

Protecting Our Water Environment



Metropolitan Water Reclamation District of Greater Chicago

***MONITORING AND RESEARCH
DEPARTMENT***

REPORT NO. 22-06

THORNTON COMPOSITE RESERVOIR

GROUNDWATER MONITORING REPORT

FOURTH QUARTER 2021

March 2022

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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.
Director of Monitoring and Research

March 11, 2022

Mr. Michael Summers
Groundwater Section Manager
Bureau of Water/Public Water Supplies
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, IL 62794
MICHAEL.SUMMERS@Illinois.gov

Dear Mr. Summers:

Subject: Transmittal of the Report “Thornton Composite Reservoir Groundwater Monitoring Report Fourth Quarter 2021”

Please find attached the report entitled “Thornton Composite Reservoir Groundwater Monitoring Report Fourth 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@mwr.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

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

**THORNTON COMPOSITE RESERVOIR
GROUNDWATER MONITORING REPORT
FOURTH QUARTER 2021**

By

**Benjamin Morgan
Environmental Soil Scientist**

**Guanglong Tian
Principal Environmental Scientist**

**Albert Cox
Environmental Monitoring and Research Manager**

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

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LIST OF ABBREVIATIONS

Acronym	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
TCR	Thornton Composite Reservoir
TDS	total dissolved solids
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 Thornton Composite Reservoir Contract 21-100-11. Analyses were performed by the Analytical Laboratories Division and the Analytical Microbiology Laboratory of the Metropolitan Water Reclamation District of Greater Chicago (District). 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 District.

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 from the Main Quarry Sump, and one from each of the seven wells are collected annually and analyzed for the Illinois Administrative Code (IAC) Title 35 Part 620 Class I groundwater constituents. 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, sampling is required every two weeks while the water in the reservoir remains above an elevation of -280 feet 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 multilevel monitoring wells is capable of monitoring four distinct 20-foot intervals in the Silurian dolomite aquifer.

The locations of the monitoring wells, the quarry sump, the 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 feet CCD). 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 IAC Title 35 Part 620 Class I Groundwater Standards (Illinois Pollution Control Board, Illinois Environmental Protection Agency, 2013) to evaluate any exceedances in groundwater standards.

