Metropolitan Water Reclamation District of Greater Chicago

MONITORING AND RESEARCH DEPARTMENT

REPORT NO. 21-43

THORNTON COMPOSITE RESERVOIR

GROUNDWATER MONITORING REPORT

THIRD QUARTER 2021

November 2021

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November 25, 2021

Mr. Michael Summers
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Dear Mr. Summers:

Subject: Transmittal of the Report "Thornton Composite Reservoir Groundwater Monitoring Report Third Quarter 2021"

Please find attached the report entitled "Thornton Composite Reservoir Groundwater Monitoring Report Third Quarter 2021" transmitted electronically. 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 the Excel spreadsheet of the Thornton Composite Reservoir raw data as required by the IEPA.

If you have any questions or would like to have additional information, please contact Mr. Benjamin Morgan at (708) 588-3743 or MorganB@mwrd.org.

Very truly yours,

Albert E. Cox, Ph.D.
Environmental Monitoring and Research Manager
Monitoring and Research Department

AC:BM:lf
Attachments
cc: Mr. M. Brown, IEPA
Mr. E. Podczerwinski

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THORNTON COMPOSITE RESERVOIR GROUNDWATER MONITORING REPORT THIRD QUARTER 2021

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LIST OF ACRONYMS AND ABBREVIATIONS

Acronyms and Abbreviations	Definition
CCD	Chicago City Datum
CFU	Colony Forming Unit
CSF	Combined Sewer Flow
EC	electrical conductivity
GMP	Groundwater Monitoring Plan
GPS	Groundwater Protection System
IAC	Illinois Administrative Code
IPCB	Illinois Pollution Control Board
TCR	Thornton Composite Reservoir
TOC	Total Organic Carbon

ACKNOWLEDGMENTS

This report for the Thornton Composite Reservoir Groundwater Monitoring was generated by the Monitoring and Research Department. All samples were collected by A3 Environmental Consultants (contractor) under the Thornton Composite Reservoir Contract 21-100-11. Analyses were performed by the Analytical Laboratories Division and the Analytical Microbiology Section of the Metropolitan Water Reclamation District of Greater Chicago. Special thanks are due to Ms. Laura Franklin for typing and formatting this report.

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) was constructed for the Thornton Composite Reservoir (TCR) to protect against the exfiltration of combined sewer flow (CSF) into the surrounding dolomite aquifers. The CSF and minimal amounts of stormwater 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 (GMP) (Black & Veatch, 2016). As explained in the Revised GMP, one sample of reservoir water, one of the Main Quarry Sump, and one from each of the seven wells are collected annually and analyzed for constituents listed in the Illinois Pollution Control Board (IPCB) Groundwater Quality Standards for Class I: Potable Resource Groundwater, Illinois Administrative Code (IAC) Title 35 Section 620.410 (IPCB, 2012), referred to hereafter as the Part 620 groundwater standards. In addition, following a reservoir fill event or during a routine quarterly event, groundwater is sampled from the seven wells and the Main Quarry Sump and tested for a targeted list of parameters that are more likely to be detected in CSF water.

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, following a reservoir fill event, biweekly sampling is required while the water in the reservoir remains above an elevation of -280 ft Chicago City Datum (CCD). Groundwater is sampled from each well at the first sample interval port immediately below the reservoir water elevation. Each of the multi-level monitoring wells is capable of monitoring four distinct 20-ft intervals in the Silurian dolomite aquifer.

The locations of monitoring wells, quarry sump, TCR, and the GPS are presented in Figure 1. The Main 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 CCD ft). The sump contains mainly groundwater and small quantities of surface runoff, and it is sampled quarterly and during fill events, along with the wells, to evaluate the potential migration of contaminants from the TCR to the sump.

