



**DEPARTMENT OF WATER MANAGEMENT  
CITY OF CHICAGO**

December 8, 2016

Illinois Department of Natural Resources  
Office of Water Resources  
160 N. LaSalle Street, Suite S-703  
Chicago, Illinois 60601-3117

Enclosed are the completed annual water usage Report LMO-2 and the AWWA Water Loss Audit's Reporting Worksheet and Performance Indicators Sheet for the 2016 water accounting year from October 1, 2015 through September 30, 2016.

A supplemental sheet, attached to the report, details the average daily supply of water transferred to other entities.

A report detailing the activities of the Chicago Water System in regard to water conservation and accountability during the 2016 water accounting year is also attached.

Very truly yours,

Barrett B. Murphy  
Commissioner



# Illinois Department of Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271  
www.dnr.illinois.gov

Bruce Rauner, Governor  
Wayne A. Rosenthal, Director

Office of Water Resources, Michael A. Bilandic Building, 160 N. LaSalle St., S-703, Chicago, IL 60601  
Office: 312/793-5947 Fax: 312/793-5968

## 2016 Annual Water Use Audit Form (LMO-2)

This form must be completed by all Category IA and IB Permittees for the annual water use accounting year running from October 1, 2015 through September 30, 2016. This form must be submitted to the Department by January 9, 2016.

### Section I - General Information


#### Name, address and phone number of Permittee:

Name: The City of Chicago Department of Water Management  
Address: 1000 East Ohio Street  
Chicago, Illinois 60611  
County: Cook  
Phone: 312-744-7001  
Email: \_\_\_\_\_

#### Name, address and phone number of the contact person for the Permittee:

Name: Barrett B. Murphy  
Address: 1000 East Ohio Street  
Chicago, Illinois 60611  
Phone: 312-744-7001  
Email: \_\_\_\_\_

#### Authorized Official



Title: Commissioner  
Date: 12/29/16

Service Population: 5,365,598

Service population is the total population the permittee serves with water both inside and outside their corporate limits.

The Illinois Department of Natural Resources is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under Chapter 19, Section 120.2 of the Illinois Revised Statutes. Disclosure of this information is required. Failure to provide any information will result in this form not being processed. This form has been approved by the Forms Management Center, CMS.

### Section II - Water Supplied:

In order to complete this form you will have to first complete the AWWA Free Water Loss Audit Software. Lines 4, 8, 24 and 26 - 38 (highlighted) must be taken directly from the AWWA Water Loss Audit Reporting

Worksheet and Performance Indicator sheet. Both the AWWA Water Loss Audit's Reporting Worksheet and Performance Indicator sheet must be submitted along with this form. All amounts should be rounded to three decimal places.

Volume from own sources:

1. Shallow Well	mg/y	0.000 mgd
2. Deep Well	mg/y	0.000 mgd
3. Lake Michigan (Direct Diverters only)	256,862.094 mg/y	701.809 mgd
4. Total Volume From Own Sources	256,862.094 mg/y	701.809 mgd

Water imported from other sources:

	<u>Supplier:</u>	<u>Amount:</u>
5	mg/y	0.000 mgd
6	mg/y	0.000 mgd
7	mg/y	0.000 mgd
8. Total Water Imported	0.000 mg/y	0.000 mgd

Water exported to other systems:

	<u>System:</u>	<u>Amount:</u>
9	Chicago Area Suburban Communities (See Attachment)	97,839.486 mg/y 267.321 mgd
10		mg/y 0.000 mgd
11		mg/y 0.000 mgd
12		mg/y 0.000 mgd
13		mg/y 0.000 mgd
14		mg/y 0.000 mgd
15		mg/y 0.000 mgd
16		mg/y 0.000 mgd
17		mg/y 0.000 mgd
18		mg/y 0.000 mgd
19		mg/y 0.000 mgd
20		mg/y 0.000 mgd
21		mg/y 0.000 mgd
22		mg/y 0.000 mgd
23		mg/y 0.000 mgd