FIGURE 1: MONITORING WELL AND MAIN QUARRY SUMP LOCATIONS

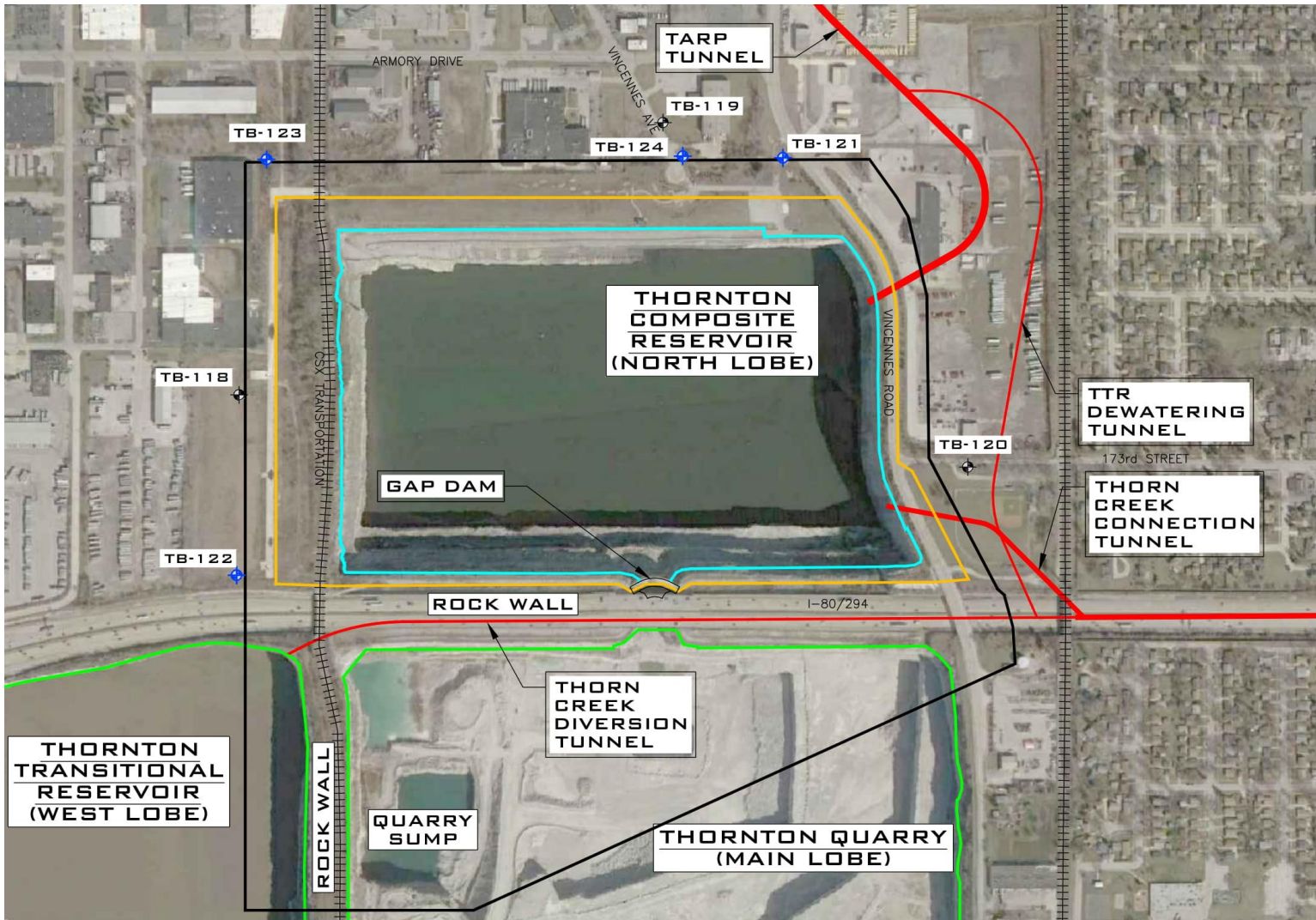


TABLE 1: CHARACTERISTICS OF MONITORING WELLS TB-118 THROUGH TB-124 AT THE THORNTON COMPOSITE RESERVOIR SITE

Well ID	Coordinates ¹		Ground Surface Elevation (ft, CCD ²)	Top of Riser Elevation (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	1,791,110.38	693,560.44	38.5	41.5	532	-85 to -105	-212 to -232	-283 to -303	-392 to -412
TB-119	1,792,316.63	695,509.39	27.9	29.5	529	-85 to -105	-212 to -232	-283 to -303	-392 to -412
TB-120	1,790,782.31	696,888.93	40.0	42.1	540	-86 to -106	-213 to -233	-284 to -304	-393 to -413
TB-121	1,792,193.10	696,044.98	29.4	30.4	461	-84 to -104	-211 to -231	-282 to -302	-391 to -411
TB-122	1,790,288.61	693,549.38	48.8	51.7	480	-85 to -105	-212 to -232	-283 to -303	-392 to -412
TB-123	1,792,185.60	693,685.69	28.9	31.8	460	-84 to -104	-211 to -231	-282 to -302	-391 to -411
TB-124 ³	1,792,200.77	695,591.56	29.6	29.2	728				-663 to -698

¹Illinois State Plane Coordinate System (NAD 1927).

²Chicago City Datum (CCD).

³TB-124 is a conventional well screened from -663 to -698 ft CCD. Samples are taken at approximately 650 ft below ground surface.

There were three fill events during the fourth quarter of 2021. The first fill event during the quarter (the eighth event of 2021) began on October 12 and lasted until October 20, with intermittent fluctuation above and below the fill threshold of -280 feet CCD. Per the Revised GMP, the annual monitoring event sampling was conducted during this fill event in place of routine fill event sampling. One complete set of annual monitoring samples was collected during October 14 – 21, 2021, at the Reservoir, the Main Quarry Sump, and all monitoring wells. The second fill event during the quarter (the ninth event of 2021) began on October 24 and lasted until November 19, requiring two samplings. One complete set of routine fill event samples was collected during October 27 – 29, 2021, at the Main Quarry Sump and all monitoring wells. The second complete set of routine fill event samples was collected during November 12 – 16, 2021, at the Main Quarry Sump and all monitoring wells. The third fill event during the quarter (the tenth event of 2021) began on December 11 and lasted until December 18, requiring one sampling. One complete set of routine fill event samples was collected during December 15 – 20, 2021, at the Main Quarry Sump and all monitoring wells. Elevation in the TCR also exceeded the -280 feet CCD fill event threshold from November 30 – December 6, 2021, 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, the TCR, and at all monitoring wells from October 14 – 21, 2021, for the annual monitoring sampling during the eighth fill event, and at the Main Quarry Sump and at all monitoring wells from October 27 – 29 and November 12 – 16 during the ninth fill event samplings, and December 15 – 20, 2021, during the tenth fill event sampling.

