

# **Fugitive Dust Plan**

## **KCBX Facility**

### **Revision – 4**

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## 1.0 Introduction

On March 13th, 2014 the City of Chicago Department of Public Health introduced new rules “to prescribe reasonable, specific operating and maintenance practices to minimize emissions of airborne particulate matter from the storage, blending, handling, Processing, and transport of Bulk Solid Materials as defined herein, including but not limited to ores, coal, and coke, including petroleum coke (‘pet coke’) and metallurgical coke (‘metcoke’)” as part of the Municipal Code of Chicago, Chapter 11-4, Article II (the “Regulations”).

This document includes the Fugitive Dust Plan requirement as prescribed in 3.0(3) and the Interim Fugitive Dust Plan requirement in 4.0(1.b) of the Regulations for KCBX Terminals Company (“KCBX”). KCBX currently operates one (1) terminal, located at 10730 South Burley Avenue, Chicago Illinois 60617. For purposes of the Regulations and this Plan, the “Facility” includes KCBX’s operations at its South Terminal further described below. This Fugitive Dust Plan will be reviewed and updated at least annually by KCBX and revised to reflect current knowledge and practice. Annual updates will be submitted to the City of Chicago Department of Health.

## 2.0 Site Map (3.0(3.a)), (4.0(1.b.i, ii))

The KCBX South Terminal is shown on Figure 1. This Site Map indicates the locations of the Facility boundaries, buildings, utilities, locations of control devices, air monitors, and weather station. The vicinity of the KCBX South Terminal is shown on Figure 2. This Vicinity Map indicates Internal Roads which are the paved roads located inside the Facility, as well External Roads which are located within one quarter mile of the perimeter of the Facility and are used for transport of material to or from the Facility. As indicated on the Vicinity Map, within the stockpile areas, transient pathways are non-permanent routes within the Facility. Stockpile area footprints and transient pathway locations and routes are not permanent and vary depending on Product inventory management being utilized at any particular time.

With regard to “[a]ll potential emission points” at the Facility, all potential emission points for particulate matter other than those emission points associated with Product piles or portable equipment are labeled on Figure 1.

Potential emission points associated with Product piles and portable equipment can occur anywhere within the area on Figure 1 labeled as “stockpile area.” It is not possible for KCBX to depict these potential emission points with any more precision for three reasons. First, portable equipment is moved throughout the stockpile areas and used wherever it is needed based on customer demands. Second, piles at the Facility change size, location, and shape—as often as daily—depending on customer demands. Third, existing piles may be completely removed from the Facility, and new piles may be brought to the Facility.

Section 3.0(3.a.iv) of the Regulations requires that a site map depict “the footprints of all Bulk Solid Material storage piles.” In accordance with this requirement, KCBX has depicted on the attached Figure 4 the approximate footprints of the piles located at the Facility as of the date of this submission. However, as noted above, piles at the Facility may change in size, location and shape daily, and may be completely removed from the Facility, and new piles may be created at the Facility periodically. KCBX does not operate with the same number of piles at all times. The number of piles at the Facility varies considerably depending on customer needs. As a consequence, the footprints of piles as depicted on Figure 4 are representative of piles at the Facility in that Figure 4 accurately represents the pile footprints as of the date of this submission. KCBX does not intend to and will not maintain the exact same number of piles, or piles with the same footprints, in the future.

Section 4.0(1.b.ii) of the Regulations requires a site map of any Facility intended to temporarily store material during implementation of an Enclosure Plan. No such temporary facilities are planned.

### **3.0 Facility Operations and Control Measures (3.0(3.b,e) (4.0(1.b.iii, iv))**

KCBX handles bulk solid materials, currently coal and petroleum coke (“Product”), which are transported to and from the Facility via truck, train, barge, and vessel. KCBX is capable of transferring Product directly from one transportation mode to another, as well as indirectly using intermediate stockpiling.

Appendix A includes the required certifying statement that control measures, devices, and technologies have been properly calibrated and maintained. Following is a description of the various modes of operation along with dust control measures.

Facility staff has been trained on the proper application and operation of all Facility control measures, devices and technologies that are applicable to each staff member’s role and responsibility at the Facility. KCBX trains Facility employees to observe for Visible Fugitive Dust, in response activities in the event that Visible Fugitive Dust is observed, and in procedures to reduce the likelihood of Visible Fugitive Dust, such as lowering drop distances. Also, as discussed in more detail below (see Section 7.0), Facility employees observe for Visible Fugitive Dust during all operations at the Facility.

### 3.1 Stockpiles

Product is stockpiled on-site at the South Terminal to satisfy customer needs throughout the year. As required by the City Rules, KCBX limits the height of stockpiles to 30 feet. As part of its regular operations, KCBX compacts, shapes, and grooms stockpiles in order to reduce peaks and edges that could be susceptible to wind erosion. In addition, KCBX applies water to stockpiles and to the storage pad (see Section 3.1.6 below) from permanent, pole-mounted cannons to address the potential for fugitive particulate emissions as well as the potential for visible emissions of fugitive particulates beyond the property line. These cannons provide overlapping coverage, as shown on Figure 4. Specifications for the water cannons are included as Attachment1. However, in some cases, a stockpile may not consistently receive 100 percent coverage from the pole-mounted water cannons due to meteorological conditions, stockpile configurations and/or pile placement. In such cases, KCBX uses portable water cannons mounted on the South Terminal water trucks to water areas not covered by the pole-mounted cannons. The South Terminal water trucks may also be used for supplemental water addition or the application of surfactant, as discussed below. The combination of the pole-mounted water spray system and the water truck provides 100 percent coverage for the stockpiles at the South Terminal.

Figure 1 shows the permanent, pole-mounted water application system for the South Terminal consisting of 42 water cannons set on 4- and 6-inch diameter risers mounted inside poles approximately 60 feet above grade. At 100 psi, the cannons provide design throw radii of 170 feet for 4-inch feed lines (delivering 235 gallons per minute (gpm)) and 250 feet for 6-inch feed lines (delivering 660 gpm) (see Table 1 for engineering specifications). All spare parts are readily attainable from local suppliers. The South Terminal water application system includes two sub-systems, a north sub-system and a south sub-system. Each sub-system includes pumps and intakes that have automated controls allowing programmed sequencing of the cannons, regulating the duration of time for cannon cycling and the timing of cycle initiation. Water for the north sub-system is supplied from the north retention basin by two pumps designed to deliver up to 500 gpm each. The south sub-system is designed to withdraw water from the south retention basin using a single pump that can deliver up to 660 gpm flow. Redundant pumps are available for both sub-systems. The pumps feed through 10-inch diameter pipes. Make up water is provided to the north and south retention basins from the Calumet River by pumps dedicated to each system.<sup>1</sup> Operators are instructed to be aware of system operating performance and report any anomalies, such as low pressure or plugged/malfunctioning cannons. In addition, the system is inspected twice per month with no more than 21 days between inspections.

Except during Freezing Conditions (see Section 3.1.8), water cannons are programmed to operate periodically throughout the day unless (1) operators change the program based on site conditions as

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<sup>1</sup> The project to install permanent pumps referenced in KCBX's June 2014 submittal has been completed.

determined by Daily Dust Emissions Control Plan (DDECP), a form for which is attached as Attachment 2, and visual observations by operators, or (2) wind speeds trigger the cannons to operate more often. KCBX uses three different pre-set cycles: “Normal/Timed Cycle,” “Heavy Cycle,” and “Continuous Cycle.” The default setting is “Normal/Timed Cycle,” in which the water cannons run once every four hours between 7:00 am and 7:00 pm. In “Heavy Cycle” the water cannons run once every two hours between 7:00 am and 7:00 pm. In “Continuous Cycle” the water cannons run a cycle, pause for 30 minutes, and then repeat, continuously, until a site operator changes the mode to one of the other cycles or until 12:00 AM the next day, at which point the cannon system automatically resets to “Normal/Timed Cycle.”

Operators may change the frequency of watering from the default “Normal/Timed Cycle” based on (1) ongoing precipitation, or (2) prevailing or forecasted weather, including wind and precipitation. Attachment 2 includes an example of the Facility’s DDECP. Facility personnel review weather forecasts and complete a DDECP every business day. For non-business days, such as weekends or holidays, a single DDECP from the prior business day includes the non-business days. The Facility’s DDECP includes worker responsibilities on non-business days. During each shift, the Shift Foreman verifies on the DDECP form that he or she observed for Visible Fugitive Dust at least every two hours during the shift, and records any necessary corrective actions taken in response to Visible Fugitive Dust. During nighttime hours, the Shift Foreman still observes for Visible Fugitive Dust to the extent that is possible under ambient lighting conditions at the Facility. For purposes of this Plan, “Visible Fugitive Dust” means the existence of a fugitive dust plume migrating four feet or more in any direction from a storage pile, hopper, transfer point, or other fugitive dust emission point.

In addition, regardless of which cycle is chosen, the cannons are programmed to override the chosen cycle and to operate in “Continuous Mode” when average wind speeds exceed 15 mph over two consecutive five minute intervals as measured by the Facility’s on-site meteorological station. When wind speeds decrease below 15 mph, the cannons automatically return to Normal/Timed Cycle.

The pole-mounted cannon system is operated to apply water, wetting the exteriors of stockpiles which are exposed to the eroding forces of wind and the mechanical displacement of operating equipment. Water trucks are also used to supplement the cannon system. Stockpiles are not kept completely saturated because only the pile surface is exposed to wind erosion and therefore, wetting the outer portion of the pile is all that is necessary to address the potential for fugitive dust. This prevents over-application of water which could result in increased need for controls associated with water runoff management.

TABLE 1. Specifications for South Terminal Fixed-Pole Water Cannon Systems

DESCRIPTION	TYPE	MANUFACTURER / MODEL
Pump, River <sup>2</sup> /Basin Water Supply	Vertical Turbine	Flowserve 10EEM-8
Pump, River Water Jockey <sup>2</sup>	Vertical Turbine	Flowserve 8ELL-8
Motor, River Water Jockey Pump <sup>2</sup>	3-Phase	Flowserve
Pump, South Basin	Vertical Turbine	American Turbine 12-H-150 or equivalent
Motor, South Basin Pump	3-Phase	American Turbine
Pump, Sump	Vertical	Flowserve 3MSX7A
Motor, Sump Pump	3-Phase	Flowserve
Pump, Surfactant Dosing	Positive Displacement	LMI S G6 6 x P P (Less Motor)
Motor, Surfactant Dosing Pump	3-Phase	LMI
Pump, Surfactant Dosing	Gear	Flowserve 5GAFM1D0
Motor, Surfactant Dosing Pump	3-Phase	Flowserve
Pump, Spray Nozzle Feed	Centrifugal	Flowserve 1J1.5X1US-6RV Mark 3
Motor, Spray Nozzle Feed Pump	3-Phase	Flowserve
Valve	Gate	NIBCO F-617-0
Valve	Check	NIBCO F-938-33, FLG
Valve	Check	NIBCO 400 Series, THRD
Valve	Motorized	NIBCO F-515-CS-F-66-F-S + Actuator
Valve	Motorized	NIBCO 200NIBBRELNEMA6120VACASSY
Valve	Ball	NIBCO T585-70
Valve	Butterfly	NIBCO FD-5765-1
Valve	Butterfly	NIBCO FD-5765-0
Valve	Solenoid	ASCO Redhat
Valve	PRV	Watts LFB223B/Cla Val 90-01AS or equivalent
Valve	Self-Contained PRV	Watts LFB223B/Cla Val 90-01AS or equivalent
Valve, Sprinkler Control	Full Port Ball	Bettis/Nibco
Valve	Air Combination	APCO 145C
Valve Actuator with Travel Limit Switches	EM-800 Motor Operator	Bettis/Nibco
Backflow Preventer	Double Check	Watts 709DCDA
Calibration Column		Harrington F-Series
Strainer, 6 [in]	Liquid In-Line	CLA-VAL X43H
Strainer, 10 [in]	Liquid In-Line	Watts 77F-DI-125
Strainer, 10 [in]	Basket	Mueller 166-DI
Valve, Pressure Reducing		CLA-VAL 90-01 BSX-X434
Valve, Pressure Reducing	Super Capacity	Watts ES-223
Valve, Pressure Reducing	Super Capacity	Watts N223B
Mixer	Static	Koflo-985

<b>Filter, (Heat Pump Units)</b>	<b>Disposable, 2 in</b>	
<b>Filter, Stainless Steel</b>	<b>Washable</b>	<b>CAMFIL FARR Type 44</b>
<b>Backpressure Relief</b>	<b>Relief Pressure</b>	<b>Fisher NPS 293H</b>

KCBX treats Inactive stockpiles<sup>2</sup> and the inactive portions of active stockpiles with a chemical stabilizer (aka “surfactant”) every sixty days. Operators can apply this chemical stabilizer through the water cannons or the cannon mounted on the water truck. KCBX maintains operating records of chemical stabilizer application on-site.

### **3.2 Product unloading**

The potential for fugitive particulate emissions with respect to Product unloading is addressed as follows. KCBX employees observe for Visible Fugitive Dust during all unloading operations.

- Rail cars are unloaded via rotary and bottom dump receiving systems, which are enclosed and equipped with a wet spray system or with air pollution control equipment, and therefore meet the requirements for transfer points in Section 3.0(7) of the City Rules.
- In the bottom dump enclosure, the potential for fugitive particulate emissions is addressed by (1) choke-feeding, and (2) the capability to operate multiple heat traced spray bar headers. Spray bars are inspected twice per month with no more than 21 days between inspections.
- In the rotary rail dump enclosure, a baghouse draws air from the enclosure, removes recoverable Product from the airstream, and returns the recovered Product to conveyor C-1 within an enclosure. The baghouse exhaust is visually monitored, and pressure drop is recorded as a means of ensuring performance. When visible emissions are evident from the exhaust or when pressure drop is outside of the range specified by the baghouse manufacturer, the system is examined for blinded or compromised bags, and repairs/maintenance are conducted as necessary.
- Trucks are unloaded directly to stockpile areas. When Product is being unloaded from trucks, operators apply water from the pole-mounted cannons and/or a water truck to the Product being unloaded if they observe Visible Fugitive Dust. During freezing conditions, KCBX shuts down Product unloading if operators observe Visible Fugitive Dust unless operators can eliminate such Visible Fugitive Dust through other operational dust control

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<sup>2</sup> Inactive stockpiles are those piles that are not receiving or having Product removed during the period of chemical stabilizer application, including the undisturbed portion of piles that have a working face.

measures such as slow dumping of material from trucks, the moisture content of the Product, and/or the use of water trucks (which are parked in a heated maintenance shop).

- In addition to rail car and truck unloading, a “clamshell bucket” on a mobile crane transfers material from barges to a box hopper that feeds the Product to a conveying system. Operators apply water from a spray bar on the box hopper or from water cannons on the site water truck if they observe Visible Fugitive Dust during unloading. Operators also adjust drop distances into the box hopper based on wind conditions.

### 3.3 Product Transfers

Material transfers are the movement of Product to and from barges, vessels, rail cars, trucks, and stockpiles, including the reclaiming of Product from piles. KCBX employees observe for Visible Fugitive Dust during all product transfers.

- Customers are required to send Shipment Quality Reports (SQR) (see example attached as Attachment 3) to KCBX for approval before Product is shipped to the Facility. The SQRs have the moisture results of the Product loaded for transportation to the Facility. During non-freezing conditions, if an SQR indicates that the moisture of a Product is less than 3%, KCBX accepts the material and uses water spray systems while unloading it.
- Spray bars are installed at multiple fixed transfer points throughout the railcar unloading and ship loading fixed conveyance systems. Operators apply water through these spray bars if they observe Visible Fugitive Dust at a fixed transfer point. KCBX inspects conveyance system spray bars twice per month with no more than 21 days between inspections.
- Transfer points also occur when front-end loaders, bulldozers, box hoppers, mobile conveyors, and stacking equipment are used to move Product. If operators observe Visible Fugitive Dust at one of these transfer points, they apply water from the pole-mounted cannons, from a portable cannon on a water truck, or from a portable conveyor spray bar.
- In addition, operators minimize drop distances at transfer points by lowering the heights of conveyors, stackers, or mobile equipment buckets and clamshells, as an additional control to reduce the potential for fugitive particulate emissions at transfer points.

### 3.4 Product loading

In addition to the controls described above and below, moisture from natural precipitation and from controls described in previous sections minimizes the potential for fugitive particulate emissions during loading with respect to all modes of transportation (i.e., barges, vessels, trucks or railcars). KCBX employees observe for Visible Fugitive Dust during all loading operations.

- For barge and vessel loading, operators minimize material drop distance and monitor and adjust feed rate to minimize the potential for fugitive dust. In addition, if operators observe Visible Fugitive Dust during barge and vessel loading, operators apply water to material on conveyors using spray bars installed on those conveyors. KCBX inspects spray bars twice per month with no more than 21 days between inspections. If these measures do not eliminate Visible Fugitive Dust inside the barge, operators run a hose to the barge and apply water to the material inside the barge using that hose.
- For vessel to barge transfer, a vessel that is equipped with water sprays on its conveyor may activate this control as requested by KCBX. If a vessel does not have the ability to apply water, KCBX has authority to stop the transfer to address the potential for fugitive dust.
- For truck loading, operators use front-end loaders to transfer Product from stockpiles to the trucks. During non-freezing conditions, operators apply water from the pole-mounted cannons and/or a water truck to the Product being loaded if they observe Visible Fugitive Dust during truck loading. Truck drivers are required to tarp their loads prior to leaving the Facility and to pass over rumble strips. During non-freezing conditions, outgoing trucks also pass through a wheel wash before exiting.

### 3.5 South Terminal traffic and parking areas

KCBX utilizes large, heavy mobile equipment to move Product. This equipment frequently traverses the stockpile pad, transient pathways within the stockpile pad, and Internal Roads. Water from pole-mounted cannons is applied to the stockpile pad (see Section 3.1.1 above) to address the potential for fugitive particulate emissions from transient pathways. On days when heavy equipment traffic is present, water from a spray bar and/or portable cannon attached to a water truck is applied on transient pathways within the stockpile pad within the range of the pole-mounted cannons as an additional dust control measure. Water application from the water truck is also used to address the potential for fugitive particulate emissions from parking areas.

The speed limit at all locations on-site is 5 mph. Speed limits are enforced by contractor and truck driver training, security personnel, site personnel, operators, and signage.

Each day that trucks are loaded or unloaded, a sweeper is used to remove dust from Internal Roads, parking areas, and External Roads within one quarter mile of the South Terminal entrance that is subject to truck traffic. During non-freezing weather, sweeping is accomplished using a wet vacuum system that moistens the particles and prevents their migration when the sweeper is unloaded. Material removed by the sweeper is disposed of offsite. During freezing conditions, sweeping is accomplished with a dry vacuum system. Attachment 4 includes example specifications for the sweeper. Street sweeping is conducted by a contractor, and actual on-site equipment can vary.

KCBX maintains written records of water truck use and sweeping. Any spills or leaks of Product or material on paved surfaces at the Facility are cleaned up by the sweeper or by Facility personnel.

KCBX visually inspects the pavement at the Facility on a quarterly basis. If KCBX identifies any damage to the pavement during those inspections, it repairs that damage.

### **3.6 Inspection and Maintenance Program**

KCBX calibrates the control measures described in the previous sections on a regular basis, per manufacturers' specifications. Various maintenance activities are utilized, depending on the requirements of the specific equipment, system, or process. The following are the primary maintenance activities:

- Control Measure inspections as described in the previous sections.
- For equipment that requires calibration, KCBX completes calibration according to the equipment manufacturer's specifications.
- Operators record inspection findings and corrective actions in response to inspection findings, and due dates for completing the corrective actions, into an electronic action register system (Dakota software).
- KCBX also puts calibration schedules into the electronic action register system (Dakota software).

That Dakota software system sends KCBX employees reminders when corrective actions or calibration is to be conducted. The software system also notifies the Facility manager of any tasks that are close to due dates and of any tasks that are overdue.

### **3.7 Freezing Conditions**

From November 1 through March 31, KCBX normally experiences freezing conditions, with air temperatures below 32 degrees Fahrenheit. During freezing conditions, KCBX employees also observe for Visible Fugitive Dust. During freezing conditions, KCBX also follows all of the procedures set forth in Sections 3.1.1 to 3.1.7, except as follows:

- The permanent, fixed-pole water cannon systems may be drained and shut down from November 1 through March 31 to protect against freeze damage. However, KCBX will continue to use the water cannon systems after November 1 until freezing conditions require shut down.
- Except during hard freezing conditions, which are typically when temperatures are less than 25 degrees Fahrenheit, KCBX applies water at the Facility on a periodic basis using the portable water cannons on the water trucks.

- During hard freezing conditions, KCBX only applies water using the portable water cannons on the water trucks to address specific concerns, if it is safe to do so.
- During freezing conditions, KCBX shuts down Product loading or unloading if operators observe Visible Fugitive Dust, unless operators can eliminate such Visible Fugitive Dust through other operational dust control measures such as slow dumping of material from trucks, moisture content of the Product, and the use of water trucks (which are parked in a heated maintenance shop).
- Prior to draining and shutting down the fixed-pole water cannon systems as discussed above, KCBX grooms stockpiles as necessary and applies surfactant to all stockpiles before such freezing conditions arrive, regardless of whether 60 days have elapsed since the last application of surfactant.
- During freezing conditions when trucks are being loaded or unloaded, sweeping is accomplished with a dry vacuum system. Attachment 4 includes example specifications for the dry vacuum sweeper. Street sweeping is conducted by a contractor, and actual on-site equipment can vary.
- During freezing conditions, KCBX reviews Shipment Quality Reports (SQR) before Product is shipped to KCBX (see Section 3.1.3 above) and rejects any load of Product that does not have at least 3.0% moisture. Such loads therefore are never shipped to KCBX.

#### **4.0 Description of Truck Routes (3.0(3.c))**

Figure 2 indicates Truck Routes utilized for incoming and outgoing trucks. All truck traffic enters and exits at the Main Gate, located at the northeast portion of the site. Truck traffic proceeds on one of the three Internal Roads (labeled Road 1, Road 2, Road 3) to the stockpile area. Once a truck crosses one of the railroad crossings, it is in the stockpile area. As noted previously, pile sizes, shapes and locations within the stockpile area vary. Thus, within the stockpile area, trucks utilize transient pathways. Transient pathway locations and routes are temporary, and change frequently depending on material inventory.

Within one quarter mile of the South Terminal, trucks visiting the South Terminal travel either eastbound or westbound on E. 106<sup>th</sup> Street to South Buffalo, to E. 107<sup>th</sup> Street, to S. Burley Ave, to the entrance of the South Terminal, as shown on Figure 2. KCBX limits truck traffic to these paved roads for sweeping purposes by requiring that all truck drivers who enter the South Terminal only utilize these routes.

Each day that trucks are loaded or unloaded, the paved areas within the South Terminal and within one quarter mile of the South Terminal are swept. Sweeping is accomplished using a wet vacuum system that moistens the particles and prevents their migration when the sweeper is unloaded. Material removed by the sweeper is disposed of offsite. During freezing conditions, sweeping is accomplished with a dry vacuum system. Attachment 4 includes example specifications for the sweeper. Street

sweeping is conducted by a contractor, and actual on-site equipment can vary. In addition, see Sections 3.1.6 and 3.1.8 above.

Trucks leaving the stockpile pad and entering Road 1 are required to pass through a wheel-wash and over rumble strips prior to leaving the Facility. The system is designed such that trucks pass through a wheel-wash to spray the tires and sides of the truck with water to loosen residual material and then over a series of rumble strips to shake off loose material before exiting the South Terminal. The wheel-wash operates each day that truck traffic is present except during freezing conditions. The wheel-wash is inspected twice per month with no more than 21 day in between inspections. The truck wash is designed to collect any liquid from its operations, and the liquid drains into a collection basin. KCBX recycles or disposes of the liquid and other material in this basin so that they do not result in Visible Fugitive Dust. KCBX documents the method (landfilling) and amount of any such material it disposes of.

Water Trucks are used for additional dust control at the Facility. Water from the truck mounted spray bar and/or cannon can be applied to Internal Roads, transient pathways, parking lots, or other high traffic areas.

## **5.0 Capacity Calculation (3.0(3.d))**

Using a maximum 30-foot pile height, the calculated maximum stockpile capacity for the KCBX South Terminal is approximately 1.1 million tons. This maximum capacity calculation is based on stockpile conditions involving a minimal number of piles. The storage layout and basis for this maximum stockpile capacity calculation are indicated on Figure 3.

## **6.0 Particulate Monitoring (PM10), Visible Fugitive Dust and Opacity Testing (3.0(3.f), 4.0(1.b.v))**

Permanent, continuous Federal Equivalent Method (FEM) PM10 source monitors are installed at the locations indicated on Figure 1. Details of the PM10 monitoring program are contained in the *Particulate Matter Less Than Ten Microns Air Quality Monitoring Siting Study Report* in Appendix B.

Visible fugitive dust and opacity testing are conducted on a quarterly basis. Visible fugitive dust and opacity observations are completed by a trained and certified, third party “Visible Dust and Opacity Reader” using USEPA Method 22 and USEPA Method 9. Visible fugitive dust and opacity readings are completed during the last month of each quarter. The actual evaluation day is within the second or third week of each targeted month, on a day that valid Method 9 observations are possible (e.g., it is not raining). The specific day of each evaluation is selected by the Visible Dust and Opacity Reader, whose decision will be in part based on weather conditions (including temperature and wind) on previous days that opacity readings were taken, in order to choose reading days on which opacity readings will be conducted during a range of weather conditions so that representative conditions at the Facility are covered. On the selected day, the Visible Dust and Opacity Reader will report to the Facility to make

visible fugitive dust and opacity observations. See Mostardi and Platt procedures, Attachment 5 for the protocol followed in conducting such observations.

## 7.0 Dust Monitoring Contingency Plan (3.0(3.g)), (4.0(1.b.vi))

PM10 data is collected and stored electronically. An alert system is used to alert personnel of cases where the PM10 data is elevated. Alerts are transmitted via email or text message. Upon receipt of an alert, KCBX personnel will determine if the Reportable Action Level (RAL) has been exceeded.

Section 3.0(4) of the Rules requires that Facilities install “permanent, continuous Federal Equivalent Method (FEM) real-time PM10 monitors.” KCBX has installed such monitors, which record PM10 on an hourly basis. Section 3.0(3) of the Rules requires KCBX to describe its “response activities when the monitors . . . detect PM 10 that exceeds the Reportable Action Level. . . . The response activities should consist of a range of increasingly aggressive measures appropriate to different levels of exceedance.” The Rules define Reportable Action Level as “the positive difference between the level of PM10 measured at the upwind monitor(s) at a Facility and the level of PM10 measured at the downwind monitor(s) at a Facility that will trigger response activities . . . . The Reportable Action Level may vary based on the value of the difference, and based on the concentration of PM10 detected at the downwind monitor(s) at a Facility.” Although the Rules allow KCBX to utilize the positive difference between the upwind and downwind monitors, KCBX utilizes the positive difference between the maximum reading and the minimum reading. This conservative calculation results in a number higher than or equal to the true upwind/downwind positive difference, but allows KCBX to respond immediately without having to determine wind direction. Accordingly, for purposes of this submission, “Difference” means the positive difference between the highest level of PM10 measured at any monitor at the Facility and the lowest level of PM10 measured at any monitor at the Facility.

KCBX utilizes a two level approach:

1. **On an hourly basis**, if the level detected any one monitor is **greater than 300 µg/m<sup>3</sup>**, KCBX personnel will observe on-going operations and site conditions in the vicinity of the monitor that had the reading greater than 300 µg/m<sup>3</sup>, and in other areas of the Terminal, and take actions as outlined below. KCBX records each occurrence on its Wind/PM10 Event Log but will not report to the city. KCBX maintains its Wind/PM10 Event Logs in accordance with Section 9.0 below.
2. **On a 24 hour average basis**, if the Difference between any two monitors is **greater than 150 µg/m<sup>3</sup>**, KCBX will report to the city and take action as identified below.

Monitor Results	Actions	Report as RAL?
1. Hourly reading <300 µg/m <sup>3</sup>	no action required	no
2. Hourly reading >300 µg/m <sup>3</sup>	Investigate and Mitigate-outlined below	no
3. 24-Hour Difference * >150 µg/m <sup>3</sup>	RAL event - outlined below	yes

\*24-Hour Difference is the difference of the hourly average over a 24-hour calendar day

If either an investigation or RAL event (items numbered 2 and 3 in the above chart) occurs, KCBX will proceed as follows.

- I. Investigate fugitive emission levels to determine suspected on-site source(s).
  - A. If a RAL event-submit written report to the City of Chicago Department of Public Health, within 24 hours.
  - B. If an on-site source is identified, proceed to II below.
  - C. If an on-site source is not identified, proceed to VI below.
  
- II. If KCBX identifies a potential on-site source, KCBX determines which actions listed below it should take to address the potential fugitive emissions, and KCBX takes those actions. These actions are not required to be taken in any particular order. Rather, KCBX may take some or all of these actions in any order it chooses based on the suspected source and on site conditions. Water application is considered KCBX's first and primary response activity to control fugitive emissions.
  - A. Stockpile Potential Source
    1. compact, shape, or perform other pile maintenance; and/or
    2. apply targeted water through cannon system; and/or
    3. apply targeted water through water truck; and/or
    4. apply targeted chemical stabilizer through water truck.
  
  - B. Product Unloading Potential Source
    1. apply targeted water through cannon system; and/or
    2. apply targeted water through water truck; and/or
    3. if rotary rail dump enclosure is suspected source, visually monitor baghouse exhaust and check pressure drop, and if issue is apparent, examine for blinded or compromised bags
  
  - C. Product Transfer Potential Source
    1. apply water through spray bars; and/or
    2. apply targeted water through cannon system; and/or
    3. apply targeted water through water truck.
  
  - D. Product Loading Potential Source
    1. minimize drop distance; and/or
    2. reduce feed rate; and/or
    3. apply water through spray bars; and/or

4. utilize choke feeding; and/or
5. if vessel to barge transfer, and vessel discharge conveyor is equipped with water spray, instruct vessel representatives to activate water spray.

E. Internal Roads, Transient Pathways, or Parking Areas Potential Source

1. apply targeted water through cannon system; and/or
2. apply targeted water through water truck; and/or
3. conduct additional sweeping.

F. Proceed to III below

III. Monitor PM10 Readings in next hour

A. PM10 Readings

1. if after taking Steps I and II, the hourly reading for the monitor at issue is  $<300 \mu\text{g}/\text{m}^3$ , proceed to VI below;
2. if after taking Steps I and II, the hourly reading for the monitor at issue is  $>300 \mu\text{g}/\text{m}^3$ , proceed to IV below.

IV. Suspend

- A. suspend the on-site source identified under I above and conduct mitigation activities; and,
- B. monitor PM10 levels hourly until the hourly reading for the monitor at issue is  $<300 \mu\text{g}/\text{m}^3$ , in which case, proceed to V below.

V. Restart

When the hourly reading for the monitor at issue is  $<300 \mu\text{g}/\text{m}^3$ , restart the source/activities suspended under IV above.

VI. Recording

Record and retain an event report that includes pertinent PM10 data, meteorological information, timing of alert, timing of suspension (if applicable), timing of restart (if applicable), description of mitigation efforts, and other pertinent information relating to the event.

### 7.1. High Wind Events

Wind direction and speed data are collected and stored electronically. An alert system is used to alert supervisory personnel of cases when the average wind speeds exceed 15 miles per hour over two consecutive five minute intervals of time. Alerts are transmitted via email or text message. Upon receipt of an alert, KCBX personnel will proceed as follows:

- A. The Facility's water cannons will automatically override the mode on which they are operating ("Normal" or "Heavy") and operate in "Continuous Mode." The water cannons will continue to operate in Continuous Mode until winds decline to speeds below 15 mph over two consecutive five minute intervals.
- B. Supervisors receiving the alert will notify operators present at the Facility that a High Wind alert has occurred. For the remainder of their shift, the operators shall (i) observe the Facility for Visible Fugitive Dust, and (ii) take appropriate steps in response to any Visible Fugitive Dust, as outlined in Sections 3.1 through 3.7 above.
- C. If no hourly reading at any monitor is  $>300 \mu\text{g}/\text{m}^3$ , no further action is necessary. Proceed to G below.
- D. If an hourly reading at any monitor is  $>300 \mu\text{g}/\text{m}^3$ , suspend all transfer activities at the Facility and mitigate suspected source(s). Proceed to E below.
- E. When the hourly reading at all monitors decreases to  $<300 \mu\text{g}/\text{m}^3$ , restart the source/activities suspended under D above. Proceed to F below.
- F. Record and retain an event report that includes pertinent PM10 data, meteorological information, timing of alert, timing of suspension (if applicable), timing of restart (if applicable), description of mitigation efforts, and other pertinent information relating to the event. Proceed to G below.
- G. Conclude event.

## 8.0 PM10 Monitor Contingency Plan (3.0(3.h))

Appendix C contains the Quality Assurance Project Plan (QAPP) for the PM10 monitors. The QAPP includes operations and maintenance activities associated with the PM10 monitoring program. The City of Chicago Department of Health will be notified, within 24 hours, any time monitoring equipment has malfunctioned preventing readings or logging of data. Reporting does not apply to maintenance or calibration activities.

If the wind monitor at the Facility is out of service, web-based local weather data will be substituted.

If a PM10 monitor is out of service for greater than 48 hours, KCBX will increase the frequency of opacity readings described in Section 6.0 to once per day at the location of the out of service PM10 monitor. The increased frequency of opacity readings will continue until the PM10 monitor is back in service.

## 9.0 Recordkeeping System (3.0(3.i))

Records relating to this plan are maintained at the Facility and available for inspection. The records are retained for a minimum of three (3) years. Attachment 6 includes sample forms and logs that KCBX uses to keep records. The record-keeping system includes:

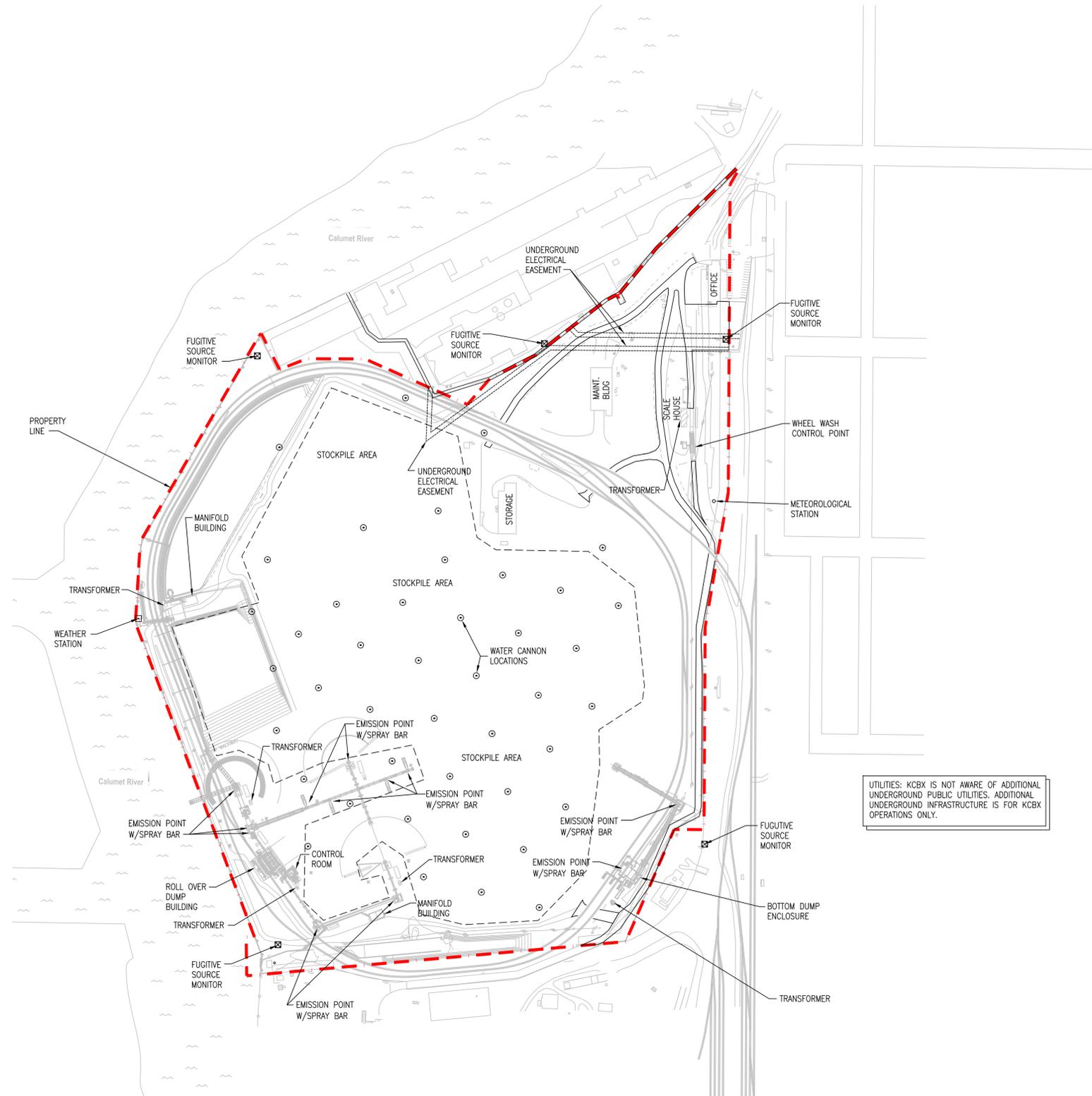
- Daily log of all cleaning and street sweeping (3.0(17)(a)).
- Daily log of weather conditions, including wind speed and direction as documented by the on-site weather station and DDECP forms (3.0(17)(b)).

- Wind/PM10 Event Logs.
- Water and/or chemical stabilizer applications (3.0(17)(c)).
- Instances of suspension of activities due to high wind conditions (3.0(17)(d)).
- Continuous monitoring for fugitive dust, including instances of RAL exceedance and records of any action taken to respond to the detection of fugitive dust (3.0(17)(e)).
- Quarterly opacity test results (3.0(17)(f)).
- Quarterly visual Fugitive Dust test results (3.0(17)(f)).
- Schedule for routine inspections, maintenance, and testing of all control measures devices and technologies, including a schedule for inspection of Product piles, inspection of all monitors, inspection of External Roads within one quarter mile of the Facility that are subject to truck traffic, and sidewalks adjacent to those External Roads, for the presence of spilled material, and weekly inspections around the perimeter of the Property for the presence of spilled material extending from the Property; and the individual(s) responsible for such inspections, maintenance, and testing (3.0(17)(g)).

## **10.0 Fugitive Dust Plan Fact Sheet (3.0(3.j))**

Appendix D contains the Fugitive Dust Plan Fact Sheet.

# **FIGURE 1**



UTILITIES: KCBX IS NOT AWARE OF ADDITIONAL UNDERGROUND PUBLIC UTILITIES. ADDITIONAL UNDERGROUND INFRASTRUCTURE IS FOR KCBX OPERATIONS ONLY.

KEY	
---	PROPERTY LINE
----	STOCKPILE AREA BOUNDARY
○	WATER CANNON
⊗	FUGITIVE SOURCE MONITOR
○	METEOROLOGICAL STATION
⊠	WEATHER STATION - DUST SUPPRESSION SYSTEM

A PLAN VIEW  
1A 1" = 200'-0"

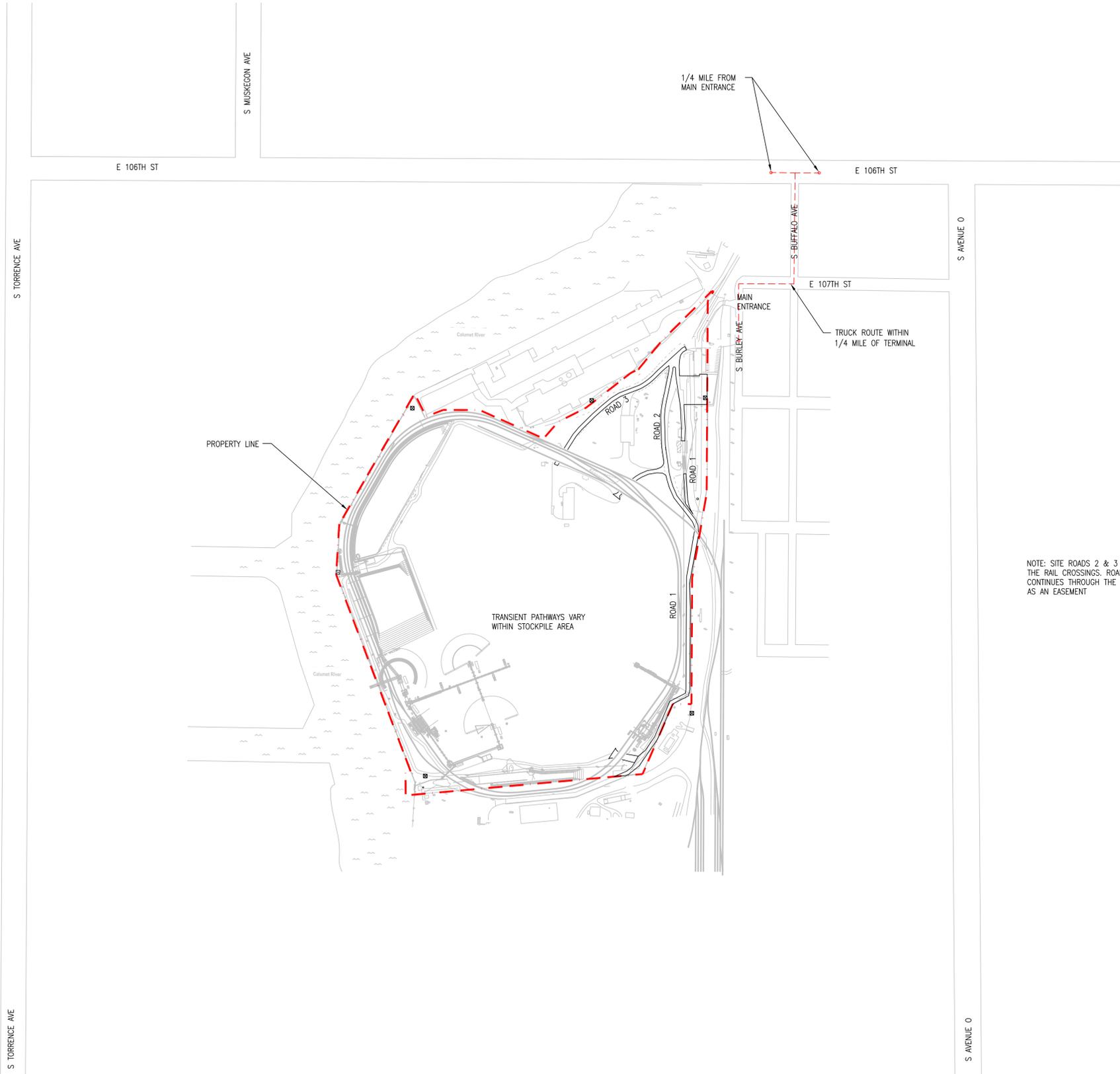
THIS DRAWING INCLUDING THE PRINCIPLES OF DESIGN IS THE PROPERTY OF SMITH & MONROE & GRAY ENGINEERS, INC. (SMG). THE DESIGN SHOWN IN THIS DRAWING IS SITE SPECIFIC AND SHALL BE USED ONLY FOR THE PROJECT SHOWN ON THE TITLE BLOCK. IF THIS DRAWING IS NOT STAMPED WITH AN ENGINEER'S SEAL, THE DRAWING MAY HAVE BEEN REPRODUCED FROM AN UNAUTHORIZED ELECTRONIC COPY. REFER TO A STAMPED AND SIGNED HARD COPY OF THIS DRAWING FOR THE AUTHORIZED DOCUMENT. THIS DRAWING IS NOT TO BE USED IN A MANNER THAT WOULD BE A DETRIMENT TO SMG. ACCEPTANCE OF THIS DRAWING IS AN AGREEMENT TO THE ABOVE.

SYL	REVISIONS	BY	DATE	CHK'D
D	UPDATED		6/4/14	
C	UPDATED		5/21/14	
B	UPDATED		5/7/14	
A	ISSUED FOR REVIEW			

 <b>Smith Monroe Gray</b> ENGINEERS, INC. Phone: 503.643.8595		 <b>KCBX TERMINALS COMPANY</b>	

<b>KCBX SOUTH</b> BULK TERMINAL SITE MAP		
SCALE AS NOTED	DWG. NO. <b>FIGURE 1</b>	REV. <b>D</b>

# **FIGURE 2**



NOTE: SITE ROADS 2 & 3 STOP AT THE RAIL CROSSINGS. ROAD 1 CONTINUES THROUGH THE PROPERTY AS AN EASEMENT

KEY	
---	PROPERTY LINE
- - -	PUBLIC TRUCK ROUTE

A  
2A PLAN VIEW  
1" = 300'-0"

THIS DRAWING INCLUDING THE PRINCIPLES OF DESIGN IS THE PROPERTY OF SMITH & MONROE & GRAY ENGINEERS, INC. (SMG). THE DESIGN SHOWN IN THIS DRAWING IS SITE SPECIFIC AND SHALL BE USED ONLY FOR THE PROJECT SHOWN ON THE TITLE BLOCK. IF THIS DRAWING IS NOT STAMPED WITH AN ENGINEER'S SEAL, THE DRAWING MAY HAVE BEEN REPRODUCED FROM AN UNAUTHORIZED ELECTRONIC COPY. REFER TO A STAMPED AND SIGNED HARD COPY OF THIS DRAWING FOR THE AUTHORIZED DOCUMENT. THIS DRAWING IS NOT TO BE USED IN A MANNER THAT WOULD BE A DETRIMENT TO SMG. ACCEPTANCE OF THIS DRAWING IS AN AGREEMENT TO THE ABOVE.

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A	ISSUED FOR REVIEW			

 <b>Smith Monroe Gray</b> ENGINEERS, INC. Phone: 503.643.8595		 <b>KCBX TERMINALS COMPANY</b>	

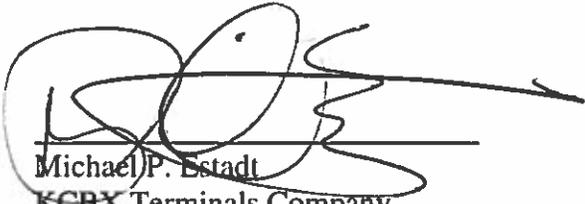
<b>KCBX SOUTH</b> BULK TERMINAL VICINITY MAP		
SCALE AS NOTED	DWG. NO. <b>FIGURE 2</b>	REV. <b>D</b>

# **FIGURE 3**



**Certification of Capacity Calculation**

Pursuant to Section 3.0(3)(d) of the City of Chicago Department of Public Health – Rules and Regulations for Bulk Materials Storage, dated March 14, 2014, I, Michael P. Estadt, as Manager of the KCBX Terminals Company Facility located at 10730 South Burley Avenue, Chicago Illinois 60617, hereby certify that the capacity calculation submitted as Figure 3 of the Facility's Fugitive Dust Plan is accurate.



Michael P. Estadt  
KCBX Terminals Company  
Chicago, Illinois

Date: 12 Feb 2016

## DELEGATION OF SIGNATURE AUTHORITY

**KCBX Terminals Co.  
10730 South Burley Avenue, Chicago, IL 60617**

I, Scott Lebbin, Vice President - Operations of KCBX Terminals Co., which is the operator of the terminal at 10730 South Burley Avenue in Chicago, Illinois (the "Facility"), do hereby delegate to the person whom from time to time is designated with the title of Operations Manager of the Facility the authority to sign the following documents:

**1. Water Discharge Permit Applications, Reports and Submittals**

All (i) applications for NPDES or other wastewater discharge permits, (ii) reports required by any NPDES, Underground Injection Control or other wastewater discharge or disposal permits or regulatory requirements, and (iii) other information submittals requested by the appropriate water discharge or disposal regulatory authorities for the Facility. This delegation is intended to constitute a signature delegation under the provisions of 40 CFR Parts 122, 123 and 144, Ill. Admin. Code, tit. 35, parts 309, 310, 702 and 704 and all other similar federal, state and local authorized signatory requirements applicable to wastewater discharge and disposal.

**2. Solid and Hazardous Waste Permit Applications, Reports And Submittals**

All (i) applications for solid or hazardous permits, (ii) reports required by any solid and hazardous waste permits or regulatory requirements, and (iii) other information submittals requested by the appropriate solid and hazardous waste regulatory authorities for the Facility. This delegation is intended to constitute a signature delegation under the provisions of 40 CFR Parts 260, 262 and 270, Ill. Admin. Code, tit. 35, subtitle G, and all other similar federal, state and local authorized signatory requirements applicable to solid and hazardous waste.

**3. Air Permit Applications, Reports and Submittals**

All (i) applications for air permits, (ii) reports required by any air permits or air regulatory requirements, and (iii) other information submittals requested by appropriate air regulatory authorities for the Facility. This delegation is intended to constitute a signature delegation under the provisions of 40 CFR Parts 52 and 70, Ill. Admin. Code, tit. 35, subtitle B, and all other similar federal, state and local authorized signatory requirements applicable to air emissions. KCBX Terminals Co. has also submitted a letter along with an executed original of Form 500-CAAPP under separate cover to the Chief of the IEPA Bureau of Air.

**4. Drinking Water Permit Applications, Reports, and Submittals**

All (i) applications for permits to supply water for human consumption, (ii) reports required by any drinking water permits or drinking water regulatory requirements, and (iii) other information submittals requested by appropriate drinking water regulatory authorities for the Facility. This delegation is intended to constitute a signature delegation under the provisions of 40 C.F.R. Part 141, Ill. Admin Code tit. 35, part 602, and all other similar federal, state and local authorized signatory requirements applicable to drinking water.

**5. Other Environmental Permit Applications, Reports and Submittals**

All (i) applications for other environmental permits not specifically addressed above, (ii) reports required by any other environmental regulatory requirements not specifically addressed above, and (iii) other information submittals requested by appropriate environmental regulatory authorities for the Facility. This delegation is intended to constitute a signature delegation under the provisions of applicable federal, state and local authorized signatory requirements for requirements that are not specifically addressed above.

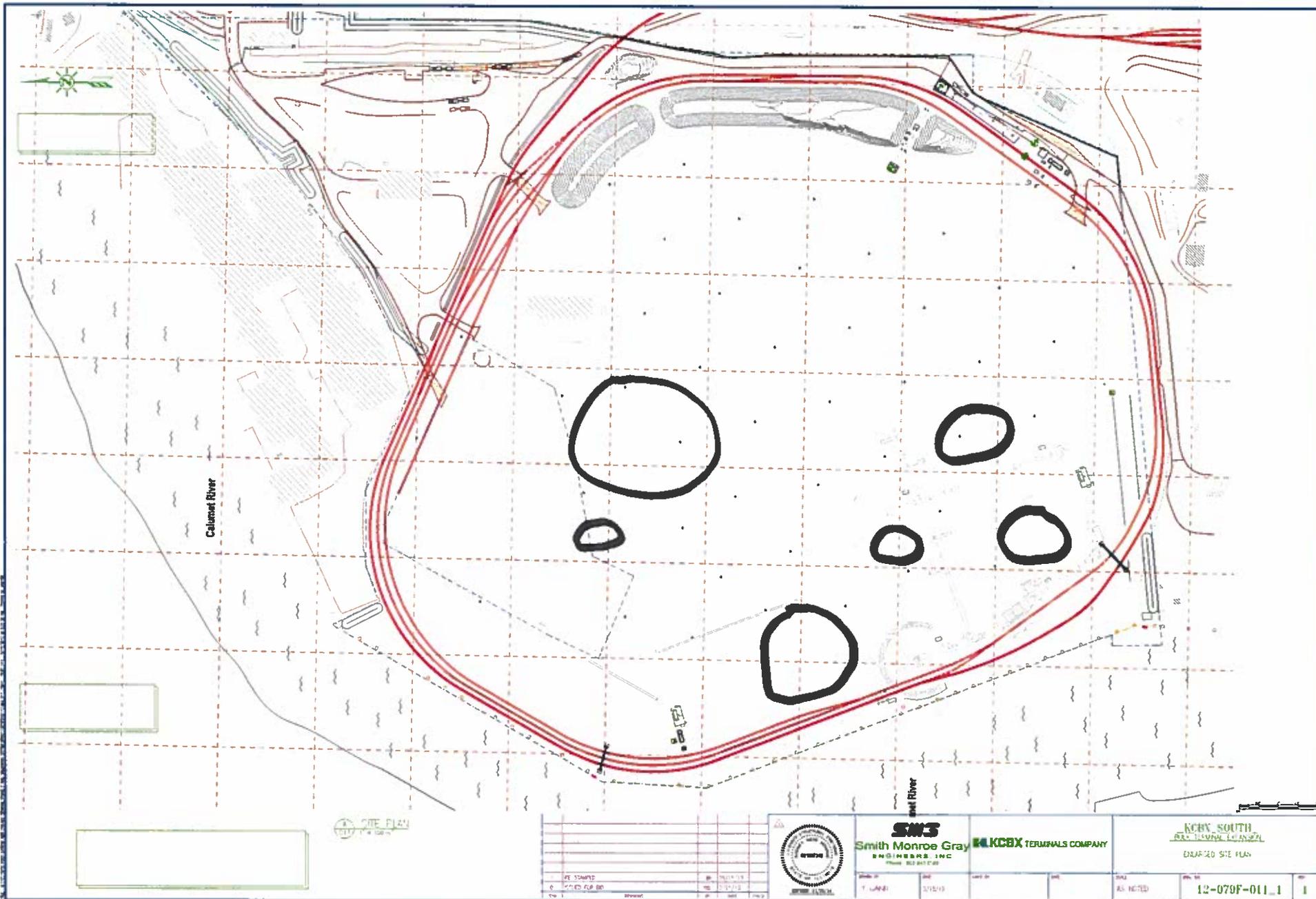
This delegation of signature authority supersedes all prior delegations for the Facility, and shall remain in effect during such time as KCBX Terminals Co. is the owner/operator of the Facility and until it is either replaced with a new delegation of signature authority or withdrawn.

**KCBX TERMINALS CO.**

By: Scott Lebbin  
**Scott Lebbin**  
**Vice President - Operations**

8/12/13  
Date

# **FIGURE 4**



Columet River

West River

4 SITE PLAN  
1/14/12



**SWS**  
Smith Monroe Gray  
ENGINEERS, INC.  
PHONE: 815.847.1700

**KCBX** TERMINALS COMPANY

KCBX SOUTH  
600 S. ILLINOIS ST.  
DRAFTED SITE PLAN

DATE	BY	APP'D	SCALE
12/14/11	SMG	SMG	AS SHOWN
12/14/11	SMG	SMG	AS SHOWN
12/14/11	SMG	SMG	AS SHOWN
12/14/11	SMG	SMG	AS SHOWN

NO.	DATE	BY	REVISION
1	12/14/11	SMG	AS NOTED

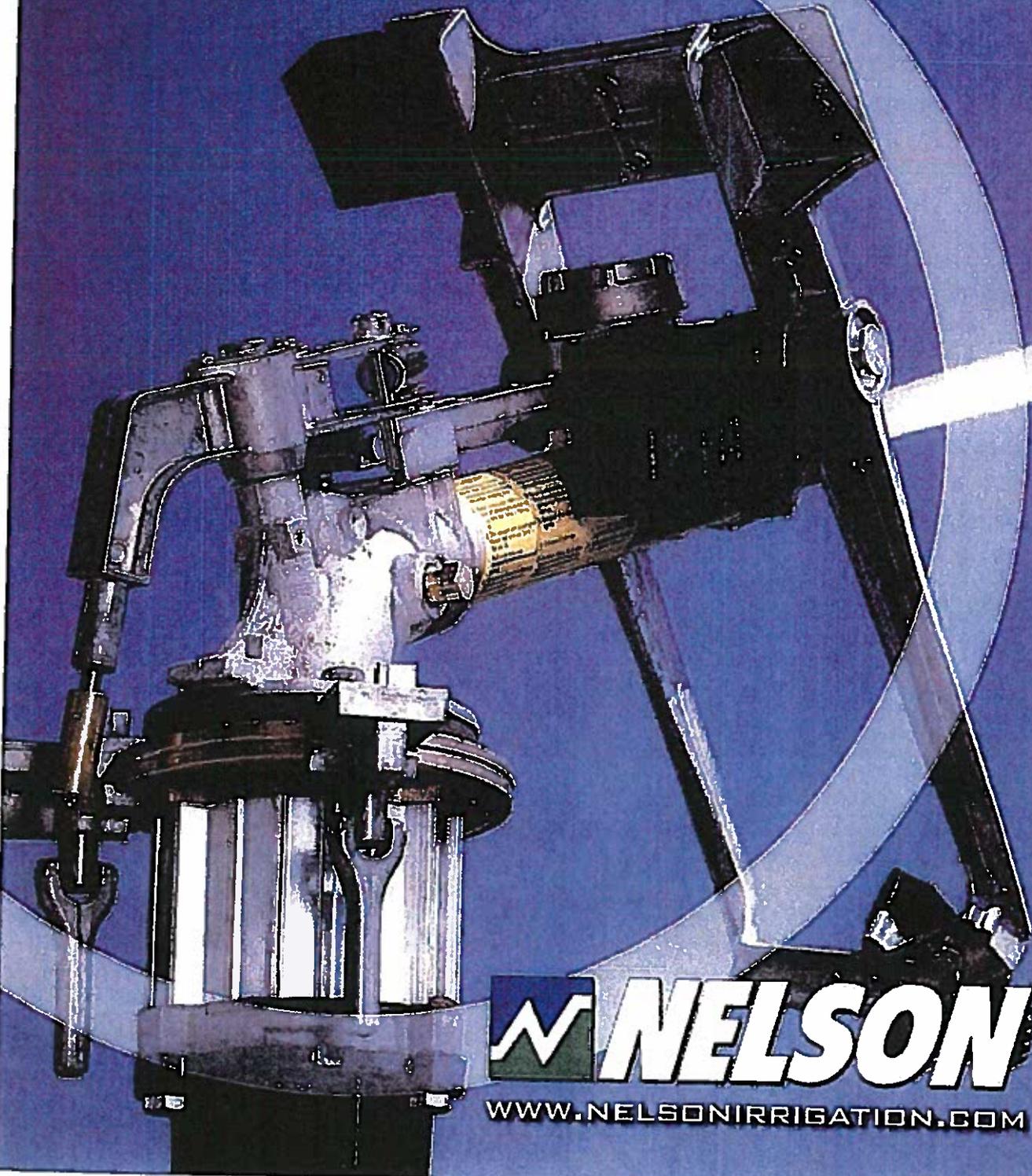
12-078F-011\_1 1

# **ATTACHMENT 1**

ENGLISH  
BIG GUN 907

*the original*

**BIG GUN® SPRINKLER**



**NELSON**

[WWW.NELSONIRRIGATION.COM](http://WWW.NELSONIRRIGATION.COM)

# NELSON BIG GUN® SPRINKLERS

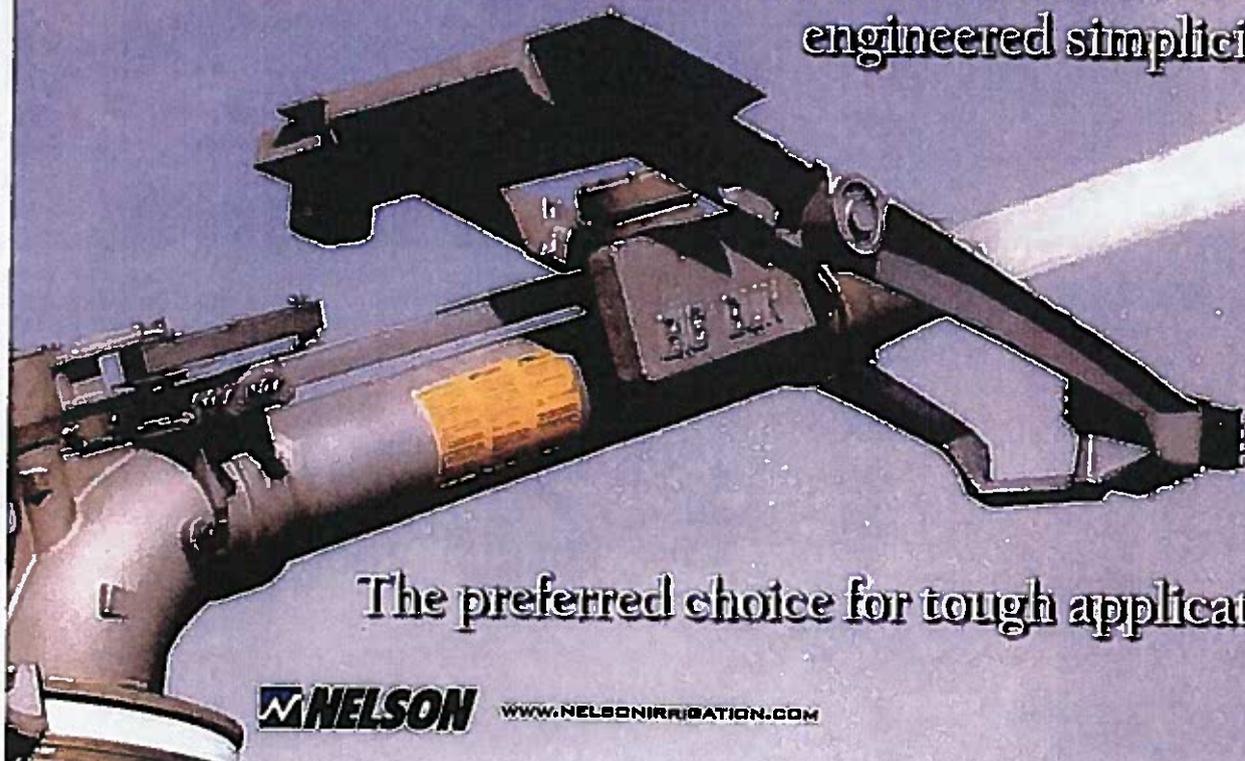
The Leader in Quality, Performance & Support



In the field of large-volume sprinklers, Nelson Big Guns® are recognized the world over as the leader in quality, performance and technical support. They are engineered and precision manufactured for heavy-duty reliability and long wear life. Every Nelson Big Gun® is subjected to the toughest inspection testing and quality control standards in the industry — including individual water testing of every gun at the factory.



Durable and reliable with  
engineered simplicity.

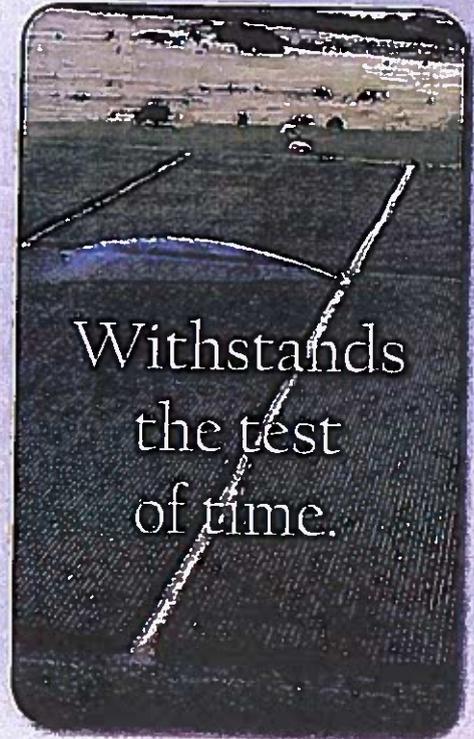
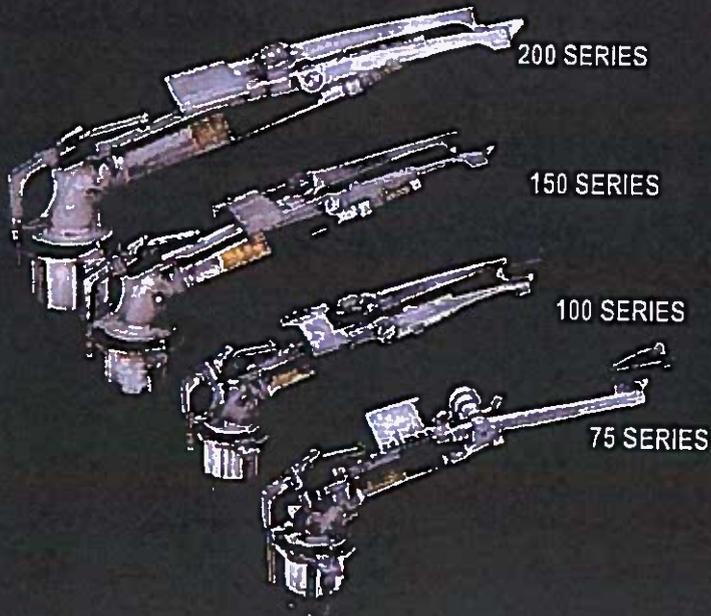


The preferred choice for tough applications.

**NELSON**

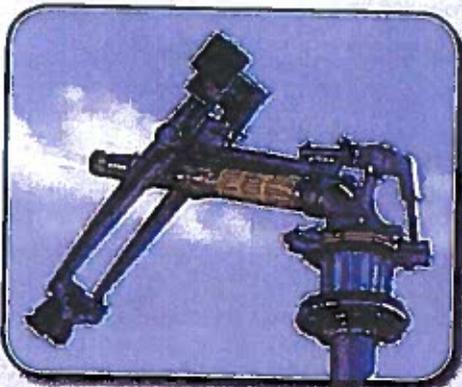
[WWW.NELSONIRRIGATION.COM](http://WWW.NELSONIRRIGATION.COM)

## The Big Gun<sup>®</sup> Family



Withstands  
the test  
of time.

The only gun for hour after hour,  
year after year operation.



**SET IT AND FORGET IT.** A simple, positive, reliable adjustment allows for setting the arc to within 1 degree, without overriding the stops. The setting will not change over time, a concept proven with years in the field.

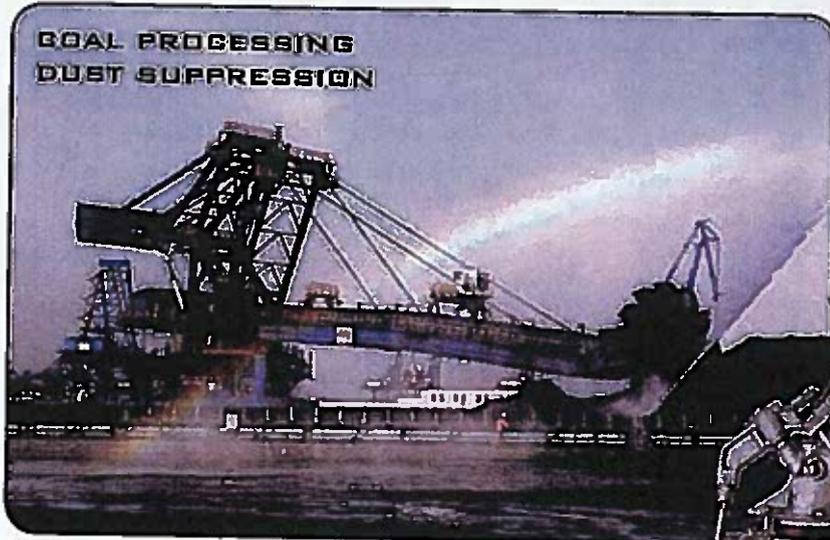
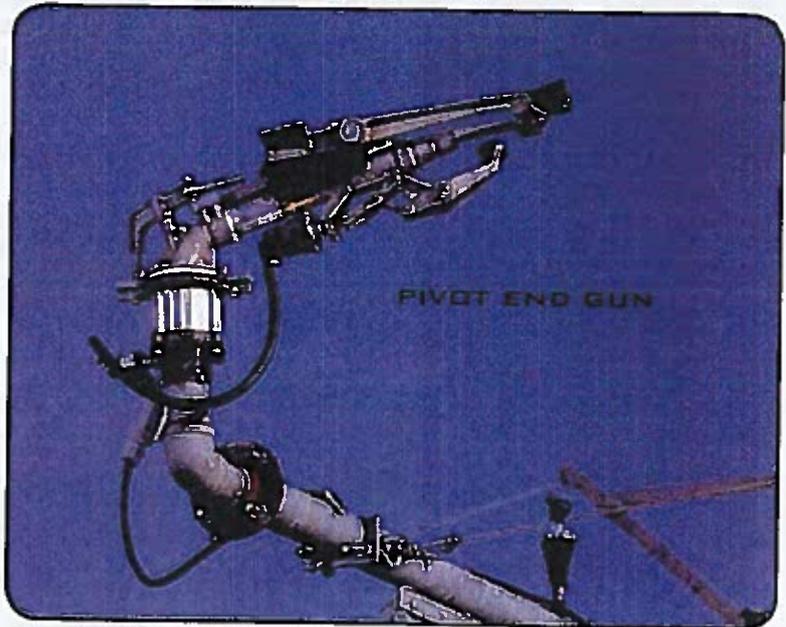
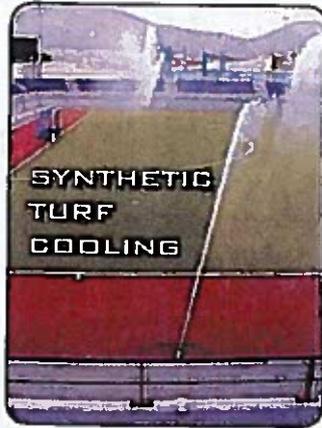
**WORKS RIGHT OUT OF THE BOX.** Nelson pioneered the concept of a slow, steady and uniform forward and reverse drive action. The drive vane automatically compensates through the full range of nozzle sizes and pressures.



