Metropolitan Water Reclamation District of Greater Chicago

MONITORING AND RESEARCH DEPARTMENT

REPORT NO. 17-39

RE-EVALUATION OF LOCAL PRETREATMENT LIMITS

2017 ADDENDUM WITH REVISED BACKGROUND POLLUTANT CONCENTRATIONS/LOADINGS

August 2017

Protecting Our Water Environment

Metropolitan Water Reclamation District of Greater Chicago

CECIL LUE-HING RESEARCH AND DEVELOPMENT COMPLEX
6001 WEST PERSHING ROAD CICERO, ILLINOIS 60804-4112

Edward W. Podczerwinski, P.E.
Acting Director of Monitoring and Research

August 31, 2017

Mr. Scott Ireland
Section Chief
NPDES Programs Branch
United States Environmental Protection Agency
Region 5
Mail Code WN-16J
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Dear Mr. Ireland:

Subject: United States Environmental Protection Agency Review of Metropolitan Water Reclamation District of Greater Chicago's 2014 Re-Evaluation of Local Pretreatment Limits Report

The Metropolitan Water Reclamation District of Greater Chicago (District) references meetings at the United States Environmental Protection Agency Region 5 (USEPA) offices on July 20 and November 28, 2016. In those meetings, the USEPA Pretreatment and the National Pollutant Discharge Elimination System Programs' staff updated the District on the status of its review of the District's most recent "Re-Evaluation of Local Pretreatment Limits" report, originally submitted to the USEPA for review in December 2014. The USEPA advised that the data and methodology employed by the District to estimate loadings from background and domestic sources (city of Chicago's distributed Lake Michigan water) in the report were not acceptable. In lieu of this methodology, the USEPA directed the District to conduct sampling studies within trunk or intercepting sewers in the District's service area that receive and convey only domestic and/or light-commercial (i.e., nonindustrial) flows and to revise that section of the report accordingly. The District also makes reference to its letter to the USEPA dated January 12, 2017, wherein the District accepted and verified your directive to revise the methodology used to calculate loadings from background and domestic sources.

In response to that directive, the District conducted sampling studies to obtain the background concentrations from domestic and commercial sources for each of the seven water reclamation plants (WRPs) in the District's service area. Those WRP-specific background concentrations from the interceptor sampling studies were then used to again re-evaluate the local limits. An addendum to the 2014 report, including sampling point descriptions and locations, sampling methodology, raw and average data, and a revised evaluation of local limits for pollutants of concern, is enclosed for your review.

Subject: United States Environmental Protection Agency Review of Metropolitan Water Reclamation District of Greater Chicago's 2014 Re-Evaluation of Local Pretreatment Limits Report

If you have any further questions regarding these or any other matters, please contact Mr. Mathew Joseph, Assistant Director of Monitoring and Research, Industrial Waste Division, at (312) 751-3040.

Very truly yours,

Edward W. Podczerwinski
Acting Director
Monitoring and Research Department

EWP:MJ:KK:cm
Attachment
cc: Mr. K. Pierard, USEPA
Mr. M. Joseph

Metropolitan Water Reclamation District of Greater Chicago
100 East Erie Street Chicago, Illinois 60611-2803 (312) 751-5600

RE-EVALUATION OF LOCAL PRETREATMENT LIMITS

2017 ADDENDUM WITH REVISED BACKGROUND POLLUTANT CONCENTRATIONS/LOADINGS

By

Kuldip Kumar
Senior Environmental Soil Scientist

Gregory Yarnik
Supervising Environmental Specialist

Diane Moe
Senior Environmental Chemist

Heng Zhang
Assistant Director of Monitoring and Research
Environmental Monitoring and Research Division

Monitoring and Research Department
Edward W. Podczerwinski, Acting Director **August 2017**

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF ABBREVIATIONS

2014 Report	Monitoring and Research Department Report 14-58, "Re-Evaluation of Local Pretreatment Limits"
Ag	silver
AHL	allowable headworks loading
As	arsenic
BOD_5	five-day biochemical oxygen demand
C_6H_6O	phenol
Cd	cadmium
CFR	*Code of Federal Regulations*
CMP	Code of Management Practices
CN^-	cyanide
Cr	chromium, total
Cr^{6+}	hexavalent chromium
Cu	copper
District	Metropolitan Water Reclamation District of Greater Chicago
F^-	fluoride
Fe	iron
FOG	fats, oils, and greases
Hg	mercury
M&R	Monitoring and Research
MAHL	maximum allowable headworks loading
MAIL	maximum allowable industrial loading
Mo	molybdenum
NH_3	ammonia
Ni	nickel
Pb	lead
POC	pollutant of concern
Se	selenium
SS	suspended solids
USEPA	United States Environmental Protection Agency
WQMAHL	water quality maximum allowable headworks loading
WRP	water reclamation plant
Zn	zinc

DISCLAIMER

Mention of proprietary equipment and chemicals in this report does not constitute endorsement by the Metropolitan Water Reclamation District of Greater Chicago.

ESTIMATED LOADINGS FROM BACKGROUND AND DOMESTIC SOURCES

Pursuant to a directive from the United States Environmental Protection Agency (USEPA), the data used for the domestic loading calculation is derived from a comprehensive pollutant sampling of one residential and light-commercial sector within each of the Metropolitan Water Reclamation District of Greater Chicago's (District's) seven water reclamation plant (WRP) service area collection systems (District intercepting sewers or local municipal sewers upstream of and directly tributary to a District intercepting sewer) during 2017.

Sample Point Descriptions and Locations

Sampling points were located and identified using the District's collection system maps and GIS program. Because only residential and light-commercial sectors in each of the District's seven WRP service area collection systems would be sampled pursuant to the USEPA directive, identified sampling points were generally located far upstream and distant from the WRP. Locations, designations, and descriptions of the sample points are listed as follows.

1. Calumet WRP Collection System
   Station 19LL
   Manhole on the District's Calumet No. 20 intercepting sewer
   Austin Avenue at Jody Lane
   Tinley Park, IL

2. John E. Egan WRP Collection System
   Station 10LL
   Manhole on the District's Upper Salt Creek No. 10 intercepting sewer
   550 South Meacham Road
   Schaumburg, IL

3. Hanover Park WRP Collection System
   Station 84LL
   Manhole on Bartlett, IL, public sewer tributary to the District's Northwest No. 20 intercepting sewer
   Devon Avenue at Berteau Avenue
   Bartlett, IL

4. Kirie WRP Collection System
   Station 20LL
   Manhole on Elk Grove Village public sewer tributary to the District's Upper Des Plaines No. 20C intercepting sewer
   Oakton Street at Shadywood Lane
   Elk Grove Village, IL

5. Lemont WRP Collection System
   Station 4LL
   Manhole on the District's Lemont No. 4 intercepting sewer
   Walker Road at Oak Avenue
   Lemont, IL

6. O'Brien WRP Collection System
   Station 6LL
   Manhole on the District's Golf Road Extension intercepting sewer
   Golf Road at Oak Lane
   Des Plaines, IL

7. Stickney WRP Collection System
   Station 16LL
   Manhole on the District's Southwest No. 16 intercepting sewer
   59th Street at South Brainard Avenue
   Countryside, IL

Sampling Methodology

Sampling at each of the seven collection system locations was conducted during the months of April and May, 2017, for 14 consecutive calendar days during both dry and wet weather conditions. Sampling methodologies and protocols were standardized over the seven locations as follows. Twenty-four (24) hour automated composite samples were collected for the trace metals, phosphorus, ammonia-nitrogen, biochemical oxygen demand (BOD), suspended solids (SS), and fluoride (F^-) parameters using Isco or Hach programmable, peristaltic pump-type wastewater samplers. Individual aliquots of the composite samples were collected at 15-minute intervals over each 24-hour period. In addition to the composite samples, manual grab samples were collected each day for the cyanide (CN^-), fats, oils, and greases (FOG), and phenol (C_6H_6O) parameters. All samples were preserved on ice and with all required preservation reagents during both collection and transport and were analyzed by the District's Analytical Laboratory in conformance with established procedures for chain of custody and quality control.

Results

The concentration and reporting limit values for each parameters from the background sources are detailed in Appendix Table A-1. For the conventional pollutants five-day BOD (BOD_5) and SS, the values from domestic sources obtained in this sampling study are also included in Appendix Table A-1, which are used as the background sources differentiating from industrial sources.

According to the Local Limits Development Guidance developed by USEPA (pages 5–6, EPA 833-R-04-002A), half (1/2) of respective reporting limits are used to calculate arithmetic mean concentrations when pollutant concentrations are reported as below the reporting limits. All data generated in this study were included in the calculations of arithmetic mean. The arithmetic mean concentrations of all pertinent pollutants analyzed in this study are presented in Appendix Table AI-

2. The collection system data collected in this study is also compared with the background pollutant concentrations in the City of Chicago's distributed Lake Michigan water. This background pollutant concentration is the average of the north, south, and central distribution sample concentrations, which are detailed in Appendix Table AV-1 of Monitoring and Research (M&R) Department Report 14-58, "Re-Evaluation of Local Pretreatment Limits" (2014 Report). A comparison of these two sets of data is presented in Appendix Table AI-2.

The background flow for each WRP is the difference between the average WRP influent flow and the industrial flow into the WRP. Each WRP is evaluated independently. The background loads, once determined, are deducted from the maximum allowable pollutant loads at the headworks of each WRP. The remainder of the pollutant load for each WRP is evenly distributed among industrial users in the corresponding WRP service area.

DEVELOPING OF LOCAL LIMITS

In this study, local limits were calculated as site-specific for each WRP or WRPs for sludge-related evaluations. Variations are caused by differences in treatment processes, pollutant removal efficiencies, receiving stream water quality standards, biosolids disposal methods, and domestic wastewater pollutant background concentrations. The AHLs derived based on various criteria that were determined for each pollutant at each WRP are summarized in Table 62 (2014 Report, pages 101–104). The corresponding maximum allowable headworks loading (MAHL) for further evaluation are noted in the table. Only a portion of the MAHL for each pollutant of concern (POC) is allocated to the WRP's current users. The remaining portion is held in reserve as a safety factor to account for future industrial growth, potential slug loadings, and other uncertainties. A safety factor of 10 percent was used for present evaluation. The revised background loadings of pollutants measured during 2017 (Table 1) were subtracted from the MAHL to determine the maximum allowable industrial loading (MAIL) for each POC, as shown below (2014 Report, page 100, Equation 7).

$$L_{MAIL} = MAHL\,(1 - SF) - L_{DOM}$$

where,

L_{MAIL} = Maximum Allowable Industrial Load, lbs/day
$MAHL$ = Maximum Allowable Headworks Loading, lbs/day
SF = Safety Factor, as a decimal
L_{DOM} = Loading from Background Sources, lbs/day

A local limit was then calculated by dividing the MAIL by the total industrial flow to the respective WRP or WRPs with respect to biosolids quality or sludge anaerobic digestion inhibition, as shown below (2014 Report, page 100, Equation 8).

$$c_{LOCAL\_LIMIT} = \frac{L_{MAIL}}{Q_{IND}\,(8.34)}$$

where,

C_{LOCAL_LIMIT} = Uniform Concentration Local Limit, mg/L
L_{MAIL} = Maximum Allowable Industrial Load, lbs/day
Q_{IND} = Total Flow from Industrial Sources within a WRP service area, MGD
8.34 = Unit Conversion Factor

The local limits based on specific criteria for all the District's WRPs were estimated based on revised 2017 background loadings (Table 2) if an evaluation was required.