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

Prior to the TCR becoming operational in November 2015, eight (8) sampling events were conducted on a quarterly basis for two years (May 2012 through March 2014) to provide background data on the existing groundwater quality. In order to evaluate the effectiveness of the grout curtain and the GPS, the Revised GMP (2016) presents the analysis of data for all samples collected during the background monitoring period and provides a baseline for comparison with routine monitoring data. Changes over time in groundwater calcium and magnesium concentrations would also be useful in tracking the occurrence of infiltration/exfiltration. Groundwater analytical data routinely generated for the monitoring wells, reservoir, and sump will also be compared with the Part 620 groundwater standards to evaluate any exceedances in groundwater standards.

FIGURE 1: MONITORING WELL AND MAIN QUARRY SUMP LOCATIONS

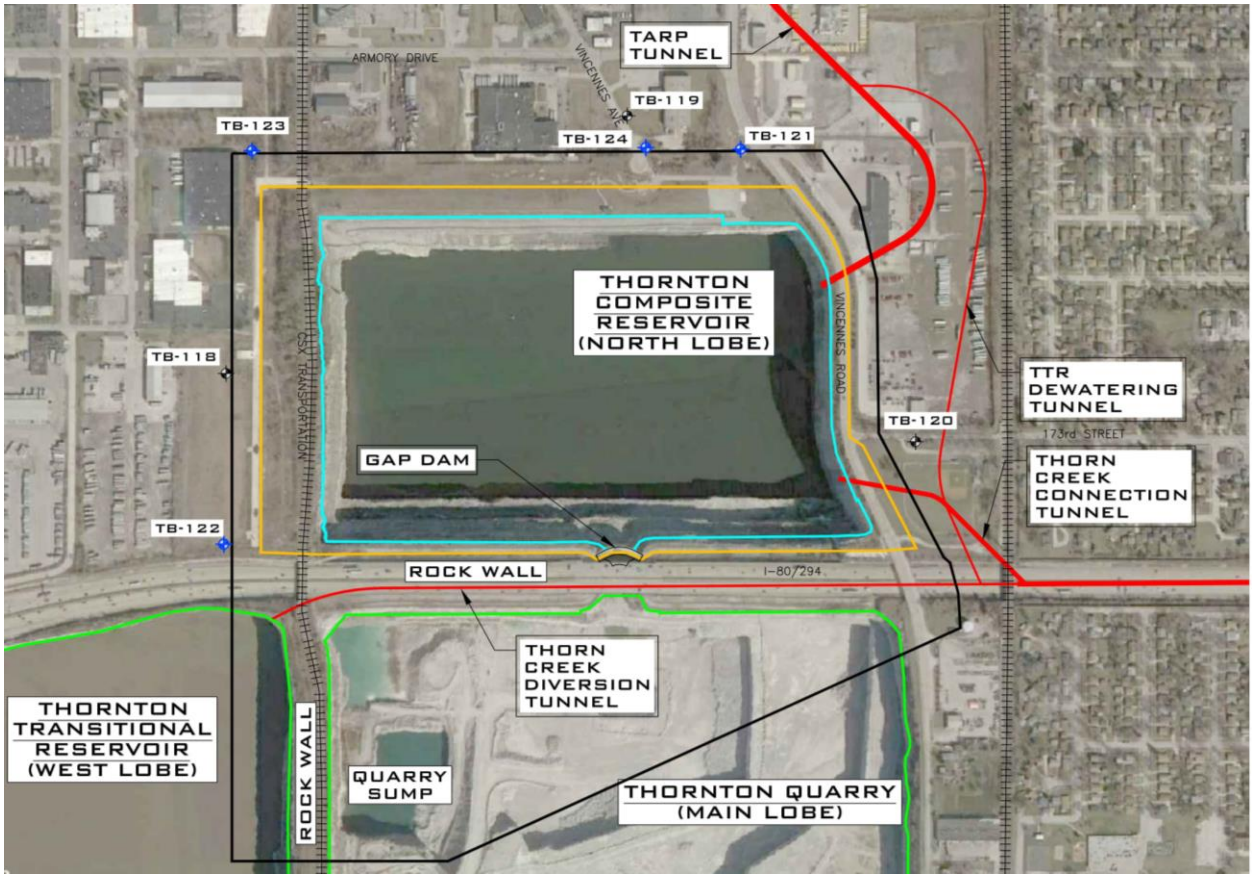

TABLE 1: CHARACTERISTICS OF MONITORING WELLS TB-118 THROUGH TB-124 AT THE THORNTON COMPOSITE RESERVOIR SITE

Well ID	Coordinates[1] Northing (ft)	Coordinates[1] Easting (ft)	Ground Surface Elevation (ft, CCD[2])	Top of Riser Elevation (ft, CCD[2])	Depth of Well (ft)	Sampling Port Interval (ft, CCD) 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).

There were five fill events during the third quarter of 2021. These were the third through seventh fill events of 2021. The first fill event of the third quarter began on June 26 and lasted until August 1, requiring two sampling events. However, it was not possible to collect samples for this fill event until July 28 due to malfunction of equipment, so only one complete set of samples was collected at the Main Quarry Sump and all monitoring wells for the fill event. The second fill event of the third quarter began on August 5 and lasted until August 6. One complete set of samples was collected at the Main Quarry Sump and all monitoring wells. The third fill event of the third quarter began on August 12 and lasted until August 15. One complete set of samples was collected at the Main Quarry Sump and all monitoring wells. The fourth fill event of the third quarter started on August 25 and lasted until August 28. Due to a malfunction of the control device for the Westbay multilevel