FIELD ACTIVITIES

For this report period, one complete set of samples for the annual monitoring event was collected at the TCR, the Main Quarry Sump, the deep well, and at sampling port interval 3 of all multilevel wells from October 14 – 21, 2021. Three complete sets of fill-event samples were collected at the Main Quarry Sump, the deep well, and at sampling port interval 3 of all multilevel wells, from October 27 – 29, November 12 – 16, and December 15 – 20, 2021. Sample collection dates are shown in Table 2.

Using a Myron L Ultrameter 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 multilevel wells, hydrostatic pressure was measured to calculate the groundwater elevation at Port 3 of each well. Table 3 lists the elevations at Port 3 of each well and the corresponding groundwater elevations during the annual monitoring event in October and during fill event sampling in October, November, and December 2021.

All samples were packed in ice and shipped to the Metropolitan Water Reclamation District of Greater Chicago's (District's) Analytical Laboratories Division for the analysis of selected inorganic constituents (IAC Title 35 Part 620 Class I Groundwater Standards) in accordance with the Revised GMP. Additional aliquots were also prepared in the field and shipped in ice to the District's Analytical Microbiology Laboratory for fecal coliform (FC) analysis. For the annual monitoring event, an additional set of aliquots was prepared in the field and shipped in ice to a contract laboratory for analysis of selected organic constituents (IAC Title 35 Part 620 Class I Groundwater Standards) in accordance with the Revised GMP.

TABLE 2: DEVICES AND CORRESPONDING DATES OF SAMPLING DURING THE ANNUAL MONITORING EVENT IN OCTOBER AND FILL EVENT SAMPLING IN OCTOBER, NOVEMBER, AND DECEMBER 2021

Date of Sampling	Device/Structure Sampled
-----Annual Sampling-----	
10/14/21	TB-119
10/15/21	TB-121
10/18/22	TB-118 (FC ¹ only), TB-120, TB-122 (FC only), TB-124
10/19/22	TB-118, TB-122
10/20/22	TB-123, TB-123 duplicate
10/21/22	Main Quarry Sump, Reservoir
-----Fill Event #9, Sampling #1-----	
10/27/22	TB-119, TB-124, TB-124 duplicate
10/28/22	TB-118, TB-120, TB-122
10/29/22	TB-121, TB-123, Main Quarry Sump
-----Fill Event #9, Sampling #2-----	
11/12/22	TB-119, TB-119 duplicate, TB-124
11/15/22	TB-118, TB-122, TB-123
11/16/22	TB-120, TB-121, Main Quarry Sump
-----Fill Event #10-----	
12/15/22	Main Quarry Sump, Sump duplicate
12/16/22	TB-119, TB-120, TB-124
12/20/22	TB-118, TB-121, TB-122, TB-123

¹FC = Fecal coliform.

TABLE 3: SUMMARY OF ELEVATIONS AT SAMPLING PORT 3 OF EACH WELL AND CORRESPONDING GROUNDWATER ELEVATIONS DURING THE ANNUAL MONITORING EVENT IN OCTOBER AND FILL EVENT MONITORING IN OCTOBER, NOVEMBER, AND DECEMBER 2021