24. Total Water Exported	97,839.486 mg/y	267.321 mgd
25. WATER SUPPLIED (Line 4 + Line 8 - Line 24)		434.488 mgd
26. WATER SUPPLIED (adjusted for master meter error)	152,753.896 mg/y	417.360 mgd

Section III; Authorized Consumption:

27. Billed Metered	66,830.868 mg/y	182.598 mgd
28. Billed Unmetered	62,482.788 mg/y	170.718 mgd
29. Unbilled Metered	4,741.927 mg/y	12.956 mgd
30. Unbilled Unmetered (See the explanation attachment 1)	2,631.174 mg/y	7.189 mgd
(If not using the AWWA default of 1.25% of Water Supplied, provide an explanation)		
31. AUTHORIZED CONSUMPTION	136,686.757	373.461 mgd

**Section IV: Water Losses:**

<b>32. Apparent Losses</b>	908.624 mg/y	2.483 mgd
<b>33. Real Losses</b>	15,158.515 mg/y	41.417 mgd
<b>34. Water Losses</b>	16,067.139 mg/y	43.899 mgd

**Section V: Non Revenue Water:**

<b>35. NON REVENUE WATER</b>	23,440.240 mg/y	64.044 mgd
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**Section VI: Performance Indicators:**

<b>36. Annual cost of Apparent Losses</b>	3,461,858 \$/year
<b>37. Annual cost of Real Losses</b>	2,197,075 \$/year
<b>38. Non-revenue water as percent by volume of Water Supplied</b>	15.3 %

**Section VII - Conversion Table**

Below are conversion calculations to convert the most commonly used units to units of million gallons per day (mgd).

To convert cubic feet per year (cf) to (mgd) use:  
 $(cf \times 7.48) / 1,000,000 / 365 = \text{mgd}$

To convert gallons per year (g) to (mgd) use:  
 $g / 1,000,000 / 365$

To convert gallons per day (g/d) to (mgd) use:  
 $(g/d) / 1,000,000$

To convert million gallons per year (mg) to (mgd) use:  
 $mg / 365 = \text{mgd}$

CITY OF CHICAGO  
DEPARTMENT OF WATER  
SUPPLEMENT TO FORM LMO-2

WATER METERED AND BILLED DIRECTLY BY CHICAGO WATER DEPARTMENT  
OCTOBER 1, 2015 TO SEPTEMBER 30, 2016

ENTITY	MGD
ALSIP *	5.760
BEDFORD PARK *	21.255
BERWYN	4.739
BLUE ISLAND	2.259
BRIDGEVIEW	2.103
BROOKFIELD-N. RIVERSIDE W.C. *	4.227
BURNHAM	0.095
CALUMET CITY	0.401
CALUMET PARK	0.629
CENT. STICKNEY SD	0.100
CICERO	7.737
DES PLAINES *	5.052
DOLTON	2.696
DUPAGE W.C. *	73.599
ELMWOOD PARK	2.075
EVERGREEN PARK	1.622
FOREST PARK	2.273
FOREST VIEW	0.127
FRANKLIN PARK	2.578
GARDEN HOMES S.D.	0.060
HARVEY *	8.617
HARWOOD HEIGHTS	0.780
HILLSIDE-BERKELEY W.C. *	1.669
HOMETOWN	0.313
JUSTICE-WILLOW SPRINGS W.C. *	2.793
LINCOLNWOOD	1.479
MAYWOOD	2.587
McCOOK *	5.203
MELROSE PARK *	7.980
MERRIONETTE PARK	0.174
MIDLOTHIAN-MARKHAM W.C. *	2.521
MORTON GROVE *	2.660
NILES *	5.895
NORRIDGE	1.283
NORTHWEST SUB JOINT ACTION W. A. *	27.821
AQUA ILLINOIS INC	0.013
OAK LAWN *	28.238
OAK PARK	4.951
PARK RIDGE	3.951
RIVER FOREST	1.149
RIVER GROVE	0.991
RIVERDALE	1.272
ROBBINS	1.310
ROSEMONT	1.581
SCHILLER PARK	1.438
SOUTH HOLLAND *	2.195
SOUTH STICKNEY S.D.	2.113
STICKNEY	1.511
SUMMIT	1.110
WESTCHESTER-BROADVIEW W.C. *	3.457
WORTH	0.869
METRO WATER RECLAMATION DIST	0.015
TOTAL	267.321