well sampling probe, samples could only be collected at monitoring well TB-124 using a manual bailer and at the Main Quarry Sump and pressure readings could not be made. The fifth fill event of the third quarter started on September 10 and lasted until September 28. Samples were collected only at monitoring well TB-124 and the Main Quarry Sump as the Westbay probe control device was still undergoing inspection and repair. Elevation in the TCR also exceeded the -280 ft CCD threshold for a fill event on August 20 and 21, but this was due to inflow of diverted Thorn Creek water, rather than CSF, during dewatering of the Thornton Transitional Reservoir, so no samples were collected.

This report presents field activities, observations, and analytical data for surface and groundwater monitoring samples taken at the Main Quarry Sump and at all monitoring wells during fill event sampling conducted from July 28 – September 16, 2021.

FIELD ACTIVITIES

For this report period, samples were collected at the Main Quarry Sump and the deep well, and at sampling port interval 3 of all multi-level wells during fill event sampling from July 28 – September 16, 2021, except for a few samplings inadvertently done at port interval 2 or 4 as indicated in Table 2.

Using a Myron L Ultrameter 6P pH/conductivity/temperature meter, the pH, electrical conductivity (EC), and temperature of each sample were measured and recorded immediately after collection.

Prior to sampling the multi-level wells, hydrostatic pressure was measured at Port 3 of a well to calculate the groundwater elevation, except for at Port 4 for TB-118 on July 29, 2021 and TB-120 on August 16, 2021, and Port 2 for TB-118 on August 17, 2021. Table 3 lists the elevations at the relevant port of each well and the corresponding groundwater elevations during fill event sampling from July 28 – September 16, 2021.

All samples were packed in ice and transported to the Metropolitan Water Reclamation District of Greater Chicago's (District's) Analytical Laboratories Division for the analysis of selected inorganic constituents (Part 620 groundwater standards, IAC Title 35 Section 620.410) in accordance with the revised GMP. Additional aliquots were also prepared in the field and transported in ice to the District's Analytical Microbiology Laboratory for fecal coliform analysis.