TABLE 1: 2017 BACKGROUND/DOMESTIC POLLUTANT CONCENTRATIONS AND LOADINGS

Pollutant	Calumet WRP	Egan WRP	Hanover Park WRP	Kirie WRP	Lemont WRP	O'Brien WRP	Stickney WRP
	Average Background Pollutant Concentrations (mg/L)						
Arsenic	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Cadmium	0.0025	0.0025	0.0025	0.0025	0.0028	0.0025	0.0025
Chromium, Total	0.0063	0.0058	0.0042	0.0054	0.0052	0.0046	0.008
Hexavalent Chromium[2]	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Copper	0.0354	0.0392	0.0409	0.0439	0.0385	0.0734	0.0448
Cyanide	0.0032	0.0029	0.0054	0.0028	0.003	0.003	0.0028
Iron	1.0599	0.9794	0.4412	0.9899	0.4968	0.9916	0.9658
Lead	0.01	0.01	0.0107	0.01	0.01	0.01	0.01
Mercury	0.000025	0.00013	0.000025	0.0000379	0.0000911	0.000025	0.0000529
Molybdenum	0.0083	0.0064	0.005	0.0054	0.005	0.005	0.005
Nickel	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0028
Selenium	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Silver	0.0005	0.0008	0.0005	0.0005	0.0005	0.0005	0.0008
Zinc	0.0685	0.0778	0.0833	0.0974	0.0825	0.0936	0.0619
	Domestic Background Load at WRP[1] (lb/day)						
Arsenic	50.49	5.59	1.89	7.82	0.52	48.61	145.6
Cadmium	5.05	0.56	0.19	0.78	0.06	4.86	14.56
Chromium, Total	12.72	1.30	0.32	1.69	0.11	8.94	46.60
Hexavalent Chromium[2]	0.40	0.04	0.02	0.06	0.004	0.39	1.16
Copper	71.50	8.77	3.09	13.73	0.80	142.7	260.9
Cyanide	6.46	0.65	0.41	0.88	0.06	5.83	16.31
Iron	2,141	219.1	33.35	309.6	10.36	1,929	5,625
Lead	20.20	2.24	0.81	3.13	0.21	19.44	58.20
Mercury	0.05	0.03	0.002	0.01	0.002	0.05	0.31

TABLE 1 (Continued): 2017 BACKGROUND/DOMESTIC POLLUTANT CONCENTRATIONS AND LOADINGS

Pollutant	Calumet WRP	Egan WRP	Hanover Park WRP	Kirie WRP	Lemont WRP	O'Brien WRP	Stickney WRP
Molybdenum	16.76	1.43	0.38	1.69	0.10	9.72	29.12
Nickel	5.05	0.56	0.19	0.78	0.05	4.86	16.31
Selenium	50.49	5.59	1.89	7.82	0.52	48.61	145.6
Silver	1.01	0.18	0.04	0.16	0.01	0.97	4.66
Zinc	138.4	17.40	6.30	30.46	1.72	182.0	360.5
Average WRP Flow, MGD	250.5	27.35	9.26	38.40	2.52	235	721
Average Industrial Flow, MGD	8.32	0.53	0.20	0.90	0	1.86	22.61
Average Domestic Flow, MGD	242.2	26.82	9.07	37.50	2.52	233.14	698.39

[1]Domestic flow, which is the difference between WRP influent flow and the industrial flow, is used to calculate domestic load.
[2]Hexavalent chromium was not analyzed during the 2017 sampling. Background data from the 2014 Report was used.

TABLE 2: 2017 SUMMARY OF ESTIMATED LOCAL LIMITS FOR DIFFERENT POLLUTANTS OF CONCERN BASED ON DIFFERENT CRITERIA AND A SAFETY FACTOR OF 10 PERCENT

POC	Criteria	Current Local Limit (mg/L)	Estimated Local Limit Based on Different Criteria (mg/L)						
			Calumet WRP	Egan WRP	Hanover Park WRP	Kirie WRP	Lemont WRP	O'Brien WRP	Stickney WRP
Arsenic	Water Quality	None	N/R	N/R	N/R	N/R	N/A	N/R	N/R
	Biosolids Quality		0.64	4.1	-0.76	N/A	N/A	N/A	1.2
	Sludge Inhibition		2.0	N/R	N/R	N/R	N/A	N/R	2.1
	Anaerobic Digestion		N/R	N/R	-0.54	N/A	N/A	N/A	N/R
Cadmium	Water Quality	2.0	N/R	N/R	N/R	N/R	N/A	N/R	N/R
	Biosolids Quality		N/R	N/R	N/R	N/A	N/A	N/A	0.02
	Sludge Inhibition		N/R	N/R	N/R	N/R	N/A	118	N/R
	Anaerobic Digestion		N/R	N/R	N/R	N/A	N/A	N/A	N/R
Chromium, trivalent	Water Quality	25	N/R	N/R	N/R	N/R	N/A	N/R	N/R
	Sludge Inhibition		N/R	N/R	N/R	N/R	N/A	N/R	N/R
	Anaerobic Digestion		N/R	N/R	N/R	N/A	N/A	N/A	N/R
Chromium, hexavalent	Water Quality	10	N/R	N/R	N/R	N/R	N/A	N/R	N/R
	Sludge Inhibition		N/R	N/R	N/R	N/R	N/A	N/R	N/R
	Anaerobic Digestion		N/R	N/R	N/R	N/A	N/A	N/A	N/R
Copper	Water Quality	3.0	N/R	N/R	4.8	N/R	N/A	N/R	N/R
	Biosolids Quality		N/R	11	N/R	N/A	N/A	N/A	2.7
	Sludge Inhibition		3.0	5.3	4.2	19	N/A	6.6	2.8
	Anaerobic Digestion		N/R	N/R	N/R	N/A	N/A	N/A	3.1
Lead	Water Quality	0.5	N/R	N/R	N/R	N/R	N/A	N/R	4.9

TABLE 2 (Continued): 2017 SUMMARY OF ESTIMATED LOCAL LIMITS FOR DIFFERENT POLLUTANTS OF CONCERN BASED ON DIFFERENT CRITERIA AND A SAFETY FACTOR OF 10 PERCENT

POC	Criteria	Current Local Limit (mg/L)	Estimated Local Limit Based on Different Criteria (mg/L)						
			Calumet WRP	Egan WRP	Hanover Park WRP	Kirie WRP	Lemont WRP	O'Brien WRP	Stickney WRP
	Biosolids Quality		N/R	N/R	N/R	N/A	N/A	N/A	1.4
	Sludge Inhibition		N/R	N/R	N/R	N/R	N/A	N/R	N/R
	Anaerobic Digestion			N/R		N/A	N/A	N/A	
			N/R		N/R				N/R
Iron Total	Water Quality	250		N/R			N/A	N/R	
			N/R		N/R	N/R			N/R
Fluoride	Water Quality	None	N/R	N/R	N/R	N/R	N/A	N/R	N/R
Mercury	Water Quality	0.0005	N/R	0.31	0.26	0.26	N/A	N/R	0.02
	Biosolids Quality		N/R	N/R	N/R	N/A	N/A	N/R	N/R
	Sludge Inhibition			N/R			N/A	N/R	
			N/R		N/R	N/R			N/R
Molybdenum[1]	Biosolids Quality	None	N/R	N/R	N/R	N/R	N/A	N/R	N/R
Nickel	Water Quality	10	N/R	0.90	N/R	0.88	N/A	N/R	N/R
	Biosolids Quality		N/R	N/R	N/R	N/A	N/A	N/A	N/R
	Sludge Inhibition		N/R	N/R	N/R	N/R	N/A	N/R	N/R
	Anaerobic Digestion			N/R		N/A	N/A	N/A	
			N/R		N/R				N/R
Selenium	Water Quality	None	N/R	N/R	N/R	N/R	N/A	N/R	N/R
	Biosolids Quality			N/R		N/A	N/A	N/A	0.86
			N/R		N/R				
Silver	Water Quality	None	N/R	N/R	N/R	N/R	N/A	N/R	N/R
	Anaerobic Digestion			N/R		N/A	N/A	N/A	N/R
			N/R		N/R				

TABLE 2 (Continued): 2017 SUMMARY OF ESTIMATED LOCAL LIMITS FOR DIFFERENT POLLUTANTS OF CONCERN BASED ON DIFFERENT CRITERIA AND A SAFETY FACTOR OF 10 PERCENT

POC	Criteria	Current Local Limit (mg/L)	Estimated Local Limit Based on Different Criteria (mg/L)						
			Calumet WRP	Egan WRP	Hanover Park WRP	Kirie WRP	Lemont WRP	O'Brien WRP	Stickney WRP
Zinc	Water Quality	15	N/R	N/R	N/R	N/R	N/R	N/A	N/R
	Biosolids Quality		3.3	N/R	N/R	N/A	N/A	N/A	N/R
	Sludge Inhibition		3.0 (29)[2]	2.6 (37)	2.4 (35)	6.2 (60)	N/A	2.5 (77)	3.6 (32)
	Anaerobic Digestion		N/R	N/R	N/R	N/A	N/A	N/A	N/R
Cyanide, WAD or Total	Water Quality	5.0	N/A	N/R	N/R	N/R	N/A	N/A	N/A
	Sludge Inhibition		N/R	N/R	N/R	N/R	N/A	N/R	N/R
	Anaerobic Digestion		N/R	N/R	N/R	N/A	N/A	N/A	N/R

N/A = Not applicable; N/R = Further local limits evaluation not required according to 2004 USEPA Guidance, details in 2014 report.

[1]Allowable headworks loading cannot be calculated because molybdenum concentrations in WRP influents are not available. Evaluation was made based on molybdenum concentrations in biosolids, which are routinely monitored.