\* INCLUDES OTHER MUNICIPALITIES  
ALL METERS ARE READ BETWEEN THE 20TH AND 30TH DAY OF EACH MONTH

Explanation for the Report (LMO-2) Line No. 30.  
(not using the AWWA default of 1.25% of Water Supplied.)

Excessive unbilled unmetered water usage was due to the following factors:

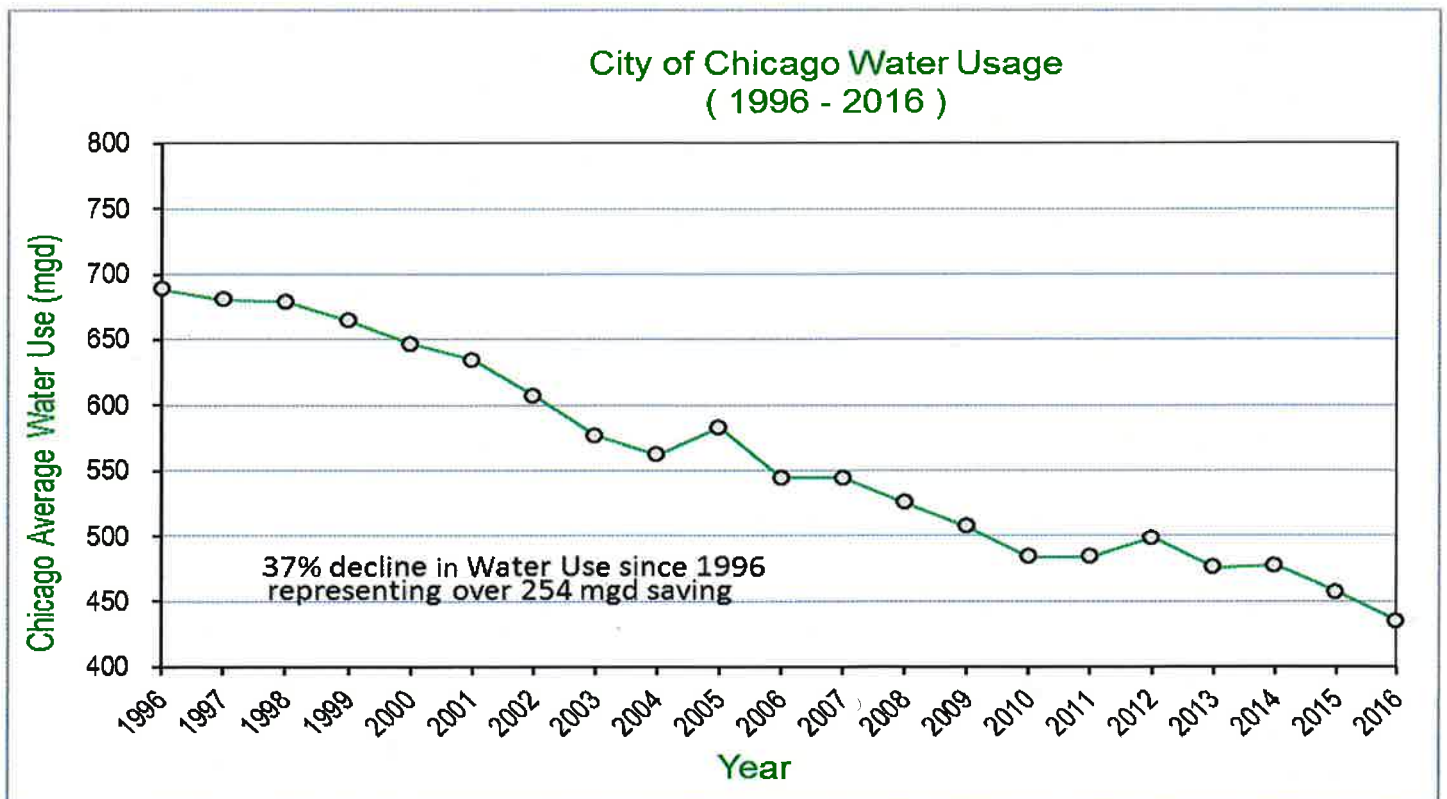
	<u>Estimated Usage</u>	<u>Percentage of water supplied</u>
1. NEW WATER MAIN FLUSHING. An accelerated water main replacement program is in progress. More hydrant flow is needed for water main flushing.	3.507 mgd	0.84%
2. FIREFIGHTING & TRAINING	2.087 mgd	0.50%
3. SEWER CLEANING	0.100 mgd	0.02%
4 STREET CLEANING	0.100 mgd	0.02%
5. PUBLIC FACILITIES CONSTRUCTION	0.417 mgd	0.10%
6. WATER MAIN FLUSHING FOR WATER QUALITY PURPOSES	0.417 mgd	0.10%
7. EXEMPTED UNMETERED ACCOUNTS	0.561 mgd	0.13%
<hr/>		
TOTAL UNBILLED UNMETERED WATER USAGE	7.189 mgd	1.71%
	<b>2,631.174 MG/Yr</b>	