Sample Date	Well ID	Sampling Port	Groundwater Elevation
			(ft CCD ¹)
----- Annual -----			
10/19/21	TB-118	-289	-86
10/14/21	TB-119	-289	-165
10/18/21	TB-120	-290	-186
10/15/21	TB-121	-288	-170
10/19/21	TB-122	-288	-168
10/20/21	TB-123	-288	-50
10/18/21	TB-124 ²	NA ³	-429 ⁴
----- Fill #9, Sampling #1 -----			
10/28/21	TB-118	-289	-86
10/27/21	TB-119	-289	-165
10/28/21	TB-120	-290	-186
10/09/21	TB-121	-288	-170
10/28/21	TB-122	-288	-162
10/29/21	TB-123	-288	-38
10/27/21	TB-124	NA	-348
----- Fill #9, Sampling #2 -----			
11/15/21	TB-118	-289	-85
11/12/21	TB-119	-289	-164
11/16/21	TB-120	-290	-189
11/16/21	TB-121	-288	-169
11/15/21	TB-122	-288	-161
11/15/21	TB-123	-288	-48
11/12/21	TB-124	NA	-347
----- Fill #10 -----			
12/20/21	TB-118	-289	-85
12/16/21	TB-119	-289	-164
12/16/21	TB-120	-290	-188
12/20/21	TB-121	-288	-169
12/20/21	TB-122	-288	-161
12/20/21	TB-123	-288	-49
12/16/21	TB-124	NA	-345

¹Chicago City Datum.

²TB-124 is a conventional well screened from -663 to -698 ft CCD. Samples were taken at approximately 650 ft below ground surface once during the annual monitoring event sampling in October 2021 and during the fill events in October, November, and December 2021.

³Not applicable.

⁴Piezometric pressure used to calculate groundwater elevation at well TB-124 is measured inside the well casing.

ANALYTICAL RESULTS

Table 4 lists the analytical methods used by the laboratory for measured parameters. Analytical results were reviewed to identify any analytes that exceeded the Illinois Class I Groundwater Standards (35 IAC Part 620).

The analytical data for all well samples, the Main Quarry Sump, and the TCR collected during the annual monitoring event from October 14 – 21 are presented in Table 5. There were a few exceedances of the Part 620 groundwater standards, including pH, total dissolved solids (TDS), chloride, sulfate, and boron, as indicated in bold font in Table 5. Among these parameters, only pH showed a value higher than the background maximum. Fecal coliform bacteria were not detected in any well or in the Main Quarry Sump during the annual monitoring event (Table 5).

Almost all organic parameters were undetectable in the annual monitoring samples from wells and the Main Quarry Sump (Table 5). Only 2,4-dinitrotoluene and bis(2-ethylhexyl)phthalate were detected above the Class I Groundwater Standards, both in well TB-124, and of these, only bis(2-ethylhexyl)phthalate was detected above the background maximum. For 2,4-dinitrotoluene and bis(2-ethylhexyl)phthalate in all samples except TB-124, and for all PCB arochlors, total PCBs, 1,3-dinitrobenzene, 2,6-dinitrotoluene, ethylene dibromide, 1,4-dioxane, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, indeno[1,2,3-cd]pyrene, and pentachlorophenol in all samples, the parameter was below the laboratory reporting limit, but the reporting limits for all analyses were higher than the Class I Groundwater Standards. The maximum laboratory reporting limits for RDX (cyclonite) and bis(2-ethylhexyl)phthalate were also higher than their background maximum concentrations (0.00021 and 0.0052 mg/L, respectively).

The analytical data for all well samples and the Main Quarry Sump sample collected from October 27 – 29 for the first sampling of fill event nine monitoring are presented in Table 6. There were a few exceedances of the Part 620 groundwater standards, including pH, TDS, chloride, sulfate, and boron, as indicated in bold font in Table 6. Among these parameters, only pH showed a value higher than the background maximum. Fecal coliform bacteria were detected only in well TB-119 at 4 CFU/100 mL during this fill event sampling (Table 6).

The analytical data for all well samples and the Main Quarry Sump sample collected from November 12 – 16 for the second sampling of fill event nine monitoring are presented in Table 7. There were a few exceedances of the Part 620 groundwater standards, including pH, TDS, chloride, and sulfate, as indicated in bold font in Table 7. Among these parameters, only pH showed a value higher than the background maximum. Fecal coliform bacteria were not detected in any well or in the Main Quarry Sump during this fill event sampling (Table 7).

The analytical data for all well samples and the Main Quarry Sump sample collected from December 15 – 20 for fill event ten monitoring are presented in Table 8. There were a few exceedances of the Part 620 groundwater standards, including pH, TDS, chloride, and sulfate, as indicated in bold font in Table 8. Among these parameters, only pH showed a value higher than the background maximum. Fecal coliform bacteria were not detected in any well or in the Main Quarry Sump during this fill event sampling (Table 8).

