MONITORING AND RESEARCH DEPARTMENT

REPORT NO. 16-32

THORNTON COMPOSITE RESERVOIR

GROUNDWATER MONITORING REPORT

FOURTH QUARTER (ANNUAL MONITORING) 2015

August 2016

Protecting Our Water Environment

Metropolitan Water Reclamation District of Greater Chicago

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August 30, 2016

Richard P. Cobb, P.G.
Deputy Division Manager
Division of Public Water Supplies
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, IL 62794

Dear Mr. Cobb:

Subject: Transmittal of the Report "Thornton Composite Reservoir Groundwater Monitoring Report Fourth Quarter (Annual Monitoring) 2015"

Please find attached the electronic copy of the report entitled "Thornton Composite Reservoir Groundwater Monitoring Report Fourth Quarter (Annual Monitoring) 2015." The report is prepared for transmittal to the Illinois Environmental Protection Agency (IEPA) in accordance with the Thornton Composite Reservoir Groundwater Monitoring Plan. Also attached is a PDF of the 2015 Thornton Composite Reservoir raw data from Grace Analytical Laboratory as required by the IEPA.

If you have any questions or would like to have additional information, please contact Dr. Pauline Lindo at (708) 588-4109 or pauline.lindo@mwrd.org.

Very truly yours,

Thomas C. Granato, Ph.D., BCES
Director
Monitoring and Research

TCG:HZ:PL:cm
Attachments
cc: Dr. H. Zhang
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Dr. G. Tian
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THORNTON COMPOSITE RESERVOIR
GROUNDWATER MONITORING REPORT
FOURTH QUARTER (ANNUAL MONITORING) 2015

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LIST OF ACRONYMS

Acronym	Definition
CCD	Chicago City Datum
CSO	Combined Sewer Overflow
FC	fecal coliform
GMP	Groundwater Monitoring Plan
GPS	Groundwater Protection System
IAC	Illinois Administrative Code
TCR	Thornton Composite Reservoir
TDS	total dissolved solids

ACKNOWLEDGEMENTS

This report for the Thornton Composite Reservoir Groundwater Monitoring was generated for the Engineering Department by the consultants of Black and Veatch, according to Engineering Contract 04-203-4F. All samples were collected and reports drafted by Black and Veatch, and all analyses performed by Grace Analytical Laboratory, Inc. The final report was produced according to the new format guidelines of the Metropolitan Water Reclamation District of Greater Chicago's (District) Monitoring and Research (M&R) Department. Special thanks are due to Ms. Coleen Maurovich for her tireless efforts in converting the original report and all tables to the M&R Department's new format and to Ms. Laura Franklin for her contribution to the final formatted version.

DISCLAIMER

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

INTRODUCTION

A Groundwater Protection System (GPS) has been constructed for the Thornton Composite Reservoir (TCR) to protect against the exfiltration of combined sewer overflow (CSO) into the surrounding dolomite aquifers. The CSOs are stored in the reservoir during and after large storm events. To monitor the performance of the GPS, a network of monitoring wells located outside the perimeter of the GPS is being monitored as discussed in the Revised Groundwater Monitoring Plan (Revised GMP) (Black & Veatch, 2015). According to the Revised GMP, one sample of reservoir water, one of the quarry sump, and one from each of the seven wells are collected annually or following a fill event and analyzed for the Illinois Administrative Code (IAC) Title 35 Part 620 Class I constituents. In addition, during a reservoir fill event or a sampling event on a quarterly basis, groundwater is sampled from seven wells and the quarry sump and tested for a targeted list of parameters that are more likely to be detected in CSO water. Prior to the TCR becoming operational, eight (8) sampling events were executed on a quarterly basis for two years (April 2012 through March 2014) to provide background data on the existing groundwater quality.

The monitoring well system consists of one deep well, TB-124, which monitors the underlying Galena Aquifer, and six vertical Westbay multi-level monitoring wells: TB-118, TB-119, TB-120, TB-121, TB-122, and TB-123 which monitor the Silurian Dolomite aquifers. As discussed in the Revised GMP, groundwater is sampled from each well at the first sample interval port immediately below the water elevation in the TCR. Each of the multi-level monitoring wells monitors four distinct depths within a 20-ft. interval in the Silurian Dolomite aquifer.