**REPORT BY THE CITY OF CHICAGO  
DEPARTMENT OF WATER MANAGEMENT  
TO  
THE ILLINOIS DEPARTMENT OF NATURAL RESOURCES  
FOR THE 2016 WATER ACCOUNTING YEAR**

During Water Year 2016, the City of Chicago has continued to promote water conservation through a number of initiatives and policies to better conserve our fresh water and to wisely manage storm water. Our water conservation plan is a partnership among public and private sectors, and each resident of Chicago. It includes investing in infrastructure upgrades, working with our sister agencies and large industrial customers to promote conservation, and developing a plan to meter all residential water users. With the exception of drought years, the Department continues to see declining water usage due to its continued efforts to reduce water waste by investing in the following programs:

- 1.) Water Main Replacement
- 2.) Hydrant Custodian Installation
- 3.) Education and Public Awareness
- 4.) Volunteer Metering Program
- 5.) Meter Repair and Replacement
- 6.) Elimination of Unused Services
- 7.) Underground Leak Detection and Repair
- 8.) SCADA System Upgrade
- 9.) Installation of Variable Speed Pumps

The chart below demonstrates our progress with a plan that has had significant results in reducing water usage for the City of Chicago.



## WATER MAIN REPLACEMENT

The Water Main Replacement Program was designed to address the City's aging water mains which were installed over 100 years ago at the height of Chicago's exponential growth rate. The selection of water mains to be replaced is based primarily from analyzing break history records to determine where replacement would most benefit the water system. The City has placed a high priority on this key component of the Water Conservation Program, and believes it has had a large impact on the reduction of unaccounted for water, and a significant impact on the decline in water pumpage. Prior to 2012, the program had targeted a replacement rate of approximately 1% of the system's 4,350 miles of pipe each year. We are now on a path to target over 2% per year allowing us to mirror the installation rates over 100 years ago. The following table shows the past and current miles of main replaced per year.