TABLE 4: ANALYTICAL METHODS USED FOR REQUIRED PARAMETERS

Parameters	Analytical Method
Inorganic	
Chloride, fluoride, sulfate	USEPA 300.0
Total dissolved solids	SM 2540C
Boron and Target Analyte List metals except calcium, magnesium, and mercury	USEPA 200.8
Hardness (as calcium and magnesium)	SM 3120B, SM 2340B
Mercury	SM 3112B
Ammonia (as N)	USEPA 350.1
Total organic carbon	SM 5310B
Cyanide	USEPA Kelada-01
Organic	
Herbicides including 2,4-D, 2,4,5-TP (Silvex), dicamba, dinoseb, mecoprop, picloram, and aldicarb and carbofuran	USEPA 8321B
Dalapon	USEPA 552.3
Endothall	USEPA 548.1
Polychlorinated biphenyls	USEPA 8082A
Pesticides including alachlor, alpha-BHC, chlordane, endrin, gamma-BHC, heptachlor, heptachlor epoxide, methoxychlor, toxaphene, and atrazine and simazine	USEPA 8081B
All explosives	USEPA 8330B
1,2-dibromo-3-chloropropane and ethylene dibromide	USEPA 8011
All other volatile organic compounds	USEPA 8260B/D
Phenolics, total recoverable	USEPA 9065
All other semivolatile volatile organic compounds	USEPA 8270D
Radiological	
Radium-226 (pCi/L ¹)	SM 7500-Ra B
Radium-228 (pCi/L)	SM 7500-Ra D
Others	
Phenols (at Metropolitan Water Reclamation District of Greater Chicago laboratories for fill-event samples)	USEPA 420.4
Fecal coliform	SM 9222D

¹pCi/L = picocuries per liter.

TABLE 5: ANALYSIS OF GROUNDWATER SAMPLED AT MONITORING WELLS TB-118 THROUGH TB-124, THE MAIN QUARRY SUMP, AND THE THORNTON COMPOSITE RESERVOIR DURING THE ANNUAL MONITORING EVENT IN OCTOBER 2021

Parameter	Part 620 Groundwater			Well								Sump	Reservoir	
	Standard	Maximum Background	Lab RL ¹	TB-118	TB-119	TB-120	TB-121	TB-122	TB-123	TB-123D ²	TB-124			
pH	6.5 - 9.0	8.4	NL ³	7.8	7.8	7.3	7.7	7.8	7.8	7.8	7.8	10.6	8.2	8.9
EC (mS/m)	NL	415	NL	208	132	143	114	145	107	107	107	345	133	95.6
Fecal coliform (CFU/100 mL)	NL	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	56,000
----- Concentration (mg/L) -----														
TDS	1,200	2,960	10	1,530	548	796	1,160	874	582	582	1,052	1,154	448	
TOC	NL	1	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	39.5	<5.0	10.2
Cyanide, Total	0.2	BRL ⁴	0.005	<0.005	<0.005	<0.005	0.008	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	4	3.2	0.2	0.48	0.49	1.05	0.43	0.93	0.57	0.54	1.05	0.36	0.37	
Chloride	200	1,230	20	513	68	165	324	237	62	62	179	181	93	
Sulfate	400	890	20	216	103	103	196	94	129	128	327	470	51	
Ammonia as N	NL	ND ⁵	0.3	0.59	0.56	1.67	0.74	0.61	0.66	0.65	1.69	<0.30	10.95	
<u>Metals</u>														
Ag	0.05	0.003	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
As	0.01	0.025	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
B	2	3.78	0.005	0.717	0.845	0.943	0.845	2.32	1.63	1.61	0.516	0.842	0.401	
Ba	2	0.217	0.002	0.042	0.033	0.023	0.033	0.017	0.051	0.051	0.066	0.093	0.026	
Be	0.004	0.0002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cd	0.005	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Co	1	0.035	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.011	
Cr	0.1	86.4	0.004	<0.004	<0.004	0.003	<0.004	<0.004	0.005	<0.004	<0.004	<0.004	<0.004	<0.004
Cu	0.65	0.004	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002
Fe	5	3.23	0.002	0.119	0.255	0.469	0.255	0.030	0.082	<0.002	0.026	0.025	<0.002	<0.002
Hg	0.002	0.0007	0.0005	<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	0.002	0.005	0.004	0.033	0.004	0.003	0.003	0.002	<0.002	0.003	<0.002	<0.002
Ni	0.1	0.093	0.002	0.007	<0.002	0.007	<0.002	<0.002	0.006	<0.002	0.009	<0.002	0.037	
Pb	0.0075	0.006	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Sb	0.006	0.012	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se	0.05	0.008	0.004	<0.004	<0.004	<0.004	<0.004	0.004	0.004	0.004	<0.004	<0.004	<0.004	<0.004
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	<0.002	<0.002
V	0.049	BRL	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zn	5	9.95	0.01	0.054	0.015	2.27	0.015	<0.010	0.129	<0.010	0.773	0.026	<0.010	<0.010
Ca	NL	276	0.5	189	81.9	56.9	140	72.2	79.8	79.7	9.9	116	49.0	
Mg	NL	153	0.5	93.0	41.0	22.7	72.1	37.2	41.9	41.8	<0.50	101	19.1	
<u>Herbicides</u>														
2,4-D	0.07	BRL	0.002	<0.0002	<0.0002	<0.0002	<0.002	<0.0002	<0.00025	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
2,4,5-TP (Silvex)	0.05	BRL	0.001	<0.0001	<0.0001	<0.0001	<0.001	<0.0001	<0.00012	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Atrazine	0.003	BRL	0.00149	<0.00124	<0.00149	<0.00129	<0.00106	<0.00128	<0.00118	<0.00128	<0.00127	<0.00108	<0.00118	<0.00118
Dalapon	0.2	BRL	0.002	<0.00196	<0.00194	<0.00185	<0.00194	<0.00191	<0.00186	<0.002	0.00736	<0.00198	0.00383	
Dicamba	0.21	BRL	0.001	<0.0001	<0.0001	<0.0001	<0.001	<0.0001	<0.00012	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dinoseb	0.007	BRL	0.003	<0.0003	<0.0003	<0.0003	<0.003	<0.0003	<0.00037	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003