[2]Figures in parenthesis for sludge inhibition estimated based on inhibition concentration of 0.5 mg/L. The range provided in EPA 833-R-04-002B, EPA Office of Water, July 2004, Appendix G (http://www.epa.gov/npdes/pubs/final_local_limits_appendices.pdf) varies from 0.08–0.5 mg/L.

Evaluation of Local Limits for Pollutants of Concern

Arsenic. Arsenic (As) is currently not regulated under a local limit. Arsenic was evaluated at each of the District's seven activated sludge WRPs. The technically based evaluation considered water quality, biosolids quality, and biological inhibition. The allowable headworks loadings were determined for each environmental criterion. The derived AHLs were compared to the average and maximum historical influent loadings. The biosolids As concentrations were compared to the limits established in the 40 *Code of Federal Regulations* (CFR) Part 503.13 Regulation.

The effluent water quality evaluation for As, Table 10 (2014 Report, pages 22–23), indicated that it is not necessary to further evaluate the need for a local limit for As at the District's seven WRPs relative to water quality. A local limit for As is not needed to protect water quality at the District's WRPs.

The biosolids quality evaluation, Table 30 (2014 Report, page 64), indicated that, based on actual loading and allowable headworks loading, further evaluation of As was required for the Calumet, Egan, Hanover Park, and Stickney WRPs. Table 30 (2014 Report, page 64) indicated that the average As concentrations in biosolids from those WRPs did not exceed 30 percent of the highest quality 40 CFR Part 503.13 limit, and the maximum concentrations do not exceed 45 percent of this limit. The As concentrations in the biosolids are low enough in relation to 40 CFR Part 503.13 biosolids limits that no local limit is needed.

The evaluation of activated sludge inhibition due to As, Table 39 (2014 Report, page 73), indicated that further evaluation was needed at the Kirie, Lemont, and Stickney WRPs based on the methodology of the 2004 USEPA Guidance (USEPA, 2004a). However, the historical operations of these WRPs indicate that As is not responsible for any biological inhibition. Therefore, no local limit based on activated sludge inhibition is needed.

The headworks loadings of As were determined to potentially be high enough to cause anaerobic digestion inhibition at the Hanover Park WRP digesters only, based on the 2004 USEPA Guidance (USEPA, 2004a). The summary evaluation is shown in Table 2. However, the historical operation of the Hanover Park WRP digesters indicates that there has been no inhibition in the digestion process. Therefore, no local limit based on anaerobic digestion inhibition is needed.

The District will not establish a local limit for As at this time, as no environmental problems or biological inhibition issues have been shown in the District service area and at the District's WRPs. The interference and pass-through potential of As will continue to be monitored.

Cadmium. Cadmium (Cd) is currently regulated under a local limit. The pollutant was evaluated at each of the District's seven activated sludge WRPs. The technically based evaluation considered water quality, biosolids quality, and biological inhibition. The allowable headworks loadings were determined for each environmental criterion. The derived AHLs were compared to the average and maximum historical influent loadings. The sludge Cd concentrations were compared to the 40 CFR Part 503.13 regulation.

The effluent water quality evaluation for Cd, Table 11 (2014 Report, pages 24–25), indicated that it was not necessary to further evaluate the need for a local limit for Cd at the District's seven

WRPs relative to water quality. The current local limit for Cd was sufficient to protect effluent water quality at the District's WRPs.

The biosolids quality evaluation, Table 31 (2014 Report, page 65), indicated that further evaluation for Cd was recommended for the Stickney WRP based on actual loading versus allowable headworks loading. However, Table 31 (2014 Report, page 65) also indicated that the concentration of Cd in the Stickney WRP biosolids was much lower than the 40 CFR Part 503.13 limit, with the maximum concentration not exceeding 10 percent of the highest quality 40 CFR Part 503.13 limit. The current local limit, therefore, appears to be sufficiently protective of biosolids quality.

The evaluation of activated sludge inhibition due to Cd, Table 40 (2014 Report, page 74) and Table 2 with recent 2017 evaluation of local limits based on revised background loadings, indicate that the headworks loadings are not high enough to cause inhibition at any of the District's WRPs.

The actual headwork loadings of Cd are not high enough to cause anaerobic digestion inhibition at any of the District's digesters, according to Table 52 (2014 Report, page 87).

Also according to recent 2017 evaluation based on revised background loadings (Table 2), the established local of 2.0 mg/L is protective enough and the District will maintain the current local limit of 2.0 mg/L. The interference and pass-through potential of Cd will continue to be monitored.

Chromium. Total chromium (Cr) is currently regulated under a local limit. The pollutant was evaluated at each of the District's seven activated sludge WRPs. The technically based evaluation considered water quality, biosolids quality, and biological inhibition. The allowable headworks loadings were determined for each environmental criterion. The derived AHLs were compared to the average and maximum influent loadings.

The effluent water quality evaluation for Cr, Table 12 (2014 Report, pages 26–27), indicated that it was not necessary to further evaluate the need for a local limit for Cr at the District's seven WRPs relative to the water quality in the receiving streams. The current local limit is sufficient to protect water quality at the District's WRPs.

The evaluation of activated sludge inhibition due to Cr, Table 41 (2014 Report, page 75), indicated that the loadings were not high enough to cause inhibition at any of the seven District WRPs. Based on this evaluation, the District has determined that an update of the local limit for Cr was not needed.

The potential for Cr to exhibit toxicity to anaerobic digestion was also evaluated. Table 53 (2014 Report, page 88) showed the results, which indicate that there is a very low potential for Cr to be toxic to anaerobic digestion and, therefore, there is no need to change the current local limit.

The District has historically regulated Cr under a local limit of 25.0 mg/L, the District will maintain the current limit of 25.0 mg/L. The interference and pass-through potential of total Cr will continue to be monitored.

Hexavalent Chromium. Hexavalent chromium (Cr^{6+}) is currently regulated under a local limit. The pollutant was evaluated at each of the District's seven activated sludge WRPs. The technically based evaluation considered water quality and biological inhibition. The allowable

headworks loadings were determined for each environmental criterion. The derived AHLs were compared to the average and maximum influent loadings.

The effluent water quality evaluation for Cr^{6+}, Table 13 (2014 Report, pages 28–29), indicated that it was not necessary to further evaluate the need for a local limit for Cr^{6+} at the District's seven WRPs relative to the water quality. The current local limit for Cr^{6+} is sufficient to protect water quality at the District's WRPs.

The evaluation of activated sludge inhibition due to Cr^{6+}, Table 42 (2014 Report, page 76), indicated that the loadings were not high enough to cause inhibition at any of the District's WRPs.

The headworks loadings of Cr^{6+} were not high enough to cause anaerobic digestion inhibition at any of the District's digesters, as shown in Table 54 (2014 Report, page 89).

Based on this evaluation, the District has determined that an update of the local limit for Cr^{6+} was not needed. However, because the District has historically regulated Cr^{6+} under a local limit, the District will maintain the current local limit of 10.0 mg/L. The interference and pass-through potential of Cr^{6+} will continue to be monitored.

Copper. Copper (Cu) is currently regulated under a local limit. The pollutant was evaluated at each of the District's seven activated sludge WRPs. The technically based evaluation considered water quality, biosolids quality, and biological inhibition. The allowable headworks loadings were determined for each environmental criterion. The derived AHLs were compared to the average and maximum influent loadings. The biosolids Cu concentrations were compared to the 40 CFR Part 503.13 standard.

The effluent water quality evaluation for Cu, Table 14 (2014 Report, pages 30–31), indicated that the average Cu loadings at all seven of the WRPs were significantly lower than the maximum allowable headworks loadings except for the Hanover Park WRP. The estimated local limits from 2017 evaluation using revised background pollutant loadings based on water quality for Hanover Park WRP is 4.8 mg/L (Table 2), which is higher than present local limit of 3.0 mg/L for Cu.

The AHLs derived based on biosolids quality at the Egan and Stickney WRPs exceeded 60 percent of the allowed headworks loadings based upon the methodology of the 2004 USEPA Guidance, as shown in Table 32 (2014 Report, page 66). However, the post-digestion maximum Cu concentrations in the biosolids were well below the 40 CFR Part 503.13 standard at all District biosolids processing facilities. The historical operations data suggest that no limit is necessary to protect biosolids quality at this time.

The evaluation of activated sludge inhibition due to Cu, Table 43 (2014 Report, page 77), indicated that further evaluation was recommended at all of the seven WRPs based upon the methodology of the 2004 USEPA Guidance. The limiting parameter was nitrogenous microorganisms inhibition.

Recent 2017 evaluation based on revised background pollutant loadings showed estimated local limits concentrations ranging from 2.8–19.0 mg/L for sludge inhibition and from 1.9–13.0 mg/L for anaerobic digestion inhibition (Table 2). However, historically no inhibition due to Cu has been observed at any of the seven WRPs. In literature, the inhibition threshold concentration for

nitrogenous microorganisms varies from 0.05 to 0.48 mg/L based on Appendix G of the 2004 USEPA Guidance Appendices (USEPA, 2004b), and we used the most stringent value 0.05 mg/L for this evaluation.

The District has historically regulated Cu under a local limit; the District will maintain the current local limit of 3.0 mg/L. The current limit of 3.0 mg/L is protective enough to avoid any inhibition of activated sludge process and anaerobic digestion process at all seven WRPs. The interference and pass-through potential of Cu will continue to be monitored.

Lead. Lead (Pb) is currently regulated under a local limit. The pollutant was evaluated at each of the District's seven activated sludge WRPs, including the four anaerobic sludge digeston facilities. The technically based evaluation considered water quality, biosolids quality, and biological inhibition. The allowable headworks loadings were determined for each environmental criterion. The effluent derived MAHLs were compared to the average and maximum influent loadings. The biosolids Pb concentrations were compared to the 40 CFR Part 503.13 standard.

The effluent water quality evaluation for Pb, Table 15 (2014 Report, pages 32–33), indicated that it was necessary to further evaluate the need for a local limit for Pb at the only Stickney WRP relative to the receiving stream water quality. Recent, 2017 evaluation based on revised background loadings showed the estimated local limits for Pb based on water quality standards ranged from 2.2–25 mg/L for various District WRPs (Table 2). Thus, the present local limit of 0.5 mg/L is protective enough to protect water quality.

The biosolids quality evaluation, Table 33 (2014 Report, page 67), indicated that the historical Pb loading at the Stickney WRP digesters exceeded 60 percent of the allowed headworks loadings based upon the methodology of the 2004 USEPA Guidance. However, the post-digestion maximum Pb concentrations in the biosolids were only 42 percent of or lower than the 40 CFR Part 503.13 standard at all District biosolids processing facilities as shown in Table 33 (2014 Report, page 67). The historical operations data suggest that the current local limit is sufficient to protect biosolids quality at this time.