We are pleased to report that through the leadership and support of Mayor Rahm Emanuel, the funding to address the needs of our aging infrastructure has become available through a series of water rate increases starting in 2012 with 25% and continuing the next 3 years with 15% each year. Water mains are critical assets to deliver safe potable water to not just Chicago but to its wholesale customers. These unprecedented water rate increases were based on the fact that over 25% of our water mains are over 100 years old and demonstrate our Mayor's vision and commitment to focus on the long term needs of this aging water system. The rate increases will allow us to continue this successful program to reduce water waste as well as fund critical treatment plant and pumping station upgrades. Our long term goals have been set to replace nearly 900 miles of water mains in the 10 year period, from 2012 through 2021

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Miles of Pipe Laid	42.3	38.7	35.9	23.0	33.7	20.7	34.0	32.0	30.0	30.0	70.0	75.0	85.0	90.0	90.0

## HYDRANT CUSTODIANS

The City has historically experienced difficulty in deterring people from opening hydrants during hot summer days. The opening of hydrants creates hazardous traffic situations, may damage adjacent property, and wastes water. In addition, open hydrants reduce the pressure and amount of water available for fire fighting.

In order to minimize this problem, the City began installing hydrant custodians in areas where previous experience indicated that open hydrants may be a problem. This program had to be coordinated with the Fire Department to insure that the hydrants would always be available for fighting fires. The installation of hydrant custodians is a repetitive and evolutionary process. The City develops a locking mechanism and the water thieves develop methods of removal. This has occurred multiple times with the City attempting to stay one lock ahead of the thieves.

The City has experimented with various locking devices throughout the years and has developed two types of technologically advanced custodians that are fairly effective. In addition, the City has developed a stem design that makes it difficult to turn the hydrant valve by reaching through the ports and manually turning the stem. In the 1990's, the City investigated and tried many other deterrents and have found them to be readily defeatable by determined vandals. Over 20,000 of the City's 48,000 hydrants now have custodians. A total of 8,400 of these 19,000 are the newer "NEO" version which operates with a stronger magnet. In areas where repeated open hydrants occur, the City is retrofitting the custodian with an additional spider guard deterrent to prevent damage to the operating mechanism. These retrofits installed since 1998, have demonstrated their effectiveness by a reduction in their frequency of opening. The City has found that the newer "NEO" version of the custodian has had a very significant impact on illegal hydrant openings. The City will still install the additional spider guard retrofits, but only in the areas where the "NEO" has not been successful.



## EDUCATION AND PUBLIC AWARENESS

The Department of Water Management engages in public education and awareness on a continuing basis. Conservation messages are conveyed through a variety of channels, including community meetings, literature distribution, and extensive use of the World Wide Web. Over the past years, we have included themes from the Chicago Water Agenda. This is a gathering of local initiatives, policies, programs and proposals that address issues of conservation, water quality and storm water management in a coordinated way. The Agenda applies not just to the City of Chicago, but to suburban communities and other cities across the Great Lakes region. We have also ramped up efforts in a promotional campaign to get conservation messages out to the public through various transportation ads and street signage advertising. Our metersave program message is quite visible throughout the city.

Coordinating with other City departments, the Department of Water Management has been including Agenda messages in the annual Consumer Confidence Report, in development of an educational program for schools, in grass roots presentations to community groups and Chambers of Commerce, and in other appropriate settings. Topics range from techniques of conservation to fire hydrant usages to the prospect of universal customer metering.

## VOLUNTEER METERING PROGRAM

The City has continued to make great strides with its volunteer metering program. Accounts which are currently unmetered can have a meter installed free of charge. By the end of 2016, the City has installed over 103,000 meters, under this program, since its inception in 2009, and plan to install additional 15,000 meters in 2017. To keep up with the program, we have continued to engage in a contract to allow a private contractor to install meters from the volunteer program and supplement our in-house work force. As this program is continuously promoted and more customers realize the financial and water resource benefits, we anticipate a stronger participation, in the years to come, from our unmetered customer base. The Department of Water Management is fully committed to making this a successful program. Also, additional highlights of this program are presented on our promotional website at [www.metersave.org](http://www.metersave.org).

## METER REPAIR AND REPLACEMENT

The City continued to service those meters presently installed on suburban, commercial, industrial, and municipal accounts. The total installed meter base in Chicago is in excess of 280,000 units. As new housing is erected and rehabilitation continues, the number of meters is increasing. Maintenance of this large installed meter base requires a considerable commitment of manpower and equipment. The City is committed to maintaining its meters in conformance with the recommendation of the meter manufacturers and the AWWA.