TABLE 2: DEVICES AND CORRESPONDING DATES OF SAMPLING DURING FILL EVENT SAMPLING IN JULY, AUGUST, AND SEPTEMBER 2021

Date of Sampling	Event	Device/Structure Sampled
07/28/2021	Fill event #3	TB-119, TB-119 Duplicate, TB-121, TB-124
07/29/2021	Fill event #3	TB-118, TB-120, TB-122, TB-123
07/30/2021	Fill event #3	Sump
08/09/2021	Fill event #4	TB-119, TB-124
08/10/2021	Fill event #4	TB-118, TB-122, TB-123
08/11/2021	Fill event #4	TB-120, TB-121, Sump, Sump Duplicate
08/13/2021	Fill event #5	Sump
08/16/2021	Fill event #5	TB-119, TB-119 Duplicate, TB-120, TB-121
08/17/2021	Fill event #5	TB-118, TB-122, TB-124
08/18/2021	Fill event #5	TB-123
08/26/2021	Fill event #6	Sump
08/31/2021	Fill event #6	TB-124
09/16/2021	Fill event #7	TB-124, Sump

TABLE 3: SUMMARY OF ELEVATIONS AT SAMPLING PORT 3 OF EACH WELL AND CORRESPONDING GROUNDWATER ELEVATIONS DURING FILL EVENT SAMPLING IN JULY, AUGUST, AND SEPTEMBER 2021

Sample Date	Well ID	Sampling Port 003 Elevation	Groundwater Elevation
		(ft CCD[1])	
07/29/2021	TB-118	-398[2]	-86
07/28/2021	TB-119	-289	-163
07/29/2021	TB-120	-290	ND[3]
07/28/2021	TB-121	-288	-169
07/29/2021	TB-122	-288	-158
07/29/2021	TB-123	-288	-47
07/28/2021	TB-124	NA[4]	-343
08/10/2021	TB-118	-289	-85
08/09/2021	TB-119	-289	-181
08/11/2021	TB-120	-290	ND
08/11/2021	TB-121	-288	-170
08/10/2021	TB-122	-288	-160
08/10/2021	TB-123	-288	-47
08/09/2021	TB-124	NA	-338
08/17/2021	TB-118	-218[2]	-85
08/16/2021	TB-119	-289	-163
08/16/2021	TB-120	-399[2]	-170
08/16/2021	TB-121	-288	-170
08/17/2021	TB-122	-288	-160
08/18/2021	TB-123	-288	-121
08/17/2021	TB-124	NA	-432
08/31/2021	TB-124	NA	ND[5]
09/16/2021	TB-124	NA	ND

[1]Chicago City Datum.
[2]Sample collected and pressure measured at Port 4 (-398 ft or -399 ft) or Port 2 (-218 ft).
[3]No data available. Pressure readings could not be made at ports in this well.
[4]Not applicable. TB-124 is a conventional well screened from -663 to -698 ft CCD. During the third quarter, samples were taken at approximately 650 ft below ground surface.
[5]No data available. Pressure readings could not be made due to equipment malfunction.

ANALYTICAL RESULTS

Table 4 lists the analytical methods used by the laboratory for various parameters. Analytical results were reviewed to identify any analytes that exceeded the Part 620 groundwater standards (IAC Title 35 Section 620.410).

The analytical data for all well samples and the Main Quarry Sump sample collected during fill event sampling from July 28-30, 2021, are presented in Table 5. There were a few exceedances of the Part 620 groundwater standards, including pH, TDS, chloride, boron, and zinc, as indicated in bold font in Table 5. Among these parameters, only pH and zinc showed a value higher than the background maximum. Fecal coliform populations were detected in wells TB-119, TB-120, TB-121, TB-123, and the Main Quarry Sump at 1, 3, 3, 15, and 10 CFU/100 mL, respectively (Table 5).

The analytical data for all well samples and the Main Quarry Sump sample collected during fill event sampling from August 9-11, 2021, are presented in Table 6. There were a few exceedances of the Part 620 groundwater standards, including TDS, chloride, sulfate, boron, and zinc, as indicated in bold font in Table 6. Among these parameters, none showed a value higher than the background maximum. Fecal coliform populations were detected in wells TB-118, TB-121, TB-122, TB-123, and the Main Quarry Sump at 160, 4, 4, 6, and 110 CFU/100 mL, respectively (Table 6).