The locations of monitoring wells, quarry sump, TCR, and the GPS, are presented in Figure 1. The quarry sump is located beyond the south boundary of the GPS and is not a component of the TCR but is an integral part of the Hanson Material Services mining quarry to the south of the TCR. This sump facilitates mining operations by minimizing the water level at the bottom of the quarry. It is possible that the bottom of this sump could extend beyond the lowest depth of the TCR (-297.5 ft Chicago City Datum [CCD]). The sump contains mainly groundwater and some surface runoff.

Table 1 lists the characteristics of all wells at the TCR site (well location coordinates, elevations and depths, and the sampling port interval elevations).

This report presents field activities and analytical data for the sampling event of December 16 – 29, 2015, which is considered as the annual sampling. Samples were collected from seven wells and the reservoir and analyzed for both organic and inorganic IAC Title 35 Part 620 Class I Groundwater Constituents (Illinois PCB, 2013) to fulfill the field event, quarterly, and annual monitoring requirements.

FIGURE 1: MONITORING WELL AND MAIN QUARRY SUMP LOCATIONS

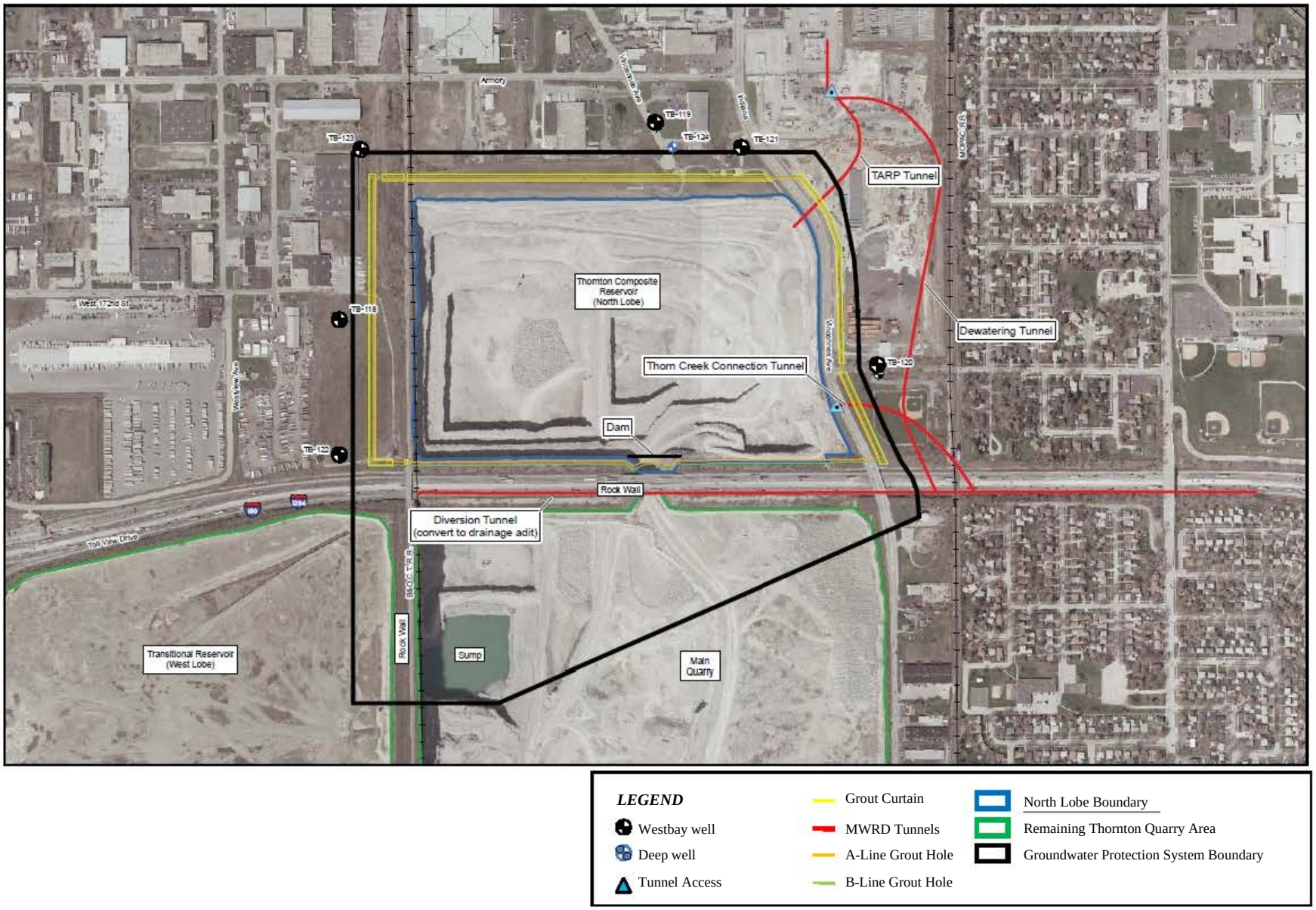

TABLE 1: CHARACTERISTICS OF MONITORING WELLS TB-118 THROUGH TB-124 AT THE THORNTON COMPOSITE RESERVOIR SITE

Well ID	Coordinates[1]		Ground Surface El[2] (ft, CCD)	Top of Riser El[2] (ft, CCD)	Depth of Well (ft)	Sampling Port Interval (ft, CCD)			
	Northing (ft)	Easting (ft)				Interval 1	Interval 2	Interval 3	Interval 4
TB-118	1791110.38	693560.44	38.5	41.5	532	-85 to -105	-212 to -232	-283 to -303	-392 to -412
TB-119	1792316.63	695509.39	27.9	29.5	529	-85 to -105	-212 to -232	-283 to -303	-392 to -412