The evaluation of activated sludge inhibition due to Pb, Table 44 (2014 Report, page 78), indicated that the actual loadings at the Stickney WRP may cause potential inhibition even though, historically, no inhibition due to Pb has been observed at the Stickney WRP. The estimated local limits based on recent 2017 revised background loadings of Pb for the District's WRPs ranged from 16–73 mg/L (Table 2), much higher than the present local limit of 0.5 mg/L for Pb.

The headworks loadings of Pb were not high enough to cause anaerobic digestion inhibition at any of the District's digesters as shown in Table 56 (2014 Report, page 91).

The District has historically regulated Pb under a local limit; the District will maintain the current local limit of 0.5 mg/L. The interference and pass-through potential of Pb will continue to be monitored.

Iron. Iron (Fe) is currently regulated under a local limit. The pollutant was evaluated at each of the District's seven activated sludge WRPs. The technically based evaluation considered water quality standards. The allowable headworks loadings were determined for secondary contact water quality standards. The derived AHLs were compared to the average and maximum influent loadings.

The effluent water quality evaluation for soluble Fe, Table 16-1 (2014 Report, pages 34–35), indicated that it was not necessary to further evaluate the need for a local limit for Fe at the District's seven WRPs relative to water quality. The effluent water quality evaluation for total Fe, Table 16-2 (2014 Report, pages 36–37), also indicated that it was not necessary to further evaluate the need for a local limit at any of the District WRPs relative to water quality.

The District has historically regulated Fe under a local limit, the District will maintain the current local limit of 250.0 mg/L for total Fe. The interference and pass-through potential of Fe will continue to be monitored.

Fluoride. F^- is not currently regulated under a local limit. The effluent water quality evaluation for F^-, Table 17 (2014 Report, pages 38–39), indicated that further evaluation is not needed for local limit consideration.

Mercury. Mercury (Hg) is currently regulated under a local limit. The pollutant was evaluated at each of the District's seven activated sludge WRPs. The technically based evaluation considered water quality, biosolids quality, and biological inhibition. The allowable headworks loadings were determined for each environmental criterion. The derived AHLs were compared to the average and maximum influent loadings. The biosolids Hg concentrations were compared to the 40 CFR Part 503.13 standard.

The effluent water quality evaluation for Hg, Table 18 (2014 Report, pages 40–41), indicated that it was necessary to further evaluate the need for a local limit for Hg at four of the District's seven WRPs relative to water quality (Egan, Hanover Park, Kirie, and Stickney). The Egan, Hanover Park, and Kirie WRPs have a State Human Health Water Quality based standard for total Hg, and based on this State Water Quality Standard for protecting Human Health, further evaluation is recommended for these three District WRPs (Table 18 2014 Report, pages 40–41). Further evaluation is also recommended for the Stickney WRP based on Indigenous Aquatic Life Use standard (Table 18 2014 Report).

However, further evaluation based on 2017 revised background concentrations (Table 2) indicates higher local limits based on all the three criteria as compared to the present local limit for Hg of 0.0005 mg/L.

The District has historically regulated Hg under a local limit of 0.0005 mg/L, the District will maintain the current limit of 0.0005 mg/L. The interference and pass-through potential of Hg will continue to be monitored. The USEPA is developing "Effluent Limitations Guidelines and Standards for the Dental Category," Proposed Rule 40 CFR Parts 403 and 441 (USEPA, 2014), once promulgated the Hg concentrations in the District WRPs are going to be further reduced. Midwest Generation's Fisk and Crawford power plants in the District service area closed in 2013, and it is expected that this will result in dry deposition of Hg being further reduced in the District service area.

Molybdenum. Molybdenum (Mo) is not currently regulated under a local limit. The pollutant was evaluated at the four anaerobic sludge digestion WRPs. The technically based evaluation considered biosolids quality. The allowable headworks loadings could not be calculated because the influent concentrations of Mo were not available. However, the biosolids Mo concentrations are compared to the 40 CFR Part 503.13 sludge standard for evaluation.

The biosolids quality evaluation, Table 35 (2014 Report, page 69), indicated that the Mo concentrations in biosolids are low (maximum concentrations do not exceed 28 percent of the highest quality standard in 40 CFR Part 508.13) and that no local limit was needed to protect biosolids quality.

The District will not establish a local limit for Mo at this time, as no environmental problems have been shown in the District service area. The concentration of Mo in biosolids will continue to be monitored.

Nickel. Nickel (Ni) is currently regulated under a local limit. The pollutant was evaluated at each of the District's seven activated sludge WRPs. The technically based evaluation considers water quality, biosolids quality, and biological inhibition. The allowable headworks loadings are determined for each environmental criterion. The derived AHLs were compared to the average and maximum influent loadings. The biosolids Ni concentrations were compared to the 40 CFR Part 503.13 standard.

The effluent water quality evaluation for Ni, Table 19 (2014 Report, pages 42–43), indicated that it was necessary to further evaluate the need for a local limit for Ni at the Egan and Kirie WRPs relative to water quality. However, the trigger for a local limit evaluation is based on L_{max}/WQMAHL greater than 80 percent, and WQMAHL is derived based on the chronic water quality standard. Theoretically, L_{max} is a one-time load and should be compared to the acceptable headworks loading (AHL) derived from Acute Toxicity (AHL-Acute Toxicity) and not the AHL derived from Chronic Toxicity. The L_{max}/AHL-Acute Toxicity was calculated to be only 9 percent and 6 percent for the Egan and Kirie WRPs, respectively. Since L_{avg}/AHL-Chronic Toxicity did not exceed 60 percent at either the Egan or Kirie WRPs, there does not appear to be a water quality concern for Ni at this time.

To address the Ni issue raised by the MAHL based limit calculations for the Egan and Kirie WRPs, the District has a Code of Management Practices (CMP) for potential Ni dischargers in the Egan and Kirie WRP discharge basins. The CMP is designed to reduce Ni discharges without any increase in District-wide regulatory burden. The CMP relies on the principles of pollution prevention by controlling Ni at the source rather than the traditional end-of-pipe approach. There is only one major industry which discharges Ni to Egan WRP, and the District has already imposed a stricter categorical limit of 2.38 mg/L on that industry rather than the District wide Ni local limit of 10.0 mg/L. Industrial Waste Division of the District is already working closely with the said industry to develop best management practices to further reduce the Ni discharge from the industry.

The biosolids quality evaluation, Table 36 (2014 Report, page 70), indicated that the Ni loadings and Ni concentrations in the biosolids were low enough that the current local limit was sufficient to protect biosolids quality.

The evaluation of activated sludge inhibition due to Ni, Table 46 (2014 Report, page 80), indicates that the loadings of Ni were not high enough to cause any inhibition of activated sludge process at any of the District WRPs.

The headworks loadings of Ni were not high enough to cause inhibition or any effect on anaerobic digestion at the District's digesters (see Table 58 2014 Report, page 93).

Based on this evaluation, the District has determined that an update on local limit for Ni is not needed at this time. The District has historically regulated Ni under a local limit of 10.0 mg/L and will retain that limit. The interference and pass-through potential of Ni will continue to be monitored.

Selenium. Selenium (Se) is not currently regulated under a local limit. The pollutant was evaluated at each of the District's seven activated sludge WRPs. The technically based evaluation considered water quality and biosolids quality. The allowable headworks loadings were determined for each area of concern. The effluent AHLs were compared to the average and maximum influent loadings. The biosolids Se concentrations were compared to the 40 CFR Part 503.13 sludge standard.

The effluent water quality evaluation for Se, Table 20 (2014 Report, pages 44–45), indicated that it was not necessary to further evaluate the need for a local limit for Se at the District's seven WRPs relative to water quality. A local limit for Se is not needed to protect water quality at the District's WRPs.

The biosolids quality evaluation, Table 37 (2014 Report, page 71), indicated that only for Stickney WRP, the actual average influent loading was greater than 60 percent of allowable headworks loading requiring further evaluation. However, the concentration of Se in biosolids was significantly lower than the 40 CFR Part 503.13 standards (maximum concentrations do not exceed 20 percent of the highest quality standards in 40 CFR Part 503.13), indicating that sludge quality is not affected.

The District will not establish a local limit for Se at this time, as no environmental problems have been shown in the District's service area. The interference and pass-through potential of Se will continue to be monitored.

Silver. Silver (Ag) is not currently regulated under a local limit. The pollutant was evaluated at each of the District's seven activated sludge WRPs. The technically based evaluation considered water quality and biological inhibition. The allowable headworks loadings were determined for each area of concern. The effluent AHLs were compared to the average and maximum influent loadings.

The effluent water quality evaluation for Ag, Table 21 (2014 Report, pages 46–47), indicated that further evaluation was not required at any of the seven WRPs.

The biological inhibition threshold for Ag to the activated sludge process is not available. The headworks loadings of Ag are not high enough to cause anaerobic digestion inhibition at any of the District digesters (see Table 59 2014 Report, page 94).

Therefore, a local limit for Ag is not necessary at this time. The interference and pass-through potential of Ag will continue to be monitored.

Zinc. Zinc (Zn) is currently regulated under a local limit. The pollutant was evaluated at each of the District's seven activated sludge WRPs. The technically based evaluation considered water quality, biosolids quality, and biological inhibition. The allowable headworks loadings are determined for each area of concern. The derived AHLs were compared to the average and maximum influent loadings. The biosolids Zn concentrations were compared to the 40 CFR Part 503.13 standard.

The effluent water quality evaluation for Zn, Table 22 (2014 Report, pages 48–49), indicated that further evaluation was not needed at any of the District's WRPs.

The biosolids quality evaluation, Table 38 (2014 Report, page 72), indicated that further evaluation is recommended at the Calumet and Stickney WRPs. The Zn loading exceeds 60 percent of the allowed headworks loadings. However, the post-digestion maximum Zn concentrations in the biosolids are well below the 40 CFR Part 503.13 standard at all District facilities. The historical operations data suggest that no new local limit is necessary to protect biosolids quality at this time.

The evaluation of activated sludge inhibition due to Zn (see Table 47, 2014 Report, page 81), indicated that further evaluation was recommended at all of the District WRPs based on the methodology of the 2004 USEPA Guidance. Inhibition of nitrogenous microorganisms was the most limiting parameter for all the WRPs. According to the 2004 USEPA Guidance, the threshold concentrations for nitrogenous microorganisms' inhibition range from 0.3 to 0.5 mg/L, and the thresholds for carbonaceous microorganisms' inhibition have two sets of literature values are reported, which are 0.3–5 mg/L and 5–10 mg/L (USEPA, 2004b). The most stringent value 0.08 mg/L was used for this evaluation (Table 47, 2014 Report, page 81). Calculated local limits based on recent 2017 estimations using revised background pollutant loadings and based on a 0.5 mg/L inhibition threshold for nitrogenous microorganisms ranged between 29–77 mg/L (Table 2) using a safety factor of 10 percent. However, the historical operations of the District WRPs indicate that Zn is not responsible for any biological inhibition. Therefore, no new local limit based on activated sludge inhibition was needed.