## ELIMINATION OF UNUSED SERVICES

The City continued its efforts to cut and seal unused services. The following table shows the data for termination of unused services since 2003.

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Number of Services Terminated	650	820	620	422	297	488	510	692	342	476	635	1540	1521	2256

A major effort has been made to eliminate these potential sources of leakage. These water services were terminated by both City forces and by private contractors. Although the termination of unused water services is very expensive, the continued reduction in the number of unused services should help reduce the amount of unaccounted for water.

## LEAK DETECTION AND REPAIR

The Department has maintained a high level of effort in its leak detection program over the past years. The Department employs one TriCorr TM 2001 correlator and in 2009 purchased some of the newer Digicorr correlators from FCS which is considered the product of choice by most professional leak detection firms and consultants, particularly in North America. These models are more sensitive in detecting leaks and have better noise filtering capabilities. In addition to our in house forces, the Department also contracts out services for leak detection. The services include not only an ongoing systematic coverage for leak detection of our distribution system every 3-4 years, but also the monitoring for leak noises while performing an ongoing valve inspection program. Through our leak detection consultant, we have been able to employ various technologies to detect and pinpoint underground leakage. One of these technologies: the "Radcom SoundSens" leak noise correlator system combines sound logging and correlation by installing three or more correlating pods within an area. The units pick up sound during the night and are then analyzed the next day by downloading the sounds to a central correlator. A multipoint correlation can then be performed between the units resulting in higher degrees of accuracy and allowing nighttime sounding without the need to work during the nighttime.

The Department is also employing the latest technology in the leak detection field for feeder mains. During 2005 and 2006, we started to survey sections of 36-inch and 60-inch mains with the Sahara® leak detection technology, where a tether-controlled Sahara® sensor is deployed inside a pipeline without any disruption to pipeline service. It moves through the pipeline with the flow and pinpoints even the smallest leaks in water mains. More documentation on this technology can be found at [http://www.puretechltd.com/products/sahara/sahara\\_leak\\_gas\\_pocket.shtml](http://www.puretechltd.com/products/sahara/sahara_leak_gas_pocket.shtml) . In 2007 we started using another newer technology for large diameter pipeline leak detection. This technology is Echologics and it differs from traditional leak correlators in that it uses the water column inside the pipeline to transmit the sound wave generated from a leak. This technology allows greater distances to between transmitters and has proven to be worthwhile. More documentation on this technology can be found at [http://www.echologics.com/leakfinder\\_overview.html](http://www.echologics.com/leakfinder_overview.html). Since then, we have been using a similar product, the Primayer leak correlator system and have made an effort to systematically survey our older trunk main systems to assure no leaks are occurring on these mains which could cause catastrophic failures and extensive damage. More documentation on this technology can be found at [http://www.primayer.co.uk/wlc\\_leak\\_location\\_eureka\\_digital.htm](http://www.primayer.co.uk/wlc_leak_location_eureka_digital.htm)

The following table demonstrates the Department's efforts toward leak detection.

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Miles of Pipe Surveyed	2310	2200	700	734	1220	1700	1460	1220	1600	1900	1760	1162	1179	1501
Number of Underground Leaks Located	1050	938	400	320	356	590	477	402	300	660	637	380	611	702

## SCADA SYSTEM

The SCADA system was upgraded during 1996-97. At that time new well gauges, discharge pressure gauges, and flow meters were installed. In 2006, the SCADA system was upgraded again with new equipment and software to improve the operations and allow even better pressure management. Today there are 84 remote pressure sensors installed in the distribution system. The sensors are continuously monitoring water pressure in real time for the entire service area of the City of Chicago. Also, there are eight additional continuously monitored points located mainly in the outlying areas to monitor supply pressure and suburban flow

demand patterns. These pressure sensors have proven to be a great aid with pumping station operation, by avoiding over pressurizing the system that in turn is believed to contribute to significant savings in water usage. The upgraded SCADA system provided a more complete monitoring and control of pressures and flows in the distribution system on a real time basis.