TB-120	1790782.31	696888.93	40.0	42.1	540	-86 to -106	-213 to -233	-284 to -304	-393 to -413
TB-121	1792193.10	696044.98	29.4	30.4	461	-84 to -104	-211 to -231	-282 to -302	-391 to -411
TB-122	1790288.61	693549.38	48.8	51.7	480	-85 to -105	-212 to -232	-283 to -303	-392 to -412
TB-123	1792185.60	693685.69	28.9	31.8	460	-84 to -104	-211 to -231	-282 to -302	-391 to -411
TB-124	1792200.77	695591.56	29.6	29.2	728			-663 to -698	

[1]Illinois State Plane Coordinate System (NAD 1927).
[2]Chicago City Datum (CCD).

FIELD ACTIVITIES

A fill event occurred during December 12 - 18, 2015. On December 14, 2015, the TCR was filled with CSO to an elevation of -272 CCD. According to the Revised GMP, CSO elevations in the TCR above -280 CCD require bi-weekly groundwater sampling. Groundwater samples were collected during December 16 – 29, 2015 from the reservoir and the sampling port Interval 3 at all six multi-level wells and the deep well. Specifically, a sample was collected from the specified well(s) on the following dates: December 16, TB-119; December 17, TB-124; December 18, reservoir; December 22, TB-122; December 28, TB-118; December 29, TB-121 and -123. On December 21, duplicate samples were collected from TB-120 only.

Each sample collected was immediately analyzed in the field for pH and conductivity. The temperature of each sample was also recorded.

Prior to sampling of the multi-level wells, hydrostatic pressure was measured to calculate the groundwater elevation at the port sampled. Table 2 lists the elevations at Port 3 of each well and the corresponding groundwater elevations during the annual December 2015 sampling event.

All samples were packed in ice and shipped to Grace Analytical Laboratories, Inc., an Illinois state ELAP/NELAC certified laboratory, for the relevant analyses.