The headworks loadings of Zn are not high enough to cause anaerobic digestion inhibition at any of the District's digesters (see Table 60, 2014 Report, page 95).

However, because the District has historically regulated Zn under a local limit, the District will maintain the current local limit of 15.0 mg/L. The interference and pass-through potential of Zn will continue to be monitored.

Ammonia. Ammonia (NH_3) is not currently regulated under a local limit. The pollutant was evaluated at each of the District's seven activated sludge WRPs. The technically based evaluation considered water quality and biological inhibition. The allowable headworks loadings were determined for each area of concern. The derived AHLs were compared to the average and maximum influent loadings.

The effluent water quality evaluation for NH_3, Table 23 (2014 Report, pages 50–51), indicated that it was not necessary to further evaluate the need for a local limit for NH_3 at the District's seven WRPs relative to water quality.

The evaluation of activated sludge inhibition due to NH_3, Table 50 (2014 Report, page 84), indicates that the loadings were not high enough to cause inhibition at any of the District's WRPs. The rare historical nitrification inhibition in the District WRPs was not related to influent NH_3 loadings.

The District will not establish a local limit for NH_3 at this time, as no environmental problems have been shown in the District's service area. The interference and pass-through potential of NH_3 will continue to be monitored.

Cyanide. CN^- is currently regulated under a local limit. The pollutant was evaluated at each of the District's seven activated sludge WRPs as well as the four anaerobic sludge digestion facilities. The technically based evaluation considered water quality and biological inhibition. CN^- is not conservative through the treatment process. CN^- provides the nitrogen source used by certain types of microbes. Chlorination can also affect CN^- speciation.

The effluent water quality evaluation for CN^-, Table 24 (2014 Report, pages 52–53), indicated that further evaluation was not needed for any of the seven District WRPs based upon the methodology of the 2004 USEPA Guidance.

The evaluation of activated sludge inhibition due to CN^-, Table 48 (2014 Report, page 82), indicated that the loadings were not high enough to cause inhibition at any of the seven WRPs and no further evaluation was required.

The headworks loadings of CN^- were not high enough to cause inhibition or any effect on anaerobic digestion at the District's digesters (Table 57, 2014 Report, page 92).

Total CN^- and WAD CN^- concentrations in the raw sewage and final effluent will continue to be closely monitored, as future disinfection may cause some changes in CN^- concentrations.

Phenol. C_6H_6O is not currently regulated under a local limit. The pollutant was evaluated at each of the District's seven activated sludge WRPs. The technically based evaluation considered water quality and biological inhibition. The allowable headworks loadings were determined for each area of concern. The effluent derived MAHLs were compared to the average and maximum influent loadings.

The effluent water quality evaluation for C_6H_6O, Table 25 (2014 Report, pages 54–55), indicated that it was not necessary to further evaluate the need for a local limit for C_6H_6O at the District's seven WRPs relative to water quality. A local limit was not needed to protect water quality at the District's WRPs.

The evaluation of activated sludge inhibition due to C_6H_6O, Table 49 (2014 Report, page 83), indicated that the loadings were not high enough to cause inhibition at any of the District's WRPs.

The District will not establish a local limit for C_6H_6O at this time, as no environmental problems have been shown in the District's service area. The interference and pass-through potential of C_6H_6O will continue to be monitored.

Five-Day Biochemical Oxygen Demand. The POC five-day biochemical oxygen demand (BOD_5), is currently not regulated under a local limit. The pollutant was evaluated at each of the District's seven activated sludge WRPs. The technically based evaluation considered effluent water quality standards. The allowable headwork loadings were determined for each WRP. The effluent derived MAHLs were compared to the average and maximum influent loadings.

The effluent water quality evaluation for carbonaceous BOD (Table 26, 2014 Report, pages 56–57), indicated that it was not necessary to further evaluate the local limit needs for all of the seven District WRPs.

Suspended Solids. SS are currently not regulated under a local limit. The pollutant was evaluated at all seven WRPs which have daily and/or monthly NPDES permit limits for SS. The allowable headworks loadings were determined for each WRP. The effluent derived MAHLs were compared to the average and maximum influent loadings.

The effluent water quality evaluation for SS, Table 27 (2014 Report, pages 58–59), indicated that it was not necessary to further evaluate the need for a local limit for any of the seven WRPs.

Fats, Oils, and Greases. The effluent water quality evaluation for FOG, Table 29 (2014 Report, pages 62–63), indicated that it was not necessary to further evaluate the need for a local limit for FOG at the District's seven WRPs relative to water quality. The District has historically regulated FOG under a local limit. The District will maintain the current local limit of 250.0 mg/L. The interference and pass-through potential of FOG will continue to be monitored.

SUMMARY

The technically based re-evaluation of the POCs at the District's seven WRPs considered 20 pollutants. The environmental criteria included consideration of water quality, biosolids quality, biological inhibition, air emissions, worker safety, and the collection system. The evaluation maintains the current limits for 11 of the 20 pollutants evaluated. Table 67 of the 2014 Report (page 131) summarizes the current and recommended District local limits. After recent evaluations considering the revised background pollutants concentrations and loadings, the District recommends keeping the local limits at the same level as in the 2014 report (Table 3).

TABLE 3: SUMMARY OF RECOMMENDATIONS

Pollutant	Current Limit (mg/L)	Recommended Limit[1] (mg/L)
Arsenic	None	None
Cadmium	2.0	2.0
Chromium, Trivalent	25.0	25.0
Chromium, Hexavalent	10.0	10.0
Copper	3.0	3.0
Lead	0.5	0.5
Iron	250.0	250.0
Fluoride	None	None
Mercury	0.0005	0.0005
Molybdenum	None	None
Nickel	10.0	10.0
Selenium	None	None
Silver	None	None
Zinc	15.0	15.0
Ammonia	None	None
cBOD	None	None
Cyanide, Total	5.0	5.0
Cyanide, WAD	None	None
FOG	250.0	250.0
Phenol	None	None
Phosphorus, Total	None	None
Suspended Solids, Total	None	None

[1]Recommended limits based on the 2017 evaluation are the same as those recommended in the 2014 Report.

APPENDIX AI

TABLE AI-1: RAW DATA ON 2017 COMPREHENSIVE SAMPLING OF RESIDENTIAL AND LIGHT-COMMERCIAL SECTOR TO ESTIMATE BACKGROUND CONCENTRATION OF POLLUTANTS IN THE COLLECTION SYSTEM FOR THE METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO'S SEVEN WATER RECLAMATION PLANTS

Date	Ag (mg/L)	As (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Fe (mg/L)	Final Hg (µg/L)	Mo (mg/L)	Ni (mg/L)	Pb (mg/L)	Se (mg/L)	Total Metals (mg/L)	Zn (mg/L)	CN (mg/L)	F (mg/L)	FOG (mg/L)	BOD (mg/L)	SS (mg/L)	NH_3-N (mg/L)	Total P (mg/L)	Phenol (µg/L)
Calumet Water Reclamation Plant																					
04/17/17	<0.0010	<0.050	<0.0050	0.0054	0.032	0.458	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.1	<0.100	<0.005	0.31	7.6	71	111	8.98	1.67	12
04/18/17	<0.0010	<0.050	<0.0050	0.0057	0.02	0.34	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.074	<0.100	0.006	0.39	10.7	45	33	11.05	1.4	8
04/19/17	<0.0010	<0.050	<0.0050	0.0055	0.035	0.546	<0.05	0.0101	<0.0050	<0.020	<0.050	0.137	<0.100	<0.005	0.38	17.3	104	98	10.78	2.28	7
04/20/17	<0.0010	<0.050	<0.0050	0.0058	0.015	0.367	<0.05	0.0107	<0.0050	<0.020	<0.050	0.063	<0.100	<0.005	0.4	11.2	41	35	10.65	1.61	10
04/21/17	<0.0010	<0.050	<0.0050	0.0057	0.035	0.696	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.12	<0.100	0.006	0.44	20.2	77	104	14.59	2.79	15
04/22/17	<0.0010	<0.050	<0.0050	0.009	0.041	0.959	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.131	<0.100	<0.005	NA	20.8	94	127	12.36	2.44	22
04/23/17	<0.0010	<0.050	<0.0050	0.0056	0.038	0.916	<0.05	0.0128	<0.0050	<0.020	<0.050	0.111	<0.100	<0.005	0.53	12.7	120	208	22.3	2.98	14
04/24/17	<0.0010	<0.050	<0.0050	0.0062	0.039	0.795	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.131	<0.100	<0.005	0.44	129.2	118	140	13.6	2.73	9
04/25/17	<0.0010	<0.050	<0.0050	0.0065	0.03	0.769	<0.05	0.011	<0.0050	<0.020	<0.050	0.116	<0.100	0.005	0.42	9.6	86	147	14.75	2.73	15
04/26/17	<0.0010	<0.050	<0.0050	0.0054	0.055	1.447	<0.05	0.0143	<0.0050	<0.020	<0.050	0.218	0.156	<0.005	0.31	13.3	54	132	12.65	2.53	21
04/27/17	<0.0010	<0.050	<0.0050	0.0065	0.033	0.956	<0.05	0.0111	<0.0050	<0.020	<0.050	0.119	<0.100	<0.005	0.36	NA	78	130	13.13	2.46	9
04/28/17	<0.0010	<0.050	<0.0050	0.0074	0.046	1.402	<0.05	0.0117	<0.0050	<0.020	<0.050	0.147	<0.100	<0.005	0.34	12.3	114	170	12.86	2.63	11
04/29/17	<0.0010	<0.050	<0.0050	0.0076	0.07	3.853	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.22	0.139	<0.005	0.21	14.8	163	263	4.71	3.03	15
04/30/17	<0.0010	<0.050	<0.0050	0.0056	0.007	1.335	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.127	0.114	<0.005	<0.10	<5.0	12	20	1.01	0.38	<5
Egan Water Reclamation Plant																					
04/21/17	0.0047	<0.050	<0.0050	0.0055	0.048	0.958	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.15	<0.100	<0.005	0.56	20.6	169	238	21.82	4	19
04/10/17	<0.0010	<0.050	<0.0050	0.0063	0.037	1.293	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.144	<0.100	<0.005	0.43	18.8	122	202	13.9	3.19	14
04/11/17	<0.0010	<0.050	<0.0050	0.006	0.03	0.792	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.13	<0.100	<0.005	0.41	14.9	155	198	14.62	2.97	11
04/12/17	<0.0010	<0.050	<0.0050	0.006	0.031	0.859	0.57	<0.0100	<0.0050	<0.020	<0.050	0.125	<0.100	0.005	0.49	14.4	161	192	15.99	3.46	14
04/13/17	<0.0010	<0.050	<0.0050	0.0054	0.032	0.821	<0.05	0.0246	<0.0050	<0.020	<0.050	0.114	<0.100	<0.005	0.37	11.5	122	213	14.84	2.81	12
04/14/17	<0.0010	<0.050	<0.0050	0.0057	0.04	0.93	0.05	<0.0100	<0.0050	<0.020	<0.050	0.151	0.104	<0.005	0.56	21	195	220	16.11	3.9	14
04/15/17	<0.0010	<0.050	<0.0050	0.0059	0.05	1.171	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.17	0.114	<0.005	0.46	13	228	192	14.59	3.65	15
04/16/17	<0.0010	<0.050	<0.0050	0.0052	0.029	0.802	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.12	<0.100	<0.005	0.34	10.2	161	158	13.06	2.76	7
04/17/17	<0.0010	<0.050	<0.0050	0.0062	0.034	0.891	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.124	<0.100	<0.005	0.46	17.1	124	220	14.66	3.27	17
04/18/17	<0.0010	<0.050	<0.0050	0.0054	0.036	0.925	0.12	<0.0100	<0.0050	<0.020	<0.050	0.135	<0.100	<0.005	0.28	15.8	160	205	17.08	3.53	14
04/19/17	<0.0010	<0.050	<0.0050	0.0057	0.038	0.916	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.144	0.1	<0.005	0.52	58.9	187	242	17.99	3.59	16
04/20/17	<0.0010	<0.050	<0.0050	0.0058	0.044	1.064	0.83	<0.0100	<0.0050	<0.020	<0.050	0.171	0.12	<0.005	0.56	18.8	196	309	19.21	2.59	19

TABLE AI-1 (Continued): RAW DATA ON 2017 COMPREHENSIVE SAMPLING OF RESIDENTIAL AND LIGHT-COMMERCIAL SECTOR TO ESTIMATE BACKGROUND CONCENTRATION OF POLLUTANTS IN THE COLLECTION SYSTEM FOR THE METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO'S SEVEN WATER RECLAMATION PLANTS

Date	Ag (mg/L)	As (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Fe (mg/L)	Final Hg (µg/L)	Mo (mg/L)	Ni (mg/L)	Pb (mg/L)	Se (mg/L)	Total Metals (mg/L)	Zn (mg/L)	CN (mg/L)	F (mg/L)	FOG (mg/L)	BOD (mg/L)	SS (mg/L)	NH_3-N (mg/L)	Total P (mg/L)	Phenol (µg/L)
04/22/17	<0.0010	<0.050	<0.0050	0.0058	0.05	1.089	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.178	0.12	0.005	0.56	24.8	228	295	23.27	3.98	25
04/23/17	<0.0010	<0.050	<0.0050	0.0059	0.05	1.2	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.187	0.131	<0.005	0.72	25.2	182	371	24.45	5.08	22
Hanover Park Water Reclamation Plant																					
04/24/17	<0.0010	<0.050	<0.0050	0.0052	0.067	0.524	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.194	0.12	0.006	0.68	60.1	264	174	32.52	5.09	45
04/25/17	<0.0010	<0.050	<0.0050	0.0056	0.064	0.442	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.211	0.14	0.007	0.66	55.1	260	220	31.71	5.13	57
04/26/17	<0.0010	<0.050	<0.0050	<0.0050	0.058	0.467	<0.05	<0.0100	<0.0050	0.02	<0.050	0.212	0.148	0.006	1.25	51.1	312	184	28.03	4.68	69
04/27/17	<0.0010	<0.050	<0.0050	<0.0050	0.044	0.384	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.148	<0.100	0.005	0.58	NA	200	225	26.43	4.36	53
04/28/17	<0.0010	<0.050	<0.0050	0.0057	0.046	0.495	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.156	0.102	0.006	0.54	44.9	230	209	29.76	4.87	54
04/29/17	<0.0010	<0.050	<0.0050	0.0062	0.031	0.803	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.131	<0.100	0.009	0.34	58.9	193	191	13.53	3.07	62
04/30/17	<0.0010	<0.050	<0.0050	0.0076	0.016	0.564	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.081	<0.100	<0.005	0.29	29.8	134	114	9.11	1.67	24
05/01/17	<0.0010	<0.050	<0.0050	<0.0050	0.02	0.346	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.082	<0.100	<0.005	0.34	24.7	129	68	11.72	2.08	9
05/02/17	<0.0010	<0.050	<0.0050	<0.0050	0.025	0.32	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.094	<0.100	<0.005	0.51	22.5	136	124	15.29	2.42	16
05/03/17	<0.0010	<0.050	<0.0050	<0.0050	0.037	0.252	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.13	<0.100	0.005	0.51	<5.0	159	148	19.79	2.79	23
05/04/17	<0.0010	<0.050	<0.0050	0.0053	0.042	0.525	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.15	0.101	0.005	0.54	28	197	186	24.54	3.87	18
05/05/17	<0.0010	<0.050	<0.0050	<0.0050	0.04	0.355	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.133	<0.100	0.007	0.51	15.7	180	192	24.03	3.94	28
05/06/17	<0.0010	<0.050	<0.0050	0.0059	0.04	0.338	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.146	0.1	0.005	0.58	35.7	202	170	24.63	3.85	28
05/07/17	<0.0010	<0.050	<0.0050	<0.0050	0.043	0.362	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.154	0.105	0.007	0.64	28.1	261	194	29.57	4.57	36
Kirie Water Reclamation Plant																					
04/24/17	<0.0010	<0.050	<0.0050	0.0064	0.075	1.451	0.17	<0.0100	<0.0050	<0.020	<0.050	0.204	0.121	0.006	0.51	20.2	215	332	18.09	4.44	23
04/25/17	<0.0010	<0.050	<0.0050	0.0062	0.034	0.907	<0.05	0.0108	<0.0050	<0.020	<0.050	0.122	<0.100	<0.005	0.53	11.7	133	131	16.84	3	16
04/26/17	<0.0010	<0.050	<0.0050	0.0066	0.078	1.86	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.729	0.643	<0.005	0.49	18.8	149	404	30.18	6.02	43
04/27/17	<0.0010	<0.050	<0.0050	0.0052	0.032	0.864	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.102	<0.100	<0.005	0.46	19.1	122	143	17.29	2.88	21
04/28/17	<0.0010	<0.050	<0.0050	0.0058	0.071	1.11	0.06	<0.0100	<0.0050	<0.020	<0.050	0.163	<0.100	<0.005	0.5	19.6	190	240	18.12	3.39	31
04/29/17	<0.0010	<0.050	<0.0050	0.0062	0.054	1.709	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.158	<0.100	<0.005	0.3	9.4	146	246	10.21	3.06	25
04/30/17	<0.0010	<0.050	<0.0050	0.0051	0.019	0.962	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.061	<0.100	<0.005	0.22	<5.0	61	70	3.96	0.86	6
05/01/17	<0.0010	<0.050	<0.0050	0.0054	0.013	0.666	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.048	<0.100	<0.005	0.23	5.1	56	338	4.14	0.91	<5
05/02/17	<0.0010	<0.050	<0.0050	<0.0050	0.016	0.576	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.049	<0.100	<0.005	0.35	10.2	47	60	6.26	0.97	8
05/03/17	—	—	—	—	—	—	—	—	—	—	—	—	—	<0.005	—	11.4	—	—	—	—	11
05/04/17	<0.0010	<0.050	<0.0050	0.0063	0.03	0.81	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.098	<0.100	<0.005	0.41	9.8	103	129	9.81	2.1	10

TABLE AI-1 (Continued): RAW DATA ON 2017 COMPREHENSIVE SAMPLING OF RESIDENTIAL AND LIGHT-COMMERCIAL SECTOR TO ESTIMATE BACKGROUND CONCENTRATION OF POLLUTANTS IN THE COLLECTION SYSTEM FOR THE METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO'S SEVEN WATER RECLAMATION PLANTS