### **VARIABLE SPEED ELECTRIC DRIVES**

The Chicago water system has 12 pumping stations. Nine of the pumping stations have pumps that are driven by electric motors, and four of these electric stations are equipped with electronically controlled variable speed drives. The variable speed drives allow the operating staff to efficiently adjust water pumpage without over pressurizing the water distribution system, which reduces water main breaks and wasting of water. The remaining three stations are steam powered with manually controlled pumps. The plan is to convert these stations to electrical power with variable speed drives. The Department has just completed the conversion of Springfield Pumping Station in 2015. The design plans have been completed for the conversion of the Central Park Pumping Station, this project will go into construction in 2017. The next steam powered station, Western Ave. Pumping station, will follow soon after the start of construction of the Central Park Station construction. And the design for the conversion of the final steam pumping station, Mayfair Ave. Pumping Station, is slated to begin in 2021.



# AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

American Water Works Association  
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[Click to access definition](#)  
[Click to add a comment](#)

**Water Audit Report for:** City of Chicago, Department of Water Management  
**Reporting Year:** 2016 10/2015 - 9/2016

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

**All volumes to be entered as: MILLION GALLONS (US) PER YEAR**

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

**WATER SUPPLIED**

<----- Enter grading in column 'E' and 'J' ----->

Volume from own sources:	<input type="button" value="+"/> <input type="button" value="7"/>	<input style="width: 150px;" type="text" value="256,862.094"/>	MG/Yr
Water imported:	<input type="button" value="+"/> <input type="button" value="5"/>	<input style="width: 150px;" type="text" value="0.000"/>	MG/Yr
Water exported:	<input type="button" value="+"/> <input type="button" value="9"/>	<input style="width: 150px;" type="text" value="97,839.486"/>	MG/Yr

**Master Meter and Supply Error Adjustments**

Pcnt:	<input type="button" value="+"/> <input type="button" value="7"/>	<input style="width: 50px;" type="text" value="1.81%"/>	<input type="radio"/>	<input type="radio"/>	<input style="width: 100px;" type="text"/>	MG/Yr
	<input type="button" value="+"/> <input type="button" value="5"/>	<input style="width: 50px;" type="text" value="-1.71%"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input style="width: 100px;" type="text"/>	MG/Yr

Enter negative % or value for under-registration  
Enter positive % or value for over-registration

**WATER SUPPLIED:** 152,753.896 MG/Yr

**AUTHORIZED CONSUMPTION**

Billed metered:	<input type="button" value="+"/> <input type="button" value="5"/>	<input style="width: 150px;" type="text" value="66,830.868"/>	MG/Yr
Billed unmetered:	<input type="button" value="+"/> <input type="button" value="5"/>	<input style="width: 150px;" type="text" value="62,482.788"/>	MG/Yr
Unbilled metered:	<input type="button" value="+"/> <input type="button" value="9"/>	<input style="width: 150px;" type="text" value="4,741.927"/>	MG/Yr
Unbilled unmetered:	<input type="button" value="+"/> <input type="button" value="6"/>	<input style="width: 150px;" type="text" value="2,631.174"/>	MG/Yr

Unbilled Unmetered volume entered is greater than the recommended default value

**AUTHORIZED CONSUMPTION:** 136,686.757 MG/Yr

Click here:   
for help using option buttons below

Pcnt:	<input type="radio"/>	<input checked="" type="radio"/>	<input style="width: 100px;" type="text" value="2,631.174"/>	MG/Yr
-------	-----------------------	----------------------------------	--	-------

Use buttons to select percentage of water supplied OR value

**WATER LOSSES (Water Supplied - Authorized Consumption)**

16,067.139 MG/Yr

**Apparent Losses**

Unauthorized consumption:   381.885 MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:   359.662 MG/Yr

Systematic data handling errors:   167.077 MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