TABLE 2: SUMMARY OF ELEVATIONS AT PORT 3 OF EACH WELL AND CORRESPONDING GROUNDWATER ELEVATIONS DURING THE SAMPLING EVENT OF DECEMBER 2015

Well and Interval ID	Sampling Port 003 Elevation (ft CCD)	Interval 3 Groundwater Elevation (ft CCD)
TB-118-003	-289	-99
TB-119-003	-289	-176
TB-120-003	-290	-194
TB-121-003	-288	-177
TB-122-003	-288	-158
TB-123-003	-288	-57
TB-124[1]	-663	-382[2]

[1]TB-124 is a conventional well screened from -663 to -698 CCD, and sample was taken at an elevation of approximately -450 ft.

[2]Interval 3 elevation is not applicable to this well; the groundwater elevation at time of sampling was -382 CCD.

ANALYTICAL RESULTS

The analytical methods and parameters used by the laboratory are provided in Table 3. Table 4 shows the results of analyses for well and reservoir samples collected in December 2015. The analytical results were reviewed to identify any analytes that exceeded the Illinois Class I Groundwater Standards (35 IAC Part 620).

The pH readings in the multi-level wells ranged from 7.2 at TB-118-003 and TB-121-003 to 7.8 at TB-122-003. An abnormally high pH reading of 11.9 was measured at TB-124. During the quarterly background sampling events, pH readings at TB-124 ranged from 8.1 to 8.4. The elevated pH in the December sample appears to be an anomaly. Conductivity ranged from 80 mS/m at TB-119-003 to 215 mS/m at TB-124.

Boron in well TB-122-003 (2.8 mg/L) exceeded the Class 1 groundwater standard of 2 mg/L. However, boron concentrations exceeded the Class 1 groundwater standard during several background sampling events (Thornton Reservoir GPS Geotechnical Data Report, 2007). The maximum boron background concentration of 3.8 mg/L was detected at TB-122-004 in the fifth-quarter sampling event.

The bis (2-ethylhexyl) phthalate, 0.0069 mg/L in well TB-124, exceeded the Class 1 groundwater standard of 0.006 mg/L. Pentachlorophenol at wells TB-119-003 (0.0045 mg/L) and TB-124 (0.0035 mg/L) exceeded the Class 1 groundwater standard of 0.001 mg/L. Pentachlorophenol was present in well TB-122-003 during the sixth quarter at a concentration of 0.169 mg/L. Pentachlorophenol was not detected during other background quarterly sampling events.

None of the inorganic constituents in the reservoir sample exceeded the Illinois groundwater standards. Only one organic constituent in the reservoir sample, bis (2-ethylhexyl) phthalate (0.0067 mg/L), exceeded the Class 1 groundwater standard of 0.006 mg/L. All other organic contaminants tested were below the analytical laboratory's reporting limits.

TABLE 3: ANALYTICAL METHODS USED FOR REQUIRED PARAMETERS

Chemical Parameters:	Analytical Method
Inorganic:	
Perchlorate	314.1
Chloride	325.2
Alkalinity, Bicarbonate	2320B
Total Dissolved Solids	2540C
Cyanide	335.4R1.0
Nitrate as N	353.2R2.0
Fluoride	4500-F,C
Sulfate	4500-SO4-2C or D
TAL metals	6010B & 7470A
TOC	5310C
Organic:	
HMX; RDX; TNB; and TNT	Explosive
Dicamba; 2,4-D; Dalapon; Dinoseb; MCPP; Picloram; and Silvex	Herb/8151
Endothall	Pest/548
Endosulfan; Endrin; Heptachlor; Heptachlor Epoxide; alpha-BHC; Lindane; Methoxychlor; and Toxaphene	Pest/8081
Chlordane	Pest/8081A
Polychlorinated biphenyls (PCBs)	PCB/8082
Alachlor; Atrazine; and Simazine	Pest/525.2
Aldicarb; and Carbofuran	Pest/531.1
SVOCs including Phenols	SVOC/8270C
1,2-Dibromo-3-chloropropane; and ethylene dibromide	VOC/8011
VOCs including P-Dioxane, and Cumene	VOC/8260B
TOC	5310C
Fecal Coliform	SM 9221E