Date	Ag (mg/L)	As (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Fe (mg/L)	Final Hg (µg/L)	Mo (mg/L)	Ni (mg/L)	Pb (mg/L)	Se (mg/L)	Total Metals (mg/L)	Zn (mg/L)	CN (mg/L)	F (mg/L)	FOG (mg/L)	BOD (mg/L)	SS (mg/L)	NH_3-N (mg/L)	Total P (mg/L)	Phenol (µg/L)
05/05/17	<0.0010	<0.050	<0.0050	0.006	0.025	0.673	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.084	<0.100	<0.005	0.43	20	84	98	10.74	1.97	14
05/06/17	<0.0010	<0.050	<0.0050	0.0058	0.056	0.77	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.119	<0.100	<0.005	0.4	6.6	94	139	11.4	2.32	8
05/07/17	<0.0010	<0.050	<0.0050	<0.0050	0.066	0.615	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.122	<0.100	<0.005	0.45	5.4	106	125	14.09	2.54	8
05/08/17	<0.0010	<0.050	<0.0050	0.0056	0.045	0.885	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.115	<0.100	—	0.41	—	89	122	14.87	2.48	—
Lemont Water Reclamation Plant																					
04/11/17	<0.0010	<0.050	<0.0050	<0.0050	0.036	0.44	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.115	<0.100	<0.005	0.69	17.6	87	101	18.4	3.18	8
04/12/17	—	—	—	—	—	—	—	—	—	—	—	—	—	<0.005	—	19.4	—	—	—	—	11
04/17/17	<0.0010	<0.050	<0.0050	<0.0050	0.02	0.204	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.066	<0.100	<0.005	0.62	44.4	70	31	14.62	1.92	19
04/18/17	<0.0010	<0.050	<0.0050	0.0054	0.052	0.49	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.173	0.116	<0.005	0.85	38.2	152	227	17.38	3.04	22
04/19/17	—	—	—	—	—	—	—	—	—	—	—	—	—	<0.005	—	16.4	—	—	—	—	18
04/20/17	<0.0010	<0.050	0.007	0.0084	0.06	1.117	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.423	0.351	—	0.74	—	102	106	16.94	2.69	—
04/21/17	<0.0010	<0.050	<0.0050	0.0057	0.043	0.632	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.137	<0.100	<0.005	0.79	23.1	150	864	17.97	3.26	14
04/22/17	<0.0010	<0.050	<0.0050	0.0057	0.065	0.941	0.13	<0.0100	<0.0050	<0.020	<0.050	0.21	0.138	<0.005	0.85	27.4	278	436	23.65	4.21	21
04/23/17	<0.0010	<0.050	<0.0050	0.005	0.047	0.52	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.138	<0.100	<0.005	0.94	34.6	165	244	23.95	4.18	28
04/24/17	<0.0010	<0.050	<0.0050	<0.0050	0.028	0.244	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.08	<0.100	<0.005	0.94	33	118	51	19.3	2.65	28
04/25/17	<0.0010	<0.050	<0.0050	0.0053	0.041	0.649	0.81	<0.0100	<0.0050	<0.020	<0.050	0.144	<0.100	<0.005	0.84	34.5	122	116	18	2.88	23
04/26/17	—	—	—	—	—	—	—	—	—	—	—	—	—	<0.005	—	34.7	—	—	—	—	26
04/27/17	<0.0010	<0.050	<0.0050	<0.0050	0.023	0.286	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.068	<0.100	—	0.82	—	96	62	17.36	2.36	—
04/28/17	—	—	—	—	—	—	—	—	—	—	—	—	—	<0.005	—	26.6	—	—	—	—	38
05/14/17	<0.0010	<0.050	<0.0050	0.0069	0.024	0.297	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.09	<0.100	—	0.76	—	128	200	16.52	3.19	—
05/15/17	<0.0010	<0.050	<0.0050	0.007	0.031	0.436	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.105	<0.100	<0.005	0.89	24	105	155	16.59	3.12	16
05/16/17	<0.0010	<0.050	<0.0050	0.0073	0.04	0.449	0.06	<0.0100	<0.0050	<0.020	<0.050	0.113	<0.100	0.005	0.86	13.6	132	202	16.33	2.99	17
05/17/17	—	—	—	—	—	—	—	—	—	—	—	—	—	0.007	—	<5.0	—	—	—	—	18
05/18/17	<0.0010	<0.050	<0.0050	0.0061	0.029	0.25	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.08	<0.100	—	0.73	—	82	84	15.49	2.47	—
05/19/17	—	—	—	—	—	—	—	—	—	—	—	—	—	<0.005	—	12.2	—	—	—	—	17
O'Brien Water Reclamation Plant																					
04/17/17	<0.0010	<0.050	<0.0050	0.0054	0.059	0.81	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.151	<0.100	<0.005	0.53	24.8	235	165	19.03	3.34	17
04/18/17	<0.0010	<0.050	<0.0050	0.0055	0.062	0.937	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.163	<0.100	0.005	0.6	21.3	132	177	21.29	3.26	18
04/19/17	<0.0010	<0.050	<0.0050	0.0056	0.064	0.973	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.169	<0.100	<0.005	0.56	26.7	173	177	23.15	3.67	20

TABLE AI-1 (Continued): RAW DATA ON 2017 COMPREHENSIVE SAMPLING OF RESIDENTIAL AND LIGHT-COMMERCIAL SECTOR TO ESTIMATE BACKGROUND CONCENTRATION OF POLLUTANTS IN THE COLLECTION SYSTEM FOR THE METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO'S SEVEN WATER RECLAMATION PLANTS

Date	Ag (mg/L)	As (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Fe (mg/L)	Final Hg (µg/L)	Mo (mg/L)	Ni (mg/L)	Pb (mg/L)	Se (mg/L)	Total Metals (mg/L)	Zn (mg/L)	CN (mg/L)	F (mg/L)	FOG (mg/L)	BOD (mg/L)	SS (mg/L)	NH_3-N (mg/L)	Total P (mg/L)	Phenol (µg/L)
04/20/17	<0.0010	<0.050	<0.0050	0.0053	0.077	0.888	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.197	0.113	<0.005	0.63	22.6	168	219	24.16	3.85	25
04/21/17	<0.0010	<0.050	<0.0050	0.0058	0.085	0.864	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.203	0.11	<0.005	0.7	28.3	185	199	23.7	4.18	30
04/22/17	<0.0010	<0.050	<0.0050	0.0056	0.086	0.828	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.198	0.105	<0.005	0.62	15.1	181	176	26.04	4.19	27
04/23/17	<0.0010	<0.050	<0.0050	0.0051	0.079	0.854	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.2	0.116	<0.005	0.67	15.2	195	170	28.46	4.61	25
04/24/17	<0.0010	<0.050	<0.0050	<0.0050	0.076	0.927	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.205	0.123	<0.005	0.66	32.2	206	224	26.18	3.61	22
04/25/17	<0.0010	<0.050	<0.0050	<0.0050	0.074	0.735	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.2	0.12	<0.005	0.56	26.1	161	226	21.19	3.88	23
04/26/17	<0.0010	<0.050	<0.0050	<0.0050	0.084	1.058	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.198	0.108	<0.005	0.58	31.6	173	203	25.6	3.89	26
04/27/17	<0.0010	<0.050	<0.0050	<0.0050	0.078	0.898	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.19	0.105	0.005	0.59	29.1	199	213	26.16	4.05	24
04/28/17	<0.0010	<0.050	<0.0050	<0.0050	0.072	0.827	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.181	0.103	<0.005	0.59	29.2	196	211	25.52	3.96	26
04/29/17	<0.0010	<0.050	<0.0050	0.0072	0.092	1.838	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.209	0.107	0.005	0.33	37	142	257	13.54	3.21	35
04/30/17	<0.0010	<0.050	<0.0050	0.0069	0.04	1.445	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.116	<0.100	<0.005	0.29	12	101	112	7.87	1.75	12
Stickney Water Reclamation Plant																					
04/11/17	<0.0010	<0.050	<0.0050	0.0057	0.016	0.463	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.068	<0.100	<0.005	0.32	10.5	44	55	5.39	1.12	8
04/12/17	—	—	—	—	—	—	—	—	—	—	—	—	—	<0.005	—	11.4	—	—	—	—	7
04/17/17	<0.0010	<0.050	<0.0050	0.0091	0.052	2.855	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.169	0.105	<0.005	0.26	13	25	19	8.17	1.09	6
04/18/17	<0.0010	<0.050	<0.0050	0.0067	0.023	0.543	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.071	<0.100	<0.005	0.33	11.3	122	136	9.28	2.3	9
04/19/17	—	—	—	—	—	—	—	—	—	—	—	—	—	<0.005	—	12	—	—	—	—	9
04/20/17	<0.0010	<0.050	<0.0050	0.0073	0.027	0.706	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.092	<0.100	—	0.37	—	48	63	9.78	1.74	—
04/21/17	<0.0010	<0.050	<0.0050	0.011	0.091	2.313	0.07	<0.0100	<0.0050	<0.020	<0.050	0.267	0.162	<0.005	0.52	6.6	273	491	12.28	4.74	14
04/22/17	<0.0010	<0.050	<0.0050	0.0099	0.038	0.819	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.12	<0.100	<0.005	0.37	14.1	106	115	12.98	2.13	14
04/23/17	<0.0010	<0.050	<0.0050	0.0085	0.04	0.724	0.37	<0.0100	<0.0050	<0.020	<0.050	0.122	<0.100	<0.005	0.51	7.1	138	165	14.98	3.12	13
04/24/17	<0.0010	<0.050	<0.0050	0.0076	0.026	0.438	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.091	<0.100	0.005	0.43	28.5	91	47	13.3	2.19	15
04/25/17	<0.0010	<0.050	<0.0050	0.0078	0.036	0.768	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.115	<0.100	<0.005	0.43	28.4	81	73	13.38	2.32	15
04/26/17	—	—	—	—	—	—	—	—	—	—	—	—	—	<0.005	—	21.1	—	—	—	—	13
04/27/17	<0.0010	<0.050	<0.0050	0.0081	0.047	0.754	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.129	<0.100	—	0.54	—	111	111	15.09	2.7	—
04/28/17	—	—	—	—	—	—	—	—	—	—	—	—	—	<0.005	—	21.5	—	—	—	—	18
05/14/17	<0.0010	<0.050	<0.0050	0.0062	0.036	0.622	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.101	<0.100	—	0.35	—	67	99	11.15	0.92	—
05/15/17	0.0044	<0.050	<0.0050	0.0079	0.092	0.774	<0.05	<0.0100	0.0069	<0.020	<0.050	0.183	<0.100	<0.005	0.4	20.9	72	120	10.83	2.15	8
05/16/17	<0.0010	<0.050	<0.0050	0.0079	0.057	0.873	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.14	<0.100	<0.005	0.4	11	89	158	12.97	2.96	10
05/17/17	—	—	—	—	—	—	—	—	—	—	—	—	—	0.005	—	24.5	—	—	—	—	14

TABLE AI-1 (Continued): RAW DATA ON 2017 COMPREHENSIVE SAMPLING OF RESIDENTIAL AND LIGHT-COMMERCIAL SECTOR TO ESTIMATE BACKGROUND CONCENTRATION OF POLLUTANTS IN THE COLLECTION SYSTEM FOR THE METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO'S SEVEN WATER RECLAMATION PLANTS

Date	Ag (mg/L)	As (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Fe (mg/L)	Final Hg (µg/L)	Mo (mg/L)	Ni (mg/L)	Pb (mg/L)	Se (mg/L)	Total Metals (mg/L)	Zn (mg/L)	CN (mg/L)	F (mg/L)	FOG (mg/L)	BOD (mg/L)	SS (mg/L)	NH_3-N (mg/L)	Total P (mg/L)	Phenol (µg/L)
05/18/17	<0.0010	<0.050	<0.0050	0.0078	0.046	0.869	<0.05	<0.0100	<0.0050	<0.020	<0.050	0.135	<0.100	—	0.42	—	120	167	12.9	3.14	—
05/19/17	—	—	—	—	—	—	—	—	—	—	—	—	—	<0.005	—	27.4	—	—	—	—	19.0
RL	0.001	0.05	0.005	0.005	0.01	0.1	0.05	0.01	0.005	0.02	0.05	—	0.10	0.005	0.10	5.0	2	15	0.1	0.10	5.0

RL = Reporting limits for all plant data.

TABLE AI-2: 2017 AVERAGE BACKGROUND CONCENTRATIONS OF POLLUTANTS IN THE COLLECTION SYSTEM OF THE METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO'S SEVEN WATER RECLAMATION PLANTS AND THOSE USED IN THE 2014 REPORT

Ag mg/L	As mg/L	Cd mg/L	Cr mg/L	Cu mg/L	Fe mg/L	Final Hg µg/L	Mo mg/L	Ni mg/L	Pb mg/L	Se mg/L	Zn mg/L	Cn mg/L	F mg/L	FOG mg/L	BOD_5 mg/L	SS mg/L	NH_3-N mg/L	Total P mg/L	Phenol µg/L
Calumet Water Reclamation Plant																			
0.0005	0.0250	0.0025	0.0063	0.0354	1.0599	0.0250	0.0083	0.0025	0.0100	0.0250	0.0685	0.0032	0.3523	21.7077	84.0714	122.7143	11.6729	2.2614	12.1786
Egan Water Reclamation Plant																			
0.0008	0.0250	0.0025	0.0058	0.0392	0.9794	0.1300	0.0064	0.0025	0.0100	0.0250	0.0778	0.0029	0.4800	20.3571	170.7143	232.5000	17.2564	3.4843	15.6429
Hanover Park Water Reclamation Plant																			
0.0005	0.0250	0.0025	0.0042	0.0409	0.4412	0.0250	0.0050	0.0025	0.0107	0.0250	0.0833	0.0054	0.5693	35.1615	204.0714	171.3571	22.9043	3.7421	37.2857
Kirie Water Reclamation Plant																			
0.0005	0.0250	0.0025	0.0054	0.0439	0.9899	0.0379	0.0054	0.0025	0.0100	0.0250	0.0974	0.0028	0.4064	12.1286	113.9286	184.0714	13.2857	2.6386	16.1786
Lemont Water Reclamation Plant																			
0.0005	0.0250	0.0028	0.0052	0.0385	0.4968	0.0911	0.0050	0.0025	0.0100	0.0250	0.0825	0.0030	0.8086	26.0000	127.6429	205.6429	18.0357	3.0100	20.4667
O'Brien Water Reclamation Plant																			
0.0005	0.0250	0.0025	0.0046	0.0734	0.9916	0.0250	0.0050	0.0025	0.0100	0.0250	0.0936	0.0030	0.5650	25.0857	174.7857	194.9286	22.2779	3.6750	23.5714
Stickney Water Reclamation Plant																			
0.0008	0.0250	0.0025	0.0080	0.0448	0.9658	0.0529	0.0050	0.0028	0.0100	0.0250	0.0619	0.0028	0.4036	16.1267	99.0714	129.9286	11.6057	2.3300	11.5333
Background Domestic Water Concentration (2014 Report)																			
0.002	0.001	0.001	0.003	0.002	0.017	0.9	0.002	0.002	0.001	0.002	0.13	0.005	0.675	NA	119.0	168.0	0.033	2.56	0.000

APPENDIX AII

TABLE AII-1: AVERAGE BACKGROUND POLLUTANT CONCENTRATIONS IN THE CITY OF CHICAGO'S NORTH, SOUTH, AND CENTRAL DISTRIBUTED LAKE MICHIGAN WATER

	Average All Locations (mg/L)			
	2010–2011		2009–2011	
	Average	Count	Average	Count
Ammonia	0.038083	12	0.034042	24
Arsenic	0.001534	18	0.004331	30
Carbonaceous BOD		0		0
Cadmium	0.001	18	0.001	30
Chromium	0.003429	18	0.0033	30
Hexavalent Chromium	0		0	
Copper	0.001598	18	0.001529	30
Cyanide	0.005	12	0.005	24
FOG		0		0
Fluoride	0.674777	18	0.804199	30
Iron	0.017368	18	0.026871	30
Lead	0.001184	18	0.001111	30
Manganese	0.002436	18	0.002595	30
Mercury	0.00086	15	0.000567	27
Molybdenum	0.001425	15	0.001644	27
Nickel	0.001562	18	0.001567	30
Phenol		0		0
TSS		0		0
Selenium	0.00207	15	0.001706	27
Silver	0.001567	18	0.00134	30
Zinc	0.013103	16	0.013851	28
		0		
Total Phosphate	1.049444	18	1.045367	30

TABLE AII-2: BACKGROUND POLLUTANT CONCENTRATIONS IN THE CITY OF CHICAGO'S NORTH DISTRIBUTED LAKE MICHIGAN WATER

Pollutant	Sampling Events										Average	Count
	8/18–19/11	5/18–19/11	03/17/11	08/24/10	06/24/10	03/25/10	12/10/09	08/27/09	06/11/09	03/12/09		
	mg/L											
Ammonia		0.03	0.03		0.1	0.03	0.03	0.03	0.08	0.03	0.045	8
Arsenic	0.002	0.001	0.001	0.0014	0.00119	0.0013	0.001	0.093	0.001	0.001	0.010389	10
Carbonaceous BOD												0
Cadmium	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	10
Chromium	0.001	0.001	0.0028	0.002	0.00734	0.00614	0.001	0.00174	0.001	0.004	0.002802	10
Hexavalent Chromium												0
Copper	0.0021	0.00282	0.00321	0.001	0.00112	0.001	0.001	0.00109	0.003	0.001	0.001734	10
Cyanide		0.005		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	8
FOG												0
Fluoride	0.00105	0.00101	0.98	1.07	0.95	1.05	1.05	0.96	1.01	0.91	0.798206	10
Iron	0.0195	0.0339	0.00812	0.024	0.0356	0.0662	0.0261	0.051	0.065	0.128	0.045742	10
Lead	0.002	0.0016	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00116	10
Manganese	0.003	0.00189	0.00152	0.002	0.005	0.00152	0.001	0.008	0.002	0.001	0.002693	10
Mercury	0.0035	0.0002	0.0002		0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000567	9
Molybdenum		0.001	0.00203	0.00185	0.001	0.001	0.001	0.001	0.005	0.001	0.001653	9
Nickel	0.001	0.002	0.00124	0.002	0.001	0.0012	0.001	0.003	0.001	0.001	0.001444	10
Phenol												0
TSS												0
Selenium		0.002	0.002	0.002	0.00239	0.002	0.002	0.001	0.001	0.001	0.00171	9
Silver	0.004	0.001	0.0012	0.001	0.002	0.0002	0.001	0.001	0.001	0.001	0.00134	10
Zinc	0.005	0.0217	0.0174		0.005	0.0202	0.0199	0.007	0.022	0.023	0.015689	9
Total Phosphate	0.949	1.164	0.867	0.932	1.19	1.1	1.4	0.951	0.822	0.912	1.0287	10

TABLE AII-3: BACKGROUND POLLUTANT CONCENTRATIONS IN THE CITY OF CHICAGO'S SOUTH DISTRIBUTED LAKE MICHIGAN WATER

	Sampling Events											
	8/18−19/11	5/18−19/11	03/17/11	08/24/10	06/24/10	03/25/10	12/10/09	08/27/09	06/11/09	03/12/09	Average	Count
	mg/L											
Ammonia		0.03	0.03		0.017	0.03	0.03	0.03	0.03	0.03	0.028375	8
Arsenic	0.002	0.001	0.001	0.0013	0.00106	0.001	0.001	0.00118	0.001	0.001	0.001154	10
Carbonaceous BOD												0
Cadmium	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	10
Chromium	0.001	0.001	0.00103	0.00245	0.00673	0.0075	0.0019	0.00614	0.001	0.006	0.003475	10
Hexavalent Chromium												0
Copper	0.002	0.00157	0.00263	0.001	0.001	0.001	0.001	0.001	0.004	0.001	0.00162	10
Cyanide		0.005		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	8
FOG												0
Fluoride	0.00096	0.00092	0.96	1.04	0.97	1.03	1.07	1.02	1.11	0.97	0.817188	10
Iron	0.005	0.005	0.0122	0.005	0.005	0.0041	0.0053	0.007	0.02	0.082	0.01506	10
Lead	0.002	0.001	0.00117	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001117	10
Manganese	0.003	0.001	0.001	0.002	0.005	0.001	0.001	0.008	0.002	0.001	0.0025	10
Mercury	0.0035	0.0002	0.0002		0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000566667	9
Molybdenum		0.00112	0.00138	0.00192	0.001	0.001	0.001	0.001	0.005	0.001	0.001602222	9
Nickel	0.0013	0.002	0.00152	0.002	0.001	0.00125	0.0017	0.003	0.001	0.001	0.001577	10
Phenol												0
TSS												0
Selenium		0.002	0.002	0.002	0.00237	0.002	0.002	0.001	0.001	0.001	0.001707778	9
Silver	0.004	0.001	0.0014	0.001	0.002	0.0002	0.001	0.001	0.001	0.001	0.00136	10
Zinc	0.005	0.00724	0.0102	0.0079	0.005	0.0137	0.01	0.007	0.008	0.0022	0.007624	10
Total Phosphate	1.01	1.238	0.839	0.956	1.26	1.23	1.04	0.951	1.19	1.164	1.0878	10

TABLE AII-4: BACKGROUND POLLUTANT CONCENTRATIONS IN THE CITY OF CHICAGO'S CENTRAL DISTRIBUTED LAKE MICHIGAN WATER

	Sampling Events											
	8/18−19/11	5/18−19/11	03/17/11	08/24/10	06/24/10	03/25/10	12/10/09	08/27/09	06/11/09	03/12/09	Average	Count
	mg/L											
Ammonia		0.03	0.03		0.01	0.03	0.03	0.03	0.04	0.03	0.02875	8
Arsenic	0.002	0.001	0.001	0.0042	0.0012	0.001	0.001	0.00115	0.001	0.001	0.001451	10
Carbonaceous BOD												0
Cadmium	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	10
Chromium	0.001	0.001	0.0017	0.0033	0.00726	0.00752	0.0016	0.0059	0.001	0.006	0.003623	10
Hexavalent Chromium												0
Copper	0.002	0.0017	0.0016	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001232	10
Cyanide		0.005		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	8
FOG												0
Fluoride	0.0011	0.001	0.99	1.08	0.95	1.07	1.04	0.93	1.01	0.9	0.797204	10
Iron	0.005	0.005	0.005	0.065	0.005	0.004	0.0071	0.007	0.008	0.087	0.01981	10
Lead	0.002	0.0006	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001055	10
Manganese	0.003	0.0019	0.00106	0.002	0.005	0.001	0.001	0.008	0.002	0.001	0.002591	10
Mercury	0.0035	0.0002	0.0002		0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.000567	9
Molybdenum	0.001	0.00122	0.0019	0.001	0.001	0.001	0.001	0.006	0.001		0.001676	9
Nickel	0.001	0.002	0.00347	0.002	0.001	0.00113	0.0012	0.003	0.001	0.001	0.00168	10
Phenol												0
TSS												0
Selenium		0.002	0.002	0.002	0.0023	0.002	0.002	0.001	0.001	0.001	0.001699	9
Silver	0.004	0.001	0.001	0.001	0.002	0.0002	0.001	0.001	0.001	0.001	0.00132	10
Zinc	0.005	0.048	0.005		0.005	0.0283	0.0161	0.007	0.031	0.025	0.018933	9
Total Phosphate	0.905	1.172	0.922	0.916	1.19	1.05	1.36	0.942	0.851	0.888	1.0196	10