The analytical data for all well samples and the Main Quarry Sump sample collected during fill event sampling from August 13-18, 2021, are presented in Table 7. There were a few exceedances of the Part 620 groundwater standards, including pH, TDS, chloride, and boron, as indicated in bold font in Table 7. Among these parameters, only pH showed a value higher than the background maximum. Fecal coliform populations were detected in wells TB-118, TB-120, TB-122, and the Main Quarry Sump at 4, 1, 1, and 28 CFU/100 mL, respectively (Table 7).

The analytical data for well TB-124 and the Main Quarry Sump sample collected during fill event sampling from August 26-31, 2021, are presented in Table 8. There were a few exceedances of the Part 620 groundwater standards, including pH and zinc, as indicated in bold font in Table 8. Among these parameters, only pH showed a value higher than the background maximum. Fecal coliform populations were detected in the Main Quarry Sump at 4 CFU/100 mL (Table 8).

The analytical data for well TB-124 and the Main Quarry Sump sample collected during fill event sampling from September 16, 2021, are presented in Table 9. There were a few exceedances of the Part 620 groundwater standards, including pH, TDS, and sulfate, as indicated in bold font in Table 9. Among these parameters, only pH showed a value higher than the background maximum. Fecal coliform populations were not detected in either well TB-124 or the Main Quarry Sump (Table 9).

TABLE 4: ANALYTICAL METHODS USED FOR REQUIRED PARAMETERS

Analytical Parameters	Analytical Method
Chloride, Sulfate	EPA 300.0 Rev 2.1
Total Dissolved Solids	SM 2540-C
Metals Except Calcium, Magnesium	EPA 200.8
Calcium, Magnesium	EPA 200.7
Ammonia (as Nitrogen)	EPA 350.1
Total Organic Carbon	SM 5310-C
Phenols	EPA 420.4
Fecal Coliform	SM 9222D

TABLE 5: ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELLS TB-118 THROUGH TB-124 AND THE MAIN QUARRY SUMP AT THE THORNTON COMPOSITE RESERVOIR SITE FOR FILL EVENT SAMPLING IN JULY 2021

Parameter	Unit	Part 620 Groundwater Standard	Maximum Background	Lab RL[1]	Well								
					TB-118	TB-119	TB-119-D[2]	TB-120	TB-121	TB-122	TB-123	TB-124	Sump
pH		6.5–9.0	8.4	NL[3]	7.4	8.2	8.2	8.4	8.2	**9.2**	7.6	8.5	8.1
EC	mS/m	NL	415	NL	210	138	138	124	148	160	111	228	121
TDS	mg/L	1,200	2,960	25	**1,394**	560	576	618	1,068	892	592	**1,624**	946
TOC	"	NL	1	1	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	11	<5.0
Chloride	"	200	1,230	1	**396**	71	71	137	**296**	**245**	64	**203**	143
Sulfate	"	400	890	1	191	109	109	102	190	96	130	381	356
Ammonia as N	"	NL	ND[5]	0.3	0.58	0.55	0.54	0.71	0.76	0.58	0.76	2.0	<0.30
Total Phenol	"	0.1	0.06	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fecal Coliform	CFU/100 mL	NL	<1	1	<1	<1	1	3	3	<1	15	<1	10
Ag	mg/L	0.05	0.003	0.002	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
B	"	2	3.8	0.005	0.852	0.906	0.874	0.713	1.00	**2.66**	**2.09**	0.610	0.294
Be	"	0.004	0.002	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Co	"	1	0.035	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.005
Cr	"	0.1	86.4	0.002	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Cu	"	0.65	0.004	0.001	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002
Mn	"	0.15	0.183	0.005	0.005	0.005	0.005	0.030	0.003	0.003	0.003	<0.002	0.004
Se	"	0.05	0.008	0.002	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
V	"	0.049	ND	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zn	"	5	10	0.005	0.031	0.011	0.011	**10.5**	0.026	0.024	0.016	0.730	<0.010
Ca	"	NL	276	0.5	164	87.0	86.5	54.0	136	73.1	80.7	56.4	98.3
Mg	"	NL	153	0.5	79.2	43.4	43.3	19.6	69.8	36.9	42.2	1.0	73.8

[1]Laboratory reporting limit.
[2]Duplicate sample.
[3]No existing limit.
[4]Not determined.

TABLE 6: ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELLS TB-118 THROUGH TB-124 AND THE MAIN QUARRY SUMP AT THE THORNTON COMPOSITE RESERVOIR SITE FOR THE FIRST FILL EVENT SAMPLING IN AUGUST 2021 (AUGUST 9–11)

Parameter	Unit	Part 620 Groundwater Standard	Maximum Background	Lab RL[1]	Well								
					TB-118	TB-119	TB-120	TB-121	TB-122	TB-123	TB-124	Sump	Sump-D[2]
pH		6.5–9.0	8.4	NL[3]	7.2	7.1	7.3	7.2	7.5	7.6	8.1	8.1	8.1
EC	mS/m	NL	415	NL	247	133	132	209	176	109	171	121	121
TDS	mg/L	1, 200	2, 960	25	**1,280**	1, 050	650	1, 092	866	552	**1,518**	914	914
TOC	"	NL	1	1	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chloride	"	200	1, 230	1	**421**	**964**	147	**322**	**229**	60	**290**	155	144
Sulfate	"	400	890	1	199	177	105	195	88	120	**647**	373	348
Ammonia as N	"	NL	ND[4]	0.3	0.55	0.66	0.75	0.68	0.56	0.69	1.1	<0.30	<0.30
Total Phenol	"	0.1	0.06	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fecal Coliform	CFU/100 mL	NL	<1	1	160	<1	<1	4	4	6	<1	110	110
Ag	mg/L	0.05	0.003	0.002	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
B	"	2	3.8	0.005	0.666	0.989	0.804	0.911	**2.41**	1.57	1.03	0.294	0.283
Be	"	0.004	0.002	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Co	"	1	0.035	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.005	0.005
Cr	"	0.1	86.4	0.002	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Cu	"	0.65	0.004	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mn	"	0.15	0.183	0.005	0.005	0.006	0.028	0.003	0.003	0.003	0.003	<0.002	<0.002
Se	"	0.05	0.008	0.002	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
V	"	0.049	ND	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zn	"	5	10	0.005	0.022	0.036	**6.11**	0.025	0.023	0.026	0.786	<0.010	<0.010
Ca	"	NL	276	0.5	180	138	57.2	150	74.4	79.5	95.2	105	104
Mg	"	NL	153	0.5	87.7	71.4	21.5	77.6	38.0	41.7	62.9	83.0	82.2

[1]Laboratory reporting limit.
[2]Duplicate sample.
[3]No existing limit.
[4]Not determined.

TABLE 7: ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELLS TB-118 THROUGH TB-124 AND THE MAIN QUARRY SUMP AT THE THORNTON COMPOSITE RESERVOIR SITE FOR THE SECOND FILL EVENT SAMPLING IN AUGUST 2021 (AUGUST 13–18)

Parameter	Unit	Part 620 Groundwater Standard	Maximum Background	Lab RL[1]	Well TB-118	TB-119	TB-119-D[2]	TB-120	TB-121	TB-122	TB-123	TB-124	Sump
pH		6.5–9.0	8.4	NL[3]	7.4	7.2	7.2	7.3	7.1	7.5	8.6	**11.4**	8.2
EC	mS/m	NL	415	NL	123	127	127	132	210	NRR[4]	135	281	123
TDS	mg/L	1,200	2,960	25	**1,886**	630	654	868	**1,240**	902	372	1,136	936
TOC	"	NL	1	1	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	11	<5.0
Chloride	"	200	1,230	1	**699**	68	68	149	**346**	**246**	6.7	**210**	145
Sulfate	"	400	890	1	211	103	103	107	208	93	18	396	342
Ammonia as N	"	NL	ND[5]	0.3	0.43	0.50	0.50	0.73	0.61	0.50	0.49	1.9	<0.30
Total Phenol	"	0.1	0.06	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.017	<0.005
Fecal Coliform	CFU/100 mL	NL	<1	1	4	<1	<1	1	<1	1	<1	<1	28
Ag	mg/L	0.05	0.003	0.002	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
B	"	2	3.8	0.005	0.346	0.825	0.829	1.37	0.927	**2.07**	1.62	0.529	0.292
Be	"	0.004	0.002	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Co	"	1	0.035	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.005
Cr	"	0.1	86.4	0.002	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Cu	"	0.65	0.004	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mn	"	0.15	0.183	0.005	0.009	0.006	0.005	0.022	0.003	0.003	<0.002	<0.002	0.003
Se	"	0.05	0.008	0.002	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
V	"	0.049	ND	0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zn	"	5	10	0.005	<0.010	<0.010	0.035	4.46	0.012	0.011	0.013	0.602	<0.010
Ca	"	NL	276	0.5	207	88.5	91.0	48.4	153	75.2	37.8	55.3	99.8
Mg	"	NL	153	0.5	98.1	44.1	45.4	19.1	78.2	38.4	20.9	1.0	76.2

[1]Laboratory reporting limit.
[2]Duplicate sample.
[3]No existing limit.
[4]No reportable result due to instrument error.
[5]Not determined.

TABLE 8: ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL TB-124 AND THE MAIN QUARRY SUMP AT THE THORNTON COMPOSITE RESERVOIR SITE FOR THE THIRD FILL EVENT SAMPLING IN AUGUST 2021 (AUGUST 26–31)

Parameter	Unit	Part 620 Groundwater Standard	Maximum Background	Lab RL[1]	Well							
					TB-118	TB-119	TB-120	TB-121	TB-122	TB-123	TB-124	Sump
pH		6.5 - 9.0	8.4	NL[2]	NC[3]	NC	NC	NC	NC	NC	**10.5**	**9.1**
EC	mS/m	NL	415	NL	NC	NC	NC	NC	NC	NC	257	134
TDS	mg/L	1,200	2,960	25	NC	NC	NC	NC	NC	NC	1,026	960
TOC	"	NL	1	1	NC	NC	NC	NC	NC	NC	45	<5.0
Chloride	"	200	1,230	1	NC	NC	NC	NC	NC	NC	181	160
Sulfate	"	400	890	1	NC	NC	NC	NC	NC	NC	338	372
Ammonia as N	"	NL	ND[4]	0.3	NC	NC	NC	NC	NC	NC	1.6	<0.30
Total Phenol	"	0.1	0.06	0.005	NC	NC	NC	NC	NC	NC	0.026	<0.005
Fecal Coliform	CFU/100 mL	NL	<1	1	NC	NC	NC	NC	NC	NC	<1	4
Ag	mg/L	0.05	0.003	0.002	NC	NC	NC	NC	NC	NC	<0.004	<0.004
B	"	2	3.8	0.005	NC	NC	NC	NC	NC	NC	0.649	0.300
Be	"	0.004	0.002	0.001	NC	NC	NC	NC	NC	NC	<0.002	<0.002
Co	"	1	0.035	0.001	NC	NC	NC	NC	NC	NC	<0.002	0.006
Cr	"	0.1	86.4	0.002	NC	NC	NC	NC	NC	NC	0.005	<0.004
Cu	"	0.65	0.004	0.001	NC	NC	NC	NC	NC	NC	0.005	<0.002
Mn	"	0.15	0.183	0.005	NC	NC	NC	NC	NC	NC	0.004	<0.002
Se	"	0.05	0.008	0.002	NC	NC	NC	NC	NC	NC	<0.004	<0.004
V	"	0.049	ND	0.001	NC	NC	NC	NC	NC	NC	<0.002	<0.002
Zn	"	5	10	0.005	NC	NC	NC	NC	NC	NC	**7.85**	<0.010
Ca	"	NL	276	0.5	NC	NC	NC	NC	NC	NC	16.2	102
Mg	"	NL	153	0.5	NC	NC	NC	NC	NC	NC	<0.50	83.9

[1]Laboratory reporting limit.
[2]No existing limit.
[3]Sample could not be collected due to equipment malfunction.
[4]Not determined.

TABLE 9: ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL TB-124 AND THE MAIN QUARRY SUMP AT THE THORNTON COMPOSITE RESERVOIR SITE FOR FILL EVENT SAMPLING IN SEPTEMBER 2021

Parameter	Unit	Part 620 Groundwater Standard	Maximum Background	Lab RL[1]	Well							
					TB-118	TB-119	TB-120	TB-121	TB-122	TB-123	TB-124	Sump
pH		6.5 - 9.0	8.4	NL[2]	NC[3]	NC	NC	NC	NC	NC	**10.0**	**9.9**
EC	mS/m	NL	415	NL	NC	NC	NC	NC	NC	NC	263	126
TDS	mg/L	1,200	2,960	25	NC	NC	NC	NC	NC	NC	1,090	**1,222**
TOC	"	NL	1	1	NC	NC	NC	NC	NC	NC	39	<5.0
Chloride	"	200	1,230	1	NC	NC	NC	NC	NC	NC	172	185
Sulfate	"	400	890	1	NC	NC	NC	NC	NC	NC	323	**454**
Ammonia as N	"	NL	ND[4]	0.3	NC	NC	NC	NC	NC	NC	1.7	<0.30
Total Phenol	"	0.1	0.06	0.005	NC	NC	NC	NC	NC	NC	0.027	<0.005
Fecal Coliform	CFU/100 mL	NL	<1	1	NC	NC	NC	NC	NC	NC	<1	<1
Ag	mg/L	0.05	0.003	0.002	NC	NC	NC	NC	NC	NC	<0.004	<0.004
B	"	2	3.8	0.005	NC	NC	NC	NC	NC	NC	0.600	0.429
Be	"	0.004	0.002	0.001	NC	NC	NC	NC	NC	NC	<0.002	<0.002
Co	"	1	0.035	0.001	NC	NC	NC	NC	NC	NC	<0.002	<0.002
Cr	"	0.1	86.4	0.002	NC	NC	NC	NC	NC	NC	<0.004	<0.004
Cu	"	0.65	0.004	0.001	NC	NC	NC	NC	NC	NC	0.005	<0.002
Mn	"	0.15	0.183	0.005	NC	NC	NC	NC	NC	NC	0.002	<0.002
Se	"	0.05	0.008	0.002	NC	NC	NC	NC	NC	NC	<0.004	<0.004
V	"	0.049	ND	0.001	NC	NC	NC	NC	NC	NC	<0.002	<0.002
Zn	"	5	10	0.005	NC	NC	NC	NC	NC	NC	2.99	<0.010
Ca	"	NL	276	0.5	NC	NC	NC	NC	NC	NC	14.5	124
Mg	"	NL	153	0.5	NC	NC	NC	NC	NC	NC	<0.50	107

[1]Laboratory reporting limit.
[2]No existing limit.
[3]Sample could not be collected due to equipment malfunction.
[4]Not determined.

REFERENCES

Black & Veatch, 2014, "Background Groundwater Quality Report for Thornton Composite Reservoir," prepared for the Metropolitan Water Reclamation District of Greater Chicago, July 2014.

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Illinois Pollution Control Board, 2012. Illinois Administrative Code Title 35: Environmental Protection, Subtitle F: Public Water Supplies, Chapter I: Pollution Control Board, Section 620.410: Groundwater Quality Standards for Class I: Potable Resource Groundwater, amended at 36 Ill. Reg. 15206, effective October 5, 2012.