TABLE 4: ANALYSIS OF WATER SAMPLED FROM THE THORNTON COMPOSITE RESERVOIR AND ADJACENT WELLS DURING DECEMBER 2015

Parameter	Unit	Groundwater Standard[1]	Maximum Background	Lab RL[2]	Reservoir	Well							
						TB-118-003	TB-119-003	TB-120-003	TB-120-003 D	TB-121-003	TB-122-003	TB-123-003	TB-124
pH		6.5 - 9	8.4		7.4	7.2	7.6	7.3	7.4	7.2	7.8	7.5	12
Electrical Conductivity	mS/m	NL[3]	415	0.5	92	152	80	112	114	131	128	88	215
Total Dissolved Solids	mg/L	1,200	2,960		440	1,010	430	635	638	876	692	461	923
Total Organic Carbon	"	NL	1.0	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cyanide	"	0.2	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	"	4.0	3.2	0.1	0.45	0.59	0.59	0.76	0.76	0.48	1.1	0.60	0.79
Chloride	"	200	1,230	5	136	179	51	121	113	159	148	48	147
Sulfate	"	400	890	15	66	172	83	92	99	168	74	118	386
Perchlorate	"	0.0049	5.1	0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012
Ammonia as N	"	NL	<0.1	0.1	<0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.1	<0.1
Ag	"	0.05	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
As	"	0.01	0.025	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
B	"	2.0	3.78	0.05	0.12	0.94	0.71	0.99	0.99	1.0	2.8	1.9	0.49
Ba	"	2.0	0.217	0.005	0.024	0.026	0.026	0.040	0.038	0.086	0.011	0.046	0.096
Be	"	0.004	<0.004	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Cd	"	0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Co	"	1.0	0.035	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cr	"	0.10	86.4	0.005	<0.005	<0.005	<0.005	<0.005	0.008	<0.005	0.012	0.006	<0.005
Cu	"	0.65	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fe	"	5.0	3.23	0.03	0.38	0.29	0.34	0.22	0.24	0.03	0.31	0.06	0.06

TABLE 4 (Continued): ANALYSIS OF WATER SAMPLED FROM THE THORNTON COMPOSITE RESERVOIR AND ADJACENT WELLS DURING DECEMBER 2015

Parameter	Unit	Groundwater Standard	Maximum Background	Lab RL	Reservoir	Well							
						TB-118-003	TB-119-003	TB-120-003	TB-120-003 D	TB-121-003	TB-122-003	TB-123-003	TB-124
Hg	mg/L	0.002	<0.0005	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Mn	"	0.15	0.183	0.005	0.05	0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Ni	"	0.10	0.093	0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.006	0.008	0.006	<0.005
Pb	"	0.0075	0.006	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Sb	"	0.006	0.012	0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Se	"	0.05	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tl	"	0.002	0.013	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
V	"	0.049	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zn	"	5.0	9.95	0.010	0.014	0.040	0.053	0.083	0.184	0.056	0.089	0.054	3.24
Ca	"	NL	276	0.5	60	135	76	85	89	116	75	74	25
Mg	"	NL	153	0.5	21	65	38	42	43	62	37	41	<0.50
HERBICIDES													
2,4,5-TP (Silvex)	"	0.050	<0.00028	0.00028	<0.00028	<0.00028	<0.00028	<0.00028	<0.00028	<0.00028	<0.00028	<0.00028	<0.00028
2,4-D	"	0.070	<0.00056	0.00056	<0.00056	<0.00056	<0.00056	<0.00056	<0.00056	<0.00056	<0.00056	<0.00056	<0.00056
Dalapon	"	0.20	<0.00056	0.0056	<0.0056	<0.0056	<0.0056	<0.0056	<0.0056	<0.0056	<0.0056	<0.0056	<0.0056
Dicamba	"	0.21	<0.00056	0.00056	<0.00056	<0.00056	<0.00056	<0.00056	<0.00056	<0.00056	<0.00056	<0.00056	<0.00056
Dinoseb	"	0.007	<0.0011	0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
Endothall	"	0.100	<0.010	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Mecoprop	"	0.007	<0.130	0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Picloram	"	0.50	<0.00056	0.00056	<0.00056	0.100	<0.00056	<0.00056	<0.00056	<0.00056	<0.00056	<0.00056	<0.00056
PCBs	"												
PCB-1016 (Aroclor 1016)	"	0.0005	<0.0008	0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008

TABLE 4 (Continued): ANALYSIS OF WATER SAMPLED FROM THE THORNTON COMPOSITE RESERVOIR AND ADJACENT WELLS DURING DECEMBER 2015

Parameter	Unit	Groundwater Standard	Maximum Background	Lab RL	Reservoir	Well							
						TB-118-003	TB-119-003	TB-120-003	TB-120-003 D	TB-121-003	TB-122-003	TB-123-003	TB-124
PCB-1221 (Aroclor 1221)	mg/L	0.0005	<0.0008	0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
PCB-1232 (Aroclor 1232)	"	0.0005	<0.0008	0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
PCB-1242 (Aroclor 1242)	"	0.0005	<0.0008	0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
PCB-1248 (Aroclor 1248)	"	0.0005	<0.0008	0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
PCB-1254 (Aroclor 1254)	"	0.0005	<0.0016	0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016
PCB-1260 (Aroclor 1260)	"	0.0005	<0.0016	0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016
PESTICIDES													
Alachlor	"	0.002	<0.00022	0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022
Aldicarb	"	0.003	<0.0025	0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
alpha-BHC (-benzene hexachloride)	"	0.00011	<0.0008	0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
Atrazine	"	0.003	<0.00022	0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022
Carbofuran	"	0.040	<0.0025	0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
Chlordane	"	0.002	<0.00008	0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
Endrin	"	0.002	<0.00016	0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016
gamma-BHC (Lindane)	"	0.0002	<0.00008	0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
Heptachlor	"	0.0004	<0.00008	0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

TABLE 4 (Continued): ANALYSIS OF WATER SAMPLED FROM THE THORNTON COMPOSITE RESERVOIR AND ADJACENT WELLS DURING DECEMBER 2015

Parameter	Unit	Groundwater Standard	Maximum Background	Lab RL	Reservoir	Well							
						TB-118-003	TB-119-003	TB-120-003	TB-120-003 D	TB-121-003	TB-122-003	TB-123-003	TB-124
Heptachlor epoxide	mg/L	0.0002	0.00008	0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
Methoxychlor	"	0.040	0.0008	0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
Simazine	"	0.004	<0.00055	0.00055	<0.00055	<0.00055	<0.00055	<0.00055	<0.00055	<0.00055	<0.00055	<0.00055	<0.00055
Toxaphene	"	0.003	0.00016	0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016
EXPLOSIVES													
1,3-Dinitrobenzene	"	0.0007	0.010	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
2,4-Dinitrotoluene	"	0.0001	0.0684	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
2,6-Dinitrotoluene	"	0.0003	0.0197	0.0007	<0.0007	<0.0007	<0.0007	<0.0007	<0.0007	<0.0007	<0.0007	<0.0007	<0.0007
1,3,5-Trinitrobenzene (TNB)	"	0.84	0.00020	0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
2,4,6-Trinitrotoluene (TNT)	"	0.014	0.00020	0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Nitrobenzene	"	0.014	0.012	0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012
RDX (Cyclonite)	"	0.084	0.00020	0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
HMX	"	1.4	0.04400	0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020

TABLE 4 (Continued): ANALYSIS OF WATER SAMPLED FROM THE THORNTON COMPOSITE RESERVOIR AND ADJACENT WELLS DURING DECEMBER 2015

Parameter	Unit	Groundwater Standard	Maximum Background	Lab RL	Reservoir	Well TB-118-003	TB-119-003	TB-120-003	TB-120-003 D	TB-121-003	TB-122-003	TB-123-003	TB-124
VOCs													
1,1,1-Trichloroethane	mg/L	0.200	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1,2-Trichloroethane	"	0.005	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1-Dichloroethane	"	1.4	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1-Dichloroethene	"	0.007	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2-Dibromo-3-chloropropane		0.0002	0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
1,2-Dibromoethane (Ethylene dibromide)	"	0.00005	0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
1,2-Dichloroethane	"	0.005	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2-Dichloropropane	"	0.005	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2-Butanone (MEK)	"	4.2	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acetone	"	6.3	0.100	0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Benzene	"	0.005	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Carbon disulfide	"	0.700	0.008	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.012
Carbon tetrachloride	"	0.005	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chlorobenzene (benzene Cl)	"	0.100	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chloroform	"	0.070	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

TABLE 4 (Continued): ANALYSIS OF WATER SAMPLED FROM THE THORNTON COMPOSITE RESERVOIR AND ADJACENT WELLS DURING DECEMBER 2015

Parameter	Unit	Groundwater Standard	Maximum Background	Lab RL	Reservoir	Well							
						TB-118-003	TB-119-003	TB-120-003	TB-120-003 D	TB-121-003	TB-122-003	TB-123-003	TB-124
cis-1,2-Dichloroethene	mg/L	0.070	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Ethylbenzene	"	0.700	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Isopropylbenzene (Cumene)	"	0.70	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Methylene chloride (dichloromethane)	"	0.005	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Methyl-tertbutyl ether	"	0.070	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tetrachloroethene	"	0.005	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Toluene	"	1.0	0.008	0.005	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
Total Xylenes	"	10.0	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
trans-1,2-Dichloroethene	"	0.100	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Trichloroethene	"	0.005	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Trichlorofluoro-methane	"	2.1	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Vinyl chloride	"	0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SVOCs													
1,2,4-Trichlorobenzene	"	0.070	0.050	0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012
1,2-Dichlorobenzene (ortho-)	"	0.600	0.049	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

TABLE 4 (Continued): ANALYSIS OF WATER SAMPLED FROM THE THORNTON COMPOSITE RESERVOIR AND ADJACENT WELLS DURING DECEMBER 2015

Parameter	Unit	Groundwater Standard	Maximum Background	Lab RL	Reservoir	Well							
						TB-118-003	TB-119-003	TB-120-003	TB-120-003 D	TB-121-003	TB-122-003	TB-123-003	TB-124
1,4-Dichlorobenzene (para-)	mg/L	0.075	0.048	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	"	0.028	0.034	0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012
2-Methylphenol	"	0.350	<0.011	0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011
Acenaphthene	"	0.42	0.077	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	"	2.10	0.010	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)anthracene	"	0.00013	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Benzo(a)pyrene	"	0.0002	0.003	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Benzo(b) fluoranthene	"	0.00018	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Benzo(k) fluoranthene	"	0.00017	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzoic acid	"	28	0.050	0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.091
Bis(2-ethylhexyl) phthalate	"	0.006	0.005	0.005	0.007	<0.005	<0.005	0.005	0.006	<0.005	0.005	<0.005	0.007
Chrysene	"	0.012	0.0030	0.0030	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Dibenzo(a,h) anthracene	"	0.0003	0.010	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Diethyl phthalate	"	5.60	0.010	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Di-n-butylphthalate	"	0.700	0.011	0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011
Fluoranthene	"	0.280	0.113	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Fluorene	"	0.280	0.010	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Hexachlorocyclo-pentadiene	"	0.050	0.012	0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012

TABLE 4 (Continued): ANALYSIS OF WATER SAMPLED FROM THE THORNTON COMPOSITE RESERVOIR AND ADJACENT WELLS DURING DECEMBER 2015

Parameter	Unit	Groundwater Standard	Maximum Background	Lab RL	Reservoir	Well TB-118-003	TB-119-003	TB-120-003	TB-120-003 D	TB-121-003	TB-122-003	TB-123-003	TB-124
Indeno (1,2,3-cd) pyrene	mg/L	0.00043	0.010	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Naphthalene	"	0.140	0.012	0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012
Pentachlorophenol	"	0.001	0.1690	0.0025	<0.0025	<0.0025	0.0045	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	0.0035
Phenol	"	0.100	0.062	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Pyrene	"	0.210	0.126	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

[1]Illinois Part 620 Class I Groundwater Standard.
[2]Lab reporting limit.
[3]Not established.