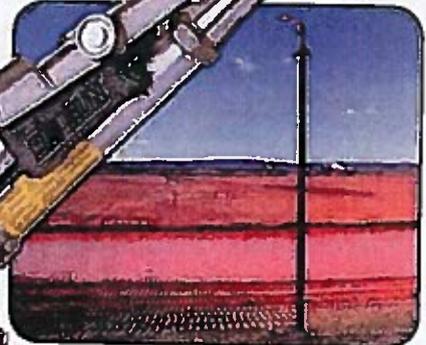
the original **BIG GUN<sup>®</sup> SPRINKLER**

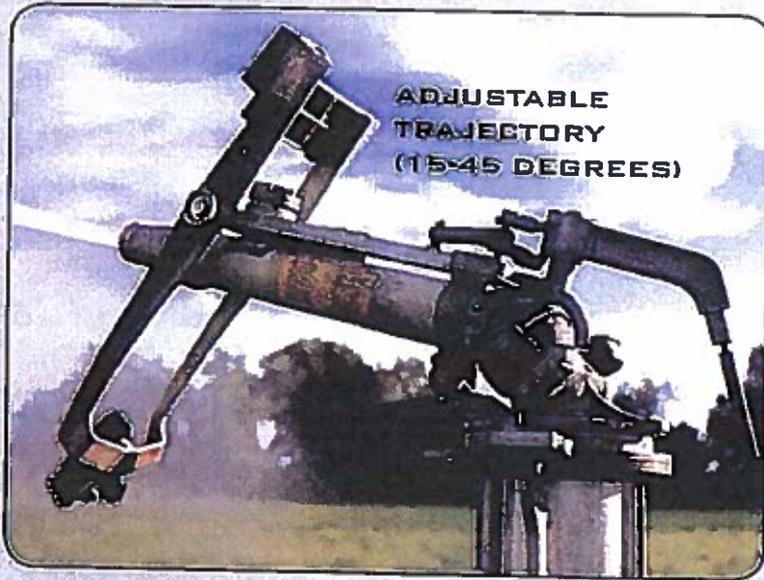
# APPLICATIONS

- Pivot End Gun Irrigation
- Traveler Irrigation
- Solid Set Irrigation
  - Corn, Sugar Cane, Pineapple, Pastures, etc.
- Environmental Applications
  - Feedlot Dust Suppression & Cooling
  - Wastewater Applications
  - Mining Dust Suppression
- Sports Field Applications
  - Turf Irrigation
  - Synthetic Turf Cooling & Conditioning



**43° BIG GUN  
FOR DUST  
SUPPRESSION**



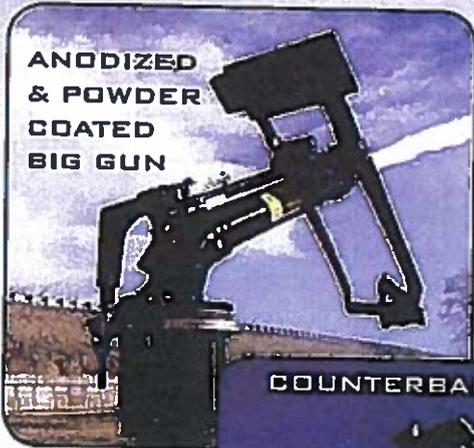


**ADJUSTABLE  
TRAJECTORY  
(15-45 DEGREES)**

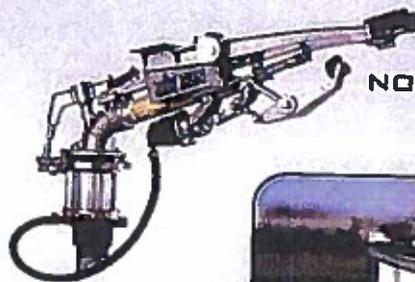
## OPTIONS

- Adjustable Trajectory
- 800 Series Valve/Big Gun® Combination
- Nozzle Valve
- Quick Coupling Valve
- Special Coatings
- Add-on Kits: Secondary Nozzle, Wedge and Counterbalance

*(See Big Gun® Add-on Kits literature for details.)*



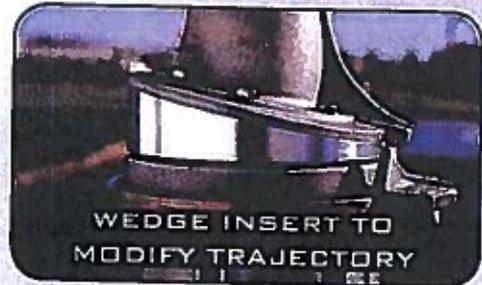
**ANODIZED  
& POWDER  
COATED  
BIG GUN**



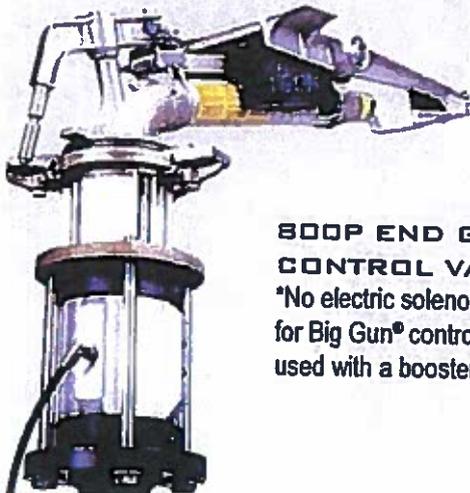
**NOZZLE VALVE**



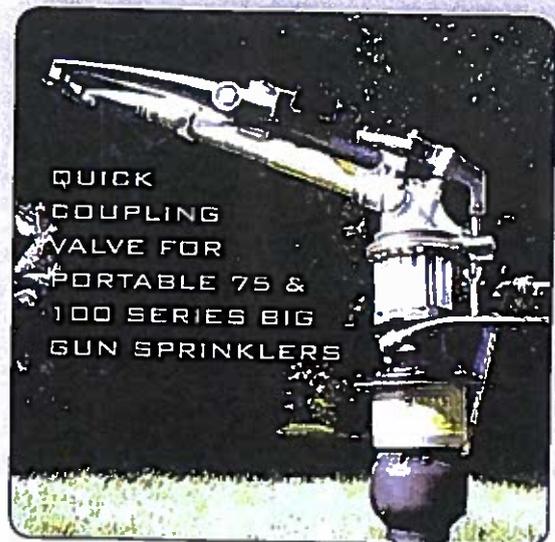
**COUNTERBALANCE KIT**



**WEDGE INSERT TO  
MODIFY TRAJECTORY**



**800P END GUN  
CONTROL VALVE\***  
\*No electric solenoid required  
for Big Gun® control when  
used with a booster pump



**QUICK  
COUPLING  
VALVE FOR  
PORTABLE 75 &  
100 SERIES BIG  
GUN SPRINKLERS**

# HEAVY DUTY — PRECISION

**THE BIG GUN® NAME** has a world-wide reputation for quality, performance and support in a number of heavy-duty agricultural and industrial applications.



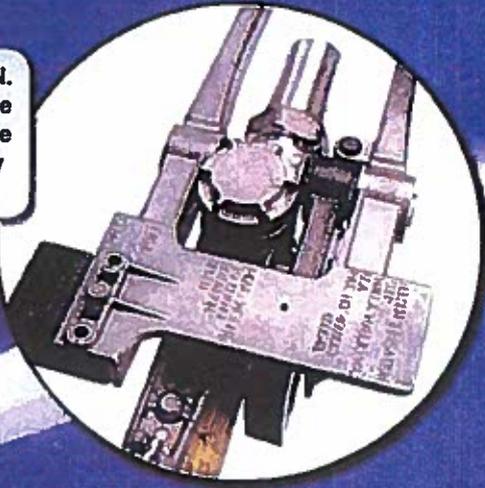
**GREATEST RANGE OF OPTIONS.** Full & part-circle sprinklers available in a variety of trajectory, nozzle & coating options.

**HAND ADJUSTABLE STOPS** for Precise Arc Control.

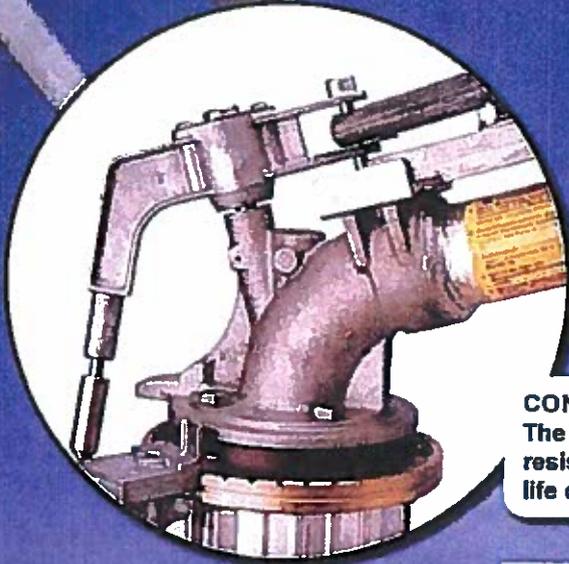
**TWIN BALL BEARING IN LOWER BEARING UNIT.** Gun has a total of 9 ball bearings — all sealed and lifetime lubricated for long wear life and reliability.

# SION MANUFACTURED

**EXCELLENT DRIVE ACTION.**  
The SR Series has the same slow forward and reverse speeds, increasing stability and improving uniformity.

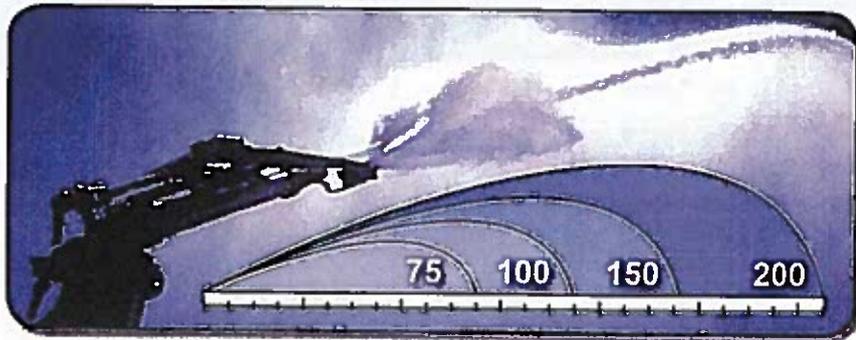


**PATENTED PRESSURE AND FLOW COMPENSATING DRIVE SPOON** eliminates need for adjustments throughout the full range of nozzle sizes and pressures.



**CONSISTENT BRAKE LOAD.**  
The brake provides a consistent resistance to rotation over the life of the gun.

# BIG GUN® OPTIONS AVAILABLE



## TO ORDER BIG GUNS® SPECIFY THE FOLLOWING:

Model No., Trajectory, Connection Size & Type, Nozzle Size & Type, Optional Coatings (Anodized or Anodized and Powder Coated) NOTE: Extended lead time may be necessary for large quantities of anodized or anodized and powder coated products.

Specification Example:  
SR100 (24°), 2" FNPT, 100T-0.8"

	75 SERIES		100 SERIES			150 SERIES			200 SERIES	
<b>PERFORMANCE</b>	30-160 GPM (6.8-36.3 M <sup>3</sup> /H)  25-80 PSI (1.75-6 Kg/cm <sup>2</sup> )		50-300 GPM (10-70 M <sup>3</sup> /H)  40-110 PSI (3.5-9 Kg/cm <sup>2</sup> )			100-630 GPM (23-150 M <sup>3</sup> /H)  50-120 PSI (3.5-9 Kg/cm <sup>2</sup> )			250-1200 GPM (55-275 M <sup>3</sup> /H)  60-130 PSI (4-9 Kg/cm <sup>2</sup> )	
<b>MODEL &amp; TRAJECTORY</b>	Full Circle F75	Part Circle SR75	Full Circle F100	Part Circle SR100	Part Circle SRA100	Full Circle F150	Part Circle SR150	Part Circle SRA150	Full Circle F200	Part Circle SR200
	21°, 24°	18°, 21°, 24°, 43°	18°, 21°, 24°, 43°	15-45° Adjustable		21°, 24°	21°, 24°, 27°, 43°	15-45° Adjustable	21°, 24°, 27°	
<b>NOZZLE OPTIONS</b>	Not Available		100T (Specify Size)			150T (Specify Size)			200T (Specify Size)	
	TR75 (Specify Size)		100TR (Specify Size)		NA for SRNV	150TR (Specify Size)			Not Available	
	Not Available		100R (Includes Set of Rings)		NA for SRNV	150R (Includes Set of Rings)			200R (Includes Set of Rings)	
<b>SPECIAL OPTIONS</b>	Not Available		Anodized & Powder Coated, Vaneless Range Tube*			Anodized & Powder Coated, Stainless Steel (SRA150 N/A), Vaneless Range Tube			Anodized & Powder Coated	
<b>ADD-ON KITS</b>	HD Lower Bearing, 12° Wedge Kit, Counterbalance Kit, Stream Straightener Vane		Low-Pressure Drive Vane Kit, Counterbalance Kit, Secondary Nozzle Kit, 12° Wedge Kit, Stream Straightener Vane			Counterbalance Kit, Secondary Nozzle Kit, Stream Straightener Vane			Secondary Nozzle Kit (standard), 12° Wedge Kit (SR200 only)	
<b>MOUNTING DETAILS</b>	Fits QC** & 2" 800 Series Valve		Fits QC** & 2" 800 Series Valve (QC NA for SRNV100)			Substantial thrust on riser, use 3" valve minimum			Substantial thrust on riser, use 4" valve minimum	
<b>CONNECTION OPTIONS</b>	1 1/2" or 2" FNPT or FBSP ANSI/DIN Nelson or Euro Flange		2" FNPT or FBSP, 2 1/2" FNPT ANSI/DIN, Nelson or Euro Flange		2" FNPT or FBSP for SRNV	Nelson, Euro or ANSI/DIN Flange Also, Nelson Flange to Female Adapters			Nelson, Euro or ANSI/DIN Flange Also, Nelson Flange to Female Adapters	

\*Vaneless Range Tube option is for wastewater applications containing hair, straw, etc.

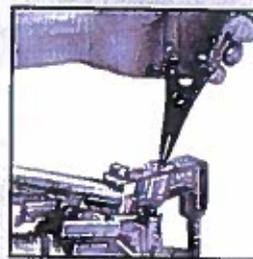
\*\* The "Quick Coupling Valve" inlet is available in both 2" and 3" FNPT and FBSP for connection to the piping system. The "Quick Coupling Key" outlet is available in 2" FNPT, 2" FBSP, and Nelson Flange Connection for connection to the Big Gun.

# BIG GUN® FLANGE DETAILS

	75 & 100 SERIES	150 SERIES	200 SERIES
NELSON FLANGE	<p>5/16-18 UNC 2B Threaded Through</p> <p>Use 5/16-18 Bolts Connects to 2" Nelson Flange Bolt Pattern</p>	<p>.406" (10.3mm) Hole Drilled Through</p> <p>Use 3/8-16 Bolts &amp; Nuts or M10 Bolts &amp; Nuts Connects to 3" Nelson Flange Bolt Pattern</p>	<p>3/8-16 UNC Thread .75" (19mm) Deep</p> <p>Use 3/8-16 Bolts &amp; Nuts Connects to 4" Nelson Flange Bolt Pattern (F200 has same bolt pattern as SR150.)</p>
ANSIDIN COMPATIBLE FLANGE	<p>1/2-13 UNC 2B Threaded Through</p> <p>Use 1/2-13 Bolts Connects to 2" ANSI or 50mm DIN Flanges</p>	<p>1/2-13 UNC 2B Threaded Through</p> <p>Use 1/2-13 Bolts Connects to 3" ANSI or 80mm DIN Flanges</p>	<p>1/2-13 UNC 2B Threaded Through</p> <p>Use 1/2-13 Bolts Connects to 4" ANSI or 100mm DIN Flanges</p>
EURO FLANGE	<p>9.1mm Hole Drilled Through</p> <p>Use M8 Bolts &amp; Nuts Connects to European Traveler Flange</p>	<p>M8 x 1.25 - 6H Threaded Through</p> <p>Use M8 x 1.25 Bolts Connects to European Traveler Flange</p>	<p>M8 x 1.25 - 6H Thread .75" (19mm) Deep</p> <p>Use M8 x 1.25 Bolts Connects to European Traveler Flange</p>

Contact the factory or go to [www.nelsonirrigation.com](http://www.nelsonirrigation.com) for Parts Lists, Operation & Maintenance Guides, Repair Kits, Dimensional Drawings, Add-on Kit literature & Thrust Force information.

Nelson Big Guns  
are easy to repair  
with readily  
available parts.



the original **BIG GUN®** SPRINKLER

# BIG GUN® PERFORMANCE (U.S. UNITS)

Flow and diameter (feet) information at various pressures with different nozzle sizes. (See information at bottom of page 11.)

## 75 TAPER RING NOZZLE — 24° TRAJECTORY

PSI	0.4"		0.45"		0.5"		0.55"		0.6"		0.65"		0.7"		0.75"		0.8"	
	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.
25	—	—	—	—	—	—	42	146	50	155	59	161	69	167	80	174	91	182
30	—	—	—	—	—	—	37	158	45	158	55	165	64	172	75	182	87	187
35	—	—	32	154	40	164	49	172	59	178	69	191	81	198	93	202	106	208
40	27	149	35	160	43	171	52	180	63	190	74	198	87	204	98	213	112	221
45	29	153	37	167	46	180	56	189	67	198	79	206	91	214	104	223	118	230
50	30	161	39	174	48	186	59	195	70	203	83	212	95	220	109	230	123	237
55	32	165	41	179	50	193	62	203	74	213	87	221	100	230	115	239	130	247
60	33	169	42	184	53	198	64	208	77	220	91	228	104	237	120	245	136	254
65	35	172	44	189	55	205	67	216	80	227	95	237	109	247	125	254	142	263
70	36	175	45	194	57	210	69	221	83	232	98	243	113	254	129	260	147	270
75	37	178	47	201	59	217	72	228	86	239	101	250	117	261	134	268	153	277
80	39	182	49	207	61	222	74	234	89	244	105	256	121	266	138	274	158	283

\*Operating at pressures above 30 PSI provides better performance.

## 100 TAPER BORE NOZZLE — 24° TRAJECTORY

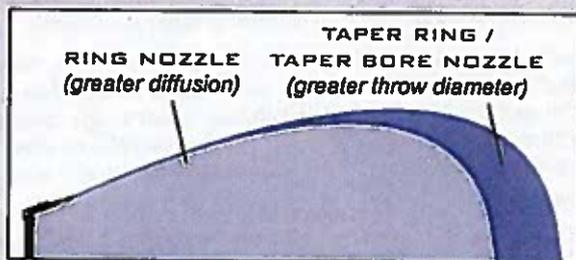
PSI	0.5"		0.55"		0.6"		0.65"		0.7"		0.75"		0.8"		0.85"		0.9"		1.0"	
	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.
40	47	191	57	202	66	213	78	222	91	230	103	240	118	250	134	256	152	262	—	—
50	50	205	64	215	74	225	87	235	100	245	115	256	130	265	150	273	165	280	204	300
60	55	215	69	227	81	240	96	250	110	260	126	270	143	280	164	288	182	295	224	316
70	60	225	75	238	88	250	103	263	120	275	136	283	155	295	177	302	197	310	243	338
80	64	235	79	248	94	260	110	273	128	285	146	295	165	305	189	314	210	325	258	354
90	68	245	83	258	100	270	117	283	135	295	155	306	175	315	201	326	223	335	274	362
100	72	255	87	268	106	280	123	293	143	305	163	316	185	325	212	336	235	345	289	372
110	76	265	92	278	111	290	129	303	150	315	171	324	195	335	222	344	247	356	304	380

## 150 TAPER BORE NOZZLE — 24° TRAJECTORY

PSI	0.7"		0.8"		0.9"		1.0"		1.1"		1.2"		1.3"		1.4"	
	GPM	DIAM. FT.														
50	100	250	130	270	165	290	205	310	255	330	300	345	350	360	408	373
60	110	265	143	285	182	305	225	325	275	345	330	365	385	380	446	396
70	120	280	155	300	197	320	245	340	295	360	355	380	415	395	483	412
80	128	290	165	310	210	335	260	355	315	375	380	395	445	410	516	427
90	135	300	175	320	223	345	275	365	335	390	405	410	475	425	547	442
100	143	310	185	330	235	355	290	375	355	400	425	420	500	440	577	458
110	150	320	195	340	247	365	305	385	370	410	445	430	525	450	605	471
120	157	330	204	350	258	375	320	395	385	420	465	440	545	460	632	481

## 200 TAPER BORE NOZZLE — 27° TRAJECTORY

PSI	1.05"		1.1"		1.2"		1.3"		1.4"		1.5"		1.6"		1.75"		1.9"	
	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.	GPM	DIAM. FT.
60	250	345	285	355	330	375	385	390	445	410	615	430	585	445	695	470	825	495
70	270	360	310	380	365	395	415	410	480	430	655	450	630	465	755	495	890	515
80	290	375	330	395	390	410	445	430	515	450	690	470	675	485	805	515	950	535
90	310	390	350	410	405	425	475	445	545	465	725	485	715	505	855	535	1005	555
100	325	400	370	420	425	440	500	460	575	480	760	500	755	520	900	550	1060	575
110	340	410	390	430	445	450	525	470	605	495	795	515	790	535	945	565	1110	590
120	355	420	405	440	465	460	545	480	630	505	825	530	825	550	985	580	1160	605
130	370	425	425	445	485	465	565	485	655	515	855	540	860	560	1025	590	1210	620



See opposite page for nozzle descriptions.



# BIG GUN® PERFORMANCE (METRIC)

Flow and diameter (meters) information at various pressures with different nozzle sizes. (See information at bottom of page.)

## 75 TAPER RING NOZZLE TR75 — 24° TRAJECTORY

Kgf/cm <sup>2</sup>	10.2 mm			11.4 mm			12.7 mm			14.0 mm			15.2 mm			16.5 mm			17.8 mm			19.1 mm			20.3 mm					
	L/S	MPH	DIAL M	L/S	MPH	DIAL M	L/S	MPH	DIAL M	L/S	MPH	DIAL M	L/S	MPH	DIAL M	L/S	MPH	DIAL M	L/S	MPH	DIAL M	L/S	MPH	DIAL M	L/S	MPH	DIAL M			
1.75*	—	—	—	—	—	—	—	—	—	—	—	—	2.64	9.5	44	3.17	11.4	48	3.72	13.4	49	4.30	15.5	51	4.91	17.7	54	5.59	20.1	56
2.00*	—	—	—	—	—	—	—	—	—	—	—	—	2.82	10.2	48	3.39	12.2	51	3.98	14.3	52	4.59	16.5	56	5.25	18.9	58	5.97	21.5	59
2.50	—	—	—	2.11	7.6	47	2.32	8.3	50	2.86	10.3	53	3.46	12.4	57	4.15	14.9	59	4.88	17.6	61	5.63	20.3	63	6.43	23.1	66	7.32	26.3	69
3.00	1.83	6.6	47	2.32	8.3	50	2.86	10.3	53	3.46	12.4	57	4.15	14.9	59	4.88	17.6	61	5.63	20.3	63	6.43	23.1	66	7.32	26.3	69	8.28	29.8	73
3.50	1.98	7.1	49	2.50	9.0	52	3.09	11.1	57	3.74	13.4	60	4.48	16.1	62	5.27	19.0	64	6.08	21.9	67	6.95	25.0	70	7.90	28.4	73	8.96	32.3	80
4.00	2.11	7.6	50	2.67	9.6	54	3.30	11.9	59	3.99	14.4	62	4.79	17.2	65	5.63	20.3	67	6.50	23.4	71	7.43	26.7	73	8.45	30.4	76	9.55	34.5	83
4.50	2.24	8.1	52	2.84	10.2	57	3.50	12.6	62	4.24	15.2	66	5.08	18.3	68	5.97	21.5	71	6.89	24.8	75	7.88	28.4	78	8.96	32.3	80	10.15	36.6	90
5.00	2.36	8.5	53	2.99	10.8	60	3.69	13.3	64	4.46	16.1	68	5.35	19.3	70	6.30	22.7	74	7.26	26.1	78	8.30	29.9	80	9.45	34.0	84	10.70	38.7	95
5.50	2.48	8.9	55	3.13	11.3	62	3.87	13.9	66	4.68	16.9	70	5.61	20.2	73	6.60	23.8	77	7.62	27.4	81	8.71	31.3	83	9.90	35.7	86	11.15	40.4	100
6.00	2.59	9.3	56	3.27	11.8	63	4.04	14.6	68	4.89	17.6	72	5.86	21.1	74	6.90	24.8	79	7.96	28.6	84	9.09	32.7	85	10.3	37.2	87	11.60	42.8	105

\*Operating at pressures above 2 Kgf/cm<sup>2</sup> provides better performance.

## 100 TAPER BORE NOZZLE — 24° TRAJECTORY

Kgf/cm <sup>2</sup>	12.7 mm			14.0 mm			15.2 mm			16.5 mm			17.8 mm			19.1 mm			20.3 mm			21.6 mm			22.9 mm			25.4 mm		
	L/S	MPH	DIAL M																											
3.0	3.00	10.8	59.5	3.73	13.4	62.8	4.33	15.6	66.1	5.09	18.3	68.8	5.84	21.0	71.4	6.71	24.1	74.5	7.64	27.5	77.5	8.74	31.5	79.5	9.67	34.8	81.4	11.9	42.8	88.1
4.0	3.40	12.2	64.3	4.25	15.3	67.8	5.00	18.0	71.8	5.86	21.1	74.8	6.82	24.6	77.8	7.73	27.8	81.0	8.86	31.2	82.8	10.1	36.2	86.4	11.2	40.4	88.6	13.8	49.5	94.8
5.0	3.79	13.6	69.0	4.72	17.0	72.7	5.59	20.1	76.4	6.56	23.6	80.2	7.52	27.5	84.4	8.66	31.2	86.7	9.91	34.9	90.4	11.3	40.5	92.5	12.5	45.2	94.7	15.5	55.6	103
6.0	4.17	15.0	73.4	5.14	18.5	77.3	6.12	22.1	80.7	7.19	25.9	85.0	8.35	30.1	88.7	9.51	34.3	91.8	10.9	38.2	94.7	12.4	44.5	97.7	13.7	49.5	101	16.8	60.5	109
7.0	4.53	16.3	77.6	5.52	19.9	81.6	6.61	23.8	85.0	7.75	27.9	89.3	9.02	32.5	93.0	10.3	37.0	96.1	11.7	41.3	99.0	13.3	48.0	102.2	14.8	53.5	105	18.2	65.5	113
8.0	4.89	17.6	81.7	5.84	21.0	85.7	7.07	25.5	89.3	8.25	29.7	93.1	9.64	34.8	97.3	11.0	39.4	99.7	12.5	44.1	103	14.2	51.2	105.8	15.9	57.2	109	19.5	70.2	116

## 150 TAPER BORE NOZZLE — 24° TRAJECTORY

Kgf/cm <sup>2</sup>	17.8 mm			20.3 mm			22.9 mm			25.4 mm			27.9 mm			30.5 mm			33.0 mm			35.6 mm								
	L/S	MPH	DIAL M	L/S	MPH	DIAL M	L/S	MPH	DIAL M																					
3.5	6.39	23.0	76.0	8.29	29.8	82.0	10.5	37.8	88.0	13.0	46.9	95.0	15.9	57.1	101	19.0	68.3	105	22.3	80.1	110	25.8	92.9	114	29.8	108.1	118	34.8	125.1	126
4.0	6.83	24.6	79.6	8.86	31.9	85.6	11.2	40.4	91.6	13.9	50.1	97.8	16.9	61.0	104	20.3	73.0	109	23.8	85.7	114	27.4	98.6	118	31.8	111	126	37.8	137.1	133
5.0	7.63	27.5	85.4	9.91	35.7	91.6	12.6	45.2	98.6	15.6	56.0	105	18.9	68.2	111	22.7	81.7	117	26.6	95.8	121	30.8	111	126	36.8	121	133	43.8	157.1	140
6.0	8.38	30.1	89.7	10.9	39.1	96.7	13.8	49.5	104	17.0	61.3	110	20.8	74.7	117	24.9	89.5	123	29.1	105	128	33.6	121	133	40.8	131	139	48.8	177.1	147
7.0	9.03	32.5	95.0	11.7	42.2	101	14.9	53.5	108	18.4	66.3	114	22.4	80.7	122	26.8	96.6	128	31.5	113	134	36.4	131	139	43.8	131	139	52.8	193.1	155
8.0	9.68	34.8	99.3	12.5	45.1	105	15.9	57.2	112	19.7	70.8	118	24.0	86.3	126	28.7	103	132	33.7	121	138	38.9	140	145	46.8	140	145	56.8	209.1	162
9.0	10.2	36.9	104	13.3	47.9	110	16.8	60.6	117	20.9	75.1	123	25.4	91.5	131	30.4	110	137	35.7	129	143	41.1	148	149	48.8	148	149	60.8	225.1	170

## 200 TAPER BORE NOZZLE — 27° TRAJECTORY

Kgf/cm <sup>2</sup>	26.7 mm			27.9 mm			30.5 mm			33.0 mm			35.6 mm			38.1 mm			40.6 mm			44.5 mm			48.3 mm					
	L/S	MPH	DIAL M	L/S	MPH	DIAL M	L/S	MPH	DIAL M	L/S	MPH	DIAL M	L/S	MPH	DIAL M	L/S	MPH	DIAL M												
4.0	15.5	55.7	104	17.8	63.9	106	20.3	73.1	112	23.8	85.8	117	27.5	98.9	123	32.2	118	129	36.1	130	134	42.9	154	141	50.7	183	149	60.7	216	158
5.0	17.3	62.3	111	19.9	71.5	117	22.7	81.7	121	26.7	96.0	126	30.7	111	132	36.0	130	138	40.3	145	143	48.0	173	152	56.7	204	158	68.7	246	167
6.0	19.0	68.2	115	21.8	78.3	121	24.9	89.5	126	29.2	105	132	33.7	121	138	39.4	142	144	44.2	159	149	52.6	189	158	62.1	224	164	76.7	288	176
7.0	20.5	73.7	122	23.5	84.6	128	26.9	96.7	134	31.5	114	140	36.3	131	146	42.6	153	152	47.7	172	159	56.8	204	168	67.1	241	175	81.7	304	184
8.0	21.9	78.8	126	25.1	90.4	132	28.7	103	138	33.7	121	144	38.9	140	152	45.5	164	159	51.0	184	165	60.7	218	174	71.7	258	182	86.7	320	192
9.0	23.2	83.6	130	26.6	95.9	136	30.4	110	142	35.8	129	148	41.2	148	157	48.3	174	164	54.1	195	170	64.4	232	180	76.0	274	188	91.7	336	199

Diameters are based on a 24° trajectory for the 75, 100 and 150 Series and a 27° trajectory for the 200 Series. The lower trajectory angles result in better wind fighting ability, but reduced throw distances. Throw reduction depends upon nozzle flow rate. In general, the throw distance is reduced approximately 3% with each 3° drop in trajectory angle. Use of the wedge insert to modify trajectory will affect distance. Big Gun® performance data has been obtained under ideal test conditions and may be adversely affected by wind, poor hydraulic entrance conditions or other factors. Test riser height of 3 feet (0.91 meters) above measurement surface. No representation regarding droplet condition, uniformity, application rate, or suitability for a particular application is made herein.

Additional nozzle options and sizes available. Go to [www.nelsonirrigation.com](http://www.nelsonirrigation.com) or contact the factory for nozzle performance.

**TAPER BORE NOZZLE.** Most common nozzle type. Used where the available water flow and pressure are consistent. A nozzle size must be specified when ordering a Big Gun with a Taper Bore Nozzle. *The Nozzle Valve End Gun requires a Taper Bore Nozzle.*

**RING NOZZLE SET.** The Ring Nozzle Set is an easy and economic way of changing nozzles to match the available water flow and pressure. These are commonly used where the available water flow and pressure are variable and or when the Big Gun is shifted between various water sources with different capacities. The abrupt orifice of the nozzle is less efficient so the radius of throw is less than that achieved with an equivalent diameter Taper Bore nozzle. The abrupt orifice of the Ring Nozzle does break the stream of water up more, which can be an advantage in low pressure applications. The Ring Nozzle comes with a set of rings. *The Ring Nozzle should not be used with the Nozzle Valve End Gun.*

**TAPER RING NOZZLE.** This nozzle combines the changeability of a Ring Nozzle with some of the efficiency of a Taper Bore Nozzle. When ordering the Taper Ring Nozzle, specify the size as only one Taper Ring comes with the nozzle body and cap. Additional taper ring sizes can be purchased. *The Taper Ring Nozzle should not be used with the Nozzle Valve End Gun.*



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Tel: +61 7 3715 8555 Fax: +61 7 3715 8668 [info@nelsonirrigation.com.au](mailto:info@nelsonirrigation.com.au)

**WARRANTY AND DISCLAIMER:** Nelson Big Gun® Sprinklers are warranted for one year from date of original sale to be free of defective materials and workmanship when used within the working specifications for which the products were designed and under normal use and service. The manufacturer assumes no responsibility for installation, removal or unauthorized repair of defective parts. The manufacturer's liability under this warranty is limited solely to replacement or repair of defective parts and the manufacturer will not be liable for any crop or other consequential damages resulting from defects or breach of warranty. **THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSES AND OF ALL OTHER OBLIGATIONS OR LIABILITIES OF MANUFACTURER.** No agent, employee or representative of the manufacturer has authority to waive, alter or add to the provisions of this warranty, nor to make any representations or warranty not contained herein.

This product may be covered by one or more of the following U.S. Patent Nos. D297,453, 3,559,887, 3,744,720, 4,193,548, 4,669,663 and other U.S. Patents pending or corresponding issued or pending foreign patents.

innovation in irrigation™

**NELSON****BIG GUN® NOZZLES****THRUST FORCE OF NELSON BIG GUN® NOZZLES**

The thrust force for the Big Gun can be calculated by knowing the flow rate through the gun and the nozzle pressure of the gun. The following equation shows the relationship.

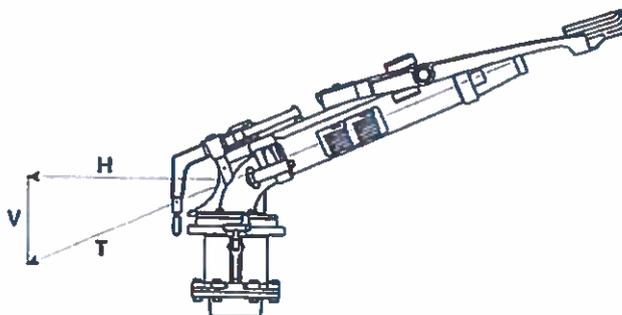
$$T = 2P \frac{Q}{38\sqrt{P}} \quad (1)$$

where,

T = thrust force of the nozzle (lb.)

P = nozzle pressure (psi)

Q = flow rate (gpm)



As seen in the diagram above, the thrust force is directly opposite the nozzle exit. Since the thrust force (T) is now known, the horizontal (H) and vertical (V) thrust force can be calculated using trigonometry.

$$H = T \cos (\text{gun angle from horizontal}) \quad (2)$$

$$V = T \sin (\text{gun angle from horizontal}) \quad (3)$$

The tables below show values of thrust force (T) and horizontal thrust force (H) for the 150 and 200 Big Guns of varying pressures and nozzle sizes.

**T — THRUST FORCE OF 150 BIG GUN NOZZLES (LB.)**

Pressure PSI	Nozzle 0.7"	Nozzle 0.8"	Nozzle 0.9"	Nozzle 1.0"	Nozzle 1.1"	Nozzle 1.2"	Nozzle 1.3"
50	37	48	62	76	95	112	130
60	45	58	74	92	112	135	157
70	53	68	87	108	130	156	183
80	60	78	99	123	148	179	210
90	68	87	111	137	167	202	237
100	75	97	124	153	187	224	263
110	83	108	136	168	204	246	290
120	91	118	149	185	222	268	314

**H — HORIZONTAL THRUST FORCE OF 150 BIG GUN® NOZZLES WITH 24° TRAJECTORY (LB.)**

Pressure PSI	Nozzle 0.7"	Nozzle 0.8"	Nozzle 0.9"	Nozzle 1.0"	Nozzle 1.1"	Nozzle 1.2"	Nozzle 1.3"
50	34	44	56	70	87	102	119
60	41	53	68	84	103	123	143
70	48	62	79	99	119	143	167
80	55	71	90	112	136	164	191
90	62	80	102	126	153	185	217
100	69	89	113	140	171	204	241
110	76	98	125	154	187	224	265
120	83	108	136	169	203	245	287

**T — THRUST FORCE OF 200 BIG GUN® NOZZLES (LB.)**

Pressure PSI	Nozzle 1.05"	Nozzle 1.2"	Nozzle 1.3"	Nozzle 1.4"	Nozzle 1.5"	Nozzle 1.6"	Nozzle 1.75"	Nozzle 1.9"	Nozzle 2.0"
50	93	112	130	153	175	199	238		
60	102	135	157	182	210	239	283	336	369
70	119	156	183	212	245	277	333	392	432
80	137	179	210	243	278	318	379	447	494
90	155	202	237	272	312	357	427	502	554
100	171	225	263	303	348	398	474	558	616
110	188	246	290	334	384	436	522	613	679
120	205	268	314	363	418	476	568	669	741
130	222	291	339	393	453	516	615	726	801

**H — HORIZONTAL THRUST FORCE OF 200 BIG GUN® NOZZLES WITH 24° TRAJECTORY (LB.)**

Pressure PSI	Nozzle 1.05"	Nozzle 1.2"	Nozzle 1.3"	Nozzle 1.4"	Nozzle 1.5"	Nozzle 1.6"	Nozzle 1.75"	Nozzle 1.9"	Nozzle 2.0"
50	85	102	119	140	160	182	218		
60	93	123	143	166	192	218	259	307	337
70	109	143	167	193	223	253	304	358	394
80	125	164	191	222	254	290	346	409	452
90	142	185	217	249	285	326	390	459	506
100	156	204	241	277	317	363	433	510	563
110	172	225	265	305	351	398	477	560	620
120	187	245	287	332	382	435	519	611	677
130	203	266	310	359	414	472	562	664	732

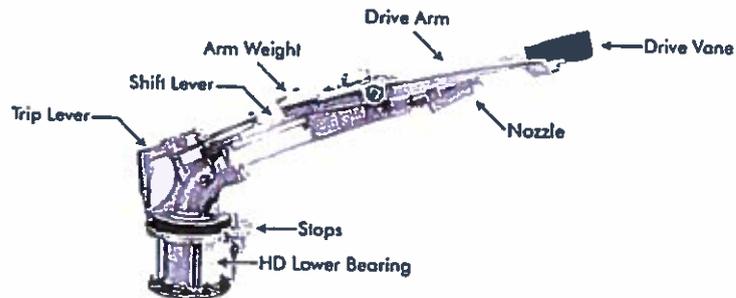
**WARRANTY AND DISCLAIMER**

Nelson Big Gun® Sprinklers are warranted for one year from date of original sale to be free of defective materials and workmanship when used within the working specifications for which the products were designed and under normal use and service. The manufacturer assumes no responsibility for installation, removal or unauthorized repair of defective parts. The manufacturer's liability under this warranty is limited solely to replacement or repair of defective parts and the manufacturer will not be liable for any crop or other consequential damages resulting from defects or breach of warranty. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSES AND OF ALL OTHER OBLIGATIONS OR LIABILITIES OF MANUFACTURER. No agent, employee or representative of the manufacturer has authority to waive, alter or add to the provisions of this warranty, nor to make any representations or warranty not contained herein.

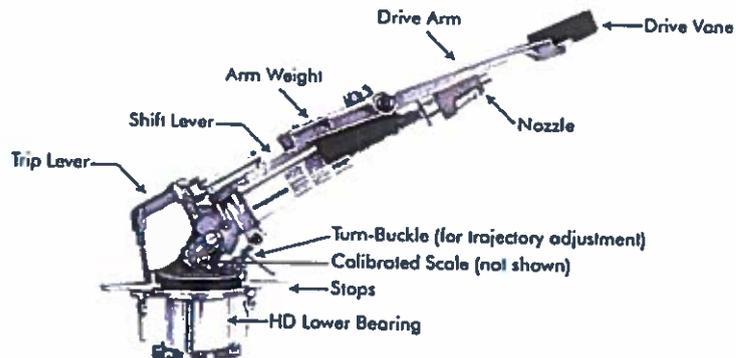
Innovation in Irrigation™

**NELSON****SR/SRA150 BIG GUN®****SR/SRA150 BIG GUN® OPERATION AND MAINTENANCE INSTRUCTIONS****SET UP FOR OPERATION:**

1. Install nozzle. If using ring nozzle set, or taper ring nozzle, install desired ring size in ring nozzle cap. Assure the ring is centered. The ring nozzle cap can be sufficiently tightened by hand.
2. Adjust location of arc stops to give desired arc of coverage. Stops must be mounted so that arrows point toward each other and the trip lever is located between arrows. If the stops are set incorrectly on the wrong end of the arc, the sprinkler will fail to reverse.
3. The SR150 and SRA150 are factory set for normal rotation speed. If a faster or slower speed is desired, move arm weight backward for faster operation or forward for slower operation.
4. To vary the trajectory angle of the SRA150 simply adjust the turn-buckle and dial in the desired trajectory using the calibrated scale. Varying trajectory angle is simple, and can be used to increase wind-fighting ability or to avoid obstacles such as power lines in the field.



The SR150 is available in fixed trajectory angles of 21°, 24°, 27° and 43°. A trajectory modification using a 12° wedge kit #11237 is available.



The SRA150 is a variable trajectory model with adjustability from 15-45°.

**NOTE ON LUBRICATION:** The SR/SRA150 sprinkler is lifetime lubricated and does not require periodic lubrication. The ball bearings in the H.D. lower bearing operate in a water resistant lubricant that is packed in the housing cavities and retained by seals. If repair of the lower bearing is done, it is recommended to use Nelson #6143 lubricant or a good grade of water resistant lubricant such as Lubriplate 130-AA.

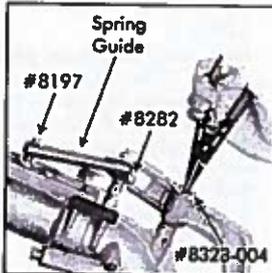
**BE CAREFUL:** Read operating instructions before operating sprinkler or making any adjustments. Never make adjustments or perform service while sprinkler is in operation. Stand clear of operating sprinkler. Stand clear of high velocity water stream. Never direct water stream onto roadway or electrical transmission lines.

**WARRANTY AND DISCLAIMER**

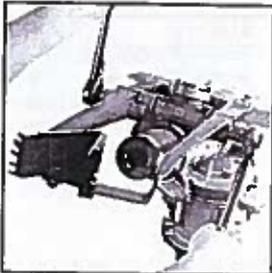
Nelson Big Gun® Sprinklers are warranted for one year from date of original sale to be free of defective materials and workmanship when used within the working specifications for which the product was designed under normal use and service. The manufacturer assumes no responsibility for installation, is limited solely to replacement or repair of defective parts, and the manufacturer will not be liable for any crops or other consequential damages resulting from any defects or breach of warranty. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSES AND OF ALL OTHER OBLIGATIONS OR LIABILITIES OF MANUFACTURER. No agent, employee or representative of the manufacturer has authority to waive, alter or add to the provision of the warranty, nor to make any representations or warranty not contained herein.

SEE SR/SRA150 PARTS LISTS FOR COMPLETE PARTS LIST AND DESCRIPTION

## DISASSEMBLY



**STEP 1 (Trip Lever)**  
 Remove #6714 Cotter Pin from #8197 Pin. Remove two #8311 Screws and #8263 Cap. Using small retaining ring pliers, remove #8323-004 Retaining Ring. Pull entire trip lever assembly and spring guide from gun. At this time inspect wear on #8282 Follower. Replace if worn.



**STEP 2 (Drive Arm)**  
 Using internal retaining ring pliers, remove two #6565 Retaining Rings from both arm hubs. Remove two #10067-001 Arm Caps. Using two 11/16" sockets, loosen and remove one #6603 Nut from left side of arm. Holding the opposite #6603 Nut, pull shaft free from hub.



**STEP 3**  
 Using a thin-bladed screwdriver, push #8327-001 Spacer back into arm hub. Holding onto counterweight, remove arm and weight. Be careful not to damage seals.

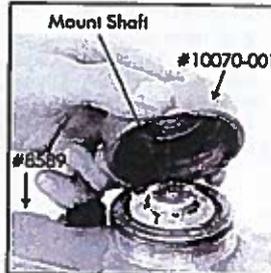


**STEP 4**  
 Inspect seal spacer and counterweight spacer for wear. If spacers show excessive wear, replace both spacers and #6600 Seals. To remove seals, drive thin-bladed screwdriver under lip of seal and pry seal out. To replace seals, use block of wood over seal making sure lip is to the outside, and secure by lightly tapping on wooden block until seal lip is flush with hub.

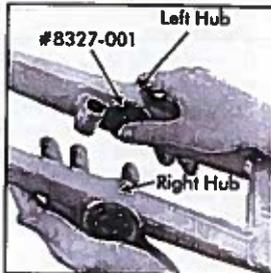


**STEP 5**  
 Remove #10070-001 Cap Assembly. Using external retaining ring pliers, remove #8323-017 Retaining Ring. Pull Shift lever from mount. A gear puller will help in removing the lever.

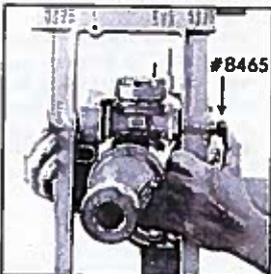
## REASSEMBLY



**STEP 6 (Shift Lever)**  
 At the upper portion of the gun, inspect the mount shaft for wear. Press the #8589 Shift Lever assembly onto the mount. With external retaining ring pliers, snap the #8323-017 Retaining Ring on. Be sure #8272 Cap Gasket is in place and in good condition. Replace #10070-001 Cap Assembly



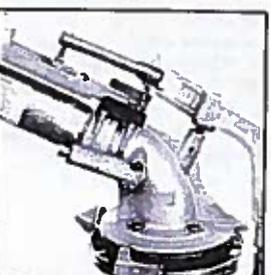
**STEP 7 (Drive Arm)**  
 Lubricate #6600 Seal lips with #9673 Silicone Grease. Install #8327-001 Spacer flush with #6600 Seal in left arm hub. Insert #6607-001 (coated spacer) in right arm hub and #6607 (uncoated spacer) in left counterweight seal (or a second #6607-001 coated spacer). Start #8297 Shaft into right arm hub.



**STEP 8**  
 Holding counterweight in place on the left side of shift lever, roll drive arm into position shown by pushing on the left arm bearing. Work #8327-001 Spacer into seal on counterweight. Be sure spacer is correctly positioned in counterweight to prevent cutting of the seal lip. Push shaft through the bearings and spacers and assemble #6603 Nut. Torque to 25 ft. lbs. using two 11/16" sockets.



**STEP 9**  
 Snap in two #10067-001 Arm Cap Assemblies. Install two #6565 Retaining Rings. Arm must have free movement at this point. If arm feels sticky, assure that lip seals at counterweight and right arm hub are not rubbing on each other.



**STEP 10**  
 Mount trip lever assembly along with spring guide onto their respective pins. Install #8323-04 Retaining Ring. Install #8263 Cap using two #8311 Screws making sure #8265 gasket is in place. Install #8409 Washer and #7814 Cotter Pin onto spring guide.

SEE BACK PAGE FOR PARTS LIST

## DISASSEMBLY (LOWER UNIT)



**STEP 11**  
 After removing bearing from gun, insert two 5/16-18" #8408 Bolts into shaft top. Clamp bolt heads into a vise securely. Remove three #8462 Bolts (or #10153-001 for ANS/DIN).



**STEP 12**  
 The #10068 Retainer Assembly is removed by using a spanner wrench with unit still bolted into vise. NOTE: An extension handle on the spanner wrench may be needed to loosen the retainer. Remove retainer and flange, and slide #8405 Housing from bearing shaft.



**STEP 13**  
 Remove the #8373 Seal. To remove the two #6253 Bearings use a hammer and three blocks of wood. Lightly tap uniformly around inner race of bearing until removed. Bearings are removed from opposite sides of the #8405 Housing.



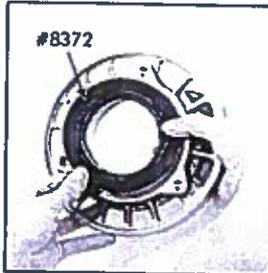
**STEP 14**  
 Remove #8400 Cover from shaft. Remove #8372 Seal from cover. Remove #8371 brake ring and #8473 dust seal from shaft.

Inspect all parts for wear and replace as required.



**STEP 15**  
 Assemble #8473 Dust Seal onto #8459 Shaft Assembly. Slide #8371 Brake Ring onto shaft. Locate the four studs of the brake ring in the center holes between the smaller threaded holes.

## REASSEMBLY (LOWER UNIT)



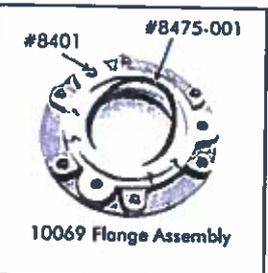
**STEP 16**  
 Place #8372 Lip Seal into #8400 cover as shown with Nelson name toward ball bearing. Pack #6253 Bearing with #6143 Lubricant or equivalent. (See "Notes on Lubrication" on the front cover.) Press bearing into #8400 Cover. Slide cover assembly onto bearing shaft. CAUTION: Do not get grease on brake surface.



**STEP 17**  
 Assemble #8461 Gasket. Press on #8405 Housing Fully pack housing with #6143 Lubricant. Assemble #6253 Bearing into housing.



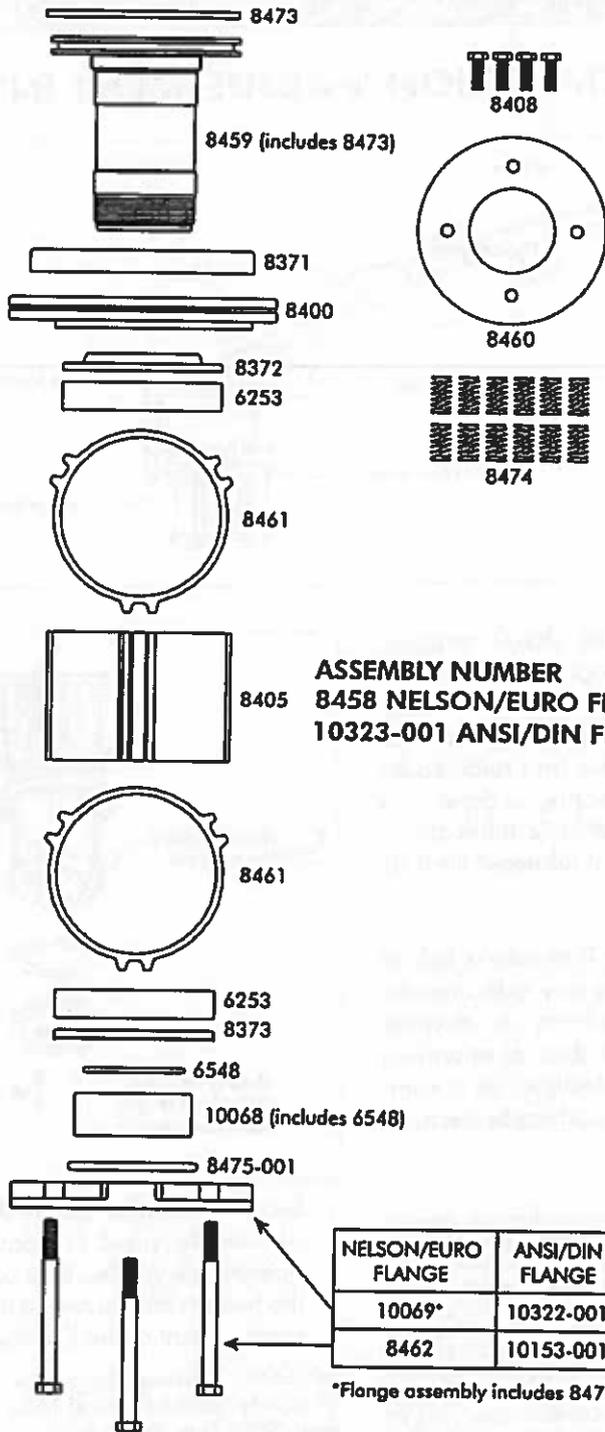
**STEP 18**  
 Install #6548 O-Ring in #8402 Retainer and assemble retainer on shaft. Using method described in disassembly (Lower Unit) instructions Step 12, secure bearing shaft from rotating. Torque on #10068 Retainer Assembly to 100-120 ft. lbs. Assemble #8373 Lip Seal. Orient with lip side out.



**STEP 19**  
 Assemble #8461 Gasket. Install #8475-001 O-Ring in #8401 Flange and mount onto assembly using three #8462 Bolts. Torque bolts to 130-150 in. lbs.



# LOWER BEARING ASSEMBLY PARTS LIST



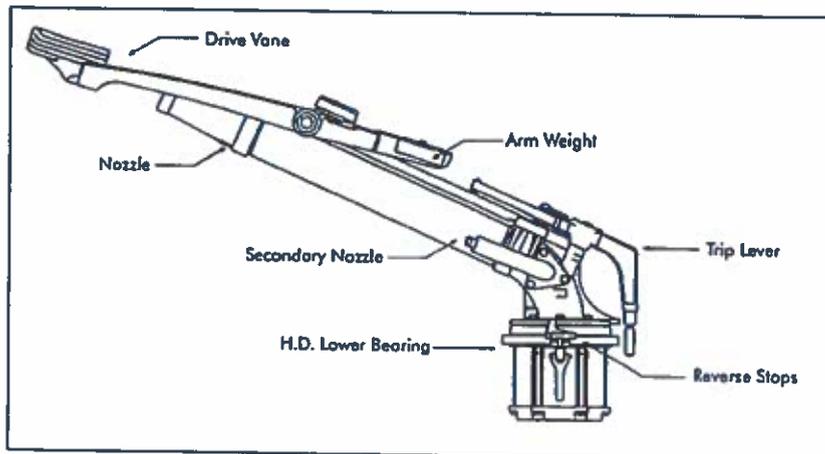
**ASSEMBLY NUMBER**  
**8458 NELSON/EURO FLG. CONN.**  
**10323-001 ANSI/DIN FLG. CONN.**

NELSON/EURO FLANGE	ANSI/DIN FLANGE
10069*	10322-001*
8462	10153-001

\*Flange assembly includes 8475-001

SEE SR150/SRA150 PARTS LISTS FOR DETAILS ON OTHER PARTS

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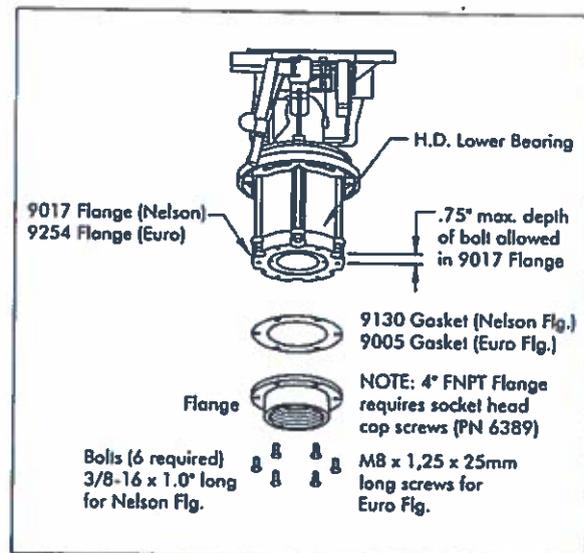
**NELSON****SR200 BIG GUN®****SR200 BIG GUN® OPERATION & ADJUSTMENT INSTRUCTIONS**

**NOTE ON LUBRICATION:** The SR200 sprinkler is lifetime lubricated and does not require periodic lubrication. The ball bearings in the H.D. lower bearing operate in a water resistant lubricant that is packed in the housing cavities and retained by seals. If repair of the lower bearing is done, it is recommended to use Nelson #6143 lubricant or a good grade of water resistant lubricant such as Lubriplate 130-AA.

**BE CAREFUL:** Read operating instructions before operating sprinkler or making any adjustments. Never make adjustments or perform service while sprinkler is in operation. Stand clear of operating sprinkler. Stand clear of high velocity water stream. Never direct water stream onto roadway or electrical transmission lines.

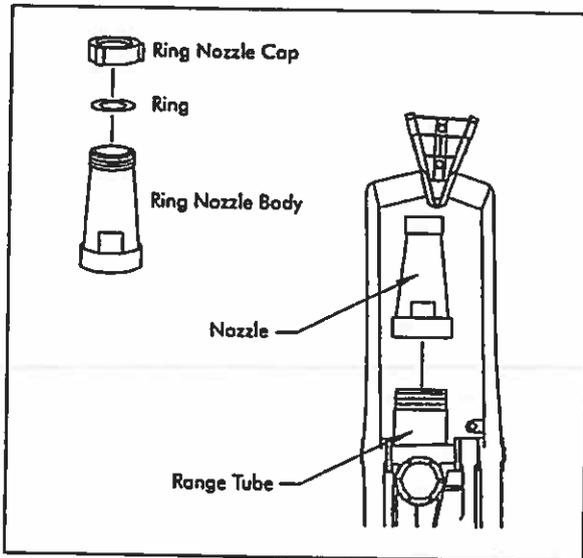
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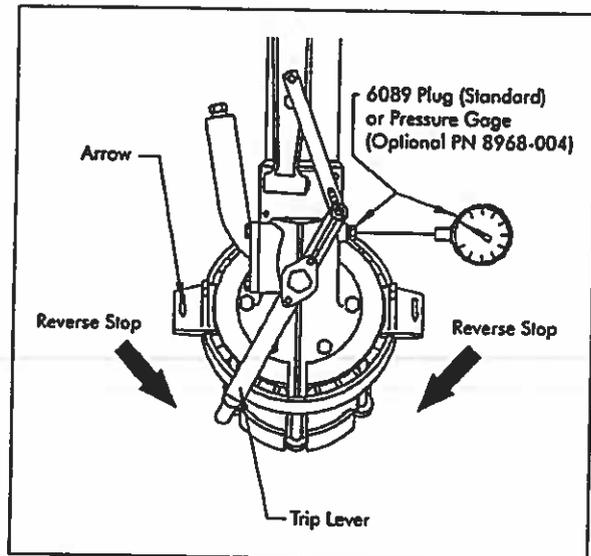


1. Securely connect SR200 Big Gun to traveller or riser designed to handle the loads of the operating sprinkler. Take care not to bottom out the bolts in the flange yet allow for at least 1/2" engagement of the bolt threads.

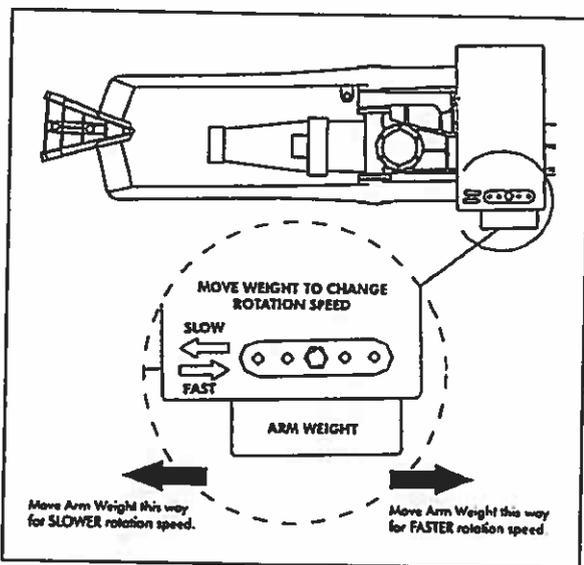
**NOTE:** 9017 Nelson Flange has a 5.75" bolt circle with six equally spaced threaded holes 3/8-16 UNC-2B x .75" deep. 9254 Euro Flange has a 5.118" (130mm) bolt circle with six equally spaced threaded holes M8 x 1,25-6H x .76" (19,3mm) deep.



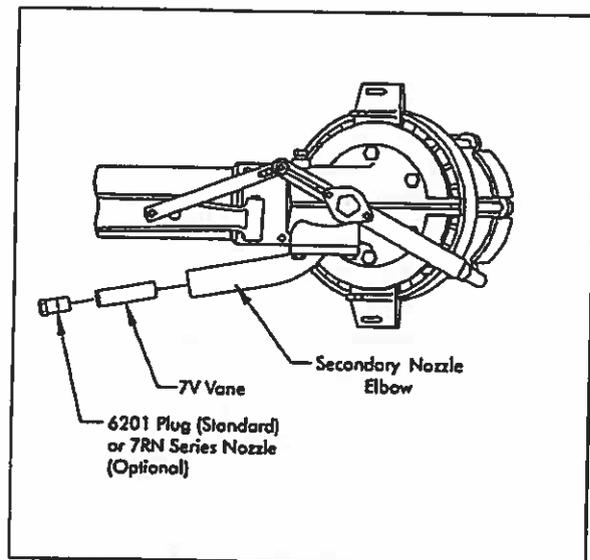
2. Install Nozzle on end of Range Tube. If using a Ring Nozzle, Install desired Ring size in Cap. Assure Ring is centered. Ring Nozzle Cap and Nozzle can be sufficiently tightened by hand.



3. Adjust location of Reverse Stops to give desired arc of coverage. Stops must be mounted such that the arrows point towards each other with the Trip Lever located between them. If the Stops are set incorrectly on the wrong end of the arc, the sprinkler will fail to reverse.



4. The SR200 is factory set for normal rotation speed. If a faster or slower speed is desired, move the Arm Weight backward for faster operation or forward for slower operation.



5. The SR200 is capable of using a Secondary Nozzle for in-close coverage. To use this feature, remove the supplied 6201 Plug and replace with the 7RN Series Nozzle of your choice. The supplied 7V Vane must be used to maintain proper stream integrity.

# **ATTACHMENT 2**

ORIGINATION - To be completed by Terminal Manager's designee

Plan Generated By:	<input type="text"/>	DDECP Start Date:	<input type="text"/>	DDECP Start Time:	<input type="text"/>
Plan Closed Out By:	<input type="text"/>	DDECP Stop Date:	<input type="text"/>	DDECP Stop Time:	<input type="text"/>

**KCBX (QH) GOAL > CONTROL COMPLIANCE RISK - DUST EMISSIONS**

Visible dust emissions can create complaints & compliance issues. Managers (and/or Supervisors) are expected to generate and execute on a Daily Dust Emission Control Plan (DDECP). The DDECP must be generated each normal business day & outline required actions & responsible owners. Owners of action items are required to complete / verify/ sign off that the required actions were completed as appropriate. DDECP should be viewed for accuracy & filled out according to proper RIM requirements.

**EXPECTATION - DDECPs are generated each normal business day with Friday's covering the entire weekend**

Assign any action steps warranted to properly address the forecast wind speeds  
Talk through future wind speeds workers & make sure action items are assigned & understood by owners

Wind Forecast	Date	Time	Wind Speed (MPH)	Wind Conditions - Normal/Wind Event/ Unusual Event
Wind Speed #1				
Wind Speed #2				
Wind Speed #3				
Wind Speed #4				
Wind Speed #5				
Wind Speed #6				
Wind Speed #7				
Wind Speed #8				

<p><b>Areas To Watch</b> (will apply during wind event)</p>	<p><b>Wind Direction:</b> <b>Wind Peak:</b> <b>Where to Apply Controls:</b> <b>South Terminal:</b> Area on the Pad to focus on: Pile face to focus on: <b>North Terminal:</b> Area on the Pad to focus on: Pile face to focus on:</p>
---	---

DDECP Action Steps	Responsible Person	Crew/Shift	Time of Actions	Action Items (Include Action Items for non-business days)
Initials: <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	1) Conduct visual observations for potential dust emissions
Initials: <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	1) Conduct visual observations for potential dust emissions

**COMMENTS**

**Instructions:** Note below conditions or events that effect execution of the plan. (examples: "Rainfall = 1.5", "Snowfall = 4", "Freezing conditions", "Equipment malfunction")  
When completed, Action owners & Verifying Supervisor (or Admin Clerk) must initial by their names at the top of the page  
Verifying Supervisor (or Admin Clerk) should review document for omissions or errors that need resolution before filing.  
This document is owned by the EHS Supervisor & is identified as a EHS Internal record.

Record instances of positive visual observations below:

Date and Time	Description and Location	Corrective Actions	Comments

By signing below, the Shift Foreman verifies that, pursuant to the KCBX Fugitive Particulate Operating Plan, during this shift: (1) I observed for Visible Fugitive Dust at least every 2 hours during the shift, (2) necessary Corrective Actions were taken in response to any observations of Visual Fugitive Dust as detailed in the Comments section above, and (3) the Action Items listed above were completed unless otherwise noted in the Comments section.

Signature Line (Shift Foreman)	<input type="text"/>	Date	<input type="text"/>
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# **ATTACHMENT 3**

Appleton Coated L Quality for CEYKS15009  
Shipment Quality Report

FAX:  
RPO: CEYKS15/009 S863

Customer:  
Outbound ID: CEYKS15/009  
Report Date: 11/16/2015  
Shipment Date: 11/15/2015  
Total Tonnage: 12,336.30

PO Number: 765-44347  
Inbound ID:  
Mine:  
Plant Name:

Moisture:	9.71	SO3:	
Ash:	9.72	Ash Fus Diff Temp:	
Volatile:		SO3 Free Sodium:	
Fixed Carbons:		SO3 Free Potassium:	
BTU:	11347	MAF BTU:	14083
Sulfur:	0.45	DRY BTU:	12567
Sodium:		#S/MBTU:	0.40
Iron:		Lbs SO2:	0.79
Calcium:		Lbs Ash:	8.57
Magnesium:		Dry Sulfur:	0.50
Potassium:		Dry Ash:	10.77
Chlorine:		Lbs Sodium:	

Tons Loaded from Samples - Sample #:  
2611S195

Tons  
12,336.30

# **ATTACHMENT 4**



Arrange for a demonstration today!

# STARFIRE S-4

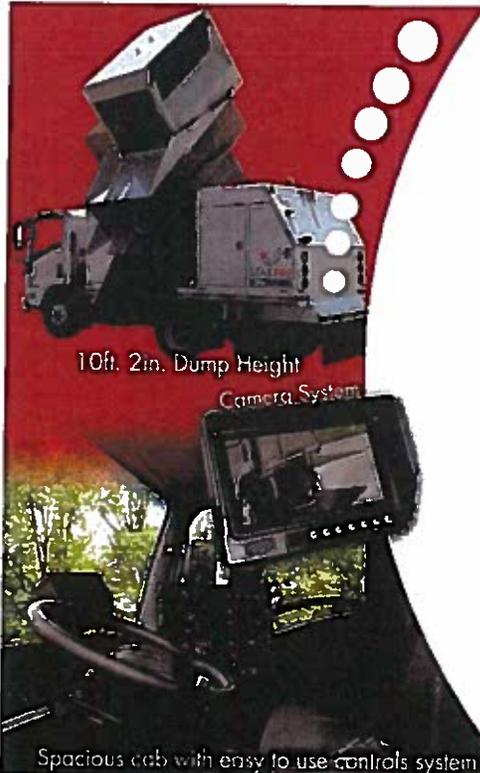
**From chip seal and milling operations to heavy spring clean-up, the Stewart-Amos Sweeper Co.'s Starfire S-4 can handle it.**

The S-4 is a four wheel, dual engine, mechanical broom street sweeper that has a compact design, but is as productive as sweepers mounted on larger trucks.

Manufactured with reliability and simplicity in mind, the S-4 is built for day-in and day-out continuous duty sweeping. The short wheelbase chassis combines tight maneuverability like a 3-wheel sweeper, yet is still capable of traveling at highway speeds between job-sites.

### The benefits of the Starfire S-4 include:

- 4.0 Cubic Yard Hopper
- High Performance Sweeping
- Large Volume Dust Suppression
- Variable Height Dumping
- Highly Maneuverable
- Great Mobility
- Rugged Construction
- Extremely Fuel Efficient
- Ease of Maintenance
- Simplicity of Design
- Remarkably Quiet
- Safety Monitoring Camera System
- Proudly made in the U.S.A.
- PM-10 Certified



**No CDL License Required**



Harrisburg, PA | 800.482.2302 | [stewart-amos.com](http://stewart-amos.com)



# S-4 SPECIFICATIONS

### General:

Sweeping Path: 10' maximum  
 Debris Hopper: 4.0 cubic yards volumetric  
 Dump Height (variable): 16" to 122"  
 Turning Radius\*: 16'9"  
 Overall Length\*: 19'6"  
 Overall Height\*: 102.5" including Strobe Lights  
 GVWR\*: 19,500#

\*Based upon sweeper unit and  
 GMC W-5500-HD series cab-over chassis

### Main Broom:

Length: 58" Diameter: 36"  
 Type: Chevron  
 Drive: Hydraulic motor/direct drive and reversible  
 Mounting: Full floating, trailing arm, with shocks  
 Lift Control: Hydraulic, in-cab  
 Speed: Variable with aux. engine rpm  
 Dirt Shoes: Carbide, 2" wide

### Gutter Brooms:

Diameter: 42"  
 Type: Disposable 4 segment with wire fill  
 Drive: Hydraulic and reversible  
 Mounting: Free-floating, trailing arm  
 Lift Control: Hydraulic, in-cab  
 Speed: Variable with aux. engine rpm

### Conveyor/Elevator:

Type: 7' flight squeegee with replaceable rubber edging  
 Liner: Bolt-in, 2 piece AR steel plates  
 Chain: HD constant radius roller chain  
 Sprockets: Urethane  
 Shafts: Three  
 Drive: Hydraulic, in-cab, and reversible  
 Lift Control: Hydraulic, in-cab  
 Elevator Jam Warning: Buzzer and light in-cab  
 Flushing System: Built-in

### Debris Hopper:

Volumetric Capacity: 4.0 cubic yards  
 Dump Height (variable): 16" to 122"  
 Hopper Door Reach from Side: 44"  
 Inspection door, window, and safety props

### Hydraulic System:

Pump: Dual tandem gear  
 Capacity: 20 GPM @ 2000 rpm  
 Reservoir: 45 gallons  
 Hydraulic Oil Filter: 10 micron

### Water Spray System:

Tank Capacity: 200 gallons  
 Construction: Polyethylene  
 Mounting: Removable  
 Pump: 3.6 GPM electric diaphragm  
 Spray Nozzles:

- 4 on front spray bar
- 2 on each gutter broom
- 4 on main broom

Fill Hose: 20' with NST coupler with anti-siphon air gap  
 Water Pump Prefilter: 80 mesh

### Electrical System:

Alternator: 120 AMP Voltage: 12 volt  
 Lights: front and rear strobes; gutter brooms  
 and rear mounted working lights; license plate;  
 2 stop/turn/tail; and clearance lights  
 Backup alarm

### Camera and Monitor Safety System:

7" Color monitor with right side gutter  
 broom and rear mounted color cameras

### Instrumentation and Controls:

Sweeper function rocker switches  
 Elevator stall alarm and light  
 Auxiliary engine hour meter and tachometer  
 Electric throttle  
 Console night light

### Sweeper Engine:

Make: Kubota V2403-M-TE3  
 Tier 3 Compliant  
 Horsepower: 47.9 continuous @ 2700 rpm  
 Type: in-line, four-cylinder turbo diesel

### Paint:

Body: Standard white- high-gloss urethane enamel  
 Undercarriage: Flat black enamel

### Standard Accessories:

Auto pickup in reverse  
 Auto shutdown for high temperature/low pressure  
 Independent left and right gutter broom operation  
 30 gallon, common fuel tank  
 Operators, parts and maintenance manuals

### Warranty Policy:

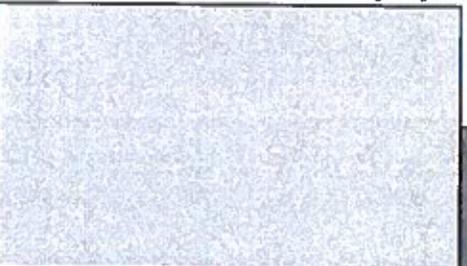
The Starfire S-4 sweeper is guaranteed to be free from defects due to faulty materials and/or workmanship for a period of 12 months, or 1,000 hours (whichever occurs first). Liability is limited to replacement of defect parts at factory or authorized dealer. The standard warranty of the chassis manufacturer and auxiliary engine applies.

### Available Options: (not included in base price)

Arrow Board  
 LED light package in lieu of standard  
 Strobe/Beacon protector  
 Gutter broom tilt; in-cab (electric)  
 Front mounted magnet  
 100 gallon auxiliary water tank  
 7 GPM water pump in lieu of standard  
 Epoxy Hopper liner  
 Stainless steel hopper  
 Extended warranties  
 Body paint colors  
 Others upon request  
 Wide variety of available chassis\*\*  
 \*\*Consult your dealer for details

**The Starfire S-4 has built a reputation for rugged reliability and superior sweeping performance. Let us build one for you. Call your dealer today to arrange for a demonstration.**

### Sold and Supported Locally by:



Harrisburg, PA  
 800.482.2302  
 stewart-amos.com

Please Note:  
 Specifications are subject  
 to change without notice

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# **ATTACHMENT 5**



December 15, 2015

## OPACITY PROGRAM for KCBX

In accordance with the KCBX Fugitive Dust Plan, Mostardi Platt conducts independent opacity testing and visible emissions observations on a quarterly basis. All readings are conducted by Certified Visible Emissions readers (Certified VE Reader, or Opacity Reader) that satisfactorily pass certification testing every six months.

### Scheduling

To provide consistency to the process, Mostardi Platt conducts the test program during the second or third week of the last month of each quarter (i.e. March, June, September, and December). The Opacity Reader picks a date at random within the two week window and notifies the KCBX site contact of the selected date to obtain permission for site access.

### Meteorological Conditions

Opacity testing is conducted if the weather conditions are suitable for testing. If it is raining, snowing, and/or foggy on the test date such that it would affect the ability to follow the USEPA Reference Method 9 procedure, the testing would either be conducted later in the day, or the date would be rescheduled to the next available date. Testing typically begins around 8:00 am, and is completed no later than 3:30 pm.

Opacity testing is performed during a range of wind and temperature conditions, including days when it is sunny, partly cloudy, or cloudy conditions due to the fact that any visible emissions from the storage piles would be from black particulate which can be easily determined against a clear or gray sky background.

### Test Methods

Mostardi Platt performs **USEPA Reference Method 9--Visual Determination of the Opacity of Emissions From Stationary Sources** to evaluate point sources and storage piles within the facility fence lines, and utilizes **USEPA Reference Method 22--Visual Determination of Fugitive Emissions From Material Sources and Smoke Emissions From Flares** to evaluate whether or not visible emissions are observed crossing the fence lines. Copies of those procedures are attached.

### Test Program

Since the bulk storage piles can change locations, Mostardi Platt obtains site-specific pile drawings from a cognizant site representative to identify the various storage piles. The test program is completed by one or two Certified VE Readers. Inside the fence line, the Certified VE Reader will get situated for each test run with the sun in the background in accordance with

Rev 1-22-2016

888 Industrial Drive  
Elmhurst, Illinois 60126  
630-993-2100



the Method 9 procedure, and begin taking opacity readings of the various storage piles, and material handling if in operation (e.g. conveyor transfers, truck unloading, dozer operation). Pursuant to 35 Ill. Adm. Code 212.316(d), "no person shall cause or allow fugitive particulate matter emissions from any storage pile to exceed an opacity of 10 percent, to be measured four feet from the pile surface." Therefore, all storage pile measurements are taken at a four foot elevation above the pile surface. The exact location of storage pile readings (if opacity is visible) are taken at the point of maximum opacity anywhere across the storage pile at the 4 foot elevation above the surface. If no opacity is visible, the readings are taken at the midpoint of each pile.

For opacity measurements of transfer points or loading/unloading, the opacity measurement location (if opacity is visible) is at the point of maximum visible opacity. Otherwise, the opacity reading is conducted 4 feet above the transfer point.

In accordance with Method 9, opacity readings are taken at 15 second intervals for a minimum of 24 readings (six minutes). Due to the large number of potential test locations, Mostardi Platt takes opacity readings for a minimum of 10 minutes (40 readings) at each test location. Should opacity be visible, the reading duration would be extended to a minimum of 30 minutes (with up to 60 minutes total as a maximum duration) to evaluate opacity levels.

To demonstrate whether or not visible emissions are crossing the property lines, a Certified VE Reader conducts USEPA Method 22 to evaluate whether or not visible emissions are seen crossing the property line. A stopwatch is used to count the amount of time in the measurement period that visible emissions are present crossing the property line being tested. The minimum test duration for each property line segment is 20 minutes.

### **Test Report**

A test report is written for each test date that identifies the date of testing, personnel involved, site location, test locations/drawing, opacity reading summaries, and visible emission (Method 22) property line readings. The test report includes the actual Method 9/22 forms and a diagram of test locations, along with the VE Reader's current certification and hourly meteorological data.

Prepared by:

Joseph J. Macak III  
Principal Consultant  
Mostardi Platt  
jmacak@mp-mail.com

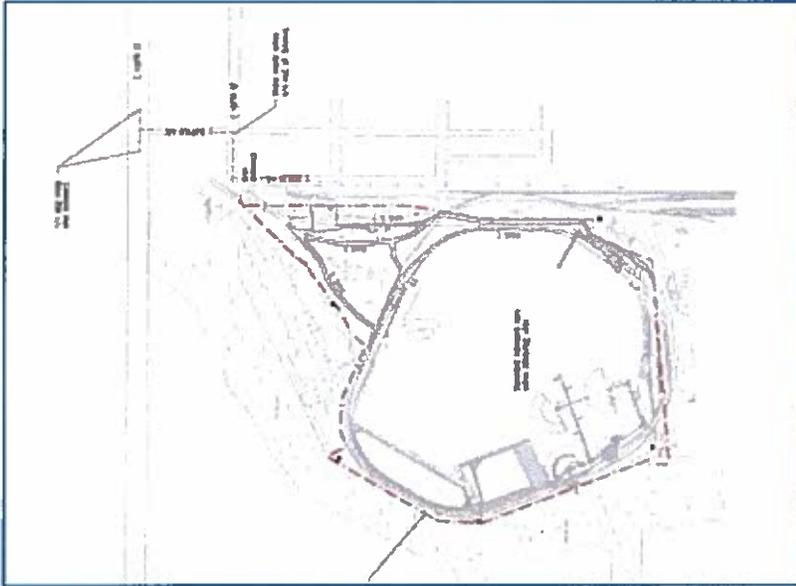
# **ATTACHMENT 6**

DAKOTA PROACTIVITY REPORT

Custom>Part 7>  
1897:2

1. Part 7.

- Okay
- Action Required



KCBX South Map.jpg (KCBX South Map.jpg)

C2. East Boundary of the Facility

Was there any spilled material extending from the KCBX Property across the East Border of the Facility?

If yes, document in the findings section and take corrective action immediately, to remove material.

- Yes
- No

C3. North Border of Facility

Was there any spilled material extending from the KCBX Property across the North Border of the Facility?

If yes, document in the findings section and take corrective action immediately to remove material.

- Yes
- No

C4. South Border of Facility

Was there any spilled material extending from the KCBX Property across the South Border of the Facility?

If yes, document in the findings section and take corrective action immediately to remove material.

Yes

No

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ORIGINATION - To be completed by Terminal Manger's designee

Plan Generated By:	Daniel H.	DDECP Start Date:	2/10/2016	DDECP Start Time:	3:00 PM
Plan Closed Out By:	Daniel H.	DDECP Stop Date:	2/12/2016	DDECP Stop Time:	9:00 AM

**KCBX (CHI) GOAL > CONTROL COMPLIANCE RISK - DUST EMISSIONS**

Visible dust emissions can create complaints & compliance issues. Managers (and/or Supervisors) are expected to generate and execute on a Daily Dust Emission Control Plan (DDECP). The DDECP must be generated each normal business day & outline required actions & responsible owners. Owners of action items are required to complete / verify/ sign off that the required actions were completed as appropriate. DDECP should be viewed for accuracy & filled out according to proper RIM requirements.

**EXPECTATION - DDECPs are generated each normal business day with Friday's covering the entire weekend**

Assign any action steps warranted to properly address the forecast wind speeds  
Talk through future wind speeds workers & make sure action items are assigned & understood by owners

Wind Forecast	Date	Time	Wind Speed (MPH)	Wind Conditions - Normal/Wind Event/ Unusual Event
Wind Speed #1	2/10/2016	3:00 PM	18-20	Wind Event
Wind Speed #2	2/10/2016	9:00 PM	18-20	Wind Event
Wind Speed #3	2/11/2016	3:00 AM	20-22	Wind Event
Wind Speed #4	2/11/2016	9:00 AM	16-17	Wind Event
Wind Speed #5	2/11/2016	3:00 PM	10-10	Normal
Wind Speed #6	2/11/2016	9:00 PM	13-14	Normal
Wind Speed #7	2/12/2016	3:00 AM	17-21	Wind Event
Wind Speed #8	2/12/2016	9:00 AM	20-22	Wind Event

**Areas To Watch**  
(will apply during wind event)

*Wind Direction: Winds coming out of the NE*  
*Wind Peak: 9 AM*  
**Where to Apply Controls:**  
*South Terminal:*  
Area on the Pad to focus on: SE section by the Ashross  
Pile face to focus on: NW facing  
*North Terminal:*  
Area on the Pad to focus on:  
Pile face to focus on:

DDECP Action Steps	Responsible Person	Crew/Shift	Time of Actions	Action Items
Initials: <input type="text"/>	Uzoras	C	Day Shift- 2/11	1) Conduct visual observations for potential dust emissions 2) Monitor weather conditions 3) Apply water truck passes as necessary
Initials: <input type="text"/>	<input type="text"/>	<input type="text"/>		1) Conduct visual observations for potential dust emissions 2)

**COMMENTS**

**Instructions: Note below conditions or events that affect execution of the plan.** (examples: "Rainfall = 1.5", "Snowfall = 4", "Freezing conditions", "Equipment malfunction")  
When completed, Action owners & Verifying Supervisor (or Admin Clerk) must initial by their names at the top of the page  
Verifying Supervisor (or Admin Clerk) should review document for omissions or errors that need resolution before filling  
This document is owned by the EH&S Supervisor & is identified as a EHS Internal record.

Record instances of positive observations below:

Date and Time	Description and location	Corrective Actions	Comments

By signing below, the Supervisor verifies that during this shift, (1) visible observations for potential dust emissions were made by operators, (2) necessary corrective actions were taken in response to those observations as detailed in the Comments section above, and (3) the Action Items listed above were completed unless otherwise noted in the comments.

Signature Line (Foreman/EHS Manager)  Date



KCBX Terminals Company		KGBX Terminals KGBX South Cannons, Water Truck, Truck Wash and Bag House Usage in accordance with 35 IAC 212.316(g)				Form Revised 2015-30-09			
Month	Day	Year	Temp	Weather Conditions					
<b>DAY SHIFT</b>									
System	Operator	Equipment Condition OK?	Applied	Coverage	Location	Trips or Run Time Hours	Gallons Water	Rate	Comments
Cannons	PLC/Leadman	YES	Daily*	600 ft diameter	Storage Piles		See PLC Report		See PLC -
Water Truck		YES	Daily*	40 ft Width	Roads/Parking Areas		5000	0	
		If no, enter comment	Daily*	varies	Pad Area/Storage Piles		5000	0	
Truck Wash		YES	*During Trucking	spray bar discharge	Near Main Office		0	15,600 gph of runtime	
		If no, enter comment							
Bag House		YES	per FPOP*	Airspace of Rotary Dumper	Rotary Dumphouse		153,000 cfm		WC Filter Reading:
Was operations stopped for any reason? Yes, For Dust control, Ran cannons and water truck passes									
<b>Chemical Dust Suppressant Application</b>									
Application Location: Stockpiles/Pad Area/Pathways <b>[[Circle what was performed]]</b>					List the Stockpiles that chemical was applied to:				
Chemical Name:					Pile:				
Concentration Dilution %:					Pile:				
Total chemical used:					Pile:				
					Pile:				
					Pile:				
					Pile:				
<b>NIGHT SHIFT</b>									
System	Operator	Equipment Condition OK?	Applied	Coverage	Location	Trips or Run Time Hours	Gallons Water	Rate	Comments
Cannons	PLC/Leadman	YES	Daily*	600 ft diameter	Storage Piles		See PLC Report		See PLC-
Water Truck		YES	Daily*	40 ft Width	Roads/Parking Areas		5000	0	
			Daily*	varies	Pad Area/Storage Piles		5000	0	
Truck Wash		YES	*During Trucking Ops		Near Main Office		0	15,600 gph of runtime	
		If no, enter comment							
Bag House		YES	per FPOP*	Airspace of Rotary Dumper	Rotary Dumphouse		153,000 cfm		WC Filter Reading:
General Notes:									
<b>Cells shaded in Yellow should have data entry</b>									
No Data Entry is required when systems are winterized based on the current Fugitive Particulate Operating Program and can be marked "N/A" Be sure to note precipitation in the comments section									
*Pursuant to the current KCBX South FPOP.									



**KCBX Terminals South Conveyor Cover Inspection**

To be completed by maintenance personnel every 2 weeks

Inspection completed by:	Date of previous Conveyor Inspection:	
Reviewing Supervisor:	Date of Current Conveyor Inspection:	

**KCBX (CHI) GOAL > CONTROL COMPLIANCE RISK- DUST EMISSIONS**

Visible dust emissions from conveying systems can create complaints & compliance issues. To help ensure reliability and compliance with current PPOP requirements, fixed/portable conveying covers should be inspected 2 times per months. For covers to be deemed in good condition, all covers must be attached to the conveying system and free of any damage.

**EXPECTATION**

Inspectors must verify that all conveying systems (fixed/portable) obtain covers in good condition and covers are properly aligned. Inspectors are responsible to note any misalignment or damage to the cover, that could cause potential emissions during a transfer. Any covers noted during the inspection, that have damage or misalignment, must be tagged out of service until covers have been repaired. All repairs will be tracked to completion in compliance system by supervisor, if they cannot be immediately addressed during the inspection.

Equipment	Are all Conveyor Covers in good Condition?	How many covers need maintenance?	Comments
C-1			
C-2			
C-3			
C-4			
C-5			
C-6			
SC-1			
SC-2			
SC-3			
Feeder 1			
Feeder 2			
Feeder 3			
Feeder 4			
Portable Conveyor #1 (Barge Unloader)			
Portable Conveyor #2			
Portable Conveyor #3			
Portable Conveyor #4			
Portable Conveyor #5 (Barge Unloader)			
Portable Conveyor #6			
Portable Conveyor #7			
Portable Conveyor #8			
Portable Conveyor #9			
Portable Conveyor #10			
Portable Conveyor #11			
Cater Stacker			
EC-1			
EC-2			
UC-1			
UC-2			

**Instructions: Note any unsolved problems in spaces below**

When completed, print the form. Inspector & Verifying Supervisor must initial by their names at the top of the page. Verifying Supervisor must issue any work orders needed to make repairs that could not be made at the time of inspection. This document is owned by the EHS Manager & is identified as a EHS Internal Record / Series CMP99 / C+5Y retention

Signature line (Inspector)	Date



**KCBX Terminals South Conveyor Cover Inspection**

*To be completed by maintenance personnel every 2 weeks*

Inspection completed by:	Date of previous Conveyor Inspection:	
Reviewing Supervisor:	Date of Current Conveyor Inspection:	

**KCBX (CHI) GOAL > CONTROL COMPLIANCE RISK- DUST EMISSIONS**

Visible dust emissions from conveying systems can create complaints & compliance issues. To help ensure reliability and compliance with current FPOP requirements, fixed/portable conveying covers should be inspected 2 times per months. For covers to be deemed in good condition, all covers must be attached to the conveying system and free of any damage.

**EXPECTATION**

Inspectors must verify that all conveying systems (fixed/portable) obtain covers in good condition and covers are properly aligned. Inspectors are responsible to note any misalignment or damage to the cover, that could cause potential emissions during a transfer. Any covers noted during the inspection, that have damage or misalignment, must be tagged out of service until covers have been repaired. All repairs will be tracked to completion in compliance system by supervisor, if they cannot be immediately addressed during the inspection.

Equipment	Are all Conveyor Covers in good Condition?	How many covers need maintenance?	Comments
C-1			
C-2			
C-3			
C-4			
C-5			
C-6			
SC-1			
SC-2			
SC-3			
Feeder 1			
Feeder 2			
Feeder 3			
Feeder 4			
Portable Conveyor #1 (Barge Unloader)			
Portable Conveyor #2			
Portable Conveyor #3			
Portable Conveyor #4			
Portable Conveyor #5 (Barge Unloader)			
Portable Conveyor #6			
Portable Conveyor #7			
Portable Conveyor #8			
Portable Conveyor #9			
Portable Conveyor #10			
Portable Conveyor #11			
Cater Stacker			
EC-1			
EC-2			
UC-1			
UC-2			

**Instructions: Note any unsolved problems in spaces below**

When completed, print the form. Inspector & Verifying Supervisor must initial by their names at the top of the page. Verifying Supervisor must issue any work orders needed to make repairs that could not be made at the time of inspection. This document is owned by the EHS Manager & is identified as a EHS Internal Record / Series CMP99 / C+SY retention

Signature Line (Inspector)	Date

DAKOTA PROACTIVITY REPORT

Custom>Part 10>

1. Part 10.

- Okay
- Action Required

C2. 1. Are all piles below 30 FT?

If NO

Notate in "Findings":

- 2. Customer Name
- 3. Pile Location
- 4. Approx Height

Piles:

Tes Pet Coke, BP Pet Coke, Bowie, PRB, Lafarge Pet Coke, Hillsboro, Williamson, Pine Bend Pet Coke, 20 Mile, West Elk, Consumers PRB, Screenings, Reclaim, Mobil Pet Coke

- Yes
- No

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DAKOTA PROACTIVITY REPORT

Custom>Part 3>

1. Part 3.

- Okay
- Action Required

C2. Are all spray bars operating as designed?

If NO

Notate in "Findings":  
Repairs needed.

- Yes
- No

C3. Is the River Pump in good condition?

If NO

Notate in "Findings":  
Issue with River Pump

- Yes
- No

C4. Are the Rail Car Spray Bars in good condition?  
(Side)

If NO

Notate in "Findings":  
Issue with Rail Car Spray Bars

- Yes
- No

C5. Are the EC1 Spray bar in good condition?

If NO

Notate in "Findings":  
Issue with EC1 Spray bars

- Yes
- No

C6. Is the EC2 Spray Bar in good condition?

If NO

Notate in "Findings":  
Issue with EC2 Spray Bars

- Yes
- No

C7. Are the UC1 Spray Bars in good condition?

If NO

Notate in "Findings":  
Issue with UC1 Spray Bars

- Yes
- No

C8. Is the SC3 Spray Bar in good condition?

If NO

Notate in "Findings":  
Issue with SC3 Spray Bars

- Yes
- No

C9. Is the SC2 Spray Bars in good condition?

If NO

Notate in "Findings":  
Issue with SC2 Spray Bars

- Yes
- No

C10. Is the Feeder 1 Spray Bars in good condition?

If NO

Notate in "Findings":  
Issue with Feeder 1 Spray Bars

- Yes
- No

C11. Is the Feeder 2 Spray Bars in good condition?

If NO

Notate in "Findings":  
Issue with Feeder 2 Spray Bars

Yes

No

C12. Is the Feeder 3 Spray Bars in good condition?

If NO

Notate in "Findings":  
Issue with Feeder 3 Spray Bars

Yes

No

C13. Is the Feeder 4 Spray Bars in good condition?

If NO

Notate in "Findings":  
Issue with Feeder 4 Spray Bars

Yes

No

C14. Is the C2 Head Spray Bars in good condition?

If NO

Notate in "Findings":  
Issue with C2 Head Spray Bars

Yes

No

C15. Is the C1/C2 Transfer Spray Bars in good condition?

If NO

Notate in "Findings":  
Issue with C1/C2 Transfer Spray Bars

Yes

No

C16. Is the C1/C4 Transfer Spray Bars in good condition?

If NO

Notate in "Findings":  
Issue with C1/C4 Transfer Spray Bars

- Yes
- No

C17. Is the C3 Head Pulley Spray Bars in good condition?

If NO

Notate in "Findings":  
Issue with C4 Spray Bars

- Yes
- No

C18. Is the C4 Spray Bars in good condition?

If NO

Notate in "Findings":  
Issue with C4 Spray Bars

- Yes
- No

C19. Is the C5 Spray Bars in good condition?

If NO

Notate in "Findings":  
Issue with C5 Spray Bars

- Yes
- No

C20. Is the C6 Spray Bars in good condition?

If NO

Notate in "Findings":  
Issue with C6 Spray Bars

- Yes
- No

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DAKOTA PROACTIVITY REPORT

Custom>Part 5>

1. Part 5.

- Okay
- Action Required

C2. Cannon #104

1. Is the cannon in good condition?

Notate in "Findings"

- 2. Actual Pressure
- 3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
- 4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C3. Cannon #105

1. Is the cannon in good condition?

Notate in "Findings"

- 2. Actual Pressure
- 3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
- 4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C4. Cannon #106

1. Is the cannon in good condition?

Notate in "Findings"

- 2. Actual Pressure
- 3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)

4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C5. Cannon #107

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C6. Cannon #108

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C7. Cannon #109

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate

(Expected Pressure 150/Expected Flow Rate 235)

4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C8. Cannon #110

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
  3. Actual Flow Rate
- (Expected Pressure 150/Expected Flow Rate 235)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C9. Cannon #111

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
  3. Actual Flow Rate
- (Expected Pressure 150/Expected Flow Rate 235)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C10. Cannon #112

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure

- 3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
- 4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C11. Cannon #113

- 1. Is the cannon in good condition?

Notate in "Findings"

- 2. Actual Pressure
- 3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
- 4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C12. Cannon #114

- 1. Is the cannon in good condition?

Notate in "Findings"

- 2. Actual Pressure
- 3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
- 4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C13. Cannon #115

- 1. Is the cannon in good condition?

Notate in "Findings"

- 2. Actual Pressure
- 3. Actual Flow Rate
- (Expected Pressure 150/Expected Flow Rate 235)
- 4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C14. Cannon #116

- 1. Is the cannon in good condition?

Notate in "Findings"

- 2. Actual Pressure
- 3. Actual Flow Rate
- (Expected Pressure 150/Expected Flow Rate 235)
- 4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C15. Cannon #117

- 1. Is the cannon in good condition?

Notate in "Findings"

- 2. Actual Pressure
- 3. Actual Flow Rate
- (Expected Pressure 150/Expected Flow Rate 235)
- 4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C16. Cannon #118

- 1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes  
 No

C17. Cannon #119

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes  
 No

C18. Cannon #120

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes  
 No

C19. Cannon #121

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes  
 No

C20. Cannon #122

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes  
 No

C21. Cannon #123

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes  
 No

**C22. Cannon #124**

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure

3. Actual Flow Rate

(Expected Pressure 150/Expected Flow Rate 235)

4. Any issues found with cannon

What is Good?

-Valve open/close operable

-Spray patterns are current as indicated on plot plan

-Cannons activate and de-activate properly

-Pump operable

-Water volume shows on flow meter

Yes

No

**C23. Cannon #125**

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure

3. Actual Flow Rate

(Expected Pressure 150/Expected Flow Rate 235)

4. Any issues found with cannon

What is Good?

-Valve open/close operable

-Spray patterns are current as indicated on plot plan

-Cannons activate and de-activate properly

-Pump operable

-Water volume shows on flow meter

Yes

No

**C24. Cannon #126**

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure

3. Actual Flow Rate

(Expected Pressure 150/Expected Flow Rate 235)

4. Any issues found with cannon

What is Good?

-Valve open/close operable

-Spray patterns are current as indicated on plot plan

-Cannons activate and de-activate properly

-Pump operable

-Water volume shows on flow meter

Yes

No

C25. Cannon #207

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 660)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes  
 No

C26. Cannon #208

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 660)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes  
 No

C27. Cannon #209

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes

No

**C28. Cannon #210**

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure

3. Actual Flow Rate

(Expected Pressure 150/Expected Flow Rate 235)

4. Any issues found with cannon

What is Good?

-Valve open/close operable

-Spray patterns are current as indicated on plot plan

-Cannons activate and de-activate properly

-Pump operable

-Water volume shows on flow meter

Yes

No

**C29. Cannon #211**

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure

3. Actual Flow Rate

(Expected Pressure 150/Expected Flow Rate 235)

4. Any issues found with cannon

What is Good?

-Valve open/close operable

-Spray patterns are current as indicated on plot plan

-Cannons activate and de-activate properly

-Pump operable

-Water volume shows on flow meter

Yes

No

**C30. Cannon #212**

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure

3. Actual Flow Rate

(Expected Pressure 150/Expected Flow Rate 235)

4. Any issues found with cannon

What is Good?

-Valve open/close operable

-Spray patterns are current as indicated on plot plan

-Cannons activate and de-activate properly

-Pump operable

-Water volume shows on flow meter

- Yes
- No

C31. Cannon #213

1. Is the cannon in good condition?

Notate in "Findings"

- 2. Actual Pressure
- 3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
- 4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C32. Cannon #214

1. Is the cannon in good condition?

Notate in "Findings"

- 2. Actual Pressure
- 3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
- 4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C33. Cannon #215

1. Is the cannon in good condition?

Notate in "Findings"

- 2. Actual Pressure
- 3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
- 4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plat plan
- Cannons activate and de-activate properly

- Pump operable
- Water volume shows on flow meter
- Yes
- No

C34. Cannon #216

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plat plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter
- Yes
- No

C35. Cannon #217

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plat plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter
- Yes
- No

C36. Cannon #218

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 235)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plat plan

- Cannons activate and de-activate properly
  - Pump operable
  - Water volume shows on flow meter
- Yes
- No

C37. Cannon #219

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate
- (Expected Pressure 150/Expected Flow Rate 235)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
  - Spray patterns are current as indicated on plat plan
  - Cannons activate and de-activate properly
  - Pump operable
  - Water volume shows on flow meter
- Yes
- No

C38. Cannon #220

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate
- (Expected Pressure 150/Expected Flow Rate 660)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
  - Spray patterns are current as indicated on plat plan
  - Cannons activate and de-activate properly
  - Pump operable
  - Water volume shows on flow meter
- Yes
- No

C39. Cannon #221

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate
- (Expected Pressure 150/Expected Flow Rate 660)
4. Any issues found with cannon

What is Good?

- Valve open/close operable

- Spray patterns are current as indicated on plat plan
  - Cannons activate and de-activate properly
  - Pump operable
  - Water volume shows on flow meter
- Yes
- No

**C40. Cannon #222**

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 660)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
  - Spray patterns are current as indicated on plot plan
  - Cannons activate and de-activate properly
  - Pump operable
  - Water volume shows on flow meter
- Yes
- No

**C41. Cannon #223**

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 660)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
  - Spray patterns are current as indicated on plat plan
  - Cannons activate and de-activate properly
  - Pump operable
  - Water volume shows on flow meter
- Yes
- No

**C42. Cannon #224**

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 660)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plat plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C43. Cannon #225

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 660)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C44. Cannon #226

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 660)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C45. River Pump 1N

1. Is the pump in good condition?

Notate in "Findings"

2. Actual Pressure  
(Expected Pressure 150)
3. Any issues found with pump

- Valve open/close operable
- Spray patterns are current as indicated on plat plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C43. Cannon #225

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 660)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C44. Cannon #226

1. Is the cannon in good condition?

Notate in "Findings"

2. Actual Pressure
3. Actual Flow Rate  
(Expected Pressure 150/Expected Flow Rate 660)
4. Any issues found with cannon

What is Good?

- Valve open/close operable
- Spray patterns are current as indicated on plot plan
- Cannons activate and de-activate properly
- Pump operable
- Water volume shows on flow meter

- Yes
- No

C45. River Pump 1N

1. Is the pump in good condition?

Notate in "Findings"

2. Actual Pressure  
(Expected Pressure 150)
3. Any issues found with pump

3. Any issues found with pump

What is Good?

-Pump operable

Yes

No

C50. River Pump 25

1. Is the pump in good condition?

Notate in "Findings"

2. Actual Pressure  
(Expected Pressure 150)

3. Any issues found with pump

What is Good?

-Pump operable

Yes

No

C51. Basin Pump 15

1. Is the pump in good condition?

Notate in "Findings"

2. Actual Pressure  
(Expected Pressure 130)

3. Any issues found with pump

What is Good?

-Pump operable

Yes

No

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DAKOTA PROACTIVITY REPORT

Custom>Part 3>

C1. Water Supply Pump

Is the water supply pump in good condition?

Yes = Device working as expected, water stream is acceptable, cycles as programmed.

No = Device working, but not at optimal levels or device failed to operate as expected

Not Applicable = Not In Service

If No comment in "Findings" field.

Add a picture

- Yes
- No

C2. In Service PSI

Is the In Service PSI in good condition?

Yes = Device working as expected, water stream is acceptable, cycles as programmed.

No = Device working, but not at optimal levels or device failed to operate as expected

Not Applicable = Not In Service

If No comment in "Findings" field.

Add a picture

- Yes
- No

C3. Wash Start Timing

Is the wash start timing in good condition?

Yes = Device working as expected, water stream is acceptable, cycles as programmed.

No = Device working, but not at optimal levels or device failed to operate as expected

Not Applicable = Not In Service

If No comment in "Findings" field.

Add a picture

- Yes
- No

**C4. Wash Run Time**

Is wash run time in good condition?

Yes = Device working as expected, water stream is acceptable, cycles as programmed.

No = Device working, but not at optimal levels or device failed to operate as expected

Not Applicable = Not In Service

If No comment in "Findings" field.

Add a picture

- Yes
- No

**C5. South Spray Bars**

Are the South Spray Bars in good condition?

Yes = Device working as expected, water stream is acceptable, cycles as programmed.

No = Device working, but not at optimal levels or device failed to operate as expected

Not Applicable = Not In Service

If No comment in "Findings" field.

Add a picture

- Yes
- No

**C6. North Spray Bars**

Are the north spray bars in good condition?

Yes = Device working as expected, water stream is acceptable, cycles as programmed.

No = Device working, but not at optimal levels or device failed to operate as expected

Not Applicable = Not In Service

If No comment in "Findings" field.

Add a picture

- Yes
- No

**C7. Bottom Sprays**

Are the bottom sprays in good condition?

Yes = Device working as expected, water stream is acceptable, cycles as programmed.

No = Device working, but not at optimal levels or device failed to operate as expected

Not Applicable = Not In Service

If No comment in "Findings" field.

Add a picture

- Yes
- No

**C8. Cement Ditch**

Is the cement ditch in good condition?

Yes = Device working as expected, water stream is acceptable, cycles as programmed.

No = Device working, but not at optimal levels or device failed to operate as expected

Not Applicable = Not In Service

If No comment in "Findings" field.

Add a picture

- Yes
- No

**C9. 6" Pump**

Is the 6" pump in good condition?

Yes = Device working as expected, water stream is acceptable, cycles as programmed.

No = Device working, but not at optimal levels or device failed to operate as expected

Not Applicable = Not In Service

If No comment in "Findings" field.

Add a picture

- Yes
- No

**C10. Rumble Strips**

Are the rumble strips in good condition?

Yes = Device working as expected, water stream is acceptable, cycles as programmed.

No = Device working, but not at optimal levels or device failed to operate as expected

Not Applicable = Not In Service

If No comment in "Findings" field.

Add a picture

- Yes
- No

**11. Part 3.**

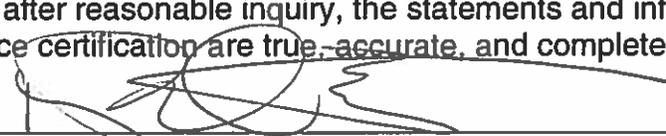
- Okay
- Action Required

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# **APPENDIX A**

**Certification of Truth, Accuracy, and Completeness (By Responsible Official)**

I, MICHAEL ESUAST certify that, based on information and belief formed after reasonable inquiry, the statements and information contained in this compliance certification are true, accurate, and complete.

Signature   
 Date: 15 Feb 2016

Responsible Official Title: KCBX TERMINALS MANAGER

**KCBX South**

Fugitive Dust Control Item	Is the item properly calibrated and maintained per this Fugitive Dust Plan?	
Water Cannon System	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Water Trucks	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Water Spray Bars	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Dust Collection Baghouse	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Weather Station	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
PM10 Monitors	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Truck Wash	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Road Sweeper	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

For any 'No' response, complete the Fugitive Dust Control Item Exception Report on the following page

# **APPENDIX B**



**Particulate Matter Less Than Ten Microns  
Air Quality Monitoring  
Siting Study Report**

**Prepared for:**

**KCBX Terminals Company  
Chicago, Illinois**

**Prepared by:**

**URS Corporation  
9400 Amberglen Blvd. (78729)  
P.O. Box 201088  
Austin, TX 78720-1088**

**December 13, 2013**

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## **1.0 Introduction**

This document presents the results of a particulate matter less than 10 microns (PM<sub>10</sub>) air quality monitor site selection study conducted at KCBX Terminal Company's (KCBX) North and South Terminal Facilities by URS Corporation. Jim Clarke and Greg Mazik from URS are the consultants responsible for the siting survey, which was conducted employing the guidance of 40CFR Part 58, Appendix E and related agency documents. The North Terminal is located at 3259 East 100<sup>th</sup> Street and the South Terminal at 10740 South Burley Avenue, in Chicago, Illinois. These terminals stage and handle bulk materials which are loaded on vessels, barges, trucks, and railcars for shipment to customers.

### **1.1 Study Background and Objective**

On November 15, 2013, the United States Environmental Protection Agency (USEPA) issued a Request for Information (RFI) under Section 114(a) of the Clean Air Act. The RFI requires KCBX to install and operate PM<sub>10</sub> air quality monitors and samplers at its South and North Terminals for a period of one year. The objective of this request is to demonstrate that operations at both terminals are meeting the National Ambient Air Quality Standards (NAAQS) for PM<sub>10</sub>. The current NAAQS for PM<sub>10</sub> is 150 µg/m<sup>3</sup> for a 24-hour average, not to be exceeded more than once per year on average over three years.

In addition, the request requires a 10-meter meteorological station be operated at one of the sites to characterize wind flow through the area during the study period. KCBX has elected to install two identical meteorological monitoring stations, one at the North Terminal NW site and one along the east fence line of the South Terminal. The meteorological monitors will meet the specifications of USEPA meteorological monitoring guidance in Volume IV of the Quality Assurance Handbook and be of sufficient quality for low threshold wind measurements to use in modeling applications if needed.

### **1.2 Required PM<sub>10</sub> Monitor and Sampler Locations**

The RFI specifies that KCBX install and operate three Federal Equivalent Method (FEM) real-time PM<sub>10</sub> monitors at each terminal for a period of one year. At the South Terminal, monitors need to be placed near the property line to the northeast, southwest, and center east. Real-time monitors at the North Terminal will be located near the northeast, southwest, and northwest property lines. In addition, each terminal is required to operate a Federal Reference Method (FRM) filter-based PM<sub>10</sub> sampler at its northeast monitoring site.

### **1.3 Supplemental PM<sub>10</sub> Monitor Locations**

KCBX has elected to voluntarily install additional FEM PM<sub>10</sub> monitors at each terminal. Two more monitor locations were identified along the north and northwest property lines at the

South Terminal. One additional monitoring location at the North Terminal was identified in the southeast corner of the property. These additional monitors will provide supplemental data for evaluating PM<sub>10</sub> levels at or near the KCBX terminals.

#### **1.4 PM<sub>10</sub> Sample Speciation**

The RFI included a requirement to archive filter media from the FRM samplers for two years, presumably for subsequent speciation analyses. KCBX would like to work with EPA Region 5 to determine appropriate speciation analyses to be performed on the FRM filter samples that will be obtained every three days from each terminal's northeast monitoring site. The species selected will drive the choice of sample media used for the study. Since metals and ions are best suited for Teflon media, and quartz fiber media are best for organic and elemental carbon, a second FRM sampler will need to be deployed at these sites to cover both media types to allow for sufficient variety of analytical techniques. The list of analyte species and methods will be discussed in the Quality Assurance Project Plan developed for the monitoring network.

## 2.0 Site Selection

The PM<sub>10</sub> air quality monitor and sampler location selection criteria were based on 40CFR, Part 58, Appendix E, and summarized in U.S. EPA's "Ambient Monitoring Guidelines for Prevention of Significant Deterioration." The following list presents the main objectives for locating a PM<sub>10</sub> air quality monitor or sampler.

- The monitor/sampler inlet should be placed near breathing height;
- An unrestricted air flow in an arc of at least 270° around the inlet is recommended;
- If the sample inlet is placed on a roof, it should be placed at least 2 meters from any other structure;
- The inlet should be at least one meter above any supporting structures;
- If the inlet is to be located between two obstacles, it should be at least 2 times the height that the obstacle protrudes above the sampler away from the obstacle; and
- The monitor/sampler inlet should be at least 20 meters from the drip line of trees in the area, and must be at least 10 meters from the drip line of trees when they act as an obstruction.

In addition, the meteorological stations were located with guidance provided in Volume IV of USEPA's Quality Assurance Handbook and the document "Meteorological Monitoring Guidance for Regulatory Modeling Applications". This document makes the following recommendations for specific meteorological parameters:

### 2.1 Wind Speed and Wind Direction

- Sensors should be located at the 10-meter level;
- Distance from obstructions to sensors should be at least 10 times the height of the obstruction;
- Wind instruments mounted on a boom should be twice the width of the tower away from the tower; and
- The boom should be at a right angle to the prevailing wind direction.

### 2.2 Temperature

- Sensor(s) located in an open and level area 9 meters in diameter;
- Surface below the sensor(s) should be covered by short grass;
- Sensor(s) should be protected from thermal radiation;

- Distance from sensor(s) to obstruction at least four times the height of the obstruction;
- Should be located at least 30 meters from large paved areas; and
- Low areas that hold standing water after rains should be avoided.

In addition to the guidance provided above, access to electrical power and security of the instrumentation were taken into account in choosing sites. Given the urban locations of the terminals, locating the meteorological stations at least ten times the height away from every possible obstruction was not possible.

### 3.0 Proposed Locations

The proposed PM<sub>10</sub> monitor/sampler and meteorological station locations at the South and North Terminals are presented in Figures 1 and 2, respectively. The supplemental locations are shown on the maps in Figures 1 and 2 with “KCBX” in the legend. Physical access, lack of electrical power or other considerations may prevent the utilization of the proposed sites. The blue lines on each figure denote the approximate property line boundaries.

The following paragraphs discuss each of the PM<sub>10</sub> and meteorological monitoring sites proposed in this document including, general site conditions, GPS coordinates, and security concerns. Photographs showing the view from each of the required locations to the north, east, south, and west are included in Appendix A for the South Terminal and Appendix B for the North Terminal.

#### 3.1 South Terminal – Center East Monitor

The Center East site is located just west of the property line in between a berm and a road used by haul trucks. The berm extends from the south to northwest sectors. Residential housing is located to the east.

GPS Coordinates: 41 41.673 N  
87 32.756 W  
Security: Located within the fenced property line.

#### 3.2 South Terminal – Southwest Monitor

This site is situated near the southwest corner of the South Terminal property. The Calumet River is directly to the west, covering the south through north sectors. KCBX property occupies the north-northwest to east sectors. Other industry is located from the east to the south.

GPS Coordinates: 41 41.608 N  
87 33.070 W  
Security: Located within the fenced property line.

#### 3.3 South Terminal – Northeast Monitor/Samplers

The northeast site is proposed near the northeast corner of the property, just south of the main office building. This site would include the FRM PM<sub>10</sub> samplers in addition to the FEM continuous monitor. Residential housing can be found from the north to south sectors. KCBX operations are located from the south to northwest. Other industry is located from the northwest to the north.

Figure 1. Location of South Terminal Monitoring Sites



Blue line is approximate KCBX property boundary

Figure 2. Location of North Terminal Monitoring Sites



Blue line is approximate KCBX property boundary

GPS Coordinates: 41 41.954 N  
87 32.744 W  
Security: Located within the fenced property line.

### **3.4 South Terminal – North Monitor**

The supplemental north site is proposed south of the north property line. Other industry occupies the northwest through northeast sectors, while, KCBX operations are located from the northeast to northwest.

GPS Coordinates: 41 41.921 N  
87 32.864 W  
Security: Located within the fenced property line.

### **3.5 South Terminal – Northwest Monitor**

The supplemental northwest site is proposed in the northwest corner of the property line adjacent to the Calumet River. Other industry occupies the area immediately east, while KCBX operations are located from the south and southeast.

GPS Coordinates: 41 41.936 N  
87 33.066 W  
Security: Located within the fenced property line.

### **3.6 South Terminal – Meteorological Station**

The meteorological station is proposed to be installed along the east property line. This location offers the best option for avoiding potential obstacles to air flow on the property.

GPS Coordinates: 41 41.854 N  
87 32.746 W  
Security: Located within the fenced property line.

### **3.7 North Terminal – Southwest Monitor**

This site would be located near the southwest corner of the North Terminal property. KCBX operations can be found from the north through east sectors. Residential property is located to the west. Other industry occupies property to the southeast.

GPS Coordinates: 41 42.573 N  
87 33.013 W  
Security: May need security fencing at this site. The road along the west property line is well travelled. Numerous trucks from various companies were observed passing by.

### **3.8 North Terminal – Northwest Monitor/Meteorological Station**

The proposed northwest monitoring site is located in an open area north of the piles and the truck access road. This location offers the best option for avoiding potential obstacles to air flow on the property. Residential property is found from the southwest through north sectors. The Belt Line Railroad owns the property to the immediate west. Other industry is found to the north. The provision of electrical power is possible and is under further investigation.

GPS Coordinates: 41 42.744 N  
87 32.911 W  
Security: Located within the fenced property line.

### **3.9 North Terminal – Northeast Monitor/Samplers**

This site would be located near the northeast corner of the property, south of E. 100<sup>th</sup> Street and west of the Calumet River. This site would include the FRM PM<sub>10</sub> samplers in addition to the FEM continuous monitor. KCBX property occupies the south through west sectors. Other industry is found to the north, across 100<sup>th</sup> Street, and from the north through south sectors.

GPS Coordinates: 41 42.797 N  
87 32.952 W  
Security: Located within the fenced property line.

### **3.10 North Terminal – Southeast Monitor**

The entire south property line is on a barge loading slip. Product piles are located very close to the edge of the slip. This location is on the point where the slip empties into the Calumet River. KCBX operations are located from the west to north sectors. Other industry can be found from the east through west sectors.

GPS Coordinates: 41 42.576 N  
87 32.708 W  
Security: Located within the fenced property line.

## 4.0 References

U.S. Environmental Protection Agency, *Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring*, 40 CFR Ch. I, 7-1-12 Edition, Part 58, Appendix E.

U.S. Environmental Protection Agency, March 2008, *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV – Meteorological Measurements Version 2.0*, EPA-454/B-08-002.

U.S. Environmental Protection Agency, 1987. *Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD)*, EPA-450/4-87-007.

U.S. Environmental Protection Agency, 2000. *Meteorological Monitoring Guidance for Regulatory Modeling Applications*, EPA-454/R-99-005.

# **APPENDIX C**



# **Quality Assurance Project Plan**

**KCBX Terminals Company**

**Chicago, Illinois**

**Prepared for:**

**KCBX Terminals Company  
3259 East 100<sup>th</sup> Street  
Chicago, IL 60617**

**Prepared by:**

**URS Corporation  
9400 Amberglen Boulevard  
Austin, TX 78729**

***Statement of Limitations:*** This document details a quality assurance plan to guide the successful implementation of Ambient Air Monitoring by URS Corporation at the KCBX Terminals Company North and South Terminals in Chicago, IL. The scope of services performed for this work may not be appropriate to satisfy the needs of other users, and any use or re-use of this document or of the findings of this study is at the sole risk of said user.



# Quality Assurance Project Plan

## KCBX Terminals Company

Chicago, Illinois

Prepared for

KCBX Terminals Company  
3259 East 100<sup>th</sup> Street  
Chicago, IL 60617

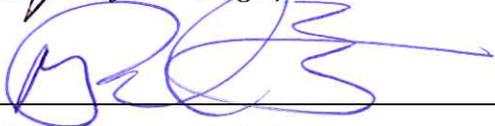
Prepared by

URS Corporation  
9400 Amberglen Boulevard  
Austin, TX 78729

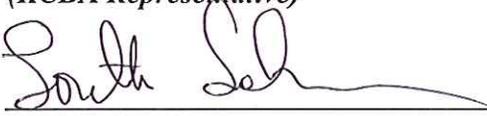
Approved by

  
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(URS Project Manager)

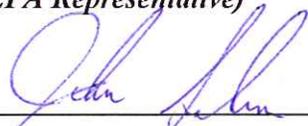
2-26-14  
(Date)

  
\_\_\_\_\_  
(KCBX Representative)

28 FEB 2014  
(Date)

  
\_\_\_\_\_  
(EPA Representative)

3-10-2014  
(Date)

  
\_\_\_\_\_  
(URS QA Task Leader)

2/26/14  
(Date)

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A Project Management	7	0	2/3/2014
B Measurement Data Acquisition	22	0	2/3/2014
C Assessment / Oversight	6	0	2/3/2014
D Data Validation and Usability	4	0	2/3/2014
E References	1	0	2/3/2014

## A. PROJECT MANAGEMENT

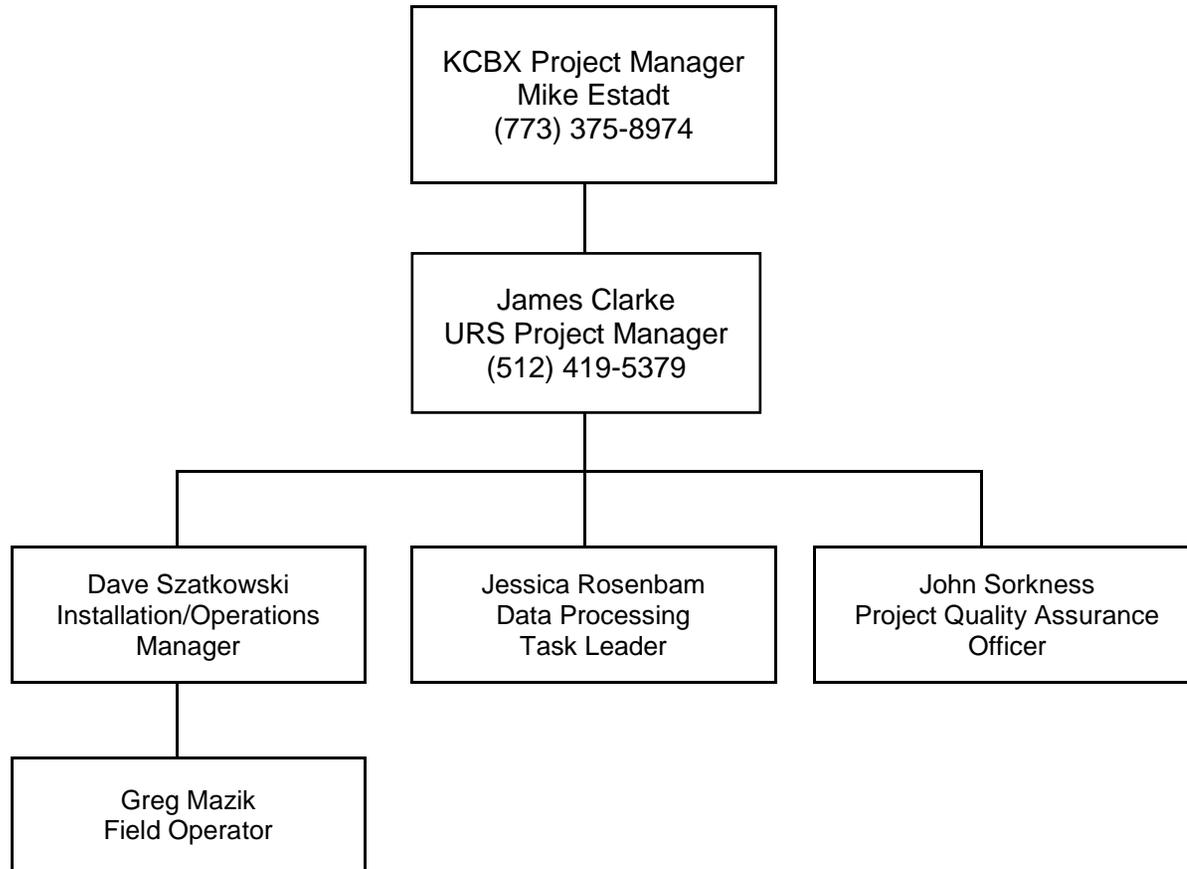
The US Environmental Protection Agency (USEPA) has established guidelines for documenting the policies and procedures used to conduct environmental monitoring programs so that organizations seeking review of a monitoring protocol or acceptance of the resulting data can do so efficiently. In accordance with these guidelines, this Quality Assurance Project Plan (QAPP) describes the sampling and analytical methods that will be used to gather the measurement data, and the procedures employed to assess, control, and document the data quality. This QAPP is in the format specified in the publication, “*EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations*,” EPA QA/R-5, March 2001. Following this format, this QAPP is divided into five sections with the following contents:

- **Section A** – Provides a description of the problem and the monitoring project with a presentation of the project organization, the data quality objectives, and the records to be generated;
- **Section B** – Provides a detailed description of all the elements of the monitoring strategy and methods, including the methods for sampling, sample handling, analysis, quality control, and data management;
- **Section C** – Provides a description of the procedures that will be used to assess and report on the QA/QC elements employed in the project;
- **Section D** – Provides a description of the methods that will be used for data review, validation and for reconciling the generated data with all regulatory agency requirements; and
- **Section E** – Provides references to regulatory and method specific documents that form the basis for obtaining the measurement data.

### A1 Project/Task Organization

This section presents the organizational structure for the air monitoring program at the KCBX Terminals Company North and South Terminals in Chicago, IL (KCBX) and describes the responsibilities of those within it. This structure is depicted in Figure A-1 showing the key personnel and team roles, including the KCBX project manager, the URS Project Manager, Field Installation/Operations Manager, Data Processing Task Leader, and Project Quality Assurance Officer. The key individuals and their responsibilities are identified below:

**Figure A-1. Project Organizational Chart**



**KCBX Project Manager** – The principal contact person for KCBX is Mr. Mike Estadt. He provides client supervision and review of the air monitoring program. Any changes to the scope of the monitoring program will be made only with the written approval of the KCBX Project Manager and review by EPA Region 5.

**URS Project Manager** – Mr. James Clarke is the Project Manager overseeing the day to-day project activities, tracking the project budget, and ensuring the proper execution of the monitoring work. He provides the primary leadership of the URS project team members.

**Installation/Operations Manager** – Mr. Dave Szatkowski is the Field Installation and Operations Manager. He is responsible for integrating and installing the monitoring equipment, then subsequently directing all data collection, equipment maintenance, and troubleshooting activities. Mr. Szatkowski's overall responsibility is to insure the collection of valid measurement data.

**Field Operator** – Mr. Greg Mazik of the URS Chicago office provides operations support to the program. He will assist with the equipment installation, conduct routine maintenance on the equipment, collect manual samples, and review raw field data.

**Data Processing Task Leader** - Ms. Jessica Rosenbam serves as Task Leader for data processing. She is responsible for reviewing the unedited data for data validity in accordance with the project data quality objectives, applying appropriate edits (refer to Data Validation Section) to the database values as determined in the data review process, and producing the data deliverables for the client.

**Quality Assurance Project Officer** – Mr. John Sorkness is the Project QA Officer. He is responsible for conducting routine assessments of the measurement systems for accuracy through periodic audits of field equipment and procedures. He fills no other role with the project to maintain objectivity.

## **A2 Problem Definition and Background**

On November 15, 2013, the United States Environmental Protection Agency (USEPA) issued a Request for Information (RFI) under Section 114(a) of the Clean Air Act. The RFI requires KCBX to install and operate PM<sub>10</sub> air quality monitors and samplers at its South and North Terminals for a period of one year.

In addition, the request requires a 10-meter meteorological station be operated at one of the sites to characterize wind flow through the area during the study period. KCBX has elected to install two identical meteorological monitoring stations, one at the North Terminal northwest site and one adjacent to South Burley Avenue along the east fence line of the South Terminal. The meteorological monitors will meet the specifications of USEPA meteorological monitoring guidance in Volume IV of the Quality Assurance Handbook and be of sufficient quality for low threshold wind measurements to use in modeling applications if needed. Each station will also be equipped to record data measurements of the following meteorological parameters:

- Wind Speed,
- Wind Direction,
- Ambient Temperature,
- Barometric Pressure, and
- Standard Deviation of Wind Direction (Sigma Theta).

### **A3 Project/Task Description and Schedule**

This project is conducted to provide air quality and meteorological data from ten monitoring sites located around the KCBX North Terminal (4 sites) and South Terminal (6 sites). The selected sites are on KCBX owned or leased property.

The monitoring stations contain pollutant monitors for PM<sub>10</sub> and are operated to obtain hourly continuous average data. Manual PM<sub>10</sub> samplers for speciation analyses are operated at the northeast site location for each Terminal. The meteorological conditions are also continuously measured at one site at each Terminal and are stored in an onsite data logger as five-minute averages.

The monitoring station siting survey was conducted in November 2013, and a report was submitted to EPA Region 5 on December 16, 2013. Deliverables for the project include this QAPP and a validated data set in Excel spreadsheet format. A project report reviewing the quality control data and audit results will also be provided to KCBX upon conclusion of the monitoring. Monthly email operational status reports are also required to be provided to KCBX. More detail about the spreadsheet and report content is presented in Section B7.

The project scope of work is divided into tasks, each of which has a designated task leader as shown in Figure A-1. The primary tasks for this project include installation/operations, data management, and quality assurance.

The current schedule is to initiate hardware integration and installation after KCBX receives approval of the proposed air monitoring program documentation (this QAPP) from EPA Region 5. It is anticipated that two weeks will be needed to perform the necessary station assembly, checkout, and installation at the KCBX Terminals. Operations will proceed for a minimum of one year.

#### **A4 Data Quality Objectives and Criteria for Measurement Data**

The EPA has developed a Data Quality Objective (DQO) process for use in the planning of environmental measurement projects. URS used the DQO process in the preparation of this QAPP and in the planning for this project. The results of the 7-step DQO process are shown in Figure A-2. The benefits of the DQO process are that it prompts a statement of the problem or issue, identifies the decision(s) to be made and the inputs needed to make the decision(s), and specifies a decision rule.

Following the DQO process, a set of quality criteria is defined for the measurement data. For this project, those criteria are given in Table A-1. These criteria are designed to provide accurate measurements of PM<sub>10</sub> and sample speciation. The criteria for meteorological data measurements are patterned after the onsite regulatory meteorological monitoring guidance published by EPA.

#### **A5 Documentation and Records**

The dataset created for this monitoring program will consist of these components stored for a minimum of five years in the project database:

- The hourly PM<sub>10</sub> data from each monitoring site;
- The laboratory analyses of manual samples for elemental/organic carbon, select metals, and PM<sub>10</sub> gravimetric mass; and
- The 5-minute average wind speed, wind direction, ambient temperature, barometric pressure, and sigma theta measurements at each meteorological monitoring site, and the calculated hourly averages from the 5-minute meteorological data.

The following sources of information will support these data:

- Station log books (in electronic form on field operator's computer);
- Calibration and maintenance records for all measurement systems;

- Laboratory reports with quality control results;
- Operational information collected internally by each monitor or sampler;
- Data validation and editing instructions; and
- QA audits of field operations and monitor performance.

**Figure A-2. DQO Process for KCBX Project**

<b>STEP 1</b>	State the Problem	KCBX has agreed to establish a program to monitor for PM <sub>10</sub> in real-time at specified locations at or near the fence line to determine on-site or off-site (whether upwind and/or downwind) contributions, if any, to the monitors. Additional manual sampling is needed to provide speciation data for elemental/organic carbon, metals, and PM <sub>10</sub> .
<b>STEP 2</b>	Identify the Decision	An ambient air monitoring program conducted at the areas identified by predominant wind flow and potential for community impact. The speciation data will be used to assist in possible determination of PM <sub>10</sub> sources.
<b>STEP 3</b>	Identify the Inputs to the Decision	Measurements of PM <sub>10</sub> concentrations will be made at nine (9) locations as 1-hour averages. Meteorological data will be collected (wind speed, wind direction, ambient temperature, barometric pressure, Sigma theta) on a 5-minute basis at each Terminal (see Figures B-1 and B-2 of QAPP) at a predominant downwind location. Speciation samples will be obtained at the northeast site of each Terminal.
<b>STEP 4</b>	Define the Study Boundaries	Location and frequency of sampling as defined in Section B of the QAPP document.
<b>STEP 5</b>	Develop a Decision Rule	KCBX will use the reported concentration levels and meteorological data to help assess net facility impacts and upwind background.
<b>STEP 6</b>	Specify the Limits of Decision Errors	Calibration of the monitoring equipment will be conducted as specified in EPA guidance documents and quality control limits will conform to guidance. See Table A-1 of the QAPP.
<b>STEP 7</b>	Optimize the Design	If the current system does not conform to the required QA/QC protocols, KCBX will initiate corrective action to bring the program into conformance.

**Table A-1. Quality Criteria for Measurement Data**

<b>1. Measurements of PM<sub>10</sub> using EPA Federal Equivalent Method (FEM) Monitor (BAM-1020)</b>	
Sensitivity	Lower Detection Limit <4.8 µg/m <sup>3</sup> 2σ, 1-hour average
Accuracy	Meets EPA Class III FEM Standard for additive and multiplicative bias; flow rate measurement accuracy ±4% at 16.7 LPM
Range	1 – 1000 µg/m <sup>3</sup>
Completeness	80% or better each month for each monitor at each site (with the exception of Acts of God, loss of power, or other situations over which neither KCBX nor their monitoring contractor have control)
Cycle Time	One hour
<b>2. Measurements of Elemental/Organic Carbon (EC/OC) using EPA speciation network SOP (TO/FID)</b>	
Accuracy	±16.7% at 23 µg/m <sup>3</sup>
Precision	0.085 at 23 µg/m <sup>3</sup>
Completeness	80% or better each month for each sampler (with the exception of Acts of God, loss of power, or other situations over which neither KCBX nor their monitoring contractor have control)
<b>3. Measurements of Metals using EPA Method IO-3.5 (ICP-MS)</b>	
Accuracy	±20% for analytical results above the reporting limit
Precision	±10% for analytical pairs above the reporting limit
Completeness	80% or better each month for each sampler (with the exception of Acts of God, loss of power, or other situations over which neither KCBX nor their monitoring contractor have control)
<b>4. Measurements of PM<sub>10</sub> using EPA Federal Reference Method (FRM) Sampler (2025i PartisolPlus)</b>	
Accuracy	Flow rate measurement accuracy ±4% at 16.7 LPM
Precision	Assessed by comparing sample data with 24 hour FEM average measurements; least squares slope within 10% on a quarterly basis for each NE monitoring site
Completeness	80% or better each month for each sampler (with the exception of Acts of God, loss of power, or other situations over which neither KCBX nor their monitoring contractor have control)
<b>3. Measurements of Meteorological Parameters using weather instruments (MetOne)</b>	
System Accuracy	±0.2 m/s (WS), ±5 degrees (WD), ±1.0°C (TMP), ±5 mmHg (BP)
Precision	EPA methodology does not provide for assessment of measurement precision
Completeness	90% or better for meteorological data based on hourly averages with a minimum 75% completeness of 5-minute data to construct a valid hourly average (with the exception of Acts of God, loss of power, or other situations over which neither KCBX nor their monitoring contractor have control)

## **B. MEASUREMENT DATA ACQUISITION**

### **B1 Sampling Process Design**

Consistent with the requirements of the Section 114(a) request, KCBX will establish monitoring sites at its North and South Terminals as indicated previously in Section A3. The source environment and monitoring site descriptions are presented in the following sections.

#### **B1.1 Source Environment Description**

The location of the KCBX North and South Terminals are in south Chicago, Illinois, near the southern tip of Lake Michigan along the Calumet River. The elevation of the area is approximately 590' above sea level and terrain is relatively flat. The suburbs of Chicago, Illinois surround the area and several neighborhoods are adjacent to portions of each Terminal fence line.

The local land use categories include refining and heavy industry, with a significant presence of residential housing immediately adjacent to and surrounding the western and eastern boundaries of the North Terminal and along the eastern boundary of the South Terminal. Minor river ports and canals are present in the area and provide access to Lake Michigan.

The climate of the area where the Terminals are located is characterized by cold winters and warm summers with occasional heat waves. The average temperature in January is 22° F and the average temperature in July is 73.3° F although 90° summer days are not uncommon. The annual average snowfall in winter is 37.5" and the annual average precipitation total is about the same. The proximity of KCBX to Lake Michigan's southernmost tip brings wind effects year-round. Annual wind roses for the area indicate a strong NW component as well as a strong SW component, based on the season.

#### **B1.2 Monitor Site Description**

Figures B-1 and B-2 (yellow pins) indicate the locations at which KCBX will operate monitoring stations as part of this program. The blue lines indicate approximate property boundaries. An example historical wind rose plot from Chicago is shown in Figure B-3. The predominant winds appear to be seasonally trimodal with very few winds directly from the East. Table B-1 lists the monitoring network configuration by site.

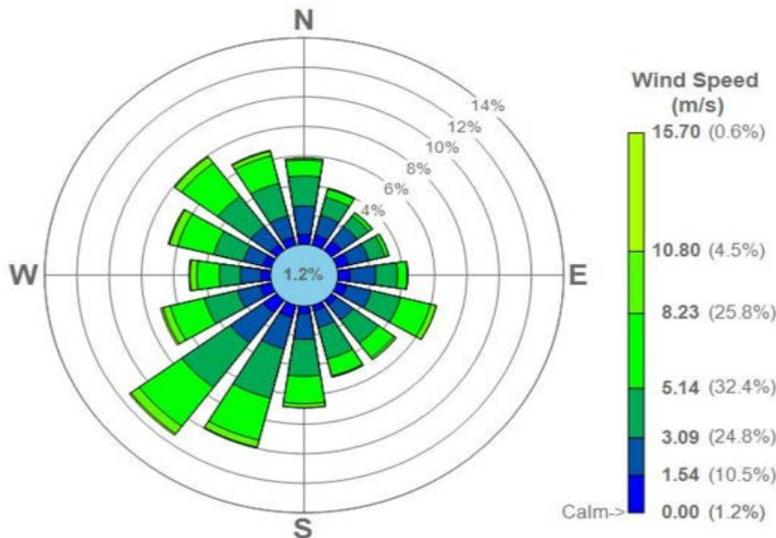
Figure B-1. Monitoring Site Locations for the KCBX North Terminal



Figure B-2. Monitoring Site Locations for the KCBX South Terminal



**Figure B-3. Wind Rose Plot for Chicago Area**



## **B2 Sampling Methods Requirements**

Sample collection methods are presented in this section as are sample documentation and control requirements that are applicable to the network. Three types of sampling methods have been identified for the KCBX network.

### **B2.1 Sample Collection Methods**

#### **BAM-1020 FEM PM<sub>10</sub>**

The PM<sub>10</sub> continuous monitors collect ambient particulate matter samples through a size-selective inlet that is designed to allow only particles with an aerodynamic diameter <10  $\mu\text{m}$  to pass through to the measurement apparatus. PM<sub>10</sub> is measured using the MetOne Instruments Model BAM-1020 (EPA designated Class III Federal Equivalent Method EQPM-0798-122). Specifications for the BAM-1020 are provided in Table B-2. The operation of the BAM unit is described in Section 3, of Revision H, of the MetOne BAM-1020 manual, along with calibration procedures (Section 5), and maintenance procedures (Section 7). The network technician has a copy of this manual for reference and an electronic copy is available to all project team members in the project management folder of the URS Austin server. The sample inlet height will be approximately 2 meters, within the 2-7 meter inlet height specification.

**Table B-1. KCBX Monitoring Network Configuration by Site**

<b>Site ID</b>	<b>Approximate Location</b>	<b>Monitoring Equipment</b>
#NT-NW	Northwest North Terminal 41 42.744 N 87 32.911 W	BAM-1020 monitor for PM <sub>10</sub> ; Meteorological monitors (MetOne 010C WS, 020C WD, 060A-2 TMP, Vaisala PTB110 BP)
#NT-NE	Northeast North Terminal 41 42.797 N 87 32.952 W	BAM-1020 monitor for PM <sub>10</sub> ; PartisolPlus 2025i samplers for EC/OC, metals, PM <sub>10</sub> mass
#NT-SW	Southwest North Terminal 41 42.573 N 87 33.013 W	BAM-1020 monitor for PM <sub>10</sub>
#NT-SE	Southeast North Terminal 41 42.576 N 87 32.708 W	BAM-1020 monitor for PM <sub>10</sub>
#ST-NW	Northwest South Terminal 41 41.936 N 87 33.066 W	BAM-1020 monitor for PM <sub>10</sub>
#ST-N	North South Terminal 41 41.921 N 87 32.864 W	BAM-1020 monitor for PM <sub>10</sub>
#ST-NE	Northeast South Terminal 41 41.954 N 87 32.744 W	BAM-1020 monitor for PM <sub>10</sub> ; PartisolPlus 2025i samplers for EC/OC, metals, PM <sub>10</sub> mass
#ST-M	East boundary South Terminal 41 41.854 N 87 32.746 W	Meteorological monitors (MetOne 010C WS, 020C WD, 060A-2 TMP, Vaisala PTB110 BP)
#ST-CE	East boundary South Terminal 41 41.673 N 87 32.756 W	BAM-1020 monitor for PM <sub>10</sub>
#ST-SW	Southwest South Terminal 41 41.608 N 87 33.070 W	BAM-1020 monitor for PM <sub>10</sub>

**Table B-2. BAM-1020 Specification**

Range	1 – 1000 $\mu\text{g}/\text{m}^3$
Sensitivity Std Deviation ( $\sigma$ ; 1 hr)	<2.4 $\mu\text{g}/\text{m}^3$
Flow Rate	16.7 liters/ minute (LPM)
Beta Source	Carbon-14; 60 $\mu\text{Ci} \pm 15 \mu\text{Ci}$
Operating Temperature	0° to 50°C
Humidity Control	Active control inlet heater; 35% RH setpoint
Analog Output	0-1 VDC std; selectable voltage and current ranges
Memory	182 days @ 1 record/hour

**PartisolPlus 2025i FRM PM<sub>10</sub>**

The PM<sub>10</sub> samplers collect ambient particulate matter samples through a size-selective inlet that is designed to allow only particles with an aerodynamic diameter <10  $\mu\text{m}$  to pass through to the measurement apparatus. PM<sub>10</sub> is measured using the Thermo Environmental Instruments Model 2025i PartisolPlus sequential sampler (EPA designated Federal Reference Method RFPS-1298-127). Specifications for the Model 2025i are provided in Table B-3. The operation of the unit is in accordance with the May 26, 2011 revision of the Thermo Environmental Instruments 2025i manual. Specific procedures are provided in Chapter 7 (Sampler Operation), Chapter 8 (Calibration), and Chapter 10 (Preventative Maintenance). The network technician has a copy of this manual for reference and an electronic copy is available to all project team members in the project management folder of the URS Austin server. The sample inlet height will be approximately 2 meters, within the 2-7 meter inlet height specification.

**Table B-3. PartisolPlus 2025i Specification**

Range	1 – 1000 $\mu\text{g}/\text{m}^3$
Sample capacity	16 filter cassettes
Flow Rate	16.7 liters/ minute (LPM)
Operating Temperature	-30° to 50°C
Data Output	selectable voltage ranges; RS-222; Ethernet
Memory	86 days @ 1 record/ 5 minutes

## **Meteorological Measurements**

Two 10 meter meteorological towers will be installed as part of this program. The first will be located near the northwest boundary of the North Terminal, and the second near the east boundary of the South Terminal. The towers will be outfitted with wind speed, wind direction, ambient temperature, and barometric pressure sensors. The data reported from the meteorological system will include vector resultant wind direction, scalar wind speed, vector wind direction standard deviation (aka Sigma Theta), ambient temperature, and barometric pressure for each five-minute and hourly collection period. Additional measurements of ambient temperature and barometric pressure will be collected from each BAM unit using onboard sensors, which enable them to calculate the correct flow rates for PM<sub>10</sub> monitoring. Sensors will be sited according to EPA guidelines. Table B-3 lists the performance specifications for each sensor type. A brief description of the meteorological sensors follows.

The Met One Model 020C wind direction sensor is a standard vane-type assembly. The vane is directly coupled to a single precision potentiometer. A built-in electronics module provides a voltage source for the potentiometer and amplifies the output signal. The voltage output is applied to a Campbell data logger for processing and storage of averages. The Met One Model 010C wind speed sensor contains a three-cup anemometer directly coupled to a slotted disc chopper wheel. The chopper rotates and interrupts the light path of an optical link. The signal is amplified and produces a pulsed frequency output proportional to wind speed. This output is applied to a Campbell data logger for processing and storage of averages. Each wind sensor is equipped with an internal heater to provide positive pressure to minimize internal dust accumulation and provide protection against light icing conditions. If extensive icing is encountered, external sleeve heaters may be employed to minimize downtime.

The Met One Model 060A-2 temperature sensor consists of a solid state electronic resistance element. The sensor is housed in a fan-aspirated radiation shield mounted at 2 meters height. The resistance output is applied to a Campbell data logger for processing and storage of averages. The Vaisala Model PTB 110 is an electronic pressure transducer. Its output is applied to a Campbell data logger for processing averages of ambient barometric pressure. It is mounted near the data logger at less than 2 meters height.

## **Shelters**

Environmentally controlled shelters with a minimum insulation rating of R11 will be installed at each monitoring site. The commercial grade climate control systems in each shelter will generally control the inside temperature within the range of 20 – 30° C for satisfactory

instrument performance and maintain a slight positive pressure. All internal electrical wiring conforms to National Electrical Code (NEC). Each shelter is configured with a sample inlet

**Table B-4. Specifications for Meteorological Sensors**

<b>Wind Speed</b>	
Starting Speed	0.22 m/s
Calibrated Range	0 to 50 m/s
Accuracy	± 1% or 0.07 m/s
Temperature Range	- 50 to +65°C
Response (Distance Constant)	< 3 feet to reach 63% of rate
<b>Wind Direction</b>	
Operating Range (Azimuth)	0 to 360 degrees
Starting Threshold	0.22 m/s
Linearity	± 0.5% of full scale
Accuracy	± 3 degrees
Damping Ratio	0.4 to 0.6
Delay Distance	Less than 3 feet
<b>Ambient Temperature</b>	
Range:	- 50° to +50° C
Accuracy:	± 0.1° C ambient
<b>Barometric Pressure</b>	
Range:	375-825 mmHg
Accuracy:	± 0.8 mmHg

flange through which the BAM-1020 inlet tubing is routed. Figure B-4 shows the EKTO dual unit cabinets which will be installed at the northeast sites at each Terminal (only one BAM unit will be installed for this monitoring network), and the single unit cabinet which will be installed at the remaining continuous PM<sub>10</sub> monitoring sites. The single unit cabinets are from ShelterOne (white exterior) and EKTO (tan interior), but are the same basic configuration.

### **Data Systems and Software**

The BAM-1020 units have onboard data logging capability of up to six months, so data values and diagnostic information are readily accessible. AirPlus software is used to communicate with the BAM-1020. The PartisolPlus samplers have capability for onboard storage of up to 90 days and the Thermo iPort software is used to communicate with the 2025i; each unit will be connected to the cellular aircard and router via Ethernet. Each meteorological monitor is wired into a Campbell Scientific CR-10X data logger with a network interface module at each meteorological tower and the CR-10X has at least six months of data storage capacity.

LoggerNet is the software program used to communicate with Campbell data loggers. Data will be acquired via cellular aircards and a router using each of these software products for file transfer protocol from the sites to the URS office in Austin, Texas each business day.

**Figure B-4. Shelter Configurations**



All datalogger, monitor, and sampler time settings will be set within  $\pm 60$  seconds of the site technician's reference time obtained from a local cell phone network.

## **B2.2 Sample Documentation and Control Requirements**

Field operation records include site visit and maintenance logs, checklists, chain of custody forms, continuous monitor calibration documents, and meteorological calibration documents. All of these records are in electronic form, as spreadsheets or text files. All field operation records are returned at least monthly to the URS data management task leader for inclusion in the project files. The automatic data polling systems are password protected and only URS team members have access. Examples of the checklists and calibration documents are presented in Appendix A and an example chain of custody form for laboratory samples is presented in Appendix B. The chain of custody protocol will follow the general guidance of Section 8 of Volume II of the EPA QA Handbook and sample specific requirements for storage and handling in each applicable analytical method, as well as Chapter 3 of the 2025i manual.

### B3 Analytical Methods Requirements

The monitoring program will collect 24-hour PM<sub>10</sub> filter samples that will later be analyzed for heavy metals and elemental carbon/organic carbon (EC/OC). Since one sample filter cannot be used for both types of analyses, URS will operate two Thermo Environmental Instruments Model 2025i PM<sub>10</sub> samplers at the northeast sites of each terminal. These samplers will operate from midnight to midnight, every three days, according to EPA's 3-day sampling schedule. The first sample date is projected to be February 19, 2014. Particulate matter is collected on pre-fired 47mm quartz fiber filters for EC/OC analysis, and on pre-weighed 47mm Teflon filters for mass and metals analysis. Samples will be collected weekly, after every 2-3 sample events and stored cold (<4°C) until a batch of filters is returned to the lab biweekly.

The exposed Teflon filters from each Terminal will be sent to Research Triangle Institute's (RTI's) laboratory in Research Triangle Park, North Carolina for analysis. RTI will initially perform a gravimetric analysis of the filters to determine its PM<sub>10</sub> mass concentration using EPA Method IO-2.1. The mass concentrations produced should provide a general indication of measurement agreement between the PartisolPlus samplers and BAM monitors at each northeast site.

Following gravimetric analysis, these filters will be prepared and extracted for heavy metal analysis using EPA Method IO-3.1, followed by Method IO-3.5 (ICP-MS). The estimated Method Detection Limit (MDL) for each of the target metals is listed below.

#### **Estimated MDL**

<b><u>Metal</u></b>	<b><u>nanograms per cubic meter (ng/m<sup>3</sup>)</u></b>
Arsenic	0.52
Barium	0.52
Cadmium	0.10
Chromium	0.26
Copper	0.10
Iron	0.26
Lead	0.10
Manganese	0.26
Nickel	0.52
Selenium	0.52
Silver	0.10
Vanadium	0.52
Zinc	0.26

Quartz fiber filters collected on the second PartisolPlus sampler located at each Terminal will be sent to RTI for EC/OC analysis. Filters will be prepared and analyzed using an application of NIOSH Method 5040, per the PM coarse speciation network SOP developed by

RTI. The carbon analysis is a Thermal Optical method. A small punch (0.5 cm<sup>2</sup>) from the quartz filter is exposed to a laser beam under helium atmosphere and temperature is raised to 540<sup>0</sup> C. All the organic carbon is determined where the carbon is oxidized to CO<sub>2</sub> by oxidation and reduced to methane by oxidation and reduction catalysts. Subsequently it is measured by a flame ionization detector. When organic carbon evolves at 540<sup>0</sup> C, oxygen is introduced and the temperature is raised to 740<sup>0</sup> C. Elemental carbon is determined by the same principle. Several peaks according to the boiling points will be shown in the thermogram, which are called different fractions such as OC1, OC2, etc. A list of carbon species targeted for this analysis and associated MDLs are provided below.

<b><u>Carbon Species</u></b>	<b><u>Estimated MDL micrograms per cubic meter (µg/m<sup>3</sup>)</u></b>
Organic Carbon 1	0.005
Organic Carbon 2	0.008
Organic Carbon 3	0.013
Organic Carbon 4	0.015
PCR	0.033
Elemental Carbon 1	0.009
Elemental Carbon 2	0.012
Elemental Carbon 3	0.013
OCR	0.038
Total Carbon	0.038

Laboratory records include sample cassette IDs imprinted on the filter support screens, chain-of-custody forms matching cassette ID to sample ID, raw data files from the analysis, QC check data, analysis reports, and electronic data files for transmittal to the project database. The laboratory is responsible for maintaining these records, and long-term archival of records is accomplished using a well-defined laboratory procedure. Each time that the lab receives field samples, sample login e-mail verification is sent to the data management task leader, as a scanned Adobe Acrobat file of the chain-of custody form.

An important consideration of the analytical work is the treatment of data at low concentrations near the method detection limit for the laboratory. Each laboratory has two boundaries within its KCBX reporting protocol: the Method Detection Limit (MDL) and the Reporting Limit (RL). Each target compound on the KCBX list has a unique MDL and RL. The RL is typically five times higher than the MDL, and results reported within this concentration range between MDL and RL are flagged as such. The precision and accuracy specifications are applicable to measurement data at or above the RL, and lower concentration data are possibly outside the quality specifications and should be treated accordingly by data users. The laboratory analysis conditions, such as sample or digestate volume can vary slightly from sample

to sample, so these numbers are not absolute. The estimated MDLs provided above are based on a nominal sample volume of 24 cubic meters of air.

The subcontract analytical laboratory has published SOPs that describe the basic procedures and quality indicators used by the lab to demonstrate adherence to the EPA methods. There are no special analytical requirements for this project outside of the EPA method or the laboratory SOPs. The SOPs may be reviewed upon request to the laboratory.

## **B4 Quality Control Requirements**

This section describes the quality control methods employed in the network. All field related information is presented in Section B4.1 and lab related information is presented in Section B4.2.

### **B4.1 Field Quality Control**

Field quality control encompasses several areas of concern. The tasks required of the field technician to promote quality are as follows (calibration tasks are discussed in Section B5):

- Documentation – The operator will maintain a file of site information that will include site visit and maintenance logs, operator checklists and calibration data. Copies of this documentation will be forwarded to the project team at least monthly, and these items will be retained in the project files. Submittal via electronic mail is acceptable. Examples of the calibration data sheets and operator checklists are presented in Appendix A.
- PM<sub>10</sub> Monitor Checks – A leak check, flow rate check, and temperature/pressure transducer check will be performed biweekly, or after any major maintenance, as recommended in the BAM-1020 manual. Additional maintenance checks are listed on the monthly QC spreadsheet used for this project (an example is shown in Appendix A).
- PM<sub>10</sub>/Speciation Sampler Checks – Appendix B contains example chain of custody form for the subcontractor laboratory participating in this monitoring effort. PartisolPlus sampler operating checks will be performed at least weekly and recorded on a QC spreadsheet, and will include a leak check and operating flow rate test. Additional maintenance checks are listed on the monthly QC spreadsheet used for this project (an example is shown in Appendix A).
- Meteorological Equipment Checks – The field technician will visually inspect the meteorological equipment at each visit (weekly at a minimum) for signs of deterioration or damage. With every site visit, he will review recent data and compare it to reported National Weather Service conditions for the area.

The meteorological sensors will be calibrated with traceable secondary instruments, which will either place the sensor in a known condition or make a comparative measurement.

All sensors are initially calibrated and certified by the instrument manufacturer and then compared to a traceable standard under ambient conditions every six months when deployed to the field.

The wind vane sensor will be aligned with landmarks of known orientations and the readings from the Campbell data acquisition system will be used to assess system accuracy. Orientation will be established relative to true north (subject to the local magnetic declination value of  $-3^{\circ} 46' W$ ), based on initial alignment conducted with a surveyor's transit. The wind speed anemometer shaft will be rotated with a traceable constant velocity motor at rates corresponding to four known wind speeds. Readings from the data acquisition system will be used to assess the correct anemometer response to a known motor velocity. These checks will be conducted every six months as part of the meteorological system calibration.

The ambient temperature and barometric pressure sensor outputs will be compared to traceable temperature and pressure standards of known accuracy every six months with the meteorological system calibration. The monthly check for the onboard temperature and pressure sensors for the BAM is documented on the BAM QC form, since the temperature and pressure readings are critical to subsequent  $PM_{10}$  mass calculations. A summary of service checks is provided in the BAM manual (refer to Section 7 of the manual). The other quality control checks for the meteorological hardware in this project include:

- Visually inspecting (from ground level) the meteorological sensor and tower system during each site visit;
- Inspecting the anemometer and wind vane for any damage if the data appear suspect;
- Visually inspecting the wind direction alignment for reasonableness during each site visit;
- Checking the temperature aspirator fans for proper operation;
- Inspecting the BAM temperature and barometric pressure sensor housing for evidence of damage or airflow blockage; and
- Comparing the current conditions to local weather reports and against measurements from other monitoring sites in the area as available.

## **B4.2 Laboratory Quality Control**

The following lists present some of the common quality control procedures required by the methods for each type of analysis. Specific quality control measures are provided in the laboratory SOP documents.

Laboratory quality control for elemental/organic carbon analyses includes the following:

- Quartz fiber filters must be prepared in a low temperature asher for 2-3 hours or in a muffle furnace for 1-2 hours at 800° C.
- Analyze replicate samples. For up to 50 samples, analyze 10 percent, and for over 50 samples, analyze 5 percent.
- Use three quality control spikes and three analyst spikes to check the instruments calibration prior to testing.
- Adjust analyzer settings according to manufacturer's recommendations.
- Double check calculations while determining EC/OC concentrations.

Refer to NIOSH Method 5040 and the RTI SOP for more detailed requirements for the EC/OC quality control measures.

Laboratory quality control for metals analyses includes the following:

- Use at least two calibration standards, and one calibration blank while performing initial calibration.
- While performing calibration verification checks, use calibration standards from a different vendor.
- Analyze a calibration blank before each run.
- Run interference check standards through the analyzer.
- Use continuing calibration standards to check the response of the instrument, as required, depending on the number of filters in a batch.
- A reagent blank should be tested.
- Laboratory control spikes should be used after each batch of samples.
- Analyze a matrix spike during each run.
- Test a duplicate or spike duplicate after testing a group of samples.

Refer to EPA Method IO-3.4 for more detailed requirements for a metals laboratory's quality control program.

Laboratory quality control for gravimetric mass analyses includes the following:

- Use media that meet the requirements for sampling presented in IO Method IO-3.1 Section 4.
- Equilibrate media under the temperature and humidity control requirements of the Method before weighing.
- Use the same microbalance for pre- and post-sampling weighing events.
- Calibrate the microbalance using Class S standard weights.

- After every tenth weighing, re-zero the balance and perform a standard weight check.
- Reweigh 10% of the samples using a different analyst.

Refer to EPA Method IO-3.1 for more detailed requirements for a mass laboratory's quality control program.

URS will be using the following method to create unique sample identification (ID) designations for each field sample collected during this study. Samples will be identified using the following format:

**XX-DDMMYY-ZV**

Where:

**XX** is the collection location; NT for North Terminal and ST for South Terminal (both are northeast site)

**DDMMYY** is the sample day, month, and year

**Z** is the sample type; C for EC/OC and M for metals and mass samples

**V** is the type of sample; R indicates a routine sample and B indicates a field blank

For example, NT-021914-CB represents a field blank for carbon species collected on February 19, 2014 at the North Terminal northeast site.

### **B4.3 Equipment Testing, Inspection, and Maintenance**

Specific tasks for periodic testing, inspection, and maintenance are required for the air sampling and monitoring equipment to provide sufficient quality control to remain within the manufacturer's operating specifications and ensure that the project quality goals are met. Initial testing of each piece of equipment is conducted in the URS air quality instrumentation lab for operation within the manufacturer's specifications, then some operational checks are repeated during installation, before initial calibration and use for field measurements. These operational checks are described in Section B4.1. The maintenance tasks are summarized for each type of equipment below.

- **Continuous Monitor Maintenance** – Each monitor has manufacturer-recommended maintenance schedules that are found in the operating manuals provided at the station. These must be followed at a minimum, or in response to an identified decrease in analyzer performance. For the PM<sub>10</sub> monitor, the filter tape should be inspected weekly (usual life time is 2 months before replacement). The sample inlet hardware for PM monitors should be disassembled and cleaned monthly, including

the PM<sub>10</sub> nozzle assembly, and the sample pump and tubing should be inspected. Section 7 of the BAM manual provides details.

- **Manual Sampler Maintenance** – Maintenance of the PartisolPlus 2025i samplers will be performed according to the procedures presented in the manual (Section 10). A large part of preventative maintenance of the PartisolPlus samplers is keeping the PM<sub>10</sub> head inlet system and filter cassette O-rings and seals clean from dirt. The PM<sub>10</sub> head and inlet parts should be cleaned a minimum of once a month, or more frequently, if required. Rain hoods and air screens are scheduled to be cleaned every six months. However, experience has shown that insects find these areas a good place to build a nest, requiring more frequent cleaning. O-rings and seals should be inspected monthly and kept pliable with an application of silicone grease. A sharp rise in internal and external leak check results is likely an indication of a potential future leak.
- **Meteorological System Maintenance** – The field technician must perform an inspection of the tower and equipment and perform maintenance activities with each visit. The inspection should include verifying that the wind vane and anemometer cups/propellers are intact and operable and verifying that the temperature/pressure aspirator fin set is free from debris. An inspection of the signal cables and fastening hardware should be conducted at three-month intervals, during either a system calibration or audit.

These activities must be documented in the site visit logbook. The field operations task leader should provide a schedule for all activities and checklists to the field technician. A limited number of common consumable parts are maintained in the field technician's possession. Additional parts may be obtained from the operations task leader. URS maintains an equipment cost center in Austin, Texas that serves approximately 50 air quality monitoring sites. The equipment used for this project is commonly in stock in the cost center, and spare parts are readily available to deliver to the field via overnight air express, if needed.

#### **B4.4 Acceptance Requirements for Supplies and Consumables**

Field equipment supplies and consumables are obtained either directly from the original equipment vendor, or from a scientific equipment/ materials vendor whose products are proven to be equivalent in quality, or are commonly available (silicone grease is an example). The equipment manager for the Austin cost center should be consulted if any question arises regarding suitability for intended use. Such supplies and consumables include but are not limited to: vacuum pump rebuild kits, silicone grease, filter tape, wind sensor bearing assemblies, and BAM nozzle cleaning supplies.

## **B5 Instrument Calibration and Frequency**

This section describes the calibration protocols for each type of measurement conducted in the KCBX network and the prescribed frequency.

### **B5.1 Calibration Procedures for BAM-1020**

Each BAM-1020 unit deployed to the field must undergo a zero background test before taking data. This test is performed using a zero calibration filter kit supplied by MetOne and is placed in place of the sample inlet head. The unit is then operated for a minimum of 72 hours to determine the true zero background of the unit at the given location conditions. The unit's background constant value is then updated in the operating software before sampling can commence. This check will be repeated as needed, usually at six month intervals or after major maintenance or repair.

Calibration of the PM<sub>10</sub> monitor consists of two levels of activity. First is a semi-annual calibration as described in Section 5 of the BAM manual. This calibration involves testing the flow controller at three flow rates, then setting the operating flow rate at 16.7 liters per minute (LPM). A leak check is performed, and then a flow meter traceable to a NIST primary standard (BGI DeltaCal or equivalent) is installed in place of the sample inlet head to independently measure the flow rate. The temperature and pressure transducers are tested and adjusted, and this is also accomplished using a traceable standard. The results are documented in a spreadsheet.

Second, a biweekly verification check is conducted. This check tests the ability of the sampler mass flow controller to operate at  $\pm 4\%$  measurement accuracy, and maintain the design flow rate of 16.7 LPM within  $\pm 5\%$ . This procedure is similar to the semi-annual calibration, and a spreadsheet is also used to document the results. A leak check is performed and the flow rate reading should drop to below 0.5 LPM; if this cannot be met, the nozzle should be cleaned and the check repeated. The ambient temperature and pressure transducers are also checked. The acceptance criteria for these calibration checks are  $\pm 2.0$  °C and  $\pm 10$  mmHg; if these levels are not met maintenance and adjustment is required. An example of the spreadsheets used for PM<sub>10</sub> semi-annual calibration and biweekly calibration check activities are included in Appendix A.

### **B5.2 Calibration Procedures for PartisolPlus 2025i**

Calibration of the PartisolPlus 2025i samplers should be performed at least quarterly, or after any maintenance activity that has the potential to alter the response of the instrument. Similar to the BAM-1020 calibration procedures, the PM<sub>10</sub> sampling head is removed, and the mass flow controller tested over three points against a NIST primary standard (BGI DeltaCal or equivalent). Acceptable results should be  $\pm 4\%$  of the flow reading of the primary standard for each point. During calibration, ambient temperature, compartment temperature, filter

temperature, and barometric pressure are checked against a certified transfer standard. Allowable ranges for these calibration checks are  $\pm 2.0$  °C for temperature measurements and  $\pm 10$  mmHg for pressure readings. Both internal and external leak checks are performed as part of the calibration. Leak check results reported by the instrument should be  $\pm 25$  mmHg. Readings above that level will require inspecting the O-rings and seals for cracks or other leaks within the flow system. Finally, the internal clock is compared to the time displayed by a cell phone, or other device of known accuracy. The internal clock should be  $\pm 60$  seconds of the known time (always Central Standard Time). Any results not meeting the acceptance criteria above will require immediate adjustment or corrective action until those criteria are met.

In addition to quarterly flow rate calibrations, monthly flow checks will be performed. These checks are similar to calibrations, but verify only one flow point, instead of three. During each check sampler temperatures, barometric pressure, and the internal clock will be compared to certified transfer standards. Internal and external leak checks will be conducted. As with calibrations, any parameters found to be outside allowable limits will be adjusted or corrected before sampling resumes. Refer to Appendix A for examples of calibration check forms.

### **B5.3 Calibration Procedures for Meteorological Monitors**

Meteorological sensors will be calibrated at program startup and on a scheduled semi-annual basis thereafter. Unscheduled calibrations will be performed following any sensor repair or replacement. The calibrations will occur in monitoring quarters where meteorological sensor audits are not scheduled so that an assessment is performed each quarter, whether a QC check or an audit. Monthly checks of the ambient temperature and barometric pressure sensors onboard the BAM and PartisolPlus units are also conducted as part of the monthly QC procedures for those items.

All calibration methods used will conform to EPA guidelines for calibration of meteorological systems. The specific procedures to be used for the wind instruments are described in Tables B-5 and B-6 and the procedure for temperature is described in Table B-7. Table B-8 describes the barometric pressure sensor calibration check. Meteorological calibrations will be performed twice a year or more frequently if major maintenance or repair is required on any sensor.

**Table B-5. Calibration Procedure for Wind Direction Sensors**

<b>Required Equipment: Surveyor's Transit, Tripod, Small Hose Clamp, Linearity Device, Screwdriver</b>	
1.	Begin by making a note in the station logbook of the time/date of the calibration. Lower the meteorological tower so that the wind direction sensor is accessible, noting the start time at the top of the audit form. Examine the sensor for damage or loose parts. Install the small hose clamp over the shaft and the vane collar, align the sensor benchmarks, and tighten the clamp, making sure that the benchmarks remain aligned.
2.	Check the station data system's instantaneous wind direction readout. A reading of 180° should be indicated. If the reading is not quite 180°, adjust the vane and retighten the clamp until 180° is indicated. Enter this value under "Test Angle" on the bottom of the calibration form. Raise the tower.
3.	Set up the surveyor's transit and tripod at a point along the imaginary axis created by the vane at a distance of approximately 35 yards, either to the north or south of the sensor. Level the transit and set the outer vernier to 0°. Align the compass needle to 0°, then lock the lower stage and unlock the upper stage (vernier).
4.	Sight the vane with the telescope, making sure that the axis of the vane is square in the cross-hairs. Read the degree value from the vernier to the nearest tenth, e.g., 6.3° East. Compare the value obtained to the known magnetic declination value for the area; the values should agree within ±2°. Note the value observed in the station logbook and on the calibration form. If the vane alignment is out of tolerance, see that corrective action is initiated. Upon completion of the alignment check, lower the tower, remove the clamp, install the linearity device, and set at 180°. Proceed to rotate the vane in 30° increments clockwise and record the sensor output for a full rotation. Once back at 180° rotate counterclockwise down to 0° and record each output.
5.	When calibration activities are complete, raise the tower and note the time on the calibration form and in the station logbook.

**Table B-6. Calibration Procedure for Wind Speed Sensors**

<b>Required Equipment: Allen Key Set, Tygon or Rubber Tubing, Tie-Wraps, Selectable Speed Synchronous Motor Drive, Motor Drive Mounting Arm, Torque Measurement Device</b>	
1.	Begin by making a note in the station logbook of the time/date of the calibration. Lower the tower so that the sensor is accessible and record the start time in the station notebook. Remove the sensor from its mount and examine the anemometer cups for damage or loose parts. Remove the anemometer cups from the sensor shaft.
2.	Connect the shaft of the sensor to the shaft of the motor using Tygon or similar tubing, making sure that no slippage of the tubing is possible around either shaft. A custom mounting arm is provided for this step.
3.	Check the station data system instantaneous readout for wind speed. A reading of 0.0 m/s should be indicated as the zero value. Record this value on the calibration form. Set the motor to 60-rpm, selecting clockwise rotation, and record the stable instantaneous output value from the data system. The value should be within 0.2 m/s of 1.9 m/s. Switch the motor to counter-clockwise rotation and verify that the value obtained is the same as in the clockwise rotation position.
4.	Set the motor output to 160, 300 and 600-rpm and repeat the above procedure. The value obtained should be within 0.2 m/s of each expected output shown on the spreadsheet.
5.	Remove the tubing from the sensor shaft and detach the mounting arm. Attach the torque measurement device and balance the device with the sensor in a horizontal position (all holes in the torque measurement disk should be horizontal). Place a 0.1-gram screw in the hole at a 3-cm radius horizontal from the center. Observe the disk for rotational movement away from horizontal, indicating acceptable bearing condition.
6.	Replace the anemometer cups and remount the sensor. Raise the tower and note the time on the audit form.

**Table B-7. Calibration Procedure for Temperature Sensors**

<b>Required Equipment: National Institute of Standards and Testing (NIST) Traceable Temperature Device</b>
1. Remove the 2 meter sensor from the aspirator housing and place in a water bath at 0° C with a NIST traceable temperature device in close proximity, out of direct sunlight. Allow a minimum of 15 minutes equilibration.
2. Record the temperature from the NIST traceable device(s) and the corresponding readings of the station temperature from the data logger.
3. Repeat the reading three times at intervals of at least three minutes each to verify stabilized results. Verify that the temperature is within 1.0 degrees C. Repeat the process using water baths at ambient conditions and at least 15° above ambient temperature. Replace the sensor if outside specification at any temperature level.
4. Record the results on the calibration form and in the station logbook and return to normal sampling operations.

**Table B-8. Calibration Procedure for Barometric Pressure Sensors**

<b>Required Equipment: Traceable Calibration Standard Barometer</b>
1. Place the site sensor and traceable calibration sensor in close proximity.
2. Record the readings of the two sensors as five minute averages for at least three different iterations.
3. Verify that the sensors agree within $\pm 2.3$ mmHg. Replace the sensor if outside specification.
4. Record the results on the calibration form and in the station logbook and return to normal sampling operations.

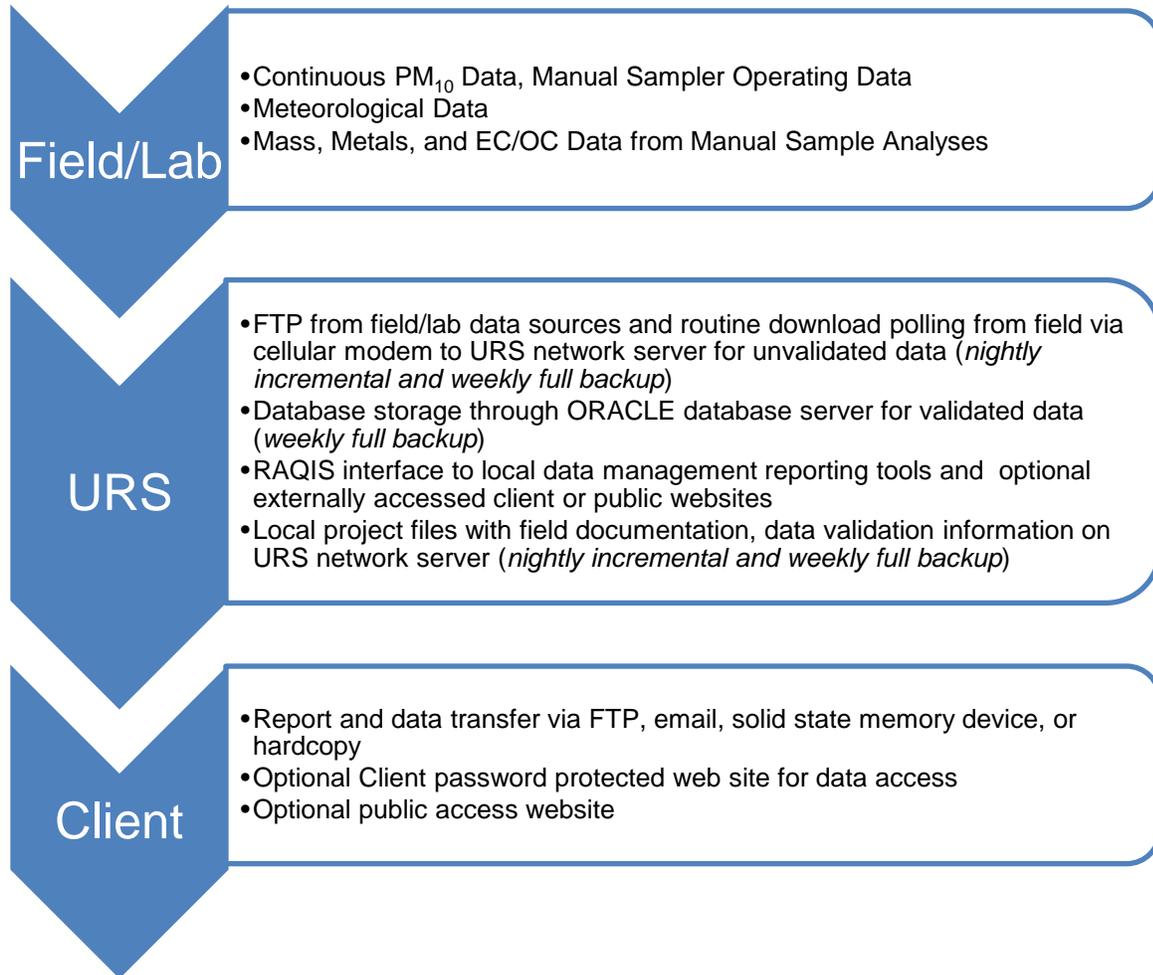
## **B6 Data Acquisition Requirements**

All data acquisition will employ the onboard data logging capability of the BAM-1020 monitor and PartisolPlus samplers for PM<sub>10</sub> and a Campbell Scientific CR-10X data logger for meteorology. The PM<sub>10</sub> measurement cycle is one hour for the BAM-1020, and the PartisolPlus stores sampler operating conditions at 5 minute intervals. The Campbell logger will sample each sensor input once per second and average the inputs to 5-minute data intervals. From these 5-minute intervals hourly averages may be calculated.

## **B7 Data Management**

Figure B-5 presents the data flow path for collecting, storing, and managing all data generated in the network. The data logging units on the BAM-1020, PartisolPlus, and the Campbell units store averages as ASCII format data. An automated daily polling routine is initiated from the URS air monitoring data processing center to collect continuous PM<sub>10</sub> data, manual sample PM<sub>10</sub> operating data, and meteorological data. Data are transmitted from the sites via cellular wireless networks for Internet access. Each of these data sets is transferred to the Radian Air Quality Information System (RAQIS) database using a custom data file loader program. All raw continuous and manual sampler data from the field are retained in the database. The data management task leader and other team members with authorization to

**Figure B-5. Data Management Tasks for KCBX Network**



access RAQIS then may obtain data for preliminary review and validation. The operations task leader and network field technician also periodically connect to the monitoring sites using remote PCs to review the operating status of the equipment. Monitor calibration data are transferred in Excel spreadsheets to the data management task leader, who then loads all of the file information to the KCBX network site on the server. URS network servers have an incremental backup performed nightly, and once a week a full backup is performed. All data are still in an unedited, non-validated form at this point and have received a screening for gross errors or anomalies only.

When a month of data is complete and present on the server, the hourly data are imported into an Oracle<sup>®</sup> database for reporting and validation tasks; this database is fully backed up

weekly. An air quality scientist reviews the data, calibration files, and logbooks and creates a set of edit instructions for the data. Any edit instructions that are required for the continuous pollutant or meteorological data are sent to the project data management task leader for application.

Once the edits have been completed the task leader saves an “edited” version of the data, and then notifies the project manager that the data are ready for final approval. The edited version of the data is then reviewed and approved. The project manager (or designee) then either approves the edits or requests further action. When the final edits are complete and the monthly data are considered validated, the database is updated to contain the edited version only (unedited data are recoverable from the server). The record of edit instructions is stored in the project files as hardcopy and is available for further review if necessary. All documentation is retained for a minimum of five years.

Client reports may be accomplished through several means: an electronic file transfer of data may be obtained (via FTP or e-mail), data may be copied onto a CD-ROM, or a hardcopy report script can be used to generate reports. Additionally, reports of averages, trends, individual sample results, and wind rose distribution plots can be generated from the intranet site that allows URS project team members access to the database as a Windows-based application.

Monthly status reports will be forwarded to KCBX within 14 days of the end of each month via email. These reports will briefly describe the progress of the monitoring efforts; discuss any issues of significance to data collection including extended downtime, present a summary table of the five highest hourly average PM<sub>10</sub> concentrations for the month at each terminal, and present a summary table of 24-hour average PM<sub>10</sub> data from each site. URS will also provide KCBX with copies of site visit and maintenance logbooks, operations checklists, and calibration forms generated each month.

A project data summary is required to be submitted to EPA on a monthly basis. The continuous monitor, filter sample speciation, and meteorological data set will be submitted as an Excel spreadsheet file as ASCII comma delimited hourly average values, with single header rows by variable. Copies of QC checks and QA audits conducted during the month will also be provided. This summary is required to be submitted via email attachment and is due 20 business days after the conclusion of each month of monitoring.

## **C. ASSESSMENT AND OVERSIGHT**

### **C1 Assessment and Response Actions**

The URS project team includes a quality assurance specialist whose duties are solely in the area of independent assessment of the measurement effort. This individual is part of the same corporate organization as the project team, but holds no duties or interests in the operation of any of the monitoring sites and networks that he audits. To promote objectivity and independence, the specialist maintains designated audit equipment in a separate location from the operations center, and has access to the Austin General Engineering Department QA Officer for assistance in promoting the quality objectives of the company. The QA Officer is also available to assist in resolution of project issues related to quality. Assessments conducted for this project fall into two categories: Technical Systems Audits and Performance Evaluation Audits. Both provide vital information regarding the status of the project team operation and how well the measurement data adhere to the quality specifications of the QAPP. All performance and technical systems audits are conducted following the guidance documents in the “EPA Quality Assurance Handbook” series, Volumes I, II, and IV. Additional method-specific quality guidance is provided by the applicable sections of the manufacturer operating manuals, in the absence of an EPA guidance document specific to the application of an equipment-specific measurement.

#### **C1.1 Technical Systems Audits**

Technical systems audits for the field operation have several areas of focus. The audit is conducted employing a checklist as a guide to the major topics to be assessed, and the auditor is free to allot greater amounts of time to any particular area as needed. A checklist is prepared in advance of the audit and is based on information presented in the QAPP and in general, the guidance of the EPA QA Handbook series.

The field technical systems audit includes a review of overall equipment siting and exposure, site visit logs, continuous analyzer and meteorological operating procedures and documentation, and any site maintenance activities. From this assessment the auditor is able to determine the quality requirements for the monitoring effort from the QAPP, and then report on the level of adherence to the specifications. This review includes traceability documentation for standards and test equipment used to conduct quality control checks on pollutant and meteorological monitors. Where the specification appears incomplete or inadequate, the auditor should be able to apply EPA guidance document information and personal experience in assessing whether the quality of the monitoring activity will produce defensible data. Technical Systems Audits are conducted quarterly for the network field operation. Some example TSA field checklists are presented in Figure C-1.

## Figure C-1. Example TSA Field Checklist

### AIR MONITORING SYSTEMS AUDIT CHECKLIST

**Site** PECO Round Rock  
**Date** March 31, 2011

Response (Y, N or Unknown. Indicate NA if question does not apply to operation under review)	Operational Function	Comments
	<b>I. System Equipment Inspection</b>	
	<b>Sample Manifold and Inlet System</b>	
Y	Is the sample inlet manifold clean and properly assembled?	
Y	Are unused manifold ports plugged?	
Y	Is the manifold material chemically inert? (Glass or Teflon)	
Y	Is the manifold blower motor working?	
Y	Is the manifold flow rate monitored? (How?)	
Y	Are manifold parts and sample inlet lines dry?	
Y	Are sample inlet lines 1/4" FEP Teflon?	
Y	Are all analyzers operational?	
Y	Do autocal data indicate "In control" conditions?	
Y	Are inlet filters used? Specify date of last change.	March 23, 2011
	<b>Auxiliary Equipment</b>	
Y	Is the A/C unit maintaining temperature between 70-80 F?	
Y	Does the telephone/modem system work?	
Y	Is the data system time and date accurate (to 5 minutes)?	
	<b>Wind direction / Wind speed</b>	
Y	Are all sensors operational?	
Y	Are wind Sigma values calculated and recorded?	
Y	Are wind vector and scalar values recorded?	
Y	Is the instrument tower plumb and the base secured?	
Y	Are instrument mountings level?	
Y	Is tower winch assembly secure and easy to operate?	
Y	Are all signal cables and connections in good shape?	
	<b>Temperature and or Differential Temperature</b>	
Y	Sensor(s) operational?	
Y	Aspiration fan(s) operational?	
Y	Instrument mounting(s) level?	
Y	Signal cable(s) and connection(s) in good shape?	
NA	<b>Precipitation</b>	
	Is the sensor operational?	
	Is the sensor level?	
	Is the signal cable in good shape?	
NA	<b>Relative Humidity</b>	
	Is the sensor operational?	
	Is the aspiration fan operational?	
	Is the instrument level?	
	Is the signal cable in good shape?	
NA	<b>Barometric Pressure</b>	
	Is the sensor operational?	
	Is the instrument level?	
	Is the signal cable in good shape?	
NA	<b>Radiation Sensor</b>	
	Is the sensor operational?	
	Is the sensor level?	
	Is the signal cable in good shape?	
	Are values at night zero for solar radiation?	
	Are values at night negative for net radiation?	
	<b>Gas Chromatography</b>	
Y	Is the analyzer operational?	
Y	Were the GC file names changed to reflect an audit?	
Y	Is the date/time correct on the GC software?	
Y	Are downstream variable rotometers set to the recommended level?	
Y	Are downstream flow controllers set to the recommended level?	
Y	Are daily calibration and blank checks performed?	
	<b>NO<sub>x</sub>/NO/NO<sub>2</sub> Analyzer</b>	
Y	Is the analyzer operational?	

Figure C-1. (continued)

N	Are there any error / status conditions on the display?	
	<b>SO<sub>2</sub> Analyzer</b>	
Y	Is the analyzer operational?	
Y	Are there any error / status conditions on the display?	Low flow warning
	<b>O<sub>3</sub> Analyzer</b>	
NA	Is the analyzer operational?	
	Are there any error / status conditions on the display?	
	<b>H<sub>2</sub>S Analyzer</b>	
NA	Is the analyzer operational?	
	Are there any error / status conditions on the display?	
	Is the converter temperature above 325 F?	
	<b>Particulate Matter Samplers</b>	
NA	Are collocated samplers operated at this site?	
	Are the samplers between 2 and 5 meters apart?	
	Are sampler gasket materials in good condition?	
	Are chart recorder traces normal?	
	Are sample elapsed time records normal? How measured?	
	If present, are stagnation pressure ports capped?	
	Are sample inlets clean? Specify date of last cleaning.	
	<b>II. Operational Procedures</b>	
	<b>Recordkeeping and Safety</b>	
N	Is a bound, document-controlled station logbook used?	Electronic form
Y	Do logbook entries show arrival/departure time and date?	
Y	Are any events that affect status noted (calibrations, "down" times)?	
Y	Is the authorship of each entry noted?	
NA	Are incorrect entries marked out with a single line?	
Y	Are the most recent calibration data completed and posted?	
Y	Is the station calibrator flow rate measurement data posted?	
Y	Is the configuration listing for the data system posted?	
Y	Are Material Safety Data Sheets (MSDS) posted?	
Y	Is an operational fire extinguisher in the shelter?	
Y	Is the site address posted, with emergency numbers (if not 911)?	
	<b>Calibrations</b>	
Y	Is the site technician trained to perform valid calibrations?	
Y	Are certified, traceable gas standards used? Specify. (Specify all cylinders used.)	SO <sub>2</sub> /NO Protocol Blend; Benzene NIST Standard
Y	Are certified, traceable flowrate standards used?	
NA	PM10 orifice?	
Y	Are automated zero/spans performed daily?	
Y	Are precision checks performed biweekly at 16-20% of full scale?	
Y	Are calibrations performed before and after analyzer adjustments?	
	<b>III. Data Chain-of-Custody</b>	
Y	Are hourly averages from the data system periodically retrieved?	
NA	Is a data shipment package sent from the field periodically?	
NA	Are duplicate copies of all written records kept on-site?	
NA	Are data shipment custody forms used?	
NA	Are particulate matter C-Q-C filter envelope forms complete?	
NA	Is a copy of the shipping bill of lading kept for tracking purposes?	
	<b>IV. Maintenance</b>	
Y	Is a schedule for preventative maintenance available?	
Y	Are adequate parts and tools available for maintenance?	
Y	Are maintenance activities recorded in a logbook?	Kept with site visit log spreadsheet
Y	Are maintenance procedures consistent with project expectations?	
	<b>V. Overall Observations</b>	
Y	Does the field operation meet project expectations?	
Y	Are the current readings consistent with ambient conditions?	
Y	Are all data system recording channels on-line? Note date/time.	March 31, 2011

AUDITOR: John Smith

Notes: Informed site operator about SO<sub>2</sub> low flow warning

**URS**

February 1, 2010

## C1.2 Performance Evaluation Audits

Continuous PM<sub>10</sub> monitor and sampler performance is audited quarterly, and consists of a leak check, a flow rate measurement accuracy check, and verification of the temperature and pressure transducer measurement accuracy. The leak check must demonstrate a flow rate less than 1 LPM, the flow rate accuracy check must be within  $\pm 4\%$ , the temperature measurement accuracy must be within  $\pm 2.0^\circ \text{C}$ , and the pressure measurement accuracy must be within  $\pm 10 \text{ mmHg}$ .

Performance audits for meteorological sensors are conducted semi-annually, in coordination with the meteorological calibration events (either a calibration or an audit is conducted every three months). The performance audits are accomplished by either direct comparison with an audit standard of known quality, or an artificial field test in which the instrument response is predicted. For the wind direction sensor, the output of the sensor with the vane turned to a series of known directions is assessed, as is the orientation of the vane with respect to true north. The wind speed sensor is tested using a traceable certified motor drive unit for which the rotational speed inputs have a predicted result. The condition of the wind instrument bearings is also checked to ensure that the starting threshold is within specification. The ambient temperature and barometric pressure audits are conducted using collocated audit standards. A digital thermistor unit with certified traceability is used for temperature and a traceable barometer is used to test the site pressure transducer. Table C-1 presents the audit objectives for the meteorological measurements.

**Table C-1. Performance Audit Specifications for Meteorological Measurements**

Measurement	Audit Activity	Specification
Wind Direction	True North Alignment	$\pm 2^\circ$
	Sensor Linearity	$\pm 3^\circ$
Wind Speed	Starting Threshold	$\leq 0.3 \text{ gm-cm}$
	Artificial Field Input	$\pm 0.22 \text{ m/s}$
Temperature	Collocated Transfer Standard	$\pm 1.0^\circ \text{ Celsius}$
Barometric Pressure	Collocated Transfer Standard	$\pm 2.3 \text{ mm Hg}$

## **C2 Reports to Management**

Reports for field performance and technical systems audits conducted by URS include a statement of the scope of the audit, summary presentation of results, and a listing of specific observations or findings related to the specifications under review. Also, the field data and traceability documents for each audit standard employed are included. The auditor should always provide the field technician and/or the operations task leader a list of preliminary findings and recommendations during a debriefing meeting held at the conclusion of the audits. If significant deficiencies are determined that impact the ability of the system to properly function, the URS Project Manager will be notified immediately. He in turn will notify the KCBX Project Manager of the situation and advise them of the response actions being undertaken to restore the systems to full operational status. A formal report should be provided to the project team within two weeks of completion of the audits. If there are no corrective action items, the auditor may close the audit. If further action is required, the audit will be classified as open pending verification that the corrective action was completed and the audit specification is being met. This information will be supplied to EPA as part of the monthly reporting effort.

Responsibility for follow-up on audit recommendations belongs to everyone on the project team, but usually one person is designated after each audit to provide a written response to the findings and communicate the outcome of the corrective action effort. This is typically the operations task leader for the field network or the subcontract laboratory manager. If the auditor does not receive a response or the response is inadequate, he must communicate the situation to the project manager, who has the ultimate responsibility for the technical execution of the project. The URS Austin General Engineering QA Officer is also available to assist in obtaining a resolution to problems related to corrective action.

A formal Corrective Action Report (CAR) system is available to document audit findings and track corrective actions undertaken by the project team, if warranted. The CAR system is a database-driven program that contains formal documentation that outlines the nature of an identified deficiency, system or systems that are affected by the deficiency, proposed corrective action, actions taken by the responsible party, and the follow-up verification of the resolution of the deficiency. The URS Austin ambient air monitoring QA group administers the CAR system, and most action items are resolved at the project team level.

Accuracy, precision, and completeness statistics are also computed on a quarterly and annual basis for each measurement as applicable. A quarterly review of laboratory detection limits will be conducted to ensure that the reported limits meet the nominal values stated in this QAPP. The computations for flow rate measurement accuracy are as described in Volume II and the computations for meteorological measurement accuracy are as described in Volume IV of the

EPA QA Handbook. Precision of PM<sub>10</sub> measurements is assessed by quarterly least squares regression comparison of FEM and FRM PM<sub>10</sub> data at each NE site where those measurements are collocated. Laboratory analysis precision is compared to the method requirements for analytical duplicate analyses. Completeness is calculated as the ratio of valid samples or hours of data compared to the total planned number of samples or operational hours of data attempted to be collected, expressed as a percentage.

Accuracy data are generated each quarter by the audit staff, as the spreadsheet results from measurement audits. Precision data are generated by the data management staff, in the form of statistics created from precision check data, or QC data from the subcontract laboratory as required by the analytical method. Completeness data are also generated by the data management staff, using an automated reporting script integrated into the RAQIS database.

## **D. DATA VALIDATION AND USABILITY**

### **D1 Data Review, Validation, and Verification Requirements**

Data review, validation, and verification procedures are presented in this section. Three types of data are collected for this project: continuous hourly data from PM<sub>10</sub> monitors, speciation data from manual samplers, and continuous 5-minute data from meteorological sensors. The five-minute data are averaged into hourly values, which is the format for final reporting. Daily data review is the responsibility of the data management task leader for the project, in parallel with operations staff. The task leader also performs the routine monthly review and validation functions or delegates and supervises them.

In the event that the daily data review indicates a potential unusual or elevated result the reviewer (this can be the site operator, operations supervisor, or data analysis specialist, as all perform routine data review tasks) notifies the project manager and data management task leader. The data editor gathers all pertinent QC data for the date and time of the result of interest and reports to the project manager regarding the validity of the measured values. This typically occurs within 24 hours of first discovery of the situation. If the measurements are valid, the project manager immediately notifies the client and provides associated meteorological data so that the client may investigate any potential events or sources that could have contributed to the result of interest.

The meteorological data are also retrieved via cellular aircard and router, and subjected to manual data review by an experienced air quality scientist every business day throughout each month. Screening tests, such as those recommended by EPA in the *“On-Site Meteorological Program Guidance for Regulatory Modeling Applications”* are performed using an automated script to aid in identifying data that require further investigation.

Analytical laboratory reports for speciation of manual samples will be forwarded in electronic format and loaded into the database using a custom loading script. The data management task leader is responsible for ensuring that the data are properly loaded and the supporting documentation is in the central project file.

Data will be declared invalid whenever documented evidence exists demonstrating that a continuous monitor or meteorological sensor was not collecting data under representative conditions or was malfunctioning. In rare cases where a consistent offset in continuous measurements can be verified, a factor may be applied to the averages in a data set with clear

identification of the affected data. The project data documentation files will contain the supporting documentation of the use of and justification for the factor.

Data validation will be performed or supervised for each monthly data set by the data management task leader, with internal peer review per URS project management policy. The data management task leader will verify that the continuous monitor data and the meteorology measurement data are complete for the month, and then initiate the validation process. The task leader will inform the project manager when the complete data set is ready for peer review.

The activities involved in validation of the data in general include the following:

- Reviewing all site visit logs, calibration data, audit data, and project memoranda for indications of malfunctioning equipment or instrument maintenance events;
- Reviewing each laboratory report for speciation;
- Reviewing all available BAM-1020 and PartisolPlus performance data from on-board diagnostic data files; and
- Examining the hourly continuous PM<sub>10</sub> and 5-minute meteorological data for spikes in the data, unusual persistence, unusually high rates of change, or measurement values that seem incongruous with normal measurement ranges and/or diurnal variations.

All continuous air quality analyzer data files are obtained via modem during the daily automated network call up routine. These data are validated using the universal calibration method, as described in EPA's *"Quality Assurance Handbook for Air Pollution Measurement Systems"*, Volume II, Section 12.8. With this method of data reduction, the on-site data system records data in conventional engineering units based on the raw instrument signal voltages, converted to full scale instrument ranges. No further calibration curve is accounted for in reporting the data since the output is sufficiently linear to meet project measurement performance goals (the zero offset is measured and coded into the BAM-1020 software at the completion of the 72-hr zero background test). Each monthly data set is manually reviewed and edited.

Data are never declared invalid solely because they are unlikely to occur in nature, but may be flagged as suspect and be subjected to further review until the cause for the apparent

anomaly is determined. The results from all quality control and quality assurance checks are evaluated to determine if the data quality objectives for each measurement are being met. Evidence of overwhelming measurement bias, external influences on the representativeness of the data, or lack of reproducibility of the measurement data may be cause for the data to be judged invalid.

After the edit and validation review is complete, the editor returns a set of instructions to the data manager for application to the data set. The final edited version of the data is then produced and peer reviewed to ensure that the edits were properly applied and that the validation process was consistent with project requirements and URS standard procedures. A record of the edit instructions is retained in the project files, as is the final data product. Once the project manager has reviewed and approved the edited data set, it is released and reported to the client.

## **D2 Reconciliation with Data Quality Objectives**

Periodically throughout the data collection effort, it is the project QA officer and project manager's responsibility to evaluate the project's progress in meeting the client's goals for the measurement data. This evaluation will occur at a minimum on an annual basis. Two areas will be reviewed: the performance of the project in respect to the quality goals specified in the QAPP and the limitations (if any) on the measurement data for their intended use. The results of this evaluation will be reported to KCBX.

### **D2.1 Assessment of Measurement Performance**

As part of the annual review the performance of the monitoring network will be assessed to determine to what extent the measurement data meet the requirements of the data user (client and/or regulatory agency). In the data quality objectives section a discussion of the key indicators was presented in relation to precision, accuracy, completeness, representativeness, and comparability goals for the monitoring effort. Specific quantitative measures of precision, accuracy, and completeness were defined for use in estimating the quality of the data set. These measures will be calculated and compared to the goals for the project.

### **D2.2 Data Quality Assessment**

If any of the data quality measures indicate performance outside the desired objective (e.g., an audit result outside the project specification or a monthly completeness average less than the project goal) the data associated with that result are not considered useless. The burden is on the project team to determine the extent to which a quality issue affects the related data, and ultimately how the issue impacts the fitness for use of the data.

Most often a single isolated incident in which the performance objective is not met does not automatically render the data useless, but rather slightly reduces the confidence that the measurement is reliable, and indicates that increased quality control measures are needed. Any such data for which there is a question of confidence will be appropriately flagged in the data base. The data quality objectives are assessed periodically throughout the monitoring effort. A month in which the completeness statistic for a given site is below the objective is cause for concern and corrective action, but if the other months are within the objective the confidence in the complete data set should remain high.

Any potential limitations of the validated data set will be identified and communicated. The project team will present all known or potential limitations on the data with each data submittal, and will clearly flag any such data so that users may determine if the data should be used for a particular conclusion or decision.

## E. REFERENCES

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EPA/625/R-96/010a (June 1999), *Compendium Method IO-3.1 Selection, Preparation and Extraction of Filter Material*, U.S. Environmental Protection Agency, ORD, Cincinnati, OH.

EPA/625/R-96/010a (June 1999), *Compendium Method IO-3.5 Determination of Metals in Ambient Particulate Matter Using Inductively Coupled Plasma/Mass (ICP-MS) Spectroscopy*, U.S. Environmental Protection Agency, ORD, Cincinnati, OH.

Carbon Analysis of PM (Revision 9, February 16, 2009), *Standard Operating Procedure for the Determination of Organic, Elemental, and Total Carbon in Particulate Matter Using a ThermoVOptical-Transmittance Carbon Analyzer*, OC/EC Laboratory, Research Triangle Institute, Environmental & Industrial Sciences Division, Research Triangle Institute, Research Triangle Park, North Carolina

NIOSH 5040 (Issue 3, March 15, 2003), *Diesel Particulate Matter (as elemental carbon)*, National Institute for Occupational Safety and Health Manual of Analytical Methods (NMAM), Fourth Edition

**BAM-1020 PARTICULATE MATTER (PM) MONITOR  
Calibration Data**

SITE NAME: KCBX NT-NE  
AQS Site Code: N/A  
DATE: 13-Feb-14  
TIME: 16:00

CLIENT: Koch  
SAMPLER ID: BAM-1020  
Model Number: 1020  
Serial Number: P21274

FLOW RATE AND LEAK CHECK Calibration Data				
Leak Check <sup>1</sup> : <input type="text" value="0.3"/> LPM	Flow Rate Calibration Device: BGI			
1. Acceptance Criteria: < 0.5 LPM		Model Number: deltaCal		
Clock/Timer Verification <sup>2</sup> :	Serial Number: 1377			
BAM-1020 : <input type="text" value="not recorded"/>	Certification Expiration: 01/21/15			
Reference Time: <input type="text" value="not recorded"/>	2. Acceptance Criteria: within 60 sec. of Reference Time			
Sampler Indicated Flow Rate (LPM)	Calibration Flow Rate (Qstd) (LPM)	Percent Difference <sup>3</sup> (Sampler vs. Calibration)	Percent Difference <sup>4</sup> (Calibration vs. Design)	
16.70	16.60	0.6%	-0.4%	

3. Acceptance Criteria: ± 4.0%

4. Acceptance Criteria: ± 5.0%

TEMPERATURE Calibration Data			
Calibration Device: BGI	Sampler Sensor Temperature (T <sub>s</sub> ) (°C)	Calibration Sensor Temperature (T <sub>a</sub> ) (°C)	Temperature Difference <sup>5</sup> (Sampler - Calibration) (°C)
Model Number: deltaCal	-0.9	-1.1	0.2
Serial Number: 1377	-0.9	-1.1	0.2
Certification Expiration: 01/21/15	-0.9	-1.1	0.2

5. Acceptance Criteria: ± 2.0 °C

PRESSURE Calibration Data			
Calibration Device: BGI	Sampler Sensor Pressure (P <sub>s</sub> ) (mm Hg)	Calibration Sensor Pressure (P <sub>a</sub> ) (mm Hg)	Pressure Difference <sup>6</sup> (Sampler - Calibration) (mm Hg)
Model Number: deltaCal	736.0	734.0	2.0
Serial Number: 1377	736.0	734.0	2.0
Certification Expiration: 01/21/15	736.0	734.0	2.0

6. Acceptance Criteria: ± 10.0 mm Hg

Calibration Tech: Greg Mazik

Notes: BKGD set to 0.0 from -0.0038, zero filter installed at 17:00

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**PARTISOL PARTICULATE MATTER (PM) SAMPLER  
Calibration Data**

**SITE NAME:** KCBX NT-NEQ (EC/OC sampler)  
**AQS Site Code:** N/A  
**DATE:** 3-Jun-13  
**TIME:** 0955-1020

**CLIENT:** Koch  
**SAMPLER ID:** PartisolPlus  
**Model Number:** 2025i  
**Serial Number:** 20704

TEMPERATURE Calibration Data			
Calibration Device: BGI Model Number: deltaCal	Sampler Sensor Temperature (T <sub>s</sub> ) (°C)	Calibration Sensor Temperature (T <sub>a</sub> ) (°C)	Temperature Difference <sup>1</sup> (Sampler - Calibration) (°C)
Serial Number: 579	24.7	24.0	0.7
Certification Expiration: 09/10/13	24.7	23.8	0.9
	24.8	24.0	0.8

1. Acceptance Criteria: ± 2.0 °C

PRESSURE Calibration Data			
Calibration Device: BGI Model Number: deltaCal	Sampler Sensor Pressure (P <sub>s</sub> ) (mm Hg)	Calibration Sensor Pressure (P <sub>a</sub> ) (mm Hg)	Pressure Difference <sup>2</sup> (Sampler - Calibration) (mm Hg)
Serial Number: 579	760.0	755.0	5.0
Certification Expiration: 09/10/13	760.0	755.0	5.0
	760.0	755.0	5.0

2. Acceptance Criteria: ± 10.0 mm Hg

COMPARTMENT TEMPERATURE Calibration Data			
Calibration Device: BGI Model Number: deltaCal	Sampler Compartment Temperature (T <sub>s</sub> ) (°C)	Calibration Sensor Temperature (T <sub>a</sub> ) (°C)	Temperature Difference <sup>3</sup> (Sampler - Calibration) (°C)
Serial Number: 579	24.7	24.0	0.7
Certification Expiration: 09/10/13	24.7	23.8	0.9
	24.8	24.0	0.8

3. Acceptance Criteria: ± 2.0 °C

LEAK CHECK, TIME, AND FLOWRATE Calibration Data				
External Leak Check <sup>4</sup> <input type="text" value="8.0"/> mmHg		Clock/Timer Verification <sup>5</sup> :		
4. Acceptance Criteria < 25 mm Hg		Partisol :	<input type="text" value="9:49:20"/>	
		Reference Time:	<input type="text" value="9:49:10"/>	
5. Acceptance Criteria: within 60 sec. of Reference Time				
Calibration Device: BGI Model Number: deltaCal	Sampler Indicated Flow Rate (LPM)	Calibration Flow Rate (Qstd) (LPM)	Percent Difference <sup>6</sup> (Sampler vs. Calibration)	Percent Difference <sup>7</sup> (Calibration vs. Design)
Serial Number: 579	14.93	14.71	1.5%	-1.9%
Certification Expiration: 09/10/13	16.62	16.44	1.1%	-1.4%
	18.32	18.20	0.7%	-1.1%

A three point flow check is required quarterly and a single point operating flow rate check is required monthly

6. Acceptance Criteria: ± 4.0%

7. Acceptance Criteria: ± 5.0%

Calibration Tech: John Smith

**URS**

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**WIND SPEED SENSOR  
Calibration Data**

**SITE NAME:** KCBX NT-SW  
**AQS Site Code:** N/A  
**DATE:** 06/03/13  
**TIME:** 1030-1057

**CLIENT:** Koch  
**Sensor ID:** MetOne  
**Model Number:** 010C  
**Serial Number:** J1392

WIND SPEED Calibration Data				
Zero Check <sup>1</sup> : <input type="text" value="0.0"/>		Bearing Condition <sup>2</sup> : <input type="text" value="0.3"/>		
1. Acceptance Criteria < 0.2 m/s		2. Acceptance Criteria < 0.4 gm-cm		
<b>Calibration Device:</b> RM Young <b>Model Number:</b> 18810 <b>Serial Number:</b> CA01953 <b>Certification Expiration:</b> 09/10/13	<b>Input CCW (RPM)</b>	<b>Calibration Input (M/S)</b>	<b>Sensor Response (M/S)</b>	<b>Difference<sup>3</sup></b>
	60	1.88	1.90	0.02
	160	4.55	4.60	0.05
	300	8.25	8.30	0.05
	600	16.25	16.10	-0.15
	<b>Input CW (RPM)</b>	<b>Calibration Input (M/S)</b>	<b>Sensor Response (M/S)</b>	<b>Difference<sup>3</sup></b>
CCW = Counter Clockwise CW = Clockwise	60	1.88	1.90	0.02
	160	4.55	4.60	0.05
	300	8.25	8.30	0.05
	600	16.25	16.15	-0.10

3. Acceptance Criteria: ± 0.22 m/s

**Calibration Tech:** Jason Balsano

**URS**  
Rev. 2 1/2014

**TEMPERATURE SENSOR  
Calibration Data**

**SITE NAME:** KCBX NT-SW  
**AQS Site Code:** N/A  
**DATE:** 06/03/13  
**TIME:** 1030-1057

**CLIENT:** Koch  
**Sensor ID:** MetOne  
**Model Number:** 060A-2  
**Serial Number:** F4539

TEMPERATURE Calibration Data			
Calibration Device: Vaisala Model Number: HM-34F	Site Sensor Temperature (°C)	Calibration Sensor Temperature (°C)	Temperature Difference <sup>1</sup> (Sampler - Calibration) (°C)
Serial Number: G1023	-0.1	0.0	-0.1
Certification Expiration: 09/10/13	22.4	22.5	-0.1
	35.5	35.4	0.1

1. Acceptance Criteria: ± 1.0 °C

**degF to degC conversion**

Temperature	Units	Input	Output
	degF	75.0	
	degC		23.9

**Clock/Timer Verification<sup>2</sup>:**

Data Logger :	9:49:20
Reference Time:	9:49:10

2. Acceptance Criteria: within 60 sec. of Reference Time

**Calibration Tech:** John Smith

**BAROMETRIC PRESSURE SENSOR**  
Calibration Data

**SITE NAME:** KCBX NT-SW  
**AQS Site Code:** N/A  
**DATE:** 06/03/13  
**TIME:** 1030-1057

**CLIENT:** Koch  
**Sensor ID:** Vaisala  
**Model Number:** PTB110  
**Serial Number:** 2356

PRESSURE Calibration Data			
Calibration Device: Vaisala Model Number: HM-34F	Site Sensor Pressure (P <sub>s</sub> ) (mm Hg)	Calibration Sensor Pressure (P <sub>c</sub> ) (mm Hg)	Pressure Difference <sup>1</sup> (Sampler - Calibration) (mm Hg)
Serial Number: G1023	760.0	761.0	-1.0
Certification Expiration: 09/10/13	760.0	761.5	-1.5
	760.0	761.0	-1.0

1. Acceptance Criteria: ± 2.3 mm Hg

**inHg to mmHg conversion**

Pressure	Units	Input	Output
	inHg	29.92	
	mmHg		759.97

**hPa to mmHg conversion**

Pressure	Units	Input	Output
	hPa	1005	
	mmHg		755.64

**Calibration Tech:** John Smith



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KCBX TERMINALS CO NORTH	SITE VISIT DATE						
	8/12/2013	8/19/2013	8/25/2013				
<b>Meteorological Station</b>							
<i>Arrival time:</i>	10:05 AM	9:35 AM	9:15 AM				
Is the temperature aspirator fan running?	Y	N	Y				
Are all signal cables secured and intact?	Y	Y	Y				
Are wind vane/ anemometer cups intact and operational?	Y	Y	Y				
Is datalogger date/time correct within 60 sec?	N	Y	Y				
Are conditions shown on logger consistent with ambient observations?	Y	Y	Y				
<b>BAM-1020 PM<sub>10</sub> Monitors</b>							
<i>Arrival time:</i>	10:20 AM	9:50 AM	9:25 AM				
Any status error flags showing?	N	N	N				
Are all monitor dates/times correct within 60 sec?	Y	Y	Y				
Are all filter transport systems operational?	Y	Y	Y				
Are hourly data being collected?	Y	Y	Y				
Is sampler inlet and downtube clean?	Y	N	Y				
Is water collection bottle clean?	Y	N	Y				
Are O-rings in good condition?	Y	N	Y				
<b>Comments section</b>							
<p>On 8/12, reset met station time (63 seconds fast).</p> <p>On 8/19 found aspirator fan not running; replaced.</p> <p>On 8/19, NT-SE site inlet removed and cleaned, o rings lubricated.</p>							

**Site ID List:**

NT-NW = Northwest BAM site (Meteorological monitors)  
 NT-NE = Northeast BAM site (Partisol samplers)  
 NT-SE = Southeast BAM site  
 NT-SW = Southwest BAM site

**MAINTENANCE LIST FOR METEOROLOGICAL STATION**

*Each Visit:* Inspect sensors and cables for signs of deterioration or damage and replace as needed  
*Monthly:* Inspect temperature aspirator and remove dust accumulation  
 Inspect tower for plumb, and verify that all fasteners are intact and tight  
*Biannually:* Perform calibration check on sensors  
 Check wind sensor bearings  
*Annually:* Replace wind sensor bearings

**MAINTENANCE LIST FOR BAM-1020**

*Each Visit:* Inspect filter tape and replace when needed (~2 months/roll; run SELF-TEST function in the TAPE menu).  
 Inspect filter tape for pinholes and irregular PM deposits  
*Monthly:* Perform flow rate and leak check  
 Clean BAM nozzle and vane  
 Clean inlet hardware, capstan shaft and pinch roller  
*Quarterly:* Verify BAM settings file  
 Flow system Calibration  
 Disassemble and clean inlet  
*Biannually:* Check pump muffler and tubing and replace as needed  
 Test filter RH and Temperature sensors  
 Test smart heater function  
*Annually:* Perform zero background test  
 Clean internal debris filter  
 Remove and check membrane span foil  
 Beta detector count rate and dark count test  
 Rebuild vacuum pump  
 Replace nozzle o-ring



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# **APPENDIX D**

## **KCBX Facility Fact Sheet**

### Description of Operation

KCBX Terminals Company (“KCBX”) handles bulk solid materials, currently coal and petroleum coke, (“Product”) which are transported via truck, train, barge, and vessel. KCBX can transfer Product either directly from one transportation mode to another or indirectly using intermediate stockpiling. Following is a description of the various modes of operation along with dust control measures.

### Dust Control Equipment

Control equipment is used to address potential dust emissions. The equipment includes:

- Permanent, pole mounted water cannons
- Water trucks
- Street Sweeper
- Dust suppression chemical stabilizer
- Water spray bars located at transfer locations
- Dust collection baghouse

### Fugitive Dust Measurement

In accordance with various regulatory requirements, various fugitive dust measurement actions are used.

- Continuous particulate matter (PM10) source monitors placed within the fence line at the Facility.
- Weather monitor to monitor and log wind speed and wind direction.
- Visual fugitive dust and opacity testing in accordance with regulatory requirements.

### Contingency Plans

KCBX has developed contingency plans to respond to various potential fugitive dust conditions.

- Respond to elevated PM10 readings
  - Automated alert system to notify personnel of alert conditions
  - Investigate to determine suspected source(s)
  - Mitigation efforts
  - Suspension of suspected source activity
- Deploy alternatives for monitor malfunctions
  - Wind monitor malfunction: use web-based weather information
  - PM10 source monitor malfunction: substitute opacity readings until monitor returns to service

# **APPENDIX E**

## Appendix E: Revision Log

Rev 1 06/09/2014	Initial Submittal
Rev 2 01/30/2015	January 2015 Required Update
Rev 3 02/15/2016	Revision
Rev 4 02/29/2016	Revision