**Apparent Losses:** 908.624 MG/Yr

Pcnt:	<input checked="" type="radio"/>	<input type="radio"/>	<input style="width: 100px;" type="text" value="0.25%"/>	MG/Yr
-------	----------------------------------	-----------------------	--	-------

	<input checked="" type="radio"/>	<input type="radio"/>	<input style="width: 100px;" type="text" value="0.50%"/>	MG/Yr
	<input checked="" type="radio"/>	<input type="radio"/>	<input style="width: 100px;" type="text" value="0.25%"/>	MG/Yr

**Real Losses (Current Annual Real Losses or CARL)**

Real Losses = Water Losses - Apparent Losses:  15,158.515 MG/Yr

**WATER LOSSES:** 16,067.139 MG/Yr

**NON-REVENUE WATER**

**NON-REVENUE WATER:**  23,440.240 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

**SYSTEM DATA**

Length of mains:	<input type="button" value="+"/> <input type="button" value="9"/>	<input style="width: 150px;" type="text" value="4,236.7"/>	miles
Number of <u>active AND inactive</u> service connections:	<input type="button" value="+"/> <input type="button" value="9"/>	<input style="width: 150px;" type="text" value="518,813"/>	
Service connection density:	<input type="button" value="7"/>	<input style="width: 150px;" type="text" value="122"/>	conn./mile main

Are customer meters typically located at the curbstop or property line?  No (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line:   50.0 ft

Average operating pressure:   45.0 psi

**COST DATA**

Total annual cost of operating water system:	<input type="button" value="+"/> <input type="button" value="9"/>	<input style="width: 150px;" type="text" value="\$819,077,000"/>	\$/Year
Customer retail unit cost (applied to Apparent Losses):	<input type="button" value="+"/> <input type="button" value="10"/>	<input style="width: 150px;" type="text" value="\$3.81"/>	\$/1000 gallons (US)
Variable production cost (applied to Real Losses):	<input type="button" value="+"/> <input type="button" value="7"/>	<input style="width: 150px;" type="text" value="\$144.94"/>	\$/Million gallons <input type="checkbox"/> Use Customer Retail Unit Cost to value real losses

**WATER AUDIT DATA VALIDITY SCORE:**

**\*\*\* YOUR SCORE IS: 72 out of 100 \*\*\***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

**PRIORITY AREAS FOR ATTENTION:**

Based on the information provided, audit accuracy can be improved by addressing the following components:

- 1: Volume from own sources
- 2: Billed metered
- 3: Billed unmetered



AWWA Free Water Audit Software:  
System Attributes and Performance Indicators

Water Audit Report for: **City of Chicago, Department of Water Management**

Reporting Year: **2016** **10/2015 - 9/2016**

**\*\*\* YOUR WATER AUDIT DATA VALIDITY SCORE IS: 72 out of 100 \*\*\***

**System Attributes:**

Apparent Losses:	908,624	MG/yr	
+	Real Losses:	15,158,515	MG/yr
=	<b>Water Losses:</b>	<b>16,067,139</b>	MG/yr
<b>?</b>	Unavoidable Annual Real Losses (UARL):	2,259.92	MG/yr
	Annual cost of Apparent Losses:	\$3,461,858	
	Annual cost of Real Losses:	\$2,197,075	

Valued at **Variable Production Cost**

Return to Reporting Worksheet to change this assumption

**Performance Indicators:**

**Financial:**

Non-revenue water as percent by volume of Water Supplied: **15.3%**

Non-revenue water as percent by cost of operating system: **0.8%** Real Losses valued at Variable Production Cost

**Operational Efficiency:**

Apparent Losses per service connection per day: **4.80** gallons/connection/day

Real Losses per service connection per day: **80.05** gallons/connection/day

Real Losses per length of main per day\*: **N/A**

Real Losses per service connection per day per psi pressure: **1.78** gallons/connection/day/psi

From Above, Real Losses = Current Annual Real Losses (CARL): **15,158,521** million gallons/year

**?** Infrastructure Leakage Index (ILI) [CARL/UARL]: **6.71**

\* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline