	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
51 N-Nitrosodi-n-propylamine	70	4.940	4.940	0.000	89	116259	80.0	79.3	
52 4-Methylphenol	108	4.934	4.934	0.000	94	166486	80.0	78.6	
55 Acetophenone	105	4.940	4.940	0.000	98	227224	80.0	78.5	
58 Hexachloroethane	117	5.069	5.069	0.000	96	77506	80.0	81.3	
60 Nitrobenzene	77	5.110	5.110	0.000	87	179643	80.0	77.8	
63 Isophorone	82	5.340	5.340	0.000	99	328867	80.0	76.9	
65 2-Nitrophenol	139	5.416	5.416	0.000	94	97521	80.0	76.4	
66 2,4-Dimethylphenol	107	5.446	5.446	0.000	95	172184	80.0	76.3	
69 Bis(2-chloroethoxy)methane	93	5.534	5.534	0.000	99	209459	80.0	77.6	
70 Benzoic acid	105	5.551	5.551	0.000	88	252254	160.0	143.0	
71 3,5-Dimethylphenol	107	5.575	5.575	0.000	86	172163	80.0	77.1	
75 2,4-Dichlorophenol	162	5.657	5.657	0.000	92	150915	80.0	76.9	
77 1,2,4-Trichlorobenzene	180	5.746	5.746	0.000	94	161621	80.0	79.1	
79 Naphthalene	128	5.822	5.822	0.000	97	526311	80.0	80.1	
80 4-Chloroaniline	127	5.857	5.857	0.000	97	234679	80.0	80.2	
81 2,6-Dichlorophenol	162	5.875	5.875	0.000	98	154415	80.0	79.0	
83 Hexachlorobutadiene	225	5.946	5.946	0.000	97	84450	80.0	78.2	
87 Caprolactam	55	6.181	6.181	0.000	82	83878	80.0	80.9	M
90 4-Chloro-3-methylphenol	107	6.334	6.334	0.000	96	154212	80.0	79.9	
94 2-Methylnaphthalene	142	6.498	6.498	0.000	93	357612	80.0	78.7	
96 1-Methylnaphthalene	142	6.598	6.598	0.000	94	342032	80.0	79.3	
97 Hexachlorocyclopentadiene	237	6.669	6.669	0.000	96	92848	80.0	74.4	
98 1,2,4,5-Tetrachlorobenzene	216	6.675	6.675	0.000	97	143627	80.0	75.6	
101 2,4,6-Trichlorophenol	196	6.775	6.775	0.000	77	103008	80.0	78.0	
102 2,3-Dichlorobenzenamine	161	6.775	6.775	0.000	92	177883	80.0	77.1	
103 2,4,5-Trichlorophenol	196	6.816	6.816	0.000	95	115684	80.0	81.2	
105 1,1'-Biphenyl	154	6.957	6.957	0.000	95	409368	80.0	78.4	
107 2-Chloronaphthalene	162	6.987	6.987	0.000	95	329411	80.0	79.3	
109 2-Nitroaniline	65	7.075	7.075	0.000	90	100264	80.0	82.4	
112 Dimethyl phthalate	163	7.245	7.245	0.000	99	369723	80.0	78.7	
113 1,3-Dinitrobenzene	168	7.275	7.275	0.000	88	66254	80.0	83.1	
114 2,6-Dinitrotoluene	165	7.304	7.304	0.000	97	89066	80.0	80.9	
115 Acenaphthylene	152	7.398	7.398	0.000	98	506019	80.0	80.0	
116 3-Nitroaniline	138	7.481	7.481	0.000	97	108425	80.0	79.3	
117 Acenaphthene	153	7.575	7.575	0.000	91	307002	80.0	75.3	
118 2,4-Dinitrophenol	184	7.581	7.581	0.000	84	107631	160.0	145.3	
120 4-Nitrophenol	109	7.645	7.645	0.000	87	103700	160.0	154.9	
122 2,4-Dinitrotoluene	165	7.710	7.710	0.000	94	113161	80.0	76.6	
123 Dibenzofuran	168	7.745	7.745	0.000	97	444576	80.0	75.5	
127 2,3,4,6-Tetrachlorophenol	232	7.869	7.869	0.000	74	86908	80.0	75.6	
128 Hexadecane	57	7.969	7.969	0.000	93	210197	80.0	74.6	
130 Diethyl phthalate	149	7.945	7.945	0.000	98	347872	80.0	74.0	
135 4-Chlorophenyl phenyl ethe	204	8.075	8.075	0.000	94	160968	80.0	74.1	
136 Fluorene	166	8.087	8.087	0.000	95	343365	80.0	73.3	
139 4-Nitroaniline	138	8.092	8.092	0.000	92	106530	80.0	74.3	
140 4,6-Dinitro-2-methylphenol	198	8.128	8.128	0.000	90	123600	160.0	165.8	
142 Diphenylamine	169	8.187	8.187	0.000	96	256583	68.0	62.7	
143 N-Nitrosodiphenylamine	169	8.187	8.187	0.000	61	256583	80.0	82.8	
144 Azobenzene	77	8.234	8.234	0.000	98	340485	80.0	72.8	
145 1,2-Diphenylhydrazine	77	8.234	8.234	0.000	99	340485	80.9	73.6	
148 2,4,6 - Tribromophenol	330	8.328	8.328	0.000	90	42790	80.0	68.8	
157 4-Bromophenyl phenyl ether	248	8.563	8.563	0.000	66	91105	80.0	82.3	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
158 Hexachlorobenzene	284	8.651	8.651	0.000	93	92766	80.0	77.7	
160 Atrazine	200	8.710	8.710	0.000	92	80681	80.0	81.1	
162 n-Octadecane	85	8.887	8.887	0.000	96	100676	80.0	86.9	
164 Pentachlorophenol	266	8.839	8.839	0.000	100	129452	160.0	158.9	
169 Phenanthrene	178	9.051	9.051	0.000	97	503348	80.0	82.1	
170 Anthracene	178	9.098	9.098	0.000	98	524873	80.0	81.9	
171 Carbazole	167	9.251	9.251	0.000	95	524070	80.0	85.9	
172 Alachlor	188	9.387	9.387	0.000	98	67600	80.0	85.6	
175 Di-n-butyl phthalate	149	9.586	9.586	0.000	100	644678	80.0	87.9	
182 Fluoranthene	202	10.386	10.386	0.000	98	549483	80.0	84.9	
185 Pyrene	202	10.704	10.704	0.000	97	569687	80.0	80.9	
192 Famphur	218	11.663	11.663	0.000	84	199364	80.0	83.1	
193 Butyl benzyl phthalate	149	11.786	11.786	0.000	96	301241	80.0	84.6	
197 3,3'-Dichlorobenzidine	252	12.910	12.910	0.000	74	178384	80.0	79.3	
198 Benzo[a]anthracene	228	12.951	12.951	0.000	99	527915	80.0	80.5	
199 Bis(2-ethylhexyl) phthalat	149	13.116	13.116	0.000	96	396005	80.0	84.0	
200 Chrysene	228	13.033	13.033	0.000	98	513627	80.0	82.1	
202 Di-n-octyl phthalate	149	14.880	14.880	0.000	99	628641	80.0	75.4	
204 Benzo[b]fluoranthene	252	15.745	15.745	0.000	98	480919	80.0	82.5	
205 Benzo[k]fluoranthene	252	15.827	15.827	0.000	99	500903	80.0	82.9	
207 Benzo[e]pyrene	252	16.510	16.510	0.000	98	447049	80.0	82.7	
208 Benzo[a]pyrene	252	16.657	16.657	0.000	78	484614	80.0	83.0	a
214 Indeno[1,2,3-cd]pyrene	276	19.886	19.886	0.000	98	416126	80.0	78.7	
215 Dibenz(a,h)anthracene	278	19.974	19.974	0.000	96	425832	80.0	83.4	a
216 Benzo[g,h,i]perylene	276	20.615	20.615	0.000	97	460446	80.0	83.4	

QC Flag Legend

Review Flags

M - Manually Integrated

a - User Assigned ID

Reagents:

MS-HSLACCV080_00158 Amount Added: 200.00 Units: uL

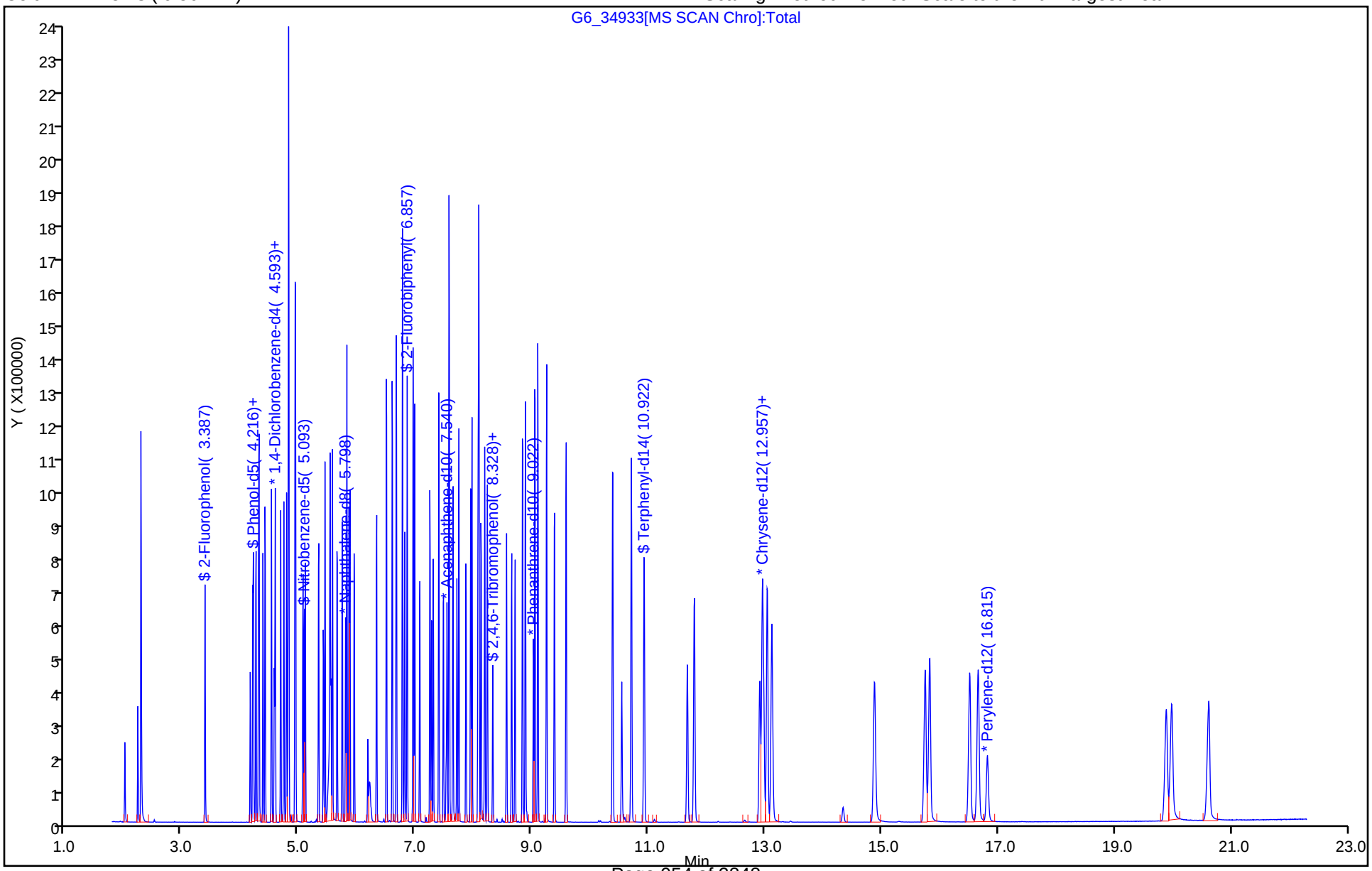
Report Date: 30-Jul-2018 10:09:00 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34933.D

Injection Date:	27-Jul-2018 15:39:30	Instrument ID:	SMS_G6	Operator ID:	KIEKELD
Lims ID:	CCV HSL			Worklist Smp#:	3
Client ID:					
Injection Vol:	0.5 ul	Dil. Factor:	1.0000	ALS Bottle#:	2
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		

Column: VF-5ms (0.50 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1



Manual Integration/User Assign Peak Report

TestAmerica Denver

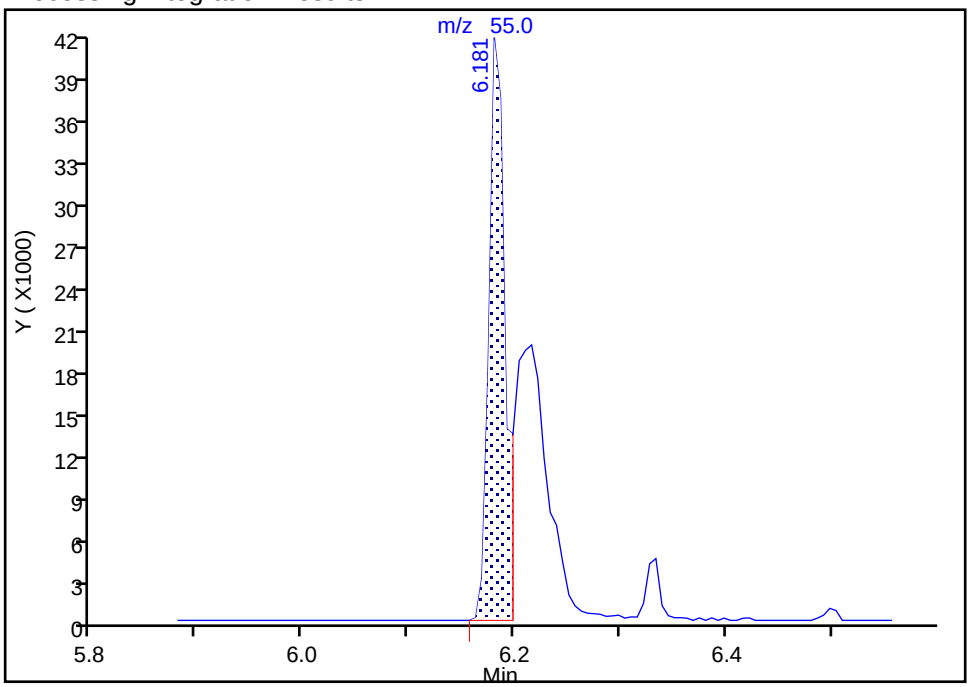
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34933.D
Injection Date: 27-Jul-2018 15:39:30 Instrument ID: SMS_G6
Lims ID: CCV HSL
Client ID:
Operator ID: KIEKELD ALS Bottle#: 2 Worklist Smp#: 3
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625
Column: VF-5ms (0.50 mm) Detector MS SCAN

87 Caprolactam, CAS: 105-60-2

Signal: 1

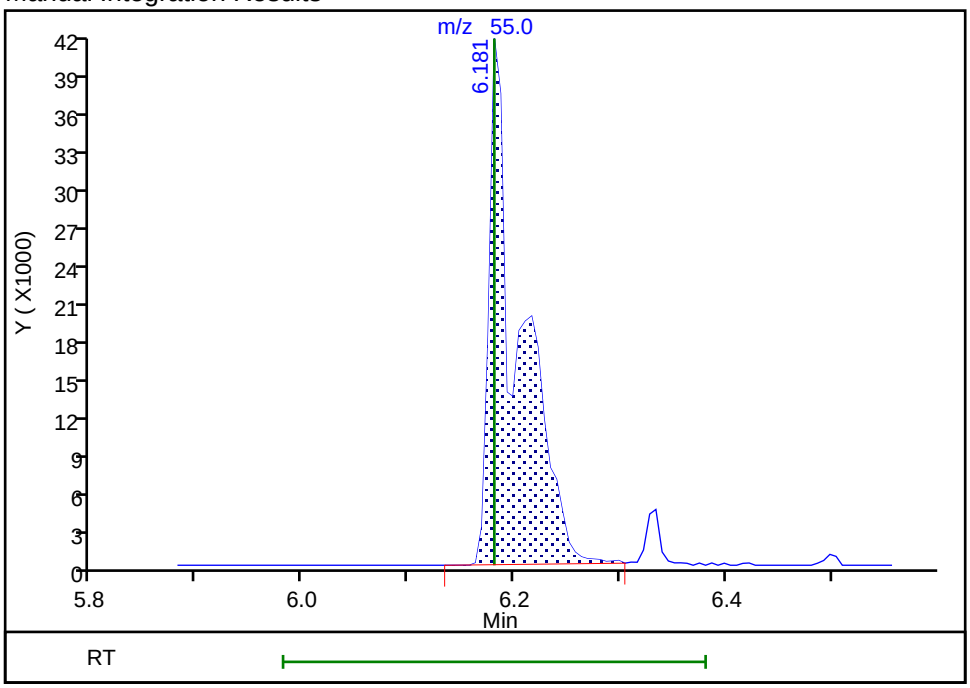
Processing Integration Results

RT: 6.18
Area: 45264
Amount: 43.639737
Amount Units: ug/ml



Manual Integration Results

RT: 6.18
Area: 83878
Amount: 80.868105
Amount Units: ug/ml



Reviewer: kiekeld, 27-Jul-2018 16:01:23
Audit Action: Manually Integrated Audit Reason: Split Peak

Manual Integration/User Assign Peak Report

TestAmerica Denver

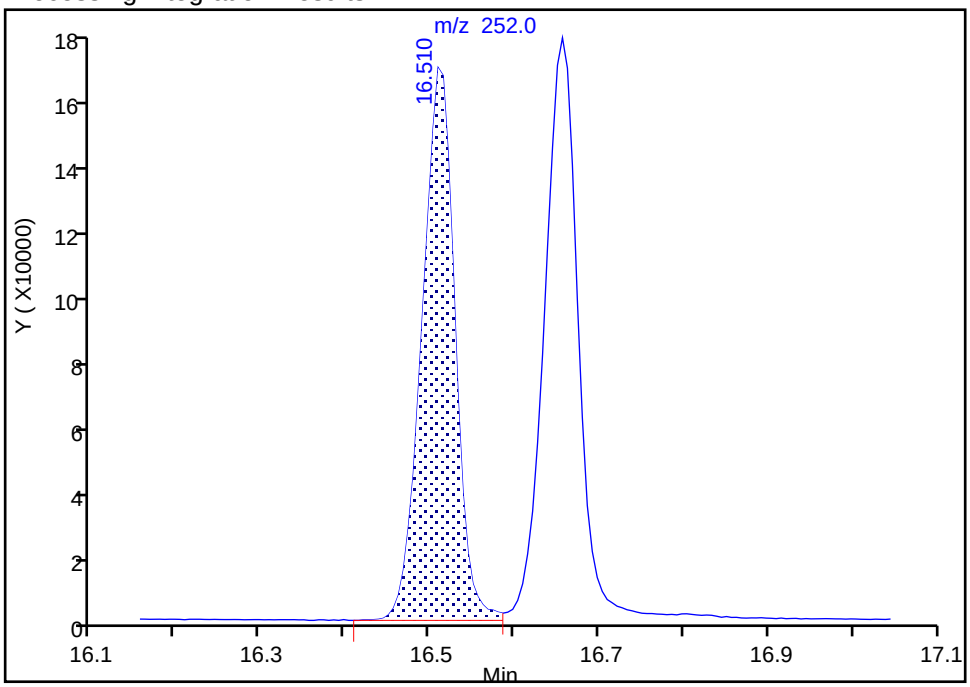
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34933.D
Injection Date: 27-Jul-2018 15:39:30 Instrument ID: SMS_G6
Lims ID: CCV HSL
Client ID:
Operator ID: KIEKELD ALS Bottle#: 2 Worklist Smp#: 3
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625
Column: VF-5ms (0.50 mm) Detector MS SCAN

208 Benzo[a]pyrene, CAS: 50-32-8

Signal: 1

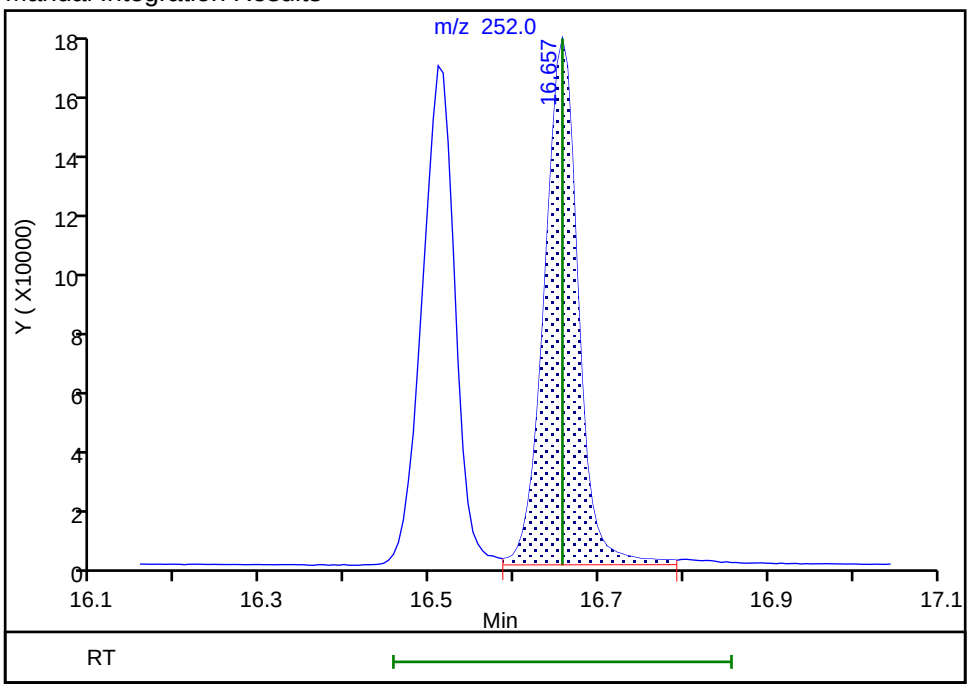
Processing Integration Results

RT: 16.51
Area: 447049
Amount: 76.562053
Amount Units: ug/ml



Manual Integration Results

RT: 16.66
Area: 484614
Amount: 82.995472
Amount Units: ug/ml



Reviewer: kiekeld, 27-Jul-2018 16:01:36
Audit Action: Assigned Compound ID Audit Reason: Wrong peak

Manual Integration/User Assign Peak Report

TestAmerica Denver

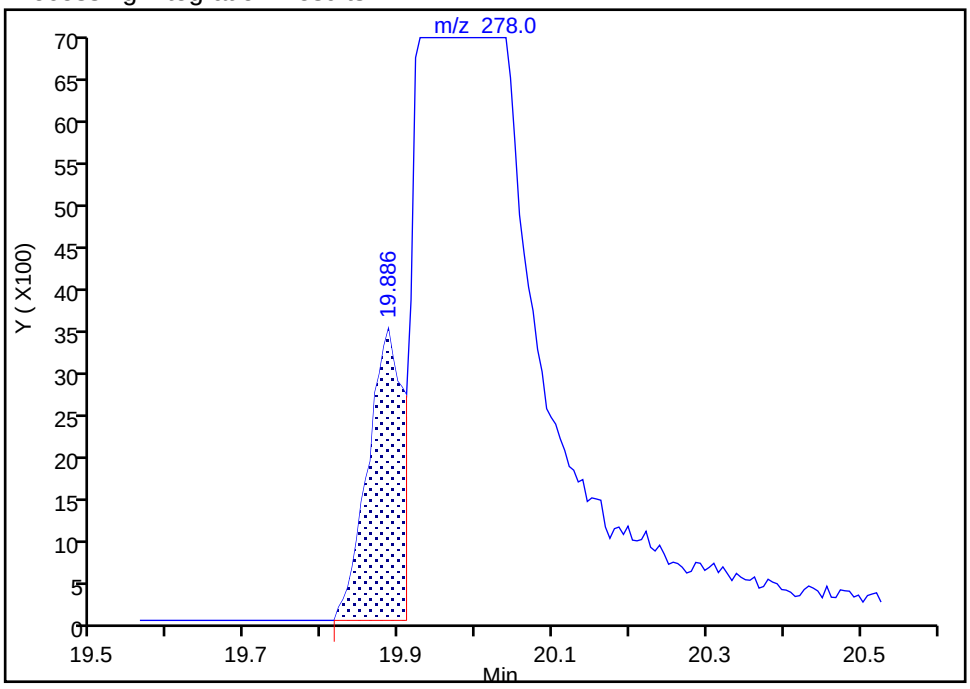
Data File:	\\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34933.D				
Injection Date:	27-Jul-2018 15:39:30	Instrument ID:	SMS_G6		
Lims ID:	CCV HSL				
Client ID:					
Operator ID:	KIEKELD	ALS Bottle#:	2	Worklist Smp#:	3
Injection Vol:	0.5 ul	Dil. Factor:	1.0000		
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		
Column:	VF-5ms (0.50 mm)	Detector	MS SCAN		

215 Dibenz(a,h)anthracene, CAS: 53-70-3

Signal: 1

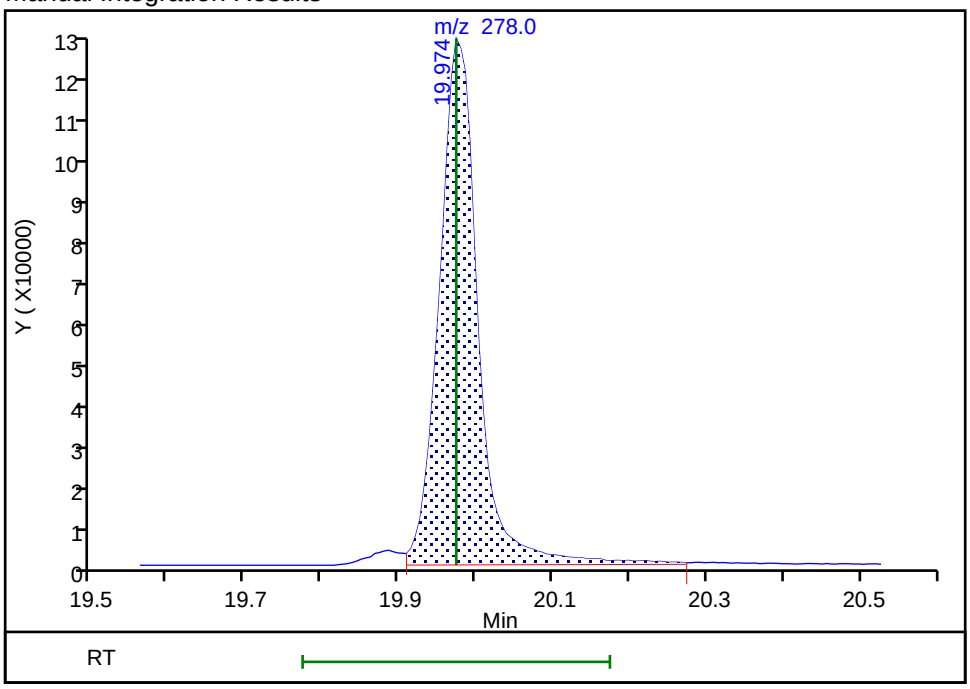
Processing Integration Results

RT: 19.89
Area: 11062
Amount: 2.167635
Amount Units: ug/ml



Manual Integration Results

RT: 19.97
Area: 425832
Amount: 83.443152
Amount Units: ug/ml



Reviewer: kiekeld, 27-Jul-2018 16:01:43
Audit Action: Assigned Compound ID Audit Reason: Wrong peak

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34331.D
Lims ID: DFTPP
Client ID:
Sample Type: DFTPP
Inject. Date: 28-Jun-2018 12:05:30 ALS Bottle#: 1 Worklist Smp#: 2
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: DFTPP
Operator ID: KIEKELD Instrument ID: SMS_G6

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 29-Jun-2018 08:22:43 Calib Date: 28-Jun-2018 19:58:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34349.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0303

First Level Reviewer: kiekeld Date: 28-Jun-2018 12:14:04

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
29 Pentachlorophenol_T	266	3.710	3.710	0.000	0	51508	NR	NR	a
54 Benzidine_T	184	4.804	4.804	0.000	0	321887	NR	NR	a
31 DFTPP									
59 4,4'-DDE	246	4.951	4.951	0.000	1	128	NR	NR	a
64 4,4'-DDD	235	5.240	5.240	0.000	95	1812	NR	NR	a
74 4,4'-DDT	235	5.457	5.457	0.000	98	133325	NR	NR	a

QC Flag Legend

Processing Flags
NR - Missing Quant Standard
Review Flags
a - User Assigned ID

Reagents:

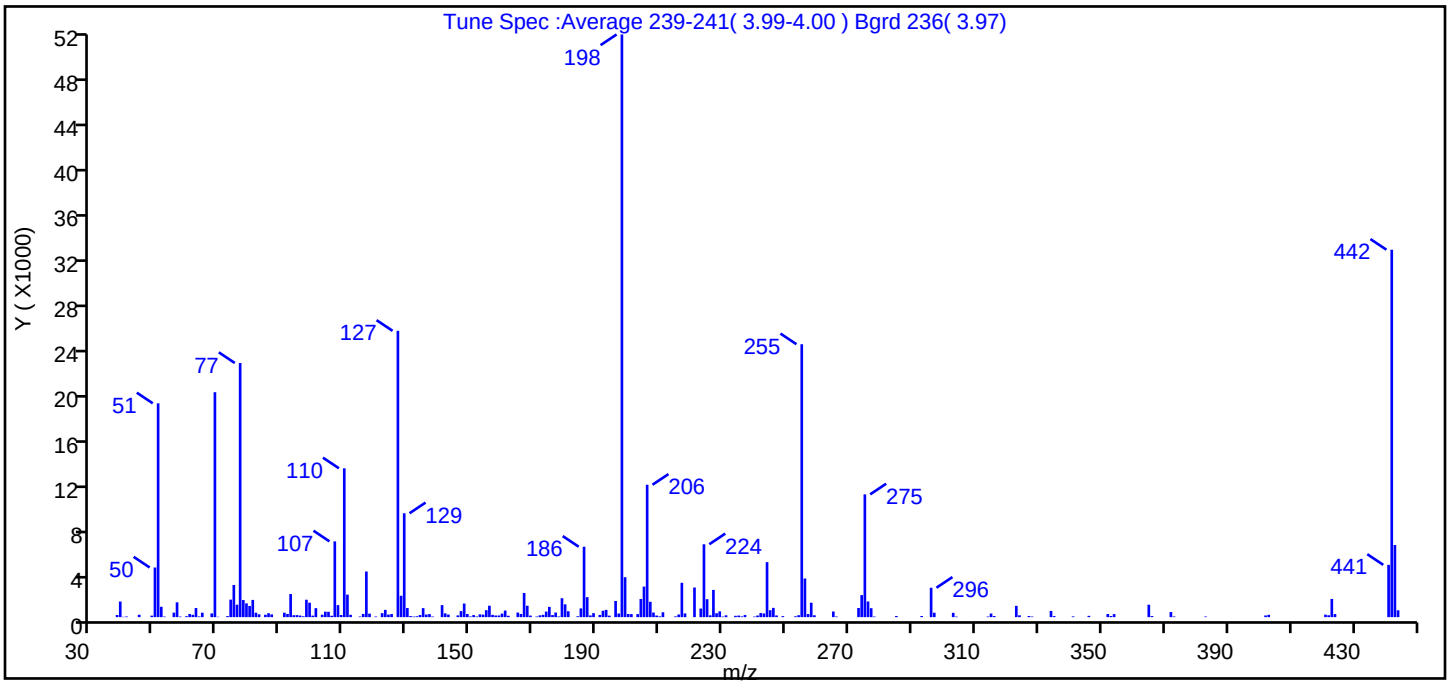
MS-DFTPP_00046 Amount Added: 200.00 Units: uL

MS Tune Report

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34331.D
Injection Date: 28-Jun-2018 12:05:30 Instrument ID: SMS_G6
Lims ID: DFTPP
Client ID:
Operator ID: KIEKELD ALS Bottle#: 1 Worklist Smp#: 2
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625
Tune Method: DFTPP Method 8270

31 DFTPP



m/z	Ion Abundance Criteria	% Relative Abundance
198	Base peak, 100% relative abundance	100.0
51	30-60% of mass 198	36.7
68	<2% of mass 69	0.6 (1.7)
69	Present	38.6
70	<2% of mass 69	0.1 (0.2)
127	40-60% of mass 198	49.1
197	<1% of mass 198	0.6
199	5-9% of mass 198	6.9
275	10-30% of mass 198	21.1
365	>1% of mass 198	2.1
441	Present but less than mass 443	9.0 (72.5)
442	>40% of mass 198	63.1
443	17-23% of mass 442	12.4 (19.6)

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34331.D\SMSG6_8270C.rslt\spectra.d
Injection Date: 28-Jun-2018 12:05:30
Spectrum: Tune Spec :Average 239-241(3.99-4.00) Bgrd 236(3.97)
Base Peak: 198.00
Minimum % Base Peak: 0
Number of Points: 216

m/z	Y	m/z	Y	m/z	Y	m/z	Y
38.00	187	110.00	13170	176.00	185	245.00	613
39.00	1381	111.00	1993	177.00	407	246.00	822
40.00	30	112.00	207	178.00	57	247.00	150
41.00	58	115.00	54	179.00	1673	249.00	91
45.00	213	116.00	287	180.00	1133	253.00	76
49.00	133	117.00	4037	181.00	521	254.00	171
50.00	4393	118.00	309	184.00	77	255.00	24152
51.00	18920	120.00	56	185.00	773	256.00	3421
52.00	917	122.00	353	186.00	6230	257.00	276
53.00	50	123.00	643	187.00	1768	258.00	1275
56.00	399	124.00	227	188.00	152	259.00	164
57.00	1312	125.00	274	189.00	352	265.00	498
58.00	51	127.00	25336	191.00	198	266.00	54
60.00	84	128.00	1893	192.00	567	273.00	808
61.00	282	129.00	9193	193.00	642	274.00	1949
62.00	208	130.00	805	194.00	134	275.00	10865
63.00	807	131.00	95	196.00	1432	276.00	1385
64.00	59	132.00	51	197.00	320	277.00	792
65.00	393	133.00	76	198.00	51560	278.00	51
68.00	331	134.00	186	199.00	3532	285.00	104
69.00	19904	135.00	798	200.00	278	293.00	100
70.00	33	136.00	231	201.00	265	296.00	2601
73.00	93	137.00	272	203.00	269	297.00	391
74.00	1549	138.00	52	204.00	1607	303.00	382
75.00	2848	141.00	1065	205.00	2705	304.00	50
76.00	1101	142.00	337	206.00	11716	314.00	54
77.00	22488	143.00	227	207.00	1358	315.00	320
78.00	1513	146.00	155	208.00	408	316.00	97
79.00	1219	147.00	536	209.00	141	323.00	998
80.00	985	148.00	1204	210.00	70	324.00	164
81.00	1525	149.00	279	211.00	431	327.00	104
82.00	393	150.00	60	215.00	69	328.00	52
83.00	251	151.00	184	216.00	234	334.00	552

Report Date: 29-Jun-2018 08:22:44 Chrom Revision: 2.2 07-Jun-2018 07:41:54
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34331.D\SMSG6_8270C.rslt\spectra.d
Injection Date: 28-Jun-2018 12:05:30
Spectrum: Tune Spec :Average 239-241(3.99-4.00) Bgrd 236(3.97)
Base Peak: 198.00
Minimum % Base Peak: 0
Number of Points: 216

m/z	Y	m/z	Y	m/z	Y	m/z	Y
85.00	212	152.00	58	217.00	3040	335.00	93
86.00	347	153.00	245	218.00	328	341.00	67
87.00	245	154.00	224	221.00	2621	346.00	115
91.00	398	155.00	616	223.00	760	352.00	281
92.00	286	156.00	1011	224.00	6450	353.00	100
93.00	2044	157.00	200	225.00	1589	354.00	267
94.00	172	158.00	145	226.00	160	365.00	1101
95.00	180	159.00	149	227.00	2410	366.00	97
96.00	139	160.00	314	228.00	345	372.00	450
97.00	72	161.00	582	229.00	511	373.00	59
98.00	1541	162.00	124	230.00	50	383.00	56
99.00	1277	165.00	405	231.00	160	402.00	150
100.00	135	166.00	283	234.00	120	403.00	207
101.00	795	167.00	2138	235.00	139	421.00	220
103.00	211	168.00	1007	236.00	65	422.00	165
104.00	483	169.00	138	237.00	190	423.00	1610
105.00	473	171.00	52	240.00	52	424.00	273
106.00	124	172.00	160	241.00	142	441.00	4626
107.00	6704	173.00	203	242.00	361	442.00	32512
108.00	1065	174.00	492	243.00	325	443.00	6381
109.00	191	175.00	910	244.00	4867	444.00	605

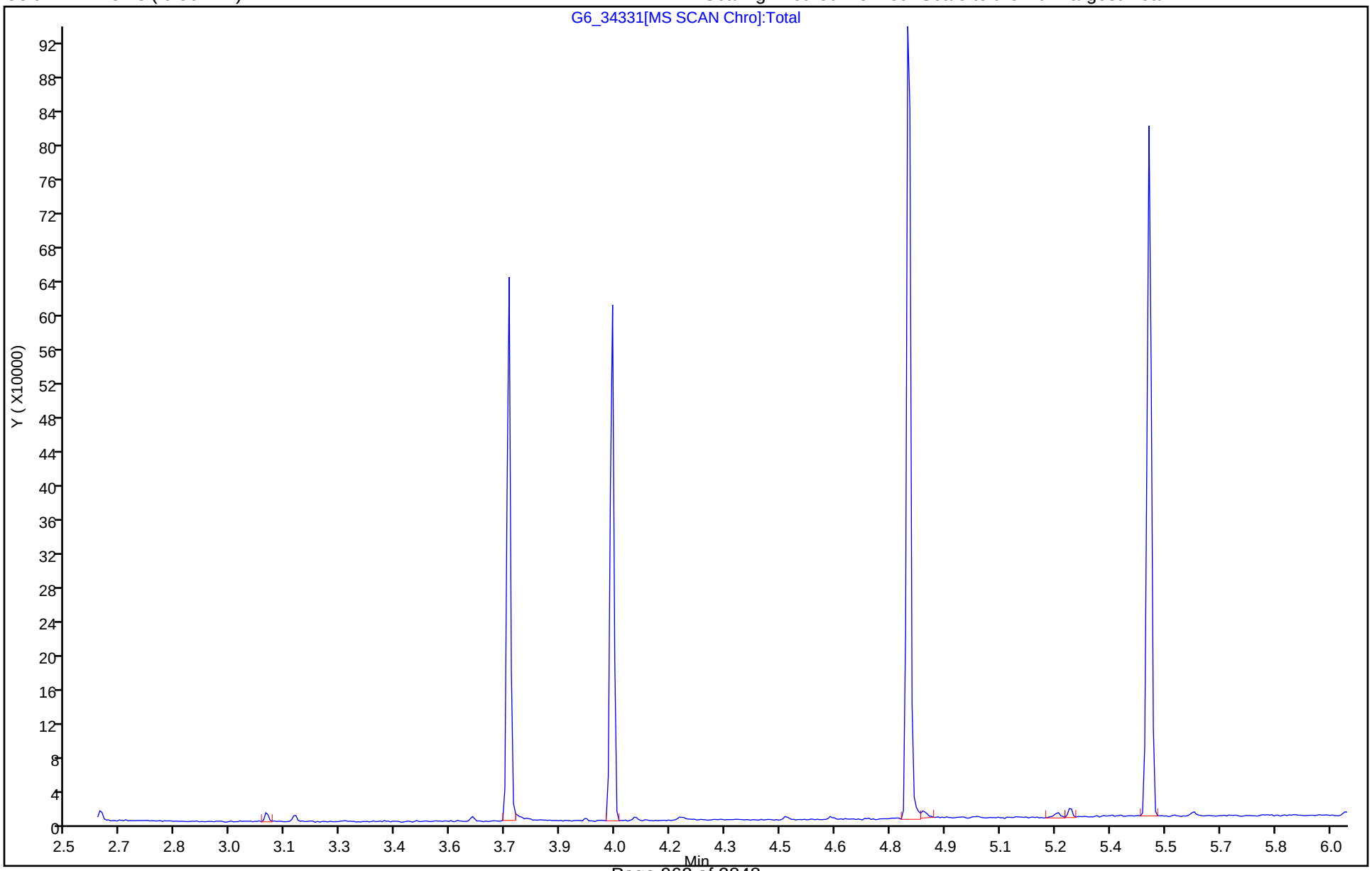
Report Date: 29-Jun-2018 08:22:44 Chrom Revision: 2.2 07-Jun-2018 07:41:54

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34331.D

Injection Date:	28-Jun-2018 12:05:30	Instrument ID:	SMS_G6	Operator ID:	KIEKELD
Lims ID:	DFTPP			Worklist Smp#:	2
Client ID:					
Injection Vol:	0.5 ul	Dil. Factor:	1.0000	ALS Bottle#:	1
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		

Column: VF-5ms (0.50 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1

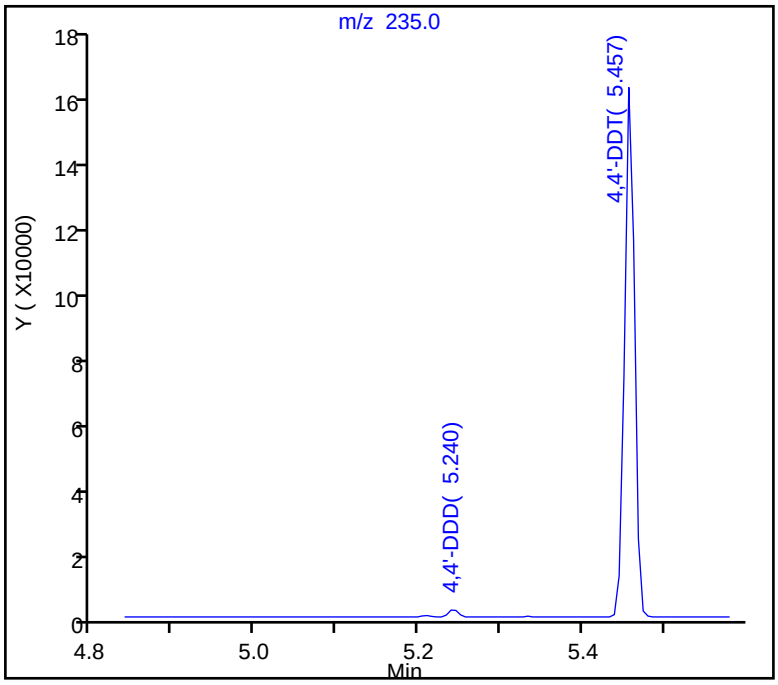


Breakdown Report

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34331.D
Injection Date: 28-Jun-2018 12:05:30 Instrument ID: SMS_G6
Lims ID: DFTPP
Client ID:
Operator ID: KIEKELD ALS Bottle#: 1 Worklist Smp#: 2
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625

74 4,4'-DDT, Detector: MS SCAN



SW-846 Method

%Breakdown =
(Area Breakdown Cpnds/
Total Area Breakdown Cpnds) * 100

74 4,4'-DDT, Area = 133325
64 4,4'-DDD, Area = 1812
59 4,4'-DDE, Area = 128

%Breakdown: 1.43%, Max Limit: 20.00%
Passed

Peak Tailing Report

TestAmerica Denver

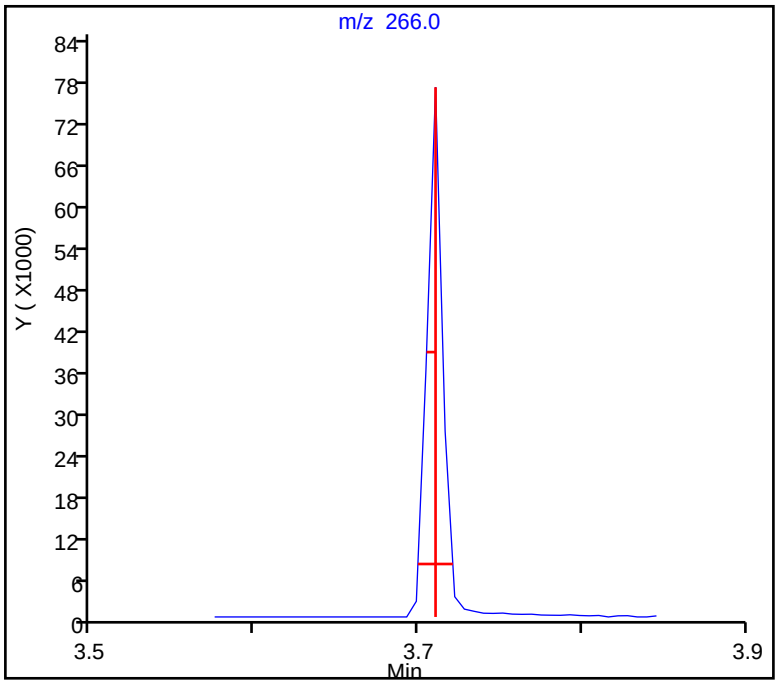
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34331.D
Injection Date: 28-Jun-2018 12:05:30 Instrument ID: SMS_G6
Lims ID: DFTPP
Client ID:
Operator ID: KIEKELD ALS Bottle#: 1 Worklist Smp#: 2
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625

29 Pentachlorophenol_T, Detector: MS SCAN

Peak Tailing Factor =
BackWidth/FrontWidth @ 10% Peak Height

Back Width = 0.011 (min.)
Front Width = 0.011 (min.)

Tailing Factor = 1.0, Max. Tailing < 5.00
Passed



Peak Tailing Report

TestAmerica Denver

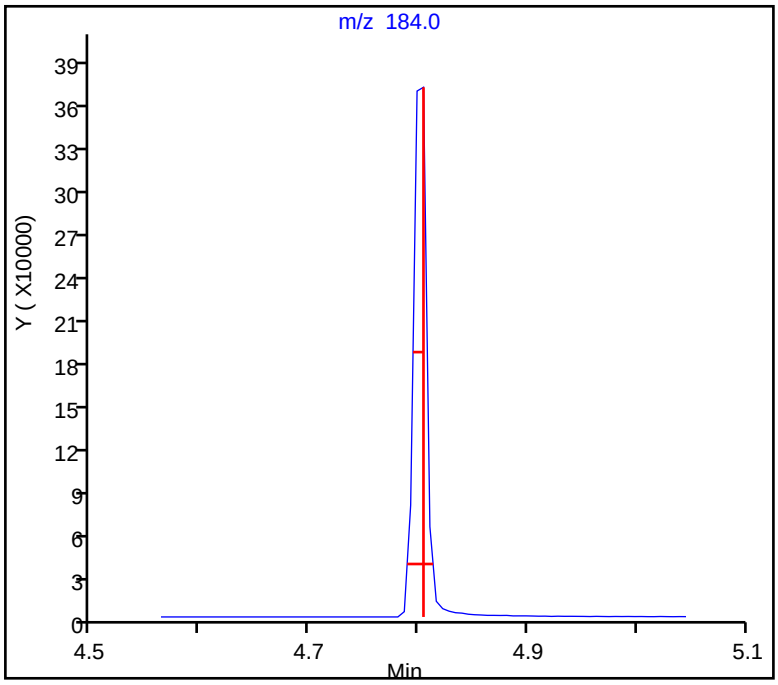
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180628-71474.b\G6_34331.D
Injection Date: 28-Jun-2018 12:05:30 Instrument ID: SMS_G6
Lims ID: DFTPP
Client ID:
Operator ID: KIEKELD ALS Bottle#: 1 Worklist Smp#: 2
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625

54 Benzidine_T, Detector: MS SCAN

Peak Tailing Factor =
BackWidth/FrontWidth @ 10% Peak Height

Back Width = 0.009 (min.)
Front Width = 0.015 (min.)

Tailing Factor = 0.6, Max. Tailing < 3.00
Passed



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34932.D
Lims ID: DFTPP
Client ID:
Sample Type: DFTPP
Inject. Date: 27-Jul-2018 15:27:30 ALS Bottle#: 1 Worklist Smp#: 2
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: DFTPP
Operator ID: KIEKELD Instrument ID: SMS_G6

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 30-Jul-2018 10:08:50 Calib Date: 02-Jul-2018 17:31:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180702-71573.b\G6_34396.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0312

First Level Reviewer: kiekeld Date: 27-Jul-2018 16:01:03

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
29 Pentachlorophenol_T	266	3.734	3.734	0.000	94	52171	NR	NR	
54 Benzidine_T	184	4.892	4.892	0.000	100	332114	NR	NR	
31 DFTPP									
59 4,4'-DDE	246	5.053	5.053	0.000	1	0	NR	NR	a
64 4,4'-DDD	235	5.369	5.369	0.000	93	1870	NR	NR	a
74 4,4'-DDT	235	5.598	5.598	0.000	97	138672	NR	NR	a

QC Flag Legend

Processing Flags
NR - Missing Quant Standard
Review Flags
a - User Assigned ID

Reagents:

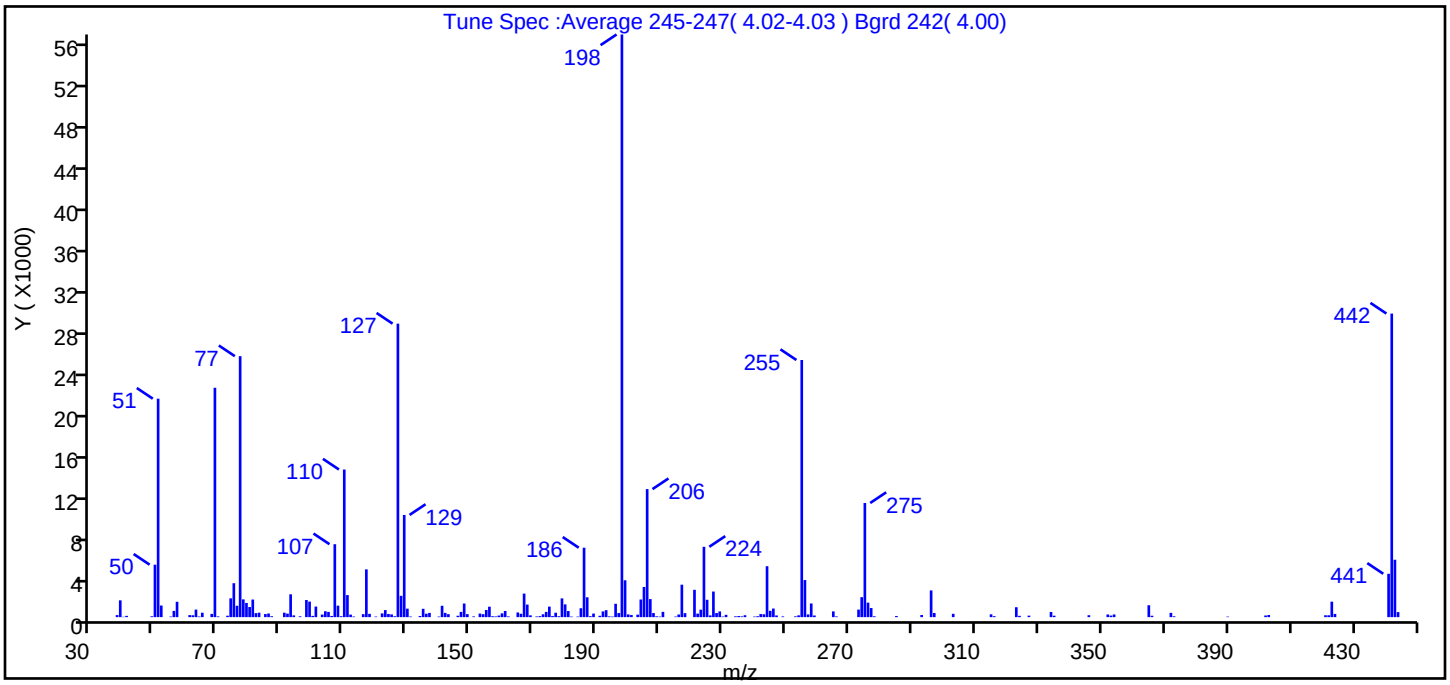
MS-DFTPP_00046 Amount Added: 200.00 Units: uL

MS Tune Report

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34932.D
Injection Date: 27-Jul-2018 15:27:30 Instrument ID: SMS_G6
Lims ID: DFTPP
Client ID:
Operator ID: KIEKELD ALS Bottle#: 1 Worklist Smp#: 2
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625
Tune Method: DFTPP Method 8270

31 DFTPP



m/z	Ion Abundance Criteria	% Relative Abundance
198	Base peak, 100% relative abundance	100.0
51	30-60% of mass 198	37.5
68	<2% of mass 69	0.6 (1.4)
69	Present	39.4
70	<2% of mass 69	0.1 (0.3)
127	40-60% of mass 198	50.4
197	<1% of mass 198	0.7
199	5-9% of mass 198	6.3
275	10-30% of mass 198	19.6
365	>1% of mass 198	2.0
441	Present but less than mass 443	7.4 (75.6)
442	>40% of mass 198	52.1
443	17-23% of mass 442	9.8 (18.9)

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34932.D\SMSG6_8270C.rslt\spectra.d
Injection Date: 27-Jul-2018 15:27:30
Spectrum: Tune Spec :Average 245-247(4.02-4.03) Bgrd 242(4.00)
Base Peak: 198.00
Minimum % Base Peak: 0
Number of Points: 208

m/z	Y	m/z	Y	m/z	Y	m/z	Y
38.00	201	112.00	247	179.00	1832	243.00	280
39.00	1642	113.00	58	180.00	1247	244.00	4974
40.00	33	116.00	291	181.00	595	245.00	619
41.00	127	117.00	4667	182.00	56	246.00	841
44.00	1	118.00	322	184.00	53	247.00	166
49.00	84	120.00	57	185.00	871	249.00	71
50.00	5123	122.00	366	186.00	6780	253.00	78
51.00	21336	123.00	690	187.00	1939	254.00	173
52.00	1135	124.00	309	188.00	92	255.00	25112
55.00	57	125.00	268	189.00	349	256.00	3623
56.00	610	126.00	85	191.00	133	257.00	265
57.00	1500	127.00	28664	192.00	559	258.00	1337
61.00	198	128.00	2082	193.00	683	259.00	161
62.00	182	129.00	9982	194.00	73	265.00	562
63.00	739	130.00	829	195.00	55	266.00	68
64.00	60	131.00	60	196.00	1306	273.00	737
65.00	432	134.00	110	197.00	400	274.00	1950
68.00	315	135.00	816	198.00	56904	275.00	11148
69.00	22400	136.00	335	199.00	3600	276.00	1414
70.00	72	137.00	412	200.00	269	277.00	889
73.00	141	140.00	57	201.00	204	278.00	81
74.00	1835	141.00	1111	203.00	245	285.00	114
75.00	3314	142.00	416	204.00	1724	293.00	207
76.00	1111	143.00	288	205.00	2946	296.00	2609
77.00	25488	146.00	137	206.00	12504	297.00	404
78.00	1735	147.00	512	207.00	1762	303.00	325
79.00	1386	148.00	1330	208.00	401	315.00	277
80.00	989	149.00	294	209.00	77	316.00	94
81.00	1720	151.00	72	210.00	51	323.00	970
82.00	392	153.00	349	211.00	517	324.00	129
83.00	436	154.00	290	215.00	56	327.00	147
85.00	303	155.00	699	216.00	258	334.00	504
86.00	355	156.00	1022	217.00	3170	335.00	141

Report Date: 30-Jul-2018 10:08:51 Chrom Revision: 2.3 19-Jul-2018 15:14:50
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34932.D\SMSG6_8270C.rslt\spectra.d
Injection Date: 27-Jul-2018 15:27:30
Spectrum: Tune Spec :Average 245-247(4.02-4.03) Bgrd 242(4.00)
Base Peak: 198.00
Minimum % Base Peak: 0
Number of Points: 208

m/z	Y	m/z	Y	m/z	Y	m/z	Y
87.00	88	157.00	87	218.00	389	346.00	187
91.00	433	158.00	68	221.00	2668	352.00	260
92.00	344	159.00	156	222.00	344	353.00	153
93.00	2230	160.00	370	223.00	730	354.00	262
94.00	172	161.00	603	224.00	6871	365.00	1163
96.00	80	162.00	70	225.00	1696	366.00	138
98.00	1676	165.00	458	226.00	168	372.00	418
99.00	1516	166.00	330	227.00	2500	373.00	83
100.00	124	167.00	2300	228.00	401	390.00	52
101.00	1033	168.00	1227	229.00	558	402.00	161
103.00	250	169.00	175	230.00	57	403.00	207
104.00	576	171.00	65	231.00	225	421.00	184
105.00	510	172.00	98	234.00	79	422.00	180
106.00	117	173.00	279	235.00	107	423.00	1512
107.00	7124	174.00	513	236.00	74	424.00	314
108.00	1121	175.00	1029	237.00	187	441.00	4235
109.00	89	176.00	104	240.00	55	442.00	29648
110.00	14418	177.00	430	241.00	89	443.00	5605
111.00	2155	178.00	88	242.00	302	444.00	493

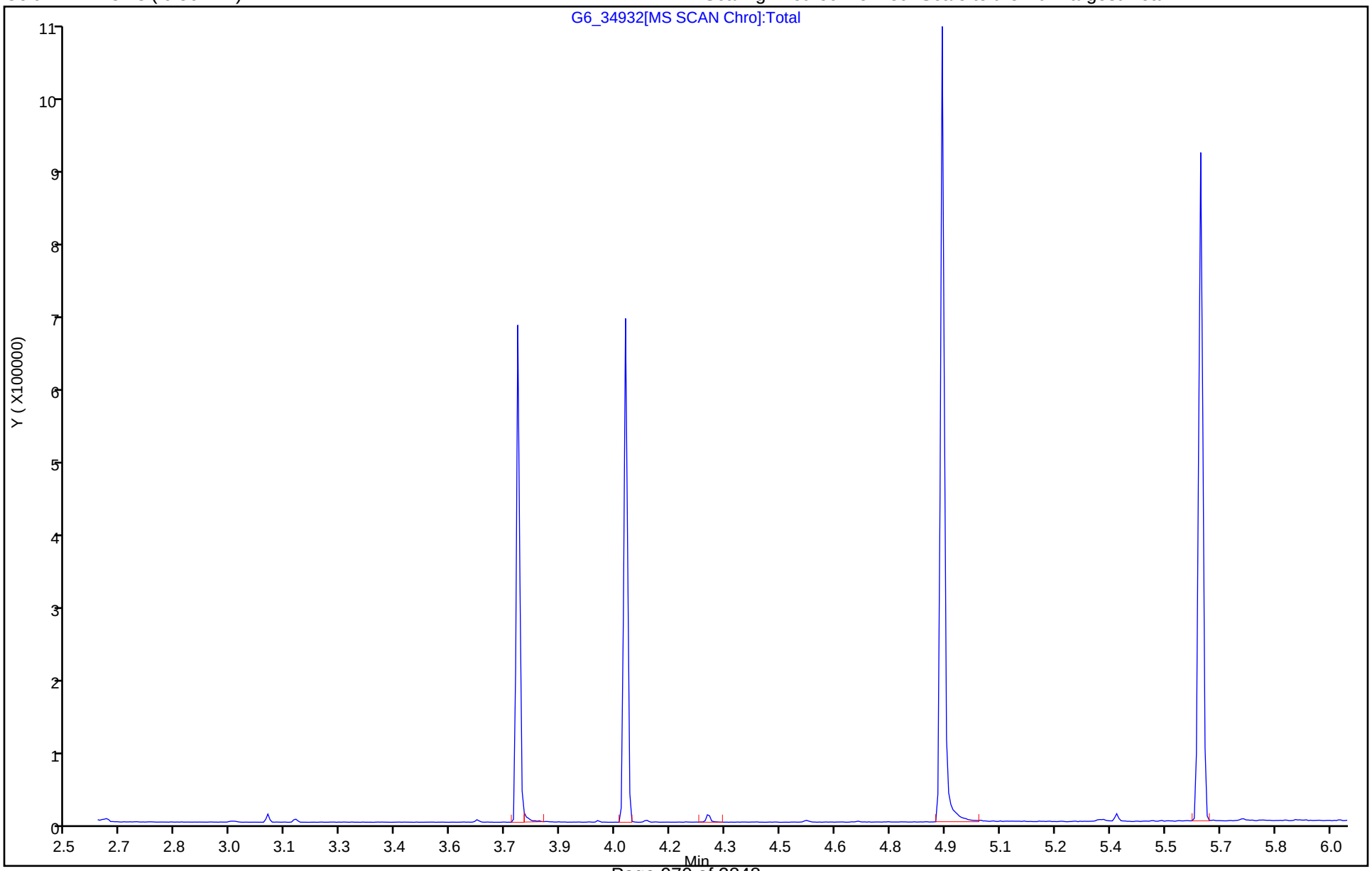
Report Date: 30-Jul-2018 10:08:51 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34932.D

Injection Date:	27-Jul-2018 15:27:30	Instrument ID:	SMS_G6	Operator ID:	KIEKELD
Lims ID:	DFTPP			Worklist Smp#:	2
Client ID:					
Injection Vol:	0.5 ul	Dil. Factor:	1.0000	ALS Bottle#:	1
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		

Column: VF-5ms (0.50 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1

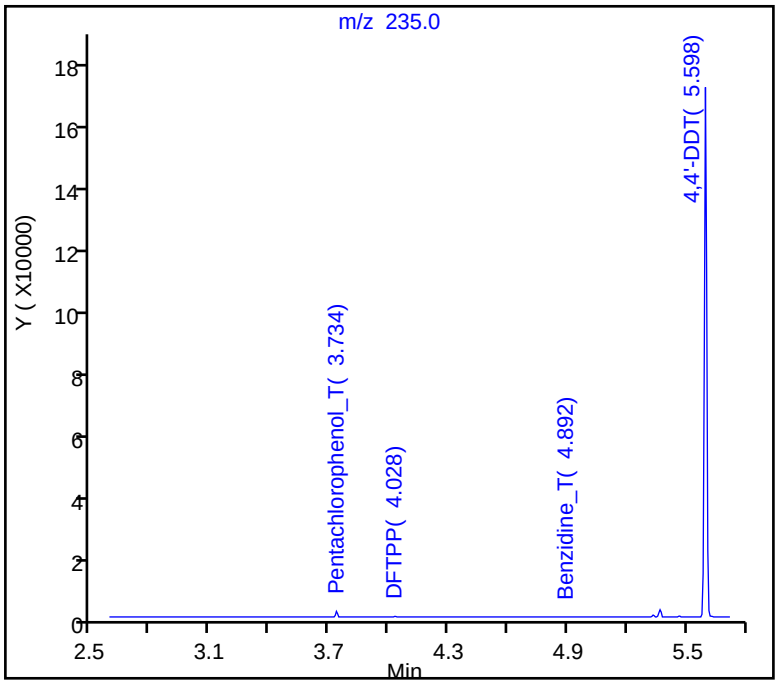


Breakdown Report

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34932.D
Injection Date: 27-Jul-2018 15:27:30 Instrument ID: SMS_G6
Lims ID: DFTPP
Client ID:
Operator ID: KIEKELD ALS Bottle#: 1 Worklist Smp#: 2
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625

74 4,4'-DDT, Detector: MS SCAN



SW-846 Method

%Breakdown =
(Area Breakdown Cpnds/
Total Area Breakdown Cpnds) * 100

74 4,4'-DDT, Area = 138672
64 4,4'-DDD, Area = 1870
59 4,4'-DDE, Area = 0

%Breakdown: 1.33%, Max Limit: 20.00%
Passed

Peak Tailing Report

TestAmerica Denver

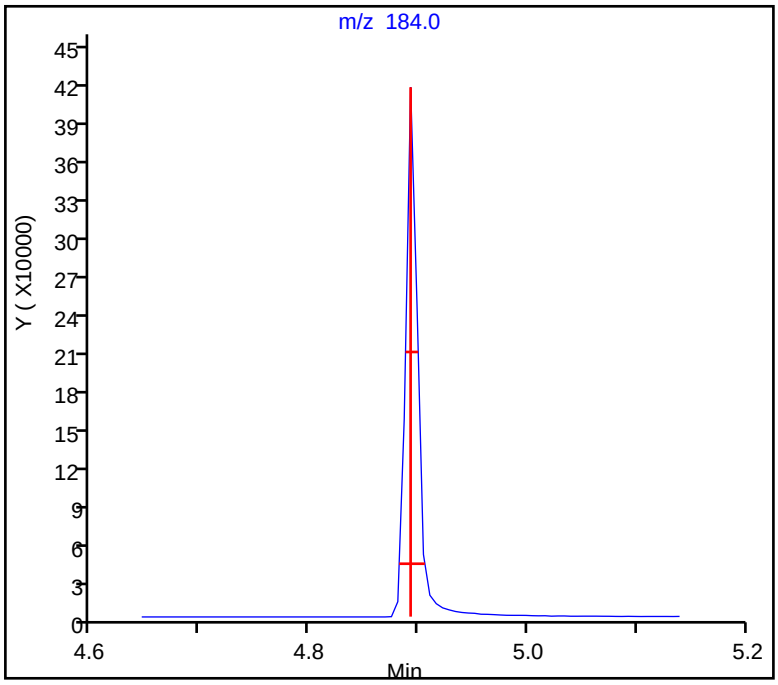
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34932.D
Injection Date: 27-Jul-2018 15:27:30 Instrument ID: SMS_G6
Lims ID: DFTPP
Client ID:
Operator ID: KIEKELD ALS Bottle#: 1 Worklist Smp#: 2
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625

54 Benzidine_T, Detector: MS SCAN

Peak Tailing Factor =
BackWidth/FrontWidth @ 10% Peak Height

Back Width = 0.013 (min.)
Front Width = 0.011 (min.)

Tailing Factor = 1.2, Max. Tailing < 3.00
Passed



Peak Tailing Report

TestAmerica Denver

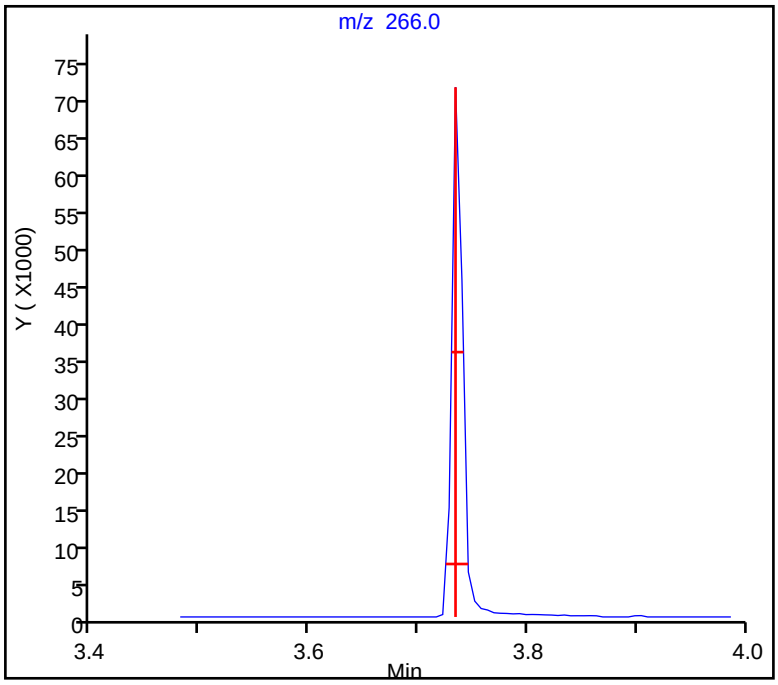
Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34932.D
Injection Date: 27-Jul-2018 15:27:30 Instrument ID: SMS_G6
Lims ID: DFTPP
Client ID:
Operator ID: KIEKELD ALS Bottle#: 1 Worklist Smp#: 2
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Method: SMSG6_8270C Limit Group: MSSV - 8270C_625

29 Pentachlorophenol_T, Detector: MS SCAN

Peak Tailing Factor =
BackWidth/FrontWidth @ 10% Peak Height

Back Width = 0.012 (min.)
Front Width = 0.009 (min.)

Tailing Factor = 1.3, Max. Tailing < 5.00
Passed



FORM I
GC/MS SEMI VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Denver | Job No.: 160-29498-1

SDG No.:

Client Sample ID: | Lab Sample ID: LB 280-423271/1-F

Matrix: Solid (TCLP) | Lab File ID: G6_34939.D

Analysis Method: 8270C | Date Collected:

Extract. Method: 3510C | Date Extracted: 07/25/2018 10:50

Sample wt/vol: 200(mL) | Date Analyzed: 07/27/2018 18:23

Con. Extract Vol.: 1(mL) | Dilution Factor: 1

Injection Volume: 0.5(uL) | Level: (low/med) Low

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 423979 | Units: mg/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
95-48-7	2-Methylphenol	0.0049	U	0.050	0.0049
15831-10-4	3 & 4 Methylphenol	0.0013	U	0.050	0.0013
1319-77-3	Total Cresols	0.0013	U	0.050	0.0013
106-46-7	1,4-Dichlorobenzene	0.0016	U	0.020	0.0016
121-14-2	2,4-Dinitrotoluene	0.0083	U	0.050	0.0083
118-74-1	Hexachlorobenzene	0.0033	U	0.050	0.0033
87-68-3	Hexachlorobutadiene	0.017	U	0.050	0.017
67-72-1	Hexachloroethane	0.011	U	0.050	0.011
98-95-3	Nitrobenzene	0.0041	U	0.050	0.0041
87-86-5	Pentachlorophenol	0.10	U	0.25	0.10
110-86-1	Pyridine	0.0057	U	0.10	0.0057
88-06-2	2,4,6-Trichlorophenol	0.0014	U	0.025	0.0014
95-95-4	2,4,5-Trichlorophenol	0.0022	U	0.050	0.0022

CAS NO.	SURROGATE	%REC	Q	LIMITS
321-60-8	2-Fluorobiphenyl	75		50-135
367-12-4	2-Fluorophenol	70		46-135
4165-62-2	Phenol-d5	62		40-135
118-79-6	2,4,6-Tribromophenol	80		50-135
1718-51-0	Terphenyl-d14	73		52-135
4165-60-0	Nitrobenzene-d5	74		49-135

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34939.D
Lims ID: LB 280-423271/1-F
Client ID:
Sample Type: LB
Inject. Date: 27-Jul-2018 18:23:30 ALS Bottle#: 8 Worklist Smp#: 24
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: LB 280-423271_1-F
Operator ID: KIEKELD Instrument ID: SMS_G6

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 30-Jul-2018 10:09:10 Calib Date: 02-Jul-2018 17:31:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180702-71573.b\G6_34396.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0312

First Level Reviewer: kiekeld Date: 30-Jul-2018 09:56:06

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
* 1 1,4-Dichlorobenzene-d4	152	4.575	4.575	0.000	95	56872	40.0	40.0	
* 2 Naphthalene-d8	136	5.798	5.798	0.000	99	225472	40.0	40.0	
* 3 Acenaphthene-d10	164	7.539	7.539	0.000	93	115118	40.0	40.0	
* 4 Phenanthrene-d10	188	9.022	9.022	0.000	97	231133	40.0	40.0	
* 5 Chrysene-d12	240	12.963	12.969	-0.006	99	211572	40.0	40.0	
* 6 Perylene-d12	264	16.804	16.809	-0.005	97	208326	40.0	40.0	
$ 7 2-Fluorophenol	112	3.393	3.387	0.006	90	145407	100.0	70.5	
$ 8 Phenol-d5	99	4.204	4.204	0.000	97	161813	100.0	62.4	
$ 9 Nitrobenzene-d5	82	5.087	5.093	-0.006	88	168793	100.0	73.7	
$ 10 2,4,6-Trichlorophenol-d2	198		6.745					ND	
$ 11 2-Fluorobiphenyl	172	6.857	6.857	0.000	99	316663	100.0	75.0	
$ 12 2,4,6-Tribromophenol	330	8.322	8.328	-0.006	93	46341	100.0	80.4	
$ 13 Terphenyl-d14	244	10.922	10.922	0.000	99	372103	100.0	73.4	
18 Triethyl amine	86		2.022					ND	
19 2-Ethoxyethanol	59		2.169					ND	
20 1,4-Dioxane	88		2.011					ND	U
21 N-Nitrosodimethylamine	74		2.234					ND	
22 Pyridine	79		2.287					ND	
23 Dimethylformamide	73		2.652					ND	
24 2-Picoline	93		2.893					ND	
25 N-Nitrosomethylethylamine	88		2.963					ND	
26 Acrylamide	71		3.169					ND	
27 Methyl methanesulfonate	80		3.210					ND	
28 N-Nitrosodiethylamine	102		3.563					ND	
29 Pentachlorophenol_T	266		3.734					ND	
30 Ethyl methanesulfonate	79		3.810					ND	
32 Benzaldehyde	106		4.163					ND	
33 Phenylmercaptan	110		4.222					ND	
34 Phenol	94		4.222					ND	
35 Aniline	93		4.263					ND	
36 Alpha Methyl Styrene	118		4.316					ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
37 Bis(2-chloroethyl)ether	93		4.304					ND	
38 Pentachloroethane	117		4.293					ND	
39 n-Decane	43		4.416					ND	
40 Methyl styrene	118		4.359					ND	
41 2-Chlorophenol	128		4.381					ND	
42 1,3-Dichlorobenzene	146		4.528					ND	
43 1,4-Dichlorobenzene	146		4.593					ND	
44 Benzyl alcohol	108		4.687					ND	
45 1,2-Dichlorobenzene	146		4.740					ND	
46 2-Methylphenol	108		4.787					ND	
47 2,2'-oxybis[1-chloropropan	45		4.816					ND	
48 Indene	116		4.822					ND	
49 3 & 4 Methylphenol	108		4.934					ND	
50 3-Methylphenol	108		4.934					ND	
51 N-Nitrosodi-n-propylamine	70		4.940					ND	
52 4-Methylphenol	108		4.934					ND	
53 N-Nitrosopyrrolidine	100		4.875					ND	
54 Benzidine_T	184		4.892					ND	
55 Acetophenone	105		4.940					ND	
56 N-Nitrosomorpholine	116		4.910					ND	
57 2-Toluidine	106		4.946					ND	
58 Hexachloroethane	117		5.069					ND	
60 Nitrobenzene	77		5.110					ND	
61 Triethyl phosphate	99		5.193					ND	
62 N-Nitrosopiperidine	114		5.210					ND	
63 Isophorone	82		5.340					ND	
65 2-Nitrophenol	139		5.416					ND	
66 2,4-Dimethylphenol	107		5.446					ND	
67 Benzyl dichloride	125		5.446					ND	
68 o,o',o''-Triethylphosphoro	198		5.475					ND	
69 Bis(2-chloroethoxy)methane	93		5.534					ND	
70 Benzoic acid	105		5.551					ND	
71 3,5-Dimethylphenol	107		5.575					ND	
72 alpha,alpha-Dimethyl phene	58		5.581					ND	
73 2,4-Xylidine	121		5.598					ND	
75 2,4-Dichlorophenol	162		5.657					ND	
76 o-Anisidine	80		5.639					ND	
77 1,2,4-Trichlorobenzene	180		5.746					ND	
78 Alpha-Terpineol	59		5.798					ND	
79 Naphthalene	128		5.822					ND	
80 4-Chloroaniline	127		5.857					ND	
81 2,6-Dichlorophenol	162		5.875					ND	
82 Hexachloropropene	213		5.881					ND	
83 Hexachlorobutadiene	225		5.946					ND	
84 4-chlorobenzenethiol	144		6.036					ND	
85 Quinoline	129		6.104					ND	
86 N-Nitrosodi-n-butylamine	84		6.145					ND	
87 Caprolactam	55		6.181					ND	
88 p-Phenylene diamine	108		6.163					ND	
89 5-Methyl-o-Anisidine	122		6.245					ND	
90 4-Chloro-3-methylphenol	107		6.334					ND	
91 Safrole, Total	162		6.363					ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
92 Carbofuran phenol	164		6.398					ND	
93 1,3-phenylenediamine	108		6.363					ND	
94 2-Methylnaphthalene	142		6.498					ND	
95 Phthalic anhydride	76		6.510					ND	
96 1-Methylnaphthalene	142		6.598					ND	
97 Hexachlorocyclopentadiene	237		6.669					ND	
98 1,2,4,5-Tetrachlorobenzene	216		6.675					ND	
99 Isosafrole Peak 1	162		6.651					ND	
100 Methyl 4-chlorophenyl sulf	158		6.753					ND	
101 2,4,6-Trichlorophenol	196		6.775					ND	
102 2,3-Dichlorobenzenamine	161		6.775					ND	
103 2,4,5-Trichlorophenol	196		6.816					ND	
104 Isosafrole Peak 2	104		6.875					ND	
105 1,1'-Biphenyl	154		6.957					ND	
106 Toluene diamine (2,4- + 2,	122		6.916					ND	
107 2-Chloronaphthalene	162		6.987					ND	
108 1-Chloronaphthalene	162		6.969					ND	
109 2-Nitroaniline	65		7.075					ND	
110 1,4-Naphthoquinone	158		7.104					ND	
111 1,4-Dinitrobenzene	168		7.157					ND	
112 Dimethyl phthalate	163		7.245					ND	
113 1,3-Dinitrobenzene	168		7.275					ND	
114 2,6-Dinitrotoluene	165		7.304					ND	
115 Acenaphthylene	152		7.398					ND	
116 3-Nitroaniline	138		7.481					ND	
117 Acenaphthene	153		7.575					ND	
118 2,4-Dinitrophenol	184		7.581					ND	
119 1,3-Dimethyl-2,4-Dinitrobe	77		7.645					ND	
120 4-Nitrophenol	109		7.645					ND	
121 Pentachlorobenzene	250		7.675					ND	
122 2,4-Dinitrotoluene	165		7.710					ND	
123 Dibenzofuran	168		7.745					ND	
124 1,3-Dimethyl-2,5-Dinitrobe	179		7.751					ND	
125 1-Naphthylamine	143		7.775					ND	
126 n-hydroxymethylphthalimide	147		7.698					ND	
127 2,3,4,6-Tetrachlorophenol	232		7.869					ND	
128 Hexadecane	57		7.969					ND	
129 2-Naphthylamine	143		7.851					ND	
130 Diethyl phthalate	149		7.945					ND	
131 1,4-Dimethyl-2,6-Dinitrobe	179		7.933					ND	
132 1,4-Dimethyl-2,3-Dinitrobe	77		7.963					ND	
133 Thionazin	97		7.987					ND	
134 1,2-Dimethyl-3,6-Dinitrobe	179		8.039					ND	
135 4-Chlorophenyl phenyl ethe	204		8.075					ND	
136 Fluorene	166		8.087					ND	
137 N-Nitro-o-toluidine	152		8.039					ND	
138 Tributyl phosphate	99		8.128					ND	
139 4-Nitroaniline	138		8.092					ND	
140 4,6-Dinitro-2-methylphenol	198		8.128					ND	
141 1,5-Dimethyl-2,4-Dinitrobe	179		8.180					ND	
142 Diphenylamine	169		8.187					ND	
143 N-Nitrosodiphenylamine	169		8.187					ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
144 Azobenzene	77		8.234					ND	
145 1,2-Diphenylhydrazine	77		8.234					ND	
146 1,5-Dimethyl-2,3-Dinitrobe	179		8.275					ND	
147 Sulfotepp	97		8.292					ND	
148 2,4,6 - Tribromophenol	330		8.328				ND	ND	U
149 1,2-Dimethyl-3,5-Dinitrobe	179		8.380					ND	
150 Diallate Peak 1	86		8.439					ND	
151 1,3,5-Trinitrobenzene	213		8.387					ND	
152 Phorate	121		8.445					ND	
153 Phenyl sulfide	186		8.475					ND	
154 Phenacetin	108		8.445					ND	
155 1,2-Dimethyl-3,4-Dinitrobe	179		8.522					ND	
156 Diallate Peak 2	86		8.528					ND	
157 4-Bromophenyl phenyl ether	248		8.563					ND	
158 Hexachlorobenzene	284		8.651					ND	
159 Dimethoate	87		8.610					ND	
160 Atrazine	200		8.710					ND	
161 1,2-Dimethyl-4,5-Dinitrobe	91		8.745					ND	
162 n-Octadecane	85		8.887					ND	
163 4-Aminobiphenyl	169		8.781					ND	
164 Pentachlorophenol	266		8.839					ND	
165 Pentachloronitrobenzene	237		8.810					ND	
166 Pronamide	173		8.839					ND	
167 Disulfoton	88		8.963					ND	
168 Dinoseb	211		8.969					ND	
169 Phenanthrene	178		9.051					ND	
170 Anthracene	178		9.098					ND	
171 Carbazole	167		9.251					ND	
172 Alachlor	188		9.387					ND	
173 Methyl parathion	109		9.339					ND	
174 Phenyl disulfide	109		9.515					ND	
175 Di-n-butyl phthalate	149		9.586					ND	
176 Ethyl Parathion	109		9.751					ND	
177 Diphenylsulfone	125		9.844					ND	
178 4-Nitroquinoline-1-oxide	190		9.792					ND	
179 Methapyrilene	97		9.881					ND	
180 Isodrin	193		10.139					ND	
181 Octachlorostyrene	308		10.220					ND	
182 Fluoranthene	202		10.386					ND	
183 4,4-Dichlorobenzil	139		10.602					ND	
184 Benzidine	184		10.545					ND	
185 Pyrene	202		10.704					ND	
187 Aramite Peak 1	185		10.822					ND	
188 p-chlorophenyl sulfone	159	10.922	10.896	0.026	43	5016			NC
189 Aramite Peak 2	185		10.945					ND	
190 p-Dimethylamino azobenzene	120		11.092					ND	
191 Chlorobenzilate	251		11.169					ND	
192 Famphur	218		11.663					ND	
193 Butyl benzyl phthalate	149		11.786					ND	
194 3,3'-Dimethylbenzidine	212		11.686					ND	
195 2-Acetylaminofluorene	181		12.186					ND	
196 4,4'-Methylene bis(2-chlor	231		12.833					ND	

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
197 3,3'-Dichlorobenzidine	252		12.910					ND	
198 Benzo[a]anthracene	228		12.951					ND	
199 Bis(2-ethylhexyl) phthalat	149		13.116					ND	
200 Chrysene	228		13.033					ND	
201 6-Methylchrysene	242		14.074					ND	
202 Di-n-octyl phthalate	149		14.880					ND	
203 7,12-Dimethylbenz(a)anthra	256		15.645					ND	
204 Benzo[b]fluoranthene	252		15.745					ND	
205 Benzo[k]fluoranthene	252		15.827					ND	
206 Hexachlorophene	196		16.556					ND	
207 Benzo[e]pyrene	252		16.510					ND	
208 Benzo[a]pyrene	252		16.657					ND	
209 Perylene	252		16.845					ND	
210 3-Methylcholanthrene	268		17.604					ND	
211 Tris(2,3-dibromopropyl)pho	119		18.298					ND	
212 Dibenz[a,h]acridine	279		19.145					ND	
213 Dibenz[a,j]acridine	279		19.298					ND	
214 Indeno[1,2,3-cd]pyrene	276		19.886					ND	
215 Dibenz(a,h)anthracene	278		19.974					ND	
216 Benzo[g,h,i]perylene	276		20.615					ND	
217 Dibenzo[a,e]pyrene	302		24.703					ND	
S 218 Total Cresols	108		15.496					ND	
S 219 Methyl Phenols,Total	108		15.496					ND	
S 220 Isosafrole	162		15.496					ND	
S 221 Diallate	86		15.496					ND	
S 222 Aramite, Total	185		15.496					ND	
S 223 Phthalic acid	148		19.689					ND	
14 2-Butoxyethanol	1		0.000					ND	
15 1,2,3,4-Tetrahydronaphthal	1		0.000					ND	
16 2-Phenoxyethanol	1		0.000					ND	
17 1,4-Dimethyl-2,5-Dinitrobe	1		0.000					ND	
59 4,4'-DDE	246		5.053					ND	
64 4,4'-DDD	235		5.369					ND	
74 4,4'-DDT	235		5.598					ND	
T 224 Hexachlorodibenzofurans TI	1		0.000					ND	
T 225 Pentachlorodibenzo-p-dioxi	1		0.000					ND	
T 226 Tetrachlorodibenzofurans T	1		0.000					ND	
T 227 2,6-Dimethylphenol	1		0.000					ND	
T 228 Pentachlorodibenzofurans T	1		0.000					ND	
T 229 Tetrachlorodibenzo-p-dioxi	1		0.000					ND	
T 230 Octadecane (TIC)	1		0.000					ND	
T 231 Hexachlorodibenzo-p-dioxin	1		0.000					ND	
S 232 TPAH	1		0.000					ND	

QC Flag Legend

Processing Flags

NC - Not Calibrated

ND - Not Detected or Marked ND

Review Flags

U - Marked Undetected

Reagents:

MS-IS_00014 Amount Added: 20.00 Units: uL Run Reagent

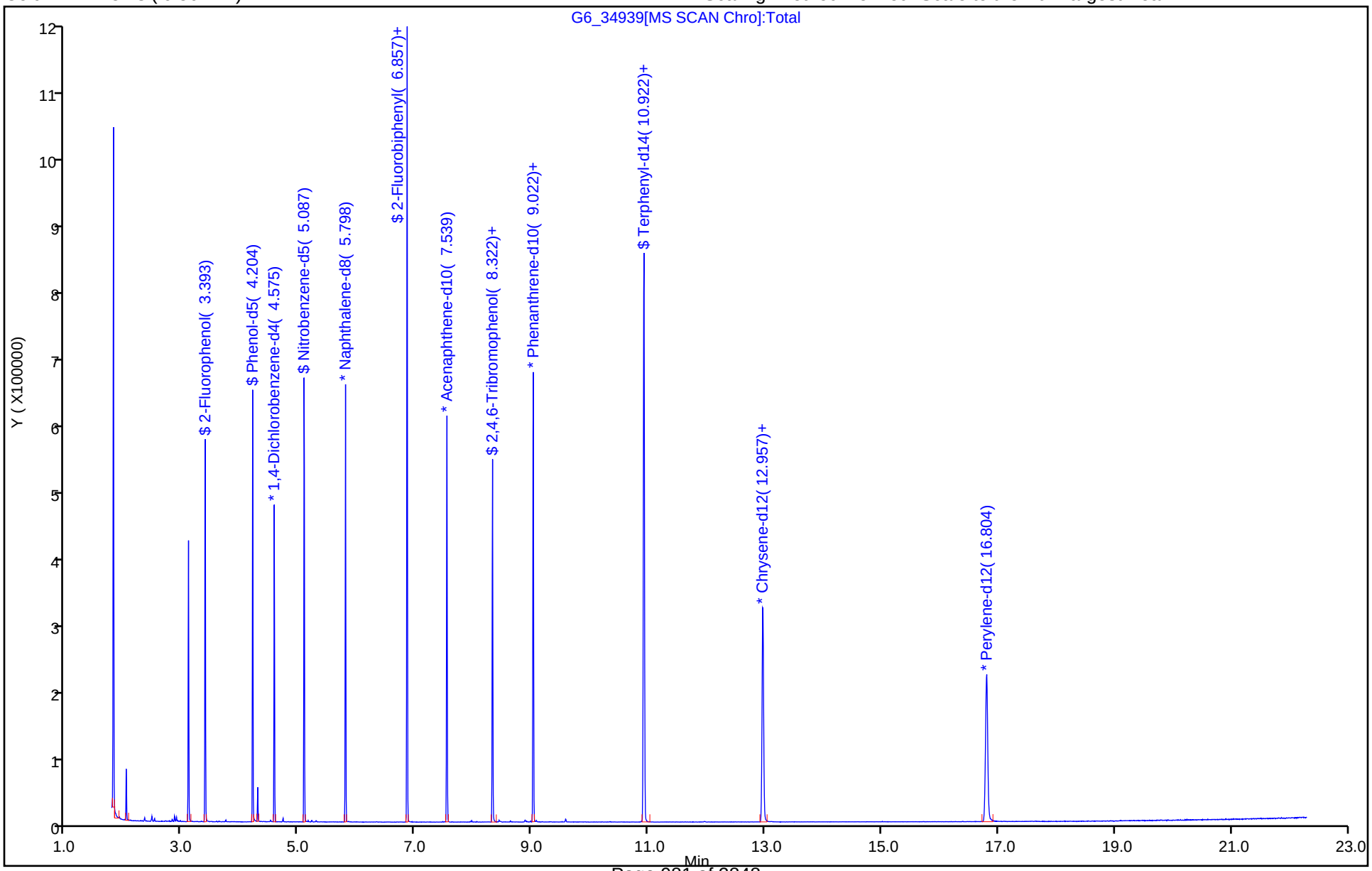
Report Date: 30-Jul-2018 10:09:38 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34939.D

Injection Date:	27-Jul-2018 18:23:30	Instrument ID:	SMS_G6	Operator ID:	KIEKELD
Lims ID:	LB 280-423271/1-F			Worklist Smp#:	24
Client ID:					
Injection Vol:	0.5 ul	Dil. Factor:	1.0000	ALS Bottle#:	8
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		

Column: VF-5ms (0.50 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1



TestAmerica Denver
Recovery Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34939.D
Lims ID: LB 280-423271/1-F
Client ID:
Sample Type: LB
Inject. Date: 27-Jul-2018 18:23:30 ALS Bottle#: 8 Worklist Smp#: 24
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: LB 280-423271_1-F
Operator ID: KIEKELD Instrument ID: SMS_G6

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 30-Jul-2018 10:09:10 Calib Date: 02-Jul-2018 17:31:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180702-71573.b\G6_34396.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0312

First Level Reviewer: kiekeld Date: 30-Jul-2018 09:56:06

Compound	Amount Added	Amount Recovered	% Rec.
$ 7 2-Fluorophenol	100.0	70.5	70.46
$ 8 Phenol-d5	100.0	62.4	62.42
$ 9 Nitrobenzene-d5	100.0	73.7	73.73
$ 11 2-Fluorobiphenyl	100.0	75.0	74.99
$ 12 2,4,6-Tribromophenol	100.0	80.4	80.42
$ 13 Terphenyl-d14	100.0	73.4	73.41

FORM I
GC/MS SEMI VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Denver | Job No.: 160-29498-1

SDG No.:

Client Sample ID: | Lab Sample ID: LCS 280-423271/3-B

Matrix: Solid (TCLP) | Lab File ID: G6_34940.D

Analysis Method: 8270C | Date Collected:

Extract. Method: 3510C | Date Extracted: 07/25/2018 10:50

Sample wt/vol: 200(mL) | Date Analyzed: 07/27/2018 18:50

Con. Extract Vol.: 1(mL) | Dilution Factor: 1

Injection Volume: 0.5(uL) | Level: (low/med) Low

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 423979 | Units: mg/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
95-48-7	2-Methylphenol	0.196		0.050	0.0049
15831-10-4	3 & 4 Methylphenol	0.395		0.050	0.0013
1319-77-3	Total Cresols	0.591		0.050	0.0013
106-46-7	1,4-Dichlorobenzene	0.186		0.020	0.0016
121-14-2	2,4-Dinitrotoluene	0.0667		0.050	0.0083
118-74-1	Hexachlorobenzene	0.0761		0.050	0.0033
87-68-3	Hexachlorobutadiene	0.189		0.050	0.017
67-72-1	Hexachloroethane	0.184		0.050	0.011
98-95-3	Nitrobenzene	0.200		0.050	0.0041
87-86-5	Pentachlorophenol	0.370		0.25	0.10
110-86-1	Pyridine	0.167		0.10	0.0057
88-06-2	2,4,6-Trichlorophenol	0.194		0.025	0.0014
95-95-4	2,4,5-Trichlorophenol	0.197		0.050	0.0022

CAS NO.	SURROGATE	%REC	Q	LIMITS
321-60-8	2-Fluorobiphenyl	74		50-135
367-12-4	2-Fluorophenol	72		46-135
4165-62-2	Phenol-d5	66		40-135
118-79-6	2,4,6-Tribromophenol	82		50-135
1718-51-0	Terphenyl-d14	78		52-135
4165-60-0	Nitrobenzene-d5	77		49-135

Report Date: 30-Jul-2018 10:09:47 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34940.D
Lims ID: LCS 280-423271/3-B
Client ID:
Sample Type: LCS
Inject. Date: 27-Jul-2018 18:50:30 ALS Bottle#: 9 Worklist Smp#: 25
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: LCS 280-423271_3-B
Operator ID: KIEKELD Instrument ID: SMS_G6

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 30-Jul-2018 10:09:10 Calib Date: 02-Jul-2018 17:31:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180702-71573.b\G6_34396.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0312

First Level Reviewer: kiekeld Date: 30-Jul-2018 09:56:24

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
* 1 1,4-Dichlorobenzene-d4	152	4.575	4.575	0.000	95	60592	40.0	40.0	
* 2 Naphthalene-d8	136	5.798	5.798	0.000	99	240812	40.0	40.0	
* 3 Acenaphthene-d10	164	7.539	7.539	0.000	94	121731	40.0	40.0	
* 4 Phenanthrene-d10	188	9.022	9.022	0.000	97	231735	40.0	40.0	
* 5 Chrysene-d12	240	12.963	12.969	-0.006	99	208945	40.0	40.0	
* 6 Perylene-d12	264	16.798	16.809	-0.011	97	207312	40.0	40.0	
$ 7 2-Fluorophenol	112	3.393	3.387	0.006	90	157669	100.0	71.7	
$ 8 Phenol-d5	99	4.204	4.204	0.000	97	181104	100.0	65.6	
$ 9 Nitrobenzene-d5	82	5.087	5.093	-0.006	88	187585	100.0	76.7	
$ 11 2-Fluorobiphenyl	172	6.857	6.857	0.000	99	331934	100.0	74.3	
$ 12 2,4,6-Tribromophenol	330	8.322	8.328	-0.006	92	49955	100.0	82.0	
$ 13 Terphenyl-d14	244	10.922	10.922	0.000	99	392661	100.0	78.4	
22 Pyridine	79	2.299	2.287	0.012	98	79719	50.0	33.5	
43 1,4-Dichlorobenzene	146	4.593	4.593	0.000	95	96847	50.0	37.1	
46 2-Methylphenol	108	4.787	4.787	0.000	93	84731	50.0	39.1	
49 3 & 4 Methylphenol	108	4.928	4.934	-0.006	80	177593	100.0	79.0	
50 3-Methylphenol	108	4.928	4.934	-0.006	92	177593	100.0	79.0	
52 4-Methylphenol	108	4.928	4.934	-0.006	94	177593	100.0	79.0	
58 Hexachloroethane	117	5.069	5.069	0.000	96	37317	50.0	36.9	
60 Nitrobenzene	77	5.110	5.110	0.000	86	93176	50.0	40.0	
83 Hexachlorobutadiene	225	5.945	5.946	-0.001	98	41142	50.0	37.8	
101 2,4,6-Trichlorophenol	196	6.775	6.775	0.000	92	50343	50.0	38.9	
103 2,4,5-Trichlorophenol	196	6.810	6.816	-0.006	96	55183	50.0	39.5	
122 2,4-Dinitrotoluene	165	7.704	7.710	-0.006	95	19348	20.0	13.3	
148 2,4,6 - Tribromophenol	330	8.322	8.328	-0.006	89	50406	100.0	82.7	
158 Hexachlorobenzene	284	8.645	8.651	-0.006	93	21296	20.0	15.2	
164 Pentachlorophenol	266	8.833	8.839	-0.006	98	69575	100.0	74.1	

Reagents:

MS-IS_00014 Amount Added: 20.00 Units: uL Run Reagent

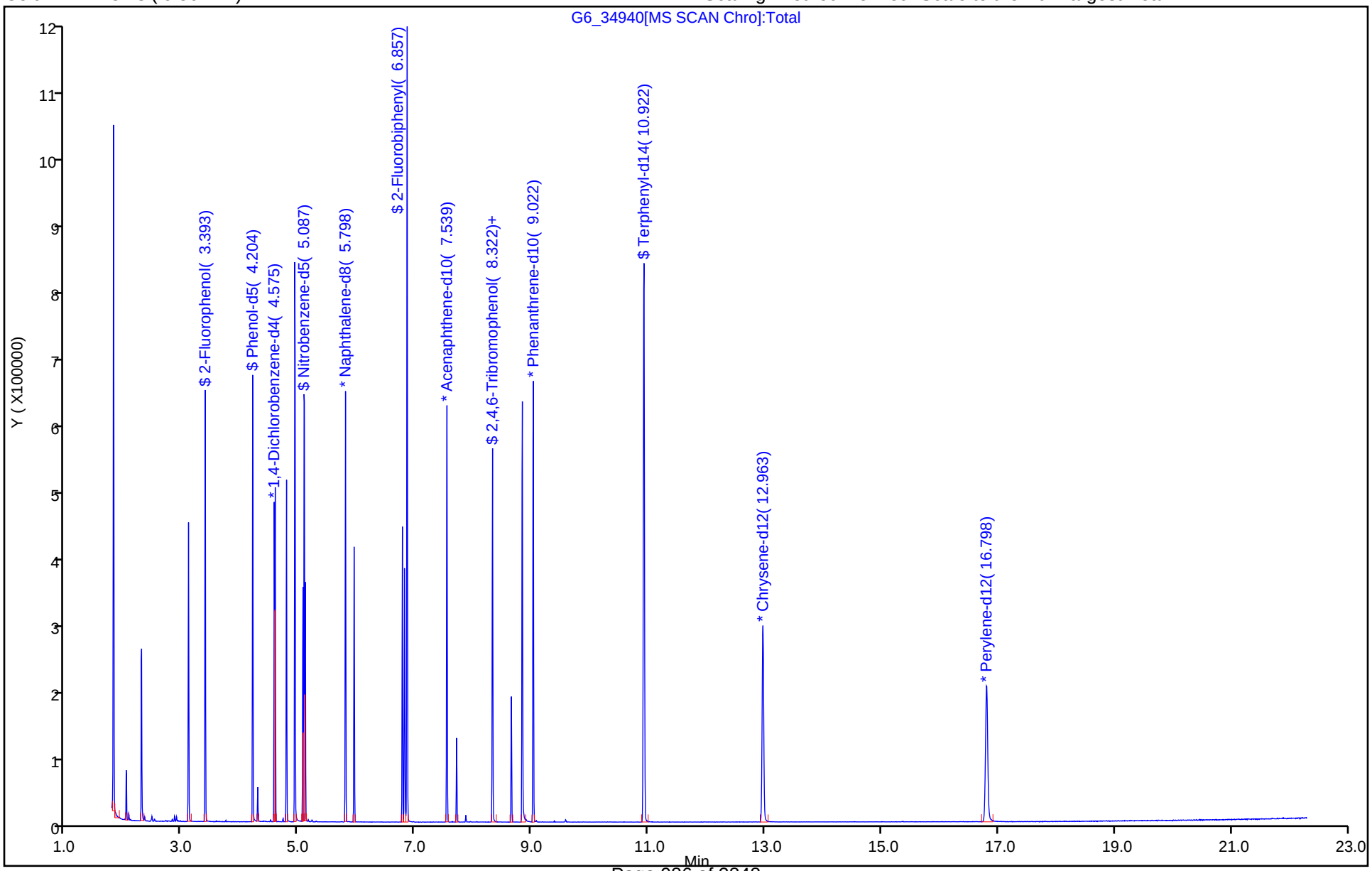
Report Date: 30-Jul-2018 10:09:47 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34940.D

Injection Date:	27-Jul-2018 18:50:30	Instrument ID:	SMS_G6	Operator ID:	KIEKELD
Lims ID:	LCS 280-423271/3-B			Worklist Smp#:	25
Client ID:					
Injection Vol:	0.5 ul	Dil. Factor:	1.0000	ALS Bottle#:	9
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		

Column: VF-5ms (0.50 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1



TestAmerica Denver
Recovery Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34940.D
Lims ID: LCS 280-423271/3-B
Client ID:
Sample Type: LCS
Inject. Date: 27-Jul-2018 18:50:30 ALS Bottle#: 9 Worklist Smp#: 25
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: LCS 280-423271_3-B
Operator ID: KIEKELD Instrument ID: SMS_G6

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 30-Jul-2018 10:09:10 Calib Date: 02-Jul-2018 17:31:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180702-71573.b\G6_34396.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0312

First Level Reviewer: kiekeld Date: 30-Jul-2018 09:56:24

Compound	Amount Added	Amount Recovered	% Rec.
$ 7 2-Fluorophenol	100.0	71.7	71.71
$ 8 Phenol-d5	100.0	65.6	65.57
$ 9 Nitrobenzene-d5	100.0	76.7	76.71
$ 11 2-Fluorobiphenyl	100.0	74.3	74.34
$ 12 2,4,6-Tribromophenol	100.0	82.0	81.98
$ 13 Terphenyl-d14	100.0	78.4	78.44

FORM I
GC/MS SEMI VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Denver | Job No.: 160-29498-1

SDG No.:

Client Sample ID: CRC-B22-0105 MS | Lab Sample ID: 160-29498-3 MS

Matrix: Solid (TCLP) | Lab File ID: G6_34955.D

Analysis Method: 8270C | Date Collected: 07/12/2018 11:50

Extract. Method: 3510C | Date Extracted: 07/25/2018 10:50

Sample wt/vol: 200(mL) | Date Analyzed: 07/28/2018 01:30

Con. Extract Vol.: 1(mL) | Dilution Factor: 1

Injection Volume: 0.5(uL) | Level: (low/med) Low

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 423979 | Units: mg/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
95-48-7	2-Methylphenol	0.198		0.050	0.0049
15831-10-4	3 & 4 Methylphenol	0.398		0.050	0.0013
1319-77-3	Total Cresols	0.596		0.050	0.0013
106-46-7	1,4-Dichlorobenzene	0.186		0.020	0.0016
121-14-2	2,4-Dinitrotoluene	0.0680		0.050	0.0083
118-74-1	Hexachlorobenzene	0.0758		0.050	0.0033
87-68-3	Hexachlorobutadiene	0.187		0.050	0.017
67-72-1	Hexachloroethane	0.181		0.050	0.011
98-95-3	Nitrobenzene	0.211		0.050	0.0041
87-86-5	Pentachlorophenol	0.377		0.25	0.10
110-86-1	Pyridine	0.165		0.10	0.0057
88-06-2	2,4,6-Trichlorophenol	0.189		0.025	0.0014
95-95-4	2,4,5-Trichlorophenol	0.202		0.050	0.0022

CAS NO.	SURROGATE	%REC	Q	LIMITS
321-60-8	2-Fluorobiphenyl	72		50-135
367-12-4	2-Fluorophenol	77		46-135
4165-62-2	Phenol-d5	70		40-135
118-79-6	2,4,6-Tribromophenol	80		50-135
1718-51-0	Terphenyl-d14	80		52-135
4165-60-0	Nitrobenzene-d5	81		49-135

Report Date: 30-Jul-2018 10:11:11 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34955.D
Lims ID: 160-29498-A-3-H MS
Client ID:
Sample Type: MS
Inject. Date: 28-Jul-2018 01:30:30 ALS Bottle#: 24 Worklist Smp#: 40
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: 160-29498-A-3-H MS
Operator ID: KIEKELD Instrument ID: SMS_G6

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 30-Jul-2018 10:11:03 Calib Date: 02-Jul-2018 17:31:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180702-71573.b\G6_34396.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0312

First Level Reviewer: kiekeld Date: 30-Jul-2018 10:08:10

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
* 1 1,4-Dichlorobenzene-d4	152	4.575	4.575	0.000	95	61701	40.0	40.0	
* 2 Naphthalene-d8	136	5.798	5.798	0.000	99	233165	40.0	40.0	
* 3 Acenaphthene-d10	164	7.539	7.539	0.000	94	131178	40.0	40.0	
* 4 Phenanthrene-d10	188	9.016	9.022	-0.006	97	236616	40.0	40.0	
* 5 Chrysene-d12	240	12.957	12.969	-0.012	98	213397	40.0	40.0	
* 6 Perylene-d12	264	16.798	16.809	-0.011	97	199479	40.0	40.0	
$ 7 2-Fluorophenol	112	3.393	3.387	0.006	90	173001	100.0	77.3	
$ 8 Phenol-d5	99	4.204	4.204	0.000	97	195849	100.0	69.6	
$ 9 Nitrobenzene-d5	82	5.087	5.093	-0.006	88	190691	100.0	80.5	
$ 11 2-Fluorobiphenyl	172	6.857	6.857	0.000	99	344294	100.0	71.6	
$ 12 2,4,6-Tribromophenol	330	8.322	8.328	-0.006	93	52773	100.0	80.4	
$ 13 Terphenyl-d14	244	10.916	10.922	-0.006	99	407864	100.0	79.8	
22 Pyridine	79	2.299	2.287	0.012	97	79873	50.0	32.9	
43 1,4-Dichlorobenzene	146	4.593	4.593	0.000	95	98620	50.0	37.1	
46 2-Methylphenol	108	4.787	4.787	0.000	93	87241	50.0	39.6	
49 3 & 4 Methylphenol	108	4.928	4.934	-0.006	80	182386	100.0	79.7	
50 3-Methylphenol	108	4.928	4.934	-0.006	92	182386	100.0	79.7	
52 4-Methylphenol	108	4.928	4.934	-0.006	95	182386	100.0	79.7	
58 Hexachloroethane	117	5.069	5.069	0.000	96	37228	50.0	36.1	
60 Nitrobenzene	77	5.104	5.110	-0.006	88	95266	50.0	42.3	
83 Hexachlorobutadiene	225	5.945	5.946	-0.001	98	39497	50.0	37.5	
101 2,4,6-Trichlorophenol	196	6.775	6.775	0.000	92	52808	50.0	37.8	
103 2,4,5-Trichlorophenol	196	6.810	6.816	-0.006	95	60697	50.0	40.3	
122 2,4-Dinitrotoluene	165	7.704	7.710	-0.006	94	21241	20.0	13.6	
148 2,4,6 - Tribromophenol	330	8.322	8.328	-0.006	91	52773	100.0	80.3	
158 Hexachlorobenzene	284	8.645	8.651	-0.006	93	21654	20.0	15.2	
164 Pentachlorophenol	266	8.828	8.839	-0.011	98	72436	100.0	75.5	

Reagents:

MS-IS_00014 Amount Added: 20.00 Units: uL Run Reagent

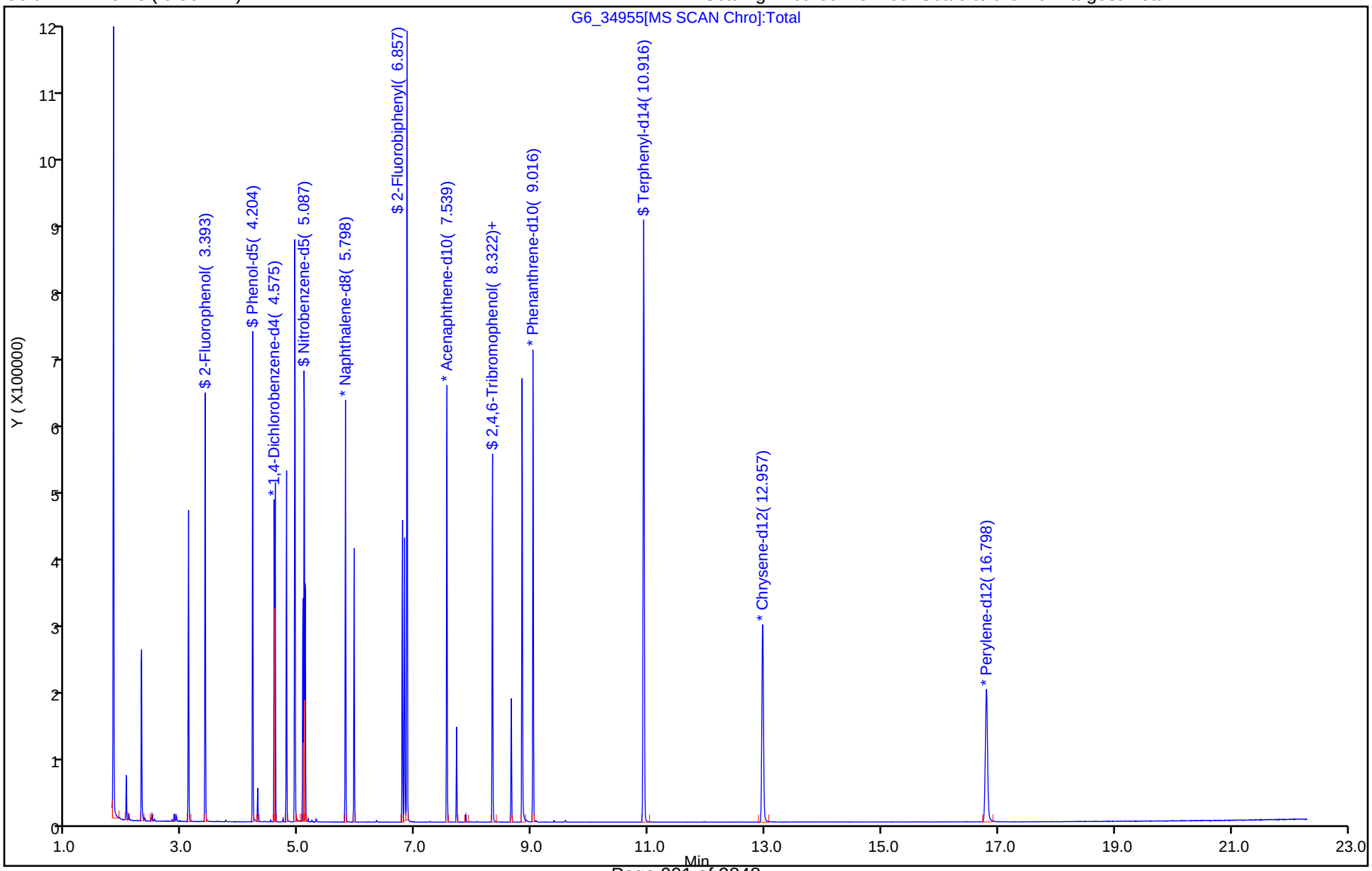
Report Date: 30-Jul-2018 10:11:11 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34955.D

Injection Date:	28-Jul-2018 01:30:30	Instrument ID:	SMS_G6	Operator ID:	KIEKELD
Lims ID:	160-29498-A-3-H MS			Worklist Smp#:	40
Client ID:					
Injection Vol:	0.5 ul	Dil. Factor:	1.0000	ALS Bottle#:	24
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		

Column: VF-5ms (0.50 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1



TestAmerica Denver
Recovery Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34955.D
Lims ID: 160-29498-A-3-H MS
Client ID:
Sample Type: MS
Inject. Date: 28-Jul-2018 01:30:30 ALS Bottle#: 24 Worklist Smp#: 40
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: 160-29498-A-3-H MS
Operator ID: KIEKELD Instrument ID: SMS_G6

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 30-Jul-2018 10:11:03 Calib Date: 02-Jul-2018 17:31:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180702-71573.b\G6_34396.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0312

First Level Reviewer: kiekeld Date: 30-Jul-2018 10:08:10

Compound	Amount Added	Amount Recovered	% Rec.
$ 7 2-Fluorophenol	100.0	77.3	77.27
$ 8 Phenol-d5	100.0	69.6	69.64
$ 9 Nitrobenzene-d5	100.0	80.5	80.54
$ 11 2-Fluorobiphenyl	100.0	71.6	71.55
$ 12 2,4,6-Tribromophenol	100.0	80.4	80.37
$ 13 Terphenyl-d14	100.0	79.8	79.78

FORM I
GC/MS SEMI VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Denver | Job No.: 160-29498-1

SDG No.:

Client Sample ID: CRC-B22-0105 MSD | Lab Sample ID: 160-29498-3 MSD

Matrix: Solid (TCLP) | Lab File ID: G6_34956.D

Analysis Method: 8270C | Date Collected: 07/12/2018 11:50

Extract. Method: 3510C | Date Extracted: 07/25/2018 10:50

Sample wt/vol: 200(mL) | Date Analyzed: 07/28/2018 01:57

Con. Extract Vol.: 1(mL) | Dilution Factor: 1

Injection Volume: 0.5(uL) | Level: (low/med) Low

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 423979 | Units: mg/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
95-48-7	2-Methylphenol	0.192		0.050	0.0049
15831-10-4	3 & 4 Methylphenol	0.379		0.050	0.0013
1319-77-3	Total Cresols	0.570		0.050	0.0013
106-46-7	1,4-Dichlorobenzene	0.156		0.020	0.0016
121-14-2	2,4-Dinitrotoluene	0.0641		0.050	0.0083
118-74-1	Hexachlorobenzene	0.0728		0.050	0.0033
87-68-3	Hexachlorobutadiene	0.145		0.050	0.017
67-72-1	Hexachloroethane	0.140		0.050	0.011
98-95-3	Nitrobenzene	0.204		0.050	0.0041
87-86-5	Pentachlorophenol	0.365		0.25	0.10
110-86-1	Pyridine	0.178		0.10	0.0057
88-06-2	2,4,6-Trichlorophenol	0.187		0.025	0.0014
95-95-4	2,4,5-Trichlorophenol	0.198		0.050	0.0022

CAS NO.	SURROGATE	%REC	Q	LIMITS
321-60-8	2-Fluorobiphenyl	71		50-135
367-12-4	2-Fluorophenol	75		46-135
4165-62-2	Phenol-d5	66		40-135
118-79-6	2,4,6-Tribromophenol	77		50-135
1718-51-0	Terphenyl-d14	75		52-135
4165-60-0	Nitrobenzene-d5	78		49-135

Report Date: 30-Jul-2018 10:11:14 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34956.D
Lims ID: 160-29498-A-3-I MSD
Client ID:
Sample Type: MSD
Inject. Date: 28-Jul-2018 01:57:30 ALS Bottle#: 25 Worklist Smp#: 41
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: 160-29498-A-3-I MSD
Operator ID: KIEKELD Instrument ID: SMS_G6

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 30-Jul-2018 10:11:03 Calib Date: 02-Jul-2018 17:31:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180702-71573.b\G6_34396.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0312

First Level Reviewer: kiekeld Date: 30-Jul-2018 10:08:29

Compound	Sig	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Q	Response	Cal Amt ug/ml	OnCol Amt ug/ml	Flags
* 1 1,4-Dichlorobenzene-d4	152	4.575	4.575	0.000	95	64275	40.0	40.0	
* 2 Naphthalene-d8	136	5.798	5.798	0.000	99	242083	40.0	40.0	
* 3 Acenaphthene-d10	164	7.540	7.539	0.001	94	129875	40.0	40.0	
* 4 Phenanthrene-d10	188	9.016	9.022	-0.006	98	236546	40.0	40.0	
* 5 Chrysene-d12	240	12.957	12.969	-0.012	98	214786	40.0	40.0	
* 6 Perylene-d12	264	16.804	16.809	-0.005	97	211685	40.0	40.0	
$ 7 2-Fluorophenol	112	3.393	3.387	0.006	90	175175	100.0	75.1	
$ 8 Phenol-d5	99	4.204	4.204	0.000	97	192718	100.0	65.8	
$ 9 Nitrobenzene-d5	82	5.087	5.093	-0.006	88	192553	100.0	78.3	
$ 11 2-Fluorobiphenyl	172	6.857	6.857	0.000	99	338118	100.0	71.0	
$ 12 2,4,6-Tribromophenol	330	8.322	8.328	-0.006	92	49909	100.0	76.8	
$ 13 Terphenyl-d14	244	10.916	10.922	-0.006	99	385246	100.0	74.9	
22 Pyridine	79	2.299	2.287	0.012	98	89970	50.0	35.6	
43 1,4-Dichlorobenzene	146	4.593	4.593	0.000	95	86498	50.0	31.3	
46 2-Methylphenol	108	4.787	4.787	0.000	93	88053	50.0	38.3	
49 3 & 4 Methylphenol	108	4.928	4.934	-0.006	80	180627	100.0	75.7	
50 3-Methylphenol	108	4.928	4.934	-0.006	92	180627	100.0	75.7	
52 4-Methylphenol	108	4.928	4.934	-0.006	94	180627	100.0	75.7	
58 Hexachloroethane	117	5.069	5.069	0.000	96	30082	50.0	28.0	
60 Nitrobenzene	77	5.104	5.110	-0.006	88	95590	50.0	40.9	
83 Hexachlorobutadiene	225	5.946	5.946	0.000	98	31722	50.0	29.0	
101 2,4,6-Trichlorophenol	196	6.775	6.775	0.000	92	51685	50.0	37.4	
103 2,4,5-Trichlorophenol	196	6.810	6.816	-0.006	95	58927	50.0	39.5	
122 2,4-Dinitrotoluene	165	7.704	7.710	-0.006	94	19811	20.0	12.8	
148 2,4,6 - Tribromophenol	330	8.322	8.328	-0.006	91	50549	100.0	77.7	
158 Hexachlorobenzene	284	8.645	8.651	-0.006	93	20792	20.0	14.6	
164 Pentachlorophenol	266	8.828	8.839	-0.011	97	70017	100.0	73.1	

Reagents:

MS-IS_00014 Amount Added: 20.00 Units: uL Run Reagent

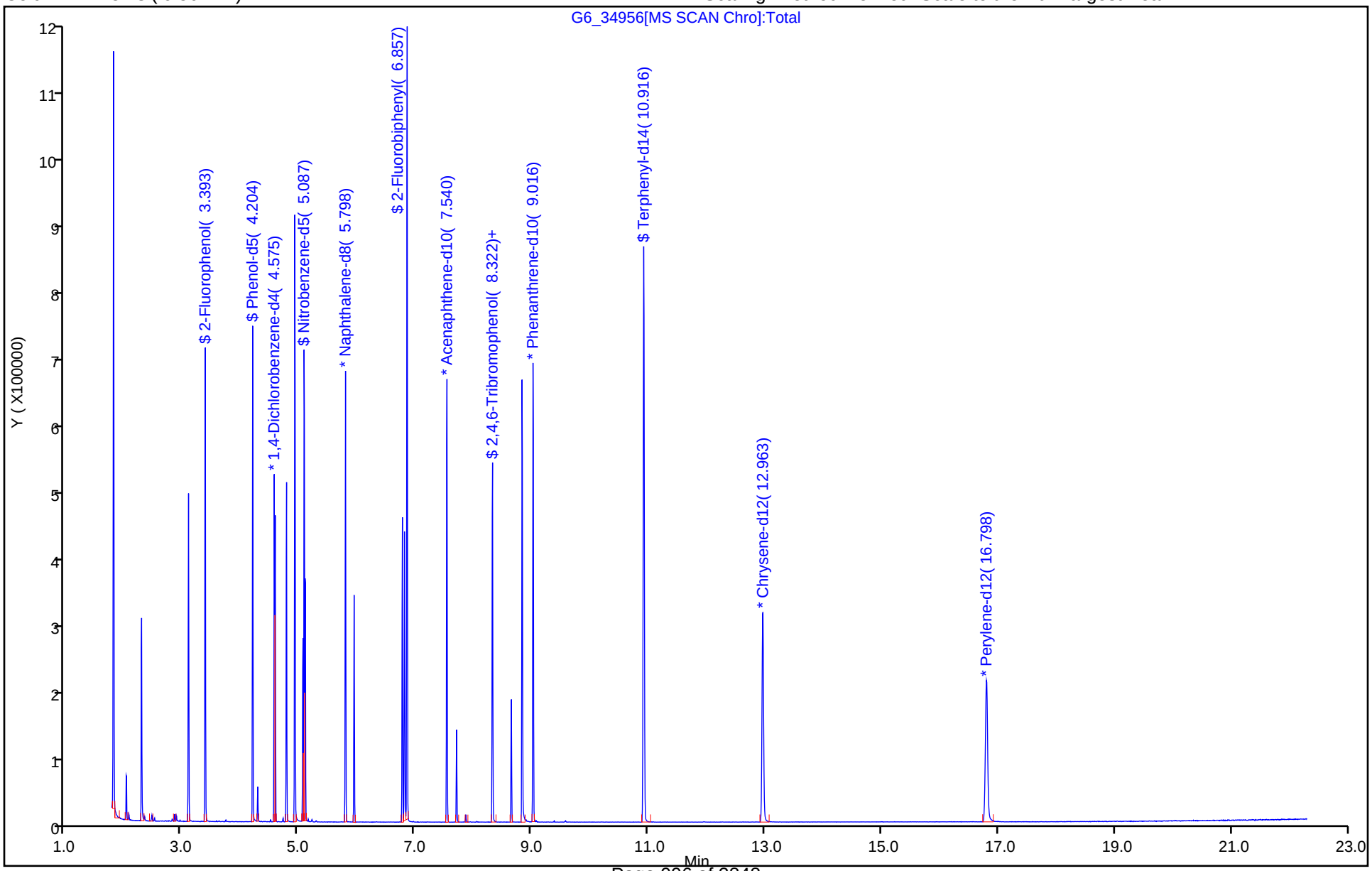
Report Date: 30-Jul-2018 10:11:14 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34956.D

Injection Date:	28-Jul-2018 01:57:30	Instrument ID:	SMS_G6	Operator ID:	KIEKELD
Lims ID:	160-29498-A-3-I MSD			Worklist Smp#:	41
Client ID:					
Injection Vol:	0.5 ul	Dil. Factor:	1.0000	ALS Bottle#:	25
Method:	SMSG6_8270C	Limit Group:	MSSV - 8270C_625		

Column: VF-5ms (0.50 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1



TestAmerica Denver
Recovery Report

Data File: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\G6_34956.D
Lims ID: 160-29498-A-3-I MSD
Client ID:
Sample Type: MSD
Inject. Date: 28-Jul-2018 01:57:30 ALS Bottle#: 25 Worklist Smp#: 41
Injection Vol: 0.5 ul Dil. Factor: 1.0000
Sample Info: 160-29498-A-3-I MSD
Operator ID: KIEKELD Instrument ID: SMS_G6

Method: \\ChromNA\Denver\ChromData\SMS_G6\20180727-72447.b\SMSG6_8270C.m
Limit Group: MSSV - 8270C_625
Method Label: 8270C / 625
Last Update: 30-Jul-2018 10:11:03 Calib Date: 02-Jul-2018 17:31:30
Integrator: RTE ID Type: Deconvolution ID
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SMS_G6\20180702-71573.b\G6_34396.D

Column 1 : VF-5ms (0.50 mm) Det: MS SCAN
Process Host: CTX0312

First Level Reviewer: kiekeld Date: 30-Jul-2018 10:08:29

Compound	Amount Added	Amount Recovered	% Rec.
$ 7 2-Fluorophenol	100.0	75.1	75.11
$ 8 Phenol-d5	100.0	65.8	65.78
$ 9 Nitrobenzene-d5	100.0	78.3	78.33
$ 11 2-Fluorobiphenyl	100.0	71.0	70.97
$ 12 2,4,6-Tribromophenol	100.0	76.8	76.77
$ 13 Terphenyl-d14	100.0	74.9	74.87

GC/MS SEMI VOA ANALYSIS RUN LOG

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SMS_G6 Start Date: 06/28/2018 12:05

Analysis Batch Number: 420416 End Date: 06/28/2018 16:48

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
DFTPP 280-420416/2		06/28/2018 12:05	1	G6_34331.D	Rxi-5Sil MS 0.25(mm)
ICIS 280-420416/3		06/28/2018 12:16	1	G6_34332.D	Rxi-5Sil MS 0.25(mm)
STD004 280-420416/4 IC		06/28/2018 12:43	1	G6_34333.D	Rxi-5Sil MS 0.25(mm)
STD010 280-420416/5 IC		06/28/2018 13:10	1	G6_34334.D	Rxi-5Sil MS 0.25(mm)
STD020 280-420416/6 IC		06/28/2018 13:37	1	G6_34335.D	Rxi-5Sil MS 0.25(mm)
STD050 280-420416/7 IC		06/28/2018 14:05	1	G6_34336.D	Rxi-5Sil MS 0.25(mm)
STD120 280-420416/8 IC		06/28/2018 14:32	1	G6_34337.D	Rxi-5Sil MS 0.25(mm)
STD160 280-420416/9 IC		06/28/2018 14:59	1	G6_34338.D	Rxi-5Sil MS 0.25(mm)
STD200 280-420416/10 IC		06/28/2018 15:26	1	G6_34339.D	Rxi-5Sil MS 0.25(mm)
ICV 280-420416/11		06/28/2018 15:53	1		Rxi-5Sil MS 0.25(mm)
ICV 280-420416/12		06/28/2018 16:21	1		Rxi-5Sil MS 0.25(mm)
ICV 280-420416/13		06/28/2018 16:48	1		Rxi-5Sil MS 0.25(mm)

GC/MS SEMI VOA ANALYSIS RUN LOG

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Instrument ID: SMS_G6 Start Date: 07/27/2018 15:27

Analysis Batch Number: 423979 End Date: 07/28/2018 01:57

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
DFTPP 280-423979/2		07/27/2018 15:27	1	G6_34932.D	Rxi-5Sil MS 0.25(mm)
CCV 280-423979/3		07/27/2018 15:39	1	G6_34933.D	Rxi-5Sil MS 0.25(mm)
CCV 280-423979/4		07/27/2018 16:18	1	G6_34934.D	Rxi-5Sil MS 0.25(mm)
CCV 280-423979/5		07/27/2018 16:41	1	G6_34935.D	Rxi-5Sil MS 0.25(mm)
ZZZZZ		07/27/2018 17:03	1		Rxi-5Sil MS 0.25(mm)
ZZZZZ		07/27/2018 17:30	1		Rxi-5Sil MS 0.25(mm)
ZZZZZ		07/27/2018 17:56	1		Rxi-5Sil MS 0.25(mm)
LB 280-423271/1-F		07/27/2018 18:23	1	G6_34939.D	Rxi-5Sil MS 0.25(mm)
LCS 280-423271/3-B		07/27/2018 18:50	1	G6_34940.D	Rxi-5Sil MS 0.25(mm)
ZZZZZ		07/27/2018 19:16	1		Rxi-5Sil MS 0.25(mm)
ZZZZZ		07/27/2018 19:43	1		Rxi-5Sil MS 0.25(mm)
ZZZZZ		07/27/2018 20:10	1		Rxi-5Sil MS 0.25(mm)
ZZZZZ		07/27/2018 20:37	1		Rxi-5Sil MS 0.25(mm)
ZZZZZ		07/27/2018 21:03	1		Rxi-5Sil MS 0.25(mm)
ZZZZZ		07/27/2018 21:30	1		Rxi-5Sil MS 0.25(mm)
ZZZZZ		07/27/2018 21:57	1		Rxi-5Sil MS 0.25(mm)
ZZZZZ		07/27/2018 22:23	1		Rxi-5Sil MS 0.25(mm)
ZZZZZ		07/27/2018 22:50	1		Rxi-5Sil MS 0.25(mm)
ZZZZZ		07/27/2018 23:17	1		Rxi-5Sil MS 0.25(mm)
CCVC 280-423979/36		07/27/2018 23:43	1		Rxi-5Sil MS 0.25(mm)
CCVC 280-423979/37		07/28/2018 00:10	1		Rxi-5Sil MS 0.25(mm)
CCVC 280-423979/38		07/28/2018 00:37	1		Rxi-5Sil MS 0.25(mm)
160-29498-3		07/28/2018 01:03	1	G6_34954.D	Rxi-5Sil MS 0.25(mm)
160-29498-3 MS		07/28/2018 01:30	1	G6_34955.D	Rxi-5Sil MS 0.25(mm)
160-29498-3 MSD		07/28/2018 01:57	1	G6_34956.D	Rxi-5Sil MS 0.25(mm)

TestAmerica-*Denver*

G6-062818-HSL

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

GC/MS Semivolatile Initial Calibration Data Review Checklist

LIMS Batch Number: 420416	Worklist: 71474	ICIS/ICIV Line # N/A	2nd Day ICV Line # N/A	Instrument ID: G6
Analyst/1st Reviewer: DDL Date: 062918	Method (circle): 625 8270C 8270D		Circle: ~~Full Scan~~ SIM BP LLSIM	
QC Type (circle): ~~Standard~~ DoD Q4 DoD Q5		QAPP_____	Other_____	

Review Items	Yes	No	NA	2nd Rev	If No, why is data reportable?
A. Tune/Calibration Verification					
1. Did DFTPP meet tune criteria? If SIM, did the PFTBA Tune check meet ion ratio criteria?	✓			✓	
2. Are the Benzidine and PCP tailing ≤ 2? (8270D/DoD) Benzidine tailing ≤3 and PCP tailing ≤5? (8270C)	✓			✓	
3. Is the DDT degradation ≤ 20%	✓			✓	
4. Were all standards injected within 12 hr of DFTPP? (or 24 hrs for 625)?	✓			✓	
5. Were ≥ 5 levels of each compound and surrogate analyzed?	✓			✓	
6. At least 6 consecutive points used for quadratic curves?			✓	NA	
7. Was low level standard at or below RL?	✓			✓	
8. If calibration points removed, were reasons for removal documented? Did sufficient calibration points remain? (removal from middle of curve not allowed)	✓			✓	(e.g.; some points <RL removed)
9. Does the low level standard have enough sensitivity to produce at least 5-10 scans across the peak, and all secondary ions are present?	✓			✓	
10. Do the average RFs meet minimum RF requirements? (625 – not method defined) (8270C-SPCCs ≥0.05) (8270D- all cmpds have min RFs defined in method/SOP)	✓			✓	
10. Did the calibration %RSD meet method requirements? (625: ≤35% all cmpds) (8270C: ≤30% for CCCs & ≤15% for all other cmpds/ surrogates) (8270D: <20% for all cmpds/surrogates)	✓			✓	
11. Was a linear or quadratic regression fit used for analytes that exceeded the %RSD requirements?	✓			✓	
12. If regression fit used, r^2 ≥0.990?	✓			✓	
13. Does the low point of a linear regression fit meet the ±30% read-back criteria? (8270D)			✓	NA	
14. For quadratic – evaluate curve fitting errors: Does each point fall within criteria when 'read-back' against the curve? (TA requirement – CA-Q-S-005; recommended limits ±30% low point & ±20% all other points) (Chrom Report - Details of Calibration per Analyte)			✓		
15. Is the concentration intercept <|RL| for each cmpd? ("X" Intercept in Chrom)	✓			✓	
16. Were manual integrations performed correctly and properly documented (Dated, initialed and reason given) for all calibration points? 2nd review of all MIs required	✓			✓	
17. Was the high point checked for detector saturation?	✓			✓	
18. Do the relative retention times for each analyte in each standard agree within +/-0.06 units (abs RT +/-0.5 min)	✓			✓	
19. Benzo(b & k)fluoranthene: height of the valley between must be less than 50% of the average of the two peak heights?	✓			✓	

Panida P
7/31/18

Review Items	Yes	No	NA	2nd Rev	If No, why is data reportable?
20. Elution order checked Isomeric pairs and coeluters?					Chrom: View/Documents/Methods/Isomers)
• aniline / bis(2-chloroethyl)ether	✓			✓	
• N-nitrosodiphenylamine/diphenylamine	✓			✓	
• 1,3- , 1,4- , 1,2-dichlorobenzene	✓			✓	
• benzyl alcohol / 2-methylphenol / 3/4-methylphenol	✓			✓	
• 2,4-dimethylphenol / 3,5-dimethylphenol	✓			✓	
• 2 & 1 - methylnaphthalene	✓			✓	
• 2,4,6- and 2,4,5-trichlorophenol	✓			✓	
• phenanthrene / anthracene	✓			✓	
• fluoranthene / pyrene	✓			✓	
• benzo(a)anthracene / chrysene	✓			✓	
• bis(2-ethylhexyl)/di-n-octyl phthalate	✓			✓	
• benzo(b)fluoranthene / benzo(k)fluoranthene	✓			✓	
• indeno(1,2,3-cd)pyrene / benzo(g,h,i)perylene	✓			✓	
• safrole/1-chloronaphthalene			NA	NA	
• 1-/2-naphthylamine			✓	✓	
• 1- and 2-chloronaphthalene			✓	✓	
• 2,4,6- and 2,4,5-tribromophenol			✓	✓	
• Benzo(e)pyrene / benzo(a)pyrene	✓			✓	
21. Was the ICV within required criteria? 625 = QCS method defined/Table6 8270C = ±35% or ±55% of expected for poor performers; 8270D = ±20%, poor performers <50% DoD = ±20% QAPP/Other	✓			✓	
22. If any criteria from items above were not met, was NCM generated?			✓	NA	NCM #:
23. Were manual integrations for ICV performed correctly and properly documented? (dated, initialed and reason given; 2nd review of all MIs required)	✓			✓	
24. Are all files and QC linked and processed correctly?	✓		✓	✓	☐ Files linked properly to calibration levels? ☐ All points are in the most recent active calibration event? [Calibration Events –'Fix ICAL linkage' if needed] ☐ Runs linked to DFTPP? [QC links] ☐ Checklist & run log scanned, attached & assigned properly?
25. Is the ICAL locked in TALS and Chrom?	✓			✓	

Comments: RB 062718

2nd Reviewer: Alex Hoffer **Review Date:** 07/02/18

Panida N 7/31/18

Injection Log

Directory: C:\HPCHEM\1\DATA\G6\062818.B

070318

Line	Vial	FileName	Multiplier	SampleName	Misc Info	Injected
1	100	G6_34330.d	1.	PRIMER		28 Jun 2018 11:39
2	1	G6_34331.d	1.	DFTPP		28 Jun 2018 12:05
3	2	G6_34332.d	1.	ICIS HSL		28 Jun 2018 12:16
4	3	G6_34333.d	1.	STD004 HSL		28 Jun 2018 12:43
5	4	G6_34334.d	1.	STD010 HSL		28 Jun 2018 13:10
6	5	G6_34335.d	1.	STD020 HSL		28 Jun 2018 13:37
7	6	G6_34336.d	1.	STD050 HSL		28 Jun 2018 14:05
8	7	G6_34337.d	1.	STD120 HSL		28 Jun 2018 14:32
9	8	G6_34338.d	1.	STD160 HSL		28 Jun 2018 14:59
10	9	G6_34339.d	1.	STD200 HSL		28 Jun 2018 15:26
11	10	G6_34340.d	1.	ICV HSL 1		28 Jun 2018 15:53
12	11	G6_34341.d	1.	ICV HSL 2		28 Jun 2018 16:21
13	12	G6_34342.d	1.	ICV FAM		28 Jun 2018 16:48
14	13	G6_34343.d	1.	STD080 AP9		28 Jun 2018 17:15
15	14	G6_34344.d	1.	STD010 AP9		28 Jun 2018 17:42
16	15	G6_34345.d	1.	STD020 AP9		28 Jun 2018 18:10
17	16	G6_34346.d	1.	STD050 AP9		28 Jun 2018 18:37
18	17	G6_34347.d	1.	STD120 AP9		28 Jun 2018 19:04
19	18	G6_34348.d	1.	STD160 AP9		28 Jun 2018 19:31
20	19	G6_34349.d	1.	STD200 AP9		28 Jun 2018 19:58
21	20	G6_34350.d	1.	ICV AP9 1		28 Jun 2018 20:25
22	21	G6_34351.d	1.	ICV AP9 2		28 Jun 2018 20:52
23	22	G6_34352.d	1.	ICV AP9 3		28 Jun 2018 21:20

Dilution Solvent Lot #: N/A **Pipette ID:** N/A **Method(s) Performed:** 8270C

Daily Maintenance: Check box if maintenance was performed. No mark indicates the item was not changed.

Changed Septum ☑ **Changed Liner** ☑ **Changed Seal** ☑ **Changed Ferrule** ☑ **Clipped Column** ☐

Panida R.
7/31/18

TestAmerica-*Denver*

G6 – 062918 – AFC

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

GC/MS Semivolatile Initial Calibration Data Review Checklist

LIMS Batch Number: 420526	Worklist: 71505	ICIS/ICIV Line # N/A	2nd Day ICV Line # N/A	Instrument ID: G6
Analyst/1st Reviewer: DEL Date: 070218	Method (circle): 625 (8270C) 8270D		Circle: (Full Scan) SIM BP LLSIM	
QC Type (circle): (Standard) (DOD Q4) (DoD Q5)	QAPP_____	Other_____		

Review Items	Yes	No	NA	2nd Rev	If No, why is data reportable?
A. Tune/Calibration Verification					
1. Did DFTPP meet tune criteria? If SIM, did the PFTBA Tune check meet ion ratio criteria?	✓			✓	
2. Are the Benzidine and PCP tailing ≤ 2? (8270D/DoD) Benzidine tailing ≤3 and PCP tailing ≤5? (8270C)	✓			✓	
3. Is the DDT degradation ≤ 20%	✓			✓	
4. Were all standards injected within 12 hr of DFTPP? (or 24 hrs for 625)?	✓			✓	
5. Were ≥ 5 levels of each compound and surrogate analyzed?	✓			✓	
6. At least 6 consecutive points used for quadratic curves?			✓	NA	
7. Was low level standard at or below RL?	✓			✓	
8. If calibration points removed, were reasons for removal documented? Did sufficient calibration points remain? (removal from middle of curve not allowed)	✓			✓	(e.g.; some points <RL removed)
9. Does the low level standard have enough sensitivity to produce at least 5-10 scans across the peak, and all secondary ions are present?	✓			✓	
10. Do the average RFs meet minimum RF requirements? (625 – not method defined) (8270C-SPCCs ≥0.05) (8270D- all cmpds have min RFs defined in method/SOP)	✓			✓	
10. Did the calibration %RSD meet method requirements? (625: ≤35% all cmpds) (8270C: ≤30% for CCCs & ≤15% for all other cmpds/ surrogates) (8270D: ≤20% for all cmpds/surrogates)	✓			✓	
11. Was a linear or quadratic regression fit used for analytes that exceeded the %RSD requirements?			✓	NA	
12. If regression fit used, r^2 ≥0.990?			✓		
13. Does the low point of a linear regression fit meet the ±30% read-back criteria? (8270D)			✓		
14. For quadratic – evaluate curve fitting errors: Does each point fall within criteria when 'read-back' against the curve? (TA requirement – CA-Q-S-005; recommended limits ±30% low point & ±20% all other points) (Chrom Report - Details of Calibration per Analyte)			✓		
15. Is the concentration intercept <|RL| for each cmpd? ("X" intercept in Chrom)	✓			✓	
16. Were manual integrations performed correctly and properly documented (Dated, initialed and reason given) for all calibration points? 2nd review of all MIs required			✓	NA	
17. Was the high point checked for detector saturation?	✓			✓	
18. Do the relative retention times for each analyte in each standard agree within +/-0.06 units (abs RT +/-0.5 min)	✓			✓	
19. Benzo(b & k)fluoranthene: height of the valley between must be less than 50% of the average of the two peak heights?			✓	NA	

Panida P. 7/31/18

Review Items	Yes	No	NA	2nd Rev	If No, why is data reportable?
20. Elution order checked Isomeric pairs and coeluters?					Chrom: View/Documents/Methods/Isomers)
• aniline / bis(2-chloroethyl)ether			N/A	N/A	
• N-nitrosodiphenylamine/diphenylamine					
• 1,3- , 1,4- , 1,2-dichlorobenzene					
• benzyl alcohol / 2-methylphenol / 3/4-methylphenol					
• 2,4-dimethylphenol / 3,5-dimethylphenol					
• 2 & 1 - methylnaphthalene					
• 2,4,6- and 2,4,5-trichlorophenol					
• phenanthrene / anthracene					
• fluoranthene / pyrene					
• benzo(a)anthracene / chrysene					
• bis(2-ethylhexyl)/di-n-octyl phthalate					
• benzo(b)fluoranthene / benzo(k)fluoranthene					
• indeno(1,2,3-cd)pyrene / benzo(g,h,i)perylene					
• safrole/1-chloronaphthalene					
• 1-/2-naphthylamine					
• 1- and 2-chloronaphthalene					
• 2,4,6- and 2,4,5-tribromophenol					
• Benzo(e)pyrene / benzo(a)pyrene					
21. Was the ICV within required criteria? 625 = QCS method defined/Table6 8270C = ±35% or ±55% of expected for poor performers; 8270D = ±20%, poor performers <50% DoD = ±20% QAPP/Other _____	✓			✓	
22. If any criteria from items above were not met, was NCM generated?			✓	N/A	NCM #:
23. Were manual integrations for ICV performed correctly and properly documented? (dated, initialed and reason given; 2nd review of all MIs required)			✓		
24. Are all files and QC linked and processed correctly?			✓		☐ Files linked properly to calibration levels? ☐ All points are in the most recent active calibration event? [Calibration Events –'Fix ICAL linkage' if needed] ☐ Runs linked to DFTPP? [QC links] ☐ Checklist & run log scanned, attached & assigned properly?
25. Is the ICAL locked in TALS and Chrom?	✓			✓	

Comments: _____

ICAL 070318

2nd Reviewer: Alex Hoffer **Review Date:** 07/09/18

Rapida R 7/31/18

Injection Log

Directory: C:\HPCHEM\1\DATA\G6\062918.B

Line	Vial	FileName	Multiplier	SampleName	Misc Info	Injected
1	100	G6_34353.d	1.	PRIMER		29 Jun 2018 08:34
2	1	G6_34354.d	1.	DFTPP		29 Jun 2018 08:59
3	2	G6_34355.d	1.	STD080 AFC		29 Jun 2018 09:16
4	3	G6_34356.d	1.	STD010 AFC		29 Jun 2018 09:39
5	4	G6_34357.d	1.	STD020 AFC		29 Jun 2018 10:01
6	5	G6_34358.d	1.	STD050 AFC		29 Jun 2018 10:24
7	6	G6_34359.d	1.	STD120 AFC		29 Jun 2018 10:46
8	7	G6_34360.d	1.	STD160 AFC		29 Jun 2018 11:08
9	8	G6_34361.d	1.	STD200 AFC		29 Jun 2018 11:31
10	9	G6_34362.d	1.	ICV AFC		29 Jun 2018 11:53
11	10	G6_34363.d	1.	STD080 BZHD		29 Jun 2018 12:16
12	11	G6_34364.d	1.	STD010 BZHD		29 Jun 2018 12:39
13	12	G6_34365.d	1.	STD020 BZHD		29 Jun 2018 13:01
14	13	G6_34366.d	1.	STD050 BZHD		29 Jun 2018 13:24
15	14	G6_34367.d	1.	STD120 BZHD		29 Jun 2018 13:46
16	15	G6_34368.d	1.	STD160 BZHD		29 Jun 2018 14:09
17	16	G6_34369.d	1.	STD200 BZHD		29 Jun 2018 14:31
18	17	G6_34370.d	1.	ICV BZHD		29 Jun 2018 14:54
19	18	G6_34371.d	1.	STD080 CUST		29 Jun 2018 15:16
20	19	G6_34372.d	1.	STD010 CUST		29 Jun 2018 15:40
21	20	G6_34373.d	1.	STD020 CUST		29 Jun 2018 16:05
22	21	G6_34374.d	1.	STD050 CUST		29 Jun 2018 16:29
23	22	G6_34375.d	1.	STD120 CUST		29 Jun 2018 16:53
24	23	G6_34376.d	1.	STD160 CUST		29 Jun 2018 17:17
25	24	G6_34377.d	1.	STD200 CUST		29 Jun 2018 17:41
26	25	G6_34378.d	1.	ICV CUST		29 Jun 2018 18:05

Dilution Solvent Lot #: N/A Pipette ID: N/A Method(s) Performed: 8270C

Daily Maintenance: Check box if maintenance was performed. No mark indicates the item was not changed.

Changed Septum ☑ Changed Liner ☑ Changed Seal ☑ Changed Ferrule ☑ Clipped Column ☐

07/03/18

91

Panida R.
7/31/18

TestAmerica-*Denver*

G6-062918-BZHD

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

GC/MS Semivolatile Initial Calibration Data Review Checklist

LIMS Batch Number: 420527	Worklist: 71505	ICIS/ICIV Line # N/A	2nd Day ICV Line # N/A	Instrument ID: G6
Analyst/1st Reviewer: AOR Date: 07/03/18	Method (circle): 625 (8270C) 8270D		Circle: (Full Scan) SIM BP LLSIM	
QC Type (circle): (Standard) DOD Q4 DoD Q5	QAPP_____	Other_____		

Review Items	Yes	No	NA	2nd Rev	If No, why is data reportable?
A. Tune/Calibration Verification					
1. Did DFTPP meet tune criteria? If SIM, did the PFTBA Tune check meet ion ratio criteria?	✓			✓	
2. Are the Benzidine and PCP tailing ≤ 2? (8270D/DoD) Benzidine tailing ≤3 and PCP tailing ≤5? (8270C)	✓			✓	
3. Is the DDT degradation ≤ 20%	✓			✓	
4. Were all standards injected within 12 hr of DFTPP? (or 24 hrs for 625)?	✓			✓	
5. Were ≥ 5 levels of each compound and surrogate analyzed?	✓			✓	
6. At least 6 consecutive points used for quadratic curves?			✓	NA	
7. Was low level standard at or below RL?	✓			✓	
8. If calibration points removed, were reasons for removal documented? Did sufficient calibration points remain? (removal from middle of curve not allowed)	✓			✓	(e.g.; some points <RL removed)
9. Does the low level standard have enough sensitivity to produce at least 5-10 scans across the peak, and all secondary ions are present?	✓			✓	
10. Do the average RFs meet minimum RF requirements? (625 – not method defined) (8270C-SPCCs ≥0.05) (8270D- all cmpds have min RFs defined in method/SOP)			✓	NA	
10. Did the calibration %RSD meet method requirements? (625: ≤35% all cmpds) (8270C: ≤30% for CCCs & ≤15% for all other cmpds/ surrogates) (8270D: ≤20% for all cmpds/surrogates)	✓			✓	
11. Was a linear or quadratic regression fit used for analytes that exceeded the %RSD requirements?			✓	NA	
12. If regression fit used, r^2 ≥0.990?			✓		
13. Does the low point of a linear regression fit meet the ±30% read-back criteria? (8270D)			✓		
14. For quadratic – evaluate curve fitting errors: Does each point fall within criteria when 'read-back' against the curve? (TA requirement – CA-Q-S-005; recommended limits ±30% low point & ±20% all other points) (Chrom Report - Details of Calibration per Analyte)			✓		
15. Is the concentration intercept <|RL| for each cmpd? ("X" intercept in Chrom)	✓			✓	
16. Were manual integrations performed correctly and properly documented (Dated, initialed and reason given) for all calibration points? 2nd review of all MIs required			✓	NA	
17. Was the high point checked for detector saturation?	✓			✓	
18. Do the relative retention times for each analyte in each standard agree within +/-0.06 units (abs RT +/-0.5 min)	✓			✓	
19. Benzo(b & k)fluoranthene: height of the valley between must be less than 50% of the average of the two peak heights?			✓	NA	

Panida R. 7/31/18

Review Items	Yes	No	NA	2nd Rev	If No, why is data reportable?
20. Elution order checked Isomeric pairs and coeluters?					Chrom: View/Documents/Methods/Isomers)
• aniline / bis(2-chloroethyl)ether			N/A	NA	
• N-nitrosodiphenylamine/diphenylamine					
• 1,3-, 1,4-, 1,2-dichlorobenzene					
• benzyl alcohol / 2-methylphenol / 3/4-methylphenol					
• 2,4-dimethylphenol / 3,5-dimethylphenol					
• 2 & 1 - methylnaphthalene					
• 2,4,6- and 2,4,5-trichlorophenol					
• phenanthrene / anthracene					
• fluoranthene / pyrene					
• benzo(a)anthracene / chrysene					
• bis(2-ethylhexyl)/di-n-octyl phthalate					
• benzo(b)fluoranthene / benzo(k)fluoranthene					
• indeno(1,2,3-cd)pyrene / benzo(g,h,i)perylene					
• safrole/1-chloronaphthalene					
• 1-/2-naphthylamine					
• 1- and 2-chloronaphthalene					
• 2,4,6- and 2,4,5-tribromophenol					
• Benzo(e)pyrene / benzo(a)pyrene					
21. Was the ICV within required criteria? 625 = QCS method defined/Table6 8270C = ±35% or ±55% of expected for poor performers; 8270D = ±20%, poor performers <50% DoD = ±20% QAPP/Other	✓			✓	
22. If any criteria from items above were not met, was NCM generated?			✓	NA	NCM #:
23. Were manual integrations for ICV performed correctly and properly documented? (dated, initialed and reason given; 2nd review of all MIs required)			✓		
24. Are all files and QC linked and processed correctly?			✓		☐ Files linked properly to calibration levels? ☐ All points are in the most recent active calibration event? [Calibration Events –'Fix ICAL linkage' if needed] ☐ Runs linked to DFTPP? [QC links] ☐ Checklist & run log scanned, attached & assigned properly?
25. Is the ICAL locked in TALS and Chrom?	✓			✓	

Comments: Rec'd 07/09/18

2nd Reviewer: Alex Haefner **Review Date:** 07/09/18

Panida K 7/31/18

GC/MS SEMI VOA BATCH WORKSHEET

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Batch Number: 423271 Batch Start Date: 07/23/18 14:57 Batch Analyst: Bourgery, David F

Batch Method: 1311 Batch End Date: 07/24/18 19:17

Lab Sample ID	Client Sample ID	Method Chain	Basis	ExtractFluid	AnalysisComment				
LB 280-423271/1		1311, 3510C, 8270C		t1					
LCS 280-423271/3		1311, 3510C, 8270C		t1	TOX				
160-29498-A-3	CRC-B22-0105	1311, 3510C, 8270C	P	t1	TOX				

Batch Notes	
First End time	07/24/18 09:54
First Start time	07/23/18 14:57

Basis	Basis Description
P	TCLP

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Analyst: DB

Date: 7.23.18

DV-IP-0012

TCLP/SPLP Worksheet No. 1

Sample Description

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Login No.	112301	112301	112301	112301	112301	112301	112301	112301	112301	112301
Sample No.	1	2	3	4	5	6	7	8	9	10
A. Sample Description										
Number of phases	1	1	1	1	1	1	1	1	1	1
1. Solid	X	X	X	X	X	X	X	X	X	X
2. Liquid										
a. lighter than water										
b. water										
c. heavier than water										
B. Percent Solid Phase										
Balance ID										
1. Weight of filter (g)										
2. Weight of subsample										
a. gross weight (g)										
b. tare weight (g)										
c. net weight (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3. Weight of filtrate										
a. gross weight (g)										
b. tare weight (g)										
c. net weight (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d. density of filtrate (g/mL)										
4. Total weight wet solids (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Weight percent solids (wet) (%)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
6. Weight percent solids (dry)										
a. gross dry weight 1 (g)										
b. gross dry weight 2 (g)										
c. percent dry solids (%)										
d. Oven Temp (observed) (^{o}C)										
Thermometer Correction Factor	0									
Oven Temp Actual (^{o}C)	0	0	0	0	0	0	0	0	0	0
7. Vol. of initial aqueous filtrate (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
8. Vol. of initial organic filtrate (mL)										

Comments:

$$(\text{Weight percent dry solids, B.6.c}) = 100 \times \frac{(\text{Gross dry weight 2 or 1, B.6.b or B.6.a if B.6.a is blank}) - (\text{Weight of filter, B.1})}{(\text{Weight of subsample .B.2.c})}$$

(Net Weight of Subsample, B.2.c) = (gross weight, B.2.a) - (tare weight, B.2.b)

(Net Weight of Filtrate, B.3.c) = (gross weight, B.3.a) - (tare weight, B.3.b)

(Total weight wet solids, B.4) = (Weight subsample, B.2.c) - (Weight filtrate, B.3.c)

(Vol of initail filtrate, B.7) = (Weight of filtrate, B.3.c) / (Denisity of filtrate, B.3.d)

(Weight percent wet solids, B.5.) = 100 X (Total weight wet solids, B.4.) / (Weight of subsample, B.2.c.)

Analyst: DB

DV-IP-0012
TCLP Worksheet No. 2
Selection of Leach Fluid

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Login No.	112301	112301	112301	112301	112301	112301	112301	112301	112301	112301
Sample No.	1	2	3	4	5	6	7	8	9	10
C. Leach Fluid Determination- Does not apply to determination of volatile organic components or SPLP.										
1. Particle size reduction? (<1mm) Yes/No	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**
If yes, write NCM descibing how.										
2. Balance ID	24950431	24950431	24950431	24950431	24950431	24950431	24950431	24950431	24950431	24950431
3. Sample weight, 5.0 +/- 0.1g	5.08	5.09	5.03	4.91	5.08	4.97	4.97	4.96	4.91	4.93
4. Add 96.5 (+/- 2% or 94.57mL to 98.43mL)										
a. Pipette ID or Grad Cylinder ID	TCLP BT	TCLP BT	TCLP BT	TCLP BT	TCLP BT	TCLP BT	TCLP BT	TCLP BT	TCLP BT	TCLP BT
5. Initial pH (after 5 min. mixing time)										
a. Start Time for Mixing	17:40	17:46	17:54	18:00	18:00	18:00	18:00	18:00	18:00	18:00
b. Stop Time for Mixing	17:45	17:51	17:59	18:05	18:05	18:05	18:05	18:05	18:05	18:05
c. pH reading after mixing	9.3	9.07	9.62	9.65	9.74	9.70	10.24	9.48	9.64	9.56
6. If pH > 5.0, then add 3.5 mL 1N HCL & mark **"X"**	X	X	X	X	X	X	X	X	X	X
a. HCL Lot# used	1N HCl_00037	1N HCl_00037	1N HCl_00037	1N HCl_00037	1N HCl_00037	1N HCl_00037	1N HCl_00037	1N HCl_00037	1N HCl_00037	1N HCl_00037
b. Pipette ID	TCLP#2	TCLP#2	TCLP#2	TCLP#2	TCLP#2	TCLP#2	TCLP#2	TCLP#2	TCLP#2	TCLP#2
7. Secondary pH (after 10min at 50C to 55C)										
a. Thermometer ID	311846	311846	311846	311846	311846	311846	311846	311846	311846	311846
Termometer Correction Factor	0	0	0	0	0	0	0	0	0	0
b. Start Time	18:47	18:47	18:47	18:47	18:47	18:47	18:47	18:47	18:47	18:47
c. Start Temperature (Observed)	50	50	50	50	50	50	50	50	50	50
Start Temperature (Actual)	50	50	50	50	50	50	50	50	50	50
d. Finish Time	18:57	18:57	18:57	18:57	18:57	18:57	18:57	18:57	18:57	18:57
e. Finish Temperature (Observed)	51	51	51	51	51	51	51	51	51	51
Finish Temperature (Actual)	51	51	51	51	51	51	51	51	51	51
f. pH reading after heating (temperature corrected)	1.63	1.57	1.73	1.85	2.07	2.02	2.54	2.14	2.33	2.00
D. Selection of Leach Fluid										
1. If pH from C.5. or C.7.f. is <5.0 use Leach Fluid #1	Fluid 1	Fluid 1	Fluid 1	Fluid 1	Fluid 1	Fluid 1	Fluid 1	Fluid 1	Fluid 1	Fluid 1
2. If pH from C.7.f is > 5.0, use Leach Fluid #2										
3. SPLP Fluid 1: Soils- East of the Mississippi River; Wastewates; or Wastewaters										
4. SPLP Fluid 2: Soils- West of Mississippi River										
5. SPLP Fluid 3: If VOCs or Cyanide containing wastes.										
6. **X** if filtrate and fluid are miscible										

Analyst: DB

DV-IP-0012

TCLP/SPLP Worksheet No. 3

Bottle Leach Procedure for Metals and Semi-Volatile Organic Components

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Login No.	112301	112301	112301	112301	112301	112301	112301	112301	112301	112301
Sample No.	1	2	3	4	5	6	7	8	9	10
E. Determination of Sample Size										
1. Particle size reduction? Yes/no	N	N	N	N	N	N	N	N	N	N
If yes, write NCM descibing how.										
2. Balance ID	24950431	24950431	24950431	24950431	24950431	24950431	24950431	24950431	24950431	24950431
3. Weight of wet solids after filtration (g)	100.07	100.21	100.47	100.37	100.89	100.91	100.13	101.45	101.11	101.60
F. Determination of Amount of Leach Fluid										
Fluid Type from Wksht 2	TCLP 1	TCLP 1	TCLP 1	TCLP 1	TCLP 1	TCLP 1	TCLP 1	TCLP 1	TCLP 1	TCLP 1
1. TCLP Fluid 1 Lot #	T1_00256	T1_00256	T1_00256	T1_00256	T1_00256	T1_00256	T1_00256	T1_00256	T1_00256	T1_00256
2. TCLP Fluid 2 Lot #										
3. SPLP 1 (East) Lot #										
4. SPLP 2 (West) Lot #										
5. pH of leach fluid	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94
6. Vol of Fluid = wet solids x 20 (mL)	2001	2004	2009	2007	2018	2018	2003	2029	2022	2032
G. Record of Leach - leach period is 16 to 20 hours										
1. Rotator checked to be rotating between 28 and 32 RPM?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2. Leach start date and time	7/23/18 20:15	7/23/18 20:15	7/23/18 20:15	7/23/18 20:15	7/23/18 20:15	7/23/18 20:15	7/23/18 20:15	7/23/18 20:15	7/23/18 20:15	7/23/18 20:15
3. Leach stop date and time	7/24/18 12:57	7/24/18 12:57	7/24/18 12:57	7/24/18 12:57	7/24/18 12:57	7/24/18 12:57	7/24/18 12:57	7/24/18 12:57	7/24/18 12:57	7/24/18 12:57
4. Room temperature										
Thermometer Correction Factor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
a.Temp Min (Observed) (^oC)	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4
b.Temp Max (Observed) (^oC)	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4
c.Temp Min (Actual) (^oC)	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4
d.Temp Max (Actual) (^oC)	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4	24.4
5. pH of leachate	4.99	4.97	5.21	5.28	5.35	5.43	5.74	5.72	5.96	5.44
Was the sample multiphasic?	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
6. Volume of leachate (mL)										
a. Oil recovered from leachate (mL)										
7. Volume of initial filtrate for recombination (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
8. Combined initial filtrate + leachate (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
COMMENTS:										

(Volume of Fluid, F.4) = (Weight of wet solids, E.3) X 20

(Vol. of Combined Filtrate and Leachate, G.8) = (Vol of Leachate, G.6) + (Vol of Filtrate, G.7)

$$(\text{Vol. of Inital Filtrate for Recombinat ion, G.7}) = \frac{(\text{Solids Leachated, E.3})}{(\text{Tot. Wet Solids, B.4})} \times \frac{(\text{LeachateRe covered, G.6})}{(\text{FluidAdded , F.6})} \times (\text{InitialFil trat, B.7})$$

Analyst: DB

DV-IP-0012
TCLP/SPLP Worksheet No. 4
ZHE Leach

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Login No.	112301	112301	112301	112301	112301	112301	112301	112301	112301	112301
Sample No.	1	2	3	4	5	6	7	8	9	10
H.Determination of Amount of Leach Fluid										
1. Balance ID										
2. ZHE vessel number	Tim	3								
3. Weight of material added to ZHE (g)										
"X" if there was headspace in container.										
4. Weight of filtrate in syringe										
a. gross weight (g)										
b. tare weight (g)										
c. net weight (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Volume of filtrate in syringe (mL)										
6. Wet solids in ZHE (g)										
7. Weight of fluid to add (g)	0	0	0	0	0	0	0	0	0	0
a. TCLP Fluid 1 Lot #										
b. SPLP Fluid 3 Lot #										
c. pH of Blank Fluid										
8. Percent Wet Solids (%)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
I. Record of ZHE Leach - the Leach period is 16 to 20 hours.										
1. Leak Check										
a. Reading #1 (psi)										
b. Reading #2 (psi)										
2. Rotator checked to be rotating between 28 and 32 RPM?										
3. Leach start date & time										
4. Leach stop date & time										
5. Room temperature										
Thermometer Correction Factor										
a.Temp Min (Observed) (^oC)										
b.Temp Max (Observed) (^oC)										
c.Temp Min (Actual) (^oC)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
d. Temp Max (Actual) (^oC)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. **X** if still under positive pressure after leaching										
7. Volume of leachate recovered (mL)										
a. Volume of oil recovered after leaching										
8. Vol. of initial aqueous filtrate for recombination										
a. Calculated from Worksheet 1 (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
b. Calculated from Worksheet 4 (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

(Net Weight of Filtrate, H.4.c) = (Gross weight, H.4.a.) - (Tare weight, H.4.b.)

(Percent Wet Solids, H.8.) = 100 X **[** (Wet Solids in ZHE, H.6) / (Weight of material added to ZHE, H.3) **]**

(Wet Solids in ZHE, H.6) = (Weight of material added to ZHE, H.3.) - (net weight of filtrate, H.4.c.)

(Vol of Filtrate for recombination, I.7.b) = (Vol of Leachate Recvd, I.6) X (Weight of Filtrate, H.4.c) / (Vol Fluid Added, H.7.)

(Weight of Fluid to add, H.7.) = (Wet Solids in ZHE, H.6) X 20

(Vol of Filtrate for recombination, I.7.a) = **[** (Wet Solids in ZHE, H.6.) / (Tot Wet Solids, B.4) **]** X **[** (Vol Leachate Recvd, I.6.) / (Vol Fluid Add, H.7.) **]** X (Vol Filtrate, B.7.)

COMMENTS:

Analyst: DB

Date: 7.23.18

DV-IP-0012
TCLP/SPLP Worksheet No. 1
Sample Description

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Login No.	112301									
Sample No.	11									
A. Sample Description										
Number of phases	1									
1. Solid	X									
2. Liquid										
a. lighter than water										
b. water										
c. heavier than water										
B. Percent Solid Phase										
Balance ID										
1. Weight of filter (g)										
2. Weight of subsample										
a. gross weight (g)										
b. tare weight (g)										
c. net weight (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3. Weight of filtrate										
a. gross weight (g)										
b. tare weight (g)										
c. net weight (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d. density of filtrate (g/mL)										
4. Total weight wet solids (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Weight percent solids (wet) (%)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
6. Weight percent solids (dry)										
a. gross dry weight 1 (g)										
b. gross dry weight 2 (g)										
c. percent dry solids (%)										
d. Oven Temp (observed) (^{o}C)										
Thermometer Correction Factor	0									
Oven Temp Actual (^{o}C)	0	0	0	0	0	0	0	0	0	0
7. Vol. of initial aqueous filtrate (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
8. Vol. of initial organic filtrate (mL)										

Comments:

$$(\text{Weight percent dry solids, B.6.c}) = 100 \times \frac{(\text{Gross dry weight 2 or 1, B.6.b or B.6.a if B.6.a is blank}) - (\text{Weight of filter, B.1})}{(\text{Weight of subsample .B.2.c})}$$

(Net Weight of Subsample, B.2.c) = (gross weight, B.2.a) - (tare weight, B.2.b)

(Net Weight of Filtrate, B.3.c) = (gross weight, B.3.a) - (tare weight, B.3.b)

(Total weight wet solids, B.4) = (Weight subsample, B.2.c) - (Weight filtrate, B.3.c)

(Vol of initail filtrate, B.7) = (Weight of filtrate, B.3.c) / (Denisity of filtrate, B.3.d)

(Weight percent wet solids, B.5.) = 100 X (Total weight wet solids, B.4.) / (Weight of subsample, B.2.c.)

Analyst: DB

DV-IP-0012
TCLP Worksheet No. 2
Selection of Leach Fluid

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Login No.	112301									
Sample No.	11									
C. Leach Fluid Determination- Does not apply to determination of volatile organic components or SPLP.										
1. Particle size reduction? (<1mm) Yes/No	**N**									
If yes, write NCM descibing how.										
2. Balance ID	24950431									
3. Sample weight, 5.0 +/- 0.1g	4.98									
4. Add 96.5 (+/- 2% or 94.57mL to 98.43mL)										
a. Pipette ID or Grad Cylinder ID	TCLP BT									
5. Initial pH (after 5 min. mixing time)										
a. Start Time for Mixing	18:00									
b. Stop Time for Mixing	18:05									
c. pH reading after mixing	9.3									
6. If pH > 5.0, then add 3.5 mL 1N HCL & mark **"X"**	X									
a. HCL Lot# used	1N HCl_00037									
b. Pipette ID	TCLP#2									
7. Secondary pH (after 10min at 50C to 55C)										
a. Thermometer ID	311846									
Termometer Correction Factor	0									
b. Start Time	18:47									
c. Start Temperature (Observed)	50									
Start Temperature (Actual)	50	0	0	0	0	0	0	0	0	0
d. Finish Time	18:57									
e. Finish Temperature (Observed)	51									
Finish Temperature (Actual)	51	0	0	0	0	0	0	0	0	0
f. pH reading after heating (temperature corrected)	1.59									
D. Selection of Leach Fluid										
1. If pH from C.5. or C.7.f. is <5.0 use Leach Fluid #1	Fluid 1									
2. If pH from C.7.f is > 5.0, use Leach Fluid #2										
3. SPLP Fluid 1: Soils- East of the Mississippi River; Wastewates; or Wastewaters										
4. SPLP Fluid 2: Soils- West of Mississippi River										
5. SPLP Fluid 3: If VOCs or Cyanide containing wastes.										
6. **X** if filtrate and fluid are miscible										

Analyst: DB

DV-IP-0012

TCLP/SPLP Worksheet No. 3

Bottle Leach Procedure for Metals and Semi-Volatile Organic Components

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Login No.	112301									
Sample No.	11									
E. Determination of Sample Size										
1. Particle size reduction? Yes/no	N									
If yes, write NCM descibing how.										
2. Balance ID	24950431									
3. Weight of wet solids after filtration (g)	100.35									
F. Determination of Amount of Leach Fluid										
Fluid Type from Wksht 2	**TCLP 1**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**	**#VALUE!**
1. TCLP Fluid 1 Lot #	T1_00256	T1_00256	T1_00256	T1_00256						
2. TCLP Fluid 2 Lot #										
3. SPLP 1 (East) Lot #										
4. SPLP 2 (West) Lot #										
5. pH of leach fluid	4.94									
6. Vol of Fluid = wet solids x 20 (mL)	2007									
G. Record of Leach - leach period is 16 to 20 hours										
1. Rotator checked to be rotating between 28 and 32 RPM?	Y									
2. Leach start date and time	7/23/18 20:15									
3. Leach stop date and time	7/24/18 12:57									
4. Room temperature										
Thermometer Correction Factor	0.0									
a.Temp Min (Observed) (^oC)	23.4									
b.Temp Max (Observed) (^oC)	24.4									
c.Temp Min (Actual) (^oC)	23.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
d.Temp Max (Actual) (^oC)	24.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5. pH of leachate	5.04									
Was the sample multiphasic?	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
6. Volume of leachate (mL)										
a. Oil recovered from leachate (mL)										
7. Volume of initial filtrate for recombination (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
8. Combined initial filtrate + leachate (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
COMMENTS:										

(Volume of Fluid, F.4) = (Weight of wet solids, E.3) X 20

(Vol. of Combined Filtrate and Leachate, G.8) = (Vol of Leachate, G.6) + (Vol of Filtrate, G.7)

$$(\text{Vol. of Inital Filtrate for Recombinat ion, G.7}) = \frac{(\text{Solids Leachated, E.3})}{(\text{Tot. Wet Solids, B.4})} \times \frac{(\text{LeachateRe covered, G.6})}{(\text{FluidAdded , F.6})} \times (\text{InitialFil trat, B.7})$$

Analyst: DB

DV-IP-0012
TCLP/SPLP Worksheet No. 4
ZHE Leach

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Login No.	112301									
Sample No.	11									
H.Determination of Amount of Leach Fluid										
1. Balance ID										
2. ZHE vessel number	Tim	3								
3. Weight of material added to ZHE (g)										
"X" if there was headspace in container.										
4. Weight of filtrate in syringe										
a. gross weight (g)										
b. tare weight (g)										
c. net weight (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Volume of filtrate in syringe (mL)										
6. Wet solids in ZHE (g)										
7. Weight of fluid to add (g)	0	0	0	0	0	0	0	0	0	0
a. TCLP Fluid 1 Lot #										
b. SPLP Fluid 3 Lot #										
c. pH of Blank Fluid										
8. Percent Wet Solids (%)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
I. Record of ZHE Leach - the Leach period is 16 to 20 hours.										
1. Leak Check										
a. Reading #1 (psi)										
b. Reading #2 (psi)										
2. Rotator checked to be rotating between 28 and 32 RPM?										
3. Leach start date & time										
4. Leach stop date & time										
5. Room temperature										
Thermometer Correction Factor										
a.Temp Min (Observed) (^oC)										
b.Temp Max (Observed) (^oC)										
c.Temp Min (Actual) (^oC)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
d. Temp Max (Actual) (^oC)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. **X** if still under positive pressure after leaching										
7. Volume of leachate recovered (mL)										
a. Volume of oil recovered after leaching										
8. Vol. of initial aqueous filtrate for recombination										
a. Calculated from Worksheet 1 (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
b. Calculated from Worksheet 4 (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

(Net Weight of Filtrate, H.4.c) = (Gross weight, H.4.a.) - (Tare weight, H.4.b.)

(Percent Wet Solids, H.8.) = 100 X **[** (Wet Solids in ZHE, H.6) / (Weight of material added to ZHE, H.3) **]**

(Wet Solids in ZHE, H.6) = (Weight of material added to ZHE, H.3.) - (net weight of filtrate, H.4.c.)

(Vol of Filtrate for recombination, I.7.b) = (Vol of Leachate Recvd, I.6) X (Weight of Filtrate, H.4.c) / (Vol Fluid Added, H.7.)

(Weight of Fluid to add, H.7.) = (Wet Solids in ZHE, H.6) X 20

(Vol of Filtrate for recombination, I.7.a) = **[** (Wet Solids in ZHE, H.6.) / (Tot Wet Solids, B.4) **]** X **[** (Vol Leachate Recvd, I.6.) / (Vol Fluid Add, H.7.) **]** X (Vol Filtrate, B.7.)

COMMENTS:

Analyst: DB

Date: 7.23.18

DV-IP-0012

TCLP/SPLP Worksheet No. 1

Sample Description

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Login No.	160-29498	160-29498	112151	112151	112230	112289	112289	320-41149	550-106063	LB
Sample No.	2	3	1	2	1	1	2	36	1	
A. Sample Description										
Number of phases	1	1	1	1	1	1	1	1	1	
1. Solid	X	X	X	X	X	X	X	X	X	
2. Liquid										
a. lighter than water										
b. water										
c. heavier than water										
B. Percent Solid Phase										
Balance ID										
1. Weight of filter (g)										
2. Weight of subsample										
a. gross weight (g)										
b. tare weight (g)										
c. net weight (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3. Weight of filtrate										
a. gross weight (g)										
b. tare weight (g)										
c. net weight (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d. density of filtrate (g/mL)										
4. Total weight wet solids (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Weight percent solids (wet) (%)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
6. Weight percent solids (dry)										
a. gross dry weight 1 (g)										
b. gross dry weight 2 (g)										
c. percent dry solids (%)										
d. Oven Temp (observed) (^{o}C)										
Thermometer Correction Factor	0									
Oven Temp Actual (^{o}C)	0	0	0	0	0	0	0	0	0	0
7. Vol. of initial aqueous filtrate (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
8. Vol. of initial organic filtrate (mL)										

Comments:

$$(\text{Weight percent dry solids, B.6.c}) = 100 \times \frac{(\text{Gross dry weight 2 or 1, B.6.b or B.6.a if B.6.a is blank}) - (\text{Weight of filter, B.1})}{(\text{Weight of subsample .B.2.c})}$$

(Net Weight of Subsample, B.2.c) = (gross weight, B.2.a) - (tare weight, B.2.b)

(Net Weight of Filtrate, B.3.c) = (gross weight, B.3.a) - (tare weight, B.3.b)

(Total weight wet solids, B.4) = (Weight subsample, B.2.c) - (Weight filtrate, B.3.c)

(Vol of initail filtrate, B.7) = (Weight of filtrate, B.3.c) / (Denisity of filtrate, B.3.d)

(Weight percent wet solids, B.5.) = 100 X (Total weight wet solids, B.4.) / (Weight of subsample, B.2.c.)

Analyst: DB

DV-IP-0012
TCLP Worksheet No. 2
Selection of Leach Fluid

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Login No.	160-29498	160-29498	112151	112151	112230	112289	112289	320-41149	550-106063	LB
Sample No.	2	3	1	2	1	1	2	36	1	
C. Leach Fluid Determination- Does not apply to determination of volatile organic components or SPLP.										
1. Particle size reduction? (<1mm) Yes/No		**N**	**N**	**N**	**N**	**N**			**N**	
If yes, write NCM descibing how.										
2. Balance ID		24950431	24950431	24950431	24950431	24950431			24950431	
3. Sample weight, 5.0 +/- 0.1g		4.92	5.04	4.93	4.97	5.06			5.01	
4. Add 96.5 (+/- 2% or 94.57mL to 98.43mL)										
a. Pipette ID or Grad Cylinder ID		TCLP BT	TCLP BT	TCLP BT	TCLP BT	TCLP BT			TCLP BT	
5. Initial pH (after 5 min. mixing time)										
a. Start Time for Mixing		11:27	11:27	11:27	11:27	11:27			11:27	
b. Stop Time for Mixing		11:32	11:32	11:32	11:32	11:32			11:32	
c. pH reading after mixing		8.77	9.65	9.68	11.62	9.26			7.85	
6. If pH > 5.0, then add 3.5 mL 1N HCL & mark **"X"**		X	X	X	X	X			X	
a. HCL Lot# used		1N HCl_00037	1N HCl_00037	1N HCl_00037	1N HCl_00037	1N HCl_00037			1N HCl_00037	
b. Pipette ID		TCLP#2	TCLP#2	TCLP#2	TCLP#2	TCLP#2			TCLP#2	
7. Secondary pH (after 10min at 50C to 55C)										
a. Thermometer ID		311846	311846	311846	311846	311846			311846	
Termometer Correction Factor		0	0	0	0	0			0	
b. Start Time		11:56	11:56	11:56	11:56	11:56			11:56	
c. Start Temperature (Observed)		50	50	50	50	50			50	
Start Temperature (Actual)	0	50	50	50	50	50	0	0	50	0
d. Finish Time		12:06	12:06	12:06	12:06	12:06			12:06	
e. Finish Temperature (Observed)		53	53	53	53	53			53	
Finish Temperature (Actual)	0	53	53	53	53	53	0	0	53	0
f. pH reading after heating (temperature corrected)		1.83	5.83	5.88	2.15	1.65			1.99	
D. Selection of Leach Fluid										
1. If pH from C.5. or C.7.f. is <5.0 use Leach Fluid #1		Fluid 1			Fluid 1	Fluid 1			Fluid 1	
2. If pH from C.7.f is > 5.0, use Leach Fluid #2			Fluid 2	Fluid 2						
3. SPLP Fluid 1: Soils- East of the Mississippi River; Wastewates; or Wastewaters										
4. SPLP Fluid 2: Soils- West of Mississippi River										
5. SPLP Fluid 3: If VOCs or Cyanide containing wastes.										
6. **X** if filtrate and fluid are miscible										

Analyst: DB

DV-IP-0012

TCLP/SPLP Worksheet No. 3

Bottle Leach Procedure for Metals and Semi-Volatile Organic Components

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Login No.	160-29498	160-29498	112151	112151	112230	112289	112289	320-41149	550-106063	LB
Sample No.	2	3	1	2	1	1	2	36	1	
E. Determination of Sample Size										
1. Particle size reduction? Yes/no		N	N	N	N	N			N	
If yes, write NCM descibing how.										
2. Balance ID		24950431	24950431	24950431	24950431	24950431			24950431	
3. Weight of wet solids after filtration (g)		100.02	100.23	102.23	100.76	102.32			101.95	
F. Determination of Amount of Leach Fluid										
Fluid Type from Wksht 2	#VALUE!	TCLP 1	TCLP 2	TCLP 2	TCLP 1	TCLP 1	#VALUE!	#VALUE!	TCLP 1	#VALUE!
1. TCLP Fluid 1 Lot #	T1_00251	T1_00256	T1_00251	T1_00251	T1_00256	T1_00256			T1_00256	
2. TCLP Fluid 2 Lot #			T2_00105	T2_00105						
3. SPLP 1 (East) Lot #										
4. SPLP 2 (West) Lot #										
5. pH of leach fluid		4.94	2.89	2.89	4.94	4.94			4.94	2.89/4.94
6. Vol of Fluid = wet solids x 20 (mL)		2000	2005	2045	2015	2046			2039	
G. Record of Leach - leach period is 16 to 20 hours										
1. Rotator checked to be rotating between 28 and 32 RPM?		Y	Y	Y	Y	Y			Y	Y
2. Leach start date and time		7/23/18 14:57	7/23/18 14:57	7/23/18 14:57	7/23/18 14:57	7/23/18 14:57			7/23/18 14:57	7/23/18 14:57
3. Leach stop date and time		7/24/18 9:54	7/24/18 9:54	7/24/18 9:54	7/24/18 9:54	7/24/18 9:54			7/24/18 9:54	7/24/18 9:54
4. Room temperature										
Thermometer Correction Factor		0.0	0.0	0.0	0.0	0.0			0.0	0.0
a.Temp Min (Observed) (^oC)		23.4	23.4	23.4	23.4	23.4			23.4	23.4
b.Temp Max (Observed) (^oC)		24.4	24.4	24.4	24.4	24.4			24.4	24.4
c.Temp Min (Actual) (^oC)	0.0	23.4	23.4	23.4	23.4	23.4	0.0	0.0	23.4	23.4
d.Temp Max (Actual) (^oC)	0.0	24.4	24.4	24.4	24.4	24.4	0.0	0.0	24.4	24.4
5. pH of leachate		5.38	5.85	5.85	6.12	5.33			5.40	2.88/4.94
Was the sample multiphasic?	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
6. Volume of leachate (mL)										
a. Oil recovered from leachate (mL)										
7. Volume of initial filtrate for recombination (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
8. Combined initial filtrate + leachate (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
COMMENTS:										

(Volume of Fluid, F.4) = (Weight of wet solids, E.3) X 20

(Vol. of Combined Filtrate and Leachate, G.8) = (Vol of Leachate, G.6) + (Vol of Filtrate, G.7)

$$(\text{Vol. of Inital Filtrate for Recombinat ion, G.7}) = \frac{(\text{Solids Leachated, E.3})}{(\text{Tot. Wet Solids, B.4})} \times \frac{(\text{LeachateRe covered, G.6})}{(\text{FluidAdded , F.6})} \times (\text{InitialFil trat, B.7})$$

Analyst: DB

DV-IP-0012
TCLP/SPLP Worksheet No. 4
ZHE Leach

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Login No.	160-29498	160-29498	112151	112151	112230	112289	112289	320-41149	550-106063	LB
Sample No.	2	3	1	2	1	1	2	36	1	
H.Determination of Amount of Leach Fluid										
1. Balance ID	24950431				24950431	24950431		24950431		
2. ZHE vessel number	Verona				Don	EEE		Rachael		AAA
3. Weight of material added to ZHE (g)	25.00				25.19	25.07		25.14		
"X" if there was headspace in container.	X									
4. Weight of filtrate in syringe										
a. gross weight (g)										
b. tare weight (g)										
c. net weight (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Volume of filtrate in syringe (mL)										
6. Wet solids in ZHE (g)	25				25	25		25		
7. Weight of fluid to add (g)	500	0	0	0	504	501	0	503	0	0
a. TCLP Fluid 1 Lot #	T1_00255				T1_00255	T1_00255		T1_00255		T1_00255
b. SPLP Fluid 3 Lot #										
c. pH of Blank Fluid	4.92				4.92	4.92		4.92		4.92
8. Percent Wet Solids (%)	100	#DIV/0!	#DIV/0!	#DIV/0!	100	100	#DIV/0!	100	#DIV/0!	#DIV/0!
I. Record of ZHE Leach - the Leach period is 16 to 20 hours.										
1. Leak Check										
a. Reading #1 (psi)	40				40	40		40		40
b. Reading #2 (psi)	40				40	40		40		40
2. Rotator checked to be rotating between 28 and 32 RPM?	Y				Y	Y		Y		Y
3. Leach start date & time	7/23/18 17:36				7/23/18 17:36	7/23/18 17:36		7/23/18 17:36		7/23/18 17:36
4. Leach stop date & time					7/24/18 9:54	7/24/18 9:54		7/24/18 9:54		7/24/18 9:54
5. Room temperature										
Thermometer Correction Factor										
a.Temp Min (Observed) (^oC)										
b.Temp Max (Observed) (^oC)										
c.Temp Min (Actual) (^oC)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
d. Temp Max (Actual) (^oC)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. **X** if still under positive pressure after leaching										
7. Volume of leachate recovered (mL)										
a. Volume of oil recovered after leaching										
8. Vol. of initial aqueous filtrate for recombination										
a. Calculated from Worksheet 1 (mL)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
b. Calculated from Worksheet 4 (mL)	0.0	#DIV/0!	#DIV/0!	#DIV/0!	0.0	0.0	#DIV/0!	0.0	#DIV/0!	#DIV/0!

(Net Weight of Filtrate, H.4.c) = (Gross weight, H.4.a.) - (Tare weight, H.4.b.)

(Percent Wet Solids, H.8.) = 100 X **[** (Wet Solids in ZHE, H.6) / (Weight of material added to ZHE, H.3) **]**

(Wet Solids in ZHE, H.6) = (Weight of material added to ZHE, H.3.) - (net weight of filtrate, H.4.c.)

(Vol of Filtrate for recombination, I.7.b) = (Vol of Leachate Recvd, I.6) X (Weight of Filtrate, H.4.c) / (Vol Fluid Added, H.7.)

(Weight of Fluid to add, H.7.) = (Wet Solids in ZHE, H.6) X 20

(Vol of Filtrate for recombination, I.7.a) = **[** (Wet Solids in ZHE, H.6.) / (Tot Wet Solids, B.4) **]** X **[** (Vol Leachate Recvd, I.6.) / (Vol Fluid Add, H.7.) **]** X (Vol Filtrate, B.7.)

COMMENTS:

LogTag ID 1000645053
User ID TCLP (+0.0)
First reading 7/23/2018 2:55:27 PM
Last reading 7/24/2018 12:45:27 PM
Name of file TCLP (+0.0)1000645053 Started 7-23-2018, Finished 7-24-2018.ltd
File location C:\Users\DenOrgPrep\Documents\My LogTag Data\

LogTag ID	1000645053
User ID	TCLP (+0.0)
LogTag battery	OK
Non alert range	21.0 to 25.0 °C
Time zone	UTC -07:00, daylight time
Number of readings	728
Reading interval	10 Minutes
Number of starts	231
First reading	7/23/2018 2:55:27 PM
Last reading	7/24/2018 12:45:27 PM
Elapsed Time	21 Hours, 50 Minutes
Reading range	23.4 to 24.4 °C
Average reading	23.9 °C
Standard Deviation (S)	0.2 °C
Degree Minutes below lower alert	0.00 °C-Minutes
Degree Minutes above upper alert	0.00 °C-Minutes
Mean Kinetic Temperature	23.94 °C
Time below lower alert	None
Time above upper alert	None
Time not in alert	21 Hours, 50 Minutes
Statistics for between the first reading and inspection mark #1:	
First reading	7/23/2018 2:55:27 PM
Last reading	7/23/2018 5:25:27 PM
Elapsed Time	2 Hours, 30 Minutes
Reading range	23.4 to 24.0 °C
Average reading	23.8 °C
Standard Deviation (S)	0.2 °C
Degree Minutes below lower alert	0.00 °C-Minutes
Degree Minutes above upper alert	0.00 °C-Minutes
Mean Kinetic Temperature	23.78 °C
Time below lower alert	None
Time above upper alert	None
Time not in alert	2 Hours, 30 Minutes
Statistics for between inspection mark #1 and inspection mark #2:	
First reading	7/23/2018 5:35:27 PM
Last reading	7/23/2018 8:05:27 PM
Elapsed Time	2 Hours, 30 Minutes
Reading range	23.6 to 24.1 °C
Average reading	23.9 °C
Standard Deviation (S)	0.2 °C
Degree Minutes below lower alert	0.00 °C-Minutes
Degree Minutes above upper alert	0.00 °C-Minutes

LogTag ID 1000645053
User ID TCLP (+0.0)
First reading 7/23/2018 2:55:27 PM
Last reading 7/24/2018 12:45:27 PM
Name of file TCLP (+0.0)1000645053 Started 7-23-2018, Finished 7-24-2018.ltd
File location C:\Users\DenOrgPrep\Documents\My LogTag Data\

Mean Kinetic Temperature	23.93 °C
Time below lower alert	None
Time above upper alert	None
Time not in alert	2 Hours, 30 Minutes
Statistics for between inspection mark #2 and the last reading:	
First reading	7/23/2018 8:15:27 PM
Last reading	7/24/2018 12:45:27 PM
Elapsed Time	16 Hours, 30 Minutes
Reading range	23.6 to 24.4 °C
Average reading	24.0 °C
Standard Deviation (S)	0.2 °C
Degree Minutes below lower alert	0.00 °C-Minutes
Degree Minutes above upper alert	0.00 °C-Minutes
Mean Kinetic Temperature	23.96 °C
Time below lower alert	None
Time above upper alert	None
Time not in alert	16 Hours, 30 Minutes

GC/MS SEMI VOA BATCH WORKSHEET

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Batch Number: 423590 Batch Start Date: 07/25/18 10:50 Batch Analyst: Getahun, Abaynesh A

Batch Method: 3510C Batch End Date: 07/26/18 12:14

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	ReceivedpH	FirstAdjustpH	SecondAdjustpH	8270Surrogate 00123
LB 280-423271/1-A		3510C, 8270C		200 mL	1 mL	7 SU	1-2 SU	14 SU	1 mL
LCS 280-423271/3-A		3510C, 8270C		200 mL	1 mL	7 SU	1-2 SU	14 SU	1 mL
160-29498-A-3-A MS	CRC-B22-0105	3510C, 8270C	P	200 mL	1 mL	6 SU	1-2 SU	14 SU	1 mL
160-29498-A-3-A MSD	CRC-B22-0105	3510C, 8270C	P	200 mL	1 mL	6 SU	1-2 SU	14 SU	1 mL
160-29498-A-3-A	CRC-B22-0105	3510C, 8270C	P	200 mL	1 mL	6 SU	1-2 SU	14 SU	1 mL

Lab Sample ID	Client Sample ID	Method Chain	Basis	8270TCLPSpike 00060					
LB 280-423271/1-A		3510C, 8270C							
LCS 280-423271/3-A		3510C, 8270C		1 mL					
160-29498-A-3-A MS	CRC-B22-0105	3510C, 8270C	P	1 mL					
160-29498-A-3-A MSD	CRC-B22-0105	3510C, 8270C	P	1 mL					
160-29498-A-3-A	CRC-B22-0105	3510C, 8270C	P						

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GC/MS SEMI VOA BATCH WORKSHEET

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Batch Number: 423590 Batch Start Date: 07/25/18 10:50 Batch Analyst: Getahun, Abaynesh A

Batch Method: 3510C Batch End Date: 07/26/18 12:14

Batch Notes	
Acid Used for pH Adjustment ID	1:1 H2SO4_00071
Balance ID	24750399
Base Used to Adjust pH ID	10N_NaOH_00125
Batch Comment	DV-OP-0006/0007
Analyst ID - Concentration	KO/MF (trainer) AAG (trainee)
Concentration 1 Corrected Temperature	84/84 Degrees C
Equipment ID - Concentration 1	A/B
Analyst ID - Extraction	AAG
Method/Fraction	3510C/8270C
Na2SO4 ID	0000186445_00002
NaCl ID	181331
Pipette/Syringe/Dispenser ID	1n2s
Prep Solvent ID	MeCl2_Cycl_00397
Prep Solvent Volume Used	180 mL
Analyst ID - Spike Analyst	AAG
Analyst ID - Spike Witness Analyst	Reviewer:RC
Sufficient Volume for Batch QC	yes
Concentration 1 Uncorrected Temperature	86/85 Degrees C
Reagent Water ID	S. H2O Elga

Basis	Basis Description
P	TCLP

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Method 8081B

Organochlorine Pesticides (GC) by Method 8081B

FORM II
PESTICIDES SURROGATE RECOVERY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Matrix: Solid (TCLP) Level: Low

GC Column (1): CLP1 ID: 0.32(mm)

Client Sample ID	Lab Sample ID	TCX1 #	DCBP1 #
CRC-B22-0105	160-29498-3	91	100
	LB 280-423271/1-G	83	94
	LCS 280-423271/2-F	79	91
	LCS 280-423271/3-C	77	91
CRC-B22-0105 MS	160-29498-3 MS	86	91
CRC-B22-0105 MSD	160-29498-3 MSD	87	91

	QC LIMITS
TCX = Tetrachloro-m-xylene	28-115
DCBP = DCB Decachlorobiphenyl	34-122

Column to be used to flag recovery values

FORM II 8081B

FORM III
PESTICIDES LAB CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Matrix: Solid (TCLP) Level: Low Lab File ID: 07300039.D

Lab ID: LCS 280-423271/2-F Client ID:

COMPOUND	SPIKE ADDED (mg/L)	LCS CONCENTRATION (mg/L)	LCS % REC	QC LIMITS REC	#
Endrin	0.00500	0.00614	123	72-126	
Heptachlor	0.00500	0.00653	131	65-122	*
Heptachlor epoxide	0.00500	0.00638	128	69-121	*
gamma-BHC (Lindane)	0.00500	0.00609	122	68-119	*
Methoxychlor	0.00500	0.00676	135	67-127	*

Column to be used to flag recovery and RPD values

FORM III 8081B

FORM III
PESTICIDES LAB CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Matrix: Solid (TCLP) Level: Low Lab File ID: 07300040.D

Lab ID: LCS 280-423271/3-C Client ID:

COMPOUND	SPIKE ADDED (mg/L)	LCS CONCENTRATION (mg/L)	LCS % REC	QC LIMITS REC	#
Toxaphene	0.0200	0.0219	109	63-142	

Column to be used to flag recovery and RPD values

FORM III 8081B

FORM III
PESTICIDES MATRIX SPIKE RECOVERY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Matrix: Solid (TCLP) Level: Low Lab File ID: 07300050.D

Lab ID: 160-29498-3 MS Client ID: CRC-B22-0105 MS

COMPOUND	SPIKE ADDED (mg/L)	SAMPLE CONCENTRATION (mg/L)	MS CONCENTRATION (mg/L)	MS % REC	QC LIMITS REC	#
Endrin	0.00500	0.000079 U	0.00618	124	72-126	
Heptachlor	0.00500	0.000077 U	0.00660	132	65-122	F1
Heptachlor epoxide	0.00500	0.000075 U	0.00646	129	69-121	F1
gamma-BHC (Lindane)	0.00500	0.000069 U	0.00632	126	68-119	F1
Methoxychlor	0.00500	0.00013 U	0.00648	130	67-127	F1

Column to be used to flag recovery and RPD values

FORM III 8081B

FORM III
PESTICIDES MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Matrix: Solid (TCLP) Level: Low Lab File ID: 07300051.D

Lab ID: 160-29498-3 MSD Client ID: CRC-B22-0105 MSD

COMPOUND	SPIKE ADDED (mg/L)	MSD CONCENTRATION (mg/L)	MSD % REC	% RPD	QC LIMITS RPD	QC LIMITS REC	#
Endrin	0.00500	0.00622	124	1	30	72-126	
Heptachlor	0.00500	0.00680	136	3	30	65-122	F1
Heptachlor epoxide	0.00500	0.00659	132	2	30	69-121	F1
gamma-BHC (Lindane)	0.00500	0.00650	130	3	30	68-119	F1
Methoxychlor	0.00500	0.00687	137	6	30	67-127	F1

Column to be used to flag recovery and RPD values

FORM III 8081B

FORM VIII
PESTICIDES INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Sample No.: STD4 280-424154/29 Date Analyzed: 07/30/2018 21:11

Instrument ID: SGC_P2 GC Column: CLP1 ID: 0.32(mm)

Lab File ID (Standard): 07300029.D Heated Purge: (Y/N) N

Calibration ID: 33261

		BNB					
		AREA #	RT #	AREA #	RT #	AREA #	RT #
INITIAL CALIBRATION MID-POINT		790371234	2.94				
UPPER LIMIT		1580742468	3.44				
LOWER LIMIT		395185617	2.44				
LAB SAMPLE ID	CLIENT SAMPLE ID						
ICV 280-424154/33		753885432	2.94				
ICV 280-424154/34		747175329	2.95				
ICV 280-424154/35		756604057	2.94				
ICV 280-424154/36		798650528	2.94				
LB 280-423271/1-G		822973243	2.95				
LCS 280-423271/2-F		862070430	2.95				
LCS 280-423271/3-C		808120653	2.95				
CCV 280-424154/45		722100129	2.95				
CCV 280-424154/46		762580855	2.95				
CCV 280-424154/47		794297320	2.95				
CCV 280-424154/48		790757788	2.95				
160-29498-3	CRC-B22-0105	765960099	2.95				
160-29498-3 MS	CRC-B22-0105 MS	816072320	2.95				
160-29498-3 MSD	CRC-B22-0105 MSD	830789635	2.95				

BNB = 1-Bromo-2-nitrobenzene

Area Limit = 50%-200% of internal standard area
RT Limit = ± 0.5 minutes of internal standard RT

Column used to flag values outside QC limits

FORM VIII 8081B

FORM VIII
PESTICIDES INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Sample No.: STD4 280-424154/29 Date Analyzed: 07/30/2018 21:11

Instrument ID: SGC_P2 GC Column: CLP2 ID: 0.32(mm)

Lab File ID (Standard): 07300029.D Heated Purge: (Y/N) N

Calibration ID: 33262

		BNB					
		AREA #	RT #	AREA #	RT #	AREA #	RT #
INITIAL CALIBRATION MID-POINT		187880516	2.73				
UPPER LIMIT		375761032	3.23				
LOWER LIMIT		93940258	2.23				
LAB SAMPLE ID	CLIENT SAMPLE ID						
ICV 280-424154/33		178080793	2.73				
ICV 280-424154/34		179367322	2.73				
ICV 280-424154/35		180154463	2.73				
ICV 280-424154/36		186370243	2.73				
LB 280-423271/1-G		197325089	2.73				
LCS 280-423271/2-F		202492047	2.73				
LCS 280-423271/3-C		194277317	2.73				
CCV 280-424154/45		171331442	2.73				
CCV 280-424154/46		179062116	2.73				
CCV 280-424154/47		188818859	2.73				
CCV 280-424154/48		185965115	2.73				
160-29498-3	CRC-B22-0105	181723401	2.73				
160-29498-3 MS	CRC-B22-0105 MS	193186849	2.73				
160-29498-3 MSD	CRC-B22-0105 MSD	195920482	2.73				

BNB = 1-Bromo-2-nitrobenzene

Area Limit = 50%-200% of internal standard area
RT Limit = ± 0.5 minutes of internal standard RT

Column used to flag values outside QC limits

FORM VIII 8081B

FORM X
IDENTIFICATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Client Sample ID: CRC-B22-0105 MS Lab Sample ID: 160-29498-3 MS

Instrument ID (1): SGC_P2 Instrument ID (2): SGC_P2

Date Analyzed (1): 07/31/2018 03:14 Date Analyzed (2): 07/31/2018 03:14

GC Column (1): CLP1 ID: 0.32(mm) GC Column (2): CLP2 ID: 0.32(mm)

ANALYTE	COL	PEAK	RT	RT WINDOW		CONCENTRATION		RPD
				FROM	TO	PEAK	MEAN	
gamma-BHC (Lindane)	1		4.73	4.72	4.74	0.00632		1.7
	2		4.66	4.65	4.68	0.00621		
Heptachlor	1		5.13	5.12	5.14	0.00660		3.0
	2		5.02	5.01	5.03	0.00641		
Heptachlor epoxide	1		5.99	5.98	6.00	0.00646		2.3
	2		5.80	5.79	5.81	0.00631		
Endrin	1		6.91	6.90	6.92	0.00618		0.0
	2		6.81	6.80	6.82	0.00618		
Methoxychlor	1		7.79	7.78	7.80	0.00648		3.4
	2		8.01	8.00	8.02	0.00626		

FORM X
IDENTIFICATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Client Sample ID: CRC-B22-0105 MSD Lab Sample ID: 160-29498-3 MSD

Instrument ID (1): SGC_P2 Instrument ID (2): SGC_P2

Date Analyzed (1): 07/31/2018 03:32 Date Analyzed (2): 07/31/2018 03:32

GC Column (1): CLP1 ID: 0.32(mm) GC Column (2): CLP2 ID: 0.32(mm)

ANALYTE	COL	PEAK	RT	RT WINDOW		CONCENTRATION		RPD
				FROM	TO	PEAK	MEAN	
gamma-BHC (Lindane)	1		4.73	4.72	4.74	0.00650		1.7
	2		4.66	4.65	4.68	0.00639		
Heptachlor	1		5.13	5.12	5.14	0.00680		4.4
	2		5.02	5.01	5.03	0.00650		
Heptachlor epoxide	1		5.99	5.98	6.00	0.00659		2.5
	2		5.80	5.79	5.81	0.00643		
Endrin	1		6.91	6.90	6.92	0.00622		1.1
	2		6.81	6.80	6.82	0.00629		
Methoxychlor	1		7.79	7.78	7.80	0.00687		8.1
	2		8.01	8.00	8.02	0.00634		

FORM X
IDENTIFICATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Client Sample ID: Lab Sample ID: LCS 280-423271/2-F

Instrument ID (1): SGC_P2 Instrument ID (2): SGC_P2

Date Analyzed (1): 07/31/2018 00:04 Date Analyzed (2): 07/31/2018 00:04

GC Column (1): CLP1 ID: 0.32(mm) GC Column (2): CLP2 ID: 0.32(mm)

ANALYTE	COL	PEAK	RT	RT WINDOW		CONCENTRATION		RPD
				FROM	TO	PEAK	MEAN	
gamma-BHC (Lindane)	1		4.73	4.72	4.74	0.00609		0.3
	2		4.67	4.65	4.68	0.00611		
Heptachlor	1		5.13	5.12	5.14	0.00653		2.9
	2		5.02	5.01	5.03	0.00634		
Heptachlor epoxide	1		5.99	5.98	6.00	0.00638		2.8
	2		5.80	5.79	5.81	0.00620		
Endrin	1		6.91	6.90	6.92	0.00614		1.0
	2		6.81	6.80	6.82	0.00621		
Methoxychlor	1		7.79	7.78	7.80	0.00676		7.5
	2		8.01	8.00	8.02	0.00627		

FORM X
IDENTIFICATION SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Client Sample ID: Lab Sample ID: LCS 280-423271/3-C

Instrument ID (1): SGC_P2 Instrument ID (2): SGC_P2

Date Analyzed (1): 07/31/2018 00:21 Date Analyzed (2): 07/31/2018 00:21

GC Column (1): CLP1 ID: 0.32(mm) GC Column (2): CLP2 ID: 0.32(mm)

ANALYTE	COL	PEAK	RT	RT WINDOW		CONCENTRATION		RPD
				FROM	TO	PEAK	MEAN	
Toxaphene	1	1	6.24	6.22	6.25	0.0133	0.0219	8.9
		2	6.76	6.75	6.77	0.0104		
		3	7.01	7.00	7.02	0.0262		
		4	7.74	7.72	7.74	0.0212		
		5	8.05	8.03	8.06	0.0383		
	2	1	5.65	5.64	5.66	0.0267	0.0200	
		2	7.02	7.01	7.03	0.0104		
		3	7.20	7.19	7.21	0.0213		
		4	7.40	7.39	7.41	0.0194		
		5	7.94	7.92	7.95	0.0221		

FORM I
PESTICIDES ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Denver | Job No.: 160-29498-1

SDG No.:

Client Sample ID: CRC-B22-0105 | Lab Sample ID: 160-29498-3

Matrix: Solid (TCLP) | Lab File ID: 07300049.D

Analysis Method: 8081B | Date Collected: 07/12/2018 11:50

Extraction Method: 3510C | Date Extracted: 07/25/2018 11:45

Sample wt/vol: 100(mL) | Date Analyzed: 07/31/2018 02:57

Con. Extract Vol.: 10(mL) | Dilution Factor: 1

Injection Volume: 1(uL) | GC Column: CLP1 ID: 0.32(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 424154 | Units: mg/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
72-20-8	Endrin	0.000079	U	0.00050	0.000079
76-44-8	Heptachlor	0.000077	U * F1	0.00050	0.000077
1024-57-3	Heptachlor epoxide	0.000075	U * F1	0.00050	0.000075
58-89-9	gamma-BHC (Lindane)	0.000069	U * F1	0.00050	0.000069
72-43-5	Methoxychlor	0.00013	U * F1	0.0010	0.00013
8001-35-2	Toxaphene	0.0037	U	0.020	0.0037
12789-03-6	Technical Chlordane	0.0014	U	0.0050	0.0014

CAS NO.	SURROGATE	%REC	Q	LIMITS
877-09-8	Tetrachloro-m-xylene	91		28-115
2051-24-3	DCB Decachlorobiphenyl	100		34-122

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300049.D
Lims ID: 160-29498-A-3-J
Client ID: CRC-B22-0105
Sample Type: Client
Inject. Date: 31-Jul-2018 02:57:40 ALS Bottle#: 44 Worklist Smp#: 49
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: 160-29498-A-3-J
Misc. Info.: 280-0072505-049
Operator ID: TEM Instrument ID: SGC_P2

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 08-Aug-2018 01:52:50 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0301

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene						
1	2.945	2.945	-0.001	765960099	150.0	
2	2.730	2.730	-0.001	181723401	150.0	
$ 4 Tetrachloro-m-xylene						
1	3.851	3.850	0.001	107656682	18.1	
2	3.720	3.720	0.000	27918334	18.9	
					RPD = 4.03	
9 gamma-BHC (Lindane)						
1		4.728			ND	
2		4.663				
13 Technical Chlordane						
1		5.061			ND	
1		5.518				
1		6.119				
1		6.243				
1		7.074				
2		4.902				
2		5.413				
2		5.987				
2		6.142				
2		7.081				
15 Heptachlor						
1		5.129			ND	
2		5.017				
21 Heptachlor epoxide						
1		5.988			ND	
2		5.798				

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	OnCol Amt ng/mL	Flags
28 Toxaphene						
1		6.235			ND	
1		6.762				
1		7.008				
1		7.730				
1		8.045				
2		5.648				
2		7.018				
2		7.202				
2		7.401				
2		7.933				
30 Endrin						
1		6.911			ND	
2		6.808				
37 Methoxychlor						
1		7.790			ND	
2		8.009				
$ 41 DCB Decachlorobiphenyl						
1	9.376	9.376	0.000	85735351	19.9	
2	9.514	9.513	0.001	24323443	20.7	
					RPD = 3.76	

Reagents:

8081_IS_00008 Amount Added: 75.00 Units: uL Run Reagent

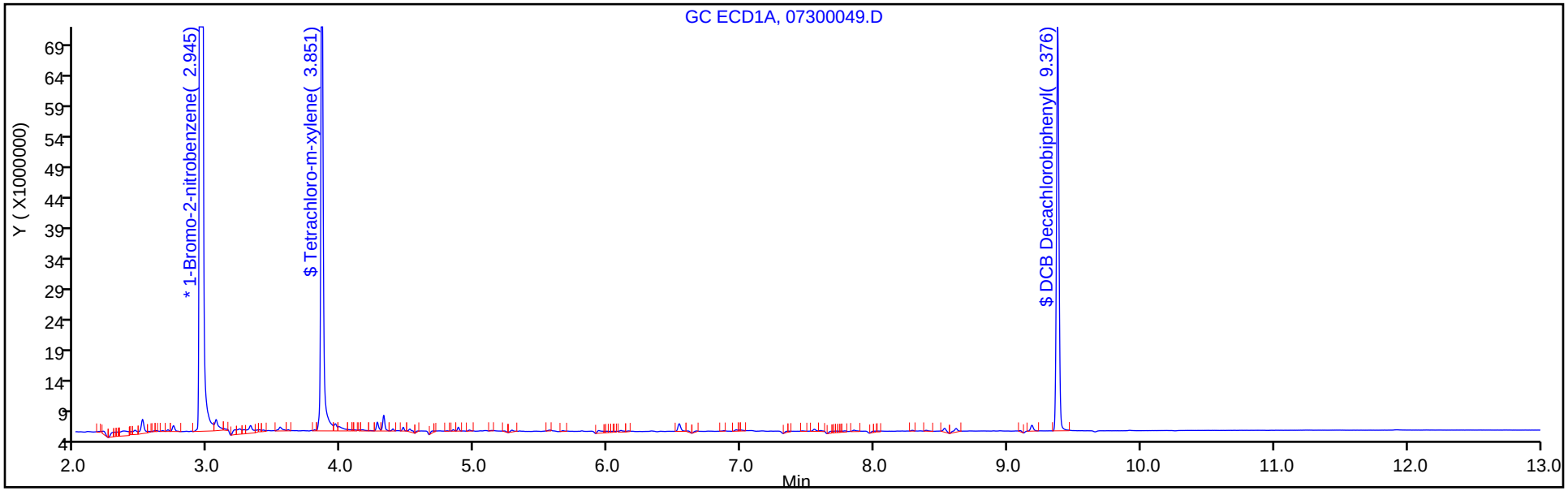
Report Date: 08-Aug-2018 01:52:51 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

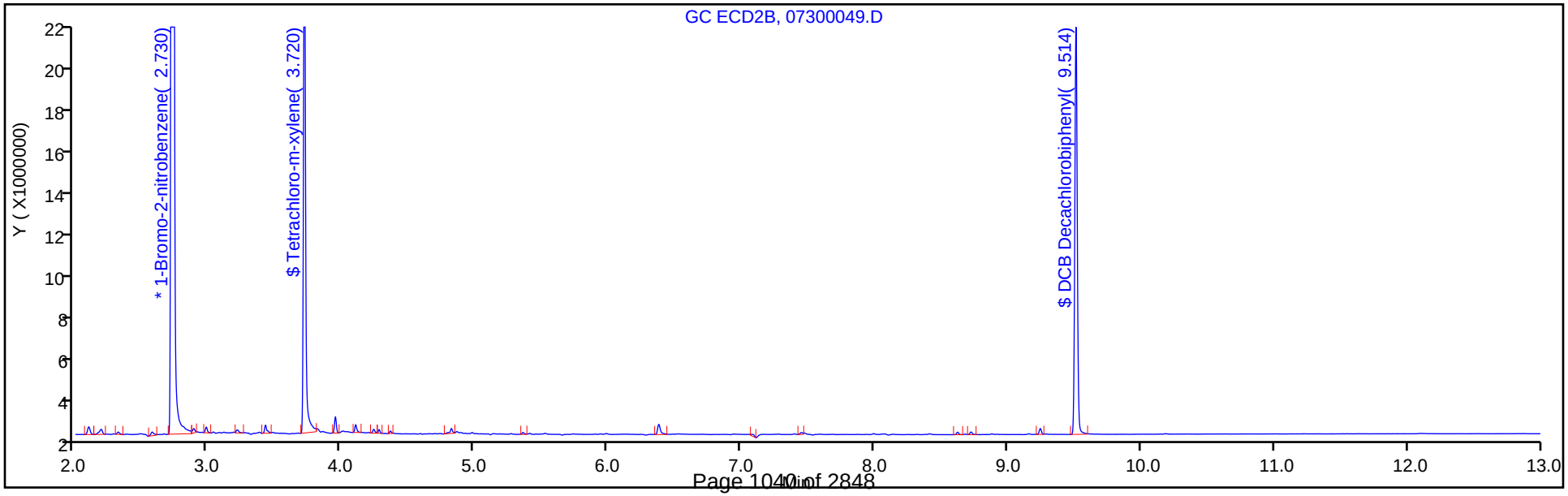
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300049.D

Injection Date:	31-Jul-2018 02:57:40	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	160-29498-A-3-J	Lab Sample ID:	280-29498-3	Worklist Smp#:	49
Client ID:	CRC-B22-0105				
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	44
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Recovery Report

Data File:	\\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300049.D				
Lims ID:	160-29498-A-3-J				
Client ID:	CRC-B22-0105				
Sample Type:	Client				
Inject. Date:	31-Jul-2018 02:57:40	ALS Bottle#:	44	Worklist Smp#:	49
Injection Vol:	1.0 ul	Dil. Factor:	1.0000		
Sample Info:	160-29498-A-3-J				
Misc. Info.:	280-0072505-049				
Operator ID:	TEM	Instrument ID:	SGC_P2		
Method:	\\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m				
Limit Group:	GCSV - 8081A - IS				
Last Update:	08-Aug-2018 01:52:50	Calib Date:	30-Jul-2018 22:03:40		
Integrator:	Falcon				
Quant Method:	Internal Standard	Quant By:	Initial Calibration		
Last ICal File:	\\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D				
Column 1 :	CLP1 (0.32 mm)		Det: GC ECD1A		
Column 2 :	CLP2 (0.32 mm)		Det: GC ECD2B		
Process Host:	CTX0301				

Surrogate Recovery, Detector: GC ECD1A

Compound	Amount Added	Amount Recovered	% Rec.
$ 4 Tetrachloro-m-xylene	20.0	18.1	90.66
$ 41 DCB Decachlorobiphenyl	20.0	19.9	99.74

Surrogate Recovery, Detector: GC ECD2B

Compound	Amount Added	Amount Recovered	% Rec.
$ 4 Tetrachloro-m-xylene	20.0	18.9	94.39
$ 41 DCB Decachlorobiphenyl	20.0	20.7	103.56

FORM VI
PESTICIDES BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424154

SDG No.:

Instrument ID: SGC_P2 GC Column: CLP1 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 07/30/2018 17:26 Calibration End Date: 07/30/2018 18:53 Calibration ID: 33253

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD1 280-424154/21	07300021.D
Level 2	STD2 280-424154/20	07300020.D
Level 3	STD3 280-424154/19	07300019.D
Level 4	STD4 280-424154/18	07300018.D
Level 5	STD5 280-424154/17	07300017.D
Level 6	STD6 280-424154/16	07300016.D

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5		B	M1	M2								
Toxaphene Peak 1	0.0143 0.0106	0.0126	0.0131	0.0114	0.0106	Lin2	0.7002	0.0111							0.9940		0.9900
Toxaphene Peak 2	0.0230 0.0195	0.0211	0.0211	0.0203	0.0201	Lin2	0.6170	0.0200							1.0000		0.9900
Toxaphene Peak 3	0.0143 0.0129	0.0132	0.0134	0.0135	0.0139	Lin2	0.1749	0.0133							0.9990		0.9900
Toxaphene Peak 4	0.0214 0.0238	0.0201	0.0216	0.0214	0.0217	Lin2	-0.259	0.0220							0.9960		0.9900
Toxaphene Peak 5	0.0112 0.0127	0.0103	0.0115	0.0110	0.0117	Lin2	-0.188	0.0117							0.9940		0.9900

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
PESTICIDES BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424154

SDG No.:

Instrument ID: SGC_P2 GC Column: CLP1 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 07/30/2018 17:26 Calibration End Date: 07/30/2018 18:53 Calibration ID: 33253

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD1 280-424154/21	07300021.D
Level 2	STD2 280-424154/20	07300020.D
Level 3	STD3 280-424154/19	07300019.D
Level 4	STD4 280-424154/18	07300018.D
Level 5	STD5 280-424154/17	07300017.D
Level 6	STD6 280-424154/16	07300016.D

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5
Toxaphene Peak 1	BNB	Lin2	15728868 529017957	31588999	64614419	116870443	280542308	200 10000	500	1000	2000	5000
Toxaphene Peak 2	BNB	Lin2	25341566 977103901	52789400	104476106	208541425	534670236	200 10000	500	1000	2000	5000
Toxaphene Peak 3	BNB	Lin2	15768649 644651041	32924706	66340887	138649316	368096152	200 10000	500	1000	2000	5000
Toxaphene Peak 4	BNB	Lin2	23588424 1190204978	50278636	106726872	219623026	576872068	200 10000	500	1000	2000	5000
Toxaphene Peak 5	BNB	Lin2	12317987 637120193	25767208	57045209	112947698	309937195	200 10000	500	1000	2000	5000

Curve Type Legend:
Lin2 = Linear 1/conc^2 ISTD

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300016.D
Lims ID: STD6 TOX
Client ID:
Sample Type: IC Calib Level: 6
Inject. Date: 30-Jul-2018 17:26:13 ALS Bottle#: 11 Worklist Smp#: 16
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD6 TOX
Misc. Info.: 280-0072505-016
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub3

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:30:54 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:17:49

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.945	2.944	0.001	749791809	150.0	150.0	
2	2.730	2.729	0.001	178278784	150.0	150.0	
28 Toxaphene							M
1	6.235	6.235	0.000	529017957	10000	9510.3	M
1	6.763	6.762	0.001	977103901	10000	9761.1	M
1	7.008	7.008	0.000	644651041	10000	9707.8	M
1	7.725	7.730	-0.005	1190204978	10000	10812	M
1	8.045	8.045	0.000	637120193	10000	10929	M
		Average of Peak Amounts =				10144	
2	5.648	5.648	0.000	47784080	10000	9085.5	M
2	7.018	7.018	0.000	393815324	10000	9427.9	M
2	7.203	7.202	0.001	159813746	10000	9578.7	M
2	7.402	7.401	0.001	480087086	10000	9518.5	M
2	7.933	7.933	0.000	435423839	10000	9697.8	M
		Average of Peak Amounts =				9461.7	
						RPD = 6.96	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

8081ToxL6_00023 Amount Added: 1.00 Units: mL
8081_IS_00008 Amount Added: 75.00 Units: uL Run Reagent

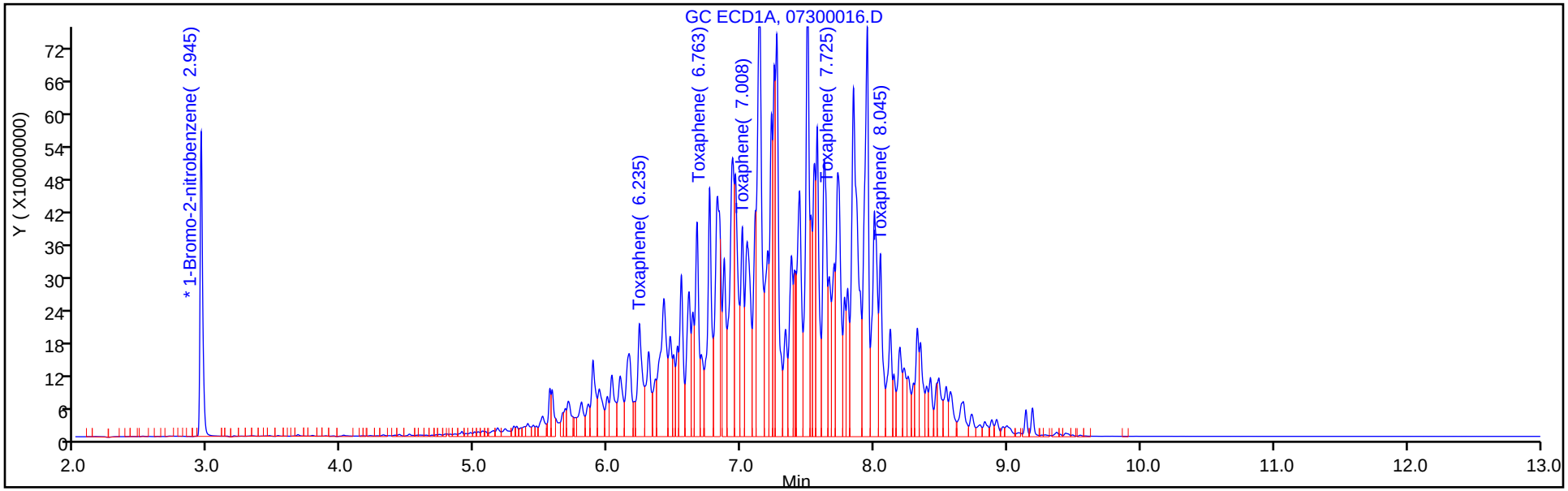
Report Date: 01-Aug-2018 15:30:57 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

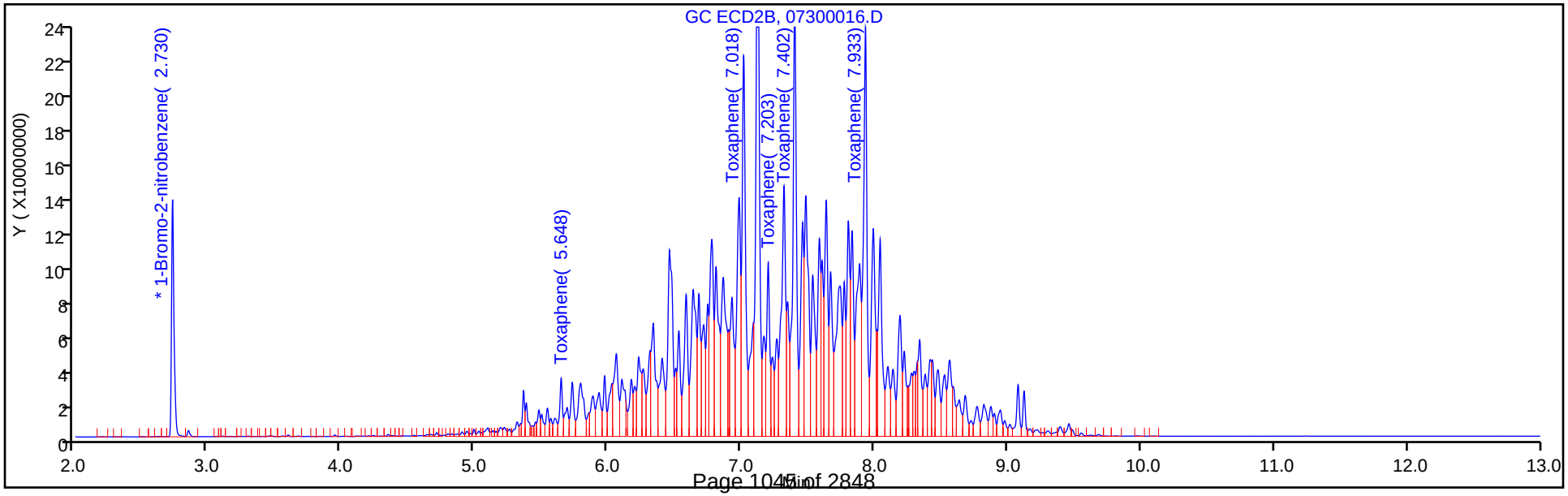
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300016.D

Injection Date:	30-Jul-2018 17:26:13	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD6 TOX			Worklist Smp#:	16
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	11
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Report Date: 01-Aug-2018 15:30:57 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300016.D

Injection Date: 30-Jul-2018 17:26:13 Instrument ID: SGC_P2

Lims ID: STD6 TOX

Client ID:

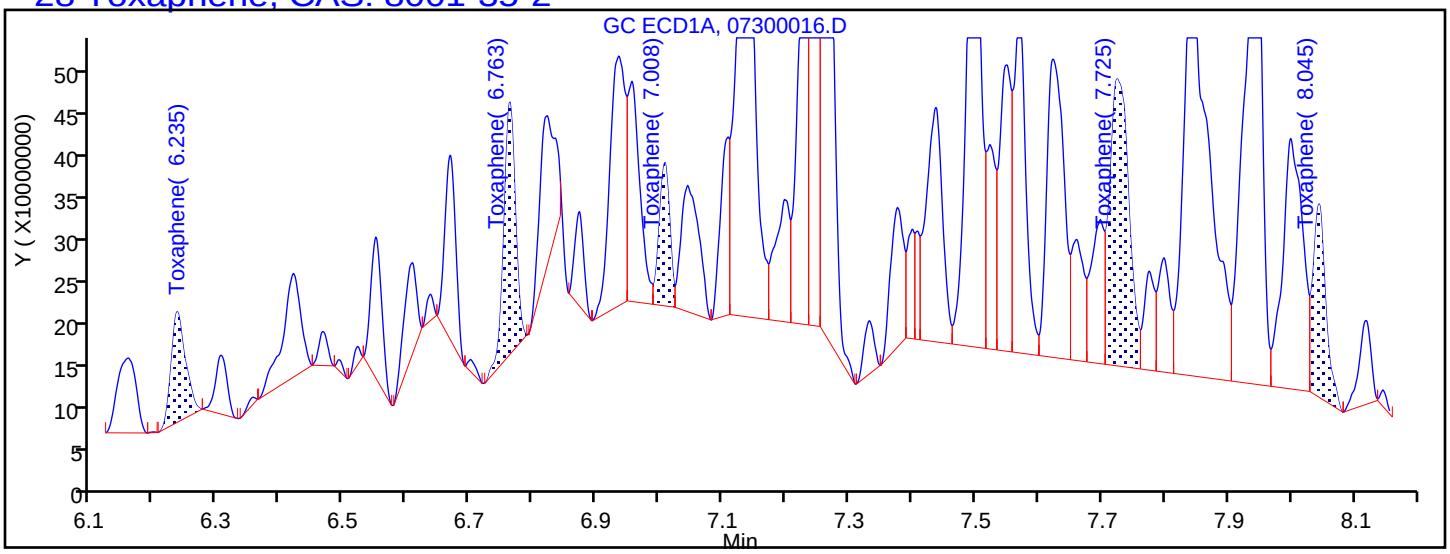
Operator ID: TEM ALS Bottle#: 11 Worklist Smp#: 16

Injection Vol: 1.0 ul Dil. Factor: 1.0000

Method: P2 8081 IS Limit Group: GCSV - 8081A - IS

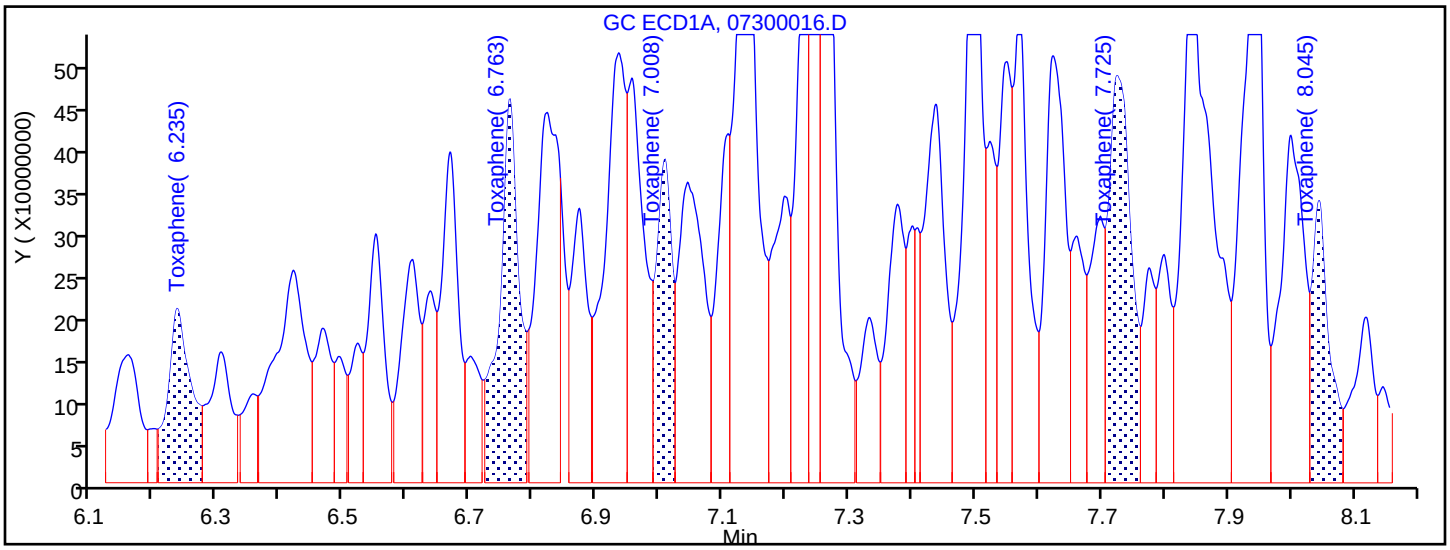
Column: CLP1 (0.32 mm) Detector GC ECD1A

28 Toxaphene, CAS: 8001-35-2



Processing Integration Results

6.235	Response = 205530061
6.763	Response = 378345543
7.008	Response = 197739351
7.725	Response = 717749966
8.045	Response = 323450879



Manual Integration Results

6.235	Response = 529017957	M
6.763	Response = 977103901	M
7.008	Response = 644651041	M
7.725	Response = 1190204978	M
8.045	Response = 637120193	M

Reviewer: mooret, 01-Aug-2018 15:08:56

Audit Action: Assigned New Baseline Audit Reason: Baseline Smoothing

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300017.D
Lims ID: STD5 TOX
Client ID:
Sample Type: IC Calib Level: 5
Inject. Date: 30-Jul-2018 17:43:40 ALS Bottle#: 12 Worklist Smp#: 17
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD5 TOX
Misc. Info.: 280-0072505-017
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub3

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:30:59 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:17:29

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.945	2.944	0.001	797116455	150.0	150.0	
2	2.730	2.729	0.001	186551778	150.0	150.0	
28 Toxaphene							M
1	6.235	6.235	0.000	280542308	5000.0	4712.2	
1	6.762	6.762	0.000	534670236	5000.0	5009.2	
1	7.008	7.008	0.000	368096152	5000.0	5207.9	
1	7.727	7.730	-0.003	576872068	5000.0	4935.5	
1	8.045	8.045	0.000	309937195	5000.0	5009.8	
		Average of Peak Amounts =				4974.9	
2	5.648	5.648	0.000	26813306	5000.0	4847.1	M
2	7.019	7.018	0.001	215067893	5000.0	4904.1	M
2	7.203	7.202	0.001	86651874	5000.0	4953.2	M
2	7.402	7.401	0.001	257103549	5000.0	4860.7	M
2	7.933	7.933	0.000	230175833	5000.0	4887.4	M
		Average of Peak Amounts =				4890.5	
						RPD = 1.71	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

8081ToxL5_00021	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

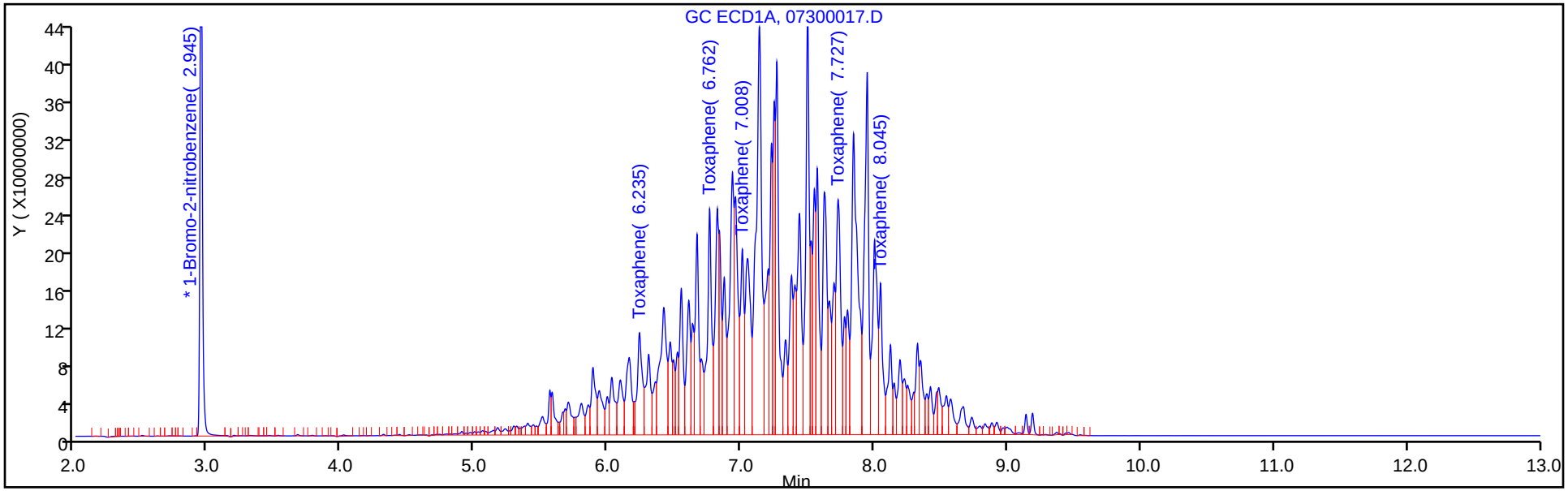
Report Date: 01-Aug-2018 15:31:01 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

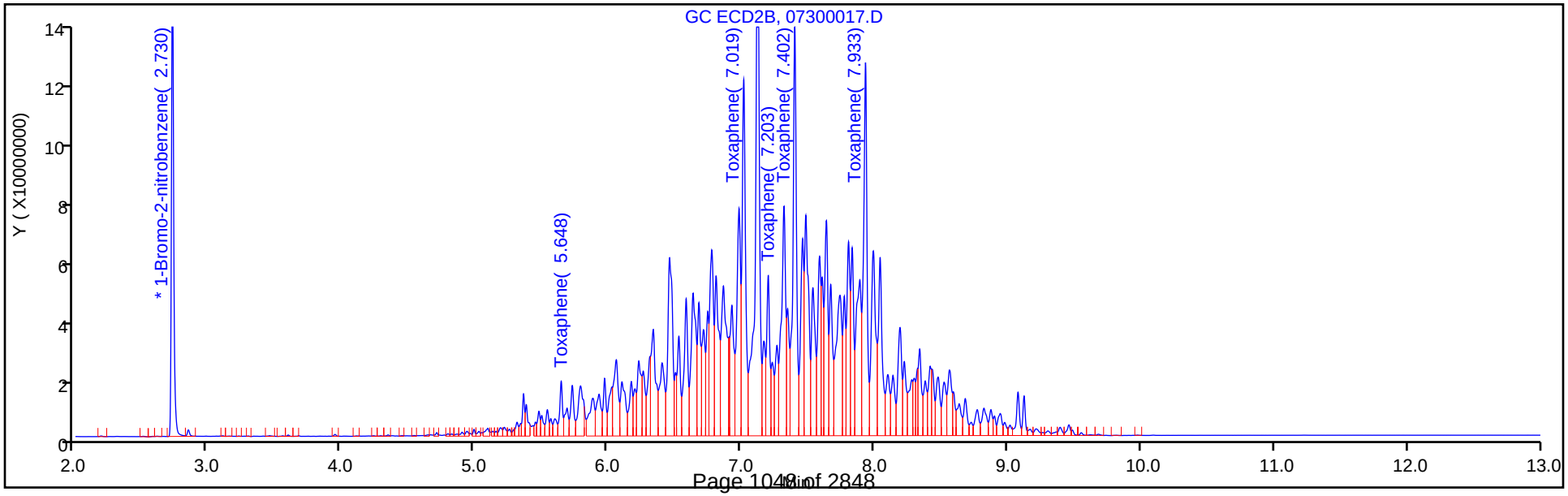
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300017.D

Injection Date:	30-Jul-2018 17:43:40	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD5 TOX			Worklist Smp#:	17
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	12
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300018.D
Lims ID: STD4 TOX
Client ID:
Sample Type: IC Calib Level: 4
Inject. Date: 30-Jul-2018 18:01:01 ALS Bottle#: 13 Worklist Smp#: 18
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD4 TOX
Misc. Info.: 280-0072505-018
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub3

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:31:04 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:17:15

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.944	0.000	769676225	150.0	150.0	
2	2.729	2.729	0.000	181680575	150.0	150.0	
28 Toxaphene							M
1	6.235	6.235	0.000	116870443	2000.0	1997.0	M
1	6.762	6.762	0.000	208541425	2000.0	2005.0	M
1	7.008	7.008	0.000	138649316	2000.0	2023.5	M
1	7.730	7.730	0.000	219623026	2000.0	1953.1	M
1	8.045	8.045	0.000	112947698	2000.0	1900.8	M
		Average of Peak Amounts =				1975.9	
2	5.648	5.648	0.000	11270358	2000.0	2061.3	
2	7.018	7.018	0.000	88407499	2000.0	2050.3	
2	7.202	7.202	0.000	35132623	2000.0	2049.9	
2	7.401	7.401	0.000	106147273	2000.0	2047.8	
2	7.933	7.933	0.000	93068800	2000.0	2015.3	
		Average of Peak Amounts =				2044.9	
						RPD = 3.43	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

8081TOXCCVL4_00014 Amount Added: 1.00 Units: mL
8081_IS_00008 Amount Added: 75.00 Units: uL Run Reagent

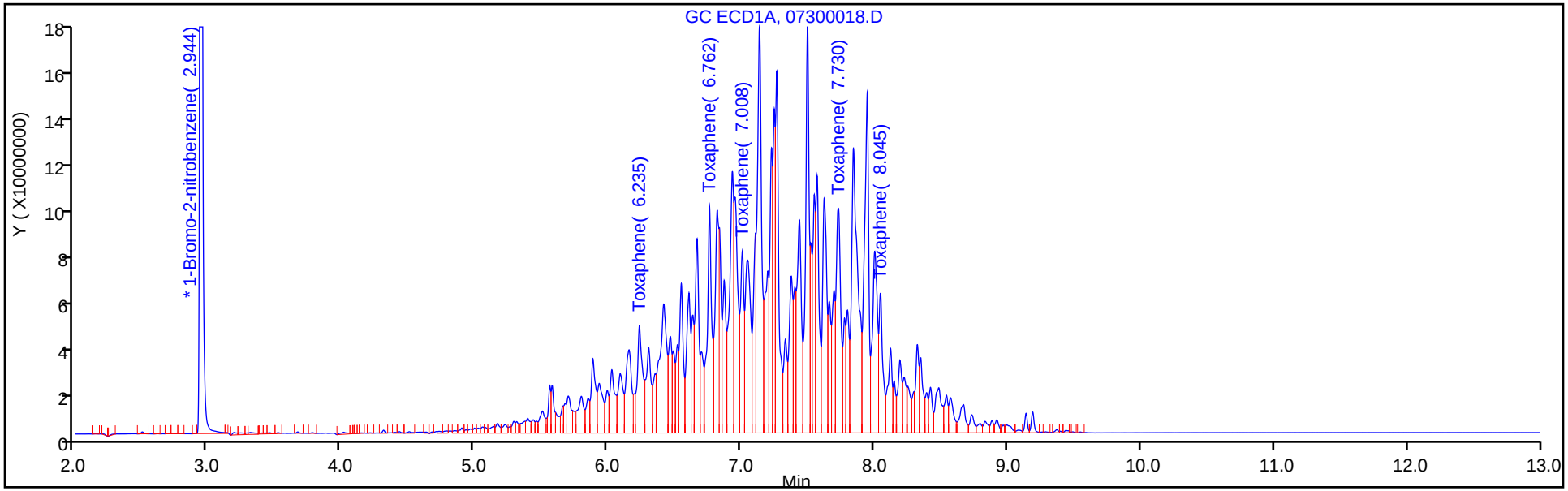
Report Date: 01-Aug-2018 15:31:06 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

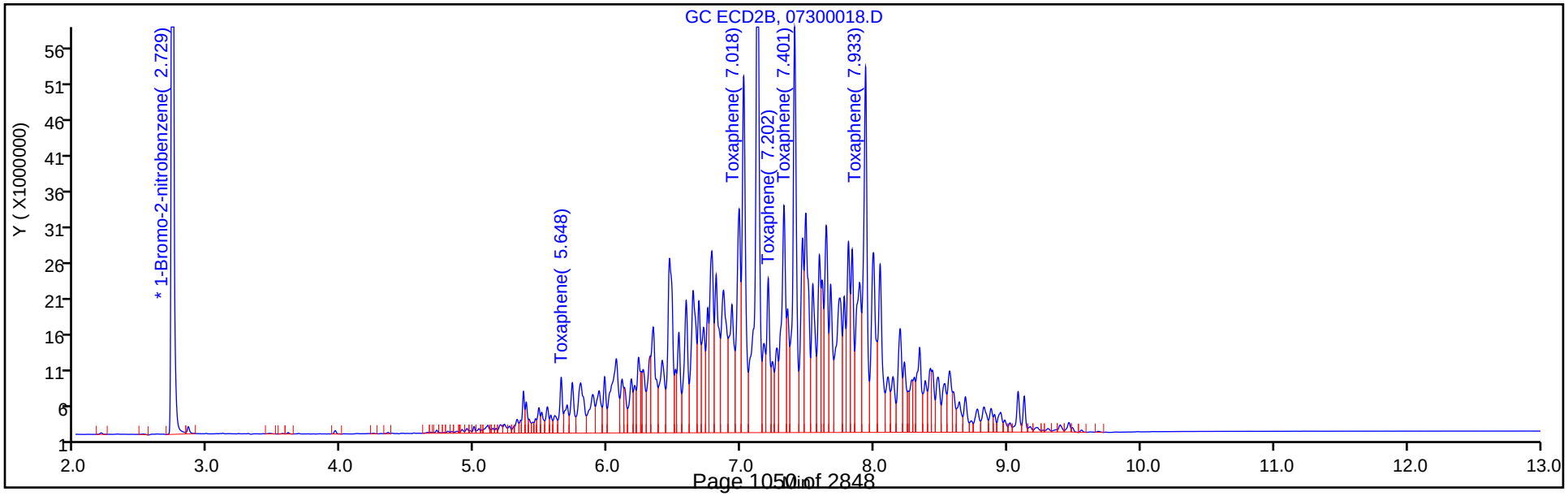
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300018.D

Injection Date:	30-Jul-2018 18:01:01	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD4 TOX			Worklist Smp#:	18
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	13
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Report Date: 01-Aug-2018 15:31:06 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300018.D

Injection Date: 30-Jul-2018 18:01:01 Instrument ID: SGC_P2

Lims ID: STD4 TOX

Client ID:

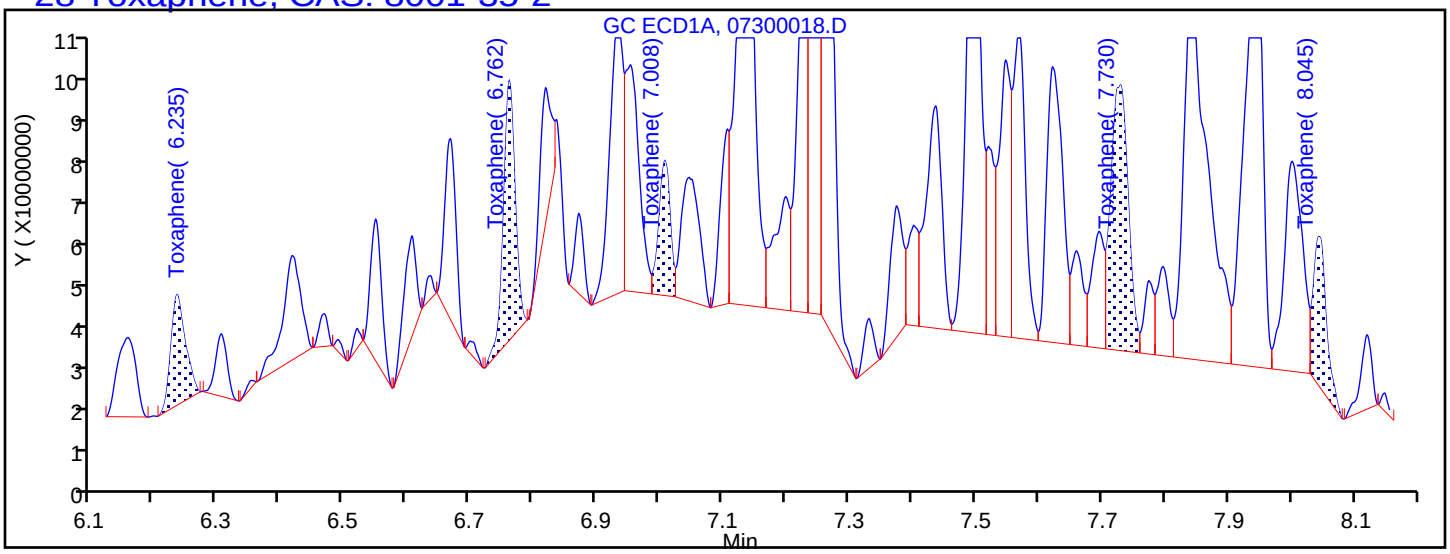
Operator ID: TEM ALS Bottle#: 13 Worklist Smp#: 18

Injection Vol: 1.0 ul Dil. Factor: 1.0000

Method: P2 8081 IS Limit Group: GCSV - 8081A - IS

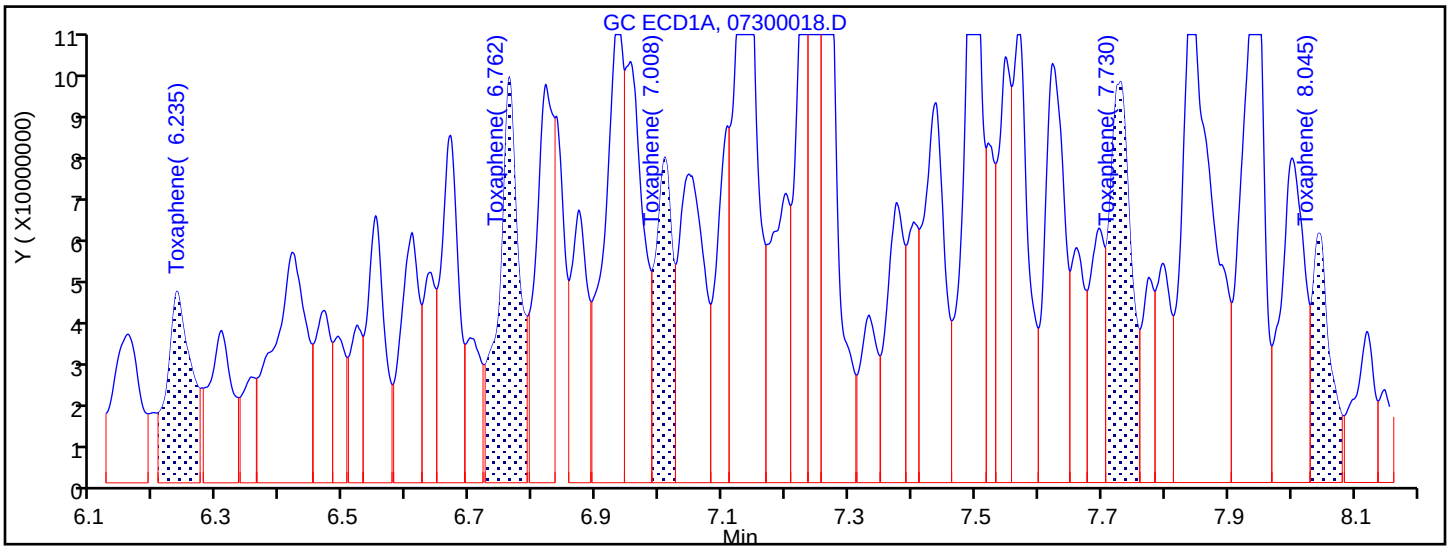
Column: CLP1 (0.32 mm) Detector GC ECD1A

28 Toxaphene, CAS: 8001-35-2



Processing Integration Results

6.235	Response = 40894567
6.762	Response = 76969225
7.008	Response = 39385155
7.730	Response = 118063156
8.045	Response = 49721885



Manual Integration Results

6.235	Response = 116870443	M
6.762	Response = 208541425	M
7.008	Response = 138649316	M
7.730	Response = 219623026	M
8.045	Response = 112947698	M

Reviewer: mooret, 01-Aug-2018 15:26:16

Audit Action: Assigned New Baseline Audit Reason: Baseline Smoothing

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300019.D
Lims ID: STD3 TOX
Client ID:
Sample Type: IC Calib Level: 3
Inject. Date: 30-Jul-2018 18:18:21 ALS Bottle#: 14 Worklist Smp#: 19
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD3 TOX
Misc. Info.: 280-0072505-019
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub3

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:31:07 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:18:13

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.944	0.000	741862380	150.0	150.0	
2	2.729	2.729	0.000	175909266	150.0	150.0	
28 Toxaphene							M
1	6.235	6.235	0.000	64614419	1000.0	1118.5	M
1	6.762	6.762	0.000	104476106	1000.0	1027.3	M
1	7.008	7.008	0.000	66340887	1000.0	997.9	M
1	7.726	7.730	-0.004	106726872	1000.0	990.6	M
1	8.044	8.045	-0.001	57045209	1000.0	1003.6	M
		Average of Peak Amounts =				1027.6	
2	5.648	5.648	0.000	5743718	1000.0	1059.3	M
2	7.019	7.018	0.001	44613150	1000.0	1052.3	M
2	7.202	7.202	0.000	17231809	1000.0	1028.1	M
2	7.401	7.401	0.000	53396951	1000.0	1053.3	M
2	7.933	7.933	0.000	47094384	1000.0	1041.9	M
		Average of Peak Amounts =				1047.0	
						RPD = 1.87	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

8081ToxL3_00020 Amount Added: 1.00 Units: mL
8081_IS_00008 Amount Added: 75.00 Units: uL Run Reagent

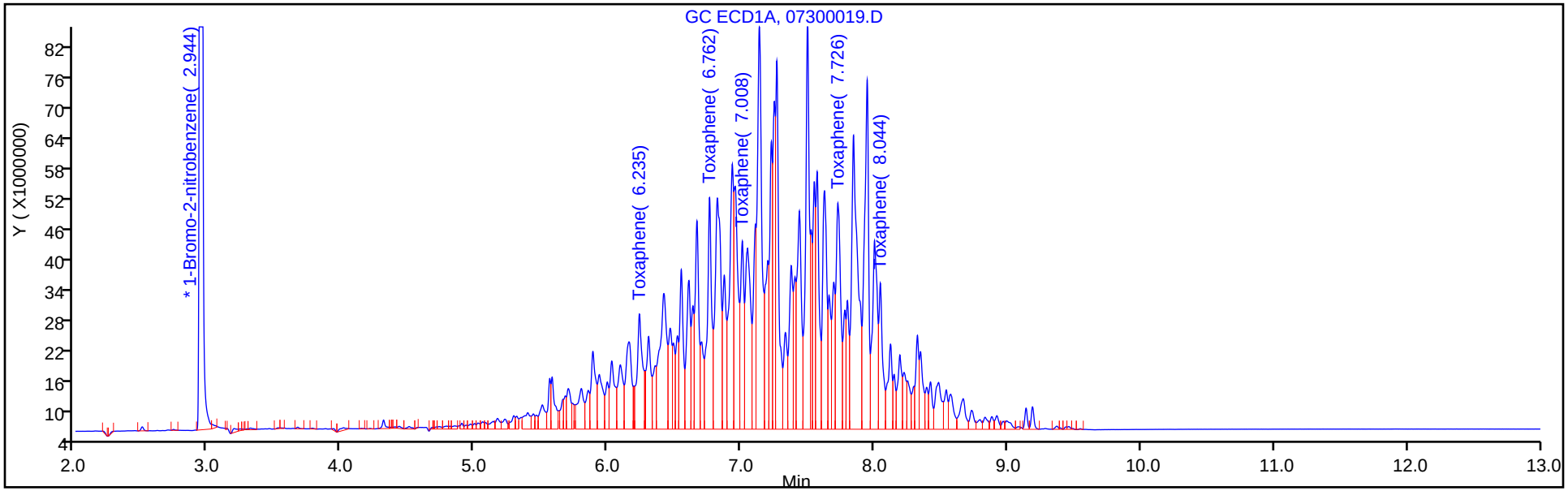
Report Date: 01-Aug-2018 15:31:09 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

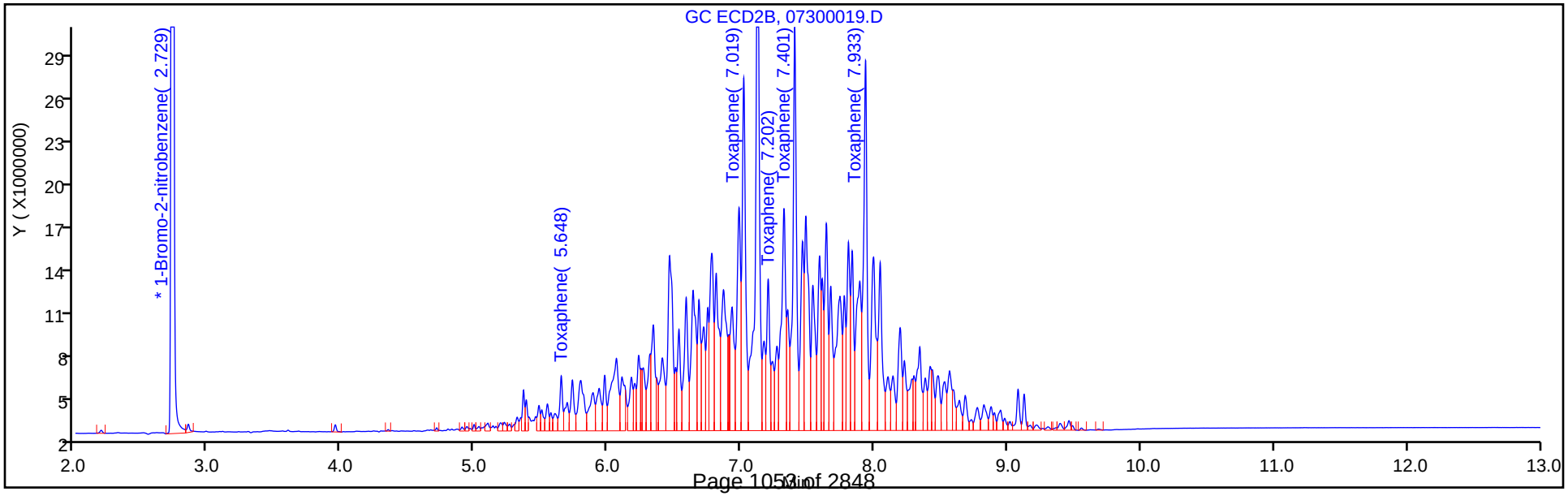
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300019.D

Injection Date:	30-Jul-2018 18:18:21	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD3 TOX			Worklist Smp#:	19
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	14
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Report Date: 01-Aug-2018 15:31:09 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300019.D

Injection Date: 30-Jul-2018 18:18:21 Instrument ID: SGC_P2

Lims ID: STD3 TOX

Client ID:

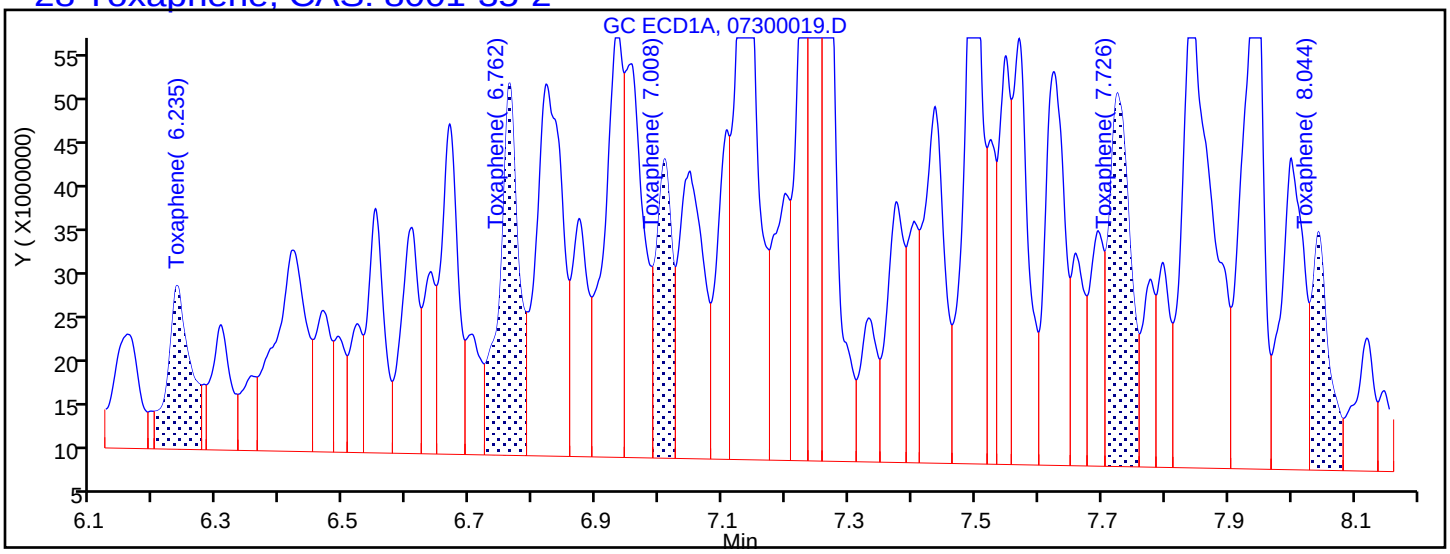
Operator ID: TEM ALS Bottle#: 14 Worklist Smp#: 19

Injection Vol: 1.0 ul Dil. Factor: 1.0000

Method: P2 8081 IS Limit Group: GCSV - 8081A - IS

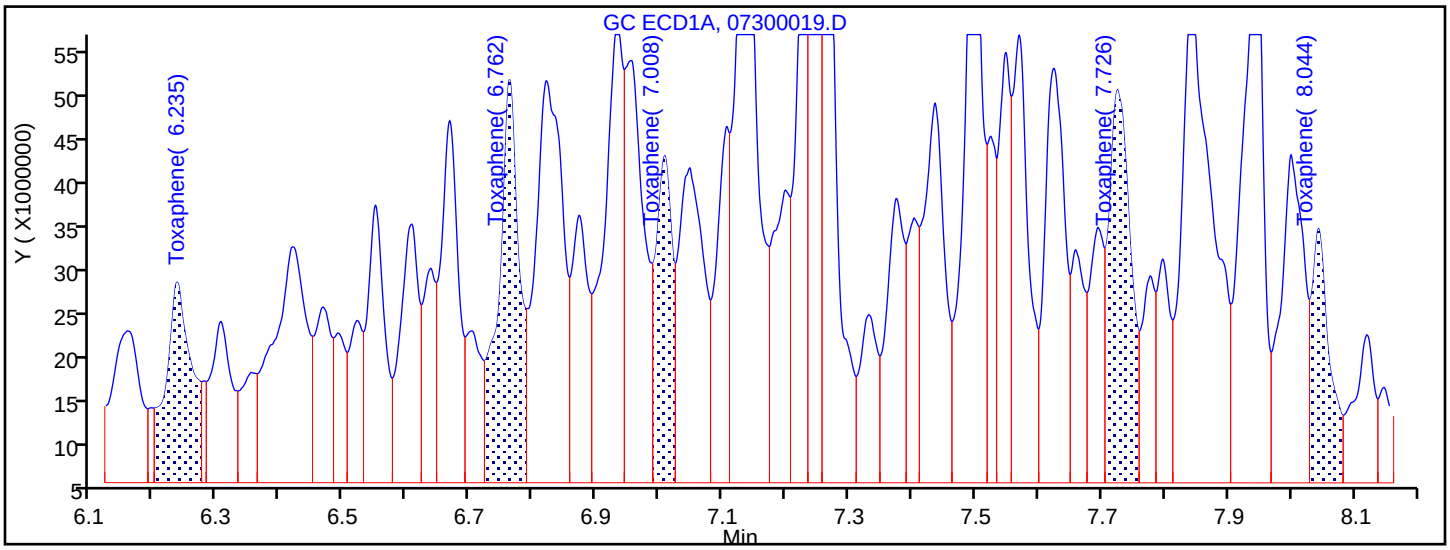
Column: CLP1 (0.32 mm) Detector GC ECD1A

28 Toxaphene, CAS: 8001-35-2



Processing Integration Results

6.235	Response = 45831703
6.762	Response = 90492730
7.008	Response = 59530966
7.726	Response = 99516477
8.044	Response = 51300019



Manual Integration Results

6.235	Response = 64614419	M
6.762	Response = 104476106	M
7.008	Response = 66340887	M
7.726	Response = 106726872	M
8.044	Response = 57045209	M

Reviewer: mooret, 01-Aug-2018 15:26:36

Audit Action: Assigned New Baseline Audit Reason: Baseline Smoothing

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300020.D
Lims ID: STD2 TOX
Client ID:
Sample Type: IC Calib Level: 2
Inject. Date: 30-Jul-2018 18:35:41 ALS Bottle#: 15 Worklist Smp#: 20
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD2 TOX
Misc. Info.: 280-0072505-020
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub3

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:31:10 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:18:27

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.942	2.944	-0.002	749985126	150.0	150.0	
2	2.728	2.729	-0.001	175228166	150.0	150.0	
28 Toxaphene							M
1	6.236	6.235	0.001	31588999	500.0	508.2	
1	6.762	6.762	0.000	52789400	500.0	498.0	
1	7.007	7.008	-0.001	32924706	500.0	483.2	
1	7.727	7.730	-0.003	50278636	500.0	467.9	
1	8.043	8.045	-0.002	25767208	500.0	457.3	
		Average of Peak Amounts =				482.9	
2	5.648	5.648	0.000	3035313	500.0	536.6	M
2	7.019	7.018	0.001	22189929	500.0	508.4	M
2	7.202	7.202	0.000	8596734	500.0	504.5	M
2	7.402	7.401	0.001	26223130	500.0	508.1	M
2	7.932	7.933	-0.001	23452004	500.0	509.0	M
		Average of Peak Amounts =				513.3	
						RPD = 6.10	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

8081ToxL2_00021 Amount Added: 1.00 Units: mL
8081_IS_00008 Amount Added: 75.00 Units: uL Run Reagent

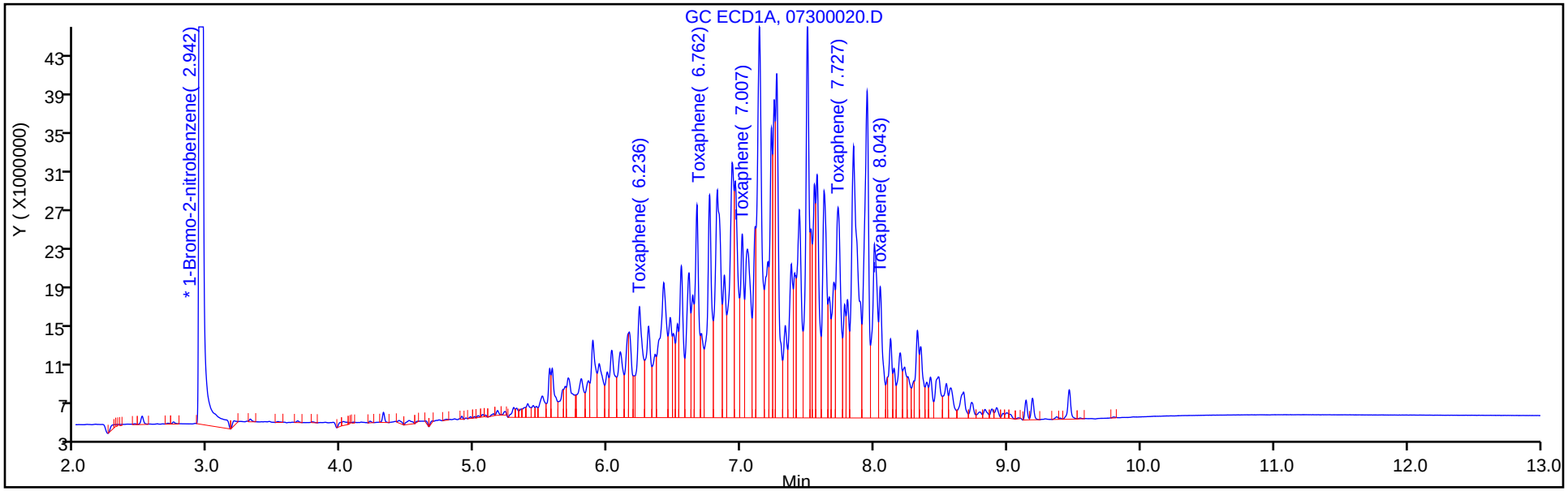
Report Date: 01-Aug-2018 15:31:12 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

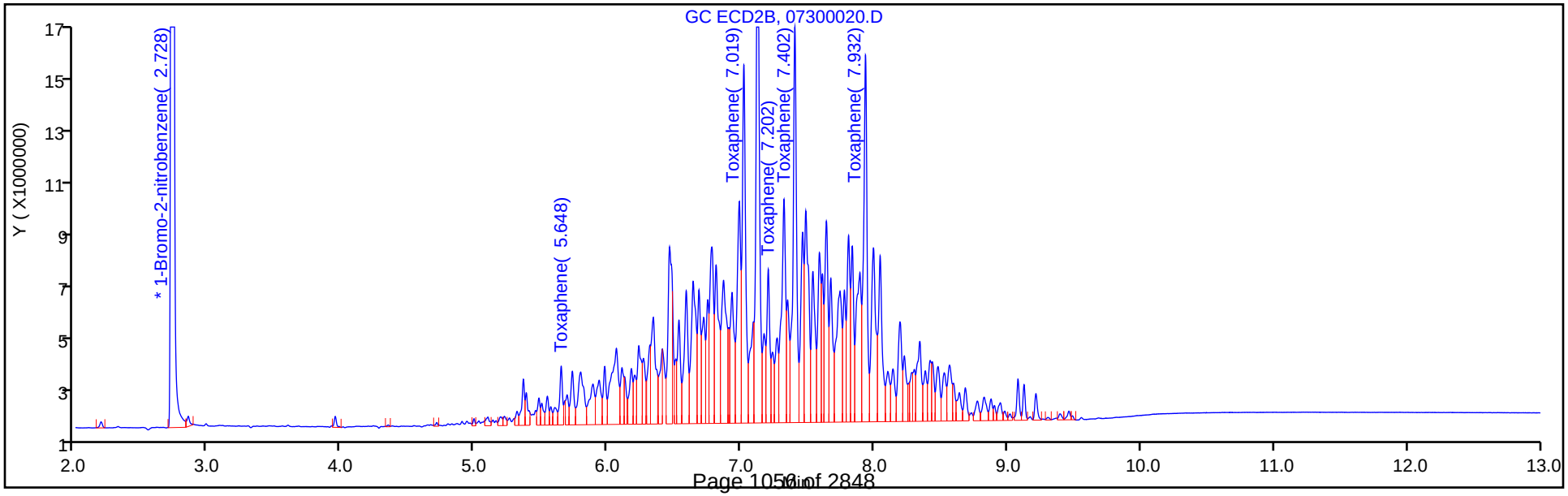
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300020.D

Injection Date:	30-Jul-2018 18:35:41	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD2 TOX			Worklist Smp#:	20
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	15
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File:	\\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300021.D				
Lims ID:	STD1 TOX				
Client ID:					
Sample Type:	IC	Calib Level:	1		
Inject. Date:	30-Jul-2018 18:53:07	ALS Bottle#:	16	Worklist Smp#:	21
Injection Vol:	1.0 ul	Dil. Factor:	1.0000		
Sample Info:	STD1 TOX				
Misc. Info.:	280-0072505-021				
Operator ID:	TEM	Instrument ID:	SGC_P2		
Sublist:	chrom-P2 8081 IS*sub3				
Method:	\\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m				
Limit Group:	GCSV - 8081A - IS				
Last Update:	01-Aug-2018 15:31:14	Calib Date:	30-Jul-2018 22:03:40		
Integrator:	Falcon				
Quant Method:	Internal Standard	Quant By:	Initial Calibration		
Last ICal File:	\\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D				
Column 1 :	CLP1 (0.32 mm)		Det: GC ECD1A		
Column 2 :	CLP2 (0.32 mm)		Det: GC ECD2B		
Process Host:	CTX0304				

First Level Reviewer: mooret Date: 01-Aug-2018 12:18:44

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.943	2.944	-0.001	827281495	150.0	150.0	
2	2.729	2.729	0.000	190854614	150.0	150.0	
28 Toxaphene							M
1	6.237	6.235	0.002	15728868	200.0	194.6	M
1	6.762	6.762	0.000	25341566	200.0	199.3	M
1	7.009	7.008	0.001	15768649	200.0	202.3	M
1	7.727	7.730	-0.003	23588424	200.0	205.8	M
1	8.045	8.045	0.000	12317987	200.0	207.3	M
		Average of Peak Amounts =				201.9	
2	5.648	5.648	0.000	1375825	200.0	191.8	M
2	7.019	7.018	0.001	10271058	200.0	196.5	M
2	7.203	7.202	0.001	3900101	200.0	197.9	M
2	7.402	7.401	0.001	11775470	200.0	196.5	M
2	7.933	7.933	0.000	10584217	200.0	197.0	M
		Average of Peak Amounts =				195.9	
						RPD = 2.98	

QC Flag Legend

Review Flags

M - Manually Integrated

Reagents:

8081ToxL1_00020	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

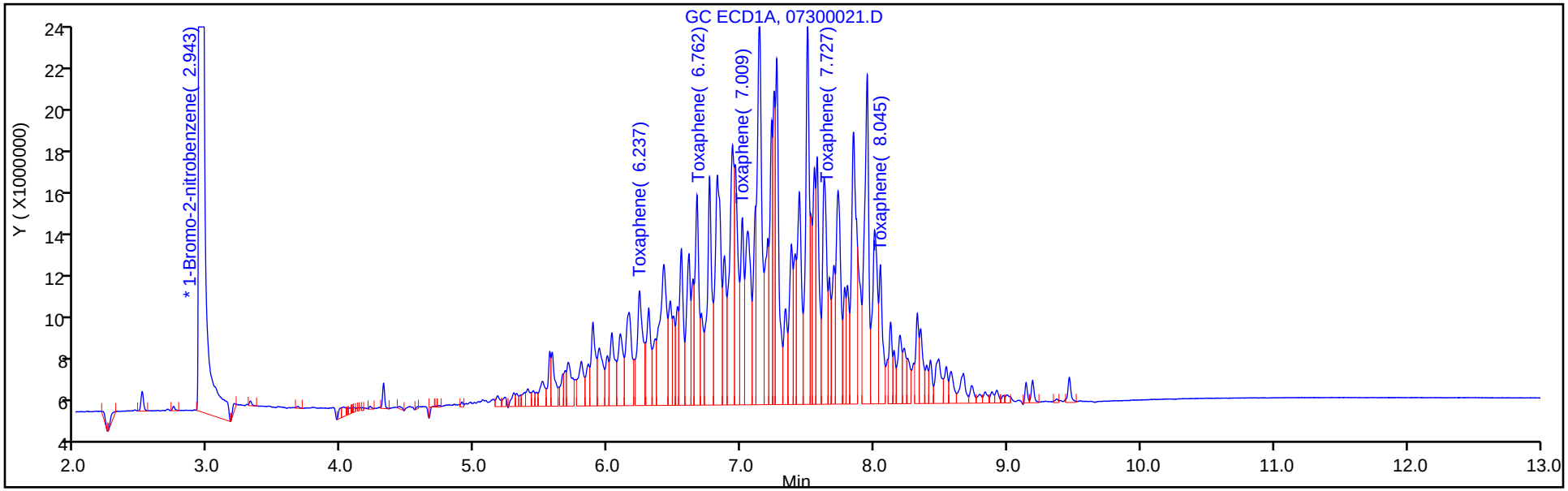
Report Date: 01-Aug-2018 15:31:18 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

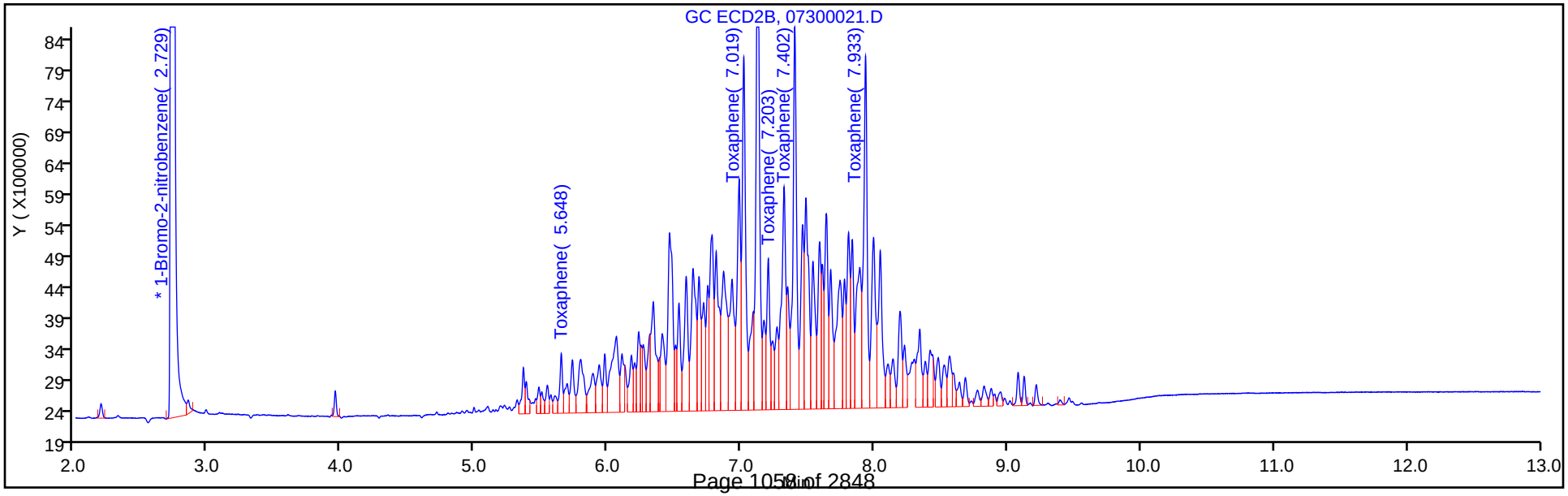
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300021.D

Injection Date:	30-Jul-2018 18:53:07	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD1 TOX			Worklist Smp#:	21
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	16
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Report Date: 01-Aug-2018 15:31:18 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300021.D

Injection Date: 30-Jul-2018 18:53:07 Instrument ID: SGC_P2

Lims ID: STD1 TOX

Client ID:

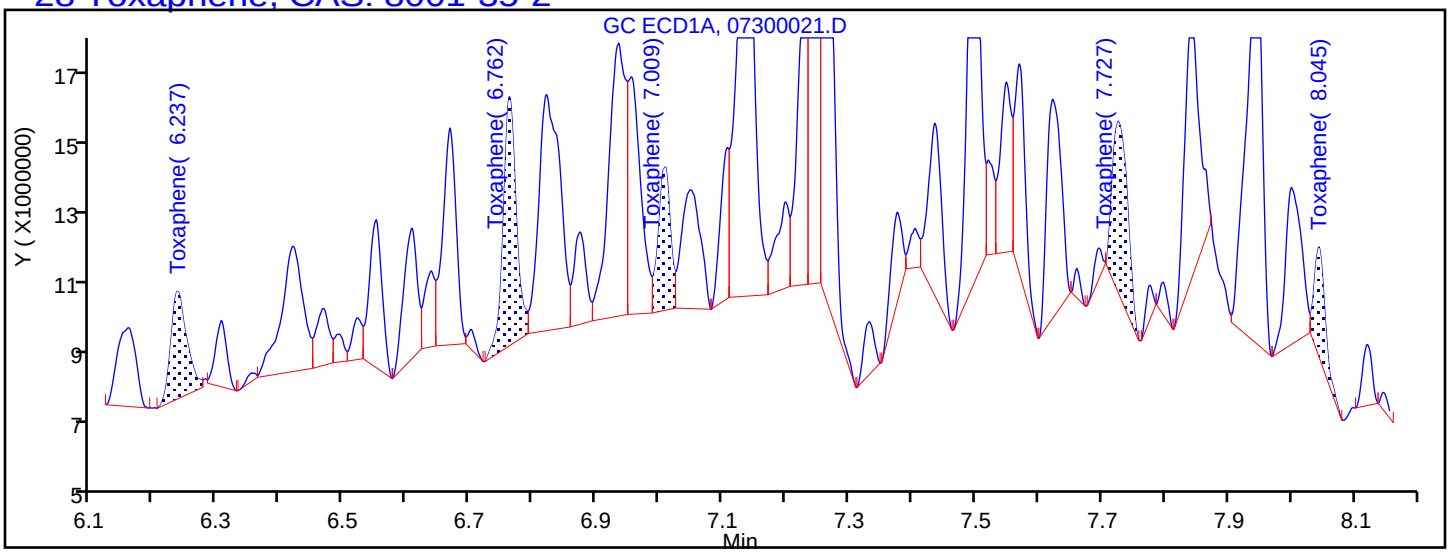
Operator ID: TEM ALS Bottle#: 16 Worklist Smp#: 21

Injection Vol: 1.0 ul Dil. Factor: 1.0000

Method: P2 8081 IS Limit Group: GCSV - 8081A - IS

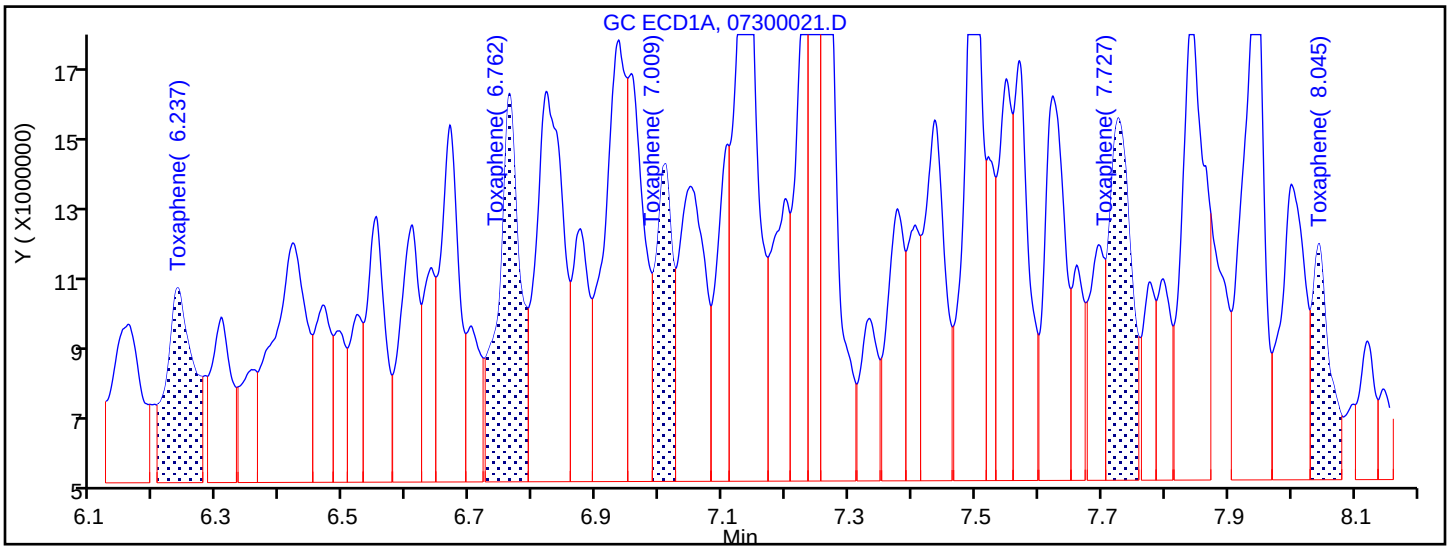
Column: CLP1 (0.32 mm) Detector GC ECD1A

28 Toxaphene, CAS: 8001-35-2



Processing Integration Results

6.237	Response = 5215701
6.762	Response = 9866731
7.009	Response = 5260461
7.727	Response = 7907728
8.045	Response = 3544679



Manual Integration Results

6.237	Response = 15728868	M
6.762	Response = 25341566	M
7.009	Response = 15768649	M
7.727	Response = 23588424	M
8.045	Response = 12317987	M

Reviewer: mooret, 01-Aug-2018 15:27:13

Audit Action: Assigned New Baseline Audit Reason: Baseline Smoothing

FORM VI
PESTICIDES BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424154

SDG No.:

Instrument ID: SGC_P2 GC Column: CLP2 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 07/30/2018 17:26 Calibration End Date: 07/30/2018 18:53 Calibration ID: 33254

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD1 280-424154/21	07300021.D
Level 2	STD2 280-424154/20	07300020.D
Level 3	STD3 280-424154/19	07300019.D
Level 4	STD4 280-424154/18	07300018.D
Level 5	STD5 280-424154/17	07300017.D
Level 6	STD6 280-424154/16	07300016.D

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5		B	M1	M2								
Toxaphene Peak 1	0.0054 0.0040	0.0052	0.0049	0.0047	0.0043	Lin2	0.2378	0.0044							0.9940		0.9900
Toxaphene Peak 2	0.0404 0.0331	0.0380	0.0380	0.0365	0.0346	Lin2	1.1929	0.0350							0.9980		0.9900
Toxaphene Peak 3	0.0153 0.0134	0.0147	0.0147	0.0145	0.0139	Lin2	0.2931	0.0140							0.9990		0.9900
Toxaphene Peak 4	0.0463 0.0404	0.0449	0.0455	0.0438	0.0413	Lin2	0.9350	0.0423							0.9980		0.9900
Toxaphene Peak 5	0.0416 0.0366	0.0402	0.0402	0.0384	0.0370	Lin2	0.8935	0.0377							0.9990		0.9900

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
PESTICIDES BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424154

SDG No.:

Instrument ID: SGC_P2 GC Column: CLP2 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 07/30/2018 17:26 Calibration End Date: 07/30/2018 18:53 Calibration ID: 33254

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD1 280-424154/21	07300021.D
Level 2	STD2 280-424154/20	07300020.D
Level 3	STD3 280-424154/19	07300019.D
Level 4	STD4 280-424154/18	07300018.D
Level 5	STD5 280-424154/17	07300017.D
Level 6	STD6 280-424154/16	07300016.D

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5
Toxaphene Peak 1	BNB	Lin2	1375825 47784080	3035313	5743718	11270358	26813306	200 10000	500	1000	2000	5000
Toxaphene Peak 2	BNB	Lin2	10271058 393815324	22189929	44613150	88407499	215067893	200 10000	500	1000	2000	5000
Toxaphene Peak 3	BNB	Lin2	3900101 159813746	8596734	17231809	35132623	86651874	200 10000	500	1000	2000	5000
Toxaphene Peak 4	BNB	Lin2	11775470 480087086	26223130	53396951	106147273	257103549	200 10000	500	1000	2000	5000
Toxaphene Peak 5	BNB	Lin2	10584217 435423839	23452004	47094384	93068800	230175833	200 10000	500	1000	2000	5000

Curve Type Legend:
Lin2 = Linear 1/conc^2 ISTD

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300016.D
Lims ID: STD6 TOX
Client ID:
Sample Type: IC Calib Level: 6
Inject. Date: 30-Jul-2018 17:26:13 ALS Bottle#: 11 Worklist Smp#: 16
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD6 TOX
Misc. Info.: 280-0072505-016
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub3

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:30:54 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:17:49

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.945	2.944	0.001	749791809	150.0	150.0	
2	2.730	2.729	0.001	178278784	150.0	150.0	
28 Toxaphene							M
1	6.235	6.235	0.000	529017957	10000	9510.3	M
1	6.763	6.762	0.001	977103901	10000	9761.1	M
1	7.008	7.008	0.000	644651041	10000	9707.8	M
1	7.725	7.730	-0.005	1190204978	10000	10812	M
1	8.045	8.045	0.000	637120193	10000	10929	M
		Average of Peak Amounts =				10144	
2	5.648	5.648	0.000	47784080	10000	9085.5	M
2	7.018	7.018	0.000	393815324	10000	9427.9	M
2	7.203	7.202	0.001	159813746	10000	9578.7	M
2	7.402	7.401	0.001	480087086	10000	9518.5	M
2	7.933	7.933	0.000	435423839	10000	9697.8	M
		Average of Peak Amounts =				9461.7	
						RPD = 6.96	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

8081ToxL6_00023 Amount Added: 1.00 Units: mL
8081_IS_00008 Amount Added: 75.00 Units: uL Run Reagent

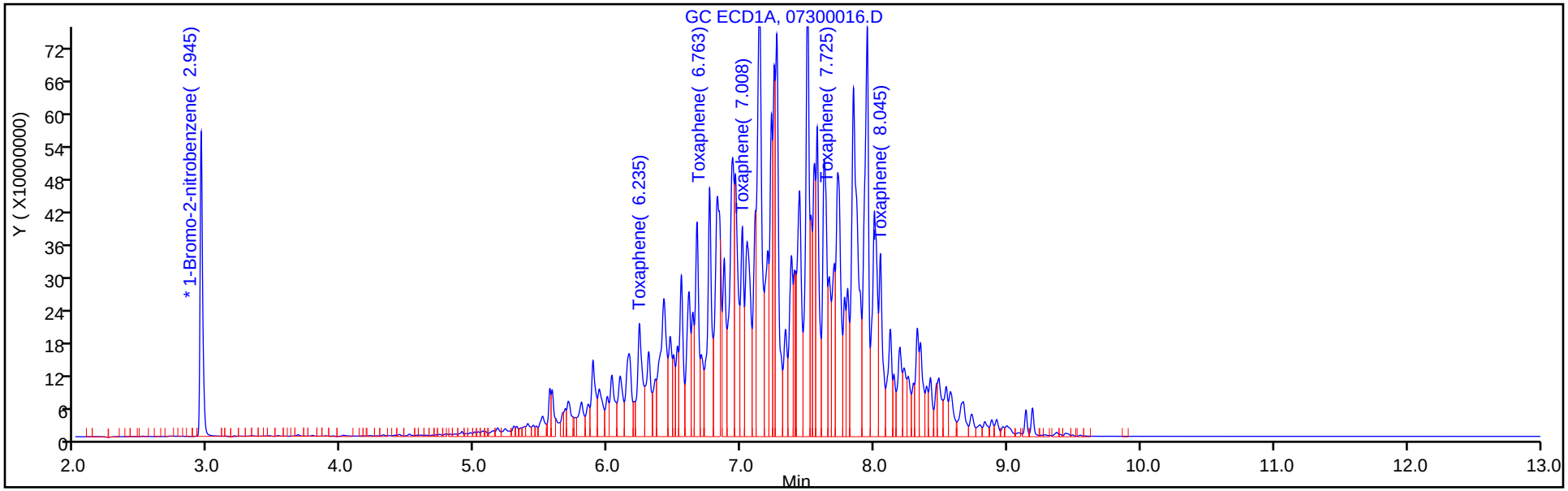
Report Date: 01-Aug-2018 15:30:57 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

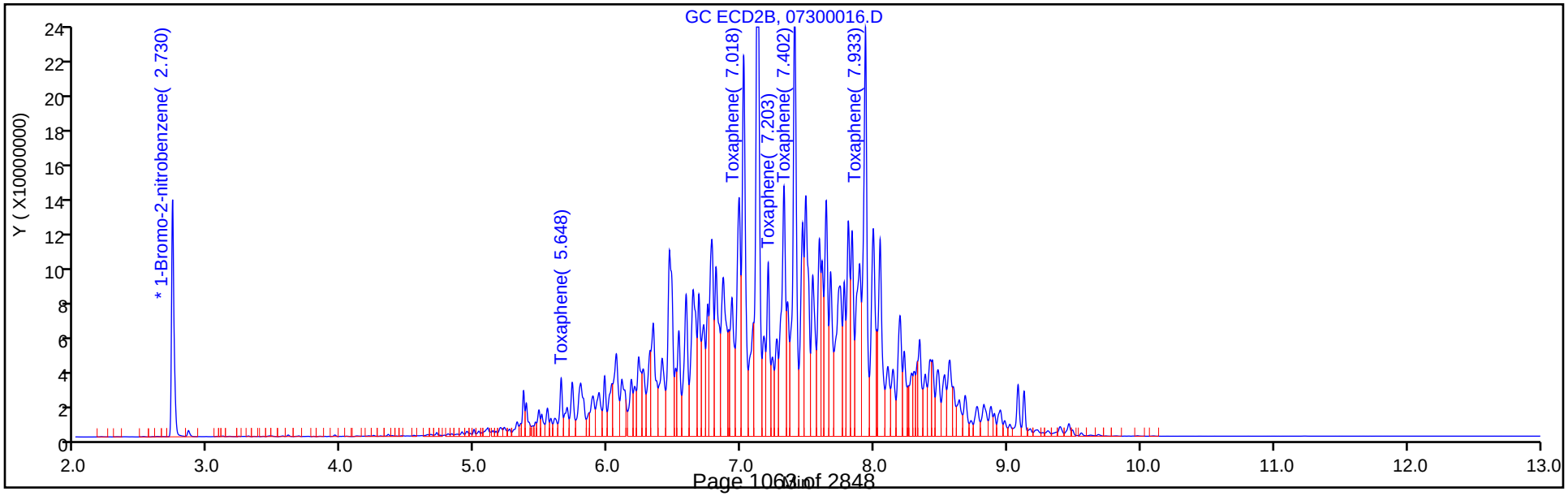
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300016.D

Injection Date:	30-Jul-2018 17:26:13	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD6 TOX			Worklist Smp#:	16
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	11
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Report Date: 01-Aug-2018 15:30:57 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300016.D

Injection Date: 30-Jul-2018 17:26:13 Instrument ID: SGC_P2

Lims ID: STD6 TOX

Client ID:

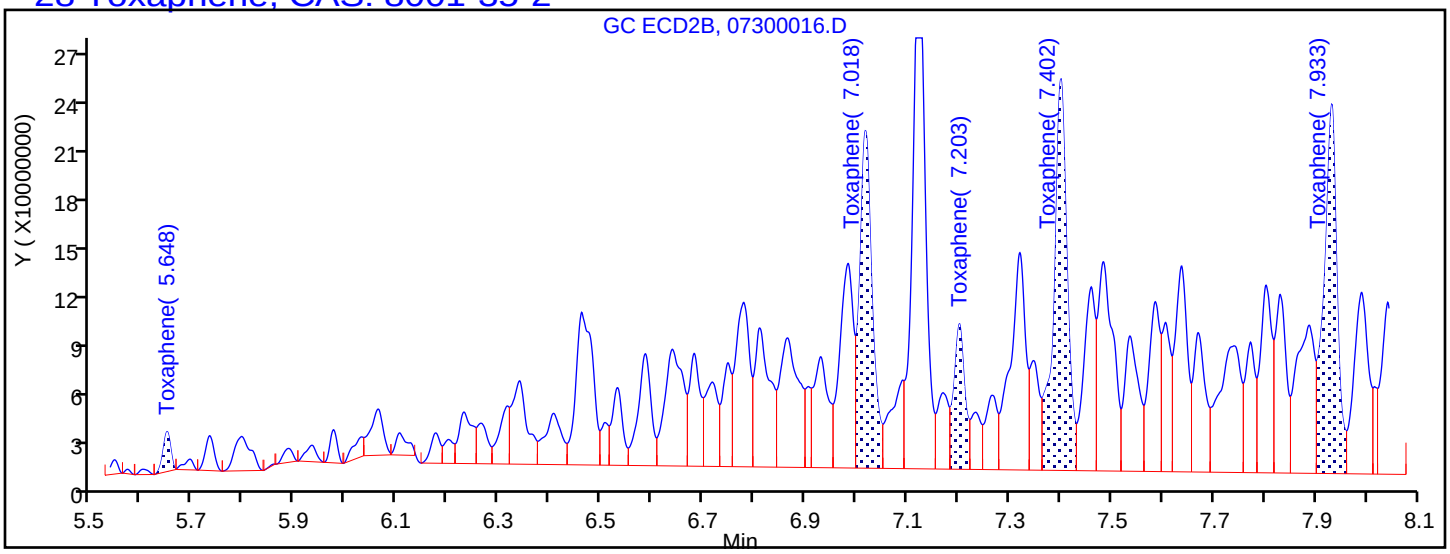
Operator ID: TEM ALS Bottle#: 11 Worklist Smp#: 16

Injection Vol: 1.0 ul Dil. Factor: 1.0000

Method: P2 8081 IS Limit Group: GCSV - 8081A - IS

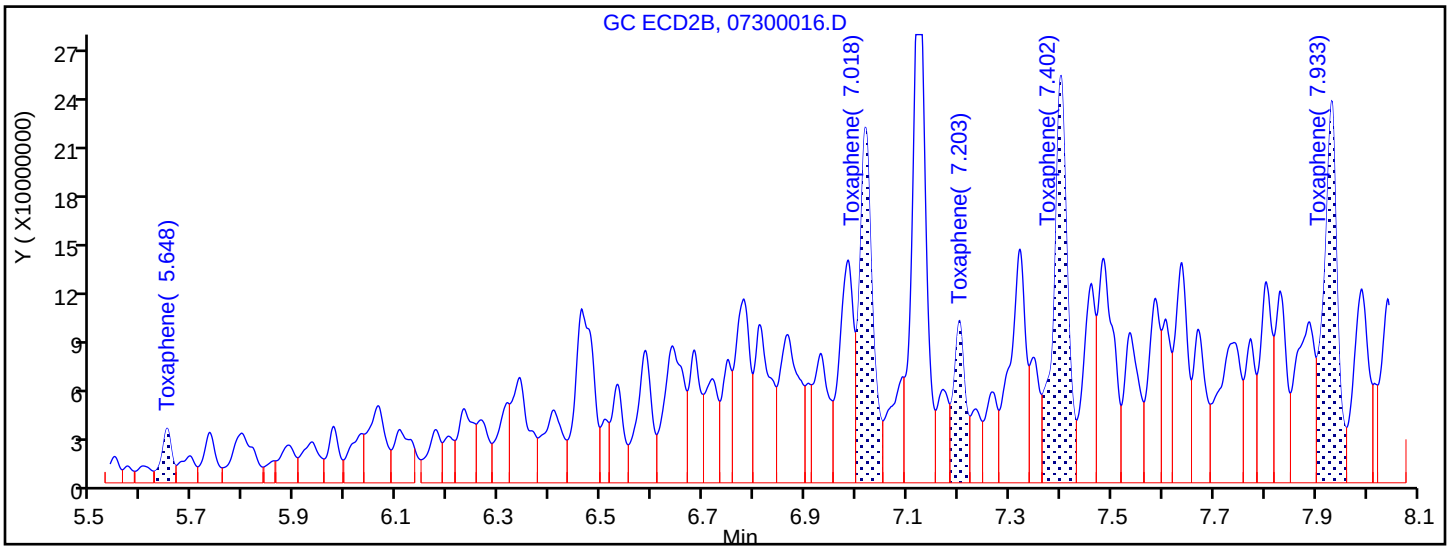
Column: CLP2 (0.32 mm) Detector GC ECD2B

28 Toxaphene, CAS: 8001-35-2



Processing Integration Results

5.648	Response = 25542092
7.018	Response = 358578461
7.203	Response = 135466067
7.402	Response = 441015039
7.933	Response = 408111992



Manual Integration Results

5.648	Response = 47784080	M
7.018	Response = 393815324	M
7.203	Response = 159813746	M
7.402	Response = 480087086	M
7.933	Response = 435423839	M

Reviewer: mooret, 01-Aug-2018 15:09:00

Audit Action: Assigned New Baseline Audit Reason: Baseline Smoothing

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300017.D
Lims ID: STD5 TOX
Client ID:
Sample Type: IC Calib Level: 5
Inject. Date: 30-Jul-2018 17:43:40 ALS Bottle#: 12 Worklist Smp#: 17
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD5 TOX
Misc. Info.: 280-0072505-017
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub3

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:30:59 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:17:29

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.945	2.944	0.001	797116455	150.0	150.0	
2	2.730	2.729	0.001	186551778	150.0	150.0	
28 Toxaphene							M
1	6.235	6.235	0.000	280542308	5000.0	4712.2	
1	6.762	6.762	0.000	534670236	5000.0	5009.2	
1	7.008	7.008	0.000	368096152	5000.0	5207.9	
1	7.727	7.730	-0.003	576872068	5000.0	4935.5	
1	8.045	8.045	0.000	309937195	5000.0	5009.8	
		Average of Peak Amounts =				4974.9	
2	5.648	5.648	0.000	26813306	5000.0	4847.1	M
2	7.019	7.018	0.001	215067893	5000.0	4904.1	M
2	7.203	7.202	0.001	86651874	5000.0	4953.2	M
2	7.402	7.401	0.001	257103549	5000.0	4860.7	M
2	7.933	7.933	0.000	230175833	5000.0	4887.4	M
		Average of Peak Amounts =				4890.5	
						RPD = 1.71	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

8081ToxL5_00021	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

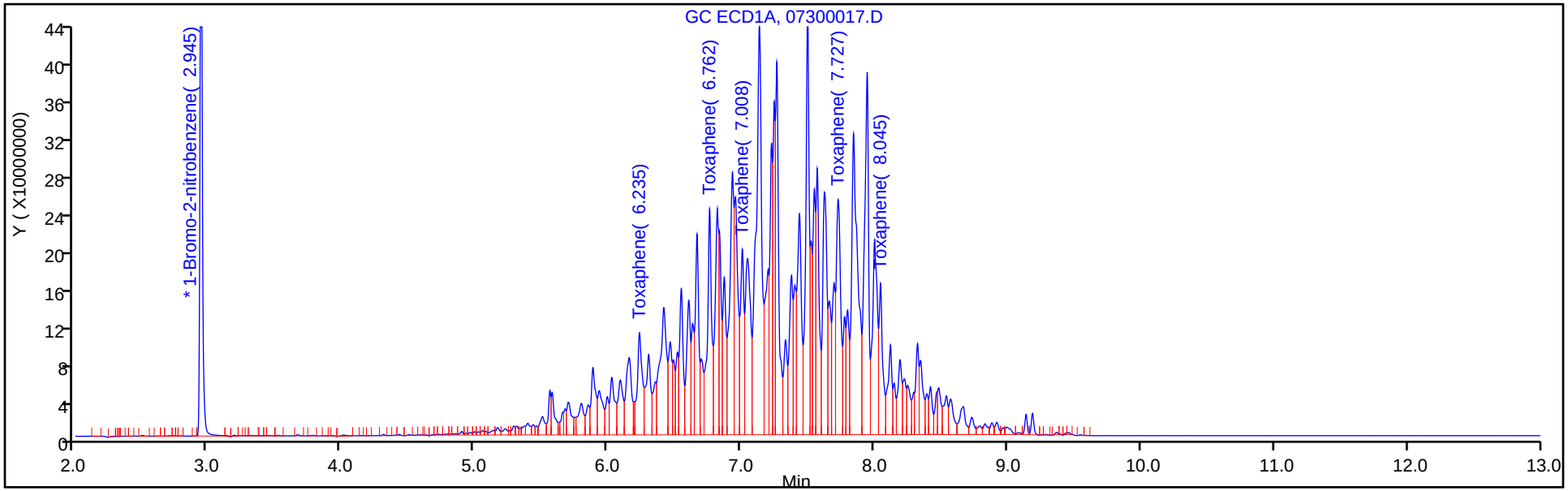
Report Date: 01-Aug-2018 15:31:01 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

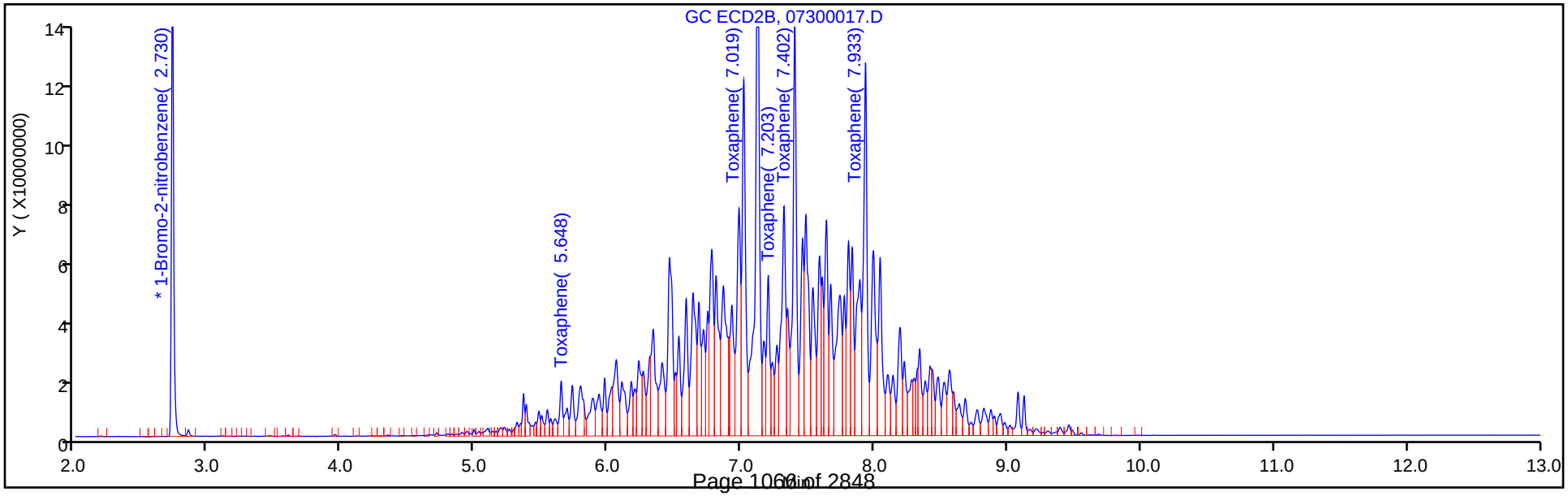
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300017.D

Injection Date:	30-Jul-2018 17:43:40	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD5 TOX			Worklist Smp#:	17
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	12
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Report Date: 01-Aug-2018 15:31:01 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300017.D

Injection Date: 30-Jul-2018 17:43:40 Instrument ID: SGC_P2

Lims ID: STD5 TOX

Client ID:

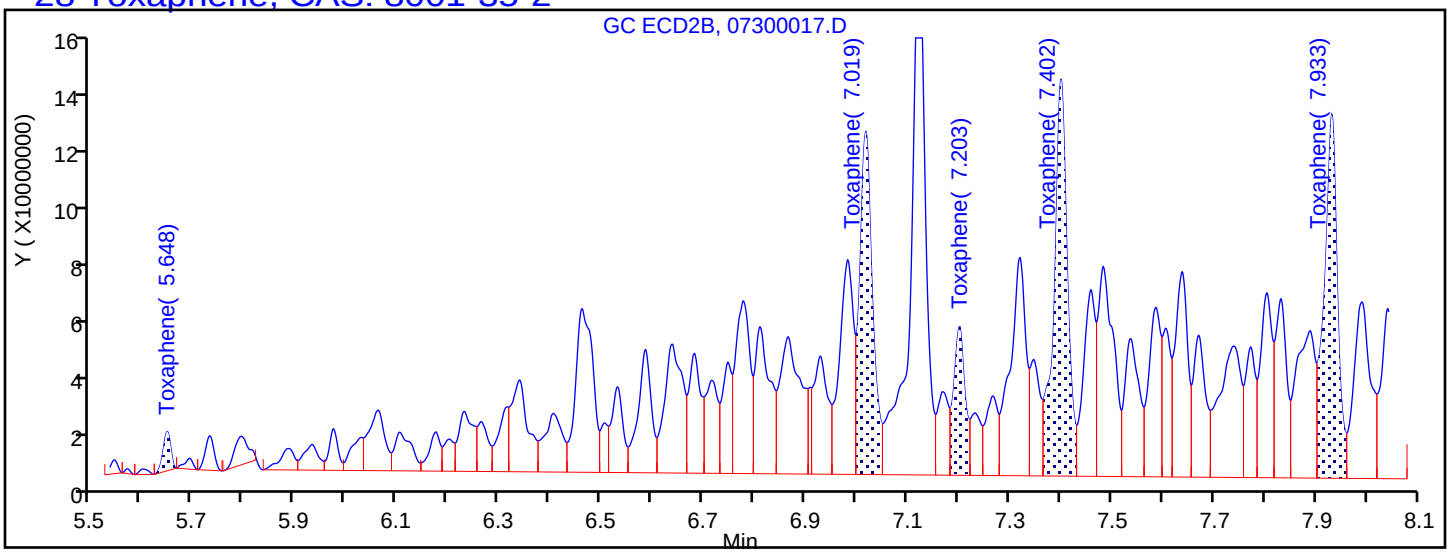
Operator ID: TEM ALS Bottle#: 12 Worklist Smp#: 17

Injection Vol: 1.0 ul Dil. Factor: 1.0000

Method: P2 8081 IS Limit Group: GCSV - 8081A - IS

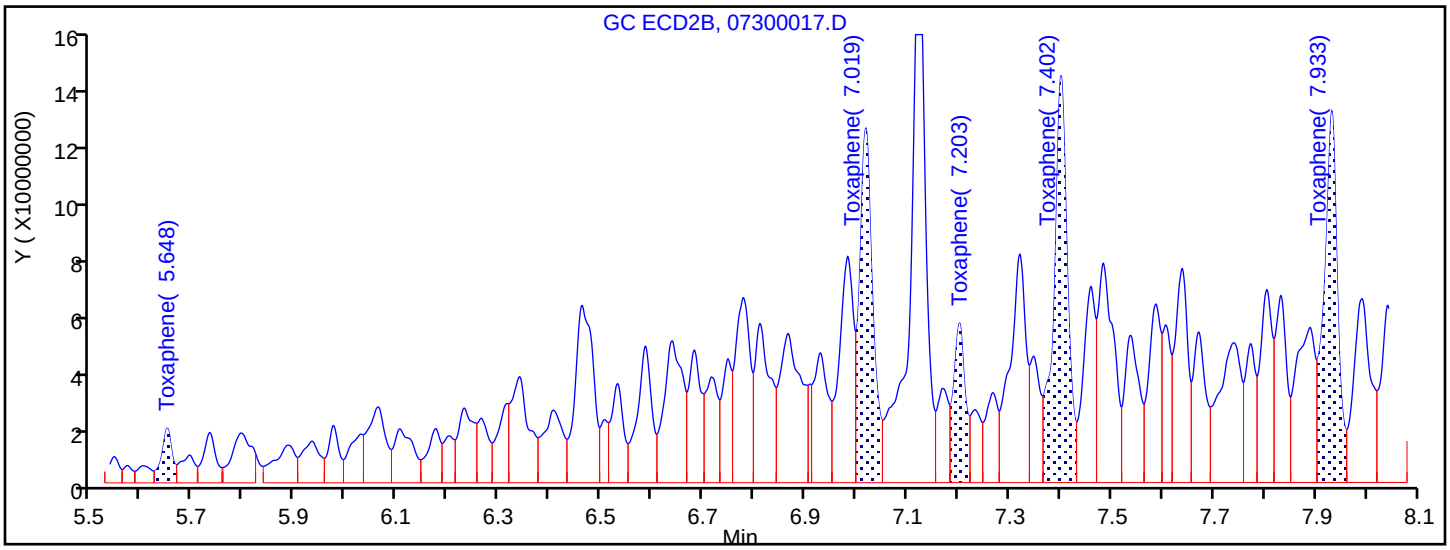
Column: CLP2 (0.32 mm) Detector GC ECD2B

28 Toxaphene, CAS: 8001-35-2



Processing Integration Results

5.648	Response = 13788724
7.019	Response = 203007107
7.203	Response = 78246048
7.402	Response = 244067139
7.933	Response = 221263078



Manual Integration Results

5.648	Response = 26813306	M
7.019	Response = 215067893	M
7.203	Response = 86651874	M
7.402	Response = 257103549	M
7.933	Response = 230175833	M

Reviewer: mooret, 01-Aug-2018 15:26:03

Audit Action: Assigned New Baseline Audit Reason: Baseline Smoothing

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300018.D
Lims ID: STD4 TOX
Client ID:
Sample Type: IC Calib Level: 4
Inject. Date: 30-Jul-2018 18:01:01 ALS Bottle#: 13 Worklist Smp#: 18
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD4 TOX
Misc. Info.: 280-0072505-018
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub3

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:31:04 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:17:15

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.944	0.000	769676225	150.0	150.0	
2	2.729	2.729	0.000	181680575	150.0	150.0	
28 Toxaphene							M
1	6.235	6.235	0.000	116870443	2000.0	1997.0	M
1	6.762	6.762	0.000	208541425	2000.0	2005.0	M
1	7.008	7.008	0.000	138649316	2000.0	2023.5	M
1	7.730	7.730	0.000	219623026	2000.0	1953.1	M
1	8.045	8.045	0.000	112947698	2000.0	1900.8	M
		Average of Peak Amounts =				1975.9	
2	5.648	5.648	0.000	11270358	2000.0	2061.3	
2	7.018	7.018	0.000	88407499	2000.0	2050.3	
2	7.202	7.202	0.000	35132623	2000.0	2049.9	
2	7.401	7.401	0.000	106147273	2000.0	2047.8	
2	7.933	7.933	0.000	93068800	2000.0	2015.3	
		Average of Peak Amounts =				2044.9	
						RPD = 3.43	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

8081TOXCCVL4_00014 Amount Added: 1.00 Units: mL
8081_IS_00008 Amount Added: 75.00 Units: uL Run Reagent

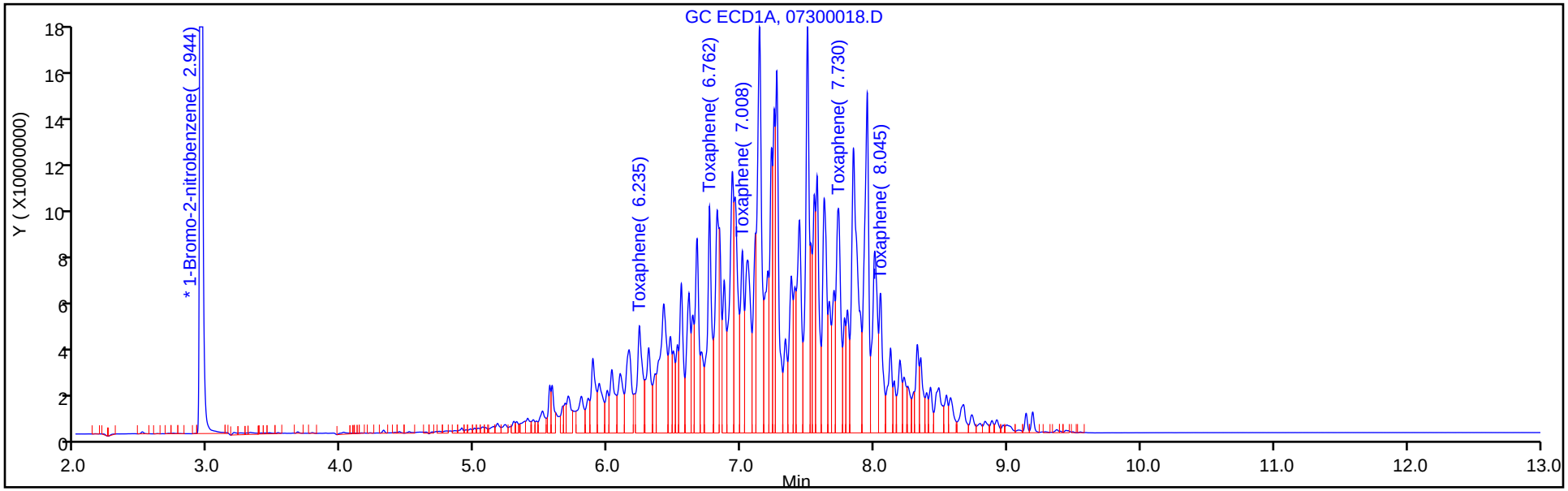
Report Date: 01-Aug-2018 15:31:06 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

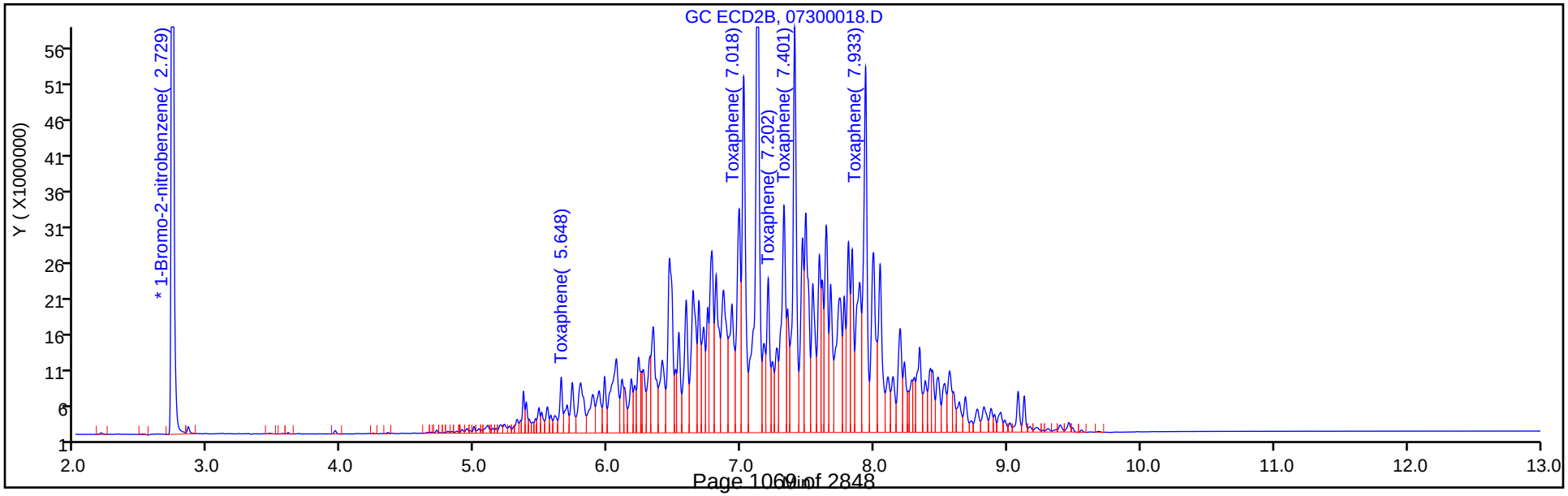
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300018.D

Injection Date:	30-Jul-2018 18:01:01	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD4 TOX			Worklist Smp#:	18
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	13
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300019.D
Lims ID: STD3 TOX
Client ID:
Sample Type: IC Calib Level: 3
Inject. Date: 30-Jul-2018 18:18:21 ALS Bottle#: 14 Worklist Smp#: 19
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD3 TOX
Misc. Info.: 280-0072505-019
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub3

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:31:07 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:18:13

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.944	0.000	741862380	150.0	150.0	
2	2.729	2.729	0.000	175909266	150.0	150.0	
28 Toxaphene							M
1	6.235	6.235	0.000	64614419	1000.0	1118.5	M
1	6.762	6.762	0.000	104476106	1000.0	1027.3	M
1	7.008	7.008	0.000	66340887	1000.0	997.9	M
1	7.726	7.730	-0.004	106726872	1000.0	990.6	M
1	8.044	8.045	-0.001	57045209	1000.0	1003.6	M
		Average of Peak Amounts =				1027.6	
2	5.648	5.648	0.000	5743718	1000.0	1059.3	M
2	7.019	7.018	0.001	44613150	1000.0	1052.3	M
2	7.202	7.202	0.000	17231809	1000.0	1028.1	M
2	7.401	7.401	0.000	53396951	1000.0	1053.3	M
2	7.933	7.933	0.000	47094384	1000.0	1041.9	M
		Average of Peak Amounts =				1047.0	
					RPD =	1.87	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

8081ToxL3_00020 Amount Added: 1.00 Units: mL
8081_IS_00008 Amount Added: 75.00 Units: uL Run Reagent

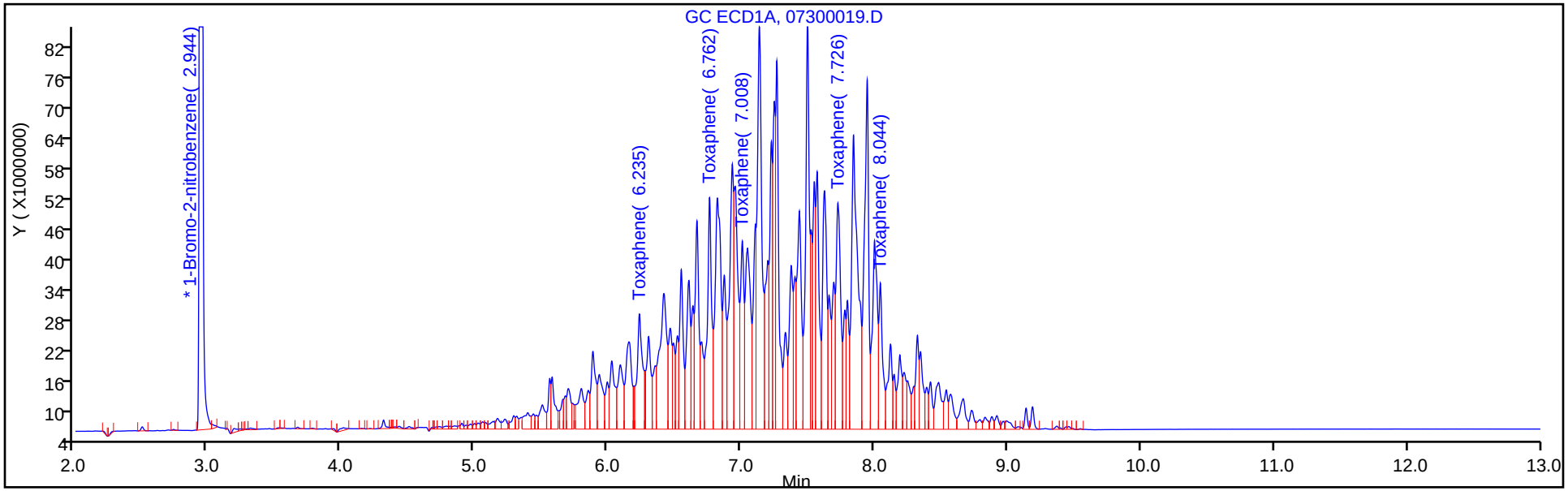
Report Date: 01-Aug-2018 15:31:09 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

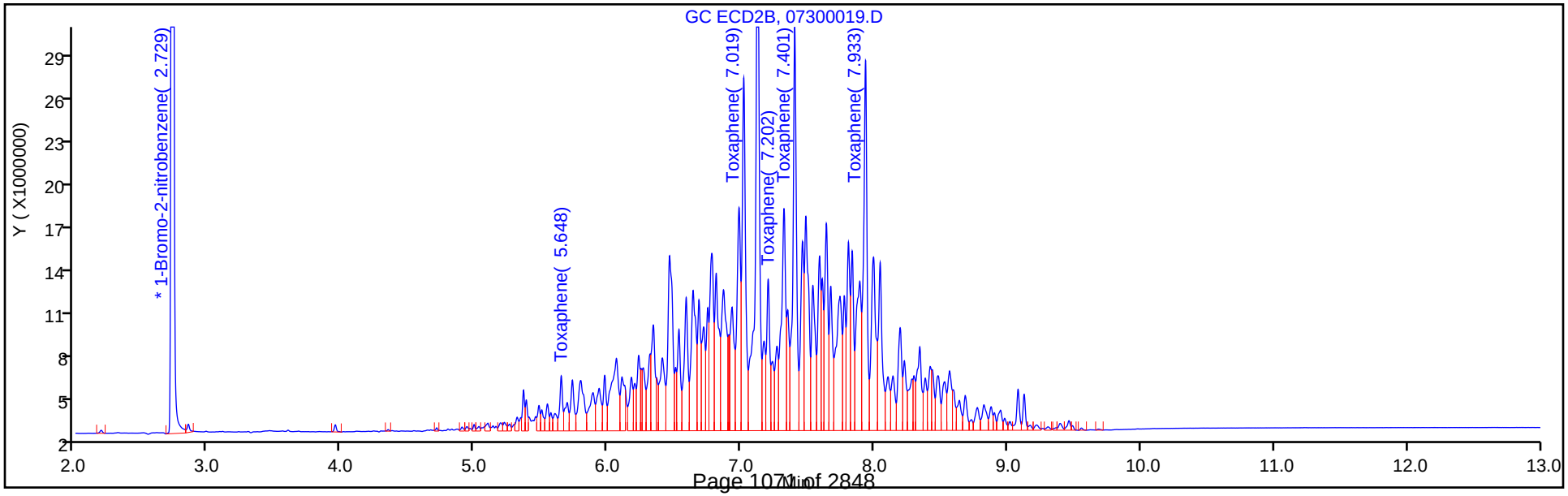
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300019.D

Injection Date:	30-Jul-2018 18:18:21	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD3 TOX			Worklist Smp#:	19
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	14
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Report Date: 01-Aug-2018 15:31:09 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300019.D

Injection Date: 30-Jul-2018 18:18:21 Instrument ID: SGC_P2

Lims ID: STD3 TOX

Client ID:

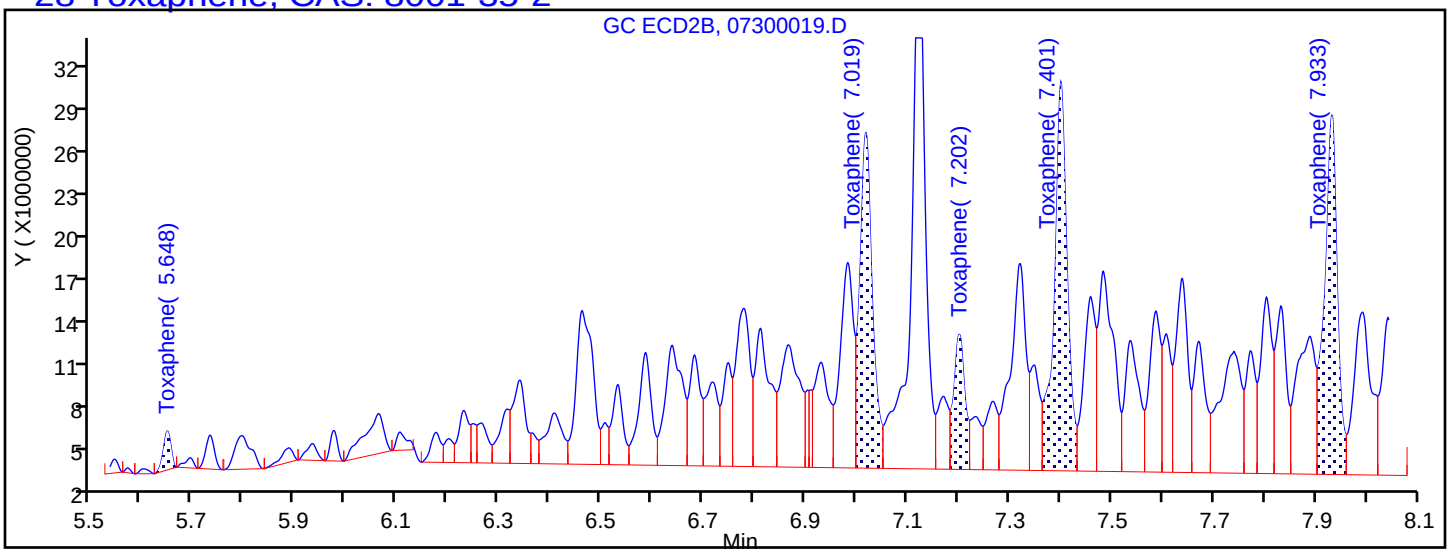
Operator ID: TEM ALS Bottle#: 14 Worklist Smp#: 19

Injection Vol: 1.0 ul Dil. Factor: 1.0000

Method: P2 8081 IS Limit Group: GCSV - 8081A - IS

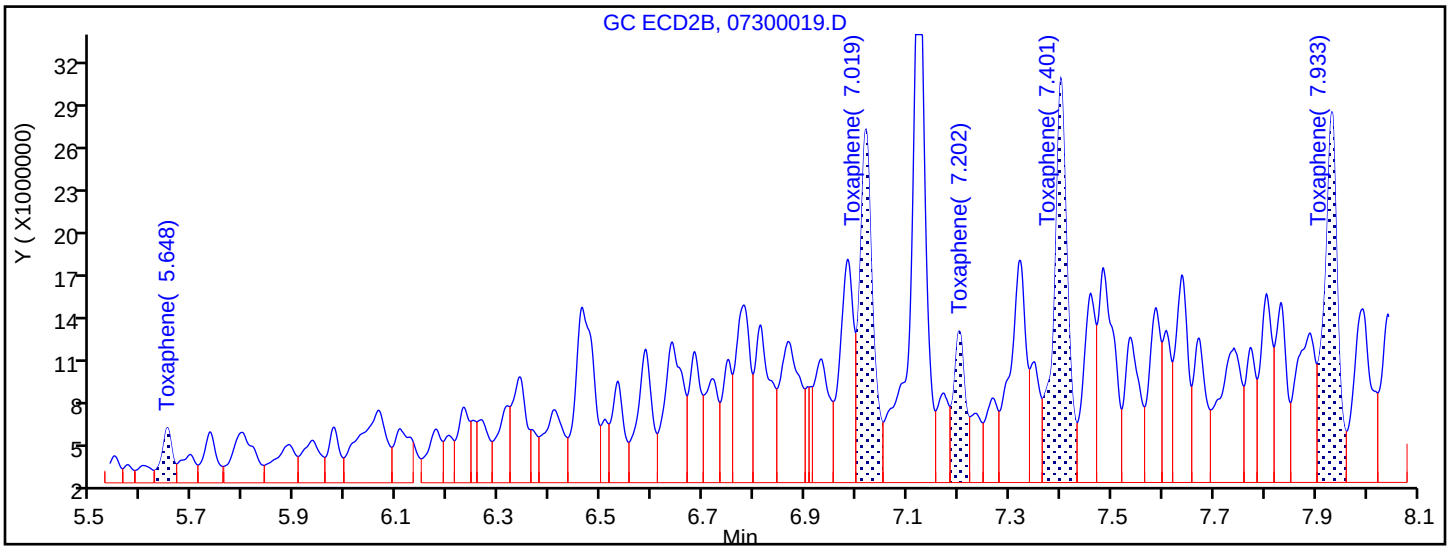
Column: CLP2 (0.32 mm) Detector GC ECD2B

28 Toxaphene, CAS: 8001-35-2



Processing Integration Results

5.648	Response = 2874679
7.019	Response = 40634596
7.202	Response = 14575975
7.401	Response = 49063362
7.933	Response = 44366861



Manual Integration Results

5.648	Response = 5743718	M
7.019	Response = 44613150	M
7.202	Response = 17231809	M
7.401	Response = 53396951	M
7.933	Response = 47094384	M

Reviewer: mooret, 01-Aug-2018 15:26:41

Audit Action: Assigned New Baseline Audit Reason: Baseline Smoothing

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300020.D
Lims ID: STD2 TOX
Client ID:
Sample Type: IC Calib Level: 2
Inject. Date: 30-Jul-2018 18:35:41 ALS Bottle#: 15 Worklist Smp#: 20
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD2 TOX
Misc. Info.: 280-0072505-020
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub3

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:31:10 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:18:27

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.942	2.944	-0.002	749985126	150.0	150.0	
2	2.728	2.729	-0.001	175228166	150.0	150.0	
28 Toxaphene							M
1	6.236	6.235	0.001	31588999	500.0	508.2	
1	6.762	6.762	0.000	52789400	500.0	498.0	
1	7.007	7.008	-0.001	32924706	500.0	483.2	
1	7.727	7.730	-0.003	50278636	500.0	467.9	
1	8.043	8.045	-0.002	25767208	500.0	457.3	
		Average of Peak Amounts =				482.9	
2	5.648	5.648	0.000	3035313	500.0	536.6	M
2	7.019	7.018	0.001	22189929	500.0	508.4	M
2	7.202	7.202	0.000	8596734	500.0	504.5	M
2	7.402	7.401	0.001	26223130	500.0	508.1	M
2	7.932	7.933	-0.001	23452004	500.0	509.0	M
		Average of Peak Amounts =				513.3	
						RPD = 6.10	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

8081ToxL2_00021 Amount Added: 1.00 Units: mL
8081_IS_00008 Amount Added: 75.00 Units: uL Run Reagent

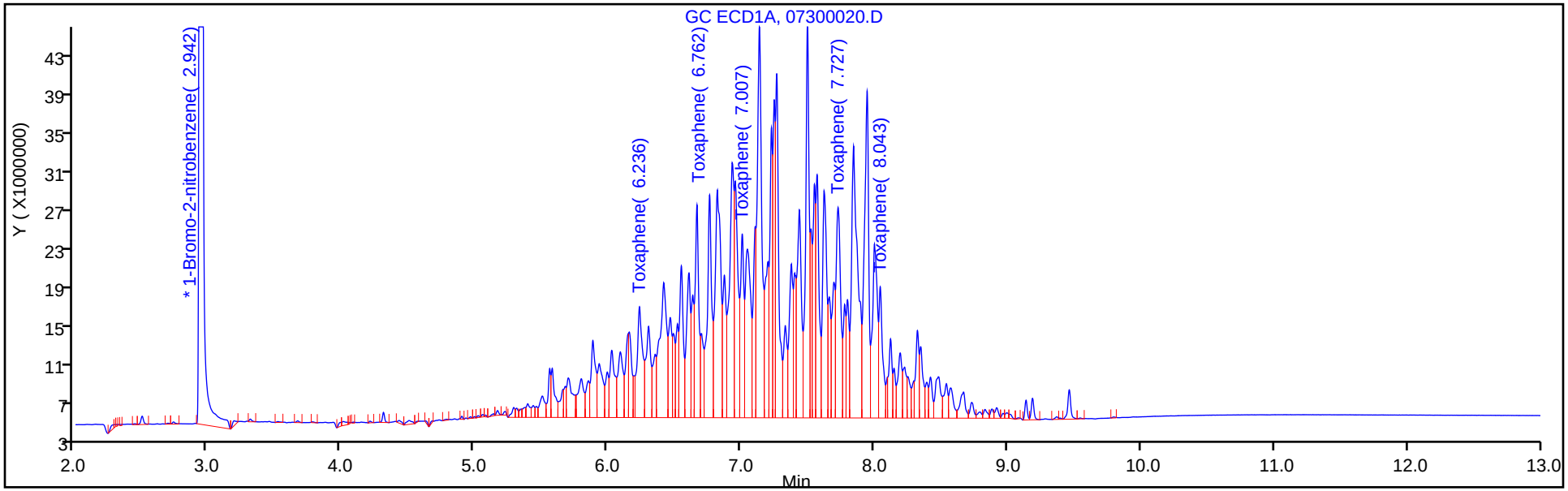
Report Date: 01-Aug-2018 15:31:13 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

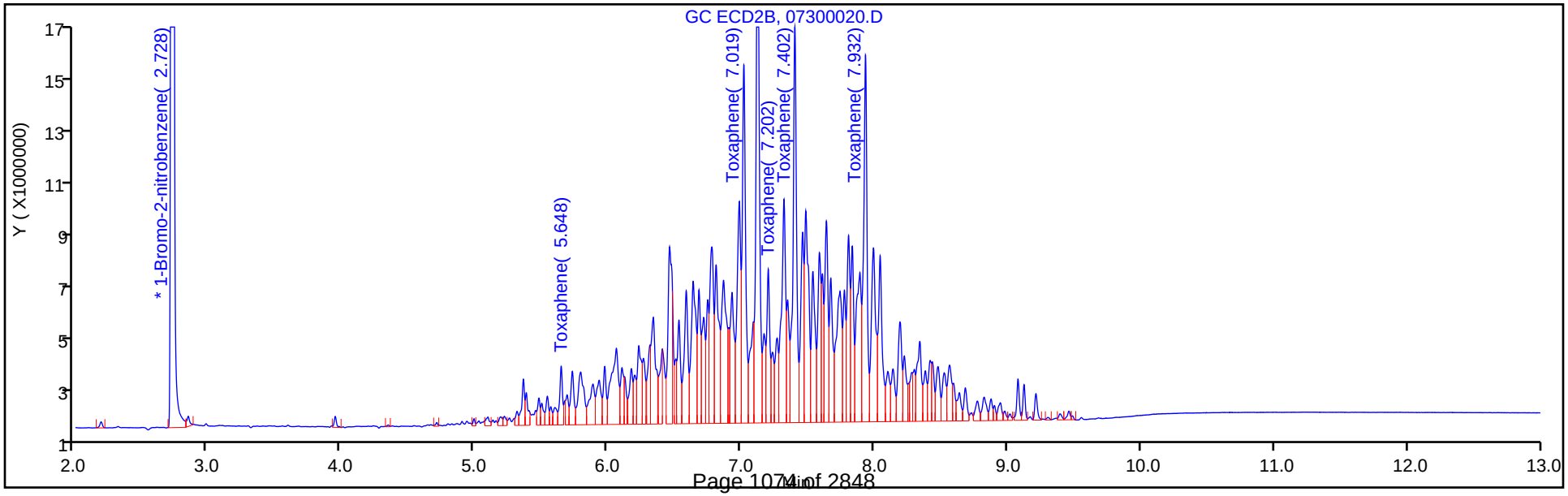
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300020.D

Injection Date:	30-Jul-2018 18:35:41	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD2 TOX			Worklist Smp#:	20
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	15
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Report Date: 01-Aug-2018 15:31:13 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300020.D

Injection Date: 30-Jul-2018 18:35:41 Instrument ID: SGC_P2

Lims ID: STD2 TOX

Client ID:

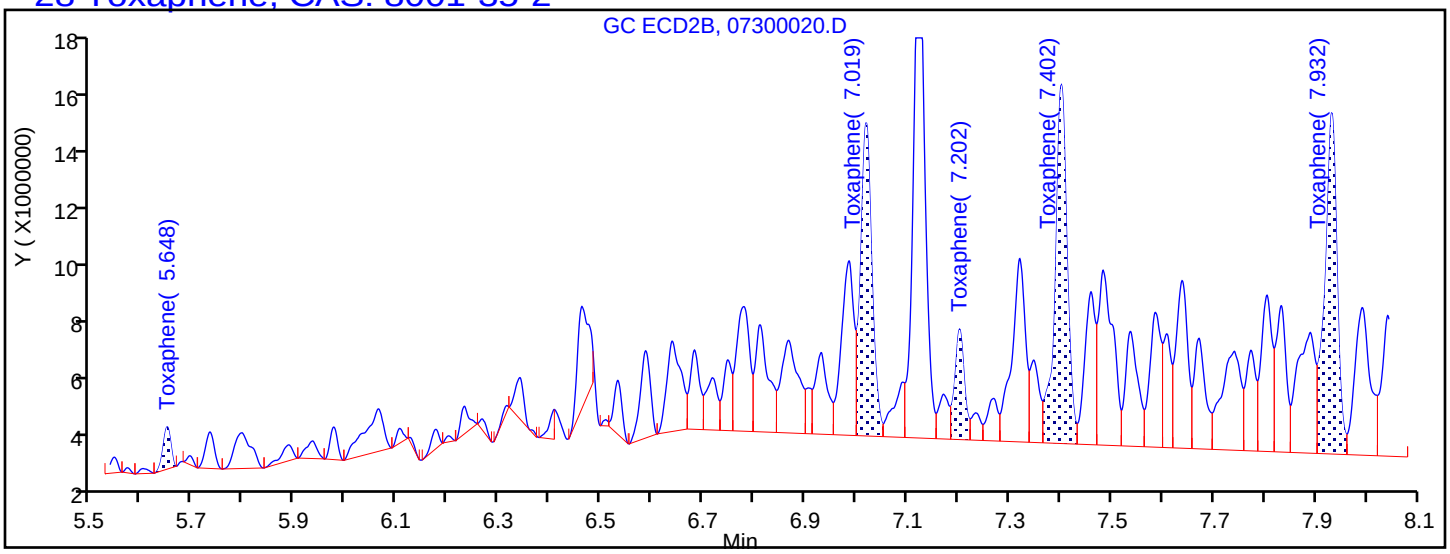
Operator ID: TEM ALS Bottle#: 15 Worklist Smp#: 20

Injection Vol: 1.0 ul Dil. Factor: 1.0000

Method: P2 8081 IS Limit Group: GCSV - 8081A - IS

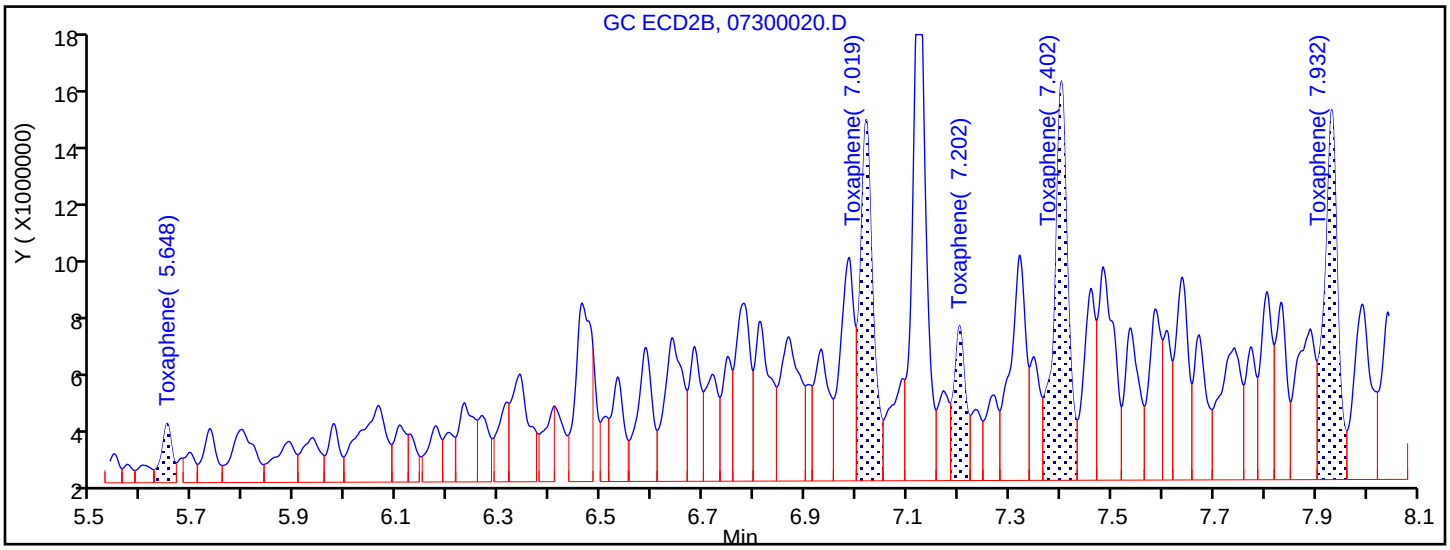
Column: CLP2 (0.32 mm) Detector GC ECD2B

28 Toxaphene, CAS: 8001-35-2



Processing Integration Results

5.648	Response = 1550877
7.019	Response = 16916696
7.202	Response = 5047089
7.402	Response = 20554153
7.932	Response = 19925435



Manual Integration Results

5.648	Response = 3035313	M
7.019	Response = 22189929	M
7.202	Response = 8596734	M
7.402	Response = 26223130	M
7.932	Response = 23452004	M

Reviewer: mooret, 01-Aug-2018 15:27:00

Audit Action: Assigned New Baseline Audit Reason: Baseline Smoothing

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300021.D
Lims ID: STD1 TOX
Client ID:
Sample Type: IC Calib Level: 1
Inject. Date: 30-Jul-2018 18:53:07 ALS Bottle#: 16 Worklist Smp#: 21
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD1 TOX
Misc. Info.: 280-0072505-021
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub3

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:31:14 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:18:44

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.943	2.944	-0.001	827281495	150.0	150.0	
2	2.729	2.729	0.000	190854614	150.0	150.0	
28 Toxaphene							M
1	6.237	6.235	0.002	15728868	200.0	194.6	M
1	6.762	6.762	0.000	25341566	200.0	199.3	M
1	7.009	7.008	0.001	15768649	200.0	202.3	M
1	7.727	7.730	-0.003	23588424	200.0	205.8	M
1	8.045	8.045	0.000	12317987	200.0	207.3	M
		Average of Peak Amounts =				201.9	
2	5.648	5.648	0.000	1375825	200.0	191.8	M
2	7.019	7.018	0.001	10271058	200.0	196.5	M
2	7.203	7.202	0.001	3900101	200.0	197.9	M
2	7.402	7.401	0.001	11775470	200.0	196.5	M
2	7.933	7.933	0.000	10584217	200.0	197.0	M
		Average of Peak Amounts =				195.9	
						RPD = 2.98	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

8081ToxL1_00020 Amount Added: 1.00 Units: mL
8081_IS_00008 Amount Added: 75.00 Units: uL Run Reagent

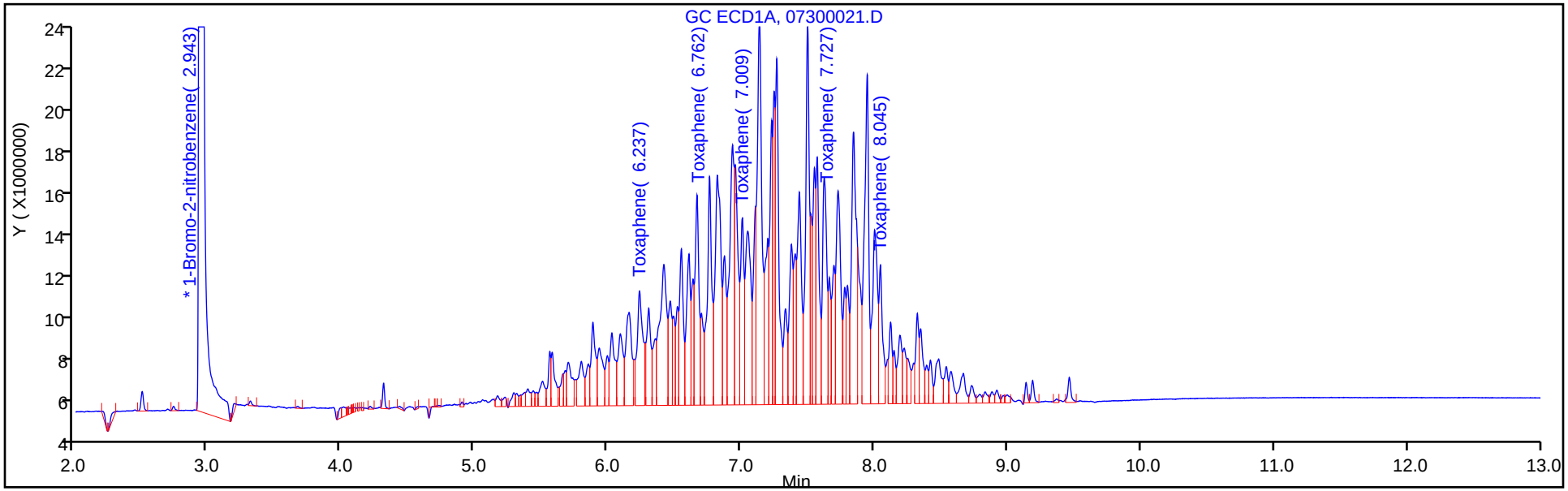
Report Date: 01-Aug-2018 15:31:18 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

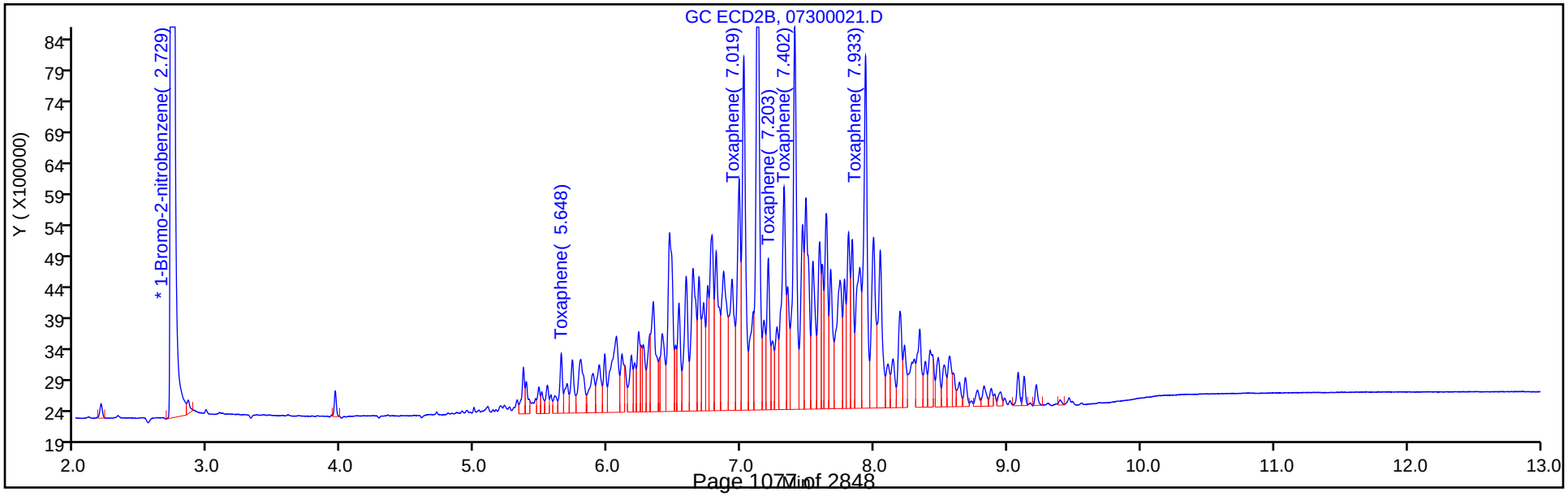
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300021.D

Injection Date:	30-Jul-2018 18:53:07	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD1 TOX			Worklist Smp#:	21
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	16
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Report Date: 01-Aug-2018 15:31:18 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300021.D

Injection Date: 30-Jul-2018 18:53:07 Instrument ID: SGC_P2

Lims ID: STD1 TOX

Client ID:

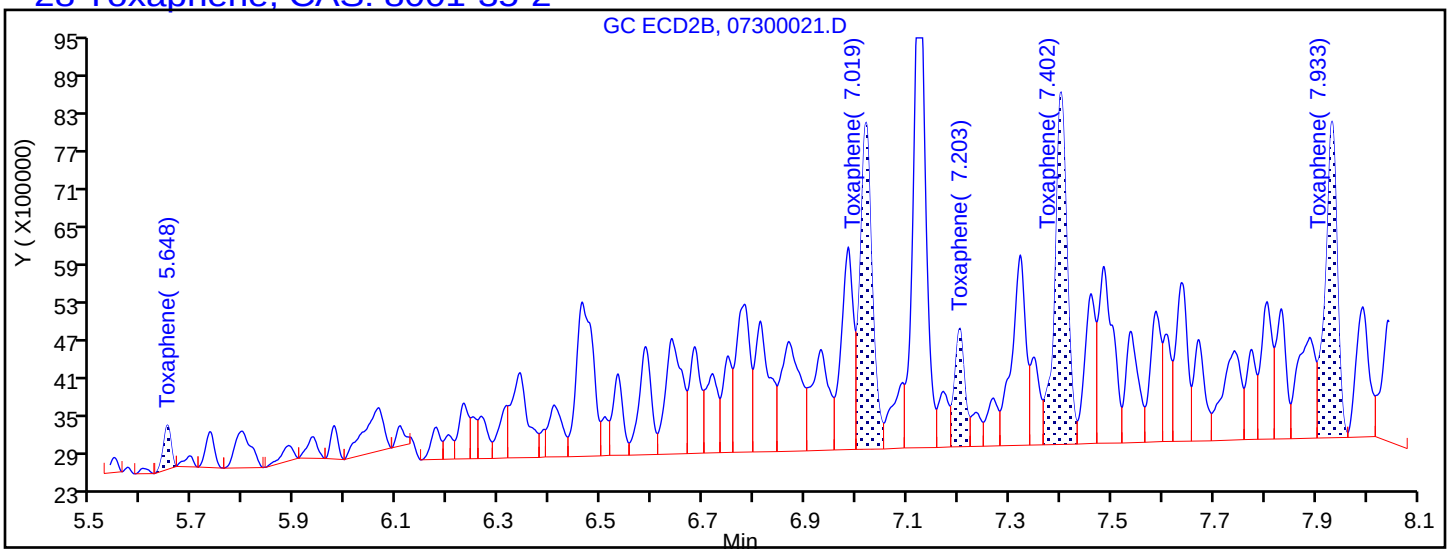
Operator ID: TEM ALS Bottle#: 16 Worklist Smp#: 21

Injection Vol: 1.0 ul Dil. Factor: 1.0000

Method: P2 8081 IS Limit Group: GCSV - 8081A - IS

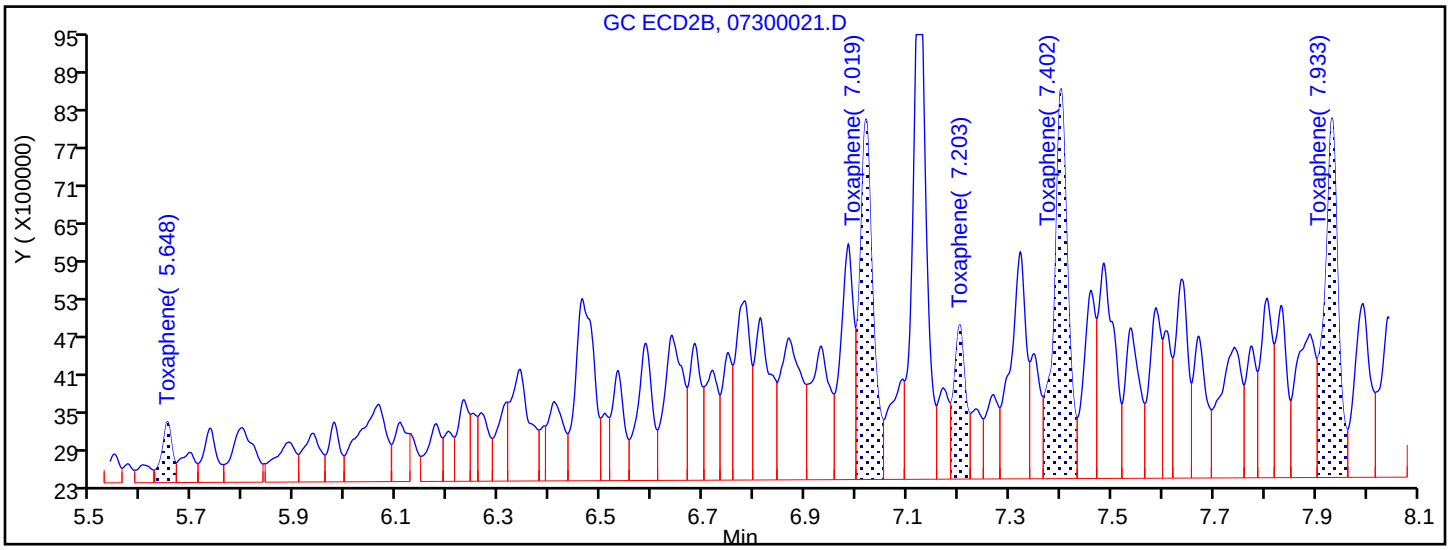
Column: CLP2 (0.32 mm) Detector GC ECD2B

28 Toxaphene, CAS: 8001-35-2



Processing Integration Results

5.648	Response = 729202
7.019	Response = 8538249
7.203	Response = 2599102
7.402	Response = 9398392
7.933	Response = 8129836



Manual Integration Results

5.648	Response = 1375825	M
7.019	Response = 10271058	M
7.203	Response = 3900101	M
7.402	Response = 11775470	M
7.933	Response = 10584217	M

Reviewer: mooret, 01-Aug-2018 15:27:19

Audit Action: Assigned New Baseline Audit Reason: Baseline Smoothing

FORM VI
PESTICIDES BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424154

SDG No.:

Instrument ID: SGC_P2 GC Column: CLP1 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 07/30/2018 19:10 Calibration End Date: 07/30/2018 20:19 Calibration ID: 33257

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD1 280-424154/26	07300026.D
Level 2	STD2 280-424154/25	07300025.D
Level 3	STD3 280-424154/24	07300024.D
Level 4	STD4 280-424154/23	07300023.D
Level 5	STD5 280-424154/22	07300022.D

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5		B	M1	M2								
Chlordane (technical) Peak 1	0.0403	0.0358	0.0348	0.0371	0.0364	Lin2	0.2223	0.0356							0.9990		0.9900
Technical Chlordane Peak 1	0.0403	0.0358	0.0348	0.0371	0.0364	Lin2	0.2223	0.0356							0.9990		0.9900
Chlordane (technical) Peak 2	0.0434	0.0364	0.0342	0.0380	0.0346	Lin2	0.4121	0.0350							0.9970		0.9900
Technical Chlordane Peak 2	0.0434	0.0364	0.0342	0.0380	0.0346	Lin2	0.4121	0.0350							0.9970		0.9900
Chlordane (technical) Peak 3	0.1549	0.1394	0.1385	0.1464	0.1456	Lin2	0.5955	0.1416							0.9990		0.9900
Technical Chlordane Peak 3	0.1549	0.1394	0.1385	0.1464	0.1456	Lin2	0.5955	0.1416							0.9990		0.9900
Chlordane (technical) Peak 4	0.2567	0.2379	0.2380	0.2514	0.2492	Lin2	0.5445	0.2435							0.9990		0.9900
Technical Chlordane Peak 4	0.2567	0.2379	0.2380	0.2514	0.2492	Lin2	0.5445	0.2435							0.9990		0.9900
Chlordane (technical) Peak 5	0.0418	0.0395	0.0386	0.0400	0.0400	Lin2	0.1186	0.0393							1.0000		0.9900
Technical Chlordane Peak 5	0.0418	0.0395	0.0386	0.0400	0.0400	Lin2	0.1186	0.0393							1.0000		0.9900

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
PESTICIDES BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424154

SDG No.:

Instrument ID: SGC_P2 GC Column: CLP1 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 07/30/2018 19:10 Calibration End Date: 07/30/2018 20:19 Calibration ID: 33257

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD1 280-424154/26	07300026.D
Level 2	STD2 280-424154/25	07300025.D
Level 3	STD3 280-424154/24	07300024.D
Level 4	STD4 280-424154/23	07300023.D
Level 5	STD5 280-424154/22	07300022.D

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1	LVL 2	LVL 3	LVL 4	LVL 5	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5
Chlordane (technical) Peak 1	BNB	Lin2	9751045	34280044	85921838	197284582	388389629	50.0	200	500	1000	2000
Technical Chlordane Peak 1	BNB	Lin2	9751045	34280044	85921838	197284582	388389629	50.0	200	500	1000	2000
Chlordane (technical) Peak 2	BNB	Lin2	10493880	34899229	84351370	202083680	369455143	50.0	200	500	1000	2000
Technical Chlordane Peak 2	BNB	Lin2	10493880	34899229	84351370	202083680	369455143	50.0	200	500	1000	2000
Chlordane (technical) Peak 3	BNB	Lin2	37451216	133606069	341820816	779397226	1555253751	50.0	200	500	1000	2000
Technical Chlordane Peak 3	BNB	Lin2	37451216	133606069	341820816	779397226	1555253751	50.0	200	500	1000	2000
Chlordane (technical) Peak 4	BNB	Lin2	62062833	228051445	587375713	1338331253	2661447796	50.0	200	500	1000	2000
Technical Chlordane Peak 4	BNB	Lin2	62062833	228051445	587375713	1338331253	2661447796	50.0	200	500	1000	2000
Chlordane (technical) Peak 5	BNB	Lin2	10117320	37868921	95143828	213182322	427328572	50.0	200	500	1000	2000
Technical Chlordane Peak 5	BNB	Lin2	10117320	37868921	95143828	213182322	427328572	50.0	200	500	1000	2000

Curve Type Legend:
Lin2 = Linear 1/conc^2 ISTD

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300022.D
Lims ID: STD5 CHL
Client ID:
Sample Type: IC Calib Level: 5
Inject. Date: 30-Jul-2018 19:10:27 ALS Bottle#: 17 Worklist Smp#: 22
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD5 CHL
Misc. Info.: 280-0072505-022
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub4

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:02 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:20:27

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.944	-0.001	800991966	150.0	150.0	
2	2.729	2.729	-0.001	185154985	150.0	150.0	
13 Technical Chlordane							
1	5.061	5.061	0.000	388389629	2000.0	2036.9	
1	5.519	5.518	0.001	369455143	2000.0	1967.3	
1	6.120	6.119	0.001	1555253751	2000.0	2053.1	
1	6.244	6.243	0.001	2661447796	2000.0	2044.3	
1	7.074	7.074	0.000	427328572	2000.0	2032.4	
		Average of Peak Amounts =				2026.8	
2	4.902	4.902	0.000	98976236	2000.0	1986.4	
2	5.413	5.413	0.000	103418115	2000.0	1968.8	
2	5.988	5.987	0.001	354879183	2000.0	1980.0	
2	6.142	6.142	0.000	274170084	2000.0	1982.4	
2	7.080	7.081	-0.001	123107808	2000.0	2005.2	
		Average of Peak Amounts =				1984.6	
						RPD = 2.11	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
14 Chlordane (technical)							
1	5.061	5.061	0.000	388389629	2000.0	2036.9	
1	5.519	5.518	0.001	369455143	2000.0	1967.3	
1	6.120	6.119	0.001	1555253751	2000.0	2053.1	
1	6.244	6.243	0.001	2661447796	2000.0	2044.3	
1	7.074	7.074	0.000	427328572	2000.0	2032.4	
		Average of Peak Amounts =				2026.8	
2	4.902	4.902	0.000	98976236	2000.0	1986.4	
2	5.413	5.413	0.000	103418115	2000.0	1968.8	
2	5.988	5.987	0.001	354879183	2000.0	1980.0	
2	6.142	6.142	0.000	274170084	2000.0	1982.4	
2	7.080	7.081	-0.001	123107808	2000.0	2005.2	
		Average of Peak Amounts =				1984.6	
						RPD = 2.11	

Reagents:

8081ChlorL5_00023	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

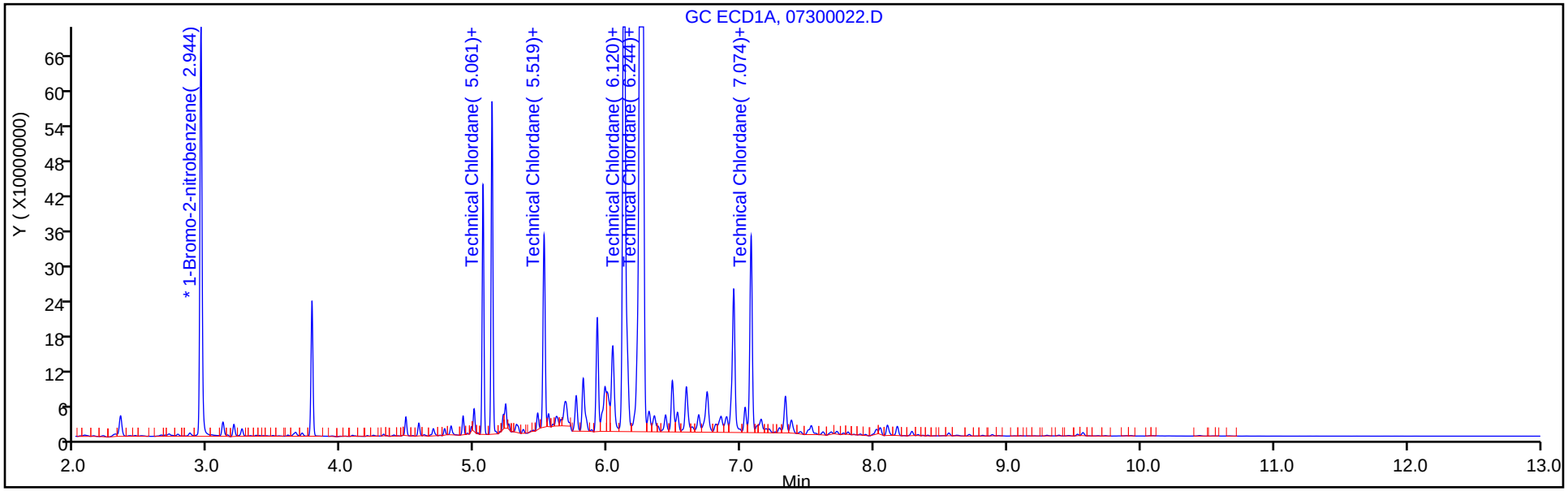
Report Date: 01-Aug-2018 12:39:04 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

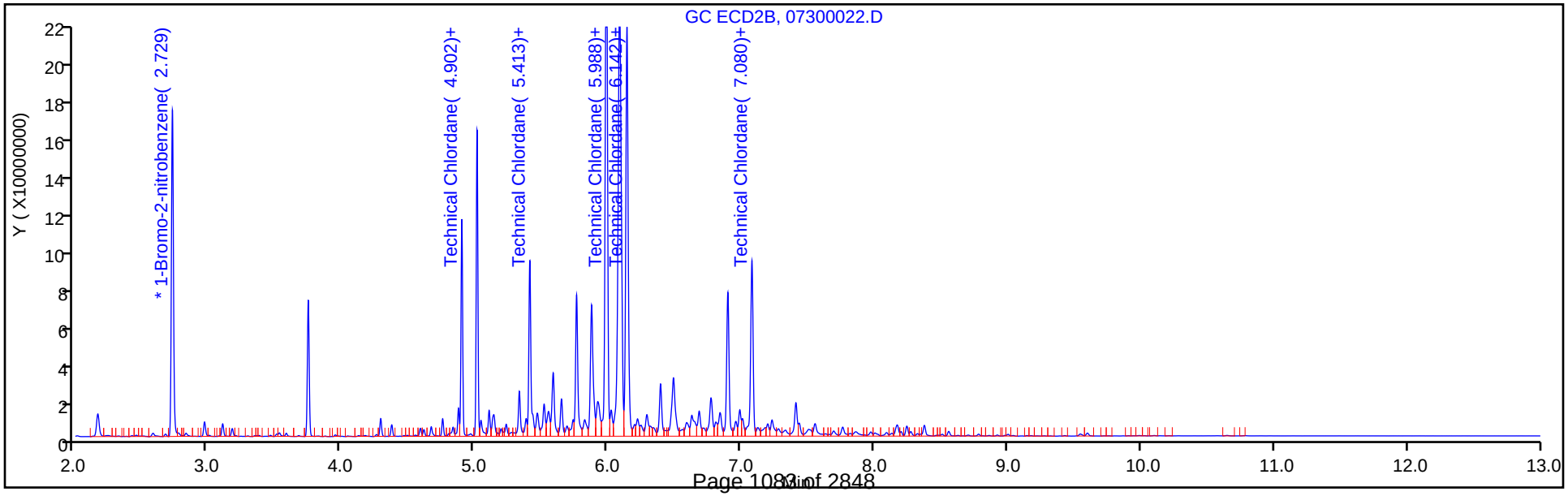
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300022.D

Injection Date:	30-Jul-2018 19:10:27	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD5 CHL			Worklist Smp#:	22
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	17
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300023.D
Lims ID: STD4 CHL
Client ID:
Sample Type: IC Calib Level: 4
Inject. Date: 30-Jul-2018 19:27:47 ALS Bottle#: 18 Worklist Smp#: 23
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD4 CHL
Misc. Info.: 280-0072505-023
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub4

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:09 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:25:34

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.943	2.943	0.000	798588111	150.0	150.0	
2	2.729	2.729	0.000	189034283	150.0	150.0	
14 Chlordane (technical)							
1	5.061	5.061	0.000	197284582	1000.0	1034.7	
1	5.518	5.518	0.000	202083680	1000.0	1074.0	
1	6.119	6.119	0.000	779397226	1000.0	1029.9	
1	6.243	6.243	0.000	1338331253	1000.0	1030.0	
1	7.074	7.074	0.000	213182322	1000.0	1015.5	
		Average of Peak Amounts =				1036.8	
2	4.902	4.902	0.000	52193315	1000.0	1023.7	
2	5.413	5.413	0.000	55531632	1000.0	1030.4	
2	5.987	5.987	0.000	188705645	1000.0	1029.8	
2	6.142	6.142	0.000	145392313	1000.0	1027.3	
2	7.081	7.081	0.000	63813160	1000.0	1016.0	
		Average of Peak Amounts =				1025.4	
						RPD = 1.10	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
13 Technical Chlordane							
1	5.061	5.061	0.000	197284582	1000.0	1034.7	
1	5.518	5.518	0.000	202083680	1000.0	1074.0	
1	6.119	6.119	0.000	779397226	1000.0	1029.9	
1	6.243	6.243	0.000	1338331253	1000.0	1030.0	
1	7.074	7.074	0.000	213182322	1000.0	1015.5	
		Average of Peak Amounts =				1036.8	
2	4.902	4.902	0.000	52193315	1000.0	1023.7	
2	5.413	5.413	0.000	55531632	1000.0	1030.4	
2	5.987	5.987	0.000	188705645	1000.0	1029.8	
2	6.142	6.142	0.000	145392313	1000.0	1027.3	
2	7.081	7.081	0.000	63813160	1000.0	1016.0	
		Average of Peak Amounts =				1025.4	
						RPD = 1.10	

Reagents:

8081ChlorL4_00022	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

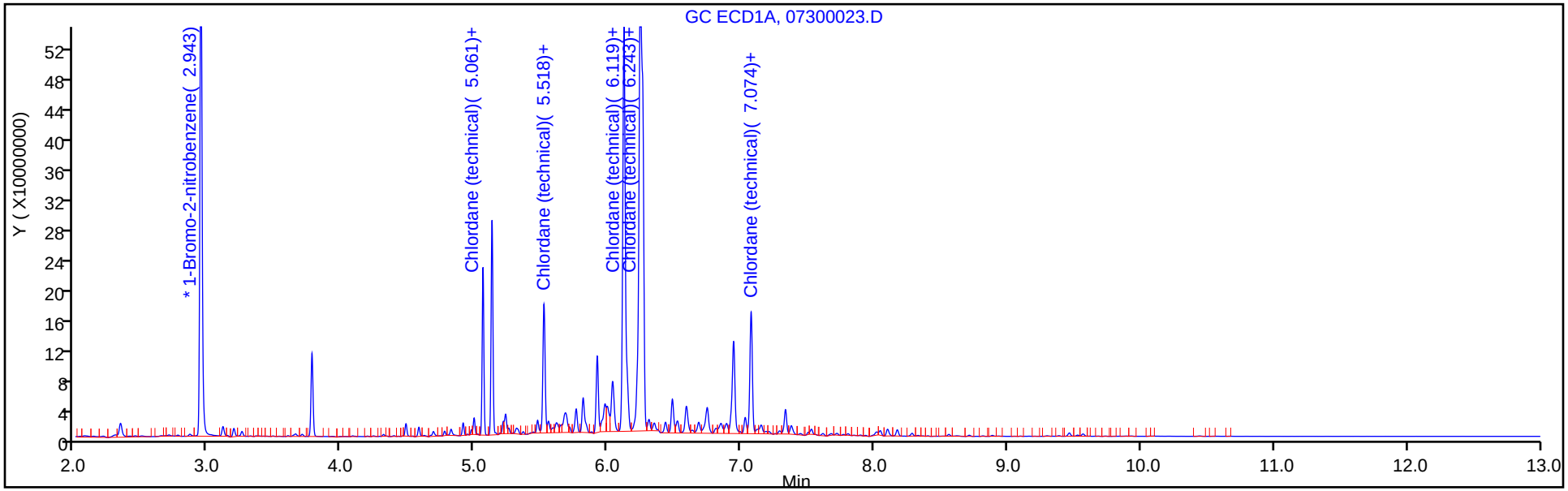
Report Date: 01-Aug-2018 12:39:11 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

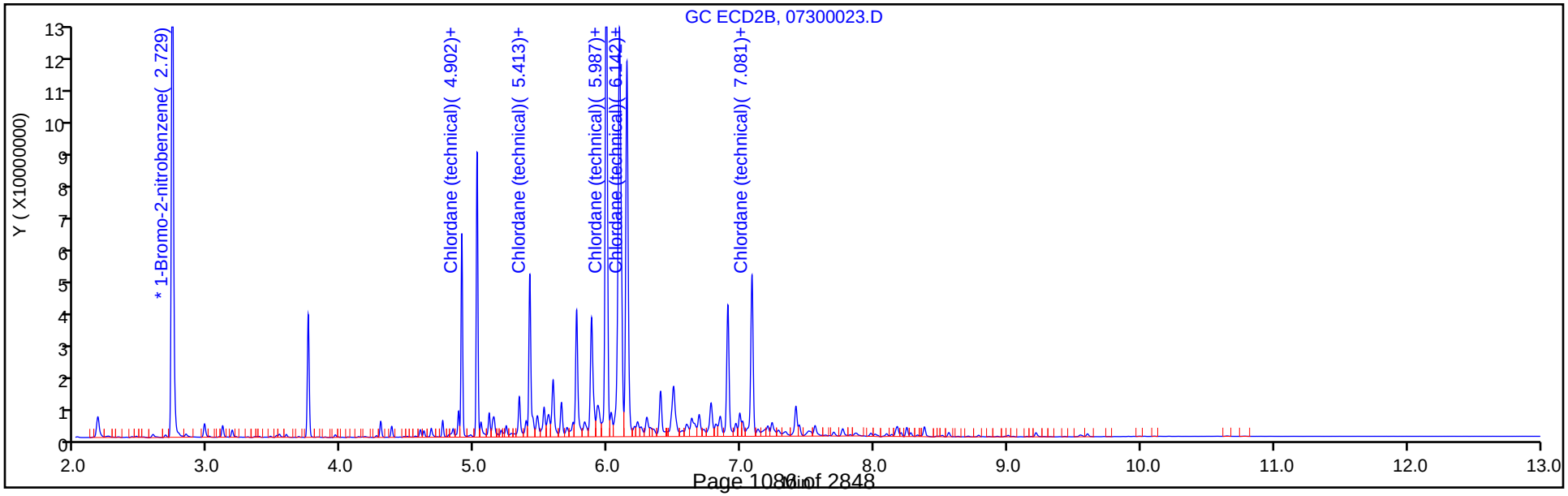
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300023.D

Injection Date:	30-Jul-2018 19:27:47	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD4 CHL			Worklist Smp#:	23
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	18
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300024.D
Lims ID: STD3 CHL
Client ID:
Sample Type: IC Calib Level: 3
Inject. Date: 30-Jul-2018 19:45:06 ALS Bottle#: 19 Worklist Smp#: 24
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD3 CHL
Misc. Info.: 280-0072505-024
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub4

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:17 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:26:05

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.943	2.943	0.000	740394066	150.0	150.0	
2	2.729	2.729	-0.001	174144429	150.0	150.0	
13 Technical Chlordane							
1	5.061	5.061	0.000	85921838	500.0	482.7	
1	5.520	5.518	0.002	84351370	500.0	477.0	
1	6.120	6.119	0.001	341820816	500.0	485.0	
1	6.243	6.243	0.000	587375713	500.0	486.4	
1	7.073	7.074	-0.001	95143828	500.0	487.3	
		Average of Peak Amounts =				483.7	
2	4.901	4.902	-0.001	23460118	500.0	497.0	
2	5.412	5.413	-0.001	25275352	500.0	503.6	
2	5.986	5.987	-0.001	84844551	500.0	501.1	
2	6.141	6.142	-0.001	66233053	500.0	505.5	
2	7.080	7.081	-0.001	29001255	500.0	499.1	
		Average of Peak Amounts =				501.2	
						RPD = 3.57	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
14 Chlordane (technical)							
1	5.061	5.061	0.000	85921838	500.0	482.7	
1	5.520	5.518	0.002	84351370	500.0	477.0	
1	6.120	6.119	0.001	341820816	500.0	485.0	
1	6.243	6.243	0.000	587375713	500.0	486.4	
1	7.073	7.074	-0.001	95143828	500.0	487.3	
		Average of Peak Amounts =				483.7	
2	4.901	4.902	-0.001	23460118	500.0	497.0	
2	5.412	5.413	-0.001	25275352	500.0	503.6	
2	5.986	5.987	-0.001	84844551	500.0	501.1	
2	6.141	6.142	-0.001	66233053	500.0	505.5	
2	7.080	7.081	-0.001	29001255	500.0	499.1	
		Average of Peak Amounts =				501.2	
						RPD = 3.57	

Reagents:

8081ChlorL3_00022	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

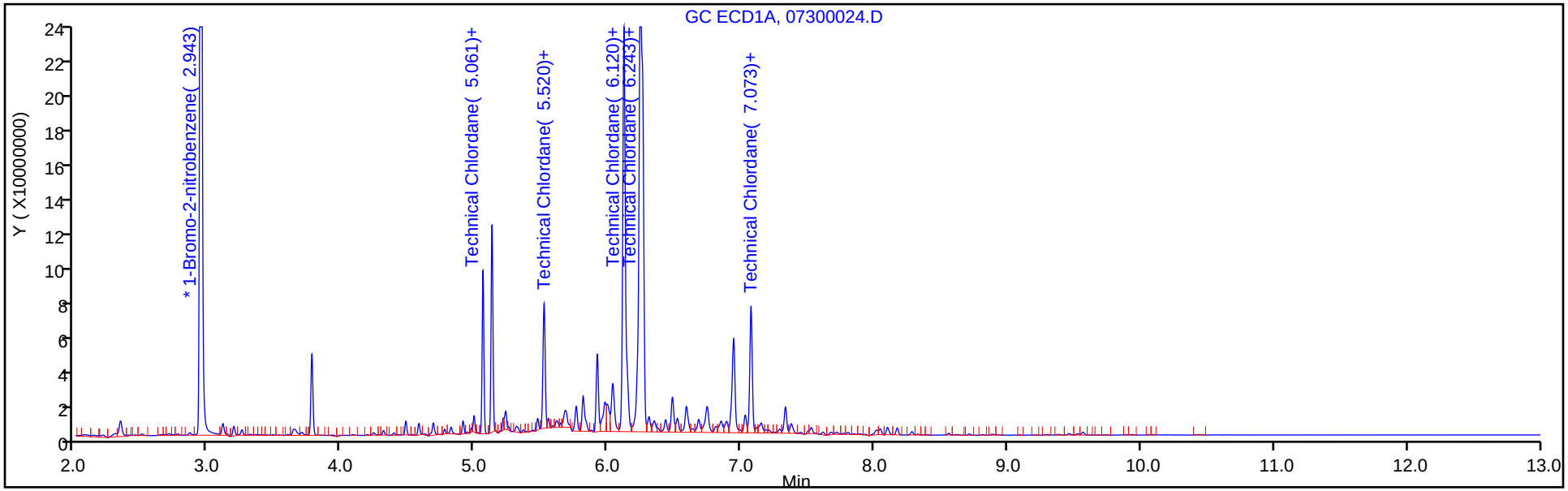
Report Date: 01-Aug-2018 12:39:19 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

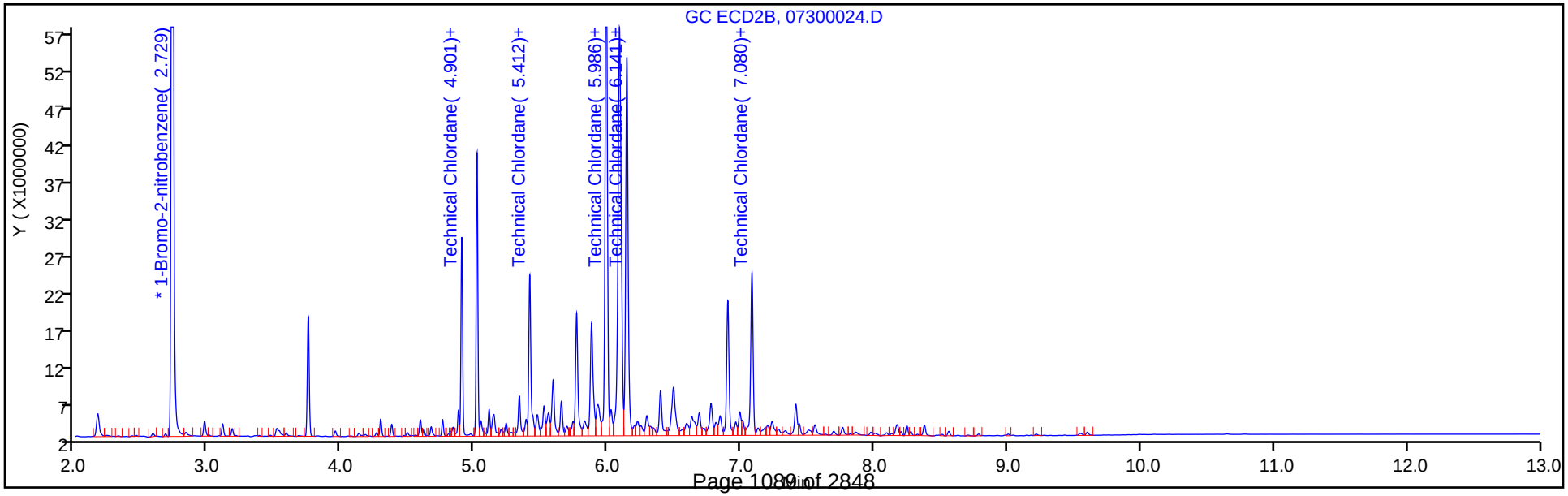
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300024.D

Injection Date:	30-Jul-2018 19:45:06	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD3 CHL			Worklist Smp#:	24
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	19
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300025.D
Lims ID: STD2 CHL
Client ID:
Sample Type: IC Calib Level: 2
Inject. Date: 30-Jul-2018 20:02:31 ALS Bottle#: 20 Worklist Smp#: 25
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD2 CHL
Misc. Info.: 280-0072505-025
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub4

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:23 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.943	0.001	718830881	150.0	150.0	
2	2.729	2.729	0.000	172173272	150.0	150.0	
14 Chlordane (technical)							
1	5.061	5.061	0.000	34280044	200.0	194.7	
1	5.520	5.518	0.002	34899229	200.0	196.5	
1	6.120	6.119	0.001	133606069	200.0	192.7	
1	6.244	6.243	0.001	228051445	200.0	193.2	
1	7.075	7.074	0.001	37868921	200.0	198.0	
		Average of Peak Amounts =				195.0	
2	4.901	4.902	-0.001	9340767	200.0	197.2	
2	5.412	5.413	-0.001	9978354	200.0	194.6	
2	5.987	5.987	0.000	32871284	200.0	194.5	
2	6.141	6.142	-0.001	25363379	200.0	192.7	
2	7.081	7.081	0.000	11391515	200.0	195.7	
		Average of Peak Amounts =				195.0	
						RPD = 0.03	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
13 Technical Chlordane							
1	5.061	5.061	0.000	34280044	200.0	194.7	
1	5.520	5.518	0.002	34899229	200.0	196.5	
1	6.120	6.119	0.001	133606069	200.0	192.7	
1	6.244	6.243	0.001	228051445	200.0	193.2	
1	7.075	7.074	0.001	37868921	200.0	198.0	
		Average of Peak Amounts =				195.0	
2	4.901	4.902	-0.001	9340767	200.0	197.2	
2	5.412	5.413	-0.001	9978354	200.0	194.6	
2	5.987	5.987	0.000	32871284	200.0	194.5	
2	6.141	6.142	-0.001	25363379	200.0	192.7	
2	7.081	7.081	0.000	11391515	200.0	195.7	
		Average of Peak Amounts =				195.0	
						RPD = 0.03	

Reagents:

8081ChlorL2_00024	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

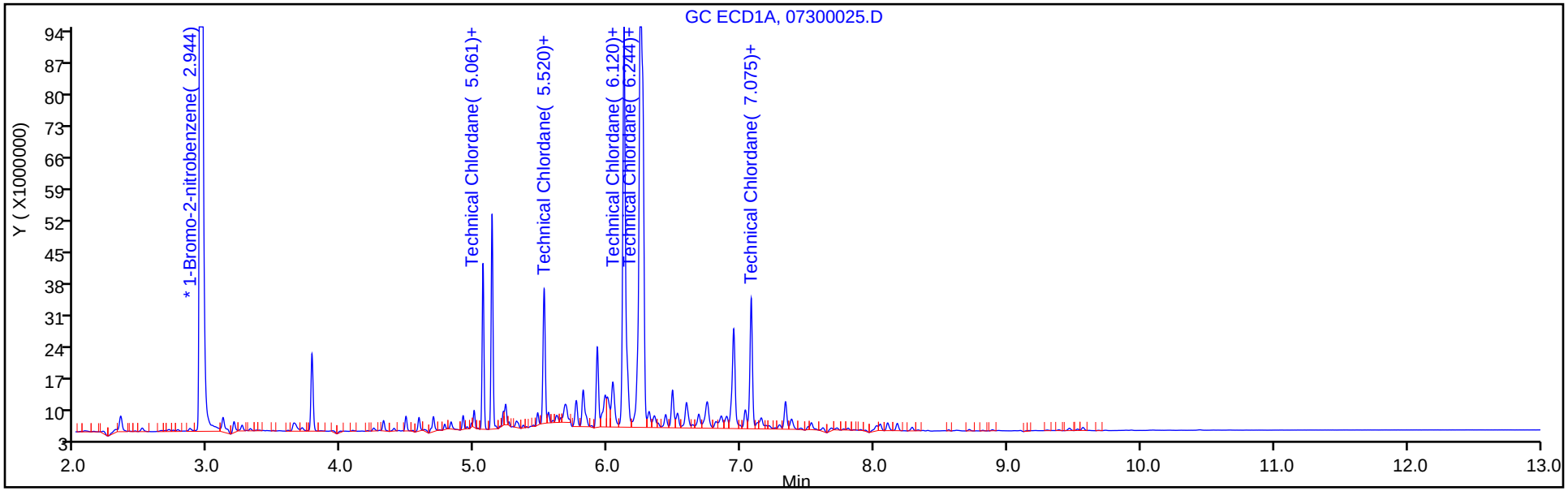
Report Date: 01-Aug-2018 12:39:25 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

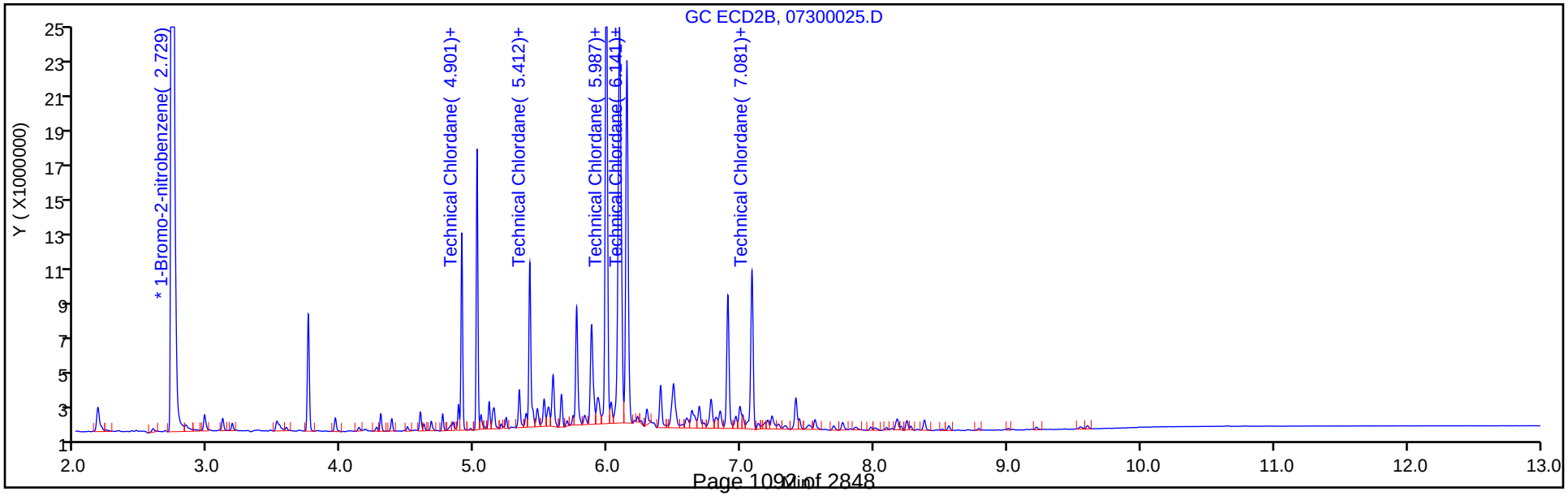
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300025.D

Injection Date:	30-Jul-2018 20:02:31	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD2 CHL			Worklist Smp#:	25
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	20
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300026.D
Lims ID: STD1 CHL
Client ID:
Sample Type: IC Calib Level: 1
Inject. Date: 30-Jul-2018 20:19:49 ALS Bottle#: 21 Worklist Smp#: 26
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD1 CHL
Misc. Info.: 280-0072505-026
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub4

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:28 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.943	0.001	725416251	150.0	150.0	
2	2.730	2.729	0.001	176365217	150.0	150.0	
13 Technical Chlordane							
1	5.061	5.061	0.000	9751045	50.0	50.4	
1	5.520	5.518	0.002	10493880	50.0	50.3	
1	6.120	6.119	0.001	37451216	50.0	50.5	
1	6.245	6.243	0.002	62062833	50.0	50.5	
1	7.075	7.074	0.001	10117320	50.0	50.2	
		Average of Peak Amounts =				50.4	
2	4.902	4.902	0.000	2604911	50.0	50.2	
2	5.413	5.413	0.000	3035703	50.0	50.2	
2	5.987	5.987	0.000	9081704	50.0	50.3	
2	6.142	6.142	0.000	7267859	50.0	50.3	
2	7.081	7.081	0.000	3179486	50.0	50.2	
		Average of Peak Amounts =				50.2	
						RPD = 0.23	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
14 Chlordane (technical)							
1	5.061	5.061	0.000	9751045	50.0	50.4	
1	5.520	5.518	0.002	10493880	50.0	50.3	
1	6.120	6.119	0.001	37451216	50.0	50.5	
1	6.245	6.243	0.002	62062833	50.0	50.5	
1	7.075	7.074	0.001	10117320	50.0	50.2	
		Average of Peak Amounts =				50.4	
2	4.902	4.902	0.000	2604911	50.0	50.2	
2	5.413	5.413	0.000	3035703	50.0	50.2	
2	5.987	5.987	0.000	9081704	50.0	50.3	
2	6.142	6.142	0.000	7267859	50.0	50.3	
2	7.081	7.081	0.000	3179486	50.0	50.2	
		Average of Peak Amounts =				50.2	
						RPD = 0.23	

Reagents:

8081ChlorL1_00023	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

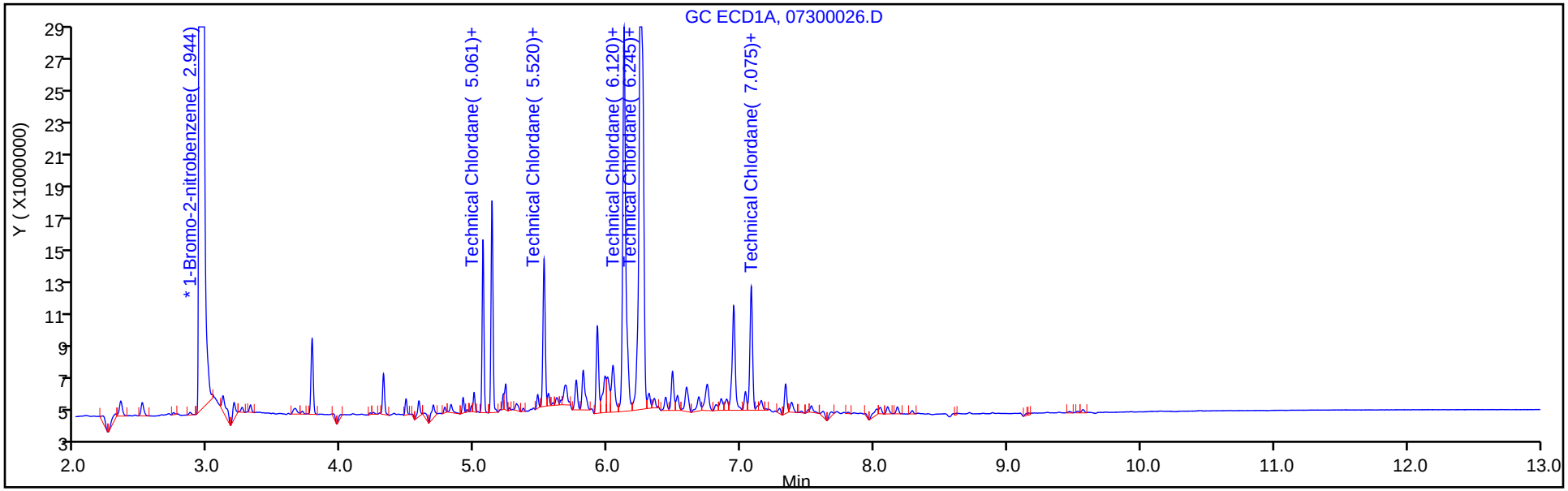
Report Date: 01-Aug-2018 12:39:30 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

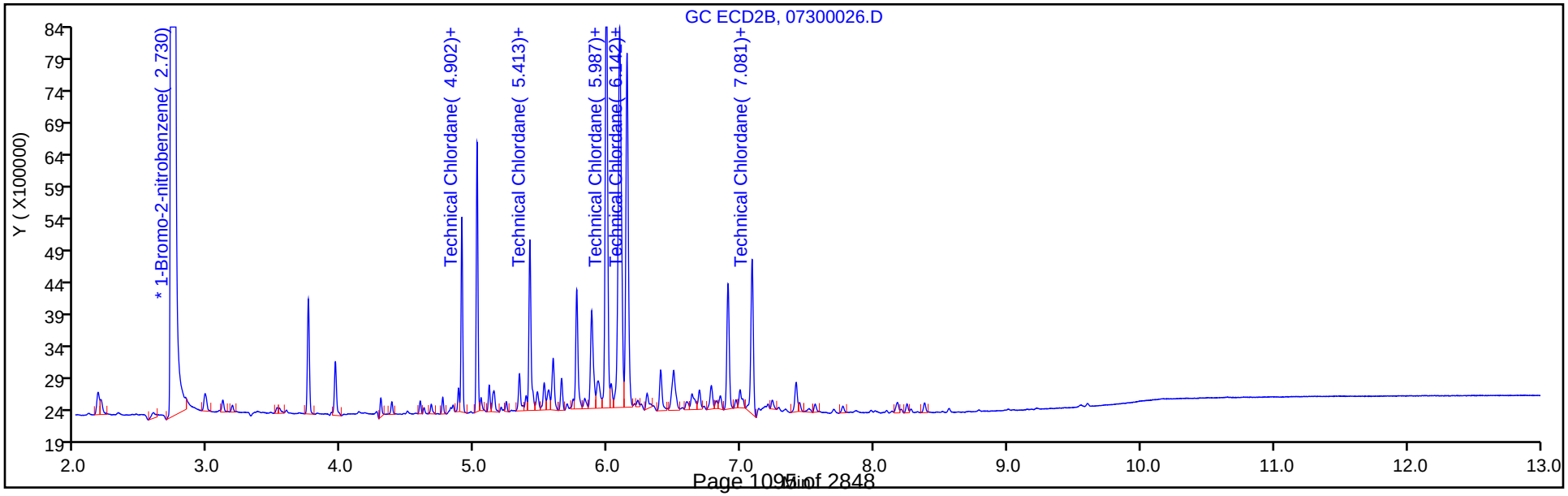
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300026.D

Injection Date:	30-Jul-2018 20:19:49	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD1 CHL			Worklist Smp#:	26
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	21
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM VI
PESTICIDES BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424154

SDG No.:

Instrument ID: SGC_P2 GC Column: CLP2 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 07/30/2018 19:10 Calibration End Date: 07/30/2018 20:19 Calibration ID: 33258

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD1 280-424154/26	07300026.D
Level 2	STD2 280-424154/25	07300025.D
Level 3	STD3 280-424154/24	07300024.D
Level 4	STD4 280-424154/23	07300023.D
Level 5	STD5 280-424154/22	07300022.D

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5		B	M1	M2								
Chlordane (technical) Peak 1	0.0443	0.0407	0.0404	0.0414	0.0401	Lin2	0.1960	0.0403							1.0000		0.9900
Technical Chlordane Peak 1	0.0443	0.0407	0.0404	0.0414	0.0401	Lin2	0.1960	0.0403							1.0000		0.9900
Chlordane (technical) Peak 2	0.0516	0.0435	0.0435	0.0441	0.0419	Lin2	0.4554	0.0423							0.9990		0.9900
Technical Chlordane Peak 2	0.0516	0.0435	0.0435	0.0441	0.0419	Lin2	0.4554	0.0423							0.9990		0.9900
Chlordane (technical) Peak 3	0.1545	0.1432	0.1462	0.1497	0.1437	Lin2	0.4361	0.1450							0.9990		0.9900
Technical Chlordane Peak 3	0.1545	0.1432	0.1462	0.1497	0.1437	Lin2	0.4361	0.1450							0.9990		0.9900
Chlordane (technical) Peak 4	0.1236	0.1105	0.1141	0.1154	0.1111	Lin2	0.5550	0.1118							0.9990		0.9900
Technical Chlordane Peak 4	0.1236	0.1105	0.1141	0.1154	0.1111	Lin2	0.5550	0.1118							0.9990		0.9900
Chlordane (technical) Peak 5	0.0541	0.0496	0.0500	0.0506	0.0499	Lin2	0.2110	0.0496							1.0000		0.9900
Technical Chlordane Peak 5	0.0541	0.0496	0.0500	0.0506	0.0499	Lin2	0.2110	0.0496							1.0000		0.9900

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
PESTICIDES BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424154

SDG No.:

Instrument ID: SGC_P2 GC Column: CLP2 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 07/30/2018 19:10 Calibration End Date: 07/30/2018 20:19 Calibration ID: 33258

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD1 280-424154/26	07300026.D
Level 2	STD2 280-424154/25	07300025.D
Level 3	STD3 280-424154/24	07300024.D
Level 4	STD4 280-424154/23	07300023.D
Level 5	STD5 280-424154/22	07300022.D

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1	LVL 2	LVL 3	LVL 4	LVL 5	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5
Chlordane (technical) Peak 1	BNB	Lin2	2604911	9340767	23460118	52193315	98976236	50.0	200	500	1000	2000
Technical Chlordane Peak 1	BNB	Lin2	2604911	9340767	23460118	52193315	98976236	50.0	200	500	1000	2000
Chlordane (technical) Peak 2	BNB	Lin2	3035703	9978354	25275352	55531632	103418115	50.0	200	500	1000	2000
Technical Chlordane Peak 2	BNB	Lin2	3035703	9978354	25275352	55531632	103418115	50.0	200	500	1000	2000
Chlordane (technical) Peak 3	BNB	Lin2	9081704	32871284	84844551	188705645	354879183	50.0	200	500	1000	2000
Technical Chlordane Peak 3	BNB	Lin2	9081704	32871284	84844551	188705645	354879183	50.0	200	500	1000	2000
Chlordane (technical) Peak 4	BNB	Lin2	7267859	25363379	66233053	145392313	274170084	50.0	200	500	1000	2000
Technical Chlordane Peak 4	BNB	Lin2	7267859	25363379	66233053	145392313	274170084	50.0	200	500	1000	2000
Chlordane (technical) Peak 5	BNB	Lin2	3179486	11391515	29001255	63813160	123107808	50.0	200	500	1000	2000
Technical Chlordane Peak 5	BNB	Lin2	3179486	11391515	29001255	63813160	123107808	50.0	200	500	1000	2000

Curve Type Legend:
Lin2 = Linear 1/conc^2 ISTD

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300022.D
Lims ID: STD5 CHL
Client ID:
Sample Type: IC Calib Level: 5
Inject. Date: 30-Jul-2018 19:10:27 ALS Bottle#: 17 Worklist Smp#: 22
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD5 CHL
Misc. Info.: 280-0072505-022
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub4

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:02 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:20:27

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.944	-0.001	800991966	150.0	150.0	
2	2.729	2.729	-0.001	185154985	150.0	150.0	
13 Technical Chlordane							
1	5.061	5.061	0.000	388389629	2000.0	2036.9	
1	5.519	5.518	0.001	369455143	2000.0	1967.3	
1	6.120	6.119	0.001	1555253751	2000.0	2053.1	
1	6.244	6.243	0.001	2661447796	2000.0	2044.3	
1	7.074	7.074	0.000	427328572	2000.0	2032.4	
		Average of Peak Amounts =				2026.8	
2	4.902	4.902	0.000	98976236	2000.0	1986.4	
2	5.413	5.413	0.000	103418115	2000.0	1968.8	
2	5.988	5.987	0.001	354879183	2000.0	1980.0	
2	6.142	6.142	0.000	274170084	2000.0	1982.4	
2	7.080	7.081	-0.001	123107808	2000.0	2005.2	
		Average of Peak Amounts =				1984.6	
						RPD = 2.11	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
14 Chlordane (technical)							
1	5.061	5.061	0.000	388389629	2000.0	2036.9	
1	5.519	5.518	0.001	369455143	2000.0	1967.3	
1	6.120	6.119	0.001	1555253751	2000.0	2053.1	
1	6.244	6.243	0.001	2661447796	2000.0	2044.3	
1	7.074	7.074	0.000	427328572	2000.0	2032.4	
		Average of Peak Amounts =				2026.8	
2	4.902	4.902	0.000	98976236	2000.0	1986.4	
2	5.413	5.413	0.000	103418115	2000.0	1968.8	
2	5.988	5.987	0.001	354879183	2000.0	1980.0	
2	6.142	6.142	0.000	274170084	2000.0	1982.4	
2	7.080	7.081	-0.001	123107808	2000.0	2005.2	
		Average of Peak Amounts =				1984.6	
						RPD = 2.11	

Reagents:

8081ChlorL5_00023	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

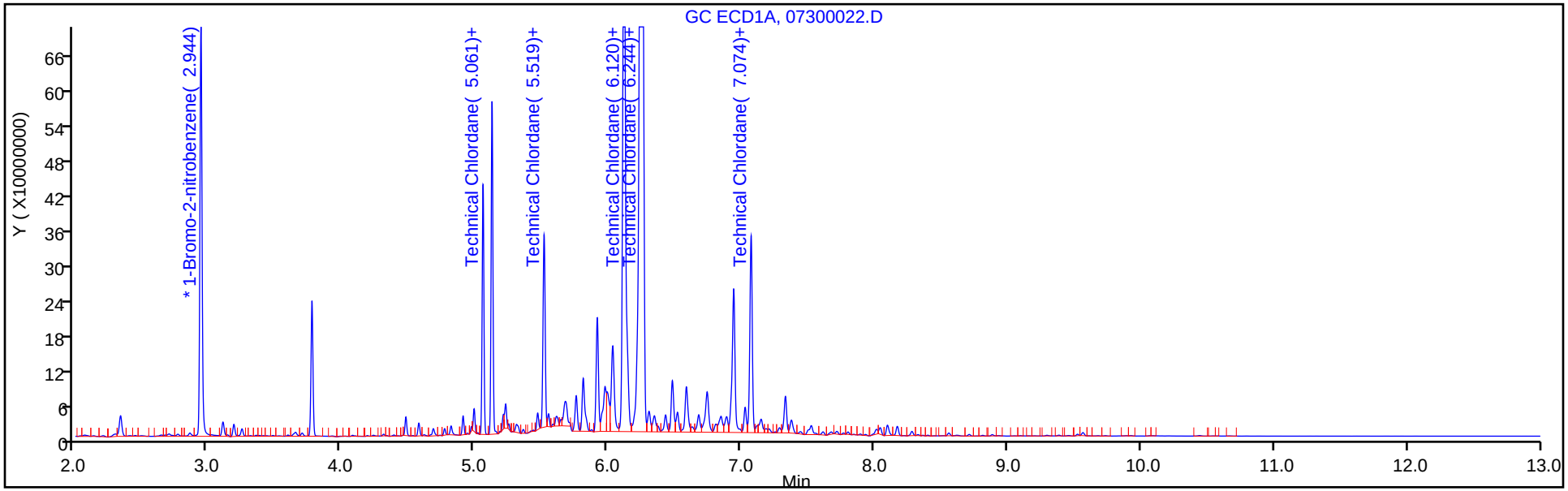
Report Date: 01-Aug-2018 12:39:04 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

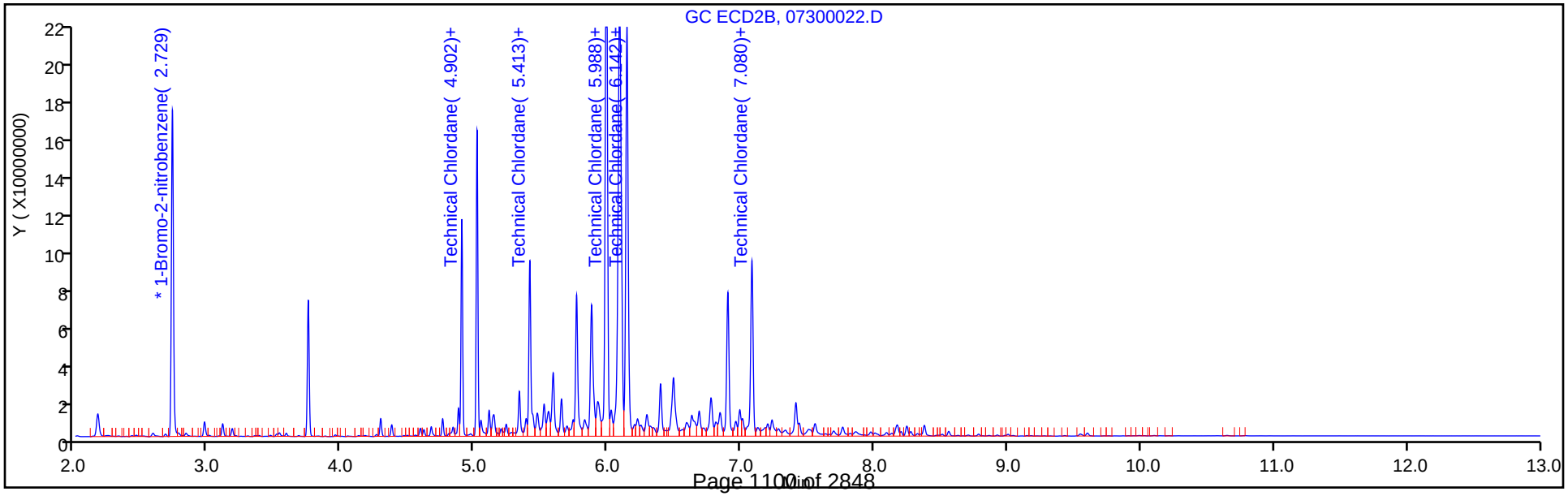
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300022.D

Injection Date:	30-Jul-2018 19:10:27	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD5 CHL			Worklist Smp#:	22
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	17
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300023.D
Lims ID: STD4 CHL
Client ID:
Sample Type: IC Calib Level: 4
Inject. Date: 30-Jul-2018 19:27:47 ALS Bottle#: 18 Worklist Smp#: 23
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD4 CHL
Misc. Info.: 280-0072505-023
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub4

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:09 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:25:34

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.943	2.943	0.000	798588111	150.0	150.0	
2	2.729	2.729	0.000	189034283	150.0	150.0	
14 Chlordane (technical)							
1	5.061	5.061	0.000	197284582	1000.0	1034.7	
1	5.518	5.518	0.000	202083680	1000.0	1074.0	
1	6.119	6.119	0.000	779397226	1000.0	1029.9	
1	6.243	6.243	0.000	1338331253	1000.0	1030.0	
1	7.074	7.074	0.000	213182322	1000.0	1015.5	
		Average of Peak Amounts =				1036.8	
2	4.902	4.902	0.000	52193315	1000.0	1023.7	
2	5.413	5.413	0.000	55531632	1000.0	1030.4	
2	5.987	5.987	0.000	188705645	1000.0	1029.8	
2	6.142	6.142	0.000	145392313	1000.0	1027.3	
2	7.081	7.081	0.000	63813160	1000.0	1016.0	
		Average of Peak Amounts =				1025.4	
						RPD = 1.10	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
13 Technical Chlordane							
1	5.061	5.061	0.000	197284582	1000.0	1034.7	
1	5.518	5.518	0.000	202083680	1000.0	1074.0	
1	6.119	6.119	0.000	779397226	1000.0	1029.9	
1	6.243	6.243	0.000	1338331253	1000.0	1030.0	
1	7.074	7.074	0.000	213182322	1000.0	1015.5	
		Average of Peak Amounts =				1036.8	
2	4.902	4.902	0.000	52193315	1000.0	1023.7	
2	5.413	5.413	0.000	55531632	1000.0	1030.4	
2	5.987	5.987	0.000	188705645	1000.0	1029.8	
2	6.142	6.142	0.000	145392313	1000.0	1027.3	
2	7.081	7.081	0.000	63813160	1000.0	1016.0	
		Average of Peak Amounts =				1025.4	
						RPD = 1.10	

Reagents:

8081ChlorL4_00022	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

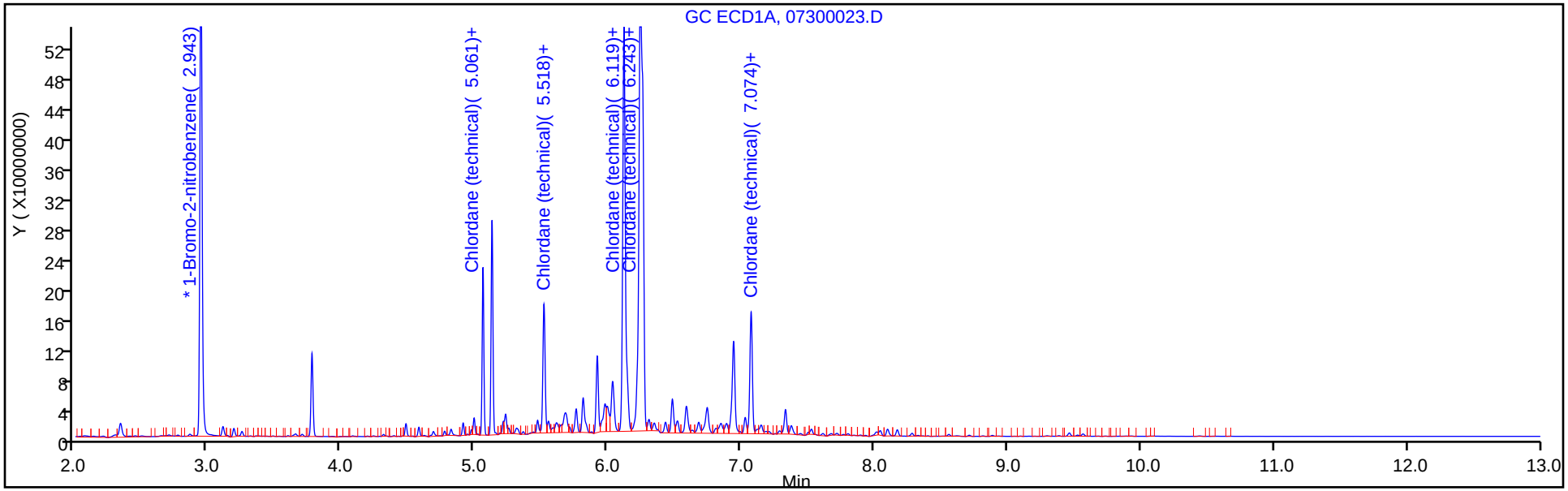
Report Date: 01-Aug-2018 12:39:13 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

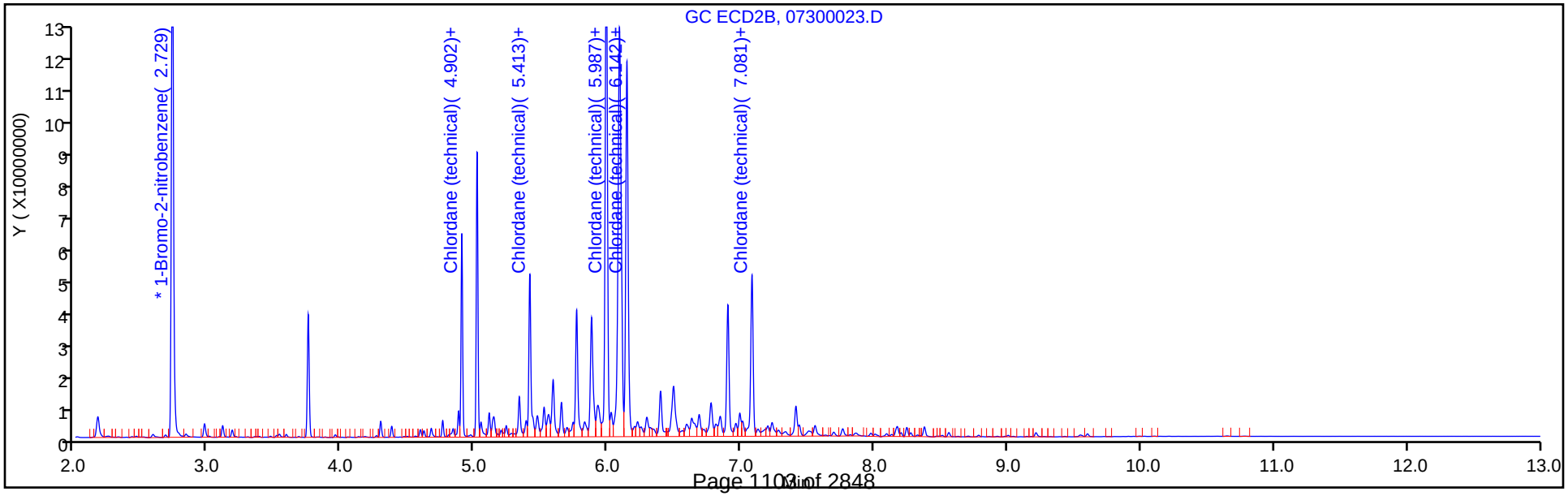
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300023.D

Injection Date:	30-Jul-2018 19:27:47	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD4 CHL			Worklist Smp#:	23
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	18
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300024.D
Lims ID: STD3 CHL
Client ID:
Sample Type: IC Calib Level: 3
Inject. Date: 30-Jul-2018 19:45:06 ALS Bottle#: 19 Worklist Smp#: 24
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD3 CHL
Misc. Info.: 280-0072505-024
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub4

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:17 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:26:05

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.943	2.943	0.000	740394066	150.0	150.0	
2	2.729	2.729	-0.001	174144429	150.0	150.0	
13 Technical Chlordane							
1	5.061	5.061	0.000	85921838	500.0	482.7	
1	5.520	5.518	0.002	84351370	500.0	477.0	
1	6.120	6.119	0.001	341820816	500.0	485.0	
1	6.243	6.243	0.000	587375713	500.0	486.4	
1	7.073	7.074	-0.001	95143828	500.0	487.3	
		Average of Peak Amounts =				483.7	
2	4.901	4.902	-0.001	23460118	500.0	497.0	
2	5.412	5.413	-0.001	25275352	500.0	503.6	
2	5.986	5.987	-0.001	84844551	500.0	501.1	
2	6.141	6.142	-0.001	66233053	500.0	505.5	
2	7.080	7.081	-0.001	29001255	500.0	499.1	
		Average of Peak Amounts =				501.2	
						RPD = 3.57	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
14 Chlordane (technical)							
1	5.061	5.061	0.000	85921838	500.0	482.7	
1	5.520	5.518	0.002	84351370	500.0	477.0	
1	6.120	6.119	0.001	341820816	500.0	485.0	
1	6.243	6.243	0.000	587375713	500.0	486.4	
1	7.073	7.074	-0.001	95143828	500.0	487.3	
		Average of Peak Amounts =				483.7	
2	4.901	4.902	-0.001	23460118	500.0	497.0	
2	5.412	5.413	-0.001	25275352	500.0	503.6	
2	5.986	5.987	-0.001	84844551	500.0	501.1	
2	6.141	6.142	-0.001	66233053	500.0	505.5	
2	7.080	7.081	-0.001	29001255	500.0	499.1	
		Average of Peak Amounts =				501.2	
						RPD = 3.57	

Reagents:

8081ChlorL3_00022	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

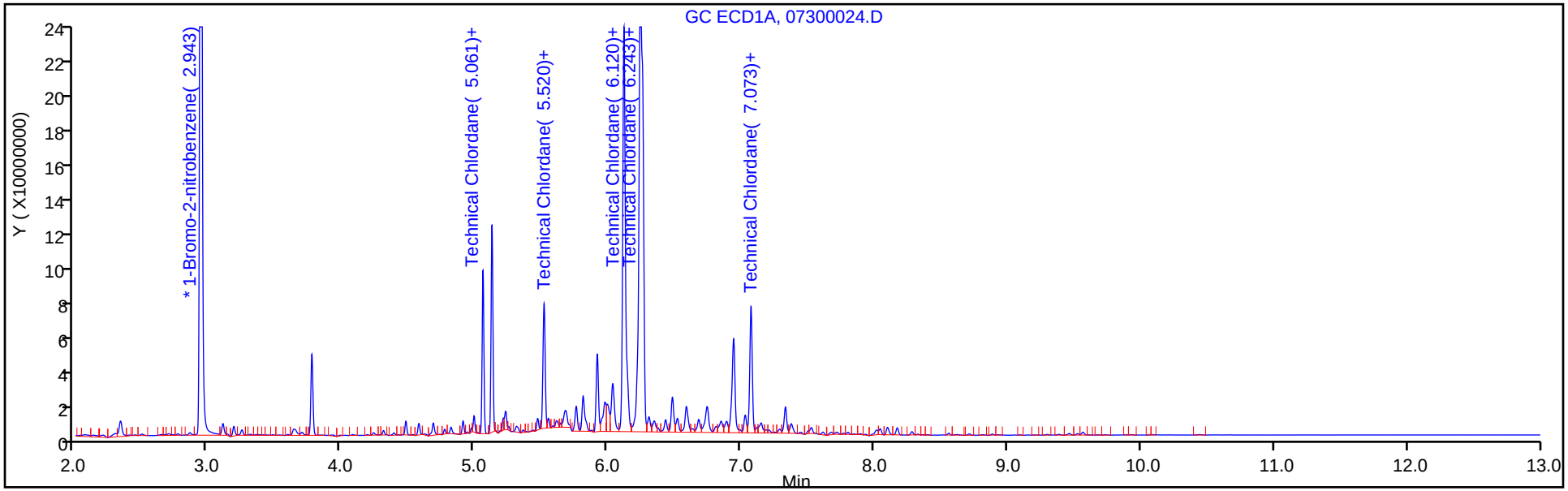
Report Date: 01-Aug-2018 12:39:20 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

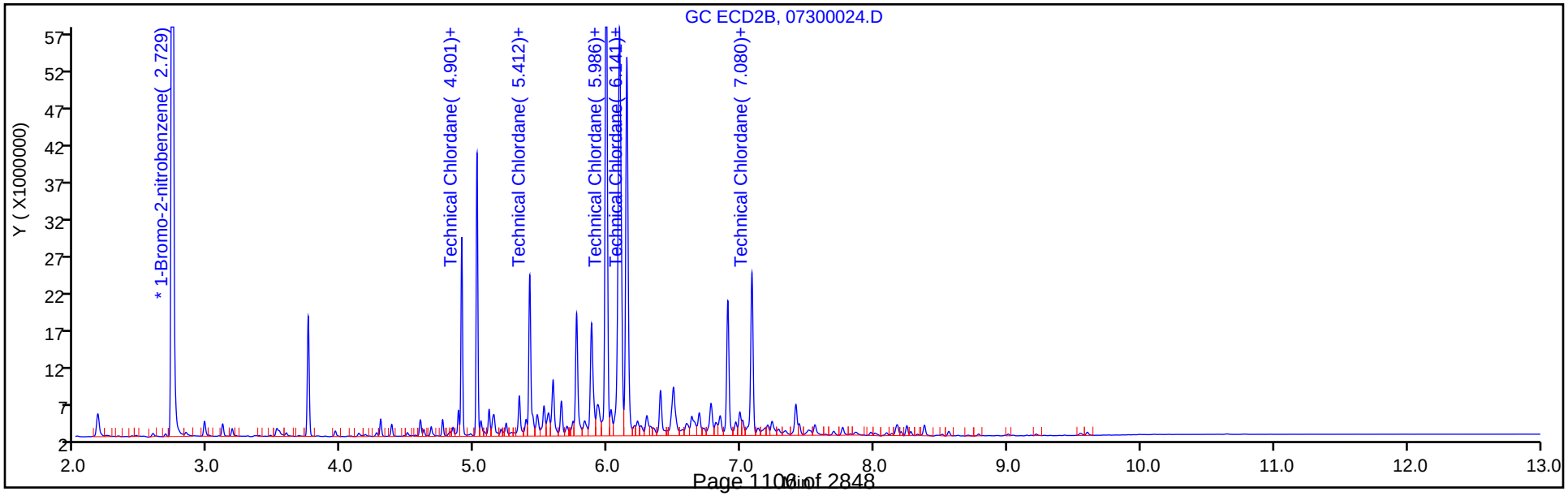
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300024.D

Injection Date:	30-Jul-2018 19:45:06	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD3 CHL			Worklist Smp#:	24
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	19
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300025.D
Lims ID: STD2 CHL
Client ID:
Sample Type: IC Calib Level: 2
Inject. Date: 30-Jul-2018 20:02:31 ALS Bottle#: 20 Worklist Smp#: 25
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD2 CHL
Misc. Info.: 280-0072505-025
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub4

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:23 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.943	0.001	718830881	150.0	150.0	
2	2.729	2.729	0.000	172173272	150.0	150.0	
14 Chlordane (technical)							
1	5.061	5.061	0.000	34280044	200.0	194.7	
1	5.520	5.518	0.002	34899229	200.0	196.5	
1	6.120	6.119	0.001	133606069	200.0	192.7	
1	6.244	6.243	0.001	228051445	200.0	193.2	
1	7.075	7.074	0.001	37868921	200.0	198.0	
		Average of Peak Amounts =				195.0	
2	4.901	4.902	-0.001	9340767	200.0	197.2	
2	5.412	5.413	-0.001	9978354	200.0	194.6	
2	5.987	5.987	0.000	32871284	200.0	194.5	
2	6.141	6.142	-0.001	25363379	200.0	192.7	
2	7.081	7.081	0.000	11391515	200.0	195.7	
		Average of Peak Amounts =				195.0	
						RPD = 0.03	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
13 Technical Chlordane							
1	5.061	5.061	0.000	34280044	200.0	194.7	
1	5.520	5.518	0.002	34899229	200.0	196.5	
1	6.120	6.119	0.001	133606069	200.0	192.7	
1	6.244	6.243	0.001	228051445	200.0	193.2	
1	7.075	7.074	0.001	37868921	200.0	198.0	
		Average of Peak Amounts =				195.0	
2	4.901	4.902	-0.001	9340767	200.0	197.2	
2	5.412	5.413	-0.001	9978354	200.0	194.6	
2	5.987	5.987	0.000	32871284	200.0	194.5	
2	6.141	6.142	-0.001	25363379	200.0	192.7	
2	7.081	7.081	0.000	11391515	200.0	195.7	
		Average of Peak Amounts =				195.0	
						RPD = 0.03	

Reagents:

8081ChlorL2_00024	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

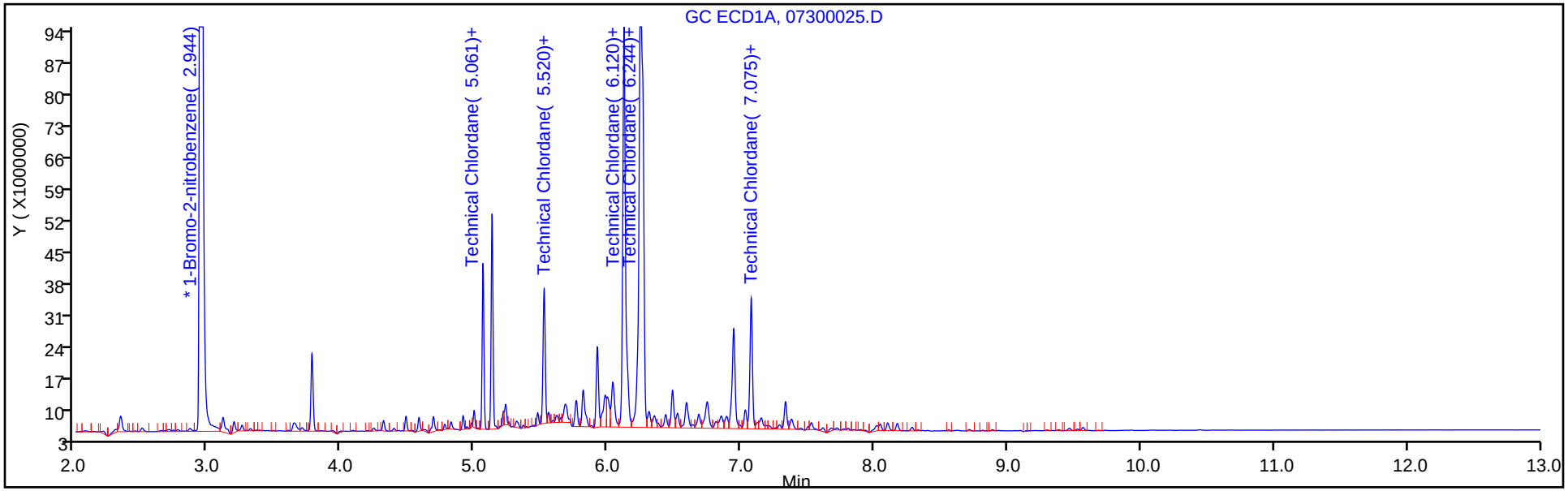
Report Date: 01-Aug-2018 12:39:25 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

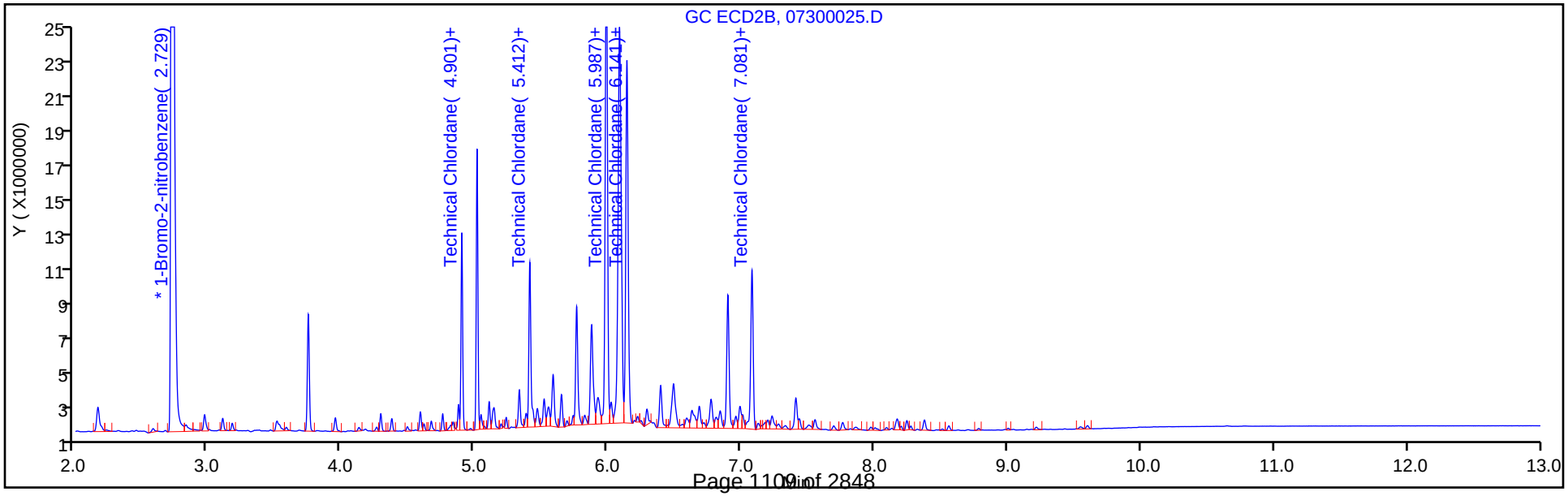
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300025.D

Injection Date:	30-Jul-2018 20:02:31	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD2 CHL			Worklist Smp#:	25
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	20
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300026.D
Lims ID: STD1 CHL
Client ID:
Sample Type: IC Calib Level: 1
Inject. Date: 30-Jul-2018 20:19:49 ALS Bottle#: 21 Worklist Smp#: 26
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD1 CHL
Misc. Info.: 280-0072505-026
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub4

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:28 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.943	0.001	725416251	150.0	150.0	
2	2.730	2.729	0.001	176365217	150.0	150.0	
13 Technical Chlordane							
1	5.061	5.061	0.000	9751045	50.0	50.4	
1	5.520	5.518	0.002	10493880	50.0	50.3	
1	6.120	6.119	0.001	37451216	50.0	50.5	
1	6.245	6.243	0.002	62062833	50.0	50.5	
1	7.075	7.074	0.001	10117320	50.0	50.2	
		Average of Peak Amounts =				50.4	
2	4.902	4.902	0.000	2604911	50.0	50.2	
2	5.413	5.413	0.000	3035703	50.0	50.2	
2	5.987	5.987	0.000	9081704	50.0	50.3	
2	6.142	6.142	0.000	7267859	50.0	50.3	
2	7.081	7.081	0.000	3179486	50.0	50.2	
		Average of Peak Amounts =				50.2	
						RPD = 0.23	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
14 Chlordane (technical)							
1	5.061	5.061	0.000	9751045	50.0	50.4	
1	5.520	5.518	0.002	10493880	50.0	50.3	
1	6.120	6.119	0.001	37451216	50.0	50.5	
1	6.245	6.243	0.002	62062833	50.0	50.5	
1	7.075	7.074	0.001	10117320	50.0	50.2	
		Average of Peak Amounts =				50.4	
2	4.902	4.902	0.000	2604911	50.0	50.2	
2	5.413	5.413	0.000	3035703	50.0	50.2	
2	5.987	5.987	0.000	9081704	50.0	50.3	
2	6.142	6.142	0.000	7267859	50.0	50.3	
2	7.081	7.081	0.000	3179486	50.0	50.2	
		Average of Peak Amounts =				50.2	
						RPD = 0.23	

Reagents:

8081ChlorL1_00023	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

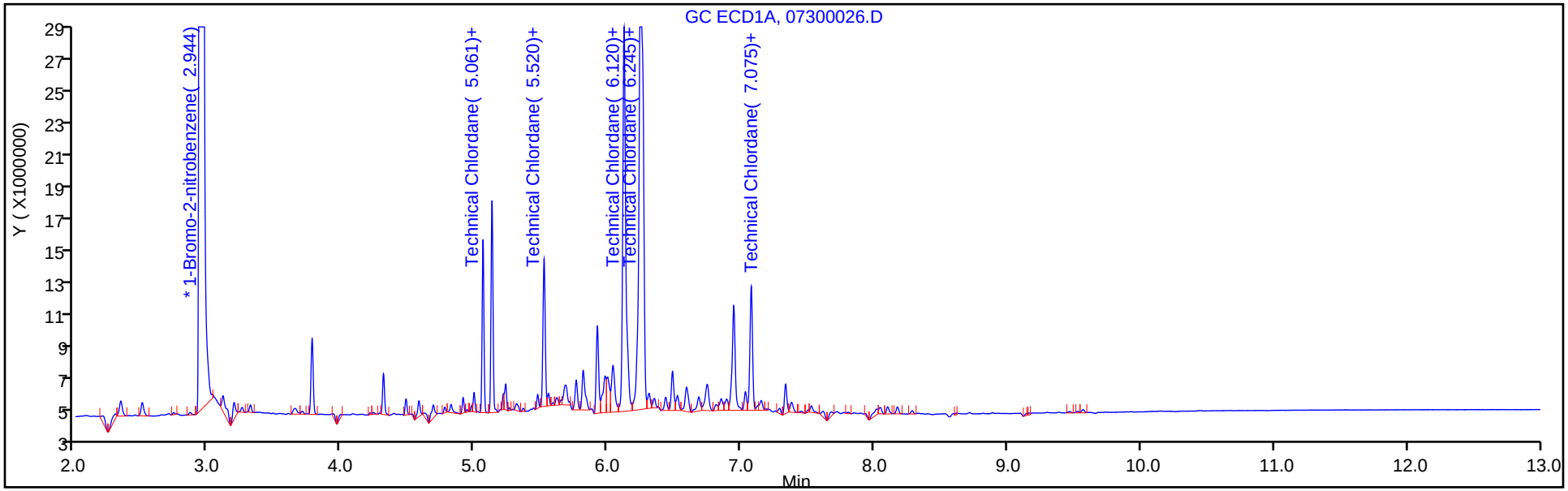
Report Date: 01-Aug-2018 12:39:31 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

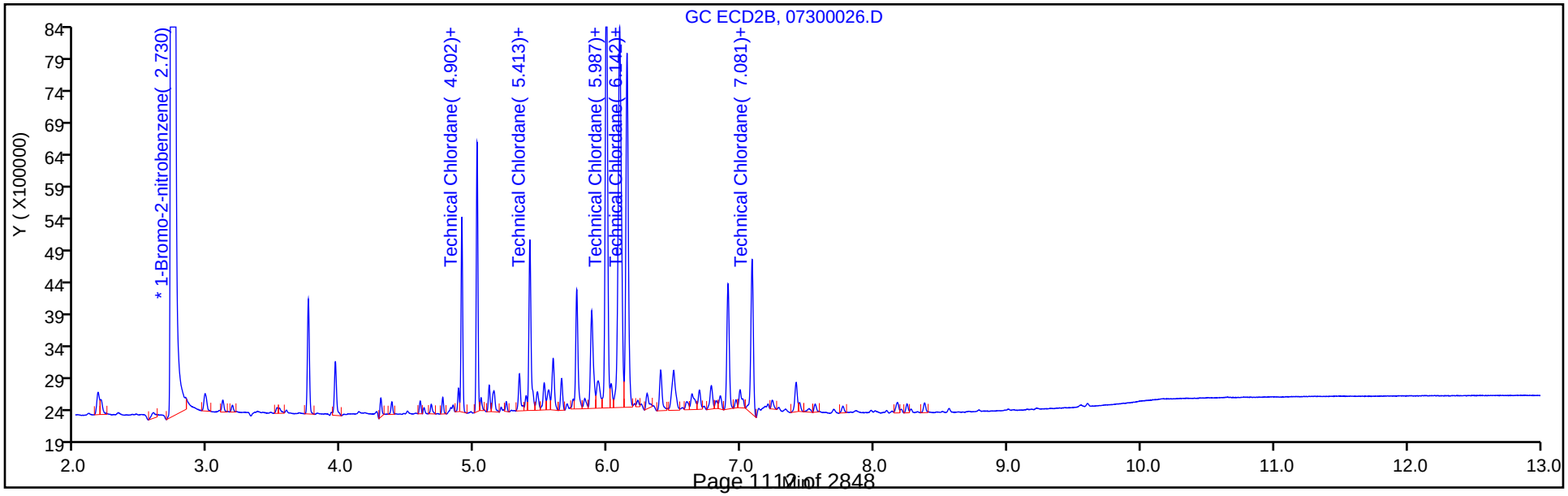
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300026.D

Injection Date:	30-Jul-2018 20:19:49	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD1 CHL			Worklist Smp#:	26
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	21
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM VI
PESTICIDES BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424154

SDG No.:

Instrument ID: SGC_P2 GC Column: CLP1 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 07/30/2018 20:37 Calibration End Date: 07/30/2018 22:03 Calibration ID: 33261

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD1 280-424154/32	07300032.D
Level 2	STD2 280-424154/31	07300031.D
Level 3	STD3 280-424154/30	07300030.D
Level 4	STD4 280-424154/29	07300029.D
Level 5	STD5 280-424154/28	07300028.D
Level 6	STD6 280-424154/27	07300027.D

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5		B	M1	M2								
Hexachlorobenzene	1.2185 1.1479	1.1379	1.1320	1.1445	1.1567	Lin2	0.2860	1.1356							1.0000		0.9900
alpha-BHC	1.5926 1.6582	1.5563	1.5619	1.6614	1.6967	Lin2	-0.318	1.6441							0.9990		0.9900
gamma-BHC (Lindane)	1.5047 1.4518	1.4108	1.4183	1.4733	1.4776	Lin2	0.1540	1.4450							0.9990		0.9900
beta-BHC	0.7568 0.5817	0.6521	0.5984	0.6155	0.5948	Lin2	0.6903	0.5834							1.0000		0.9900
delta-BHC	1.4306 1.4659	1.3826	1.4211	1.4740	1.4997	Lin2	-0.220	1.4615							0.9990		0.9900
Heptachlor	1.4241 1.1904	1.2675	1.2684	1.2687	1.2748	Lin2	0.7386	1.2290							0.9990		0.9900
Aldrin	1.4044 1.3208	1.3372	1.3260	1.3738	1.3840	Lin2	0.1991	1.3433							0.9990		0.9900
Isodrin	1.2342 1.0574	1.1351	1.0922	1.1162	1.1179	Lin2	0.5940	1.0826							0.9990		0.9900
Heptachlor epoxide	1.2891 1.0971	1.2060	1.1631	1.1749	1.1634	Lin2	0.6225	1.1373							0.9990		0.9900
trans-Chlordane	1.2980 1.2008	1.2260	1.2004	1.2422	1.2611	Lin2	0.2823	1.2177							0.9990		0.9900
cis-Chlordane	1.2700 1.1535	1.1884	1.1649	1.1945	1.2129	Lin2	0.3605	1.1713							0.9990		0.9900
4,4'-DDE	1.1684 1.1470	1.1271	1.1354	1.1673	1.1898	Lin2	0.0009	1.1558							0.9990		0.9900
Endosulfan I	1.2698 1.0546	1.1754	1.1431	1.1312	1.1179	Lin2	0.7138	1.0971							0.9990		0.9900
Dieldrin	1.3660 1.1890	1.2920	1.2412	1.2538	1.2530	Lin2	0.5861	1.2235							1.0000		0.9900
Endrin	1.2765 1.1201	1.2543	1.1839	1.1880	1.1866	Lin2	0.5063	1.1650							0.9990		0.9900

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
PESTICIDES BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424154

SDG No.:

Instrument ID: SGC_P2 GC Column: CLP1 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 07/30/2018 20:37 Calibration End Date: 07/30/2018 22:03 Calibration ID: 33261

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5		B	M1	M2								
4,4'-DDD	1.0886 0.9865	1.0840	1.0060	1.0050	1.0260	Lin2	0.3896	1.0045							0.9990		0.9900
Endosulfan II	1.1647 0.9827	1.1221	1.0621	1.0432	1.0373	Lin2	0.6276	1.0233							0.9990		0.9900
4,4'-DDT	0.6745 0.8081	0.7430	0.8874	0.7846	0.8705	Lin2	-0.703	0.8454							0.9960		0.9900
Endrin aldehyde	1.0077 0.8203	0.9302	0.8862	0.8684	0.8643	Lin2	0.6701	0.8478							0.9990		0.9900
Methoxychlor	0.3446 0.3764	0.3882	0.4437	0.3742	0.3979	Lin2	-0.199	0.4018							0.9930		0.9900
Mirex	0.8671 0.7186	0.7811	0.7561	0.7285	0.7314	Lin2	0.5902	0.7212							1.0000		0.9900
Endosulfan sulfate	1.0885 0.9280	1.0125	0.9949	0.9685	0.9694	Lin2	0.5560	0.9535							1.0000		0.9900
Endrin ketone	1.2047 1.0635	1.1413	1.1735	1.0978	1.1108	Lin2	0.4402	1.1001							0.9990		0.9900
Tetrachloro-m-xylene	1.3193 1.1504	1.1747	1.1408	1.1307	1.1378	Lin2	0.7541	1.1211							1.0000		0.9900
DCB Decachlorobiphenyl	0.9400 0.8441	0.8250	0.8612	0.8129	0.8240	Lin2	0.4320	0.8200							0.9990		0.9900

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
PESTICIDES BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424154

SDG No.:

Instrument ID: SGC_P2 GC Column: CLP1 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 07/30/2018 20:37 Calibration End Date: 07/30/2018 22:03 Calibration ID: 33261

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD1 280-424154/32	07300032.D
Level 2	STD2 280-424154/31	07300031.D
Level 3	STD3 280-424154/30	07300030.D
Level 4	STD4 280-424154/29	07300029.D
Level 5	STD5 280-424154/28	07300028.D
Level 6	STD6 280-424154/27	07300027.D

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5
Hexachlorobenzene	BNB	Lin2	26435330 579549743	61619591	143729423	301526937	448090488	4.00 100	10.0	25.0	50.0	75.0
alpha-BHC	BNB	Lin2	34552903 837167496	84277734	198318300	437711266	657279944	4.00 100	10.0	25.0	50.0	75.0
gamma-BHC (Lindane)	BNB	Lin2	32645348 732993232	76399628	180083119	388161905	572408582	4.00 100	10.0	25.0	50.0	75.0
beta-BHC	BNB	Lin2	16420081 293692978	35312828	75978311	162163172	230418380	4.00 100	10.0	25.0	50.0	75.0
delta-BHC	BNB	Lin2	31038737 740123994	74871204	180446313	388330389	580970293	4.00 100	10.0	25.0	50.0	75.0
Heptachlor	BNB	Lin2	30897488 601002657	68637960	161057328	334257640	493836292	4.00 100	10.0	25.0	50.0	75.0
Aldrin	BNB	Lin2	30469102 666853331	72414369	168363595	361935883	536116408	4.00 100	10.0	25.0	50.0	75.0
Isodrin	BNB	Lin2	26776171 533878826	61470139	138675854	294068764	433038684	4.00 100	10.0	25.0	50.0	75.0
Heptachlor epoxide	BNB	Lin2	27968745 553920726	65308748	147685567	309543730	450666160	4.00 100	10.0	25.0	50.0	75.0
trans-Chlordane	BNB	Lin2	28161792 606271479	66389856	152423956	327278982	488533890	4.00 100	10.0	25.0	50.0	75.0
cis-Chlordane	BNB	Lin2	27554314 582382681	64354140	147911306	314711713	469860150	4.00 100	10.0	25.0	50.0	75.0
4,4'-DDE	BNB	Lin2	25348644 579108265	61037942	144170146	307530439	460900758	4.00 100	10.0	25.0	50.0	75.0
Endosulfan I	BNB	Lin2	27550313 532453215	63652270	145140616	298029157	433072439	4.00 100	10.0	25.0	50.0	75.0
Dieldrin	BNB	Lin2	29636195 600318854	69964783	157600846	330329929	485403091	4.00 100	10.0	25.0	50.0	75.0
Endrin	BNB	Lin2	27694406 565535314	67922310	150320349	312974696	459651752	4.00 100	10.0	25.0	50.0	75.0
4,4'-DDD	BNB	Lin2	23618291 498064423	58699870	127730102	264769383	397468393	4.00 100	10.0	25.0	50.0	75.0

FORM VI
PESTICIDES BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424154

SDG No.:

Instrument ID: SGC_P2 GC Column: CLP1 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 07/30/2018 20:37 Calibration End Date: 07/30/2018 22:03 Calibration ID: 33261

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5
Endosulfan II	BNB	Lin2	25268596 496162248	60763880	134856741	274825254	401836243	4.00 100	10.0	25.0	50.0	75.0
4,4'-DDT	BNB	Lin2	14633442 407988196	40238707	112674764	206711912	337199795	4.00 100	10.0	25.0	50.0	75.0
Endrin aldehyde	BNB	Lin2	21863149 414170914	50372061	112526783	228788529	334832556	4.00 100	10.0	25.0	50.0	75.0
Methoxychlor	BNB	Lin2	7477447 190029541	21024758	56342051	98574119	154129028	4.00 100	10.0	25.0	50.0	75.0
Mirex	BNB	Lin2	18813075 362807509	42297656	96002031	191924433	283327827	4.00 100	10.0	25.0	50.0	75.0
Endosulfan sulfate	BNB	Lin2	23616219 468529883	54828619	126325823	255158502	375512828	4.00 100	10.0	25.0	50.0	75.0
Endrin ketone	BNB	Lin2	26136919 536944119	61804647	148999940	289221668	430313606	4.00 100	10.0	25.0	50.0	75.0
Tetrachloro-m-xylene	BNB	Lin2	28623856 580788251	63614956	144851795	297885684	440755806	4.00 100	10.0	25.0	50.0	75.0
DCB Decachlorobiphenyl	BNB	Lin2	20394568 426153368	44674242	109351478	214161224	319198187	4.00 100	10.0	25.0	50.0	75.0

Curve Type Legend:
Lin2 = Linear 1/conc^2 ISTD

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300027.D
Lims ID: STD6 AB
Client ID:
Sample Type: IC Calib Level: 6
Inject. Date: 30-Jul-2018 20:37:08 ALS Bottle#: 22 Worklist Smp#: 27
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD6 AB
Misc. Info.: 280-0072505-027
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub5

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:34 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
S 1 Hexachlorocyclohexane, technical							
1						400.4	
2						383.0	
						RPD = 4.45	
* 2 1-Bromo-2-nitrobenzene							
1	2.943	2.943	0.000	757317327	150.0	150.0	
2	2.729	2.729	0.000	181442543	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.849	3.850	-0.001	580788251	100.0	101.9	
2	3.719	3.720	-0.001	138750643	100.0	95.8	
						RPD = 6.19	
5 Hexachlorobenzene							
1	4.262	4.263	-0.001	579549743	100.0	100.8	
2	4.199	4.200	-0.001	149527207	100.0	97.8	
						RPD = 3.09	
8 alpha-BHC							
1	4.433	4.435	-0.002	837167496	100.0	101.0	
2	4.346	4.346	0.000	196399713	100.0	96.7	
						RPD = 4.39	
9 gamma-BHC (Lindane)							
1	4.726	4.728	-0.002	732993232	100.0	100.4	
2	4.663	4.663	0.000	174201492	100.0	95.5	
						RPD = 5.01	
10 beta-BHC							
1	4.806	4.808	-0.002	293692978	100.0	98.5	
2	4.741	4.743	-0.002	73140787	100.0	94.3	
						RPD = 4.43	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
12 delta-BHC							
1	4.956	4.957	-0.001	740123994	100.0	100.5	
2	4.976	4.977	-0.001	170781072	100.0	96.5	
						RPD = 3.98	
15 Heptachlor							
1	5.128	5.129	-0.001	601002657	100.0	96.3	
2	5.016	5.017	-0.001	158811680	100.0	93.0	
						RPD = 3.42	
16 Aldrin							
1	5.392	5.393	-0.001	666853331	100.0	98.2	
2	5.276	5.277	-0.001	162582303	100.0	94.2	
						RPD = 4.16	
18 Isodrin							
1	5.707	5.708	-0.001	533878826	100.0	97.1	
2	5.623	5.623	0.000	136360337	100.0	94.0	
						RPD = 3.32	
21 Heptachlor epoxide							
1	5.986	5.988	-0.002	553920726	100.0	95.9	
2	5.796	5.798	-0.002	143023092	100.0	92.9	
						RPD = 3.23	
22 trans-Chlordane							
1	6.120	6.121	-0.001	606271479	100.0	98.4	
2	5.987	5.988	-0.001	152431432	100.0	94.4	
						RPD = 4.16	
23 cis-Chlordane							
1	6.261	6.262	-0.001	582382681	100.0	98.2	
2	6.142	6.143	-0.001	143806191	100.0	93.9	
						RPD = 4.46	
24 4,4'-DDE							
1	6.344	6.346	-0.002	579108265	100.0	99.2	
2	6.329	6.330	-0.001	153994470	100.0	95.0	
						RPD = 4.41	
25 Endosulfan I							
1	6.408	6.409	-0.001	532453215	100.0	95.5	
2	6.199	6.199	0.000	134595379	100.0	91.9	
						RPD = 3.81	
27 Dieldrin							
1	6.663	6.663	0.000	600318854	100.0	96.7	
2	6.487	6.488	-0.001	153562004	100.0	94.0	
						RPD = 2.85	
30 Endrin							
1	6.911	6.911	0.000	565535314	100.0	95.7	
2	6.806	6.808	-0.002	144764934	100.0	92.9	
						RPD = 2.99	
32 4,4'-DDD							
1	6.980	6.981	-0.001	498064423	100.0	97.8	
2	6.944	6.946	-0.002	118868509	100.0	94.6	
						RPD = 3.34	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
34 Endosulfan II							
1	7.147	7.148	-0.001	496162248	100.0	95.4	
2	7.035	7.035	0.000	132904480	100.0	92.8	
						RPD = 2.81	
35 4,4'-DDT							
1	7.276	7.277	-0.001	407988196	100.0	96.4	
2	7.274	7.275	-0.001	128456246	100.0	95.5	
						RPD = 0.95	
36 Endrin aldehyde							
1	7.592	7.593	-0.001	414170914	100.0	96.0	
2	7.394	7.394	0.000	107378424	100.0	93.1	
						RPD = 3.05	
37 Methoxychlor							
1	7.790	7.790	0.000	190029541	100.0	94.2	
2	8.009	8.009	0.000	67479102	100.0	95.3	
						RPD = 1.18	
38 Mirex							
1	7.937	7.938	-0.001	362807509	100.0	98.8	
2	8.187	8.187	0.000	100446459	100.0	95.4	
						RPD = 3.50	
39 Endosulfan sulfate							
1	8.051	8.052	-0.001	468529883	100.0	96.7	
2	7.688	7.688	0.000	122087991	100.0	93.9	
						RPD = 3.03	
40 Endrin ketone							
1	8.345	8.345	0.000	536944119	100.0	96.3	
2	8.239	8.240	-0.001	143745606	100.0	93.8	
						RPD = 2.61	
$ 41 DCB Decachlorobiphenyl							
1	9.375	9.376	-0.001	426153368	100.0	102.4	
2	9.512	9.513	-0.001	110754604	100.0	98.1	
						RPD = 4.34	
S 3 Endosulfan, Total							
1						287.6	
2						278.5	
						RPD = 3.21	

Reagents:

8081IcalL6_00025	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

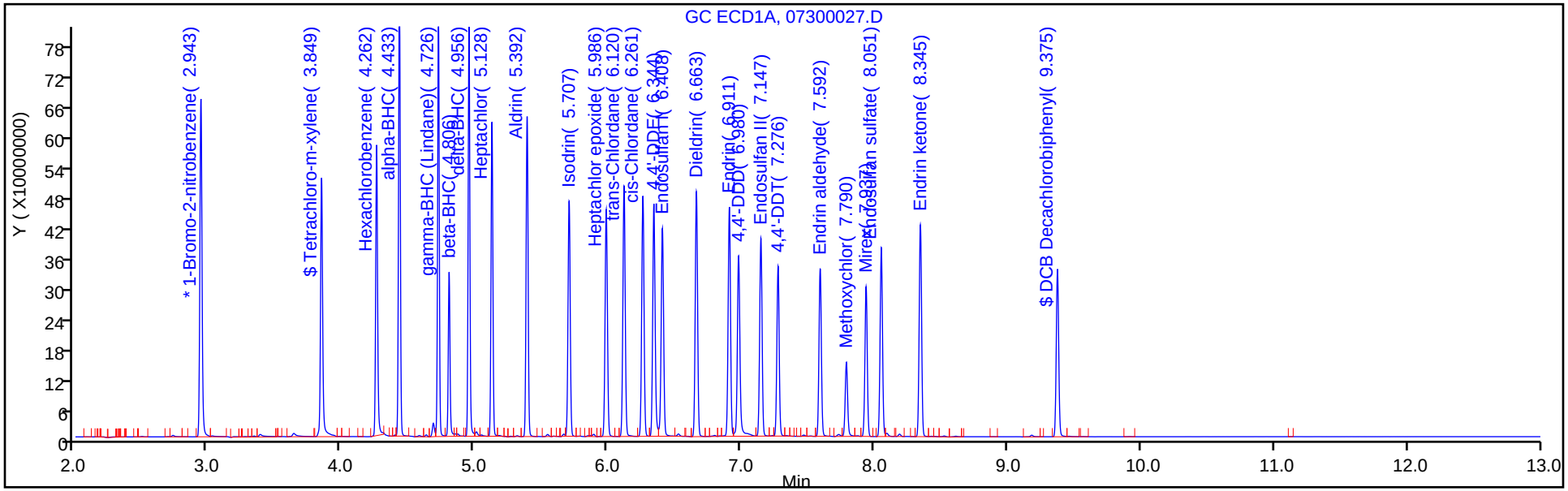
Report Date: 01-Aug-2018 12:39:36 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

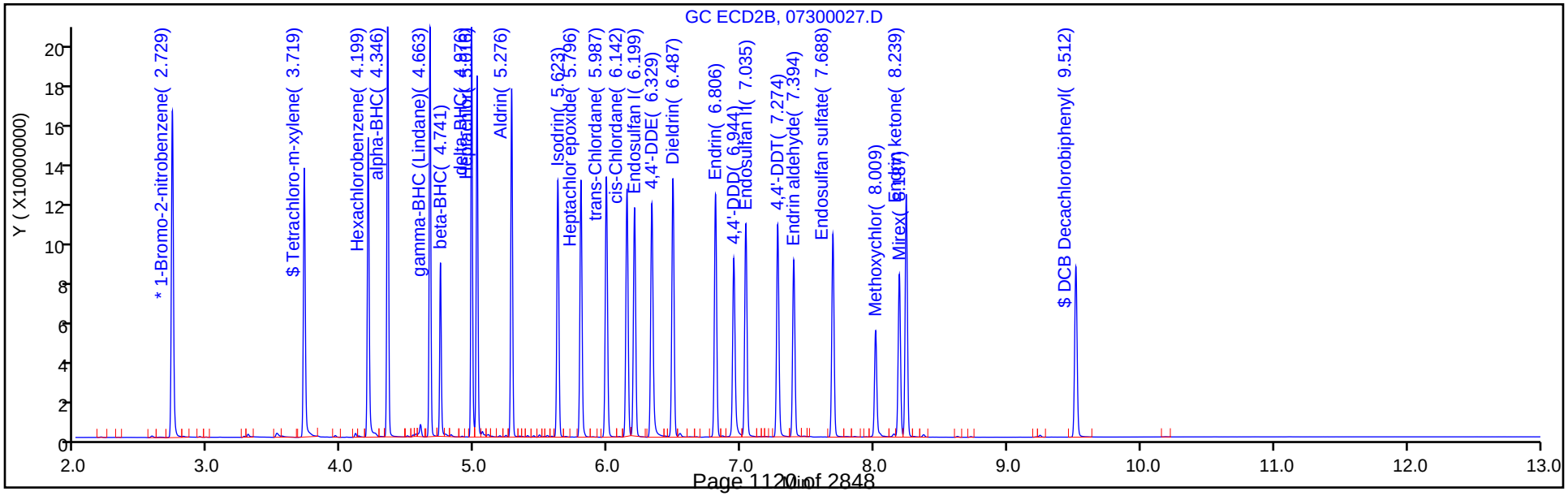
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300027.D

Injection Date:	30-Jul-2018 20:37:08	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD6 AB			Worklist Smp#:	27
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	22
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300028.D
Lims ID: STD5 AB
Client ID:
Sample Type: IC Calib Level: 5
Inject. Date: 30-Jul-2018 20:54:26 ALS Bottle#: 23 Worklist Smp#: 28
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD5 AB
Misc. Info.: 280-0072505-028
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub5

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:41 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:31:22

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
S 1 Hexachlorocyclohexane, technical							
1						306.6	
2						301.1	
						RPD = 1.80	
* 2 1-Bromo-2-nitrobenzene							
1	2.943	2.943	0.001	774762365	150.0	150.0	
2	2.729	2.729	0.000	184464485	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.849	3.850	-0.001	440755806	75.0	75.4	
2	3.720	3.720	0.000	109108396	75.0	74.0	
						RPD = 1.92	
5 Hexachlorobenzene							
1	4.262	4.263	-0.001	448090488	75.0	76.1	
2	4.200	4.200	0.000	115578741	75.0	74.1	
						RPD = 2.73	
8 alpha-BHC							
1	4.434	4.435	-0.001	657279944	75.0	77.6	
2	4.346	4.346	0.000	155422657	75.0	75.2	
						RPD = 3.15	
9 gamma-BHC (Lindane)							
1	4.727	4.728	-0.001	572408582	75.0	76.6	
2	4.663	4.663	0.000	139473661	75.0	75.1	
						RPD = 1.97	
10 beta-BHC							
1	4.807	4.808	-0.001	230418380	75.0	75.3	
2	4.742	4.743	-0.001	59592752	75.0	75.3	
						RPD = 0.05	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
12 delta-BHC							
1	4.957	4.957	0.000	580970293	75.0	77.1	
2	4.976	4.977	-0.001	135851975	75.0	75.5	
						RPD = 2.11	
15 Heptachlor							
1	5.129	5.129	0.000	493836292	75.0	77.2	
2	5.017	5.017	0.000	130118378	75.0	74.8	
						RPD = 3.16	
16 Aldrin							
1	5.392	5.393	-0.001	536116408	75.0	77.1	
2	5.277	5.277	0.000	132557196	75.0	75.4	
						RPD = 2.21	
18 Isodrin							
1	5.707	5.708	-0.001	433038684	75.0	76.9	
2	5.623	5.623	0.000	110813796	75.0	75.0	
						RPD = 2.55	
21 Heptachlor epoxide							
1	5.987	5.988	-0.001	450666160	75.0	76.2	
2	5.797	5.798	-0.001	117203821	75.0	74.7	
						RPD = 1.94	
22 trans-Chlordane							
1	6.121	6.121	0.000	488533890	75.0	77.4	
2	5.988	5.988	0.000	124344375	75.0	75.6	
						RPD = 2.39	
23 cis-Chlordane							
1	6.262	6.262	0.000	469860150	75.0	77.4	
2	6.142	6.143	-0.001	116913599	75.0	74.9	
						RPD = 3.16	
24 4,4'-DDE							
1	6.344	6.346	-0.002	460900758	75.0	77.2	
2	6.329	6.330	-0.001	124559954	75.0	75.5	
						RPD = 2.26	
25 Endosulfan I							
1	6.408	6.409	-0.001	433072439	75.0	75.8	
2	6.199	6.199	0.000	110158159	75.0	73.8	
						RPD = 2.59	
27 Dieldrin							
1	6.662	6.663	-0.001	485403091	75.0	76.3	
2	6.487	6.488	-0.001	124702597	75.0	75.0	
						RPD = 1.80	
30 Endrin							
1	6.910	6.911	-0.001	459651752	75.0	76.0	
2	6.807	6.808	-0.001	118754361	75.0	74.8	
						RPD = 1.47	
32 4,4'-DDD							
1	6.981	6.981	0.000	397468393	75.0	76.2	
2	6.945	6.946	-0.001	95776821	75.0	74.8	
						RPD = 1.85	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
34 Endosulfan II							
1	7.147	7.148	-0.001	401836243	75.0	75.4	
2	7.034	7.035	-0.001	108725549	75.0	74.4	
						RPD = 1.33	
35 4,4'-DDT							
1	7.277	7.277	0.000	337199795	75.0	78.1	
2	7.274	7.275	-0.001	103732133	75.0	75.8	
						RPD = 2.88	
36 Endrin aldehyde							
1	7.592	7.593	-0.001	334832556	75.0	75.7	
2	7.395	7.394	0.001	87626808	75.0	74.5	
						RPD = 1.51	
37 Methoxychlor							
1	7.789	7.790	-0.001	154129028	75.0	74.8	
2	8.010	8.009	0.001	53030266	75.0	73.5	
						RPD = 1.67	
38 Mirex							
1	7.937	7.938	-0.001	283327827	75.0	75.2	
2	8.187	8.187	0.000	79690659	75.0	74.2	
						RPD = 1.38	
39 Endosulfan sulfate							
1	8.052	8.052	0.000	375512828	75.0	75.7	
2	7.688	7.688	0.000	98583598	75.0	74.4	
						RPD = 1.73	
40 Endrin ketone							
1	8.344	8.345	-0.001	430313606	75.0	75.3	
2	8.240	8.240	0.000	115387345	75.0	73.9	
						RPD = 1.93	
$ 41 DCB Decachlorobiphenyl							
1	9.375	9.376	-0.001	319198187	75.0	74.8	
2	9.512	9.513	-0.001	83761992	75.0	72.7	
						RPD = 2.92	
S 3 Endosulfan, Total							
1						226.8	
2						222.6	
						RPD = 1.89	

Reagents:

8081IcalL5_00026	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

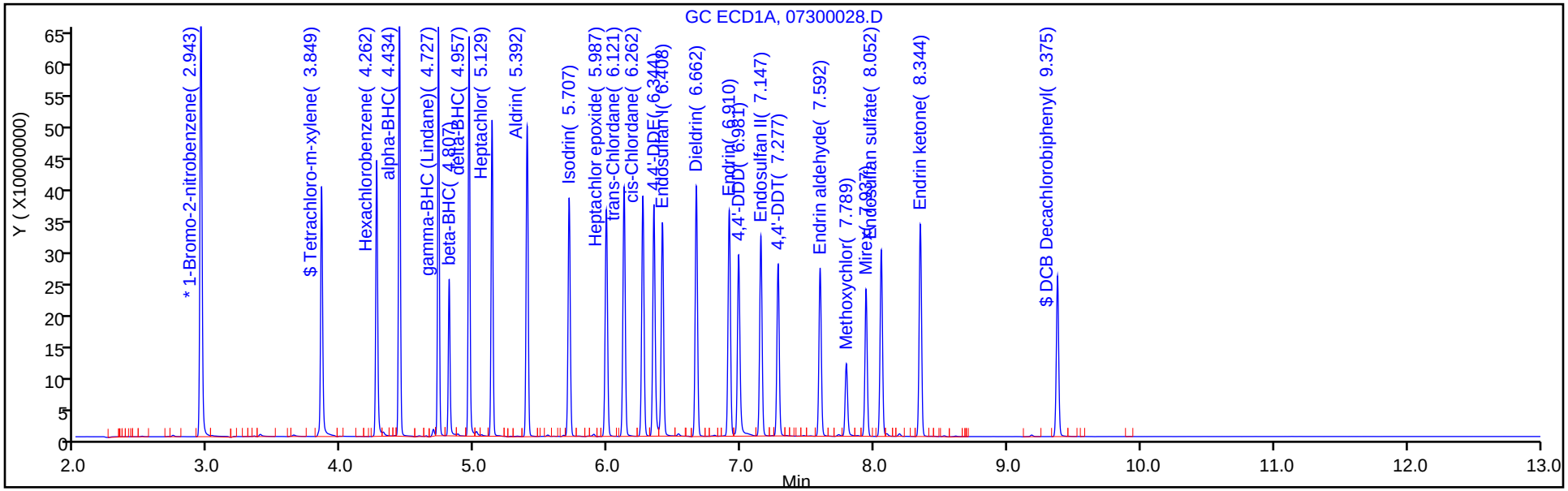
Report Date: 01-Aug-2018 12:39:43 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

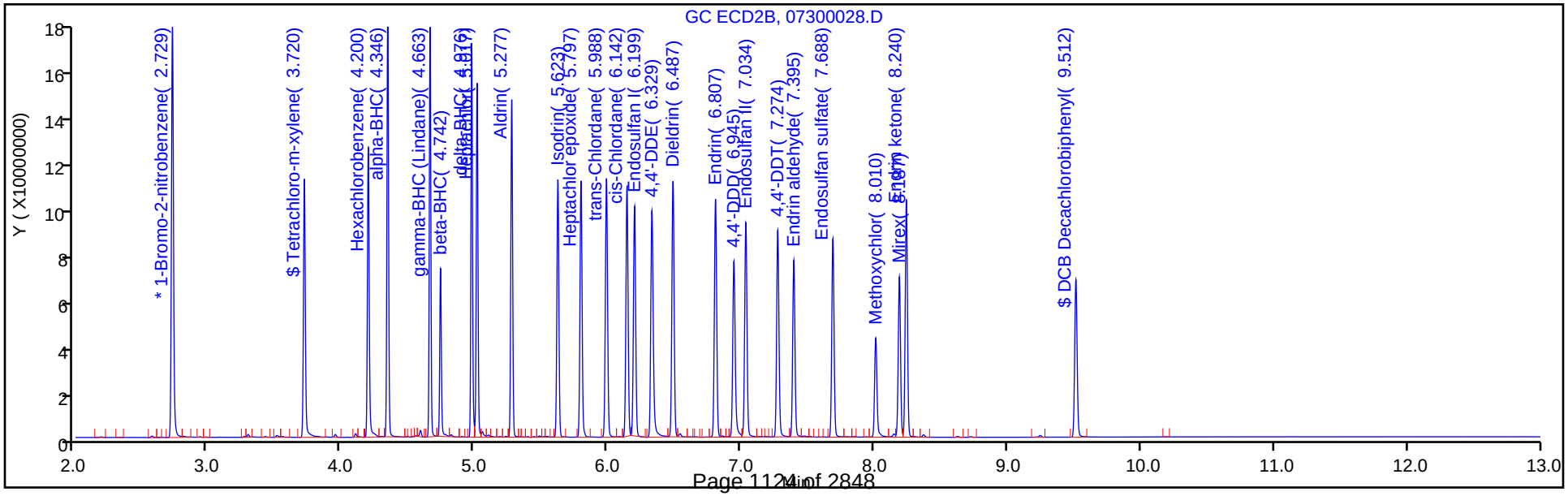
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300028.D

Injection Date:	30-Jul-2018 20:54:26	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD5 AB			Worklist Smp#:	28
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	23
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300029.D
Lims ID: STD4 AB
Client ID:
Sample Type: ICIS Calib Level: 4
Inject. Date: 30-Jul-2018 21:11:49 ALS Bottle#: 24 Worklist Smp#: 29
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD4 AB
Misc. Info.: 280-0072505-029
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub5

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:46 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:30:39

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.944	0.000	790371234	150.0	150.0	
2	2.729	2.729	0.000	187880516	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.850	3.850	0.000	297885684	50.0	49.8	
2	3.720	3.720	0.000	75556133	50.0	50.2	
						RPD = 0.83	
5 Hexachlorobenzene							
1	4.263	4.263	0.000	301526937	50.0	50.1	
2	4.200	4.200	0.000	80229568	50.0	50.2	
						RPD = 0.06	
8 alpha-BHC							
1	4.435	4.435	0.000	437711266	50.0	50.7	
2	4.346	4.346	0.000	108394427	50.0	51.4	
						RPD = 1.25	
9 gamma-BHC (Lindane)							
1	4.728	4.728	0.000	388161905	50.0	50.9	
2	4.663	4.663	0.000	97049610	50.0	51.2	
						RPD = 0.61	
10 beta-BHC							
1	4.808	4.808	0.000	162163172	50.0	51.6	
2	4.743	4.743	0.000	42501522	50.0	52.4	
						RPD = 1.63	
12 delta-BHC							
1	4.957	4.957	0.000	388330389	50.0	50.6	
2	4.977	4.977	0.000	93252524	50.0	50.8	
						RPD = 0.51	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
15 Heptachlor							
1	5.129	5.129	0.000	334257640	50.0	51.0	
2	5.017	5.017	0.000	91787892	50.0	51.5	
						RPD = 1.01	
16 Aldrin							
1	5.393	5.393	0.000	361935883	50.0	51.0	
2	5.277	5.277	0.000	91708706	50.0	51.1	
						RPD = 0.20	
18 Isodrin							
1	5.708	5.708	0.000	294068764	50.0	51.0	
2	5.623	5.623	0.000	77176673	50.0	51.0	
						RPD = 0.03	
21 Heptachlor epoxide							
1	5.988	5.988	0.000	309543730	50.0	51.1	
2	5.798	5.798	0.000	82074910	50.0	51.1	
						RPD = 0.01	
22 trans-Chlordane							
1	6.121	6.121	0.000	327278982	50.0	50.8	
2	5.988	5.988	0.000	85734376	50.0	51.0	
						RPD = 0.47	
23 cis-Chlordane							
1	6.262	6.262	0.000	314711713	50.0	50.7	
2	6.143	6.143	0.000	81503760	50.0	51.1	
						RPD = 0.80	
24 4,4'-DDE							
1	6.346	6.346	0.000	307530439	50.0	50.5	
2	6.330	6.330	0.000	85158312	50.0	50.6	
						RPD = 0.13	
25 Endosulfan I							
1	6.409	6.409	0.000	298029157	50.0	50.9	
2	6.199	6.199	0.000	78562942	50.0	51.5	
						RPD = 1.09	
27 Dieldrin							
1	6.663	6.663	0.000	330329929	50.0	50.8	
2	6.488	6.488	0.000	86054966	50.0	50.6	
						RPD = 0.25	
30 Endrin							
1	6.911	6.911	0.000	312974696	50.0	50.6	
2	6.808	6.808	0.000	82083813	50.0	50.6	
						RPD = 0.12	
32 4,4'-DDD							
1	6.981	6.981	0.000	264769383	50.0	49.6	
2	6.946	6.946	0.000	65504950	50.0	50.0	
						RPD = 0.74	
34 Endosulfan II							
1	7.148	7.148	0.000	274825254	50.0	50.4	
2	7.035	7.035	0.000	75813481	50.0	50.5	
						RPD = 0.39	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
35 4,4'-DDT							
1	7.277	7.277	0.000	206711912	50.0	47.2	
2	7.275	7.275	0.000	69673401	50.0	50.0	
						RPD = 5.64	
36 Endrin aldehyde							
1	7.593	7.593	0.000	228788529	50.0	50.4	
2	7.394	7.394	0.000	60869813	50.0	50.6	
						RPD = 0.25	
37 Methoxychlor							
1	7.790	7.790	0.000	98574119	50.0	47.0	
2	8.009	8.009	0.000	35939209	50.0	48.7	
						RPD = 3.50	
38 Mirex							
1	7.938	7.938	0.000	191924433	50.0	49.7	
2	8.187	8.187	0.000	54763894	50.0	49.7	
						RPD = 0.00	
39 Endosulfan sulfate							
1	8.052	8.052	0.000	255158502	50.0	50.2	
2	7.688	7.688	0.000	68371686	50.0	50.4	
						RPD = 0.29	
40 Endrin ketone							
1	8.345	8.345	0.000	289221668	50.0	49.5	
2	8.240	8.240	0.000	79849300	50.0	49.9	
						RPD = 0.89	
$ 41 DCB Decachlorobiphenyl							
1	9.376	9.376	0.000	214161224	50.0	49.0	
2	9.513	9.513	0.000	57819344	50.0	48.9	
						RPD = 0.21	

Reagents:

8081IcalL4_00031	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

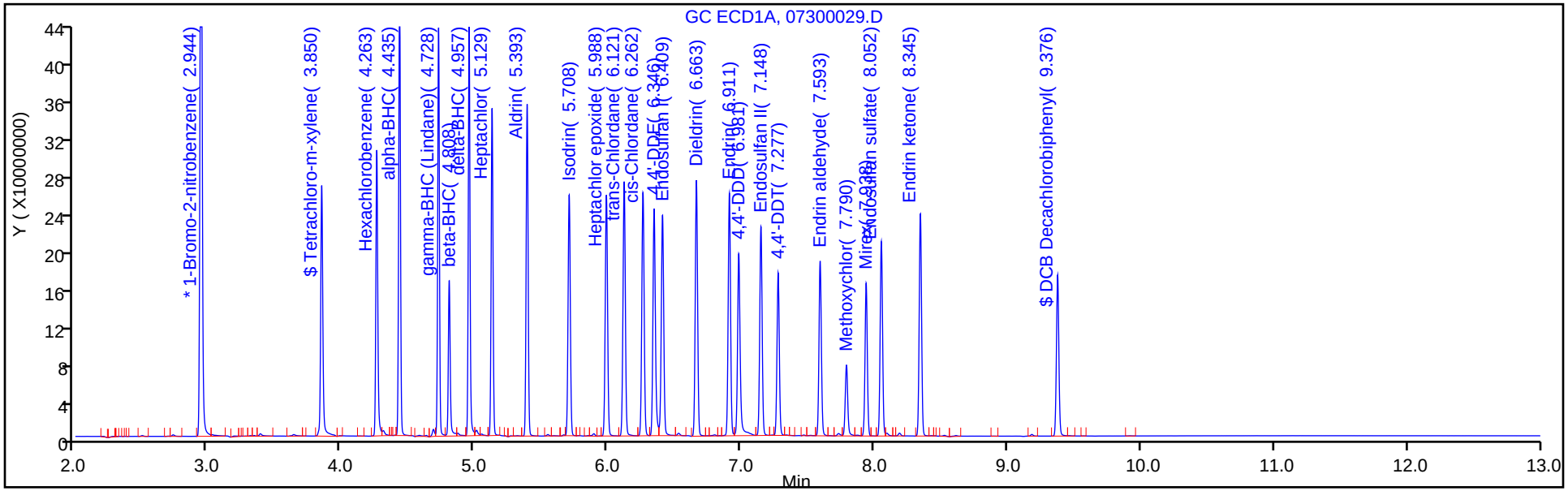
Report Date: 01-Aug-2018 12:39:48 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

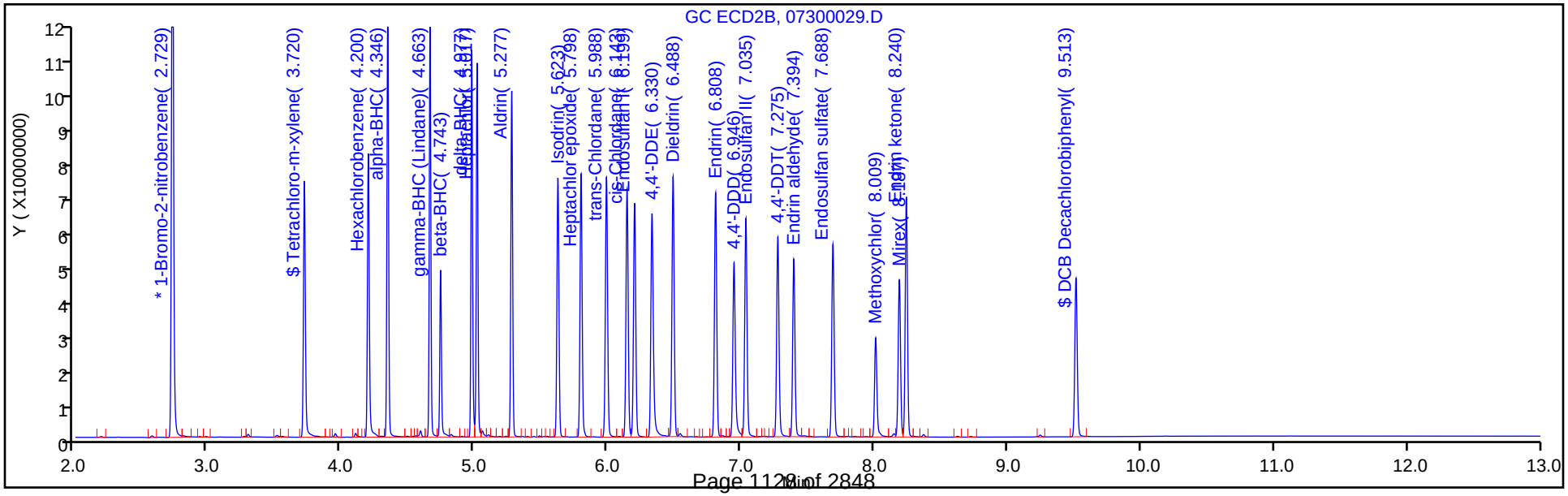
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300029.D

Injection Date:	30-Jul-2018 21:11:49	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD4 AB			Worklist Smp#:	29
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	24
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300030.D
Lims ID: STD3 AB
Client ID:
Sample Type: IC Calib Level: 3
Inject. Date: 30-Jul-2018 21:29:05 ALS Bottle#: 25 Worklist Smp#: 30
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD3 AB
Misc. Info.: 280-0072505-030
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub5

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:52 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:33:00

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
S 1 Hexachlorocyclohexane, technical							
1						97.3	
2						100.8	
						RPD = 3.53	
* 2 1-Bromo-2-nitrobenzene							
1	2.943	2.944	-0.001	761839812	150.0	150.0	
2	2.729	2.729	0.000	177429625	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.850	3.850	0.000	144851795	25.0	24.8	
2	3.720	3.720	0.000	37996772	25.0	26.5	
						RPD = 6.75	
5 Hexachlorobenzene							
1	4.263	4.263	0.000	143729423	25.0	24.7	
2	4.199	4.200	-0.001	39891070	25.0	25.9	
						RPD = 5.02	
8 alpha-BHC							
1	4.434	4.435	-0.001	198318300	25.0	23.9	
2	4.346	4.346	0.000	50931153	25.0	25.3	
						RPD = 5.70	
9 gamma-BHC (Lindane)							
1	4.727	4.728	-0.001	180083119	25.0	24.4	
2	4.663	4.663	0.000	45901883	25.0	25.4	
						RPD = 4.07	
10 beta-BHC							
1	4.808	4.808	0.000	75978311	25.0	24.5	
2	4.743	4.743	0.000	19234614	25.0	24.6	
						RPD = 0.37	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
12 delta-BHC							
1	4.957	4.957	0.000	180446313	25.0	24.5	
2	4.977	4.977	0.000	44203055	25.0	25.4	
						RPD = 3.96	
15 Heptachlor							
1	5.129	5.129	0.000	161057328	25.0	25.2	
2	5.017	5.017	0.000	43613658	25.0	25.5	
						RPD = 1.14	
16 Aldrin							
1	5.393	5.393	0.000	168363595	25.0	24.5	
2	5.277	5.277	0.000	43828106	25.0	25.6	
						RPD = 4.36	
18 Isodrin							
1	5.708	5.708	0.000	138675854	25.0	24.7	
2	5.624	5.623	0.001	37281977	25.0	25.7	
						RPD = 4.21	
21 Heptachlor epoxide							
1	5.988	5.988	0.000	147685567	25.0	25.0	
2	5.798	5.798	0.000	40055487	25.0	26.0	
						RPD = 3.94	
22 trans-Chlordane							
1	6.121	6.121	0.000	152423956	25.0	24.4	
2	5.988	5.988	0.000	41159594	25.0	25.7	
						RPD = 5.02	
23 cis-Chlordane							
1	6.262	6.262	0.000	147911306	25.0	24.6	
2	6.143	6.143	0.000	39470379	25.0	25.9	
						RPD = 5.25	
24 4,4'-DDE							
1	6.346	6.346	0.000	144170146	25.0	24.6	
2	6.332	6.330	0.002	41000059	25.0	25.6	
						RPD = 4.25	
25 Endosulfan I							
1	6.408	6.409	-0.001	145140616	25.0	25.4	
2	6.200	6.199	0.001	38561425	25.0	26.4	
						RPD = 3.74	
27 Dieldrin							
1	6.663	6.663	0.000	157600846	25.0	24.9	
2	6.488	6.488	0.000	42058793	25.0	26.0	
						RPD = 4.26	
30 Endrin							
1	6.910	6.911	-0.001	150320349	25.0	25.0	
2	6.808	6.808	0.000	40489416	25.0	26.2	
						RPD = 4.68	
32 4,4'-DDD							
1	6.983	6.981	0.002	127730102	25.0	24.6	
2	6.948	6.946	0.002	32714613	25.0	26.1	
						RPD = 5.73	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
34 Endosulfan II							
1	7.148	7.148	0.000	134856741	25.0	25.3	
2	7.035	7.035	0.000	38302365	25.0	26.5	
						RPD = 4.36	
35 4,4'-DDT							
1	7.278	7.277	0.001	112674764	25.0	27.1	
2	7.276	7.275	0.001	34278089	25.0	26.0	
						RPD = 4.10	
36 Endrin aldehyde							
1	7.593	7.593	0.000	112526783	25.0	25.3	
2	7.395	7.394	0.001	30488706	25.0	26.4	
						RPD = 4.03	
37 Methoxychlor							
1	7.790	7.790	0.000	56342051	25.0	28.1	
2	8.010	8.009	0.001	19098062	25.0	27.2	
						RPD = 3.37	
38 Mirex							
1	7.937	7.938	-0.001	96002031	25.0	25.4	
2	8.188	8.187	0.001	28186274	25.0	26.5	
						RPD = 4.44	
39 Endosulfan sulfate							
1	8.052	8.052	0.000	126325823	25.0	25.5	
2	7.689	7.688	0.001	34414908	25.0	26.4	
						RPD = 3.52	
40 Endrin ketone							
1	8.346	8.345	0.001	148999940	25.0	26.3	
2	8.240	8.240	0.000	41271135	25.0	27.0	
						RPD = 2.61	
$ 41 DCB Decachlorobiphenyl							
1	9.375	9.376	-0.001	109351478	25.0	25.7	
2	9.513	9.513	0.000	30378806	25.0	26.8	
						RPD = 3.99	
S 3 Endosulfan, Total							
1						76.2	
2						79.2	
						RPD = 3.87	

Reagents:

8081IcalL3_00028	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

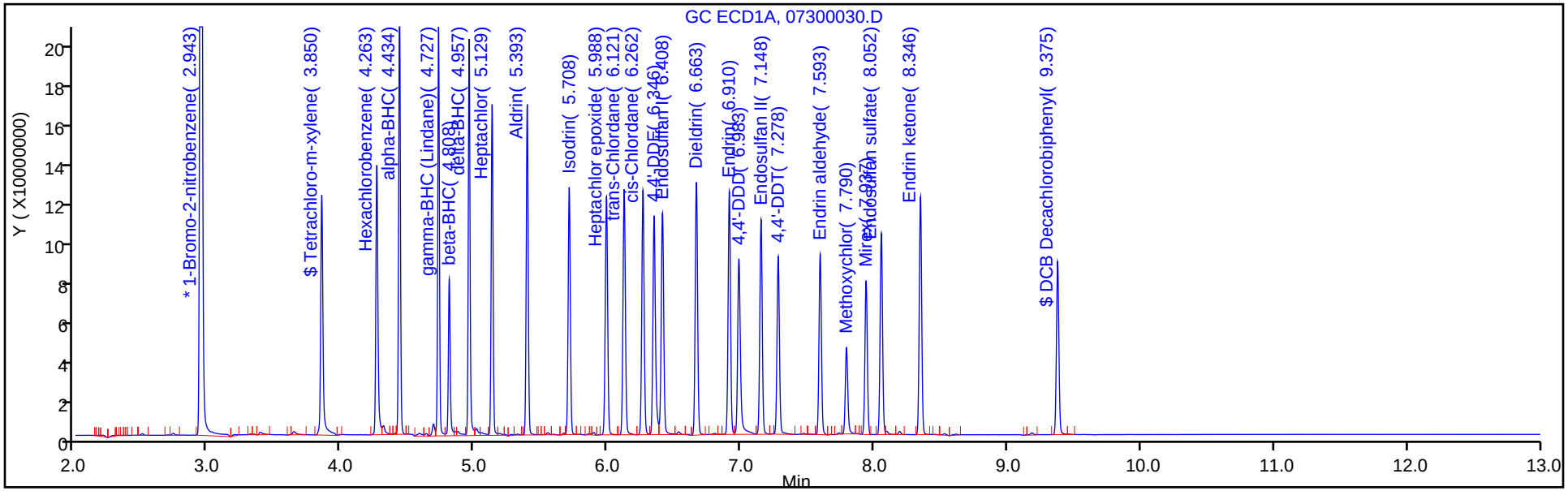
Report Date: 01-Aug-2018 12:39:54 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

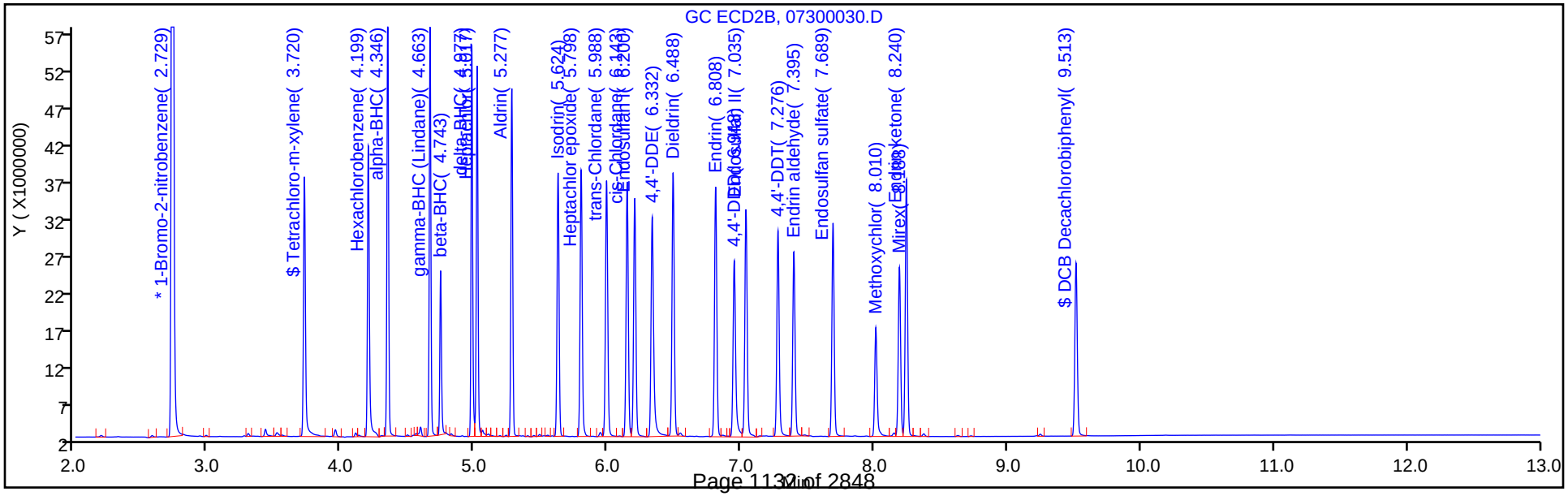
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300030.D

Injection Date:	30-Jul-2018 21:29:05	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD3 AB			Worklist Smp#:	30
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	25
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300031.D
Lims ID: STD2 AB
Client ID:
Sample Type: IC Calib Level: 2
Inject. Date: 30-Jul-2018 21:46:23 ALS Bottle#: 26 Worklist Smp#: 31
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD2 AB
Misc. Info.: 280-0072505-031
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub5

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:59 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
S 1 Hexachlorocyclohexane, technical							
1						38.9	
2						40.3	
						RPD = 3.42	
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.944	-0.001	812304364	150.0	150.0	
2	2.729	2.729	0.000	192722992	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.850	3.850	0.000	63614956	10.0	9.81	
2	3.720	3.720	0.000	16004585	10.0	9.99	
						RPD = 1.87	
5 Hexachlorobenzene							
1	4.264	4.263	0.001	61619591	10.0	9.77	
2	4.201	4.200	0.001	17655819	10.0	9.97	
						RPD = 2.04	
8 alpha-BHC							
1	4.434	4.435	-0.001	84277734	10.0	9.66	
2	4.347	4.346	0.001	22092790	10.0	9.88	
						RPD = 2.24	
9 gamma-BHC (Lindane)							
1	4.727	4.728	-0.001	76399628	10.0	9.66	
2	4.664	4.663	0.001	20218500	10.0	10.1	
						RPD = 4.42	
10 beta-BHC							
1	4.809	4.808	0.001	35312828	10.0	10.0	
2	4.744	4.743	0.001	9330523	10.0	10.4	
						RPD = 3.59	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
12 delta-BHC							
1	4.957	4.957	0.000	74871204	10.0	9.61	
2	4.978	4.977	0.001	18916563	10.0	9.94	
						RPD = 3.41	
15 Heptachlor							
1	5.129	5.129	0.000	68637960	10.0	9.71	
2	5.017	5.017	0.000	20290464	10.0	10.4	
						RPD = 6.98	
16 Aldrin							
1	5.392	5.393	-0.001	72414369	10.0	9.81	
2	5.277	5.277	0.000	19387769	10.0	10.2	
						RPD = 3.51	
18 Isodrin							
1	5.709	5.708	0.001	61470139	10.0	9.94	
2	5.624	5.623	0.001	16816928	10.0	10.3	
						RPD = 3.13	
21 Heptachlor epoxide							
1	5.987	5.988	-0.001	65308748	10.0	10.1	
2	5.798	5.798	0.000	17989107	10.0	10.3	
						RPD = 2.28	
22 trans-Chlordane							
1	6.120	6.121	-0.001	66389856	10.0	9.84	
2	5.989	5.988	0.001	18119247	10.0	10.1	
						RPD = 2.49	
23 cis-Chlordane							
1	6.262	6.262	0.000	64354140	10.0	9.84	
2	6.143	6.143	0.000	17482058	10.0	10.2	
						RPD = 3.25	
24 4,4'-DDE							
1	6.347	6.346	0.001	61037942	10.0	9.75	
2	6.332	6.330	0.002	18021221	10.0	10.2	
						RPD = 4.32	
25 Endosulfan I							
1	6.409	6.409	0.000	63652270	10.0	10.1	
2	6.199	6.199	0.000	17156189	10.0	10.3	
						RPD = 2.61	
27 Dieldrin							
1	6.664	6.663	0.001	69964783	10.0	10.1	
2	6.488	6.488	0.000	18527703	10.0	10.2	
						RPD = 1.51	
30 Endrin							
1	6.911	6.911	0.000	67922310	10.0	10.3	
2	6.808	6.808	0.000	17913825	10.0	10.3	
						RPD = 0.06	
32 4,4'-DDD							
1	6.984	6.981	0.003	58699870	10.0	10.4	
2	6.948	6.946	0.002	14582585	10.0	10.3	
						RPD = 1.16	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
34 Endosulfan II							
1	7.149	7.148	0.001	60763880	10.0	10.4	
2	7.035	7.035	0.000	17329591	10.0	10.3	
						RPD = 0.57	
35 4,4'-DDT							
1	7.279	7.277	0.002	40238707	10.0	9.62	
2	7.276	7.275	0.001	14418885	10.0	10.0	
						RPD = 3.86	
36 Endrin aldehyde							
1	7.594	7.593	0.001	50372061	10.0	10.2	
2	7.396	7.394	0.002	13550276	10.0	10.3	
						RPD = 0.75	
37 Methoxychlor							
1	7.791	7.790	0.001	21024758	10.0	10.2	
2	8.011	8.009	0.002	8087258	10.0	10.2	
						RPD = 0.87	
38 Mirex							
1	7.939	7.938	0.001	42297656	10.0	10.0	
2	8.188	8.187	0.001	12484465	10.0	10.1	
						RPD = 1.14	
39 Endosulfan sulfate							
1	8.053	8.052	0.001	54828619	10.0	10.0	
2	7.689	7.688	0.001	15209233	10.0	10.2	
						RPD = 1.77	
40 Endrin ketone							
1	8.346	8.345	0.001	61804647	10.0	9.97	
2	8.240	8.240	0.000	17693633	10.0	10.1	
						RPD = 1.73	
$ 41 DCB Decachlorobiphenyl							
1	9.376	9.376	0.000	44674242	10.0	9.53	
2	9.514	9.513	0.001	13228713	10.0	10.1	
						RPD = 6.06	
S 3 Endosulfan, Total							
1						30.4	
2						30.8	
						RPD = 1.26	

Reagents:

8081IcalL2_00025	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

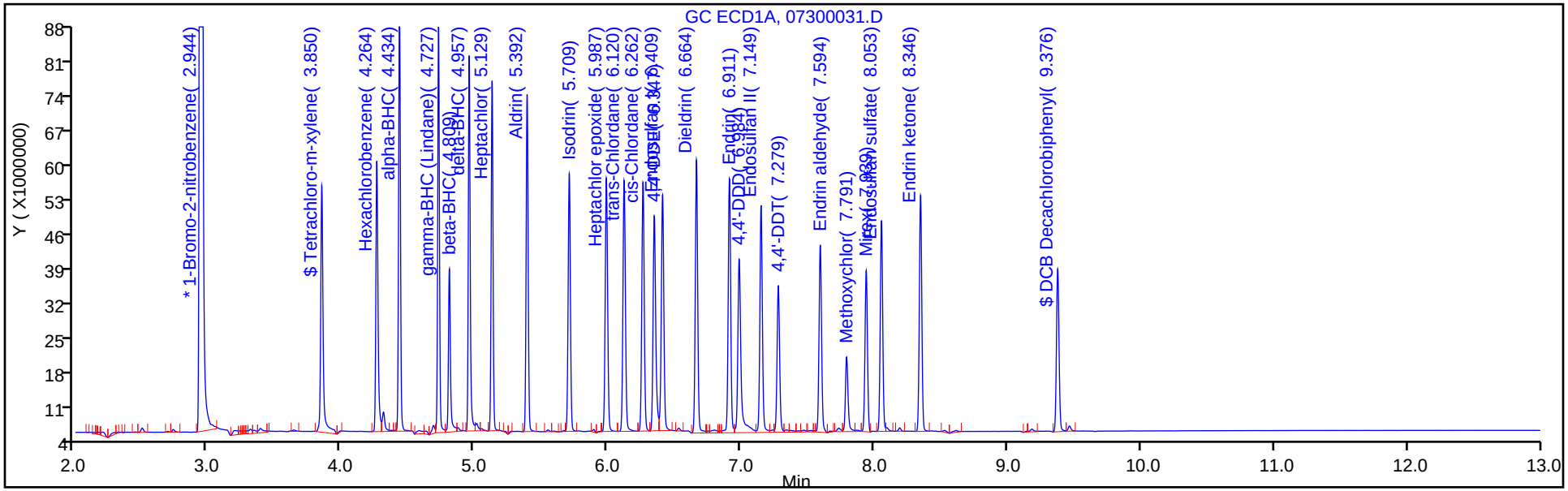
Report Date: 01-Aug-2018 12:40:01 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

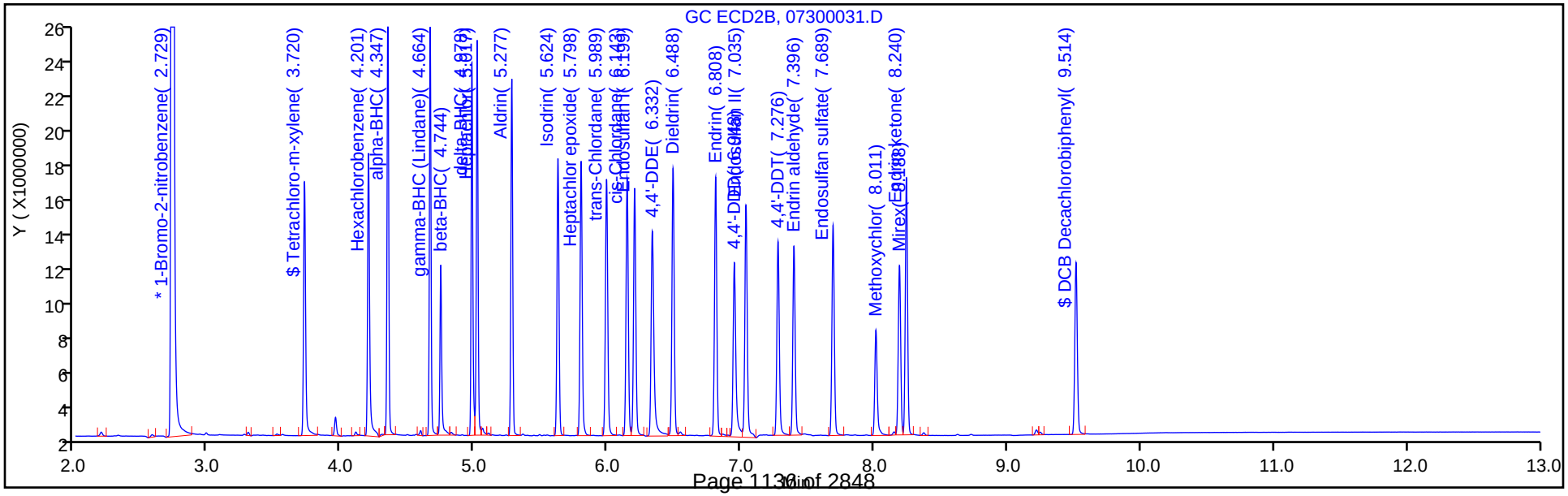
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300031.D

Injection Date:	30-Jul-2018 21:46:23	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD2 AB			Worklist Smp#:	31
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	26
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D
Lims ID: STD1 AB
Client ID:
Sample Type: IC Calib Level: 1
Inject. Date: 30-Jul-2018 22:03:40 ALS Bottle#: 27 Worklist Smp#: 32
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD1 AB
Misc. Info.: 280-0072505-032
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub5

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:40:05 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:32:53

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
S 1 Hexachlorocyclohexane, technical							
1						16.2	
2						15.9	
						RPD = 1.72	
* 2 1-Bromo-2-nitrobenzene							
1	2.945	2.944	0.001	813594398	150.0	150.0	
2	2.731	2.729	0.002	193530453	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.853	3.850	0.003	28623856	4.00	4.03	
2	3.722	3.720	0.002	6820836	4.00	3.97	
						RPD = 1.57	
5 Hexachlorobenzene							
1	4.266	4.263	0.003	26435330	4.00	4.04	
2	4.202	4.200	0.002	8067845	4.00	3.99	
						RPD = 1.35	
8 alpha-BHC							
1	4.435	4.435	0.000	34552903	4.00	4.07	
2	4.347	4.346	0.001	9521647	4.00	4.01	
						RPD = 1.52	
9 gamma-BHC (Lindane)							
1	4.728	4.728	0.000	32645348	4.00	4.06	
2	4.665	4.663	0.002	8436795	4.00	3.97	
						RPD = 2.13	
10 beta-BHC							
1	4.810	4.808	0.002	16420081	4.00	4.01	
2	4.744	4.743	0.001	4122493	4.00	3.95	
						RPD = 1.50	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
12 delta-BHC							
1	4.959	4.957	0.002	31038737	4.00	4.07	
2	4.979	4.977	0.002	7789580	4.00	4.00	
						RPD = 1.72	
15 Heptachlor							
1	5.130	5.129	0.001	30897488	4.00	4.03	
2	5.018	5.017	0.001	8665641	4.00	3.92	
						RPD = 2.79	
16 Aldrin							
1	5.393	5.393	0.000	30469102	4.00	4.03	
2	5.278	5.277	0.001	8114892	4.00	3.96	
						RPD = 1.84	
18 Isodrin							
1	5.710	5.708	0.002	26776171	4.00	4.01	
2	5.625	5.623	0.002	7199484	4.00	3.94	
						RPD = 1.69	
21 Heptachlor epoxide							
1	5.988	5.988	0.000	27968745	4.00	3.99	
2	5.799	5.798	0.001	7714190	4.00	3.93	
						RPD = 1.36	
22 trans-Chlordane							
1	6.122	6.121	0.001	28161792	4.00	4.03	
2	5.990	5.988	0.002	7721610	4.00	3.97	
						RPD = 1.55	
23 cis-Chlordane							
1	6.263	6.262	0.001	27554314	4.00	4.03	
2	6.144	6.143	0.001	7483533	4.00	3.95	
						RPD = 1.87	
24 4,4'-DDE							
1	6.349	6.346	0.003	25348644	4.00	4.04	
2	6.335	6.330	0.005	7365520	4.00	3.96	
						RPD = 2.12	
25 Endosulfan I							
1	6.410	6.409	0.001	27550313	4.00	3.98	
2	6.200	6.199	0.001	7302660	4.00	3.92	
						RPD = 1.51	
27 Dieldrin							
1	6.665	6.663	0.002	29636195	4.00	3.99	
2	6.489	6.488	0.001	7700648	4.00	3.94	
						RPD = 1.09	
30 Endrin							
1	6.912	6.911	0.001	27694406	4.00	3.95	
2	6.809	6.808	0.001	7415323	4.00	3.93	
						RPD = 0.57	
32 4,4'-DDD							
1	6.986	6.981	0.005	23618291	4.00	3.95	
2	6.950	6.946	0.004	6202612	4.00	3.94	
						RPD = 0.29	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
34 Endosulfan II							
1	7.150	7.148	0.002	25268596	4.00	3.94	
2	7.037	7.035	0.002	7803343	4.00	3.93	
						RPD = 0.35	
35 4,4'-DDT							
1	7.280	7.277	0.003	14633442	4.00	4.02	
2	7.278	7.275	0.003	5853645	4.00	3.98	
						RPD = 1.06	
36 Endrin aldehyde							
1	7.595	7.593	0.002	21863149	4.00	3.96	
2	7.397	7.394	0.003	5899381	4.00	3.93	
						RPD = 0.81	
37 Methoxychlor							
1	7.793	7.790	0.003	7477447	4.00	3.92	
2	8.013	8.009	0.004	3375867	4.00	3.93	
						RPD = 0.02	
38 Mirex							
1	7.939	7.938	0.001	18813075	4.00	3.99	
2	8.189	8.187	0.002	5688145	4.00	3.95	
						RPD = 1.00	
39 Endosulfan sulfate							
1	8.054	8.052	0.002	23616219	4.00	3.98	
2	7.691	7.688	0.003	6649151	4.00	3.94	
						RPD = 1.13	
40 Endrin ketone							
1	8.347	8.345	0.002	26136919	4.00	3.98	
2	8.241	8.240	0.001	7706705	4.00	3.94	
						RPD = 1.02	
$ 41 DCB Decachlorobiphenyl							
1	9.376	9.376	0.000	20394568	4.00	4.06	
2	9.515	9.513	0.002	5915754	4.00	3.95	
						RPD = 2.71	
S 3 Endosulfan, Total							
1						11.9	
2						11.8	
						RPD = 1.00	

Reagents:

8081IcalL1_00025	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

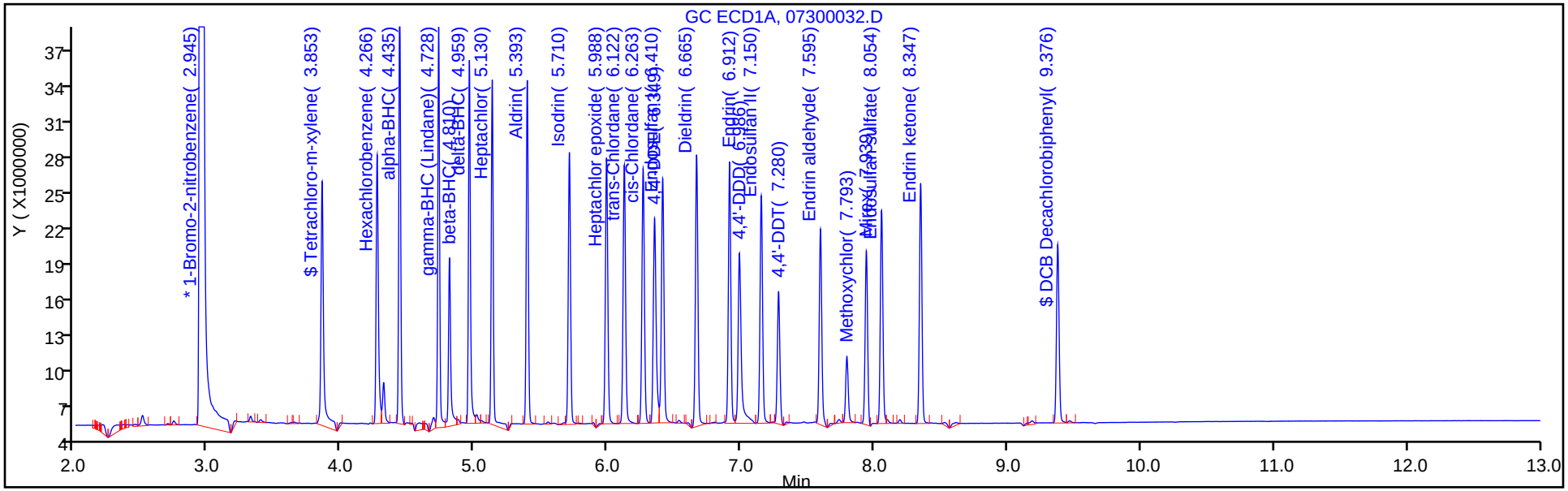
Report Date: 01-Aug-2018 12:40:08 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

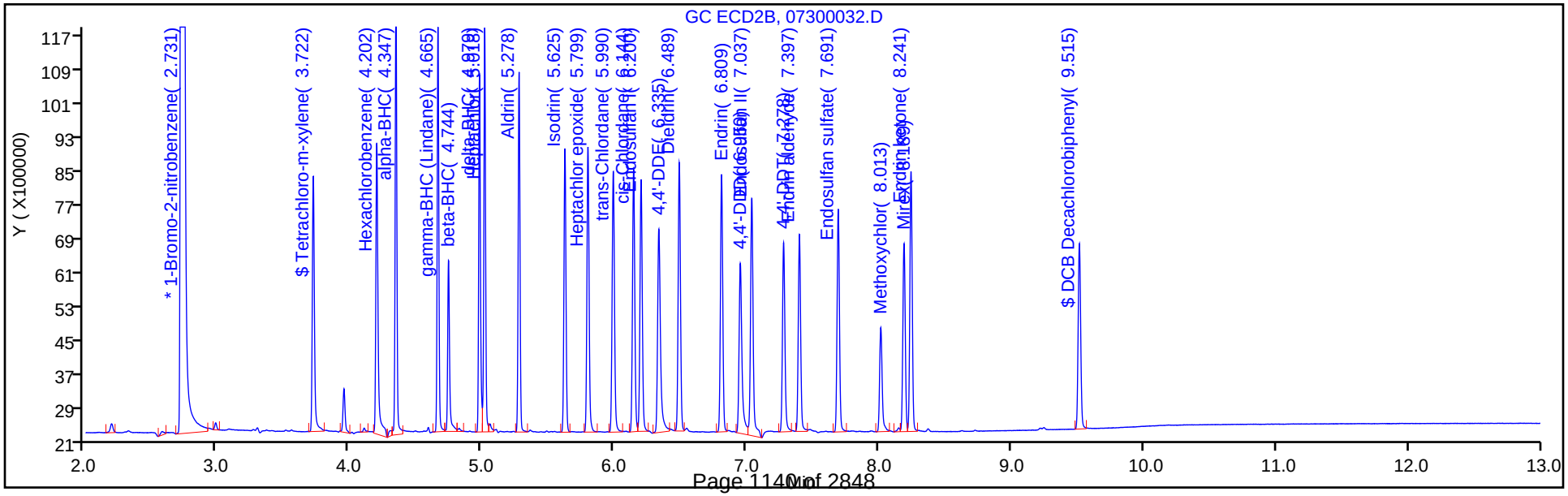
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Injection Date:	30-Jul-2018 22:03:40	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD1 AB			Worklist Smp#:	32
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	27
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM VI
PESTICIDES BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424154

SDG No.:

Instrument ID: SGC_P2 GC Column: CLP2 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 07/30/2018 20:37 Calibration End Date: 07/30/2018 22:03 Calibration ID: 33262

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD1 280-424154/32	07300032.D
Level 2	STD2 280-424154/31	07300031.D
Level 3	STD3 280-424154/30	07300030.D
Level 4	STD4 280-424154/29	07300029.D
Level 5	STD5 280-424154/28	07300028.D
Level 6	STD6 280-424154/27	07300027.D

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5		B	M1	M2								
Hexachlorobenzene	1.5633 1.2362	1.3742	1.3490	1.2811	1.2531	Lin2	1.2652	1.2514							0.9990		0.9900
alpha-BHC	1.8450 1.6237	1.7195	1.7223	1.7308	1.6851	Lin2	0.6812	1.6719							0.9990		0.9900
gamma-BHC (Lindane)	1.6348 1.4401	1.5736	1.5522	1.5496	1.5122	Lin2	0.5689	1.5027							0.9990		0.9900
beta-BHC	0.7988 0.6047	0.7262	0.6504	0.6786	0.6461	Lin2	0.6925	0.6341							0.9980		0.9900
delta-BHC	1.5094 1.4119	1.4723	1.4948	1.4890	1.4729	Lin2	0.2005	1.4606							0.9990		0.9900
Heptachlor	1.6791 1.3129	1.5792	1.4748	1.4656	1.4108	Lin2	1.2315	1.3981							0.9980		0.9900
Aldrin	1.5724 1.3441	1.5090	1.4821	1.4644	1.4372	Lin2	0.6660	1.4201							0.9990		0.9900
Isodrin	1.3950 1.1273	1.3089	1.2607	1.2323	1.2015	Lin2	0.8852	1.1904							0.9980		0.9900
Heptachlor epoxide	1.4948 1.1824	1.4001	1.3545	1.3105	1.2707	Lin2	1.0151	1.2622							0.9980		0.9900
trans-Chlordane	1.4962 1.2602	1.4103	1.3919	1.3690	1.3482	Lin2	0.7135	1.3277							0.9990		0.9900
cis-Chlordane	1.4501 1.1889	1.3607	1.3347	1.3014	1.2676	Lin2	0.8278	1.2574							0.9980		0.9900
Endosulfan I	1.4150 1.1127	1.3353	1.3040	1.2545	1.1944	Lin2	0.9556	1.2003							0.9970		0.9900
4,4'-DDE	1.4272 1.2731	1.4026	1.3865	1.3598	1.3505	Lin2	0.4199	1.3363							0.9990		0.9900
Dieldrin	1.4921 1.2695	1.4420	1.4223	1.3741	1.3520	Lin2	0.6699	1.3436							0.9980		0.9900
Endrin	1.4369 1.1968	1.3943	1.3692	1.3107	1.2876	Lin2	0.7202	1.2805							0.9970		0.9900

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
PESTICIDES BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424154

SDG No.:

Instrument ID: SGC_P2 GC Column: CLP2 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 07/30/2018 20:37 Calibration End Date: 07/30/2018 22:03 Calibration ID: 33262

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5		B	M1	M2								
4,4'-DDD	1.2019 0.9827	1.1350	1.1063	1.0460	1.0384	Lin2	0.7503	1.0308							0.9980		0.9900
Endosulfan II	1.5120 1.0987	1.3488	1.2952	1.2106	1.1788	Lin2	1.4612	1.1685							0.9970		0.9900
4,4'-DDT	1.1342 1.0620	1.1222	1.1592	1.1125	1.1247	Lin2	0.1164	1.1107							0.9990		0.9900
Endrin aldehyde	1.1431 0.8877	1.0546	1.0310	0.9719	0.9501	Lin2	0.8591	0.9444							0.9970		0.9900
Endosulfan sulfate	1.2884 1.0093	1.1838	1.1638	1.0917	1.0689	Lin2	0.9584	1.0651							0.9980		0.9900
Methoxychlor	0.6541 0.5579	0.6294	0.6458	0.5739	0.5750	Lin2	0.3318	0.5821							0.9970		0.9900
Mirex	1.1022 0.8304	0.9717	0.9532	0.8744	0.8640	Lin2	1.0121	0.8596							0.9980		0.9900
Endrin ketone	1.4933 1.1884	1.3771	1.3956	1.2750	1.2511	Lin2	1.0249	1.2561							0.9970		0.9900
Tetrachloro-m-xylene	1.3217 1.1471	1.2457	1.2849	1.2064	1.1830	Lin2	0.5547	1.1914							0.9980		0.9900
DCB Decachlorobiphenyl	1.1463 0.9156	1.0296	1.0273	0.9232	0.9082	Lin2	0.9341	0.9242							0.9980		0.9900

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
PESTICIDES BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424154

SDG No.:

Instrument ID: SGC_P2 GC Column: CLP2 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 07/30/2018 20:37 Calibration End Date: 07/30/2018 22:03 Calibration ID: 33262

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD1 280-424154/32	07300032.D
Level 2	STD2 280-424154/31	07300031.D
Level 3	STD3 280-424154/30	07300030.D
Level 4	STD4 280-424154/29	07300029.D
Level 5	STD5 280-424154/28	07300028.D
Level 6	STD6 280-424154/27	07300027.D

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5
Hexachlorobenzene	BNB	Lin2	8067845 149527207	17655819	39891070	80229568	115578741	4.00 100	10.0	25.0	50.0	75.0
alpha-BHC	BNB	Lin2	9521647 196399713	22092790	50931153	108394427	155422657	4.00 100	10.0	25.0	50.0	75.0
gamma-BHC (Lindane)	BNB	Lin2	8436795 174201492	20218500	45901883	97049610	139473661	4.00 100	10.0	25.0	50.0	75.0
beta-BHC	BNB	Lin2	4122493 73140787	9330523	19234614	42501522	59592752	4.00 100	10.0	25.0	50.0	75.0
delta-BHC	BNB	Lin2	7789580 170781072	18916563	44203055	93252524	135851975	4.00 100	10.0	25.0	50.0	75.0
Heptachlor	BNB	Lin2	8665641 158811680	20290464	43613658	91787892	130118378	4.00 100	10.0	25.0	50.0	75.0
Aldrin	BNB	Lin2	8114892 162582303	19387769	43828106	91708706	132557196	4.00 100	10.0	25.0	50.0	75.0
Isodrin	BNB	Lin2	7199484 136360337	16816928	37281977	77176673	110813796	4.00 100	10.0	25.0	50.0	75.0
Heptachlor epoxide	BNB	Lin2	7714190 143023092	17989107	40055487	82074910	117203821	4.00 100	10.0	25.0	50.0	75.0
trans-Chlordane	BNB	Lin2	7721610 152431432	18119247	41159594	85734376	124344375	4.00 100	10.0	25.0	50.0	75.0
cis-Chlordane	BNB	Lin2	7483533 143806191	17482058	39470379	81503760	116913599	4.00 100	10.0	25.0	50.0	75.0
Endosulfan I	BNB	Lin2	7302660 134595379	17156189	38561425	78562942	110158159	4.00 100	10.0	25.0	50.0	75.0
4,4'-DDE	BNB	Lin2	7365520 153994470	18021221	41000059	85158312	124559954	4.00 100	10.0	25.0	50.0	75.0
Dieldrin	BNB	Lin2	7700648 153562004	18527703	42058793	86054966	124702597	4.00 100	10.0	25.0	50.0	75.0
Endrin	BNB	Lin2	7415323 144764934	17913825	40489416	82083813	118754361	4.00 100	10.0	25.0	50.0	75.0
4,4'-DDD	BNB	Lin2	6202612 118868509	14582585	32714613	65504950	95776821	4.00 100	10.0	25.0	50.0	75.0

FORM VI
PESTICIDES BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Denver Job No.: 160-29498-1 Analy Batch No.: 424154

SDG No.:

Instrument ID: SGC_P2 GC Column: CLP2 ID: 0.32(mm) Heated Purge: (Y/N) N

Calibration Start Date: 07/30/2018 20:37 Calibration End Date: 07/30/2018 22:03 Calibration ID: 33262

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5
Endosulfan II	BNB	Lin2	7803343 132904480	17329591	38302365	75813481	108725549	4.00 100	10.0	25.0	50.0	75.0
4,4'-DDT	BNB	Lin2	5853645 128456246	14418885	34278089	69673401	103732133	4.00 100	10.0	25.0	50.0	75.0
Endrin aldehyde	BNB	Lin2	5899381 107378424	13550276	30488706	60869813	87626808	4.00 100	10.0	25.0	50.0	75.0
Endosulfan sulfate	BNB	Lin2	6649151 122087991	15209233	34414908	68371686	98583598	4.00 100	10.0	25.0	50.0	75.0
Methoxychlor	BNB	Lin2	3375867 67479102	8087258	19098062	35939209	53030266	4.00 100	10.0	25.0	50.0	75.0
Mirex	BNB	Lin2	5688145 100446459	12484465	28186274	54763894	79690659	4.00 100	10.0	25.0	50.0	75.0
Endrin ketone	BNB	Lin2	7706705 143745606	17693633	41271135	79849300	115387345	4.00 100	10.0	25.0	50.0	75.0
Tetrachloro-m-xylene	BNB	Lin2	6820836 138750643	16004585	37996772	75556133	109108396	4.00 100	10.0	25.0	50.0	75.0
DCB Decachlorobiphenyl	BNB	Lin2	5915754 110754604	13228713	30378806	57819344	83761992	4.00 100	10.0	25.0	50.0	75.0

Curve Type Legend:
Lin2 = Linear 1/conc^2 ISTD

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300027.D
Lims ID: STD6 AB
Client ID:
Sample Type: IC Calib Level: 6
Inject. Date: 30-Jul-2018 20:37:08 ALS Bottle#: 22 Worklist Smp#: 27
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD6 AB
Misc. Info.: 280-0072505-027
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub5

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:34 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
S 1 Hexachlorocyclohexane, technical							
1						400.4	
2						383.0	
						RPD = 4.45	
* 2 1-Bromo-2-nitrobenzene							
1	2.943	2.943	0.000	757317327	150.0	150.0	
2	2.729	2.729	0.000	181442543	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.849	3.850	-0.001	580788251	100.0	101.9	
2	3.719	3.720	-0.001	138750643	100.0	95.8	
						RPD = 6.19	
5 Hexachlorobenzene							
1	4.262	4.263	-0.001	579549743	100.0	100.8	
2	4.199	4.200	-0.001	149527207	100.0	97.8	
						RPD = 3.09	
8 alpha-BHC							
1	4.433	4.435	-0.002	837167496	100.0	101.0	
2	4.346	4.346	0.000	196399713	100.0	96.7	
						RPD = 4.39	
9 gamma-BHC (Lindane)							
1	4.726	4.728	-0.002	732993232	100.0	100.4	
2	4.663	4.663	0.000	174201492	100.0	95.5	
						RPD = 5.01	
10 beta-BHC							
1	4.806	4.808	-0.002	293692978	100.0	98.5	
2	4.741	4.743	-0.002	73140787	100.0	94.3	
						RPD = 4.43	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
12 delta-BHC							
1	4.956	4.957	-0.001	740123994	100.0	100.5	
2	4.976	4.977	-0.001	170781072	100.0	96.5	
						RPD = 3.98	
15 Heptachlor							
1	5.128	5.129	-0.001	601002657	100.0	96.3	
2	5.016	5.017	-0.001	158811680	100.0	93.0	
						RPD = 3.42	
16 Aldrin							
1	5.392	5.393	-0.001	666853331	100.0	98.2	
2	5.276	5.277	-0.001	162582303	100.0	94.2	
						RPD = 4.16	
18 Isodrin							
1	5.707	5.708	-0.001	533878826	100.0	97.1	
2	5.623	5.623	0.000	136360337	100.0	94.0	
						RPD = 3.32	
21 Heptachlor epoxide							
1	5.986	5.988	-0.002	553920726	100.0	95.9	
2	5.796	5.798	-0.002	143023092	100.0	92.9	
						RPD = 3.23	
22 trans-Chlordane							
1	6.120	6.121	-0.001	606271479	100.0	98.4	
2	5.987	5.988	-0.001	152431432	100.0	94.4	
						RPD = 4.16	
23 cis-Chlordane							
1	6.261	6.262	-0.001	582382681	100.0	98.2	
2	6.142	6.143	-0.001	143806191	100.0	93.9	
						RPD = 4.46	
24 4,4'-DDE							
1	6.344	6.346	-0.002	579108265	100.0	99.2	
2	6.329	6.330	-0.001	153994470	100.0	95.0	
						RPD = 4.41	
25 Endosulfan I							
1	6.408	6.409	-0.001	532453215	100.0	95.5	
2	6.199	6.199	0.000	134595379	100.0	91.9	
						RPD = 3.81	
27 Dieldrin							
1	6.663	6.663	0.000	600318854	100.0	96.7	
2	6.487	6.488	-0.001	153562004	100.0	94.0	
						RPD = 2.85	
30 Endrin							
1	6.911	6.911	0.000	565535314	100.0	95.7	
2	6.806	6.808	-0.002	144764934	100.0	92.9	
						RPD = 2.99	
32 4,4'-DDD							
1	6.980	6.981	-0.001	498064423	100.0	97.8	
2	6.944	6.946	-0.002	118868509	100.0	94.6	
						RPD = 3.34	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
34 Endosulfan II							
1	7.147	7.148	-0.001	496162248	100.0	95.4	
2	7.035	7.035	0.000	132904480	100.0	92.8	
						RPD = 2.81	
35 4,4'-DDT							
1	7.276	7.277	-0.001	407988196	100.0	96.4	
2	7.274	7.275	-0.001	128456246	100.0	95.5	
						RPD = 0.95	
36 Endrin aldehyde							
1	7.592	7.593	-0.001	414170914	100.0	96.0	
2	7.394	7.394	0.000	107378424	100.0	93.1	
						RPD = 3.05	
37 Methoxychlor							
1	7.790	7.790	0.000	190029541	100.0	94.2	
2	8.009	8.009	0.000	67479102	100.0	95.3	
						RPD = 1.18	
38 Mirex							
1	7.937	7.938	-0.001	362807509	100.0	98.8	
2	8.187	8.187	0.000	100446459	100.0	95.4	
						RPD = 3.50	
39 Endosulfan sulfate							
1	8.051	8.052	-0.001	468529883	100.0	96.7	
2	7.688	7.688	0.000	122087991	100.0	93.9	
						RPD = 3.03	
40 Endrin ketone							
1	8.345	8.345	0.000	536944119	100.0	96.3	
2	8.239	8.240	-0.001	143745606	100.0	93.8	
						RPD = 2.61	
$ 41 DCB Decachlorobiphenyl							
1	9.375	9.376	-0.001	426153368	100.0	102.4	
2	9.512	9.513	-0.001	110754604	100.0	98.1	
						RPD = 4.34	
S 3 Endosulfan, Total							
1						287.6	
2						278.5	
						RPD = 3.21	

Reagents:

8081IcalL6_00025	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

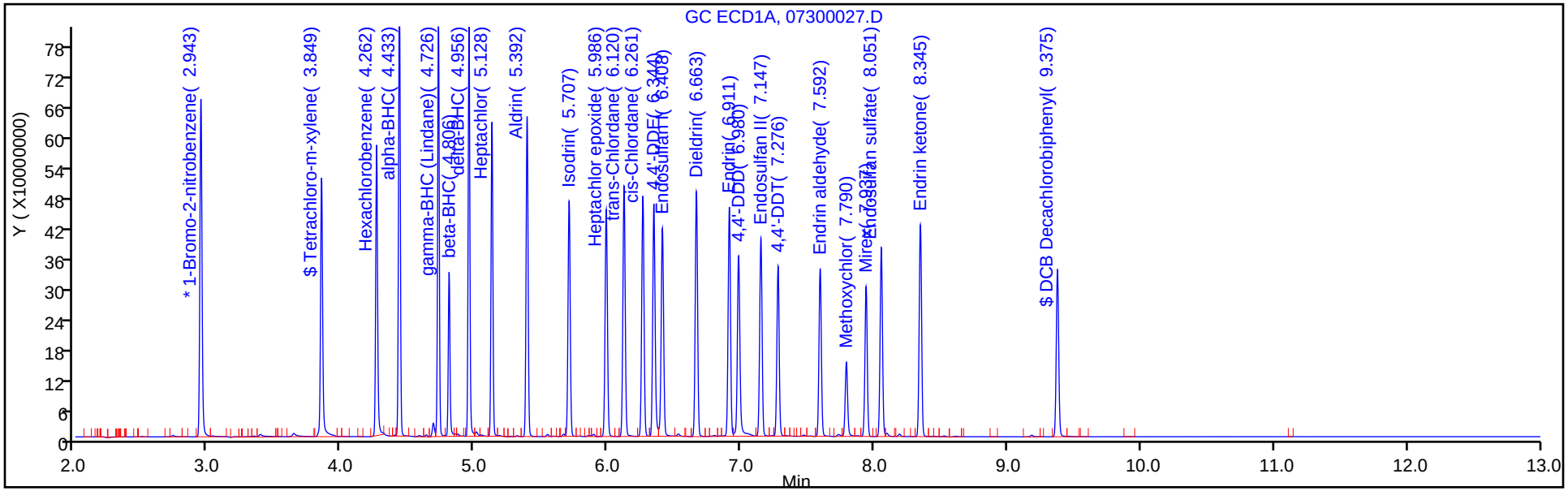
Report Date: 01-Aug-2018 12:39:37 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

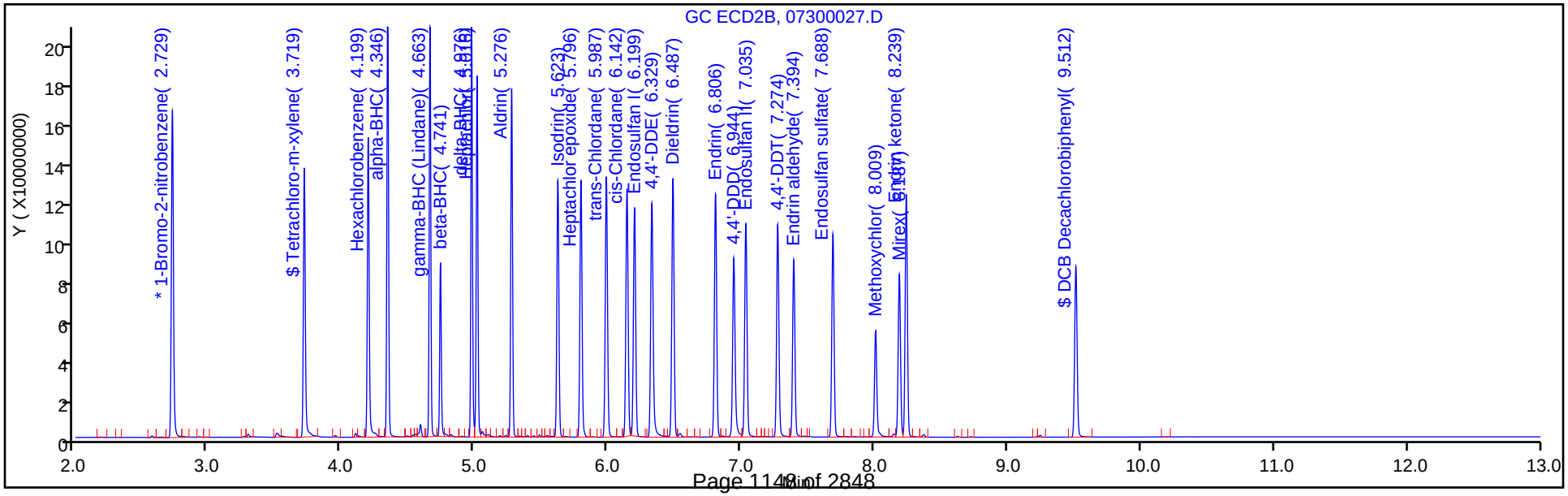
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300027.D

Injection Date:	30-Jul-2018 20:37:08	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD6 AB			Worklist Smp#:	27
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	22
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300028.D
Lims ID: STD5 AB
Client ID:
Sample Type: IC Calib Level: 5
Inject. Date: 30-Jul-2018 20:54:26 ALS Bottle#: 23 Worklist Smp#: 28
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD5 AB
Misc. Info.: 280-0072505-028
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub5

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:41 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:31:22

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
S 1 Hexachlorocyclohexane, technical							
1						306.6	
2						301.1	
						RPD = 1.80	
* 2 1-Bromo-2-nitrobenzene							
1	2.943	2.943	0.001	774762365	150.0	150.0	
2	2.729	2.729	0.000	184464485	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.849	3.850	-0.001	440755806	75.0	75.4	
2	3.720	3.720	0.000	109108396	75.0	74.0	
						RPD = 1.92	
5 Hexachlorobenzene							
1	4.262	4.263	-0.001	448090488	75.0	76.1	
2	4.200	4.200	0.000	115578741	75.0	74.1	
						RPD = 2.73	
8 alpha-BHC							
1	4.434	4.435	-0.001	657279944	75.0	77.6	
2	4.346	4.346	0.000	155422657	75.0	75.2	
						RPD = 3.15	
9 gamma-BHC (Lindane)							
1	4.727	4.728	-0.001	572408582	75.0	76.6	
2	4.663	4.663	0.000	139473661	75.0	75.1	
						RPD = 1.97	
10 beta-BHC							
1	4.807	4.808	-0.001	230418380	75.0	75.3	
2	4.742	4.743	-0.001	59592752	75.0	75.3	
						RPD = 0.05	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
12 delta-BHC							
1	4.957	4.957	0.000	580970293	75.0	77.1	
2	4.976	4.977	-0.001	135851975	75.0	75.5	
						RPD = 2.11	
15 Heptachlor							
1	5.129	5.129	0.000	493836292	75.0	77.2	
2	5.017	5.017	0.000	130118378	75.0	74.8	
						RPD = 3.16	
16 Aldrin							
1	5.392	5.393	-0.001	536116408	75.0	77.1	
2	5.277	5.277	0.000	132557196	75.0	75.4	
						RPD = 2.21	
18 Isodrin							
1	5.707	5.708	-0.001	433038684	75.0	76.9	
2	5.623	5.623	0.000	110813796	75.0	75.0	
						RPD = 2.55	
21 Heptachlor epoxide							
1	5.987	5.988	-0.001	450666160	75.0	76.2	
2	5.797	5.798	-0.001	117203821	75.0	74.7	
						RPD = 1.94	
22 trans-Chlordane							
1	6.121	6.121	0.000	488533890	75.0	77.4	
2	5.988	5.988	0.000	124344375	75.0	75.6	
						RPD = 2.39	
23 cis-Chlordane							
1	6.262	6.262	0.000	469860150	75.0	77.4	
2	6.142	6.143	-0.001	116913599	75.0	74.9	
						RPD = 3.16	
24 4,4'-DDE							
1	6.344	6.346	-0.002	460900758	75.0	77.2	
2	6.329	6.330	-0.001	124559954	75.0	75.5	
						RPD = 2.26	
25 Endosulfan I							
1	6.408	6.409	-0.001	433072439	75.0	75.8	
2	6.199	6.199	0.000	110158159	75.0	73.8	
						RPD = 2.59	
27 Dieldrin							
1	6.662	6.663	-0.001	485403091	75.0	76.3	
2	6.487	6.488	-0.001	124702597	75.0	75.0	
						RPD = 1.80	
30 Endrin							
1	6.910	6.911	-0.001	459651752	75.0	76.0	
2	6.807	6.808	-0.001	118754361	75.0	74.8	
						RPD = 1.47	
32 4,4'-DDD							
1	6.981	6.981	0.000	397468393	75.0	76.2	
2	6.945	6.946	-0.001	95776821	75.0	74.8	
						RPD = 1.85	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
34 Endosulfan II							
1	7.147	7.148	-0.001	401836243	75.0	75.4	
2	7.034	7.035	-0.001	108725549	75.0	74.4	
						RPD = 1.33	
35 4,4'-DDT							
1	7.277	7.277	0.000	337199795	75.0	78.1	
2	7.274	7.275	-0.001	103732133	75.0	75.8	
						RPD = 2.88	
36 Endrin aldehyde							
1	7.592	7.593	-0.001	334832556	75.0	75.7	
2	7.395	7.394	0.001	87626808	75.0	74.5	
						RPD = 1.51	
37 Methoxychlor							
1	7.789	7.790	-0.001	154129028	75.0	74.8	
2	8.010	8.009	0.001	53030266	75.0	73.5	
						RPD = 1.67	
38 Mirex							
1	7.937	7.938	-0.001	283327827	75.0	75.2	
2	8.187	8.187	0.000	79690659	75.0	74.2	
						RPD = 1.38	
39 Endosulfan sulfate							
1	8.052	8.052	0.000	375512828	75.0	75.7	
2	7.688	7.688	0.000	98583598	75.0	74.4	
						RPD = 1.73	
40 Endrin ketone							
1	8.344	8.345	-0.001	430313606	75.0	75.3	
2	8.240	8.240	0.000	115387345	75.0	73.9	
						RPD = 1.93	
$ 41 DCB Decachlorobiphenyl							
1	9.375	9.376	-0.001	319198187	75.0	74.8	
2	9.512	9.513	-0.001	83761992	75.0	72.7	
						RPD = 2.92	
S 3 Endosulfan, Total							
1						226.8	
2						222.6	
						RPD = 1.89	

Reagents:

8081IcalL5_00026	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

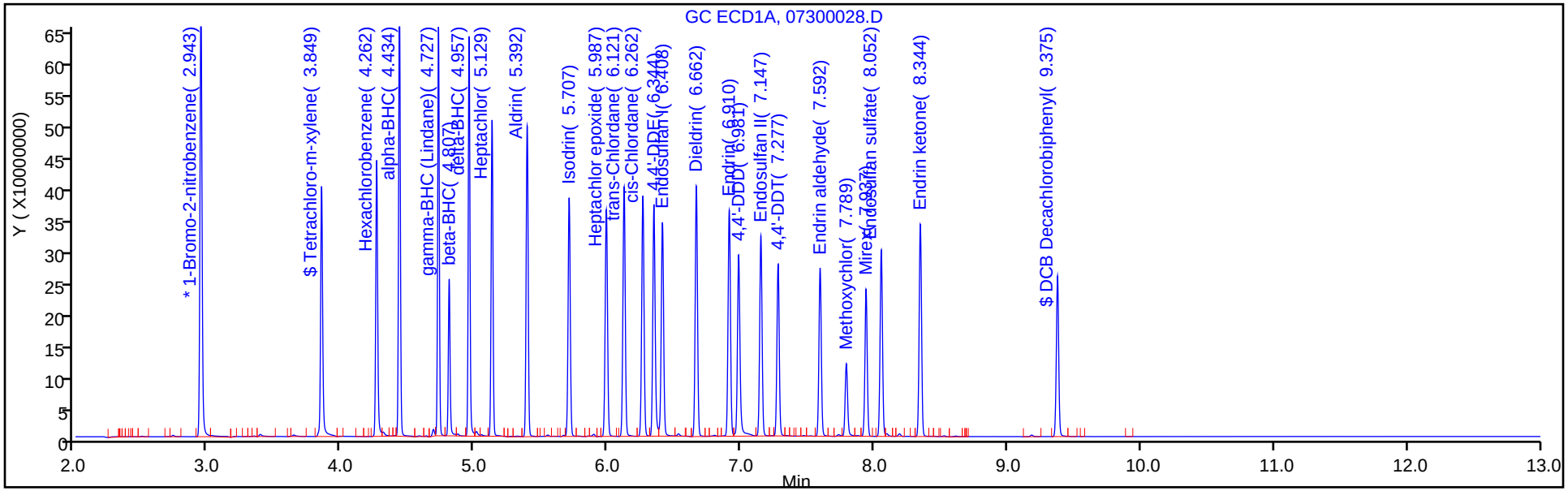
Report Date: 01-Aug-2018 12:39:43 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

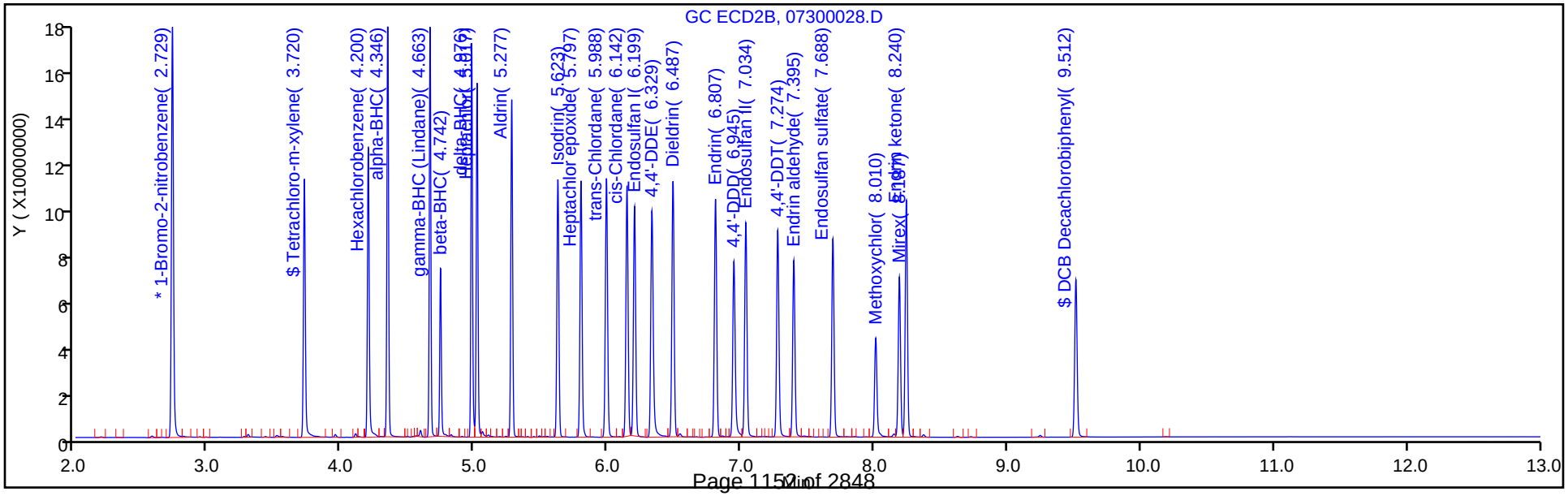
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300028.D

Injection Date:	30-Jul-2018 20:54:26	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD5 AB			Worklist Smp#:	28
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	23
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300029.D
Lims ID: STD4 AB
Client ID:
Sample Type: ICIS Calib Level: 4
Inject. Date: 30-Jul-2018 21:11:49 ALS Bottle#: 24 Worklist Smp#: 29
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD4 AB
Misc. Info.: 280-0072505-029
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub5

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:46 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:30:39

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.944	0.000	790371234	150.0	150.0	
2	2.729	2.729	0.000	187880516	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.850	3.850	0.000	297885684	50.0	49.8	
2	3.720	3.720	0.000	75556133	50.0	50.2	
						RPD = 0.83	
5 Hexachlorobenzene							
1	4.263	4.263	0.000	301526937	50.0	50.1	
2	4.200	4.200	0.000	80229568	50.0	50.2	
						RPD = 0.06	
8 alpha-BHC							
1	4.435	4.435	0.000	437711266	50.0	50.7	
2	4.346	4.346	0.000	108394427	50.0	51.4	
						RPD = 1.25	
9 gamma-BHC (Lindane)							
1	4.728	4.728	0.000	388161905	50.0	50.9	
2	4.663	4.663	0.000	97049610	50.0	51.2	
						RPD = 0.61	
10 beta-BHC							
1	4.808	4.808	0.000	162163172	50.0	51.6	
2	4.743	4.743	0.000	42501522	50.0	52.4	
						RPD = 1.63	
12 delta-BHC							
1	4.957	4.957	0.000	388330389	50.0	50.6	
2	4.977	4.977	0.000	93252524	50.0	50.8	
						RPD = 0.51	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
15 Heptachlor							
1	5.129	5.129	0.000	334257640	50.0	51.0	
2	5.017	5.017	0.000	91787892	50.0	51.5	
						RPD = 1.01	
16 Aldrin							
1	5.393	5.393	0.000	361935883	50.0	51.0	
2	5.277	5.277	0.000	91708706	50.0	51.1	
						RPD = 0.20	
18 Isodrin							
1	5.708	5.708	0.000	294068764	50.0	51.0	
2	5.623	5.623	0.000	77176673	50.0	51.0	
						RPD = 0.03	
21 Heptachlor epoxide							
1	5.988	5.988	0.000	309543730	50.0	51.1	
2	5.798	5.798	0.000	82074910	50.0	51.1	
						RPD = 0.01	
22 trans-Chlordane							
1	6.121	6.121	0.000	327278982	50.0	50.8	
2	5.988	5.988	0.000	85734376	50.0	51.0	
						RPD = 0.47	
23 cis-Chlordane							
1	6.262	6.262	0.000	314711713	50.0	50.7	
2	6.143	6.143	0.000	81503760	50.0	51.1	
						RPD = 0.80	
24 4,4'-DDE							
1	6.346	6.346	0.000	307530439	50.0	50.5	
2	6.330	6.330	0.000	85158312	50.0	50.6	
						RPD = 0.13	
25 Endosulfan I							
1	6.409	6.409	0.000	298029157	50.0	50.9	
2	6.199	6.199	0.000	78562942	50.0	51.5	
						RPD = 1.09	
27 Dieldrin							
1	6.663	6.663	0.000	330329929	50.0	50.8	
2	6.488	6.488	0.000	86054966	50.0	50.6	
						RPD = 0.25	
30 Endrin							
1	6.911	6.911	0.000	312974696	50.0	50.6	
2	6.808	6.808	0.000	82083813	50.0	50.6	
						RPD = 0.12	
32 4,4'-DDD							
1	6.981	6.981	0.000	264769383	50.0	49.6	
2	6.946	6.946	0.000	65504950	50.0	50.0	
						RPD = 0.74	
34 Endosulfan II							
1	7.148	7.148	0.000	274825254	50.0	50.4	
2	7.035	7.035	0.000	75813481	50.0	50.5	
						RPD = 0.39	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
35 4,4'-DDT							
1	7.277	7.277	0.000	206711912	50.0	47.2	
2	7.275	7.275	0.000	69673401	50.0	50.0	
						RPD = 5.64	
36 Endrin aldehyde							
1	7.593	7.593	0.000	228788529	50.0	50.4	
2	7.394	7.394	0.000	60869813	50.0	50.6	
						RPD = 0.25	
37 Methoxychlor							
1	7.790	7.790	0.000	98574119	50.0	47.0	
2	8.009	8.009	0.000	35939209	50.0	48.7	
						RPD = 3.50	
38 Mirex							
1	7.938	7.938	0.000	191924433	50.0	49.7	
2	8.187	8.187	0.000	54763894	50.0	49.7	
						RPD = 0.00	
39 Endosulfan sulfate							
1	8.052	8.052	0.000	255158502	50.0	50.2	
2	7.688	7.688	0.000	68371686	50.0	50.4	
						RPD = 0.29	
40 Endrin ketone							
1	8.345	8.345	0.000	289221668	50.0	49.5	
2	8.240	8.240	0.000	79849300	50.0	49.9	
						RPD = 0.89	
$ 41 DCB Decachlorobiphenyl							
1	9.376	9.376	0.000	214161224	50.0	49.0	
2	9.513	9.513	0.000	57819344	50.0	48.9	
						RPD = 0.21	

Reagents:

8081IcalL4_00031	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

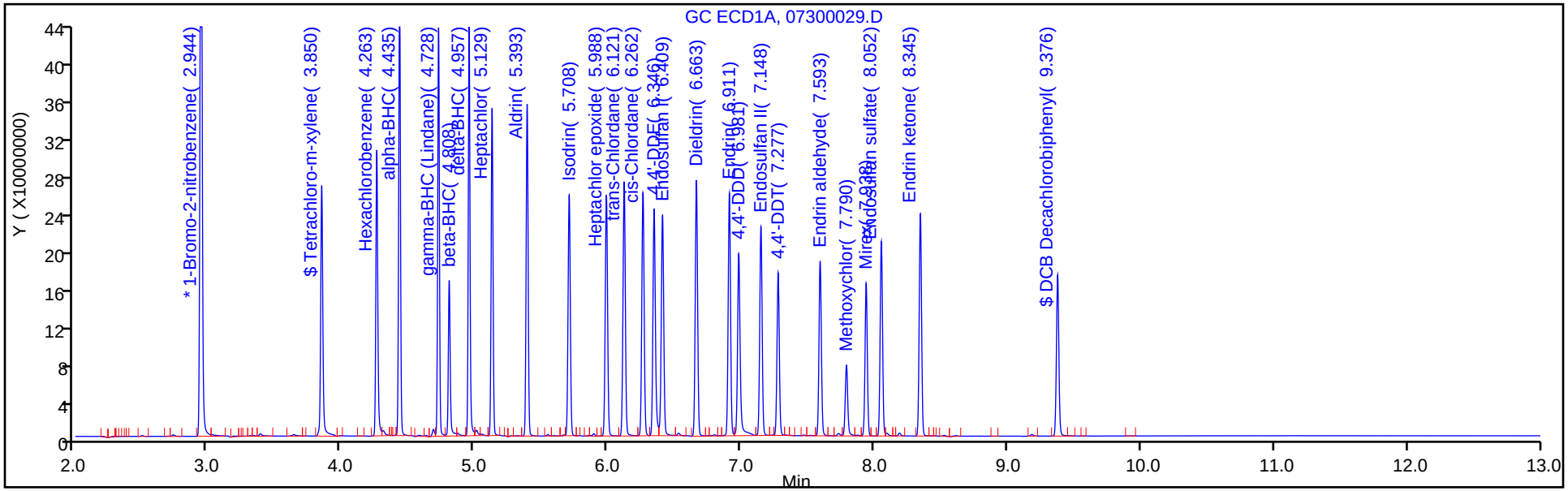
Report Date: 01-Aug-2018 12:39:49 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

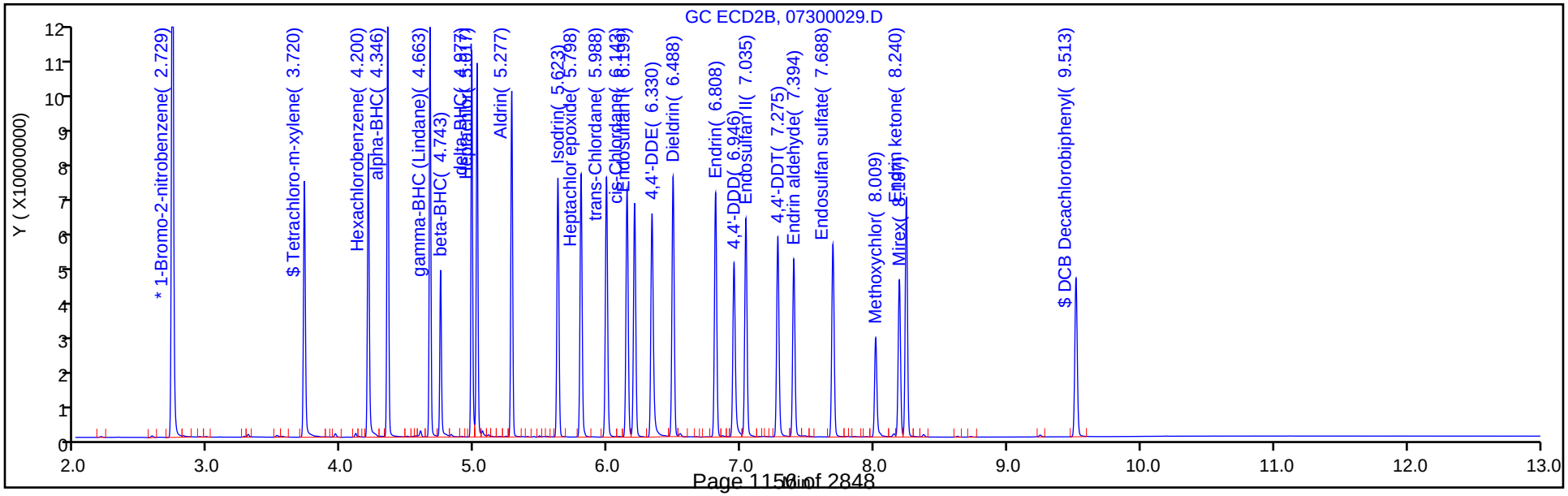
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300029.D

Injection Date:	30-Jul-2018 21:11:49	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD4 AB			Worklist Smp#:	29
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	24
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300030.D
Lims ID: STD3 AB
Client ID:
Sample Type: IC Calib Level: 3
Inject. Date: 30-Jul-2018 21:29:05 ALS Bottle#: 25 Worklist Smp#: 30
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD3 AB
Misc. Info.: 280-0072505-030
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub5

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:52 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:33:00

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
S 1 Hexachlorocyclohexane, technical							
1						97.3	
2						100.8	
						RPD = 3.53	
* 2 1-Bromo-2-nitrobenzene							
1	2.943	2.944	-0.001	761839812	150.0	150.0	
2	2.729	2.729	0.000	177429625	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.850	3.850	0.000	144851795	25.0	24.8	
2	3.720	3.720	0.000	37996772	25.0	26.5	
						RPD = 6.75	
5 Hexachlorobenzene							
1	4.263	4.263	0.000	143729423	25.0	24.7	
2	4.199	4.200	-0.001	39891070	25.0	25.9	
						RPD = 5.02	
8 alpha-BHC							
1	4.434	4.435	-0.001	198318300	25.0	23.9	
2	4.346	4.346	0.000	50931153	25.0	25.3	
						RPD = 5.70	
9 gamma-BHC (Lindane)							
1	4.727	4.728	-0.001	180083119	25.0	24.4	
2	4.663	4.663	0.000	45901883	25.0	25.4	
						RPD = 4.07	
10 beta-BHC							
1	4.808	4.808	0.000	75978311	25.0	24.5	
2	4.743	4.743	0.000	19234614	25.0	24.6	
						RPD = 0.37	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
12 delta-BHC							
1	4.957	4.957	0.000	180446313	25.0	24.5	
2	4.977	4.977	0.000	44203055	25.0	25.4	
						RPD = 3.96	
15 Heptachlor							
1	5.129	5.129	0.000	161057328	25.0	25.2	
2	5.017	5.017	0.000	43613658	25.0	25.5	
						RPD = 1.14	
16 Aldrin							
1	5.393	5.393	0.000	168363595	25.0	24.5	
2	5.277	5.277	0.000	43828106	25.0	25.6	
						RPD = 4.36	
18 Isodrin							
1	5.708	5.708	0.000	138675854	25.0	24.7	
2	5.624	5.623	0.001	37281977	25.0	25.7	
						RPD = 4.21	
21 Heptachlor epoxide							
1	5.988	5.988	0.000	147685567	25.0	25.0	
2	5.798	5.798	0.000	40055487	25.0	26.0	
						RPD = 3.94	
22 trans-Chlordane							
1	6.121	6.121	0.000	152423956	25.0	24.4	
2	5.988	5.988	0.000	41159594	25.0	25.7	
						RPD = 5.02	
23 cis-Chlordane							
1	6.262	6.262	0.000	147911306	25.0	24.6	
2	6.143	6.143	0.000	39470379	25.0	25.9	
						RPD = 5.25	
24 4,4'-DDE							
1	6.346	6.346	0.000	144170146	25.0	24.6	
2	6.332	6.330	0.002	41000059	25.0	25.6	
						RPD = 4.25	
25 Endosulfan I							
1	6.408	6.409	-0.001	145140616	25.0	25.4	
2	6.200	6.199	0.001	38561425	25.0	26.4	
						RPD = 3.74	
27 Dieldrin							
1	6.663	6.663	0.000	157600846	25.0	24.9	
2	6.488	6.488	0.000	42058793	25.0	26.0	
						RPD = 4.26	
30 Endrin							
1	6.910	6.911	-0.001	150320349	25.0	25.0	
2	6.808	6.808	0.000	40489416	25.0	26.2	
						RPD = 4.68	
32 4,4'-DDD							
1	6.983	6.981	0.002	127730102	25.0	24.6	
2	6.948	6.946	0.002	32714613	25.0	26.1	
						RPD = 5.73	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
34 Endosulfan II							
1	7.148	7.148	0.000	134856741	25.0	25.3	
2	7.035	7.035	0.000	38302365	25.0	26.5	
						RPD = 4.36	
35 4,4'-DDT							
1	7.278	7.277	0.001	112674764	25.0	27.1	
2	7.276	7.275	0.001	34278089	25.0	26.0	
						RPD = 4.10	
36 Endrin aldehyde							
1	7.593	7.593	0.000	112526783	25.0	25.3	
2	7.395	7.394	0.001	30488706	25.0	26.4	
						RPD = 4.03	
37 Methoxychlor							
1	7.790	7.790	0.000	56342051	25.0	28.1	
2	8.010	8.009	0.001	19098062	25.0	27.2	
						RPD = 3.37	
38 Mirex							
1	7.937	7.938	-0.001	96002031	25.0	25.4	
2	8.188	8.187	0.001	28186274	25.0	26.5	
						RPD = 4.44	
39 Endosulfan sulfate							
1	8.052	8.052	0.000	126325823	25.0	25.5	
2	7.689	7.688	0.001	34414908	25.0	26.4	
						RPD = 3.52	
40 Endrin ketone							
1	8.346	8.345	0.001	148999940	25.0	26.3	
2	8.240	8.240	0.000	41271135	25.0	27.0	
						RPD = 2.61	
$ 41 DCB Decachlorobiphenyl							
1	9.375	9.376	-0.001	109351478	25.0	25.7	
2	9.513	9.513	0.000	30378806	25.0	26.8	
						RPD = 3.99	
S 3 Endosulfan, Total							
1						76.2	
2						79.2	
						RPD = 3.87	

Reagents:

8081IcalL3_00028	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

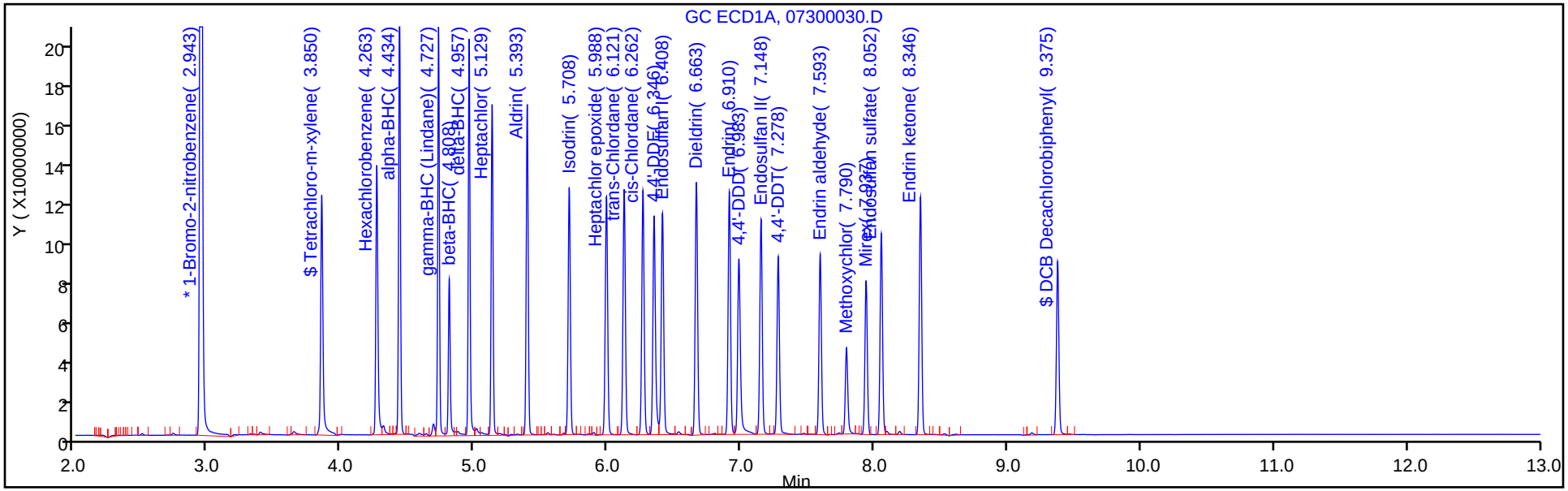
Report Date: 01-Aug-2018 12:39:54 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

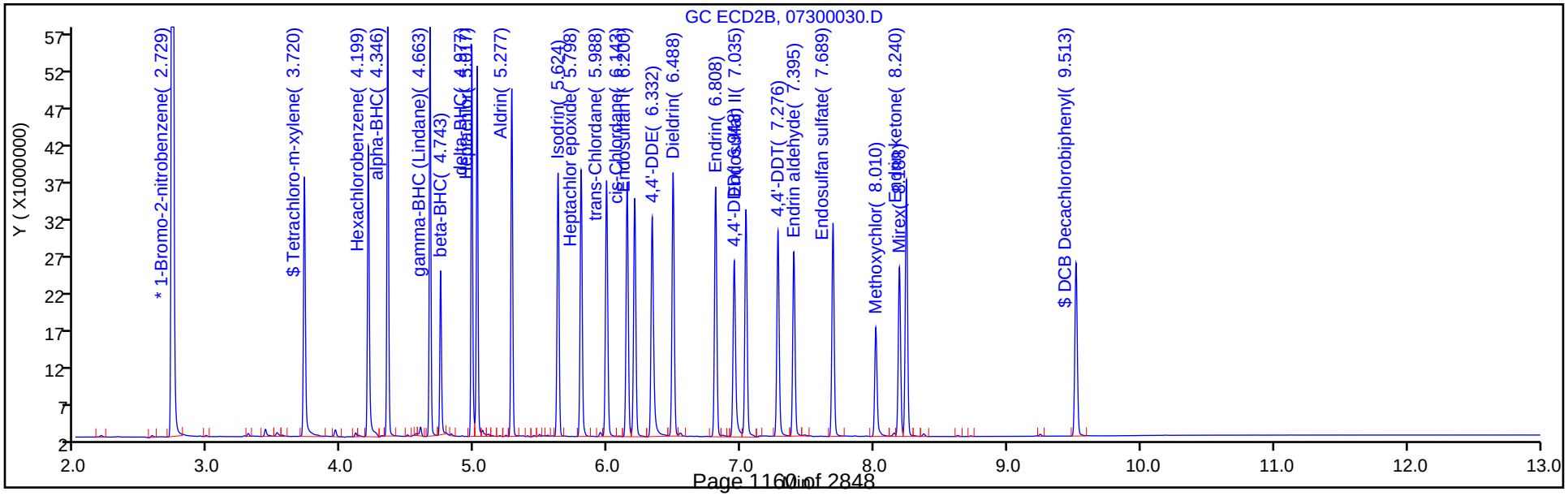
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300030.D

Injection Date:	30-Jul-2018 21:29:05	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD3 AB			Worklist Smp#:	30
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	25
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300031.D
Lims ID: STD2 AB
Client ID:
Sample Type: IC Calib Level: 2
Inject. Date: 30-Jul-2018 21:46:23 ALS Bottle#: 26 Worklist Smp#: 31
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD2 AB
Misc. Info.: 280-0072505-031
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub5

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:39:59 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
S 1 Hexachlorocyclohexane, technical							
1						38.9	
2						40.3	
						RPD = 3.42	
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.944	-0.001	812304364	150.0	150.0	
2	2.729	2.729	0.000	192722992	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.850	3.850	0.000	63614956	10.0	9.81	
2	3.720	3.720	0.000	16004585	10.0	9.99	
						RPD = 1.87	
5 Hexachlorobenzene							
1	4.264	4.263	0.001	61619591	10.0	9.77	
2	4.201	4.200	0.001	17655819	10.0	9.97	
						RPD = 2.04	
8 alpha-BHC							
1	4.434	4.435	-0.001	84277734	10.0	9.66	
2	4.347	4.346	0.001	22092790	10.0	9.88	
						RPD = 2.24	
9 gamma-BHC (Lindane)							
1	4.727	4.728	-0.001	76399628	10.0	9.66	
2	4.664	4.663	0.001	20218500	10.0	10.1	
						RPD = 4.42	
10 beta-BHC							
1	4.809	4.808	0.001	35312828	10.0	10.0	
2	4.744	4.743	0.001	9330523	10.0	10.4	
						RPD = 3.59	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
12 delta-BHC							
1	4.957	4.957	0.000	74871204	10.0	9.61	
2	4.978	4.977	0.001	18916563	10.0	9.94	
						RPD = 3.41	
15 Heptachlor							
1	5.129	5.129	0.000	68637960	10.0	9.71	
2	5.017	5.017	0.000	20290464	10.0	10.4	
						RPD = 6.98	
16 Aldrin							
1	5.392	5.393	-0.001	72414369	10.0	9.81	
2	5.277	5.277	0.000	19387769	10.0	10.2	
						RPD = 3.51	
18 Isodrin							
1	5.709	5.708	0.001	61470139	10.0	9.94	
2	5.624	5.623	0.001	16816928	10.0	10.3	
						RPD = 3.13	
21 Heptachlor epoxide							
1	5.987	5.988	-0.001	65308748	10.0	10.1	
2	5.798	5.798	0.000	17989107	10.0	10.3	
						RPD = 2.28	
22 trans-Chlordane							
1	6.120	6.121	-0.001	66389856	10.0	9.84	
2	5.989	5.988	0.001	18119247	10.0	10.1	
						RPD = 2.49	
23 cis-Chlordane							
1	6.262	6.262	0.000	64354140	10.0	9.84	
2	6.143	6.143	0.000	17482058	10.0	10.2	
						RPD = 3.25	
24 4,4'-DDE							
1	6.347	6.346	0.001	61037942	10.0	9.75	
2	6.332	6.330	0.002	18021221	10.0	10.2	
						RPD = 4.32	
25 Endosulfan I							
1	6.409	6.409	0.000	63652270	10.0	10.1	
2	6.199	6.199	0.000	17156189	10.0	10.3	
						RPD = 2.61	
27 Dieldrin							
1	6.664	6.663	0.001	69964783	10.0	10.1	
2	6.488	6.488	0.000	18527703	10.0	10.2	
						RPD = 1.51	
30 Endrin							
1	6.911	6.911	0.000	67922310	10.0	10.3	
2	6.808	6.808	0.000	17913825	10.0	10.3	
						RPD = 0.06	
32 4,4'-DDD							
1	6.984	6.981	0.003	58699870	10.0	10.4	
2	6.948	6.946	0.002	14582585	10.0	10.3	
						RPD = 1.16	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
34 Endosulfan II							
1	7.149	7.148	0.001	60763880	10.0	10.4	
2	7.035	7.035	0.000	17329591	10.0	10.3	
						RPD = 0.57	
35 4,4'-DDT							
1	7.279	7.277	0.002	40238707	10.0	9.62	
2	7.276	7.275	0.001	14418885	10.0	10.0	
						RPD = 3.86	
36 Endrin aldehyde							
1	7.594	7.593	0.001	50372061	10.0	10.2	
2	7.396	7.394	0.002	13550276	10.0	10.3	
						RPD = 0.75	
37 Methoxychlor							
1	7.791	7.790	0.001	21024758	10.0	10.2	
2	8.011	8.009	0.002	8087258	10.0	10.2	
						RPD = 0.87	
38 Mirex							
1	7.939	7.938	0.001	42297656	10.0	10.0	
2	8.188	8.187	0.001	12484465	10.0	10.1	
						RPD = 1.14	
39 Endosulfan sulfate							
1	8.053	8.052	0.001	54828619	10.0	10.0	
2	7.689	7.688	0.001	15209233	10.0	10.2	
						RPD = 1.77	
40 Endrin ketone							
1	8.346	8.345	0.001	61804647	10.0	9.97	
2	8.240	8.240	0.000	17693633	10.0	10.1	
						RPD = 1.73	
$ 41 DCB Decachlorobiphenyl							
1	9.376	9.376	0.000	44674242	10.0	9.53	
2	9.514	9.513	0.001	13228713	10.0	10.1	
						RPD = 6.06	
S 3 Endosulfan, Total							
1						30.4	
2						30.8	
						RPD = 1.26	

Reagents:

8081IcalL2_00025	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

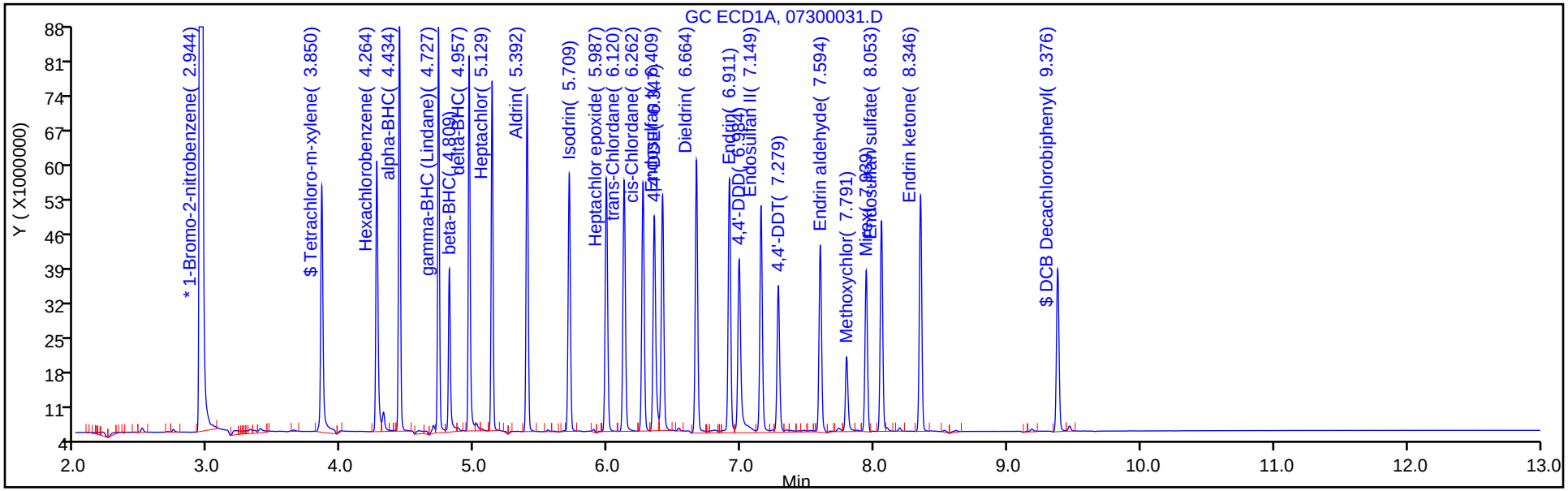
Report Date: 01-Aug-2018 12:40:02 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

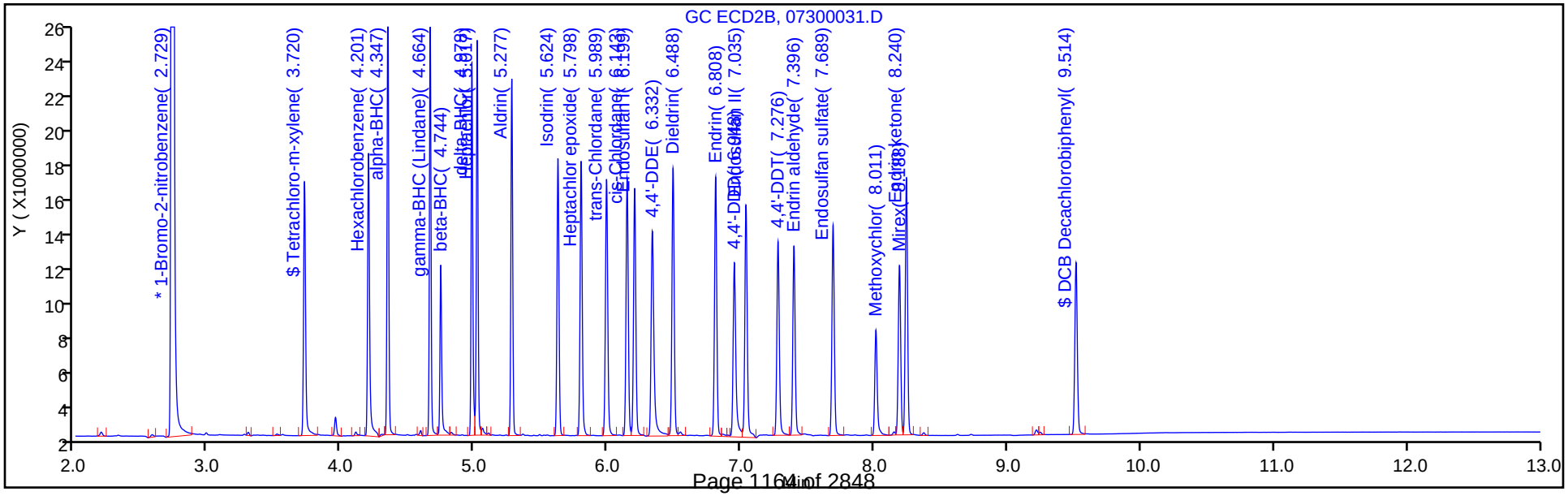
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300031.D

Injection Date:	30-Jul-2018 21:46:23	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD2 AB			Worklist Smp#:	31
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	26
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D
Lims ID: STD1 AB
Client ID:
Sample Type: IC Calib Level: 1
Inject. Date: 30-Jul-2018 22:03:40 ALS Bottle#: 27 Worklist Smp#: 32
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: STD1 AB
Misc. Info.: 280-0072505-032
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub5

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 12:40:05 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:32:53

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
S 1 Hexachlorocyclohexane, technical							
1						16.2	
2						15.9	
						RPD = 1.72	
* 2 1-Bromo-2-nitrobenzene							
1	2.945	2.944	0.001	813594398	150.0	150.0	
2	2.731	2.729	0.002	193530453	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.853	3.850	0.003	28623856	4.00	4.03	
2	3.722	3.720	0.002	6820836	4.00	3.97	
						RPD = 1.57	
5 Hexachlorobenzene							
1	4.266	4.263	0.003	26435330	4.00	4.04	
2	4.202	4.200	0.002	8067845	4.00	3.99	
						RPD = 1.35	
8 alpha-BHC							
1	4.435	4.435	0.000	34552903	4.00	4.07	
2	4.347	4.346	0.001	9521647	4.00	4.01	
						RPD = 1.52	
9 gamma-BHC (Lindane)							
1	4.728	4.728	0.000	32645348	4.00	4.06	
2	4.665	4.663	0.002	8436795	4.00	3.97	
						RPD = 2.13	
10 beta-BHC							
1	4.810	4.808	0.002	16420081	4.00	4.01	
2	4.744	4.743	0.001	4122493	4.00	3.95	
						RPD = 1.50	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
12 delta-BHC							
1	4.959	4.957	0.002	31038737	4.00	4.07	
2	4.979	4.977	0.002	7789580	4.00	4.00	
						RPD = 1.72	
15 Heptachlor							
1	5.130	5.129	0.001	30897488	4.00	4.03	
2	5.018	5.017	0.001	8665641	4.00	3.92	
						RPD = 2.79	
16 Aldrin							
1	5.393	5.393	0.000	30469102	4.00	4.03	
2	5.278	5.277	0.001	8114892	4.00	3.96	
						RPD = 1.84	
18 Isodrin							
1	5.710	5.708	0.002	26776171	4.00	4.01	
2	5.625	5.623	0.002	7199484	4.00	3.94	
						RPD = 1.69	
21 Heptachlor epoxide							
1	5.988	5.988	0.000	27968745	4.00	3.99	
2	5.799	5.798	0.001	7714190	4.00	3.93	
						RPD = 1.36	
22 trans-Chlordane							
1	6.122	6.121	0.001	28161792	4.00	4.03	
2	5.990	5.988	0.002	7721610	4.00	3.97	
						RPD = 1.55	
23 cis-Chlordane							
1	6.263	6.262	0.001	27554314	4.00	4.03	
2	6.144	6.143	0.001	7483533	4.00	3.95	
						RPD = 1.87	
24 4,4'-DDE							
1	6.349	6.346	0.003	25348644	4.00	4.04	
2	6.335	6.330	0.005	7365520	4.00	3.96	
						RPD = 2.12	
25 Endosulfan I							
1	6.410	6.409	0.001	27550313	4.00	3.98	
2	6.200	6.199	0.001	7302660	4.00	3.92	
						RPD = 1.51	
27 Dieldrin							
1	6.665	6.663	0.002	29636195	4.00	3.99	
2	6.489	6.488	0.001	7700648	4.00	3.94	
						RPD = 1.09	
30 Endrin							
1	6.912	6.911	0.001	27694406	4.00	3.95	
2	6.809	6.808	0.001	7415323	4.00	3.93	
						RPD = 0.57	
32 4,4'-DDD							
1	6.986	6.981	0.005	23618291	4.00	3.95	
2	6.950	6.946	0.004	6202612	4.00	3.94	
						RPD = 0.29	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
34 Endosulfan II							
1	7.150	7.148	0.002	25268596	4.00	3.94	
2	7.037	7.035	0.002	7803343	4.00	3.93	
						RPD = 0.35	
35 4,4'-DDT							
1	7.280	7.277	0.003	14633442	4.00	4.02	
2	7.278	7.275	0.003	5853645	4.00	3.98	
						RPD = 1.06	
36 Endrin aldehyde							
1	7.595	7.593	0.002	21863149	4.00	3.96	
2	7.397	7.394	0.003	5899381	4.00	3.93	
						RPD = 0.81	
37 Methoxychlor							
1	7.793	7.790	0.003	7477447	4.00	3.92	
2	8.013	8.009	0.004	3375867	4.00	3.93	
						RPD = 0.02	
38 Mirex							
1	7.939	7.938	0.001	18813075	4.00	3.99	
2	8.189	8.187	0.002	5688145	4.00	3.95	
						RPD = 1.00	
39 Endosulfan sulfate							
1	8.054	8.052	0.002	23616219	4.00	3.98	
2	7.691	7.688	0.003	6649151	4.00	3.94	
						RPD = 1.13	
40 Endrin ketone							
1	8.347	8.345	0.002	26136919	4.00	3.98	
2	8.241	8.240	0.001	7706705	4.00	3.94	
						RPD = 1.02	
$ 41 DCB Decachlorobiphenyl							
1	9.376	9.376	0.000	20394568	4.00	4.06	
2	9.515	9.513	0.002	5915754	4.00	3.95	
						RPD = 2.71	
S 3 Endosulfan, Total							
1						11.9	
2						11.8	
						RPD = 1.00	

Reagents:

8081IcalL1_00025	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

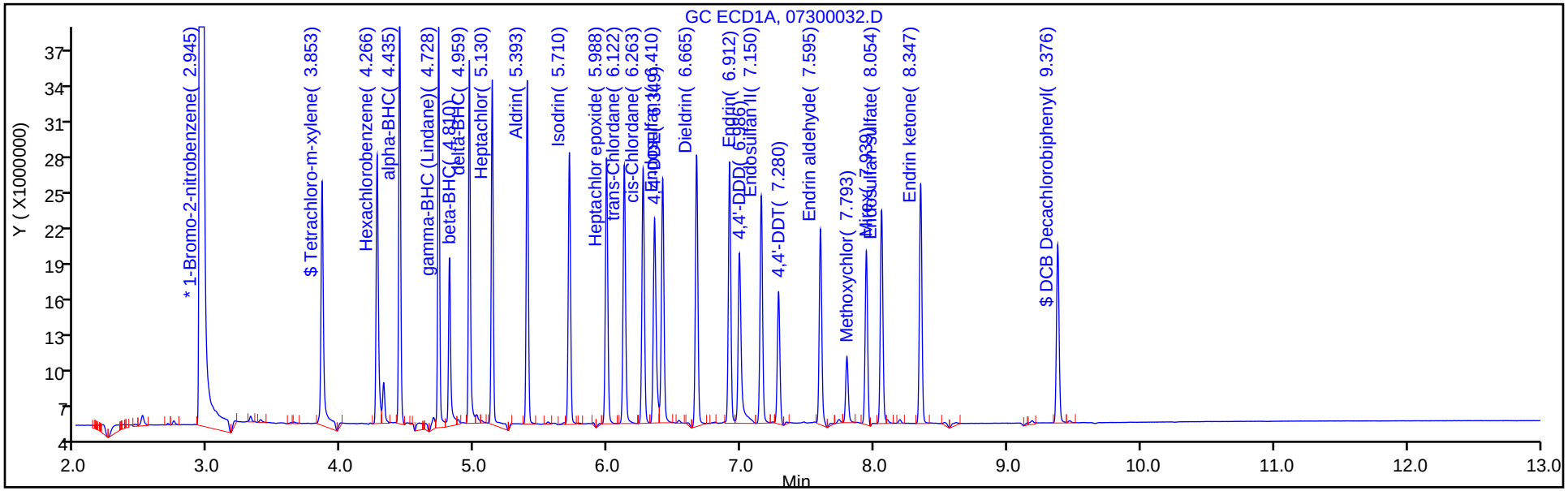
Report Date: 01-Aug-2018 12:40:08 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

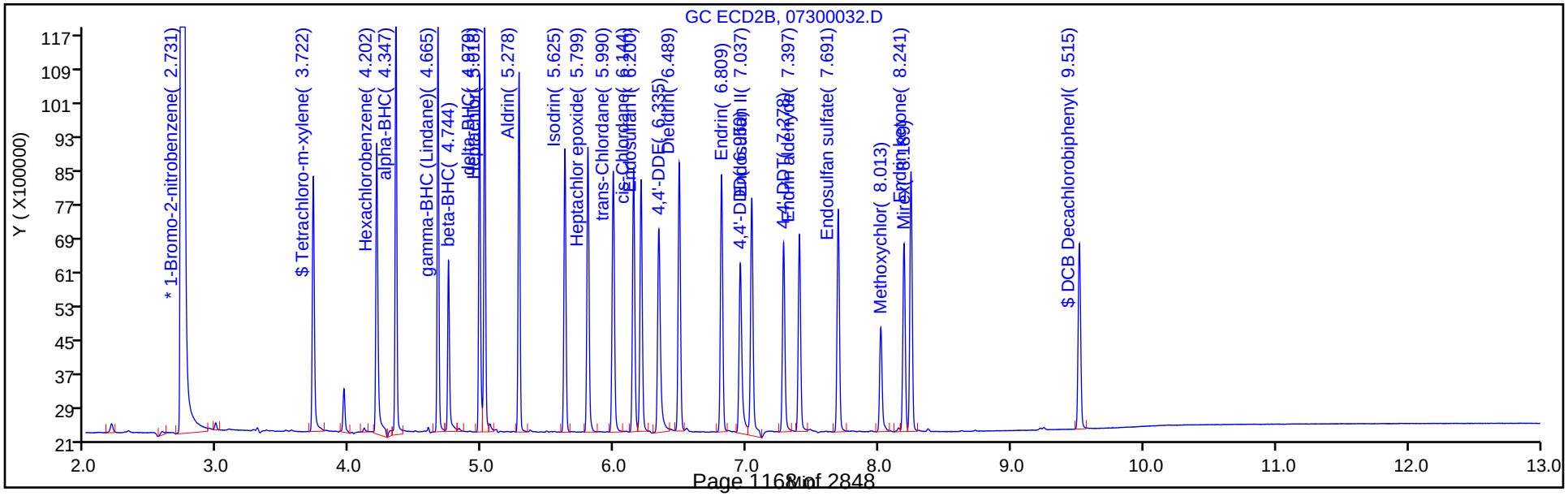
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Injection Date:	30-Jul-2018 22:03:40	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	STD1 AB			Worklist Smp#:	32
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	27
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM VII
PESTICIDES PERFORMANCE EVALUATION MIXTURE (PEM)

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: PEM 280-424154/37 Calibration Date: 07/30/2018 23:30

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 20:37

GC Column: CLP1 ID: 0.32(mm) Calib End Date: 07/30/2018 22:03

Lab File ID: 07300037.D Conc. Units: ng/mL

ANALYTE	RT	RESPONSE	BREAKDOWN (%)	LIMIT	#
Endrin	6.91	262763213	2.54	15	
Endrin aldehyde	7.60	2547825			
Endrin ketone	8.35	4308755			

ANALYTE	RT	RESPONSE	BREAKDOWN (%)	LIMIT	#
4,4'-DDT	7.28	198819768	1.32	15	
4,4'-DDD	6.99	1842820			
4,4'-DDE	6.34	822646			

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300037.D
Lims ID: PEM
Client ID:
Sample Type: PEM
Inject. Date: 30-Jul-2018 23:30:12 ALS Bottle#: 32 Worklist Smp#: 37
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: PEM
Misc. Info.: 280-0072505-037
Operator ID: TEM Instrument ID: SGC_P2
Sublist:

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 08-Aug-2018 01:52:05 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0301

First Level Reviewer: mooret Date: 01-Aug-2018 14:31:47

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.946	2.945	0.001	754585964	150.0	150.0	
2	2.731	2.730	0.001	183456814	150.0	150.0	
24 4,4'-DDE							
1	6.344	6.346	-0.002	822646		0.1407	
2	6.333	6.330	0.003	476901		-0.0224	
						RPD = 275.79	
30 Endrin							
1	6.911	6.911	0.000	262763213	40.0	44.4	
2	6.809	6.808	0.001	58308238	40.0	36.7	
						RPD = 19.08	
32 4,4'-DDD							
1	6.986	6.981	0.005	1842820		-0.0231	
2	6.949	6.946	0.003	961348		0.0346	
						RPD = 1006.00	
35 4,4'-DDT							
1	7.277	7.277	0.000	198819768	40.0	47.6	
2	7.276	7.275	0.001	58968832	40.0	43.3	
						RPD = 9.41	
36 Endrin aldehyde							
1	7.596	7.593	0.003	2547825		-0.1930	
2	7.397	7.394	0.003	1007066		-0.0378	
						RPD = -134.55	
40 Endrin ketone							
1	8.347	8.345	0.002	4308755		0.3784	
2	8.241	8.240	0.001	1444307		0.1242	
						RPD = 101.14	

Reagents:

8081_EvalBPEM_00012	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

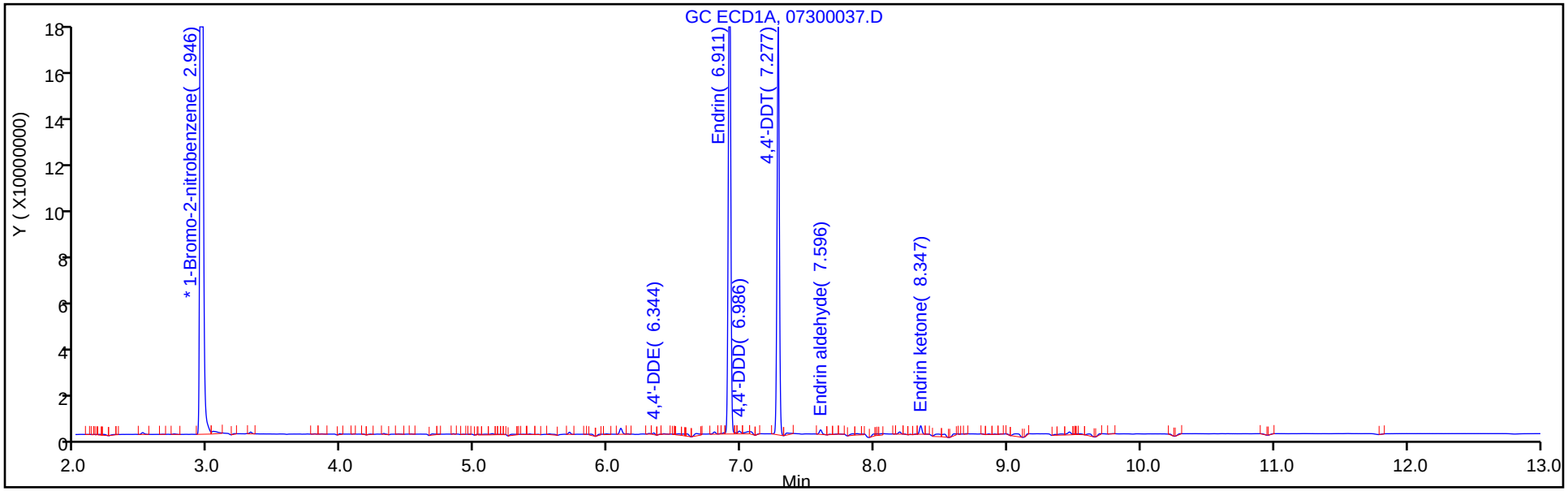
Report Date: 08-Aug-2018 01:52:35 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

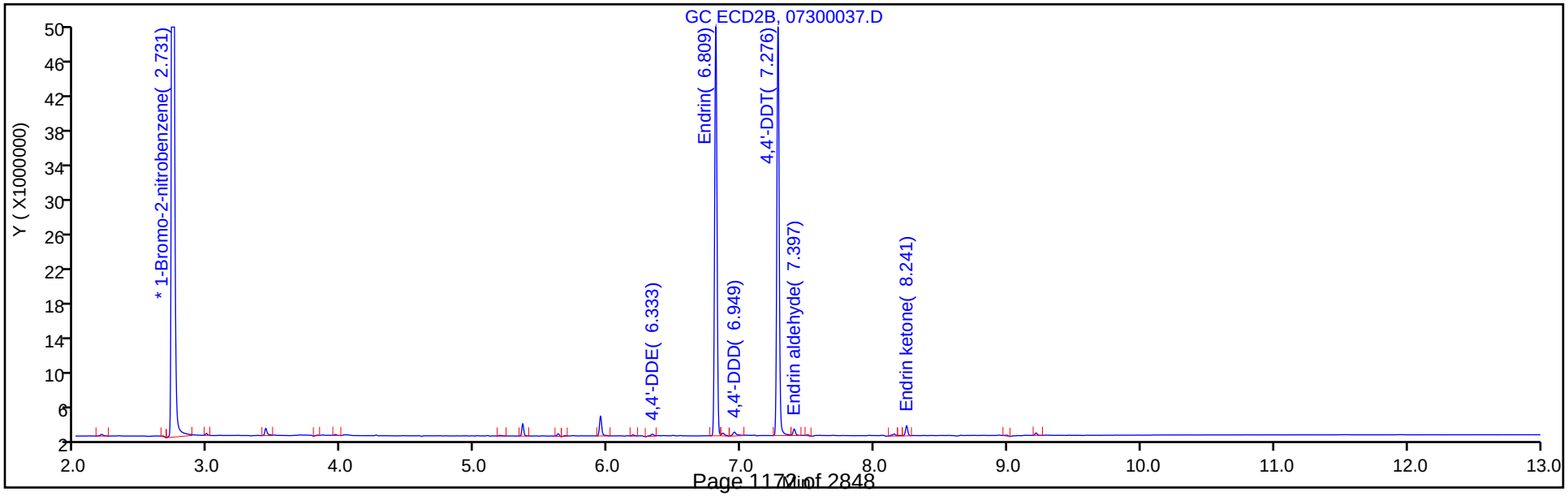
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300037.D

Injection Date:	30-Jul-2018 23:30:12	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	PEM			Worklist Smp#:	37
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	32
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM VII
PESTICIDES PERFORMANCE EVALUATION MIXTURE (PEM)

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: PEM 280-424154/37 Calibration Date: 07/30/2018 23:30

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 20:37

GC Column: CLP2 ID: 0.32(mm) Calib End Date: 07/30/2018 22:03

Lab File ID: 07300037.D Conc. Units: ng/mL

ANALYTE	RT	RESPONSE	BREAKDOWN (%)	LIMIT	#
Endrin	6.81	58308238	4.03	15	
Endrin aldehyde	7.40	1007066			
Endrin ketone	8.24	1444307			

ANALYTE	RT	RESPONSE	BREAKDOWN (%)	LIMIT	#
4,4'-DDT	7.28	58968832	2.38	15	
4,4'-DDD	6.95	961348			
4,4'-DDE	6.33	476901			

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300037.D
Lims ID: PEM
Client ID:
Sample Type: PEM
Inject. Date: 30-Jul-2018 23:30:12 ALS Bottle#: 32 Worklist Smp#: 37
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: PEM
Misc. Info.: 280-0072505-037
Operator ID: TEM Instrument ID: SGC_P2
Sublist:

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 08-Aug-2018 01:52:05 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0301

First Level Reviewer: mooret Date: 01-Aug-2018 14:31:47

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.946	2.945	0.001	754585964	150.0	150.0	
2	2.731	2.730	0.001	183456814	150.0	150.0	
24 4,4'-DDE							
1	6.344	6.346	-0.002	822646		0.1407	
2	6.333	6.330	0.003	476901		-0.0224	
						RPD = 275.79	
30 Endrin							
1	6.911	6.911	0.000	262763213	40.0	44.4	
2	6.809	6.808	0.001	58308238	40.0	36.7	
						RPD = 19.08	
32 4,4'-DDD							
1	6.986	6.981	0.005	1842820		-0.0231	
2	6.949	6.946	0.003	961348		0.0346	
						RPD = 1006.00	
35 4,4'-DDT							
1	7.277	7.277	0.000	198819768	40.0	47.6	
2	7.276	7.275	0.001	58968832	40.0	43.3	
						RPD = 9.41	
36 Endrin aldehyde							
1	7.596	7.593	0.003	2547825		-0.1930	
2	7.397	7.394	0.003	1007066		-0.0378	
						RPD = -134.55	
40 Endrin ketone							
1	8.347	8.345	0.002	4308755		0.3784	
2	8.241	8.240	0.001	1444307		0.1242	
						RPD = 101.14	

Reagents:

8081_EvalBPEM_00012	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

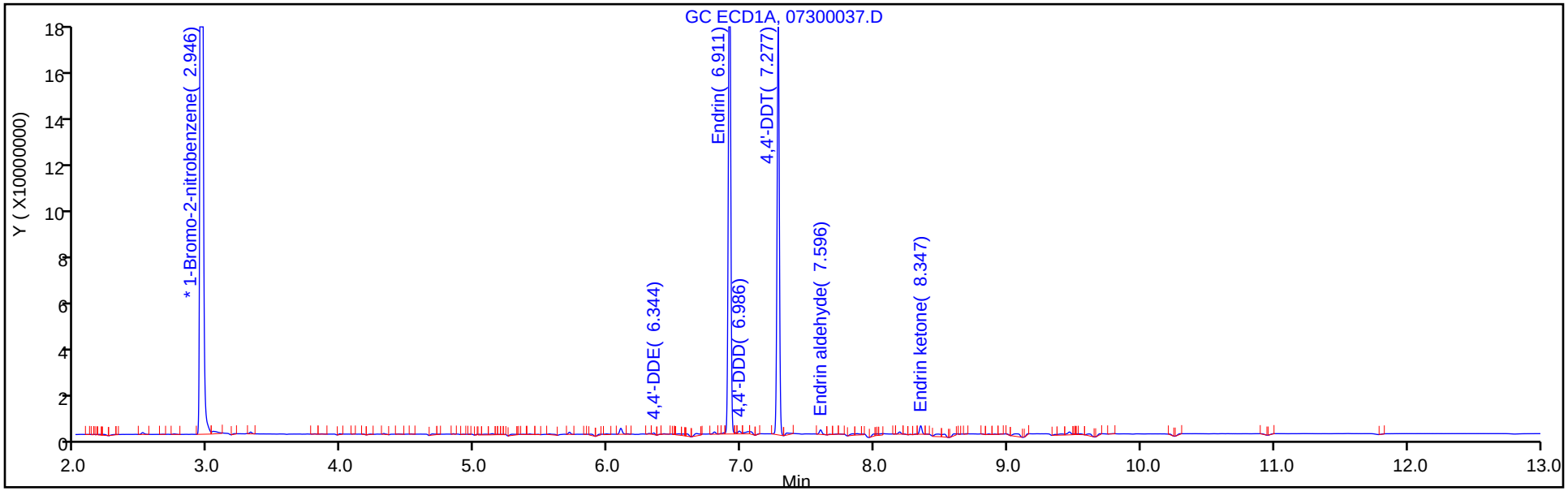
Report Date: 08-Aug-2018 01:52:36 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

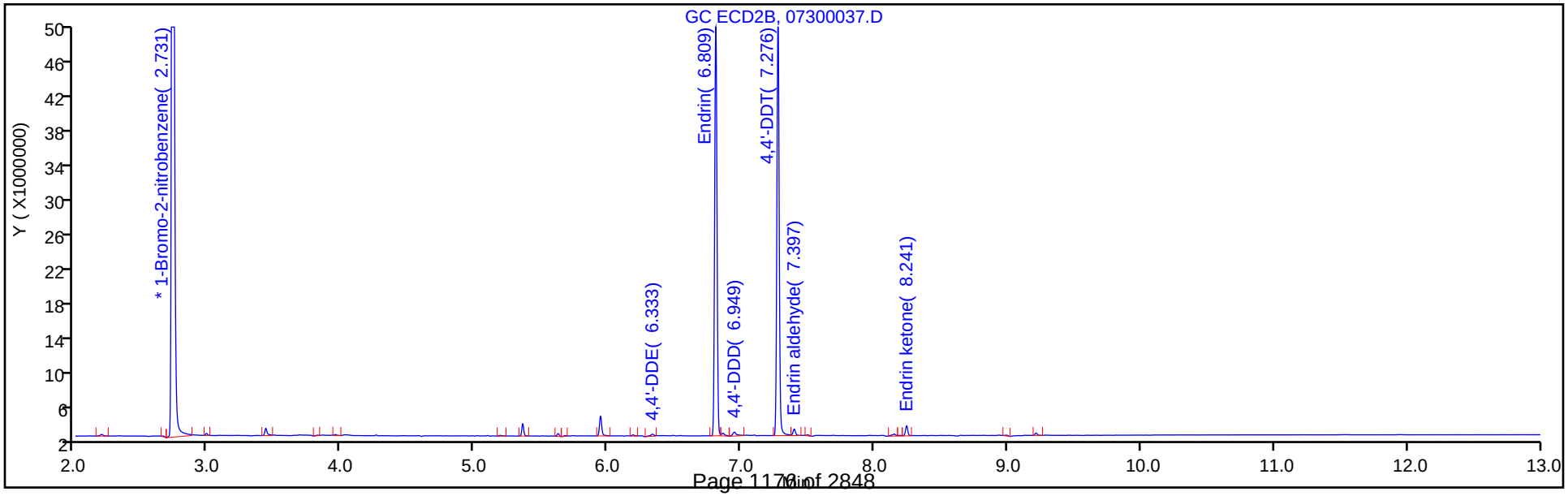
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300037.D

Injection Date:	30-Jul-2018 23:30:12	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	PEM			Worklist Smp#:	37
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	32
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM VII
PESTICIDES CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424154/34 Calibration Date: 07/30/2018 22:38

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 17:26

GC Column: CLP1 ID: 0.32(mm) Calib End Date: 07/30/2018 18:53

Lab File ID: 07300034.D Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Toxaphene Peak 1	Lin2		0.0085		702	1000	-29.8*	20.0
Toxaphene Peak 2	Lin2		0.0172		829	1000	-17.1	20.0
Toxaphene Peak 3	Lin2		0.0166		1240	1000	23.6*	20.0
Toxaphene Peak 4	Lin2		0.0219		1000	1000	0.4	20.0
Toxaphene Peak 5	Lin2		0.0221		1910	1000	91.2*	20.0

FORM VII
PESTICIDES CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424154/34 Calibration Date: 07/30/2018 22:38

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 17:26

GC Column: CLP1 ID: 0.32(mm) Calib End Date: 07/30/2018 18:53

Lab File ID: 07300034.D

Analyte	RT	RT WINDOW	
		FROM	TO
Toxaphene Peak 1	6.24	6.22	6.25
Toxaphene Peak 2	6.76	6.75	6.77
Toxaphene Peak 3	7.01	7.00	7.02
Toxaphene Peak 4	7.74	7.72	7.74
Toxaphene Peak 5	8.05	8.03	8.06

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300034.D
Lims ID: ICV TOX
Client ID:
Sample Type: ICV
Inject. Date: 30-Jul-2018 22:38:18 ALS Bottle#: 29 Worklist Smp#: 34
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: ICV TOX
Misc. Info.: 280-0072505-034
Operator ID: TEM Instrument ID: SGC_P2
Sublist:

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:29:07 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:23:53

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.945	2.944	0.001	747175329	150.0	150.0	
2	2.731	2.729	0.002	179367322	150.0	150.0	
28 Toxaphene							M
1	6.237	6.235	0.002	42133161	1000.0	701.8	M
1	6.764	6.762	0.002	85485105	1000.0	828.8	M
1	7.007	7.008	-0.001	82539565	1000.0	1235.8	M
1	7.736	7.730	0.006	108971929	1000.0	1004.0	M
1	8.046	8.045	0.001	110300964	1000.0	1912.0	M
		Average of Peak Amounts =				1136.5	
2	5.650	5.648	0.002	4488822	1000.0	799.3	
2	7.024	7.018	0.006	26404642	1000.0	596.5	
2	7.204	7.202	0.002	19983083	1000.0	1172.1	
2	7.403	7.401	0.002	50826292	1000.0	981.8	
2	7.936	7.933	0.003	56784944	1000.0	1236.4	
		Average of Peak Amounts =				957.2	
					RPD =	17.12	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

8081ToxICVL3_00012	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

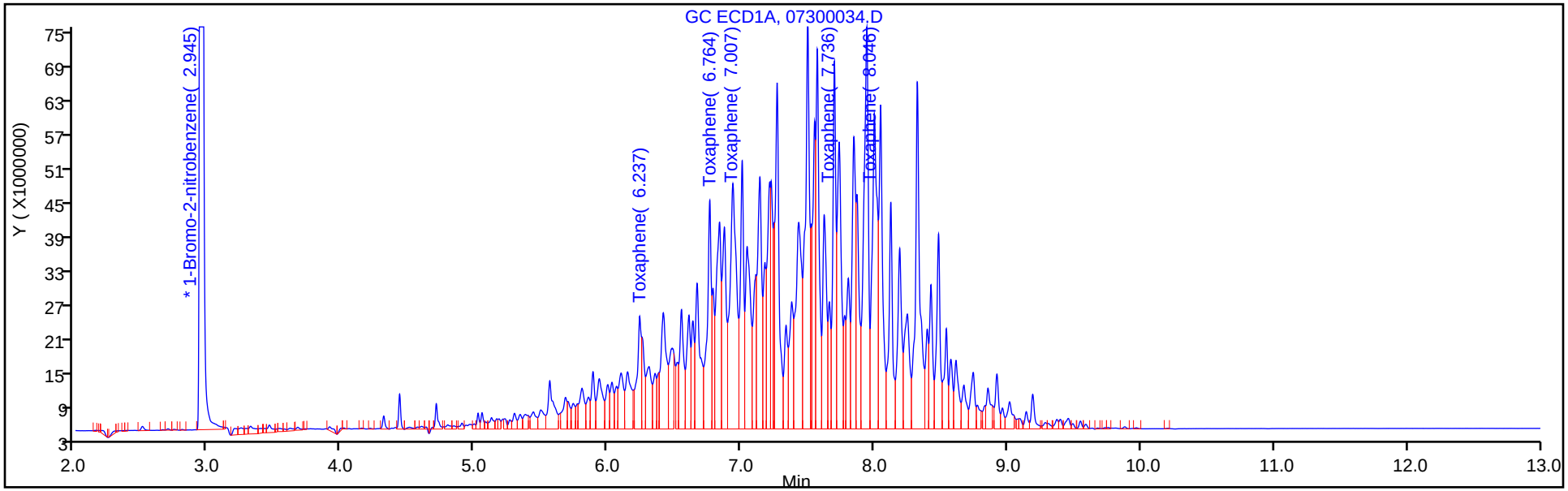
Report Date: 01-Aug-2018 15:30:33 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

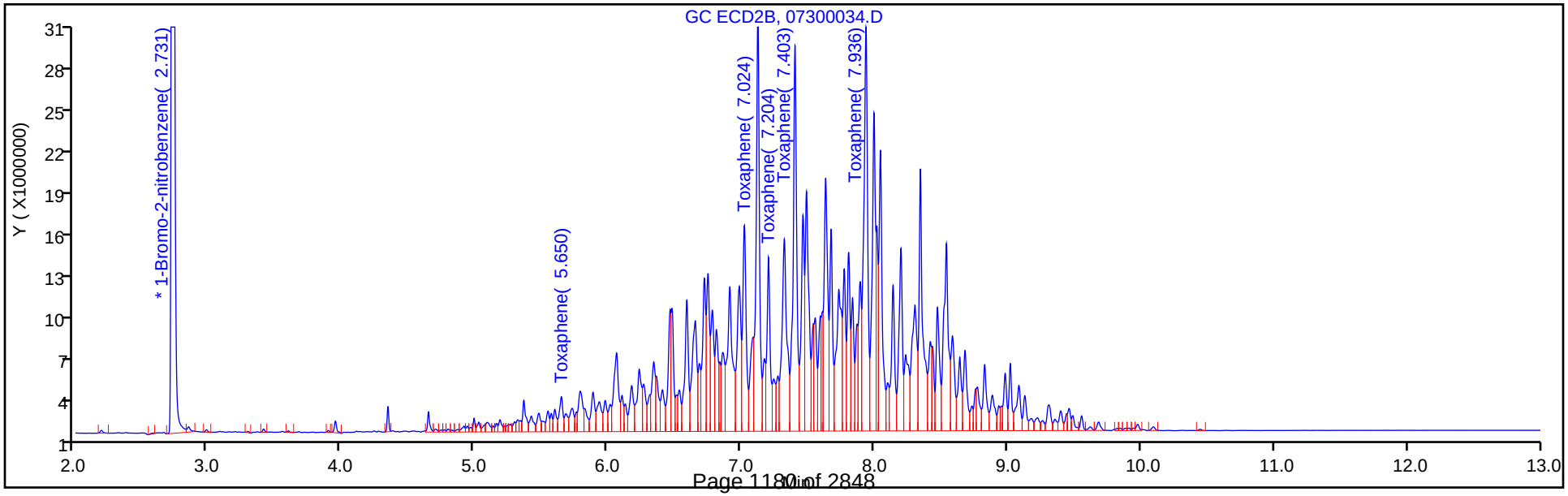
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300034.D

Injection Date:	30-Jul-2018 22:38:18	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	ICV TOX			Worklist Smp#:	34
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	29
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Report Date: 01-Aug-2018 15:30:33 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300034.D

Injection Date: 30-Jul-2018 22:38:18 Instrument ID: SGC_P2

Lims ID: ICV TOX

Client ID:

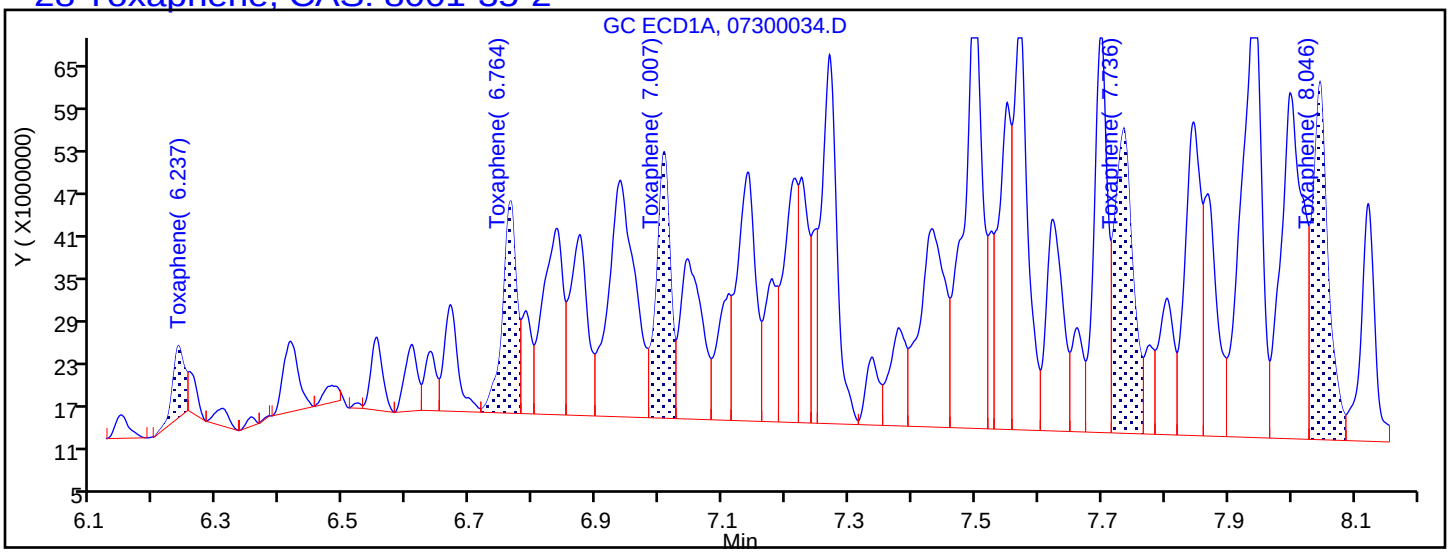
Operator ID: TEM ALS Bottle#: 29 Worklist Smp#: 34

Injection Vol: 1.0 ul Dil. Factor: 1.0000

Method: P2 8081 IS Limit Group: GCSV - 8081A - IS

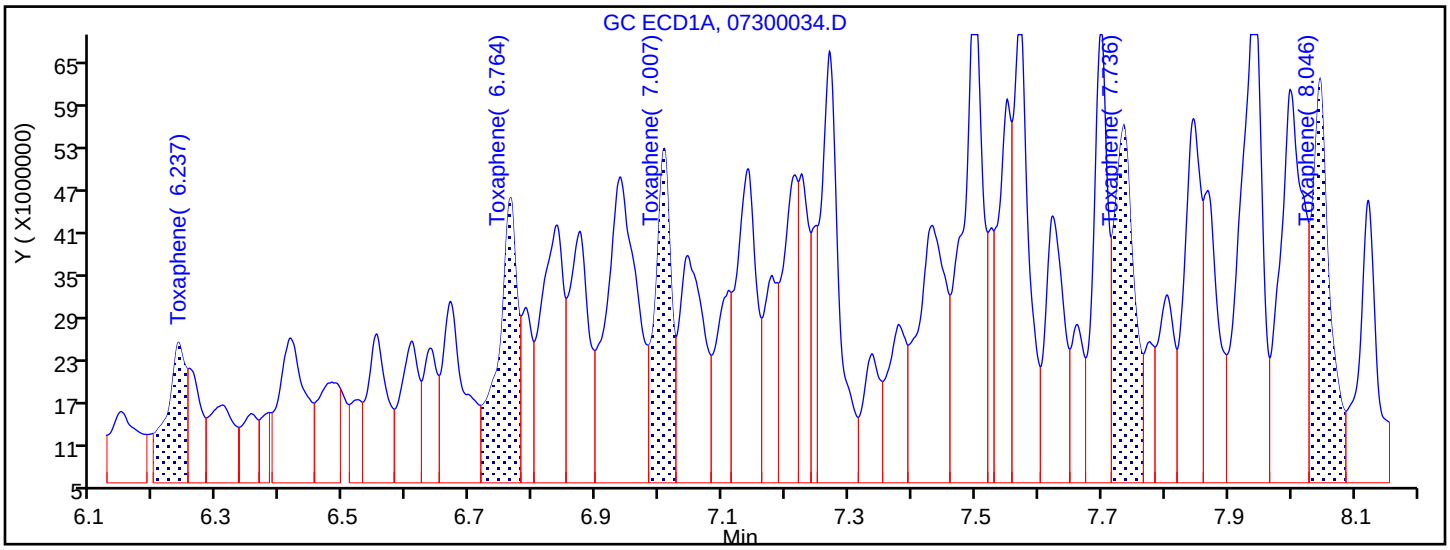
Column: CLP1 (0.32 mm) Detector GC ECD1A

28 Toxaphene, CAS: 8001-35-2



Processing Integration Results

6.237	Response = 13335736
6.764	Response = 46417362
7.007	Response = 57743444
7.736	Response = 86422113
8.046	Response = 87651622



Manual Integration Results

6.237	Response = 42133161	M
6.764	Response = 85485105	M
7.007	Response = 82539565	M
7.736	Response = 108971929	M
8.046	Response = 110300964	M

Reviewer: mooret, 01-Aug-2018 15:29:03

Audit Action: Assigned New Baseline Audit Reason: Baseline Smoothing

FORM VII
PESTICIDES CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424154/34 Calibration Date: 07/30/2018 22:38

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 17:26

GC Column: CLP2 ID: 0.32(mm) Calib End Date: 07/30/2018 18:53

Lab File ID: 07300034.D Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Toxaphene Peak 1	Lin2		0.0038		799	1000	-20.1*	20.0
Toxaphene Peak 2	Lin2		0.0221		596	1000	-40.4*	20.0
Toxaphene Peak 3	Lin2		0.0167		1170	1000	17.2	20.0
Toxaphene Peak 4	Lin2		0.0425		982	1000	-1.8	20.0
Toxaphene Peak 5	Lin2		0.0475		1240	1000	23.6*	20.0

FORM VII
PESTICIDES CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424154/34 Calibration Date: 07/30/2018 22:38

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 17:26

GC Column: CLP2 ID: 0.32(mm) Calib End Date: 07/30/2018 18:53

Lab File ID: 07300034.D

Analyte	RT	RT WINDOW	
		FROM	TO
Toxaphene Peak 1	5.65	5.64	5.66
Toxaphene Peak 2	7.02	7.01	7.03
Toxaphene Peak 3	7.20	7.19	7.21
Toxaphene Peak 4	7.40	7.39	7.41
Toxaphene Peak 5	7.94	7.92	7.95

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300034.D
Lims ID: ICV TOX
Client ID:
Sample Type: ICV
Inject. Date: 30-Jul-2018 22:38:18 ALS Bottle#: 29 Worklist Smp#: 34
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: ICV TOX
Misc. Info.: 280-0072505-034
Operator ID: TEM Instrument ID: SGC_P2
Sublist:

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:29:07 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:23:53

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.945	2.944	0.001	747175329	150.0	150.0	
2	2.731	2.729	0.002	179367322	150.0	150.0	
28 Toxaphene							M
1	6.237	6.235	0.002	42133161	1000.0	701.8	M
1	6.764	6.762	0.002	85485105	1000.0	828.8	M
1	7.007	7.008	-0.001	82539565	1000.0	1235.8	M
1	7.736	7.730	0.006	108971929	1000.0	1004.0	M
1	8.046	8.045	0.001	110300964	1000.0	1912.0	M
		Average of Peak Amounts =				1136.5	
2	5.650	5.648	0.002	4488822	1000.0	799.3	
2	7.024	7.018	0.006	26404642	1000.0	596.5	
2	7.204	7.202	0.002	19983083	1000.0	1172.1	
2	7.403	7.401	0.002	50826292	1000.0	981.8	
2	7.936	7.933	0.003	56784944	1000.0	1236.4	
		Average of Peak Amounts =				957.2	
						RPD = 17.12	

QC Flag Legend

Review Flags
M - Manually Integrated

Reagents:

8081ToxICVL3_00012 Amount Added: 1.00 Units: mL
8081_IS_00008 Amount Added: 75.00 Units: uL Run Reagent

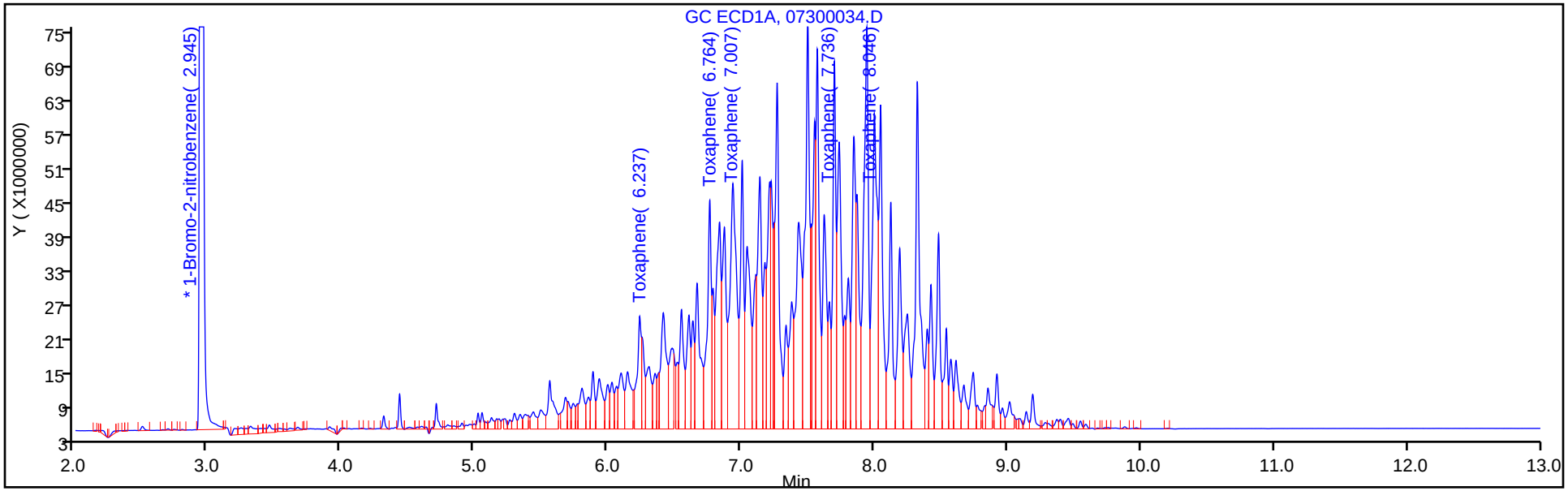
Report Date: 01-Aug-2018 15:30:34 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

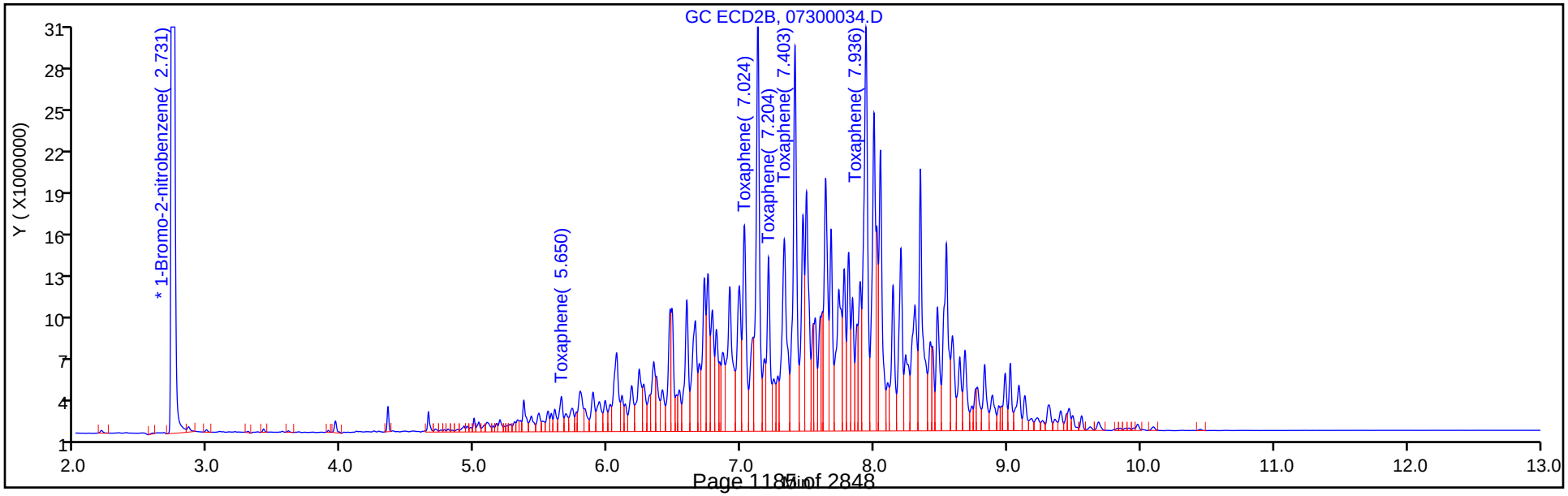
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300034.D

Injection Date:	30-Jul-2018 22:38:18	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	ICV TOX			Worklist Smp#:	34
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	29
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM VII
PESTICIDES CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424154/35 Calibration Date: 07/30/2018 22:55

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 19:10

GC Column: CLP1 ID: 0.32(mm) Calib End Date: 07/30/2018 20:19

Lab File ID: 07300035.D Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Chlordane (technical) Peak 1	Lin2		0.0341		473	500	-5.4	20.0
Technical Chlordane Peak 1	Lin2		0.0341		473	500	-5.4	20.0
Chlordane (technical) Peak 2	Lin2		0.0368		515	500	2.9	20.0
Technical Chlordane Peak 2	Lin2		0.0368		515	500	2.9	20.0
Chlordane (technical) Peak 3	Lin2		0.1340		469	500	-6.2	20.0
Technical Chlordane Peak 3	Lin2		0.1340		469	500	-6.2	20.0
Chlordane (technical) Peak 4	Lin2		0.2265		463	500	-7.5	20.0
Technical Chlordane Peak 4	Lin2		0.2265		463	500	-7.5	20.0
Chlordane (technical) Peak 5	Lin2		0.0372		470	500	-6.0	20.0
Technical Chlordane Peak 5	Lin2		0.0372		470	500	-6.0	20.0

FORM VII
PESTICIDES CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424154/35 Calibration Date: 07/30/2018 22:55

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 19:10

GC Column: CLP1 ID: 0.32(mm) Calib End Date: 07/30/2018 20:19

Lab File ID: 07300035.D

Analyte	RT	RT WINDOW	
		FROM	TO
Chlordane (technical) Peak 1	5.06	5.05	5.07
Technical Chlordane Peak 1	5.06	5.05	5.07
Chlordane (technical) Peak 2	5.52	5.51	5.53
Technical Chlordane Peak 2	5.52	5.51	5.53
Chlordane (technical) Peak 3	6.12	6.11	6.13
Technical Chlordane Peak 3	6.12	6.11	6.13
Chlordane (technical) Peak 4	6.25	6.23	6.26
Technical Chlordane Peak 4	6.25	6.23	6.26
Chlordane (technical) Peak 5	7.08	7.06	7.09
Technical Chlordane Peak 5	7.08	7.06	7.09

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300035.D
Lims ID: ICV CHL
Client ID:
Sample Type: ICV
Inject. Date: 30-Jul-2018 22:55:34 ALS Bottle#: 30 Worklist Smp#: 35
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: ICV CHL
Misc. Info.: 280-0072505-035
Operator ID: TEM Instrument ID: SGC_P2
Sublist:

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:29:07 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:28:00

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.944	0.000	756604057	150.0	150.0	
2	2.730	2.729	0.001	180154463	150.0	150.0	
13 Technical Chlordane							
1	5.062	5.061	0.001	86026156	500.0	472.8	
1	5.520	5.518	0.002	92841703	500.0	514.7	
1	6.121	6.119	0.002	337907603	500.0	469.0	
1	6.245	6.243	0.002	571123092	500.0	462.7	
1	7.076	7.074	0.002	93796323	500.0	470.0	
		Average of Peak Amounts =				477.8	
2	4.904	4.902	0.002	22075466	500.0	451.6	
2	5.414	5.413	0.001	21995011	500.0	421.9	
2	5.989	5.987	0.002	77721921	500.0	443.4	
2	6.144	6.142	0.002	58344053	500.0	429.7	
2	7.083	7.081	0.002	25520696	500.0	423.9	
		Average of Peak Amounts =				434.1	
						RPD = 9.60	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
14 Chlordane (technical)							
1	5.062	5.061	0.001	86026156	500.0	472.8	
1	5.520	5.518	0.002	92841703	500.0	514.7	
1	6.121	6.119	0.002	337907603	500.0	469.0	
1	6.245	6.243	0.002	571123092	500.0	462.7	
1	7.076	7.074	0.002	93796323	500.0	470.0	
		Average of Peak Amounts =				477.8	
2	4.904	4.902	0.002	22075466	500.0	451.6	
2	5.414	5.413	0.001	21995011	500.0	421.9	
2	5.989	5.987	0.002	77721921	500.0	443.4	
2	6.144	6.142	0.002	58344053	500.0	429.7	
2	7.083	7.081	0.002	25520696	500.0	423.9	
		Average of Peak Amounts =				434.1	
						RPD = 9.60	

Reagents:

8081ChlSSL3_00022	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

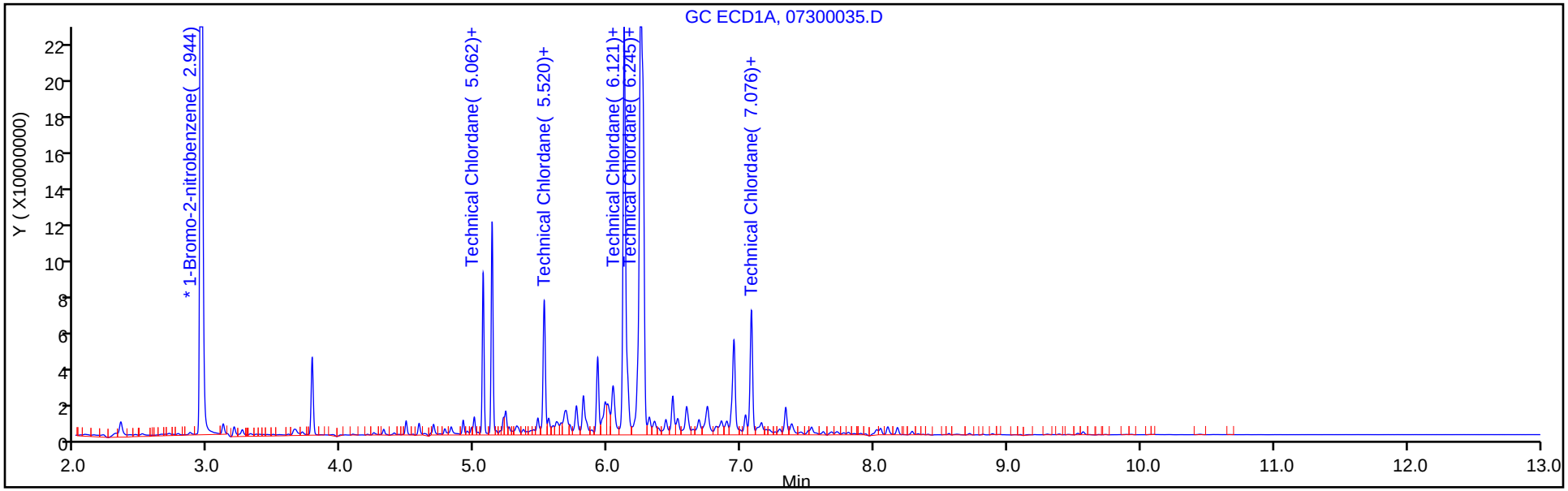
Report Date: 01-Aug-2018 15:30:47 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

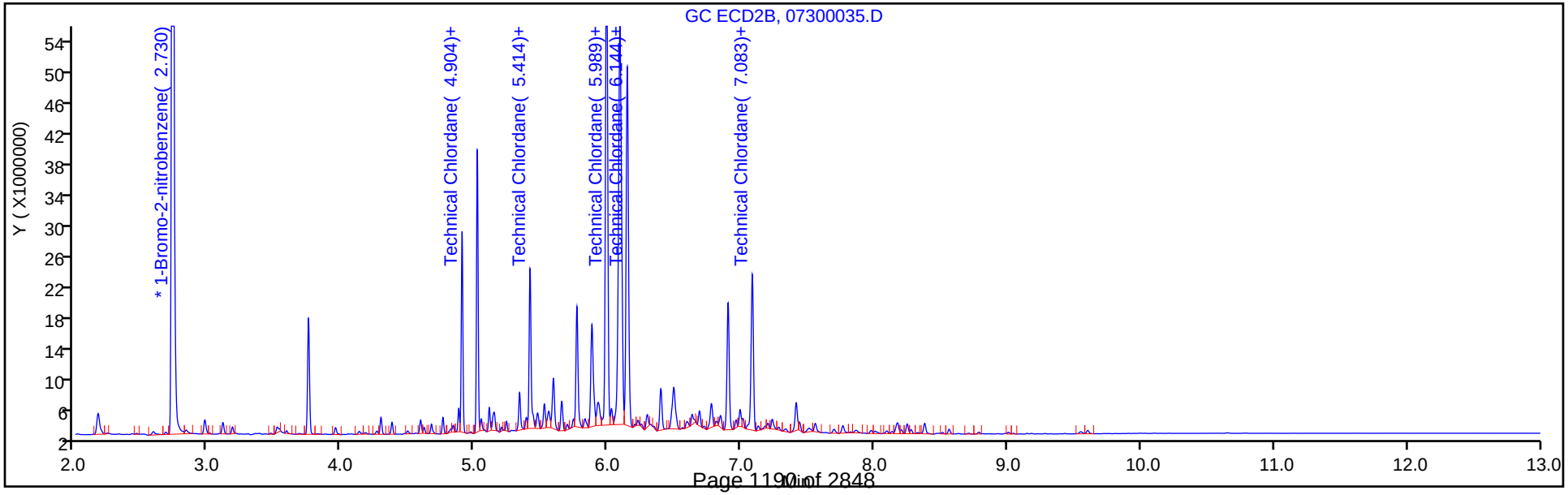
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300035.D

Injection Date:	30-Jul-2018 22:55:34	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	ICV CHL			Worklist Smp#:	35
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	30
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM VII
PESTICIDES CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424154/35 Calibration Date: 07/30/2018 22:55

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 19:10

GC Column: CLP2 ID: 0.32(mm) Calib End Date: 07/30/2018 20:19

Lab File ID: 07300035.D Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Chlordane (technical) Peak 1	Lin2		0.0368		452	500	-9.7	20.0
Technical Chlordane Peak 1	Lin2		0.0368		452	500	-9.7	20.0
Chlordane (technical) Peak 2	Lin2		0.0366		422	500	-15.6	20.0
Technical Chlordane Peak 2	Lin2		0.0366		422	500	-15.6	20.0
Chlordane (technical) Peak 3	Lin2		0.1294		443	500	-11.3	20.0
Technical Chlordane Peak 3	Lin2		0.1294		443	500	-11.3	20.0
Chlordane (technical) Peak 4	Lin2		0.0972		430	500	-14.1	20.0
Technical Chlordane Peak 4	Lin2		0.0972		430	500	-14.1	20.0
Chlordane (technical) Peak 5	Lin2		0.0425		424	500	-15.2	20.0
Technical Chlordane Peak 5	Lin2		0.0425		424	500	-15.2	20.0

FORM VII
PESTICIDES CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424154/35 Calibration Date: 07/30/2018 22:55

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 19:10

GC Column: CLP2 ID: 0.32(mm) Calib End Date: 07/30/2018 20:19

Lab File ID: 07300035.D

Analyte	RT	RT WINDOW	
		FROM	TO
Chlordane (technical) Peak 1	4.90	4.89	4.91
Technical Chlordane Peak 1	4.90	4.89	4.91
Chlordane (technical) Peak 2	5.41	5.40	5.43
Technical Chlordane Peak 2	5.41	5.40	5.43
Chlordane (technical) Peak 3	5.99	5.98	6.00
Technical Chlordane Peak 3	5.99	5.98	6.00
Chlordane (technical) Peak 4	6.14	6.13	6.15
Technical Chlordane Peak 4	6.14	6.13	6.15
Chlordane (technical) Peak 5	7.08	7.07	7.09
Technical Chlordane Peak 5	7.08	7.07	7.09

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300035.D
Lims ID: ICV CHL
Client ID:
Sample Type: ICV
Inject. Date: 30-Jul-2018 22:55:34 ALS Bottle#: 30 Worklist Smp#: 35
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: ICV CHL
Misc. Info.: 280-0072505-035
Operator ID: TEM Instrument ID: SGC_P2
Sublist:

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:29:07 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:28:00

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.944	0.000	756604057	150.0	150.0	
2	2.730	2.729	0.001	180154463	150.0	150.0	
13 Technical Chlordane							
1	5.062	5.061	0.001	86026156	500.0	472.8	
1	5.520	5.518	0.002	92841703	500.0	514.7	
1	6.121	6.119	0.002	337907603	500.0	469.0	
1	6.245	6.243	0.002	571123092	500.0	462.7	
1	7.076	7.074	0.002	93796323	500.0	470.0	
		Average of Peak Amounts =				477.8	
2	4.904	4.902	0.002	22075466	500.0	451.6	
2	5.414	5.413	0.001	21995011	500.0	421.9	
2	5.989	5.987	0.002	77721921	500.0	443.4	
2	6.144	6.142	0.002	58344053	500.0	429.7	
2	7.083	7.081	0.002	25520696	500.0	423.9	
		Average of Peak Amounts =				434.1	
						RPD = 9.60	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
14 Chlordane (technical)							
1	5.062	5.061	0.001	86026156	500.0	472.8	
1	5.520	5.518	0.002	92841703	500.0	514.7	
1	6.121	6.119	0.002	337907603	500.0	469.0	
1	6.245	6.243	0.002	571123092	500.0	462.7	
1	7.076	7.074	0.002	93796323	500.0	470.0	
		Average of Peak Amounts =				477.8	
2	4.904	4.902	0.002	22075466	500.0	451.6	
2	5.414	5.413	0.001	21995011	500.0	421.9	
2	5.989	5.987	0.002	77721921	500.0	443.4	
2	6.144	6.142	0.002	58344053	500.0	429.7	
2	7.083	7.081	0.002	25520696	500.0	423.9	
		Average of Peak Amounts =				434.1	
						RPD = 9.60	

Reagents:

8081ChlSSL3_00022	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

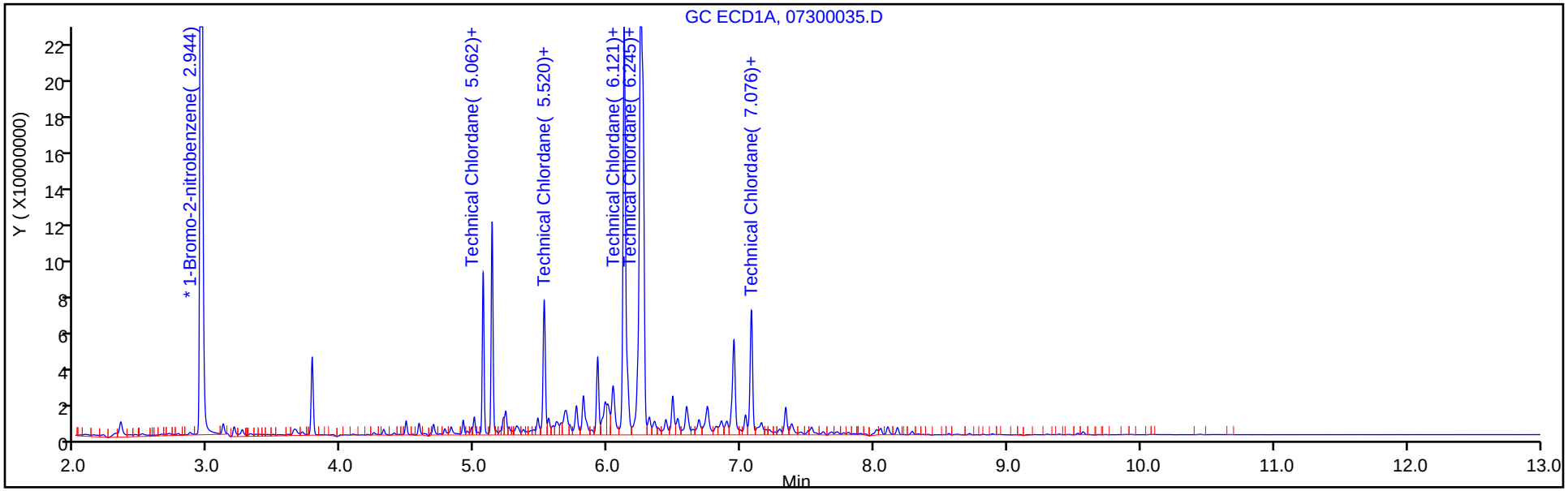
Report Date: 01-Aug-2018 15:30:47 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

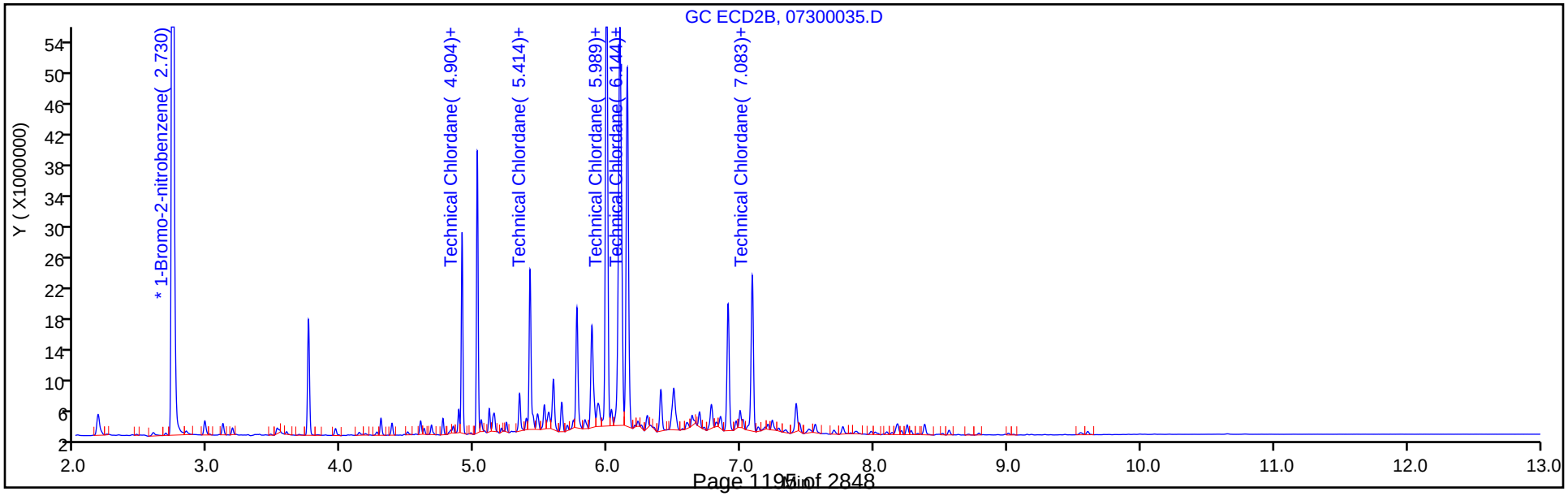
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300035.D

Injection Date:	30-Jul-2018 22:55:34	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	ICV CHL			Worklist Smp#:	35
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	30
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM VII
PESTICIDES CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424154/36 Calibration Date: 07/30/2018 23:12

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 20:37

GC Column: CLP1 ID: 0.32(mm) Calib End Date: 07/30/2018 22:03

Lab File ID: 07300036.D Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
alpha-BHC	Lin2		1.571		24.1	25.0	-3.6	20.0
gamma-BHC (Lindane)	Lin2		1.355		23.3	25.0	-6.7	20.0
beta-BHC	Lin2		0.5704		23.3	25.0	-7.0	20.0
delta-BHC	Lin2		1.346		23.2	25.0	-7.3	20.0
Heptachlor	Lin2		1.180		23.4	25.0	-6.4	20.0
Aldrin	Lin2		1.351		25.0	25.0	0.0	20.0
Heptachlor epoxide	Lin2		1.156		24.9	25.0	-0.5	20.0
trans-Chlordane	Lin2		1.193		24.3	25.0	-2.9	20.0
cis-Chlordane	Lin2		1.145		24.1	25.0	-3.5	20.0
4,4'-DDE	Lin2		1.082		23.4	25.0	-6.4	20.0
Endosulfan I	Lin2		1.109		24.6	25.0	-1.5	20.0
Dieldrin	Lin2		1.240		24.9	25.0	-0.5	20.0
Endrin	Lin2		1.100		23.2	25.0	-7.3	20.0
4,4'-DDD	Lin2		0.8932		21.8	25.0	-12.6	20.0
Endosulfan II	Lin2		1.008		24.0	25.0	-4.0	20.0
4,4'-DDT	Lin2		0.7598		23.3	25.0	-6.8	20.0
Endrin aldehyde	Lin2		0.8766		25.1	25.0	0.2	20.0
Methoxychlor	Lin2		0.3641		23.1	25.0	-7.4	20.0
Endosulfan sulfate	Lin2		0.9676		24.8	25.0	-0.9	20.0
Endrin ketone	Lin2		1.159		25.9	25.0	3.8	20.0
Tetrachloro-m-xylene	Lin2		1.143		24.8	25.0	-0.8	20.0
DCB Decachlorobiphenyl	Lin2		0.8606		25.7	25.0	2.8	20.0

FORM VII
PESTICIDES CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424154/36 Calibration Date: 07/30/2018 23:12

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 20:37

GC Column: CLP1 ID: 0.32(mm) Calib End Date: 07/30/2018 22:03

Lab File ID: 07300036.D

Analyte	RT	RT WINDOW	
		FROM	TO
alpha-BHC	4.44	4.42	4.45
gamma-BHC (Lindane)	4.73	4.72	4.74
beta-BHC	4.81	4.80	4.82
delta-BHC	4.96	4.95	4.97
Heptachlor	5.13	5.12	5.14
Aldrin	5.39	5.38	5.41
Heptachlor epoxide	5.99	5.98	6.00
trans-Chlordane	6.12	6.11	6.13
cis-Chlordane	6.26	6.25	6.27
4,4'-DDE	6.35	6.33	6.36
Endosulfan I	6.41	6.40	6.42
Dieldrin	6.66	6.65	6.68
Endrin	6.91	6.90	6.92
4,4'-DDD	6.98	6.97	6.99
Endosulfan II	7.15	7.14	7.16
4,4'-DDT	7.28	7.27	7.29
Endrin aldehyde	7.59	7.58	7.61
Methoxychlor	7.79	7.78	7.80
Endosulfan sulfate	8.05	8.04	8.06
Endrin ketone	8.35	8.33	8.36
Tetrachloro-m-xylene	3.85	3.84	3.86
DCB Decachlorobiphenyl	9.38	9.36	9.39

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300036.D
Lims ID: ICV AB
Client ID:
Sample Type: ICV
Inject. Date: 30-Jul-2018 23:12:49 ALS Bottle#: 31 Worklist Smp#: 36
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: ICV AB
Misc. Info.: 280-0072505-036
Operator ID: TEM Instrument ID: SGC_P2
Sublist:

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:29:07 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:33:39

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
S 1 Hexachlorocyclohexane, technical							
1					100.0	93.9	
2					100.0	97.6	
						RPD = 3.88	
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.944	0.000	798650528	150.0	150.0	
2	2.731	2.729	0.002	186370243	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.851	3.850	0.001	152106282	25.0	24.8	
2	3.721	3.720	0.001	39288125	25.0	26.1	
						RPD = 4.98	
5 Hexachlorobenzene							
1	4.265	4.263	0.002	150720490	25.0	24.7	
2	4.201	4.200	0.001	41859424	25.0	25.9	
						RPD = 4.88	
8 alpha-BHC							
1	4.435	4.435	0.000	209170313	25.0	24.1	
2	4.347	4.346	0.001	52535467	25.0	24.9	
						RPD = 3.25	
9 gamma-BHC (Lindane)							
1	4.727	4.728	-0.001	180316207	25.0	23.3	
2	4.665	4.663	0.002	47022874	25.0	24.8	
						RPD = 6.13	
10 beta-BHC							
1	4.808	4.808	0.000	75928824	25.0	23.3	
2	4.744	4.743	0.001	19657803	25.0	23.9	
						RPD = 2.53	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
12 delta-BHC							
1	4.956	4.957	-0.001	179194609	25.0	23.2	
2	4.977	4.977	0.000	43837974	25.0	24.0	
						RPD = 3.57	
15 Heptachlor							
1	5.129	5.129	0.000	157083530	25.0	23.4	
2	5.018	5.017	0.001	44067585	25.0	24.5	
						RPD = 4.52	
16 Aldrin							
1	5.392	5.393	-0.001	179879942	25.0	25.0	
2	5.278	5.277	0.001	45567751	25.0	25.4	
						RPD = 1.41	
18 Isodrin							
1	5.709	5.708	0.001	132628956	25.0	22.5	
2	5.625	5.623	0.002	35008805	25.0	22.9	
						RPD = 2.05	
21 Heptachlor epoxide							
1	5.988	5.988	0.000	153871829	25.0	24.9	
2	5.799	5.798	0.001	40870994	25.0	25.3	
						RPD = 1.57	
22 trans-Chlordane							
1	6.121	6.121	0.000	158843487	25.0	24.3	
2	5.989	5.988	0.001	42144637	25.0	25.0	
						RPD = 3.01	
23 cis-Chlordane							
1	6.262	6.262	0.000	152392070	25.0	24.1	
2	6.144	6.143	0.001	39668609	25.0	24.7	
						RPD = 2.48	
24 4,4'-DDE							
1	6.346	6.346	0.000	144023358	25.0	23.4	
2	6.332	6.330	0.002	42526569	25.0	25.3	
						RPD = 7.79	
25 Endosulfan I							
1	6.410	6.409	0.001	147612308	25.0	24.6	
2	6.201	6.199	0.002	39029891	25.0	25.4	
						RPD = 3.03	
27 Dieldrin							
1	6.664	6.663	0.001	165110283	25.0	24.9	
2	6.489	6.488	0.001	44184050	25.0	26.0	
						RPD = 4.33	
30 Endrin							
1	6.911	6.911	0.000	146371730	25.0	23.2	
2	6.809	6.808	0.001	39233540	25.0	24.1	
						RPD = 3.95	
32 4,4'-DDD							
1	6.984	6.981	0.003	118895459	25.0	21.8	
2	6.948	6.946	0.002	32372477	25.0	24.5	
						RPD = 11.66	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
34 Endosulfan II							
1	7.149	7.148	0.001	134124919	25.0	24.0	
2	7.036	7.035	0.001	38188659	25.0	25.1	
						RPD = 4.28	
35 4,4'-DDT							
1	7.278	7.277	0.001	101132668	25.0	23.3	
2	7.277	7.275	0.002	35292843	25.0	25.5	
						RPD = 8.90	
36 Endrin aldehyde							
1	7.594	7.593	0.001	116679122	25.0	25.1	
2	7.397	7.394	0.003	31806904	25.0	26.2	
						RPD = 4.45	
37 Methoxychlor							
1	7.791	7.790	0.001	48468662	25.0	23.1	
2	8.012	8.009	0.003	18778939	25.0	25.4	
						RPD = 9.27	
38 Mirex							
1	7.939	7.938	0.001	97356428	25.0	24.5	
2	8.189	8.187	0.002	29734559	25.0	26.7	
						RPD = 8.31	
39 Endosulfan sulfate							
1	8.053	8.052	0.001	128790861	25.0	24.8	
2	7.691	7.688	0.003	35240109	25.0	25.7	
						RPD = 3.74	
40 Endrin ketone							
1	8.346	8.345	0.001	154288947	25.0	25.9	
2	8.241	8.240	0.001	43710302	25.0	27.2	
						RPD = 4.71	
$ 41 DCB Decachlorobiphenyl							
1	9.376	9.376	0.000	114547341	25.0	25.7	
2	9.515	9.513	0.002	31897304	25.0	26.8	
						RPD = 4.03	
S 3 Endosulfan, Total							
1					75.0	73.4	
2					75.0	76.2	
						RPD = 3.68	

Reagents:

8081ABICVL3_00033	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

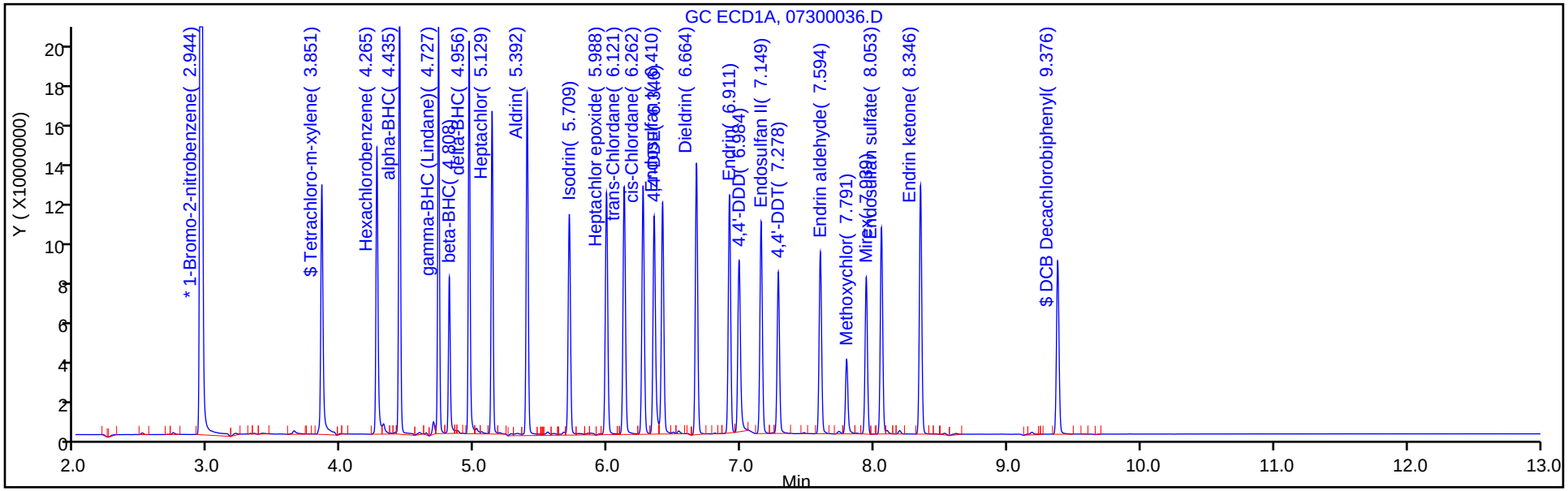
Report Date: 01-Aug-2018 15:30:53 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

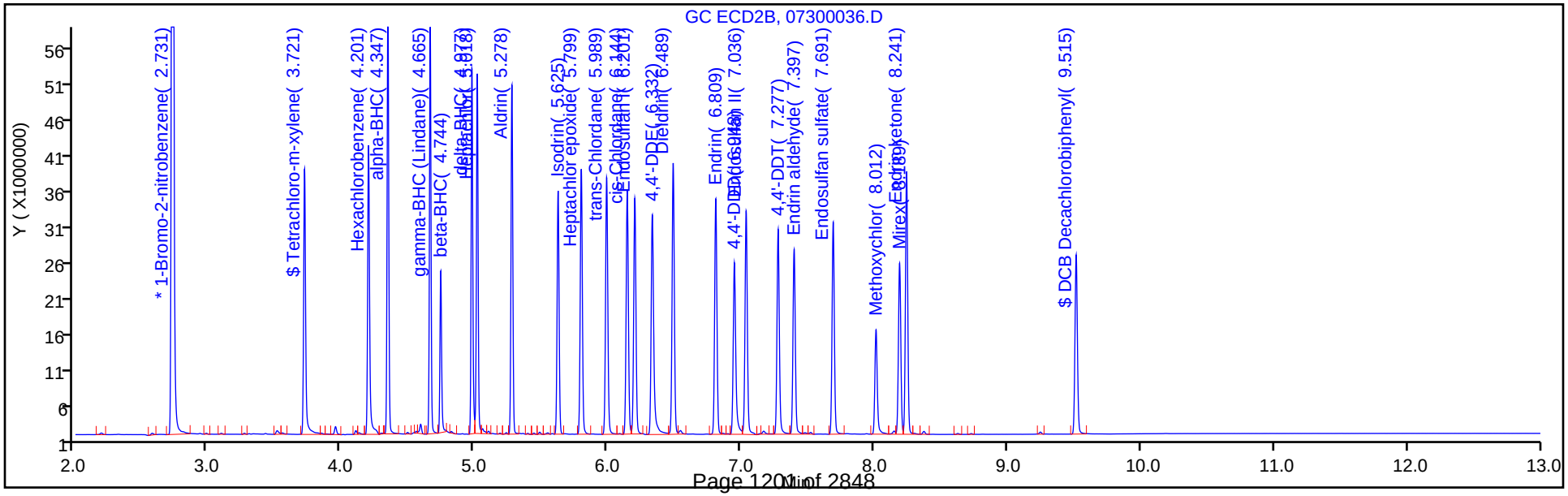
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300036.D

Injection Date:	30-Jul-2018 23:12:49	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	ICV AB			Worklist Smp#:	36
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	31
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM VII
PESTICIDES CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424154/36 Calibration Date: 07/30/2018 23:12

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 20:37

GC Column: CLP2 ID: 0.32(mm) Calib End Date: 07/30/2018 22:03

Lab File ID: 07300036.D Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
alpha-BHC	Lin2		1.691		24.9	25.0	-0.5	20.0
gamma-BHC (Lindane)	Lin2		1.514		24.8	25.0	-0.8	20.0
beta-BHC	Lin2		0.6329		23.9	25.0	-4.6	20.0
delta-BHC	Lin2		1.411		24.0	25.0	-3.9	20.0
Heptachlor	Lin2		1.419		24.5	25.0	-2.1	20.0
Aldrin	Lin2		1.467		25.4	25.0	1.4	20.0
Heptachlor epoxide	Lin2		1.316		25.3	25.0	1.0	20.0
trans-Chlordane	Lin2		1.357		25.0	25.0	0.0	20.0
cis-Chlordane	Lin2		1.277		24.7	25.0	-1.1	20.0
Endosulfan I	Lin2		1.257		25.4	25.0	1.5	20.0
4,4'-DDE	Lin2		1.369		25.3	25.0	1.2	20.0
Dieldrin	Lin2		1.422		26.0	25.0	3.9	20.0
Endrin	Lin2		1.263		24.1	25.0	-3.6	20.0
4,4'-DDD	Lin2		1.042		24.5	25.0	-1.8	20.0
Endosulfan II	Lin2		1.229		25.1	25.0	0.2	20.0
4,4'-DDT	Lin2		1.136		25.5	25.0	1.9	20.0
Endrin aldehyde	Lin2		1.024		26.2	25.0	4.8	20.0
Endosulfan sulfate	Lin2		1.135		25.7	25.0	2.9	20.0
Methoxychlor	Lin2		0.6046		25.4	25.0	1.6	20.0
Endrin ketone	Lin2		1.407		27.2	25.0	8.8	20.0
Tetrachloro-m-xylene	Lin2		1.265		26.1	25.0	4.3	20.0
DCB Decachlorobiphenyl	Lin2		1.027		26.8	25.0	7.1	20.0

FORM VII
PESTICIDES CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: ICV 280-424154/36 Calibration Date: 07/30/2018 23:12

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 20:37

GC Column: CLP2 ID: 0.32(mm) Calib End Date: 07/30/2018 22:03

Lab File ID: 07300036.D

Analyte	RT	RT WINDOW	
		FROM	TO
alpha-BHC	4.35	4.33	4.36
gamma-BHC (Lindane)	4.67	4.65	4.68
beta-BHC	4.74	4.73	4.76
delta-BHC	4.98	4.97	4.99
Heptachlor	5.02	5.01	5.03
Aldrin	5.28	5.27	5.29
Heptachlor epoxide	5.80	5.79	5.81
trans-Chlordane	5.99	5.98	6.00
cis-Chlordane	6.14	6.13	6.16
Endosulfan I	6.20	6.19	6.21
4,4'-DDE	6.33	6.32	6.34
Dieldrin	6.49	6.48	6.50
Endrin	6.81	6.80	6.82
4,4'-DDD	6.95	6.93	6.96
Endosulfan II	7.04	7.02	7.05
4,4'-DDT	7.28	7.26	7.29
Endrin aldehyde	7.40	7.38	7.41
Endosulfan sulfate	7.69	7.68	7.70
Methoxychlor	8.01	8.00	8.02
Endrin ketone	8.24	8.23	8.25
Tetrachloro-m-xylene	3.72	3.71	3.73
DCB Decachlorobiphenyl	9.52	9.50	9.53

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300036.D
Lims ID: ICV AB
Client ID:
Sample Type: ICV
Inject. Date: 30-Jul-2018 23:12:49 ALS Bottle#: 31 Worklist Smp#: 36
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: ICV AB
Misc. Info.: 280-0072505-036
Operator ID: TEM Instrument ID: SGC_P2
Sublist:

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 01-Aug-2018 15:29:07 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0304

First Level Reviewer: mooret Date: 01-Aug-2018 12:33:39

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
S 1 Hexachlorocyclohexane, technical							
1					100.0	93.9	
2					100.0	97.6	
						RPD = 3.88	
* 2 1-Bromo-2-nitrobenzene							
1	2.944	2.944	0.000	798650528	150.0	150.0	
2	2.731	2.729	0.002	186370243	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.851	3.850	0.001	152106282	25.0	24.8	
2	3.721	3.720	0.001	39288125	25.0	26.1	
						RPD = 4.98	
5 Hexachlorobenzene							
1	4.265	4.263	0.002	150720490	25.0	24.7	
2	4.201	4.200	0.001	41859424	25.0	25.9	
						RPD = 4.88	
8 alpha-BHC							
1	4.435	4.435	0.000	209170313	25.0	24.1	
2	4.347	4.346	0.001	52535467	25.0	24.9	
						RPD = 3.25	
9 gamma-BHC (Lindane)							
1	4.727	4.728	-0.001	180316207	25.0	23.3	
2	4.665	4.663	0.002	47022874	25.0	24.8	
						RPD = 6.13	
10 beta-BHC							
1	4.808	4.808	0.000	75928824	25.0	23.3	
2	4.744	4.743	0.001	19657803	25.0	23.9	
						RPD = 2.53	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
12 delta-BHC							
1	4.956	4.957	-0.001	179194609	25.0	23.2	
2	4.977	4.977	0.000	43837974	25.0	24.0	
						RPD = 3.57	
15 Heptachlor							
1	5.129	5.129	0.000	157083530	25.0	23.4	
2	5.018	5.017	0.001	44067585	25.0	24.5	
						RPD = 4.52	
16 Aldrin							
1	5.392	5.393	-0.001	179879942	25.0	25.0	
2	5.278	5.277	0.001	45567751	25.0	25.4	
						RPD = 1.41	
18 Isodrin							
1	5.709	5.708	0.001	132628956	25.0	22.5	
2	5.625	5.623	0.002	35008805	25.0	22.9	
						RPD = 2.05	
21 Heptachlor epoxide							
1	5.988	5.988	0.000	153871829	25.0	24.9	
2	5.799	5.798	0.001	40870994	25.0	25.3	
						RPD = 1.57	
22 trans-Chlordane							
1	6.121	6.121	0.000	158843487	25.0	24.3	
2	5.989	5.988	0.001	42144637	25.0	25.0	
						RPD = 3.01	
23 cis-Chlordane							
1	6.262	6.262	0.000	152392070	25.0	24.1	
2	6.144	6.143	0.001	39668609	25.0	24.7	
						RPD = 2.48	
24 4,4'-DDE							
1	6.346	6.346	0.000	144023358	25.0	23.4	
2	6.332	6.330	0.002	42526569	25.0	25.3	
						RPD = 7.79	
25 Endosulfan I							
1	6.410	6.409	0.001	147612308	25.0	24.6	
2	6.201	6.199	0.002	39029891	25.0	25.4	
						RPD = 3.03	
27 Dieldrin							
1	6.664	6.663	0.001	165110283	25.0	24.9	
2	6.489	6.488	0.001	44184050	25.0	26.0	
						RPD = 4.33	
30 Endrin							
1	6.911	6.911	0.000	146371730	25.0	23.2	
2	6.809	6.808	0.001	39233540	25.0	24.1	
						RPD = 3.95	
32 4,4'-DDD							
1	6.984	6.981	0.003	118895459	25.0	21.8	
2	6.948	6.946	0.002	32372477	25.0	24.5	
						RPD = 11.66	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
34 Endosulfan II							
1	7.149	7.148	0.001	134124919	25.0	24.0	
2	7.036	7.035	0.001	38188659	25.0	25.1	
						RPD = 4.28	
35 4,4'-DDT							
1	7.278	7.277	0.001	101132668	25.0	23.3	
2	7.277	7.275	0.002	35292843	25.0	25.5	
						RPD = 8.90	
36 Endrin aldehyde							
1	7.594	7.593	0.001	116679122	25.0	25.1	
2	7.397	7.394	0.003	31806904	25.0	26.2	
						RPD = 4.45	
37 Methoxychlor							
1	7.791	7.790	0.001	48468662	25.0	23.1	
2	8.012	8.009	0.003	18778939	25.0	25.4	
						RPD = 9.27	
38 Mirex							
1	7.939	7.938	0.001	97356428	25.0	24.5	
2	8.189	8.187	0.002	29734559	25.0	26.7	
						RPD = 8.31	
39 Endosulfan sulfate							
1	8.053	8.052	0.001	128790861	25.0	24.8	
2	7.691	7.688	0.003	35240109	25.0	25.7	
						RPD = 3.74	
40 Endrin ketone							
1	8.346	8.345	0.001	154288947	25.0	25.9	
2	8.241	8.240	0.001	43710302	25.0	27.2	
						RPD = 4.71	
$ 41 DCB Decachlorobiphenyl							
1	9.376	9.376	0.000	114547341	25.0	25.7	
2	9.515	9.513	0.002	31897304	25.0	26.8	
						RPD = 4.03	
S 3 Endosulfan, Total							
1					75.0	73.4	
2					75.0	76.2	
						RPD = 3.68	

Reagents:

8081ABICVL3_00033	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

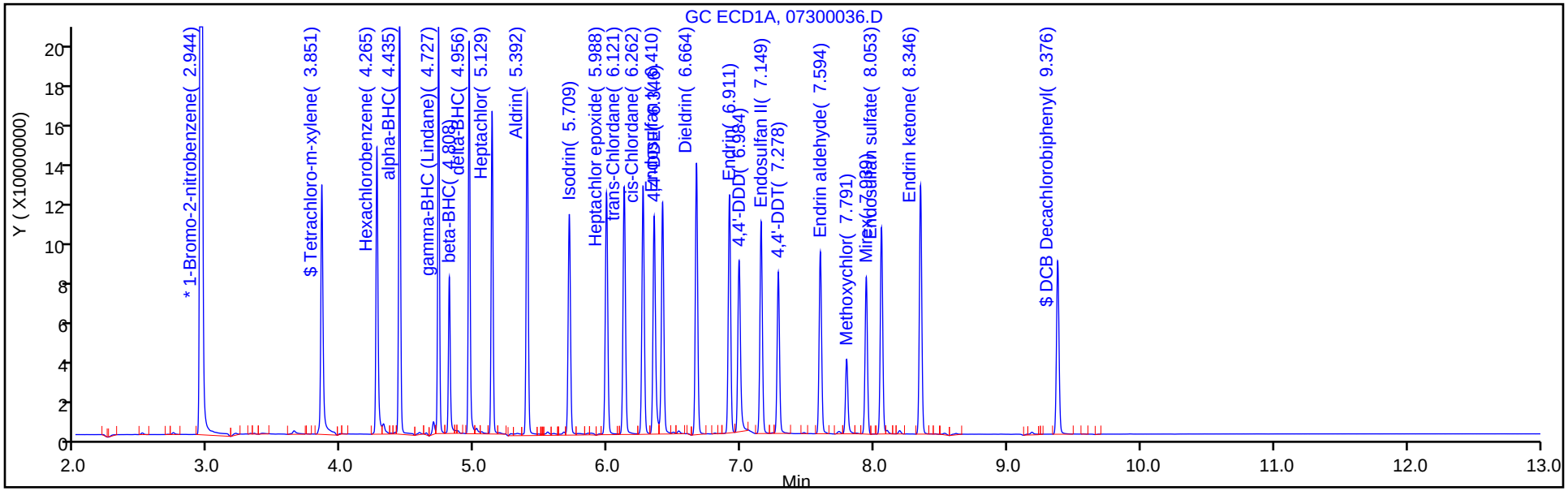
Report Date: 01-Aug-2018 15:30:54 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

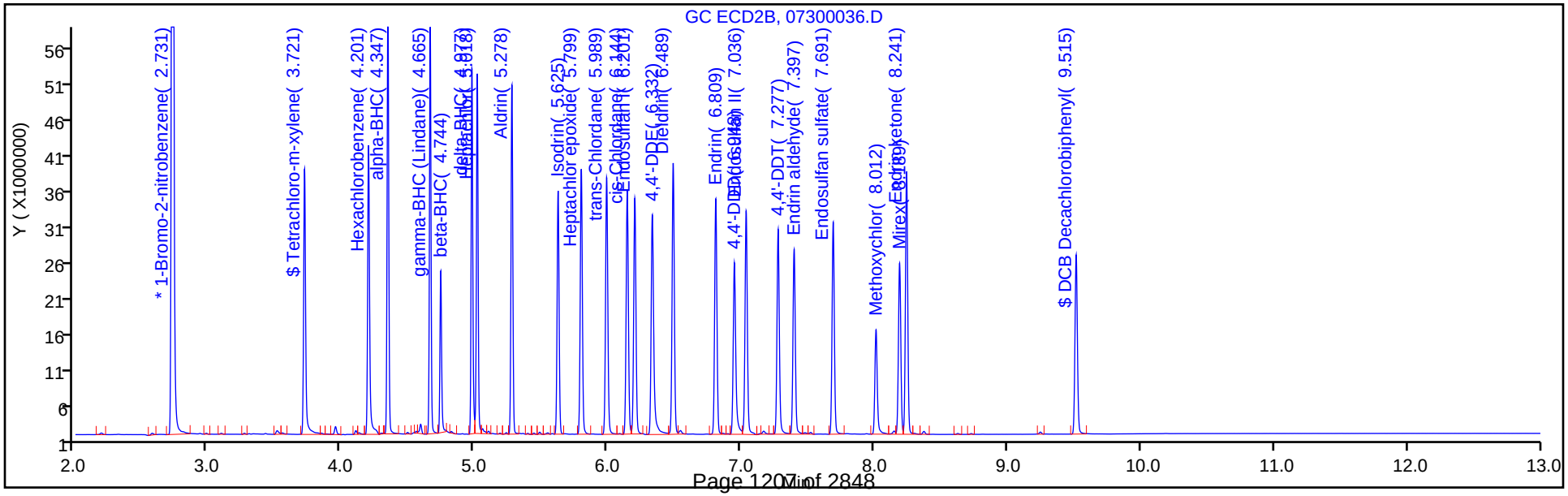
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300036.D

Injection Date:	30-Jul-2018 23:12:49	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	ICV AB			Worklist Smp#:	36
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	31
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM VII
PESTICIDES CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-424154/46 Calibration Date: 07/31/2018 02:05

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 17:26

GC Column: CLP1 ID: 0.32(mm) Calib End Date: 07/30/2018 18:53

Lab File ID: 07300046.D Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Toxaphene Peak 1	Lin2		0.0121		2120	2000	6.0	20.0
Toxaphene Peak 2	Lin2		0.0211		2090	2000	4.3	20.0
Toxaphene Peak 3	Lin2		0.0146		2180	2000	9.0	20.0
Toxaphene Peak 4	Lin2		0.0229		2090	2000	4.3	20.0
Toxaphene Peak 5	Lin2		0.0120		2070	2000	3.5	20.0

FORM VII
PESTICIDES CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-424154/46 Calibration Date: 07/31/2018 02:05

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 17:26

GC Column: CLP1 ID: 0.32(mm) Calib End Date: 07/30/2018 18:53

Lab File ID: 07300046.D

Analyte	RT	RT WINDOW	
		FROM	TO
Toxaphene Peak 1	6.24	6.22	6.25
Toxaphene Peak 2	6.76	6.75	6.77
Toxaphene Peak 3	7.01	7.00	7.02
Toxaphene Peak 4	7.73	7.72	7.74
Toxaphene Peak 5	8.05	8.03	8.06

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300046.D
Lims ID: CCV TOX
Client ID:
Sample Type: CCV
Inject. Date: 31-Jul-2018 02:05:48 ALS Bottle#: 41 Worklist Smp#: 46
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: CCV TOX
Misc. Info.: 280-0072505-046
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub3

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 08-Aug-2018 01:52:46 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0301

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.945	2.945	0.000	762580855	150.0	150.0	
2	2.731	2.730	0.001	179062116	150.0	150.0	
28 Toxaphene							
1	6.237	6.235	0.002	122656988	2000.0	2119.1	
1	6.763	6.762	0.001	214802411	2000.0	2085.6	
1	7.009	7.008	0.001	147976512	2000.0	2180.8	
1	7.727	7.730	-0.003	232525693	2000.0	2086.3	
1	8.047	8.045	0.002	121938392	2000.0	2069.7	
		Average of Peak Amounts =				2108.3	
2	5.649	5.648	0.001	11606579	2000.0	2156.2	
2	7.020	7.018	0.002	90881513	2000.0	2139.9	
2	7.203	7.202	0.001	36003288	2000.0	2132.2	
2	7.402	7.401	0.001	110444363	2000.0	2163.1	
2	7.934	7.933	0.001	98968031	2000.0	2176.2	
		Average of Peak Amounts =				2153.6	
						RPD = 2.12	

Reagents:

8081TOXCCVL4_00014 Amount Added: 1.00 Units: mL
8081_IS_00008 Amount Added: 75.00 Units: uL Run Reagent

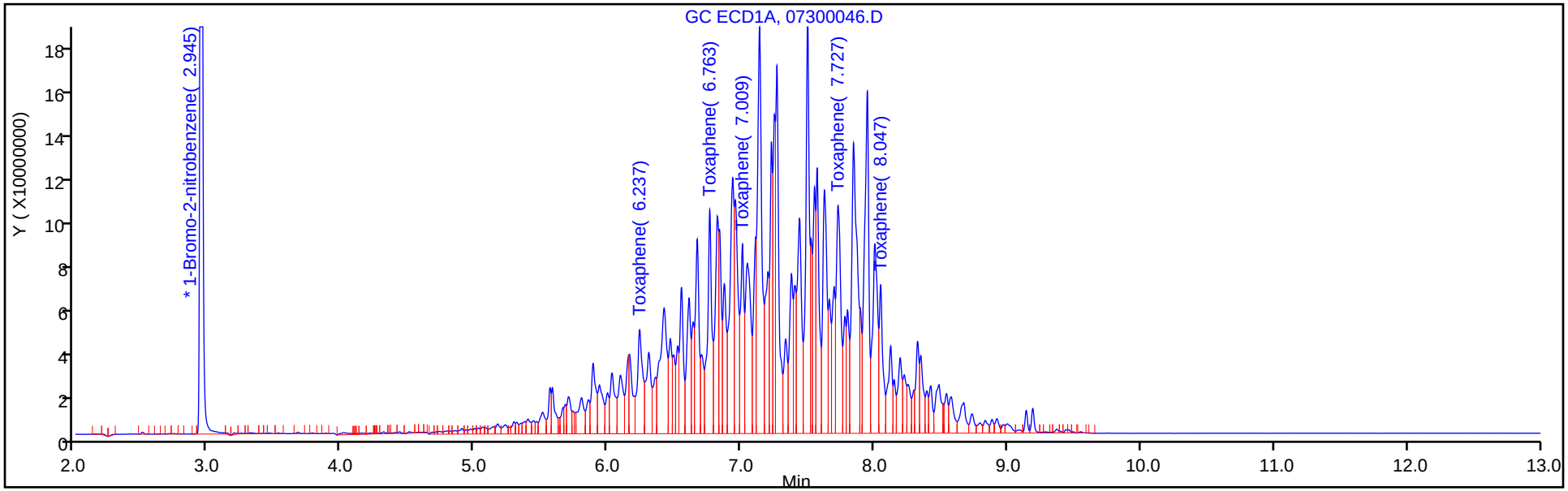
Report Date: 08-Aug-2018 01:52:47 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

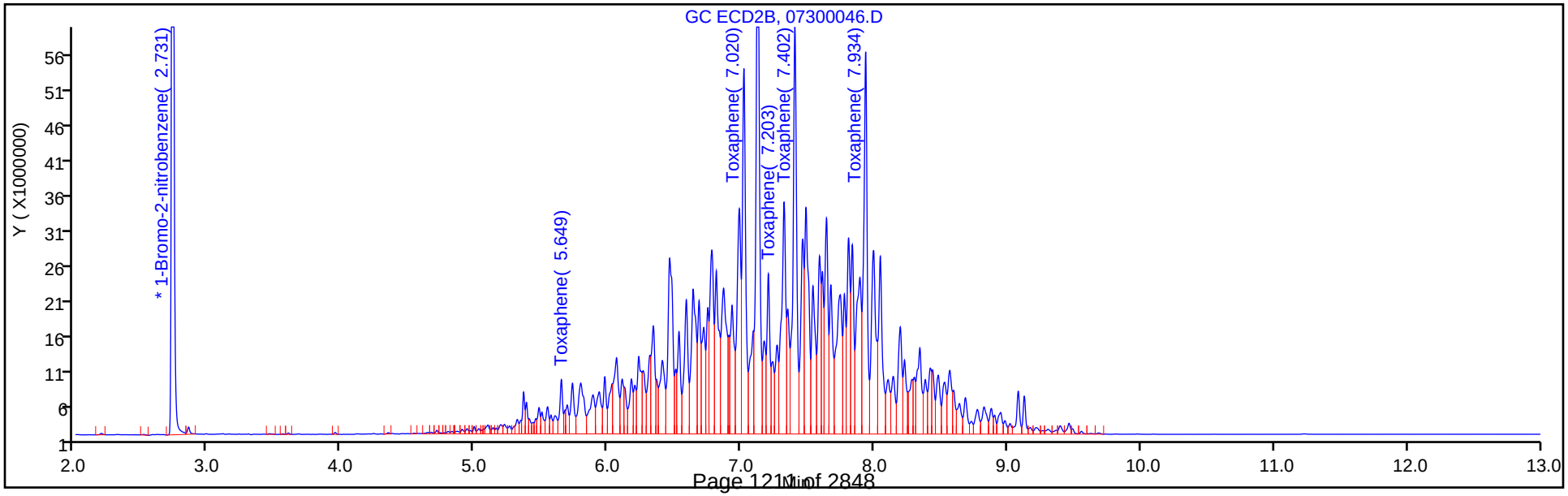
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300046.D

Injection Date:	31-Jul-2018 02:05:48	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	CCV TOX			Worklist Smp#:	46
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	41
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM VII
PESTICIDES CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-424154/46 Calibration Date: 07/31/2018 02:05

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 17:26

GC Column: CLP2 ID: 0.32(mm) Calib End Date: 07/30/2018 18:53

Lab File ID: 07300046.D Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Toxaphene Peak 1	Lin2		0.0049		2160	2000	7.8	20.0
Toxaphene Peak 2	Lin2		0.0381		2140	2000	7.0	20.0
Toxaphene Peak 3	Lin2		0.0151		2130	2000	6.6	20.0
Toxaphene Peak 4	Lin2		0.0463		2160	2000	8.2	20.0
Toxaphene Peak 5	Lin2		0.0415		2180	2000	8.8	20.0

FORM VII
PESTICIDES CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-424154/46 Calibration Date: 07/31/2018 02:05

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 17:26

GC Column: CLP2 ID: 0.32(mm) Calib End Date: 07/30/2018 18:53

Lab File ID: 07300046.D

Analyte	RT	RT WINDOW	
		FROM	TO
Toxaphene Peak 1	5.65	5.64	5.66
Toxaphene Peak 2	7.02	7.01	7.03
Toxaphene Peak 3	7.20	7.19	7.21
Toxaphene Peak 4	7.40	7.39	7.41
Toxaphene Peak 5	7.93	7.92	7.95

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300046.D
Lims ID: CCV TOX
Client ID:
Sample Type: CCV
Inject. Date: 31-Jul-2018 02:05:48 ALS Bottle#: 41 Worklist Smp#: 46
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: CCV TOX
Misc. Info.: 280-0072505-046
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub3

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 08-Aug-2018 01:52:46 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0301

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.945	2.945	0.000	762580855	150.0	150.0	
2	2.731	2.730	0.001	179062116	150.0	150.0	
28 Toxaphene							
1	6.237	6.235	0.002	122656988	2000.0	2119.1	
1	6.763	6.762	0.001	214802411	2000.0	2085.6	
1	7.009	7.008	0.001	147976512	2000.0	2180.8	
1	7.727	7.730	-0.003	232525693	2000.0	2086.3	
1	8.047	8.045	0.002	121938392	2000.0	2069.7	
		Average of Peak Amounts =				2108.3	
2	5.649	5.648	0.001	11606579	2000.0	2156.2	
2	7.020	7.018	0.002	90881513	2000.0	2139.9	
2	7.203	7.202	0.001	36003288	2000.0	2132.2	
2	7.402	7.401	0.001	110444363	2000.0	2163.1	
2	7.934	7.933	0.001	98968031	2000.0	2176.2	
		Average of Peak Amounts =				2153.6	
						RPD = 2.12	

Reagents:

8081TOXCCVL4_00014 Amount Added: 1.00 Units: mL
8081_IS_00008 Amount Added: 75.00 Units: uL Run Reagent

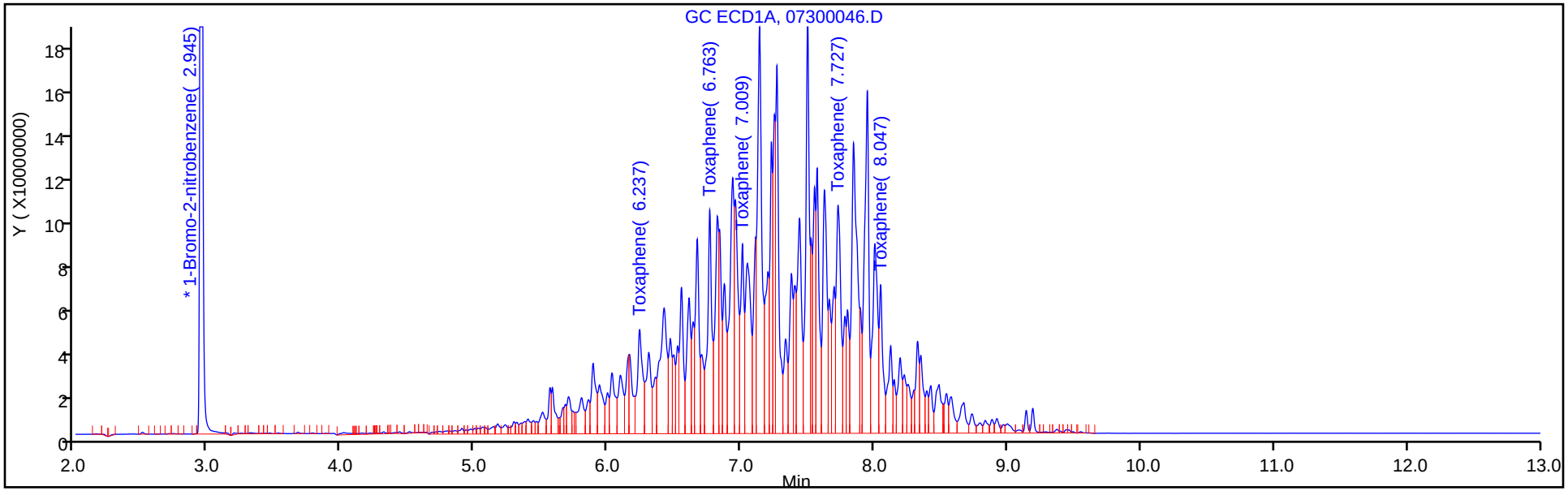
Report Date: 08-Aug-2018 01:52:47 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

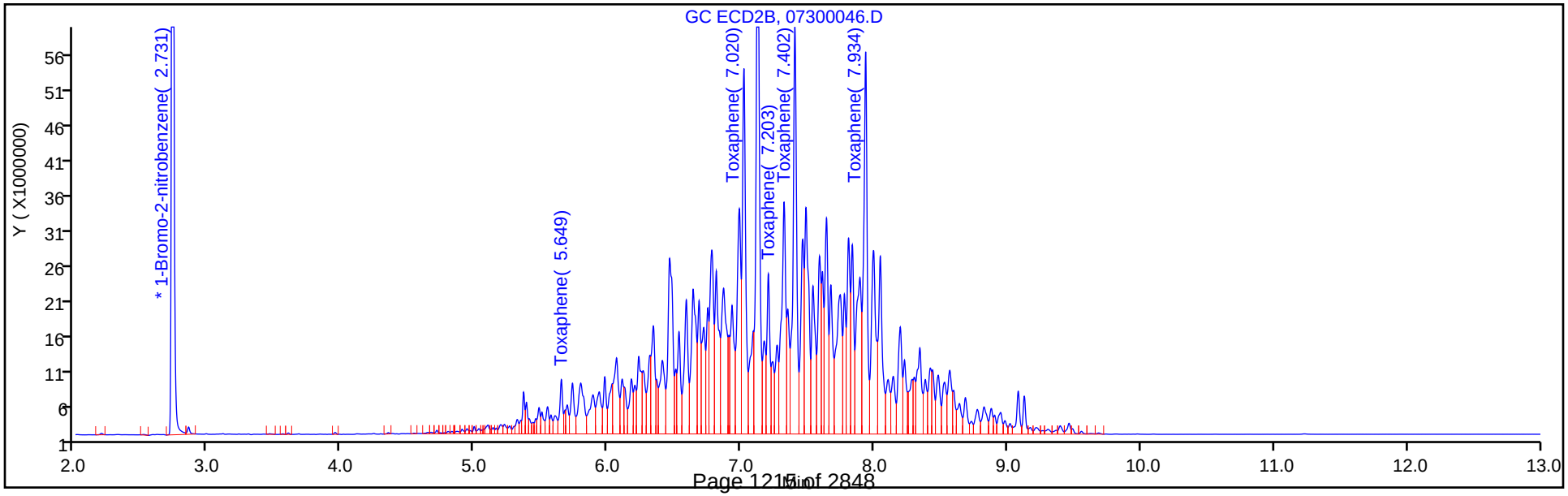
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300046.D

Injection Date:	31-Jul-2018 02:05:48	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	CCV TOX			Worklist Smp#:	46
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	41
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM VII
PESTICIDES CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-424154/47 Calibration Date: 07/31/2018 02:23

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 19:10

GC Column: CLP1 ID: 0.32(mm) Calib End Date: 07/30/2018 20:19

Lab File ID: 07300047.D Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Chlordane (technical) Peak 1	Lin2		0.0394		1100	1000	10.1	20.0
Technical Chlordane Peak 1	Lin2		0.0394		1100	1000	10.1	20.0
Chlordane (technical) Peak 2	Lin2		0.0418		1180	1000	18.2	20.0
Technical Chlordane Peak 2	Lin2		0.0418		1180	1000	18.2	20.0
Chlordane (technical) Peak 3	Lin2		0.1592		1120	1000	12.0	20.0
Technical Chlordane Peak 3	Lin2		0.1592		1120	1000	12.0	20.0
Chlordane (technical) Peak 4	Lin2		0.2697		1110	1000	10.5	20.0
Technical Chlordane Peak 4	Lin2		0.2697		1110	1000	10.5	20.0
Chlordane (technical) Peak 5	Lin2		0.0442		1120	1000	12.0	20.0
Technical Chlordane Peak 5	Lin2		0.0442		1120	1000	12.0	20.0

FORM VII
PESTICIDES CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-424154/47 Calibration Date: 07/31/2018 02:23

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 19:10

GC Column: CLP1 ID: 0.32(mm) Calib End Date: 07/30/2018 20:19

Lab File ID: 07300047.D

Analyte	RT	RT WINDOW	
		FROM	TO
Chlordane (technical) Peak 1	5.06	5.05	5.07
Technical Chlordane Peak 1	5.06	5.05	5.07
Chlordane (technical) Peak 2	5.52	5.51	5.53
Technical Chlordane Peak 2	5.52	5.51	5.53
Chlordane (technical) Peak 3	6.12	6.11	6.13
Technical Chlordane Peak 3	6.12	6.11	6.13
Chlordane (technical) Peak 4	6.25	6.23	6.26
Technical Chlordane Peak 4	6.25	6.23	6.26
Chlordane (technical) Peak 5	7.08	7.06	7.09
Technical Chlordane Peak 5	7.08	7.06	7.09

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300047.D
Lims ID: CCV CHL
Client ID:
Sample Type: CCV
Inject. Date: 31-Jul-2018 02:23:04 ALS Bottle#: 42 Worklist Smp#: 47
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: CCV CHL
Misc. Info.: 280-0072505-047
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub4

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 08-Aug-2018 01:52:48 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0301

First Level Reviewer: mooret Date: 01-Aug-2018 14:33:28

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.945	2.945	0.000	794297320	150.0	150.0	
2	2.730	2.730	0.000	188818859	150.0	150.0	
14 Chlordane (technical)							
1	5.062	5.061	0.001	208815574	1000.0	1101.5	
1	5.521	5.518	0.003	221071079	1000.0	1182.4	
1	6.123	6.119	0.004	843011298	1000.0	1120.3	
1	6.246	6.243	0.003	1428104336	1000.0	1105.2	
1	7.076	7.074	0.002	233814309	1000.0	1120.1	
		Average of Peak Amounts =				1125.9	
2	4.903	4.902	0.001	53418104	1000.0	1049.0	
2	5.414	5.413	0.001	56838295	1000.0	1056.1	
2	5.988	5.987	0.001	193664761	1000.0	1058.2	
2	6.143	6.142	0.001	148929116	1000.0	1053.6	
2	7.082	7.081	0.001	66451097	1000.0	1059.4	
		Average of Peak Amounts =				1055.2	
						RPD = 6.48	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
13 Technical Chlordane							
1	5.062	5.061	0.001	208815574	1000.0	1101.5	
1	5.521	5.518	0.003	221071079	1000.0	1182.4	
1	6.123	6.119	0.004	843011298	1000.0	1120.3	
1	6.246	6.243	0.003	1428104336	1000.0	1105.2	
1	7.076	7.074	0.002	233814309	1000.0	1120.1	
		Average of Peak Amounts =				1125.9	
2	4.903	4.902	0.001	53418104	1000.0	1049.0	
2	5.414	5.413	0.001	56838295	1000.0	1056.1	
2	5.988	5.987	0.001	193664761	1000.0	1058.2	
2	6.143	6.142	0.001	148929116	1000.0	1053.6	
2	7.082	7.081	0.001	66451097	1000.0	1059.4	
		Average of Peak Amounts =				1055.2	
						RPD = 6.48	

Reagents:

8081ChlorL4_00022	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

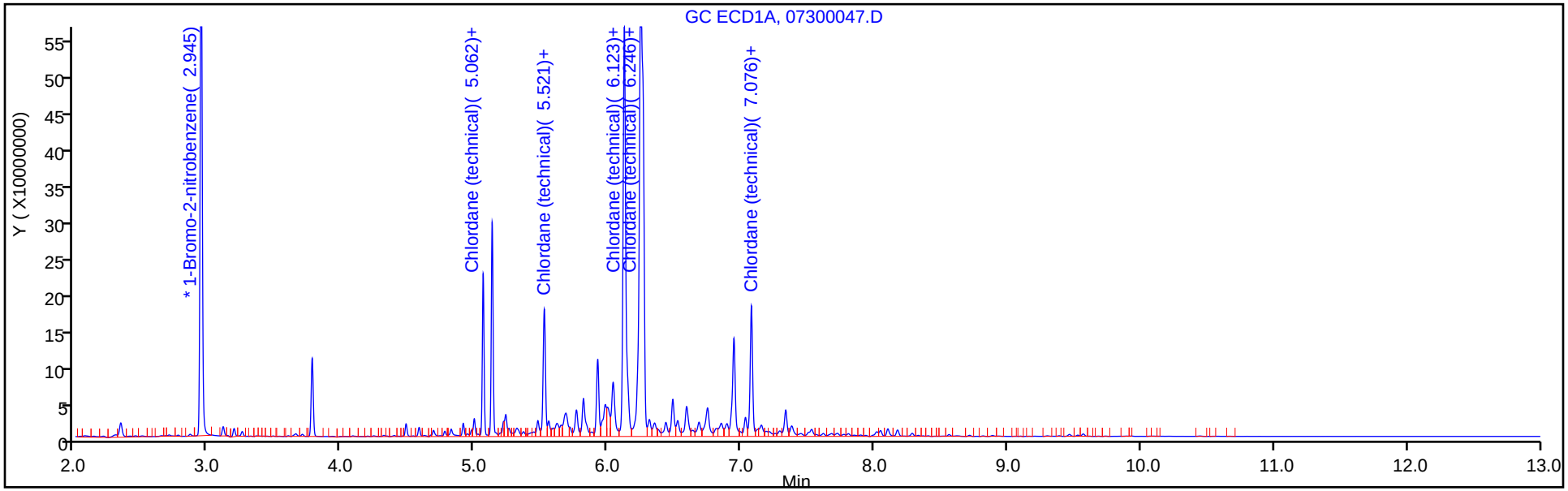
Report Date: 08-Aug-2018 01:52:48 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

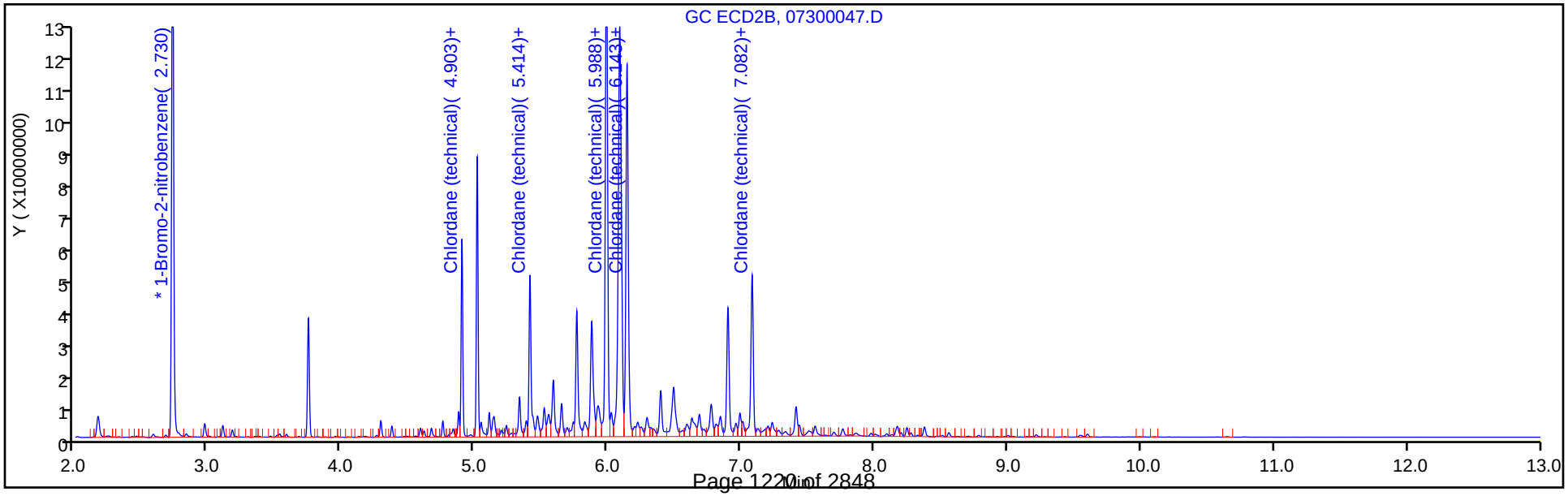
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300047.D

Injection Date:	31-Jul-2018 02:23:04	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	CCV CHL			Worklist Smp#:	47
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	42
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM VII
PESTICIDES CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-424154/47 Calibration Date: 07/31/2018 02:23

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 19:10

GC Column: CLP2 ID: 0.32(mm) Calib End Date: 07/30/2018 20:19

Lab File ID: 07300047.D Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Chlordane (technical) Peak 1	Lin2		0.0424		1050	1000	4.9	20.0
Technical Chlordane Peak 1	Lin2		0.0424		1050	1000	4.9	20.0
Chlordane (technical) Peak 2	Lin2		0.0452		1060	1000	5.6	20.0
Technical Chlordane Peak 2	Lin2		0.0452		1060	1000	5.6	20.0
Chlordane (technical) Peak 3	Lin2		0.1539		1060	1000	5.8	20.0
Technical Chlordane Peak 3	Lin2		0.1539		1060	1000	5.8	20.0
Chlordane (technical) Peak 4	Lin2		0.1183		1050	1000	5.4	20.0
Technical Chlordane Peak 4	Lin2		0.1183		1050	1000	5.4	20.0
Chlordane (technical) Peak 5	Lin2		0.0528		1060	1000	5.9	20.0
Technical Chlordane Peak 5	Lin2		0.0528		1060	1000	5.9	20.0

FORM VII
PESTICIDES CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-424154/47 Calibration Date: 07/31/2018 02:23

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 19:10

GC Column: CLP2 ID: 0.32(mm) Calib End Date: 07/30/2018 20:19

Lab File ID: 07300047.D

Analyte	RT	RT WINDOW	
		FROM	TO
Chlordane (technical) Peak 1	4.90	4.89	4.91
Technical Chlordane Peak 1	4.90	4.89	4.91
Chlordane (technical) Peak 2	5.41	5.40	5.43
Technical Chlordane Peak 2	5.41	5.40	5.43
Chlordane (technical) Peak 3	5.99	5.98	6.00
Technical Chlordane Peak 3	5.99	5.98	6.00
Chlordane (technical) Peak 4	6.14	6.13	6.15
Technical Chlordane Peak 4	6.14	6.13	6.15
Chlordane (technical) Peak 5	7.08	7.07	7.09
Technical Chlordane Peak 5	7.08	7.07	7.09

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300047.D
Lims ID: CCV CHL
Client ID:
Sample Type: CCV
Inject. Date: 31-Jul-2018 02:23:04 ALS Bottle#: 42 Worklist Smp#: 47
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: CCV CHL
Misc. Info.: 280-0072505-047
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub4

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 08-Aug-2018 01:52:48 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0301

First Level Reviewer: mooret Date: 01-Aug-2018 14:33:28

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
* 2 1-Bromo-2-nitrobenzene							
1	2.945	2.945	0.000	794297320	150.0	150.0	
2	2.730	2.730	0.000	188818859	150.0	150.0	
14 Chlordane (technical)							
1	5.062	5.061	0.001	208815574	1000.0	1101.5	
1	5.521	5.518	0.003	221071079	1000.0	1182.4	
1	6.123	6.119	0.004	843011298	1000.0	1120.3	
1	6.246	6.243	0.003	1428104336	1000.0	1105.2	
1	7.076	7.074	0.002	233814309	1000.0	1120.1	
		Average of Peak Amounts =				1125.9	
2	4.903	4.902	0.001	53418104	1000.0	1049.0	
2	5.414	5.413	0.001	56838295	1000.0	1056.1	
2	5.988	5.987	0.001	193664761	1000.0	1058.2	
2	6.143	6.142	0.001	148929116	1000.0	1053.6	
2	7.082	7.081	0.001	66451097	1000.0	1059.4	
		Average of Peak Amounts =				1055.2	
						RPD = 6.48	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
13 Technical Chlordane							
1	5.062	5.061	0.001	208815574	1000.0	1101.5	
1	5.521	5.518	0.003	221071079	1000.0	1182.4	
1	6.123	6.119	0.004	843011298	1000.0	1120.3	
1	6.246	6.243	0.003	1428104336	1000.0	1105.2	
1	7.076	7.074	0.002	233814309	1000.0	1120.1	
		Average of Peak Amounts =				1125.9	
2	4.903	4.902	0.001	53418104	1000.0	1049.0	
2	5.414	5.413	0.001	56838295	1000.0	1056.1	
2	5.988	5.987	0.001	193664761	1000.0	1058.2	
2	6.143	6.142	0.001	148929116	1000.0	1053.6	
2	7.082	7.081	0.001	66451097	1000.0	1059.4	
		Average of Peak Amounts =				1055.2	
						RPD = 6.48	

Reagents:

8081ChlorL4_00022	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

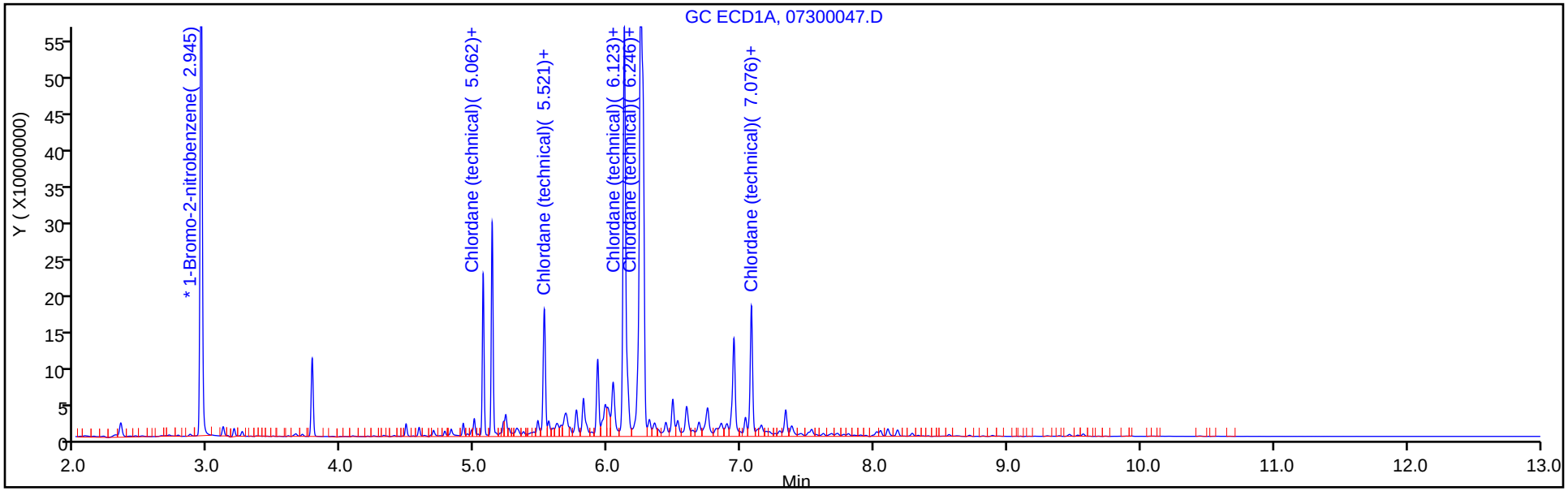
Report Date: 08-Aug-2018 01:52:49 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

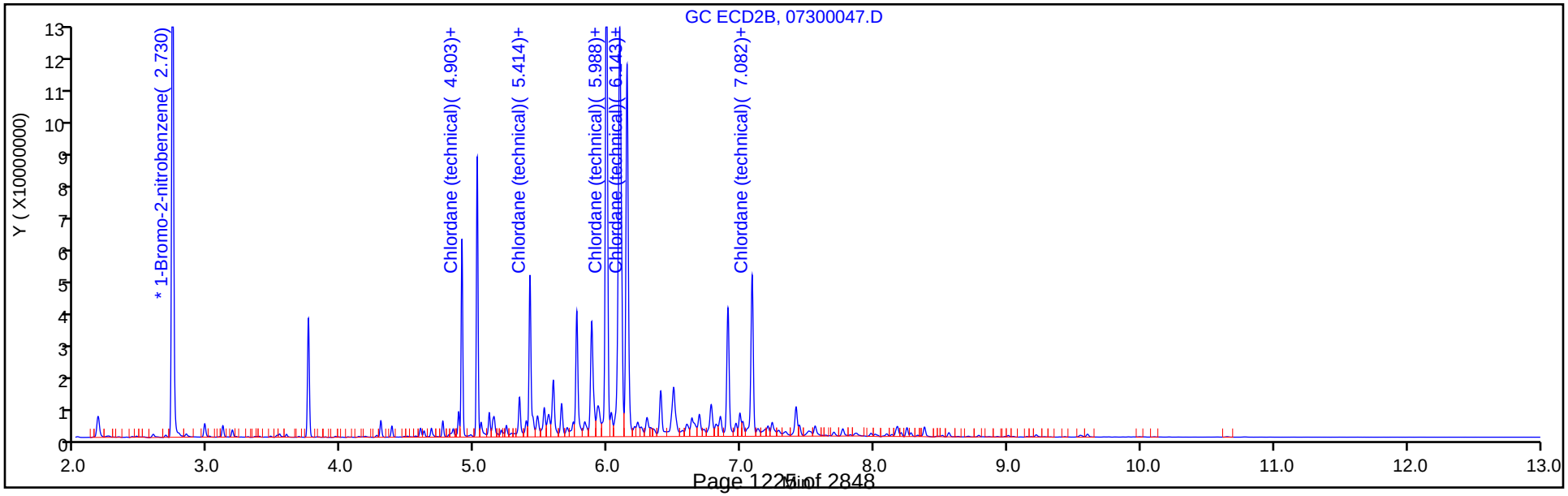
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300047.D

Injection Date:	31-Jul-2018 02:23:04	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	CCV CHL			Worklist Smp#:	47
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	42
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM VII
PESTICIDES CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-424154/48 Calibration Date: 07/31/2018 02:40

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 20:37

GC Column: CLP1 ID: 0.32(mm) Calib End Date: 07/30/2018 22:03

Lab File ID: 07300048.D Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
alpha-BHC	Lin2		1.640		50.1	50.0	0.1	20.0
gamma-BHC (Lindane)	Lin2		1.444		49.8	50.0	-0.3	20.0
beta-BHC	Lin2		0.5856		49.0	50.0	-2.0	20.0
delta-BHC	Lin2		1.452		49.8	50.0	-0.3	20.0
Heptachlor	Lin2		1.278		51.4	50.0	2.8	20.0
Aldrin	Lin2		1.363		50.6	50.0	1.2	20.0
Heptachlor epoxide	Lin2		1.167		50.8	50.0	1.6	20.0
trans-Chlordane	Lin2		1.240		50.7	50.0	1.4	20.0
cis-Chlordane	Lin2		1.197		50.8	50.0	1.6	20.0
4,4'-DDE	Lin2		1.167		50.5	50.0	1.0	20.0
Endosulfan I	Lin2		1.133		51.0	50.0	1.9	20.0
Dieldrin	Lin2		1.263		51.1	50.0	2.3	20.0
Endrin	Lin2		1.197		51.0	50.0	1.9	20.0
4,4'-DDD	Lin2		0.9746		48.1	50.0	-3.8	20.0
Endosulfan II	Lin2		1.056		51.0	50.0	2.0	20.0
4,4'-DDT	Lin2		0.7959		47.9	50.0	-4.2	20.0
Endrin aldehyde	Lin2		0.8908		51.7	50.0	3.5	20.0
Methoxychlor	Lin2		0.3555		44.7	50.0	-10.5	20.0
Endosulfan sulfate	Lin2		0.9812		50.9	50.0	1.7	20.0
Endrin ketone	Lin2		1.097		49.5	50.0	-1.1	20.0
Tetrachloro-m-xylene	Lin2		1.129		49.7	50.0	-0.7	20.0
DCB Decachlorobiphenyl	Lin2		0.8264		49.9	50.0	-0.3	20.0

FORM VII
PESTICIDES CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-424154/48 Calibration Date: 07/31/2018 02:40

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 20:37

GC Column: CLP1 ID: 0.32(mm) Calib End Date: 07/30/2018 22:03

Lab File ID: 07300048.D

Analyte	RT	RT WINDOW	
		FROM	TO
alpha-BHC	4.44	4.42	4.45
gamma-BHC (Lindane)	4.73	4.72	4.74
beta-BHC	4.81	4.80	4.82
delta-BHC	4.96	4.95	4.97
Heptachlor	5.13	5.12	5.14
Aldrin	5.39	5.38	5.41
Heptachlor epoxide	5.99	5.98	6.00
trans-Chlordane	6.12	6.11	6.13
cis-Chlordane	6.26	6.25	6.27
4,4'-DDE	6.35	6.33	6.36
Endosulfan I	6.41	6.40	6.42
Dieldrin	6.66	6.65	6.68
Endrin	6.91	6.90	6.92
4,4'-DDD	6.98	6.97	6.99
Endosulfan II	7.15	7.14	7.16
4,4'-DDT	7.28	7.27	7.29
Endrin aldehyde	7.59	7.58	7.61
Methoxychlor	7.79	7.78	7.80
Endosulfan sulfate	8.05	8.04	8.06
Endrin ketone	8.35	8.33	8.36
Tetrachloro-m-xylene	3.85	3.84	3.86
DCB Decachlorobiphenyl	9.38	9.36	9.39

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300048.D
Lims ID: CCV AB
Client ID:
Sample Type: CCV
Inject. Date: 31-Jul-2018 02:40:19 ALS Bottle#: 43 Worklist Smp#: 48
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: CCV AB
Misc. Info.: 280-0072505-048
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub5

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 08-Aug-2018 01:52:50 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0301

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
S 1 Hexachlorocyclohexane, technical							
1						198.7	
2						198.5	
						RPD = 0.12	
* 2 1-Bromo-2-nitrobenzene							
1	2.946	2.945	0.001	790757788	150.0	150.0	
2	2.731	2.730	0.001	185965115	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.852	3.850	0.002	297466850	50.0	49.7	
2	3.721	3.720	0.001	75159933	50.0	50.4	
						RPD = 1.52	
5 Hexachlorobenzene							
1	4.266	4.263	0.003	308787885	50.0	51.3	
2	4.201	4.200	0.001	79329618	50.0	50.1	
						RPD = 2.38	
8 alpha-BHC							
1	4.436	4.435	0.001	432233193	50.0	50.1	
2	4.347	4.346	0.001	104405217	50.0	50.0	
						RPD = 0.20	
9 gamma-BHC (Lindane)							
1	4.729	4.728	0.001	380486870	50.0	49.8	
2	4.664	4.663	0.001	93988203	50.0	50.1	
						RPD = 0.46	
10 beta-BHC							
1	4.809	4.808	0.001	154341723	50.0	49.0	
2	4.743	4.743	0.000	39090886	50.0	48.6	
						RPD = 0.76	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
12 delta-BHC							
1	4.958	4.957	0.001	382792158	50.0	49.8	
2	4.977	4.977	0.000	90495642	50.0	49.8	
						RPD = 0.01	
15 Heptachlor							
1	5.131	5.129	0.002	336908576	50.0	51.4	
2	5.017	5.017	0.000	90005221	50.0	51.0	
						RPD = 0.70	
16 Aldrin							
1	5.394	5.393	0.001	359298606	50.0	50.6	
2	5.277	5.277	0.000	90472008	50.0	50.9	
						RPD = 0.65	
18 Isodrin							
1	5.709	5.708	0.001	294398751	50.0	51.0	
2	5.624	5.623	0.001	76483256	50.0	51.1	
						RPD = 0.09	
21 Heptachlor epoxide							
1	5.988	5.988	0.000	307728026	50.0	50.8	
2	5.798	5.798	0.000	81548961	50.0	51.3	
						RPD = 1.04	
22 trans-Chlordane							
1	6.122	6.121	0.001	326884210	50.0	50.7	
2	5.988	5.988	0.000	85419494	50.0	51.4	
						RPD = 1.30	
23 cis-Chlordane							
1	6.263	6.262	0.001	315438653	50.0	50.8	
2	6.143	6.143	0.000	81132983	50.0	51.4	
						RPD = 1.19	
24 4,4'-DDE							
1	6.347	6.346	0.001	307607268	50.0	50.5	
2	6.329	6.330	-0.001	84989649	50.0	51.0	
						RPD = 0.99	
25 Endosulfan I							
1	6.411	6.409	0.002	298516859	50.0	51.0	
2	6.199	6.199	0.000	78411907	50.0	51.9	
						RPD = 1.82	
27 Dieldrin							
1	6.664	6.663	0.001	332883040	50.0	51.1	
2	6.487	6.488	-0.001	86486680	50.0	51.4	
						RPD = 0.57	
30 Endrin							
1	6.912	6.911	0.001	315597489	50.0	51.0	
2	6.807	6.808	-0.001	82419148	50.0	51.4	
						RPD = 0.78	
32 4,4'-DDD							
1	6.982	6.981	0.001	256893643	50.0	48.1	
2	6.946	6.946	0.000	66366763	50.0	51.2	
						RPD = 6.20	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
34 Endosulfan II							
1	7.149	7.148	0.001	278425346	50.0	51.0	
2	7.035	7.035	0.000	76952140	50.0	51.9	
						RPD = 1.70	
35 4,4'-DDT							
1	7.278	7.277	0.001	209782437	50.0	47.9	
2	7.274	7.275	-0.001	72994766	50.0	52.9	
						RPD = 9.93	
36 Endrin aldehyde							
1	7.594	7.593	0.001	234789219	50.0	51.7	
2	7.395	7.394	0.001	61925615	50.0	52.0	
						RPD = 0.46	
37 Methoxychlor							
1	7.791	7.790	0.001	93704252	50.0	44.7	
2	8.010	8.009	0.001	38136253	50.0	52.3	
						RPD = 15.57	
38 Mirex							
1	7.938	7.938	0.000	193979050	50.0	50.2	
2	8.187	8.187	0.000	56099482	50.0	51.5	
						RPD = 2.48	
39 Endosulfan sulfate							
1	8.053	8.052	0.001	258622495	50.0	50.9	
2	7.689	7.688	0.001	69427768	50.0	51.7	
						RPD = 1.58	
40 Endrin ketone							
1	8.346	8.345	0.001	289224353	50.0	49.5	
2	8.240	8.240	0.000	81925944	50.0	51.8	
						RPD = 4.59	
$ 41 DCB Decachlorobiphenyl							
1	9.376	9.376	0.000	217834328	50.0	49.9	
2	9.513	9.513	0.000	59425991	50.0	50.9	
						RPD = 1.96	
S 3 Endosulfan, Total							
1						152.8	
2						155.4	
						RPD = 1.70	

Reagents:

8081IcalL4_00031	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

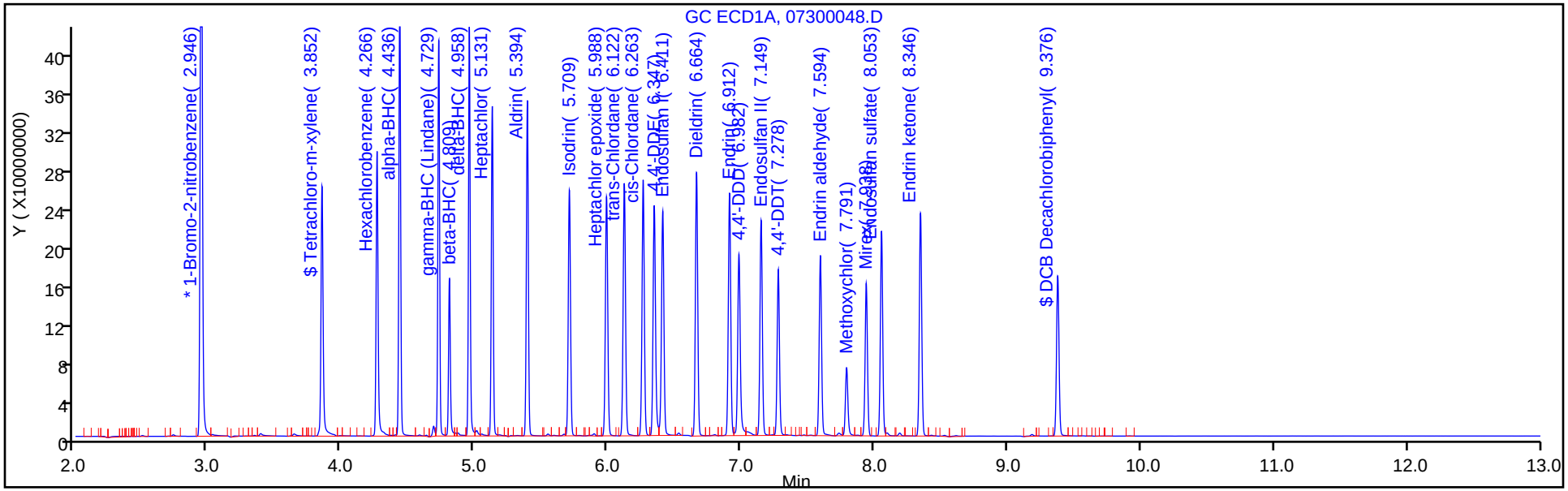
Report Date: 08-Aug-2018 01:52:50 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

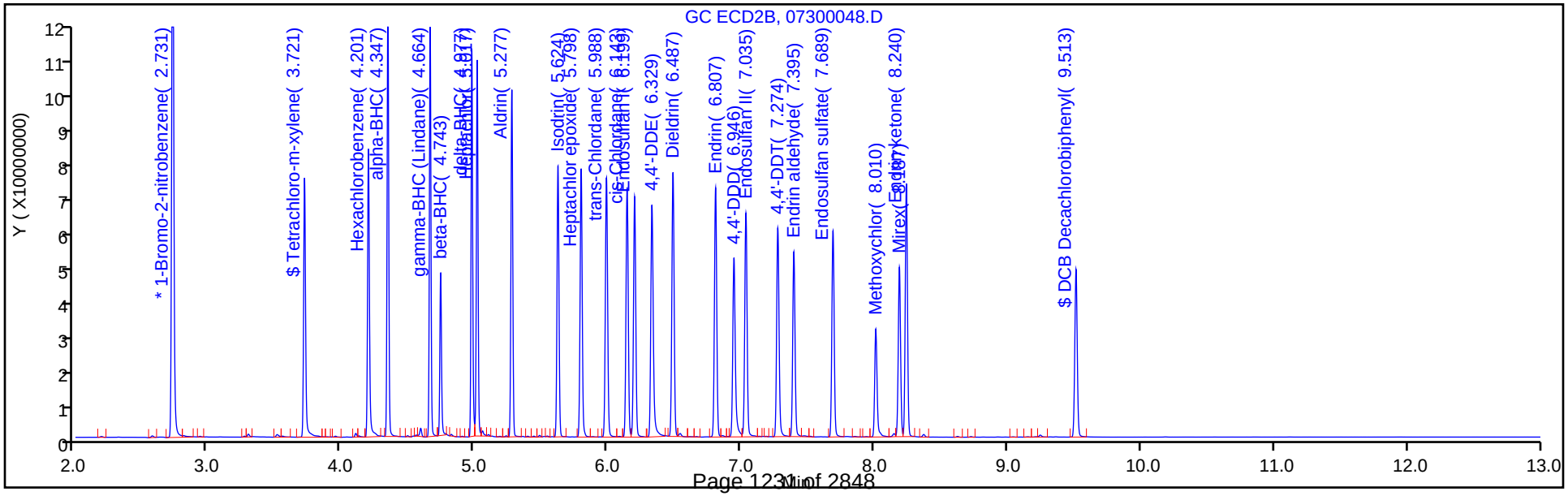
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300048.D

Injection Date:	31-Jul-2018 02:40:19	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	CCV AB			Worklist Smp#:	48
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	43
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM VII
PESTICIDES CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-424154/48 Calibration Date: 07/31/2018 02:40

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 20:37

GC Column: CLP2 ID: 0.32(mm) Calib End Date: 07/30/2018 22:03

Lab File ID: 07300048.D Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
alpha-BHC	Lin2		1.684		50.0	50.0	-0.0	20.0
gamma-BHC (Lindane)	Lin2		1.516		50.1	50.0	0.1	20.0
beta-BHC	Lin2		0.6306		48.6	50.0	-2.7	20.0
delta-BHC	Lin2		1.460		49.8	50.0	-0.3	20.0
Heptachlor	Lin2		1.452		51.0	50.0	2.1	20.0
Aldrin	Lin2		1.460		50.9	50.0	1.8	20.0
Heptachlor epoxide	Lin2		1.316		51.3	50.0	2.6	20.0
trans-Chlordane	Lin2		1.378		51.4	50.0	2.7	20.0
cis-Chlordane	Lin2		1.309		51.4	50.0	2.8	20.0
Endosulfan I	Lin2		1.265		51.9	50.0	3.8	20.0
4,4'-DDE	Lin2		1.371		51.0	50.0	2.0	20.0
Dieldrin	Lin2		1.395		51.4	50.0	2.8	20.0
Endrin	Lin2		1.330		51.4	50.0	2.7	20.0
4,4'-DDD	Lin2		1.071		51.2	50.0	2.4	20.0
Endosulfan II	Lin2		1.241		51.9	50.0	3.7	20.0
4,4'-DDT	Lin2		1.178		52.9	50.0	5.8	20.0
Endrin aldehyde	Lin2		0.999		52.0	50.0	4.0	20.0
Endosulfan sulfate	Lin2		1.120		51.7	50.0	3.4	20.0
Methoxychlor	Lin2		0.6152		52.3	50.0	4.6	20.0
Endrin ketone	Lin2		1.322		51.8	50.0	3.6	20.0
Tetrachloro-m-xylene	Lin2		1.212		50.4	50.0	0.8	20.0
DCB Decachlorobiphenyl	Lin2		0.9587		50.9	50.0	1.7	20.0

FORM VII
PESTICIDES CONTINUING CALIBRATION RETENTION TIME SUMMARY

Lab Name: TestAmerica Denver Job No.: 160-29498-1

SDG No.:

Lab Sample ID: CCV 280-424154/48 Calibration Date: 07/31/2018 02:40

Instrument ID: SGC_P2 Calib Start Date: 07/30/2018 20:37

GC Column: CLP2 ID: 0.32(mm) Calib End Date: 07/30/2018 22:03

Lab File ID: 07300048.D

Analyte	RT	RT WINDOW	
		FROM	TO
alpha-BHC	4.35	4.33	4.36
gamma-BHC (Lindane)	4.66	4.65	4.68
beta-BHC	4.74	4.73	4.76
delta-BHC	4.98	4.97	4.99
Heptachlor	5.02	5.01	5.03
Aldrin	5.28	5.27	5.29
Heptachlor epoxide	5.80	5.79	5.81
trans-Chlordane	5.99	5.98	6.00
cis-Chlordane	6.14	6.13	6.16
Endosulfan I	6.20	6.19	6.21
4,4'-DDE	6.33	6.32	6.34
Dieldrin	6.49	6.48	6.50
Endrin	6.81	6.80	6.82
4,4'-DDD	6.95	6.93	6.96
Endosulfan II	7.04	7.02	7.05
4,4'-DDT	7.27	7.26	7.29
Endrin aldehyde	7.40	7.38	7.41
Endosulfan sulfate	7.69	7.68	7.70
Methoxychlor	8.01	8.00	8.02
Endrin ketone	8.24	8.23	8.25
Tetrachloro-m-xylene	3.72	3.71	3.73
DCB Decachlorobiphenyl	9.51	9.50	9.53

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300048.D
Lims ID: CCV AB
Client ID:
Sample Type: CCV
Inject. Date: 31-Jul-2018 02:40:19 ALS Bottle#: 43 Worklist Smp#: 48
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: CCV AB
Misc. Info.: 280-0072505-048
Operator ID: TEM Instrument ID: SGC_P2
Sublist: chrom-P2 8081 IS*sub5

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 08-Aug-2018 01:52:50 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0301

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
S 1 Hexachlorocyclohexane, technical							
1						198.7	
2						198.5	
						RPD = 0.12	
* 2 1-Bromo-2-nitrobenzene							
1	2.946	2.945	0.001	790757788	150.0	150.0	
2	2.731	2.730	0.001	185965115	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.852	3.850	0.002	297466850	50.0	49.7	
2	3.721	3.720	0.001	75159933	50.0	50.4	
						RPD = 1.52	
5 Hexachlorobenzene							
1	4.266	4.263	0.003	308787885	50.0	51.3	
2	4.201	4.200	0.001	79329618	50.0	50.1	
						RPD = 2.38	
8 alpha-BHC							
1	4.436	4.435	0.001	432233193	50.0	50.1	
2	4.347	4.346	0.001	104405217	50.0	50.0	
						RPD = 0.20	
9 gamma-BHC (Lindane)							
1	4.729	4.728	0.001	380486870	50.0	49.8	
2	4.664	4.663	0.001	93988203	50.0	50.1	
						RPD = 0.46	
10 beta-BHC							
1	4.809	4.808	0.001	154341723	50.0	49.0	
2	4.743	4.743	0.000	39090886	50.0	48.6	
						RPD = 0.76	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
12 delta-BHC							
1	4.958	4.957	0.001	382792158	50.0	49.8	
2	4.977	4.977	0.000	90495642	50.0	49.8	
						RPD = 0.01	
15 Heptachlor							
1	5.131	5.129	0.002	336908576	50.0	51.4	
2	5.017	5.017	0.000	90005221	50.0	51.0	
						RPD = 0.70	
16 Aldrin							
1	5.394	5.393	0.001	359298606	50.0	50.6	
2	5.277	5.277	0.000	90472008	50.0	50.9	
						RPD = 0.65	
18 Isodrin							
1	5.709	5.708	0.001	294398751	50.0	51.0	
2	5.624	5.623	0.001	76483256	50.0	51.1	
						RPD = 0.09	
21 Heptachlor epoxide							
1	5.988	5.988	0.000	307728026	50.0	50.8	
2	5.798	5.798	0.000	81548961	50.0	51.3	
						RPD = 1.04	
22 trans-Chlordane							
1	6.122	6.121	0.001	326884210	50.0	50.7	
2	5.988	5.988	0.000	85419494	50.0	51.4	
						RPD = 1.30	
23 cis-Chlordane							
1	6.263	6.262	0.001	315438653	50.0	50.8	
2	6.143	6.143	0.000	81132983	50.0	51.4	
						RPD = 1.19	
24 4,4'-DDE							
1	6.347	6.346	0.001	307607268	50.0	50.5	
2	6.329	6.330	-0.001	84989649	50.0	51.0	
						RPD = 0.99	
25 Endosulfan I							
1	6.411	6.409	0.002	298516859	50.0	51.0	
2	6.199	6.199	0.000	78411907	50.0	51.9	
						RPD = 1.82	
27 Dieldrin							
1	6.664	6.663	0.001	332883040	50.0	51.1	
2	6.487	6.488	-0.001	86486680	50.0	51.4	
						RPD = 0.57	
30 Endrin							
1	6.912	6.911	0.001	315597489	50.0	51.0	
2	6.807	6.808	-0.001	82419148	50.0	51.4	
						RPD = 0.78	
32 4,4'-DDD							
1	6.982	6.981	0.001	256893643	50.0	48.1	
2	6.946	6.946	0.000	66366763	50.0	51.2	
						RPD = 6.20	

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
34 Endosulfan II							
1	7.149	7.148	0.001	278425346	50.0	51.0	
2	7.035	7.035	0.000	76952140	50.0	51.9	
						RPD = 1.70	
35 4,4'-DDT							
1	7.278	7.277	0.001	209782437	50.0	47.9	
2	7.274	7.275	-0.001	72994766	50.0	52.9	
						RPD = 9.93	
36 Endrin aldehyde							
1	7.594	7.593	0.001	234789219	50.0	51.7	
2	7.395	7.394	0.001	61925615	50.0	52.0	
						RPD = 0.46	
37 Methoxychlor							
1	7.791	7.790	0.001	93704252	50.0	44.7	
2	8.010	8.009	0.001	38136253	50.0	52.3	
						RPD = 15.57	
38 Mirex							
1	7.938	7.938	0.000	193979050	50.0	50.2	
2	8.187	8.187	0.000	56099482	50.0	51.5	
						RPD = 2.48	
39 Endosulfan sulfate							
1	8.053	8.052	0.001	258622495	50.0	50.9	
2	7.689	7.688	0.001	69427768	50.0	51.7	
						RPD = 1.58	
40 Endrin ketone							
1	8.346	8.345	0.001	289224353	50.0	49.5	
2	8.240	8.240	0.000	81925944	50.0	51.8	
						RPD = 4.59	
$ 41 DCB Decachlorobiphenyl							
1	9.376	9.376	0.000	217834328	50.0	49.9	
2	9.513	9.513	0.000	59425991	50.0	50.9	
						RPD = 1.96	
S 3 Endosulfan, Total							
1						152.8	
2						155.4	
						RPD = 1.70	

Reagents:

8081IcalL4_00031	Amount Added: 1.00	Units: mL	
8081_IS_00008	Amount Added: 75.00	Units: uL	Run Reagent

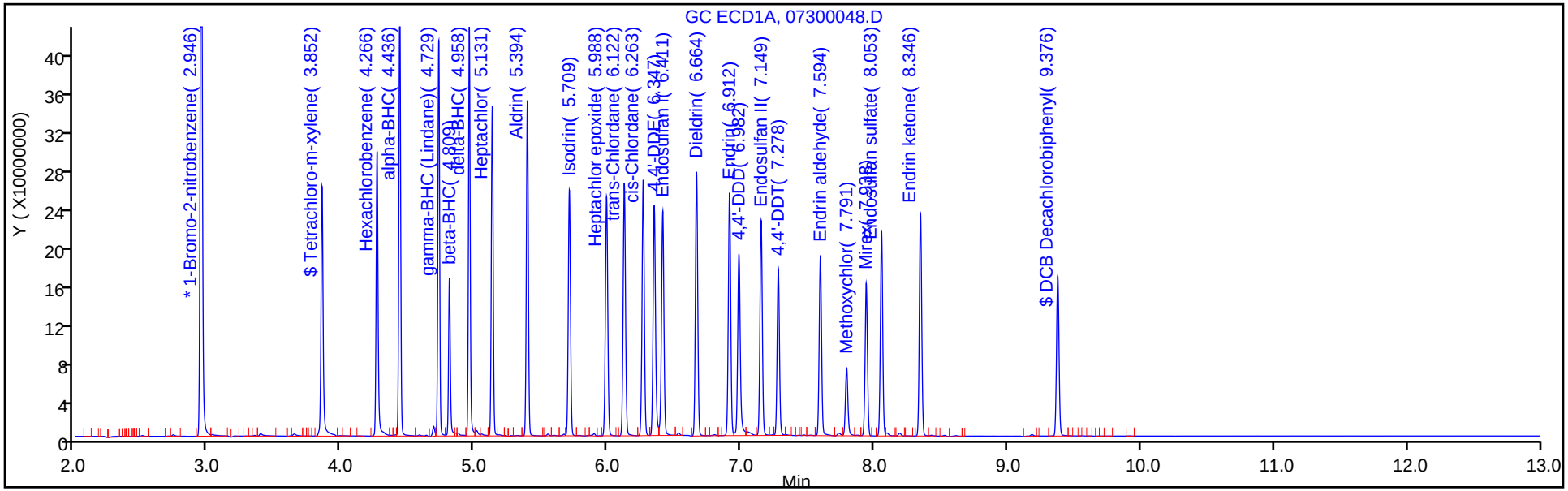
Report Date: 08-Aug-2018 01:52:50 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

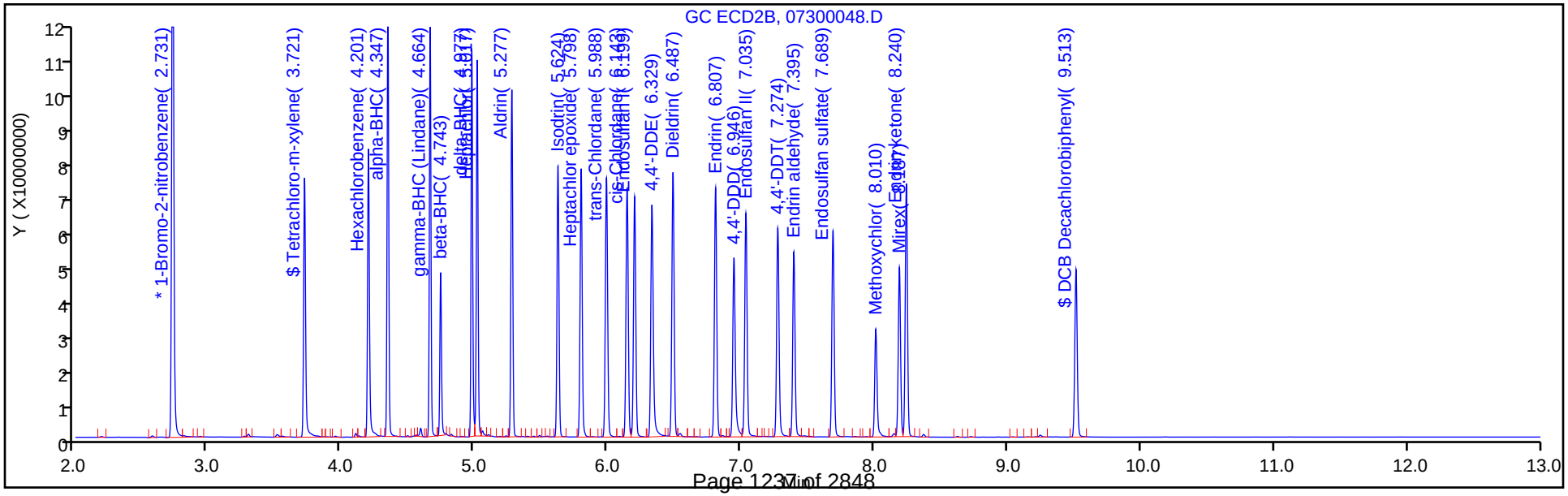
Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300048.D

Injection Date:	31-Jul-2018 02:40:19	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	CCV AB			Worklist Smp#:	48
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	43
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



FORM I
PESTICIDES ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Denver | Job No.: 160-29498-1

SDG No.:

Client Sample ID: | Lab Sample ID: LB 280-423271/1-G

Matrix: Solid (TCLP) | Lab File ID: 07300038.D

Analysis Method: 8081B | Date Collected:

Extraction Method: 3510C | Date Extracted: 07/25/2018 11:45

Sample wt/vol: 100(mL) | Date Analyzed: 07/30/2018 23:47

Con. Extract Vol.: 10(mL) | Dilution Factor: 1

Injection Volume: 1(uL) | GC Column: CLP1 ID: 0.32(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 424154 | Units: mg/L

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
72-20-8	Endrin	0.000079	U	0.00050	0.000079
76-44-8	Heptachlor	0.000077	U	0.00050	0.000077
1024-57-3	Heptachlor epoxide	0.000075	U	0.00050	0.000075
58-89-9	gamma-BHC (Lindane)	0.000069	U	0.00050	0.000069
72-43-5	Methoxychlor	0.00013	U	0.0010	0.00013
8001-35-2	Toxaphene	0.0037	U	0.020	0.0037
12789-03-6	Technical Chlordane	0.0014	U	0.0050	0.0014

CAS NO.	SURROGATE	%REC	Q	LIMITS
877-09-8	Tetrachloro-m-xylene	83		28-115
2051-24-3	DCB Decachlorobiphenyl	94		34-122

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300038.D
Lims ID: LB 280-423271/1-G
Client ID:
Sample Type: LB
Inject. Date: 30-Jul-2018 23:47:28 ALS Bottle#: 33 Worklist Smp#: 38
Injection Vol: 1.0 ul Dil. Factor: 1.0000
Sample Info: LB 280-423271/1-
Misc. Info.: 280-0072505-038
Operator ID: TEM Instrument ID: SGC_P2

Method: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\P2 8081 IS.m
Limit Group: GCSV - 8081A - IS
Last Update: 08-Aug-2018 01:52:05 Calib Date: 30-Jul-2018 22:03:40
Integrator: Falcon
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300032.D

Column 1 : CLP1 (0.32 mm) Det: GC ECD1A
Column 2 : CLP2 (0.32 mm) Det: GC ECD2B
Process Host: CTX0301

First Level Reviewer: mooret Date: 03-Aug-2018 13:07:13

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
S 1 Hexachlorocyclohexane, technical							
1		1.000				ND	
2		0.000					
* 2 1-Bromo-2-nitrobenzene							
1	2.946	2.945	0.000	822973243	150.0	150.0	
2	2.731	2.730	0.001	197325089	150.0	150.0	
$ 4 Tetrachloro-m-xylene							
1	3.852	3.850	0.002	106501051	20.0	16.6	
2	3.721	3.720	0.001	28356457	20.0	17.6	
						RPD = 5.75	
5 Hexachlorobenzene							
1		4.263				ND	
2		4.200					
6 Diallate							
1		4.293				ND	
2		4.158					
8 alpha-BHC							
1		4.435				ND	
2		4.346					
7 Propachlor							
1		4.435				ND	
2		4.064					
9 gamma-BHC (Lindane)							
1		4.728				ND	
2		4.663					
10 beta-BHC							
1		4.808				ND	
2		4.743					

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
11 2,4,5-Trichlorophenol							
1		4.861				ND	
2		4.772					
12 delta-BHC							
1		4.957				ND	
2		4.977					
14 Chlordane (technical)							
1		5.061				ND	
1		5.518					
1		6.119					
1		6.243					
1		7.074					
2		4.902					
2		5.413					
2		5.987					
2		6.142					
2		7.081					
13 Technical Chlordane							
1		5.061				ND	
1		5.518					
1		6.119					
1		6.243					
1		7.074					
2		4.902					
2		5.413					
2		5.987					
2		6.142					
2		7.081					
15 Heptachlor							
1		5.129				ND	
2		5.017					
16 Aldrin							
1		5.393				ND	
2		5.277					
17 Chlorpyrifos							
1		5.624				ND	
2		5.499					
18 Isodrin							
1		5.708				ND	
2		5.623					
19 Dicofol							
1		5.758				ND	
2		5.613					
20 2,4'-DDE							
1		5.978				ND	
2		5.999					
21 Heptachlor epoxide							
1		5.988				ND	
2		5.798					

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
22 trans-Chlordane							
1	6.121					ND	
2	5.988						
28 Toxaphene							
1	6.235					ND	
1	6.762						
1	7.008						
1	7.730						
1	8.045						
2	5.648						
2	7.018						
2	7.202						
2	7.401						
2	7.933						
23 cis-Chlordane							
1	6.262					ND	
2	6.143						
24 4,4'-DDE							
1	6.346					ND	
2	6.330						
25 Endosulfan I							
1	6.409					ND	
2	6.199						
26 2,4'-DDD							
1	6.529					ND	
2	6.540						
27 Dieldrin							
1	6.663					ND	
2	6.488						
29 2,4'-DDT							
1	6.798					ND	
2	6.860						
30 Endrin							
1	6.911					ND	
2	6.808						
31 Kepone							
1	6.955					ND	
2	6.923						
32 4,4'-DDD							
1	6.981					ND	
2	6.946						
33 Chlorobenzilate							
1	6.995					ND	
2	6.812						
34 Endosulfan II							
1	7.148					ND	
2	7.035						
35 4,4'-DDT							
1	7.277					ND	
2	7.275						

Col	RT (min.)	Exp RT (min.)	Dlt RT (min.)	Response	Cal Amt ng/mL	OnCol Amt ng/mL	Flags
36 Endrin aldehyde							
1		7.593				ND	
2		7.394					
37 Methoxychlor							
1		7.790				ND	
2		8.009					
38 Mirex							
1		7.938				ND	
2		8.187					
39 Endosulfan sulfate							
1		8.052				ND	
2		7.688					
40 Endrin ketone							
1		8.345				ND	
2		8.240					
$ 41 DCB Decachlorobiphenyl							
1	9.376	9.376	0.000	87305501	20.0	18.9	
2	9.515	9.513	0.002	25091161	20.0	19.6	
						RPD = 3.88	
42 Tris(2,3-dibromopropyl)phosphate							
1		11.127				ND	
2		11.219					
S 3 Endosulfan, Total							
1		0.000				ND	
2		0.000					

Reagents:

8081_IS_00008 Amount Added: 75.00 Units: uL Run Reagent

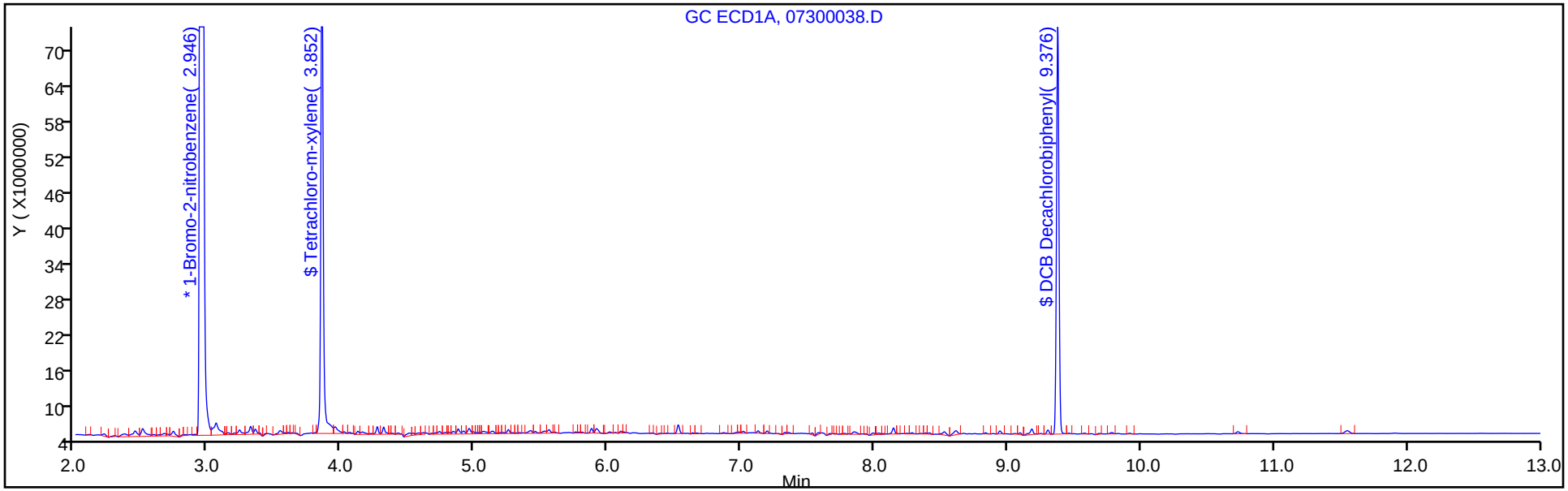
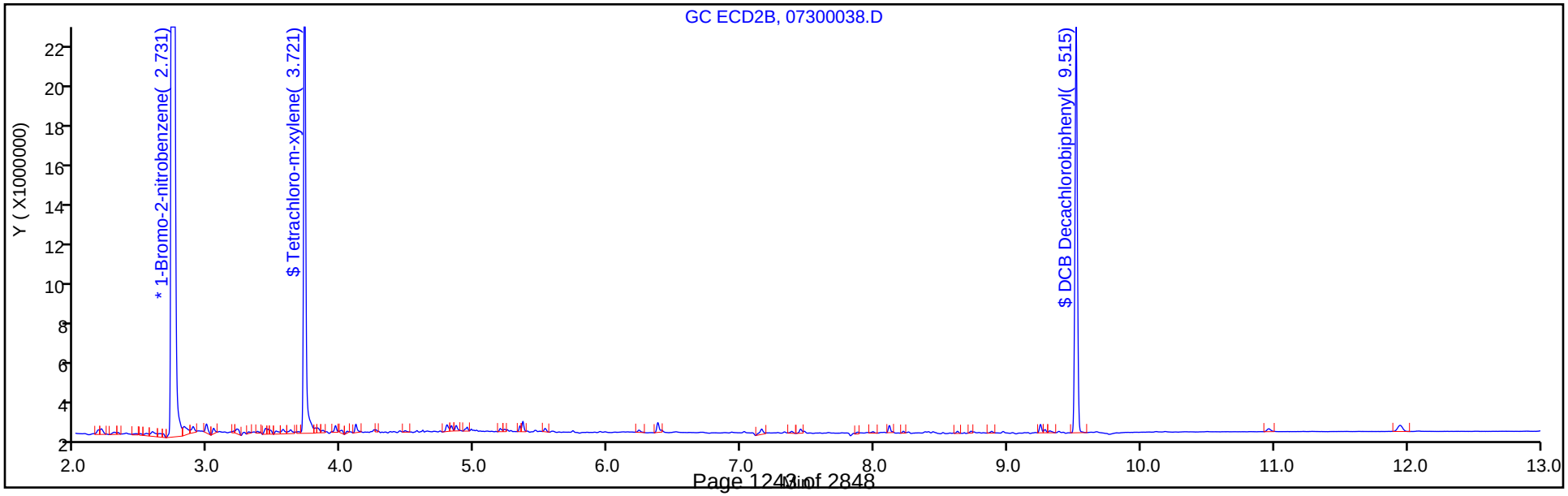
Report Date: 08-Aug-2018 01:52:36 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Denver

Data File: \\ChromNA\Denver\ChromData\SGC_P2\20180730-72505.b\07300038.D

Injection Date:	30-Jul-2018 23:47:28	Instrument ID:	SGC_P2	Operator ID:	TEM
Lims ID:	LB 280-423271/1-G			Worklist Smp#:	38
Client ID:					
Injection Vol:	1.0 ul	Dil. Factor:	1.0000	ALS Bottle#:	33
Method:	P2 8081 IS	Limit Group:	GCSV - 8081A - IS		

Column: CLP1 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3



Column: CLP2 (0.32 mm) Y Scaling: Method Defined: Scale to the Nth Largest Peak: 3