TABLE 5 (Continued): ANALYSIS OF GROUNDWATER SAMPLED AT MONITORING WELLS TB-118 THROUGH TB-124, THE MAIN QUARRY SUMP, AND THE THORNTON COMPOSITE RESERVOIR DURING THE ANNUAL MONITORING EVENT IN OCTOBER 2021

Parameter	Part 620 Groundwater			Well								Sump	Reservoir
	Standard	Maximum Background	Lab RL ¹	TB-118	TB-119	TB-120	TB-121	TB-122	TB-123	TB-123D ²	TB-124		
----- Concentration (mg/L) -----													
Endothall	0.1	BRL	0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
Mecoprop	0.007	BRL	0.001	<0.0001	<0.0001	<0.0001	<0.001	<0.0001	<0.00012	<0.0001	<0.0001	<0.0001	<0.0001
Picloram	0.5	BRL	0.001	<0.0001	<0.0001	<0.0001	<0.001	<0.0001	<0.00012	<0.0001	<0.0001	<0.0001	<0.0001
Simazine	0.004	BRL	0.00149	<0.00124	<0.00149	<0.00129	<0.00106	<0.00128	<0.00118	<0.00128	<0.00127	<0.00108	<0.00118
<u>Polychlorinated Biphenyls</u>													
PCB-1016	0.0005	BRL	0.0257	<0.0124	<0.00149	<0.0257	<0.0212	<0.0128	<0.0118	<0.0128	<0.0254	<0.0108	<0.0118
PCB-1221	0.0005	BRL	0.0154	<0.00742	<0.000897	<0.0154	<0.0127	<0.00768	<0.00709	<0.00768	<0.0152	<0.00649	<0.00708
PCB-1232	0.0005	BRL	0.0154	<0.00742	<0.000897	<0.0154	<0.0127	<0.00768	<0.00709	<0.00768	<0.0152	<0.00649	<0.00708
PCB-1242	0.0005	BRL	0.0515	<0.0247	<0.00299	<0.0515	<0.0424	<0.0256	<0.0236	<0.0256	<0.0508	<0.0216	<0.0236
PCB-1248	0.0005	BRL	0.0154	<0.00742	<0.000897	<0.0154	<0.0127	<0.00768	<0.00709	<0.00768	<0.0152	<0.00649	<0.00708
PCB-1254	0.0005	BRL	0.0154	<0.00742	<0.000897	<0.0154	<0.0127	<0.00768	<0.00709	<0.00768	<0.0152	<0.00649	<0.00708
PCB-1260	0.0005	BRL	0.0103	<0.00494	<0.000598	<0.0103	<0.00848	<0.00512	<0.00473	<0.00512	<0.0102	<0.00433	<0.00472
Total PCB	0.0005	ND	0.0154	<0.00742	<0.000897	<0.0154	<0.0127	<0.00768	<0.00709	<0.00768	<0.0152	<0.00649	<0.00708
<u>Pesticides</u>													
Alachlor	0.002	BRL	0.00149	<0.00124	<0.00149	<0.00129	<0.00106	<0.00128	<0.00118	<0.00128	<0.00127	<0.00108	<0.00118
Aldicarb	0.003	0.0048	0.002	<0.0002	<0.0002	<0.0002	<0.002	<0.0002	<0.00025	<0.0002	<0.0002	<0.0002	<0.0002
alpha-BHC	0.00011	BRL	0.0000598	<0.0000494	<0.0000598	<0.0000515	<0.0000424	<0.0000512	<0.0000473	<0.0000512	<0.0000508	<0.0000433	<0.0000472
Carbofuran	0.04	BRL	0.002	<0.0002	<0.0002	<0.0002	<0.002	<0.0002	<0.00025	<0.0002	<0.0002	<0.0002	<0.0002
Chlordane	0.002	BRL	0.00149	<0.00124	<0.00149	<0.00129	<0.00106	<0.00128	<0.00118	<0.00128	<0.00127	<0.00108	<0.00118
Endrin	0.002	BRL	0.0000598	<0.0000494	<0.0000598	<0.0000515	<0.0000424	<0.0000512	<0.0000473	<0.0000512	<0.0000508	<0.0000433	<0.0000472
gamma-BHC	0.0002	BRL	0.0000598	<0.0000494	<0.0000598	<0.0000515	<0.0000424	<0.0000512	<0.0000473	<0.0000512	<0.0000508	<0.0000433	<0.0000472
Heptachlor	0.0004	BRL	0.0000598	<0.0000494	<0.0000598	<0.0000515	<0.0000424	<0.0000512	<0.0000473	<0.0000512	<0.0000508	<0.0000433	<0.0000472
Heptachlor epoxide	0.0002	BRL	0.0000598	<0.0000494	<0.0000598	<0.0000515	<0.0000424	<0.0000512	<0.0000473	<0.0000512	0.000116	<0.0000433	<0.0000472
Methoxychlor	0.04	BRL	0.00012	<0.0000989	<0.00012	<0.000103	<0.0000848	<0.000102	<0.0000945	<0.000102	<0.000102	<0.0000866	<0.0000944
Toxaphene	0.003	BRL	0.00299	<0.00247	<0.00299	<0.00257	<0.00212	<0.00256	<0.00236	<0.00256	<0.00254	<0.00216	<0.00236
<u>Explosives</u>													
1,3-Dinitrobenzene	0.0007	BRL	0.00227	<0.00204	<0.00209	<0.00222	<0.0021	<0.00213	<0.00207	<0.00223	<0.00185	<0.00209	<0.00227
2,4-Dinitrotoluene	0.0001	0.0684	0.00227	<0.00204	<0.00209	<0.00222	<0.0021	<0.00213	<0.00207	<0.00223	0.0036	<0.00209	<0.00227
2,6-Dinitrotoluene	0.0003	0.0197	0.00227	<0.00204	<0.00209	<0.00222	<0.0021	<0.00213	<0.00207	<0.00223	<0.00185	<0.00209	<0.00227
1,3,5-Trinitrobenzene	0.84	BRL	0.00227	<0.00204	<0.00209	<0.00222	<0.0021	<0.00213	<0.00207	<0.00223	<0.00185	<0.00209	<0.00227
2,4,6-Trinitrotoluene	0.014	BRL	0.00227	<0.00204	<0.00209	<0.00222	<0.0021	<0.00213	<0.00207	<0.00223	<0.00185	<0.00209	<0.00227
Nitrobenzene	0.014	BRL	0.00227	<0.00204	<0.00209	<0.00222	<0.0021	<0.00213	<0.00207	<0.00223	<0.00185	<0.00209	<0.00227
HMX	1.4	0.044	0.00227	<0.00204	<0.00209	<0.00222	<0.0021	<0.00213	<0.00207	<0.00223	<0.00185	<0.00209	<0.00227
RDX	0.084	0.00021	0.00227	<0.00204	<0.00209	<0.00222	<0.0021	<0.00213	<0.00207	<0.00223	<0.00185	<0.00209	<0.00227
<u>Volatile Organic Compounds</u>													
1,1,1-Trichloroethane	0.2	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
1,1,2-Trichloroethane	0.005	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
1,1-Dichloroethane	1.4	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

TABLE 5 (Continued): ANALYSIS OF GROUNDWATER SAMPLED AT MONITORING WELLS TB-118 THROUGH TB-124, THE MAIN QUARRY SUMP, AND THE THORNTON COMPOSITE RESERVOIR DURING THE ANNUAL MONITORING EVENT IN OCTOBER 2021

Parameter	Part 620			Well									Sump	Reservoir
	Groundwater Standard	Maximum Background	Lab RL ¹	TB-118	TB-119	TB-120	TB-121	TB-122	TB-123	TB-123D ²	TB-124			
-----Concentration (mg/L)-----														
1,1-Dichloroethene	0.007	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
1,2-Dichloroethane	0.005	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
1,2-Dichloropropane	0.005	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
1,2-Dibromo-3-Chloropropane	0.0002	BRL	0.000143	<0.000135	<0.000143	<0.000135	<0.000135	<0.000135	<0.000135	<0.000143	<0.000135	<0.000139	<0.000135	
Ethylene Dibromide	0.00005	BRL	0.00008	<0.0000757	<0.00008	<0.0000757	<0.0000757	<0.0000757	<0.0000757	<0.00008	<0.0000757	<0.0000778	<0.0000757	
1,4-Dioxane	0.0077	BRL	0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	
2-Butanone	4.2	BRL	0.00175	<0.00175	<0.00175	<0.00175	<0.00175	<0.00175	<0.00175	<0.00175	0.00252	<0.00175	0.00391	
Acetone	6.3	BRL	0.002	<0.002	<0.002	0.00355	<0.002	<0.002	<0.002	<0.002	0.0102	<0.002	0.0473	
Benzene	0.005	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Carbon disulfide	0.7	0.008	0.001	<0.001	<0.001	0.00238	<0.001	<0.001	<0.001	<0.001	0.00205	<0.001	0.00421	
Carbon tetrachloride	0.005	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Chlorobenzene	0.1	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Chloroform	0.07	BRL	0.0005	<0.0005	<0.0005	0.00228	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
cis-1,2-Dichloroethene	0.07	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Dichlorodifluoromethane	1.4	BRL	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Ethylbenzene	0.7	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Isopropylbenzene	0.7	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Methylene Chloride	0.005	BRL	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.00225	<0.002	<0.002	
Methyl tert-butyl ether	0.07	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Styrene	0.1	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Tetrachloroethene	0.005	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Toluene	1	0.008	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00124	<0.0005	0.0388	
trans-1,2-Dichloroethene	0.1	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Trichloroethene	0.005	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Trichlorofluoromethane	2.1	BRL	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Vinyl chloride	0.002	BRL	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Xylenes, Total	10	BRL	0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	
<u>Semivolatle Organic Compounds</u>														
1,2,4-Trichlorobenzene	0.07	0.05	0.00279	<0.00261	<0.00229	<0.00221	<0.0021	<0.00239	<0.0023	<0.00279	<0.00251	<0.0021	<0.00227	
1,2-Dichlorobenzene	0.6	0.049	0.00279	<0.00261	<0.00229	<0.00221	<0.0021	<0.00239	<0.0023	<0.00279	<0.00251	<0.0021	<0.00227	
1,4-Dichlorobenzene	0.075	0.048	0.00279	<0.00261	<0.00229	<0.00221	<0.0021	<0.00239	<0.0023	<0.00279	<0.00251	<0.0021	<0.00227	
2-Methylnaphthalene	0.028	0.034	0.00557	<0.00522	<0.00458	<0.00442	<0.00419	<0.00477	<0.00459	<0.00557	<0.00502	<0.00419	<0.00454	
2-Methylphenol	0.35	BRL	0.00139	<0.00131	<0.00114	<0.00111	<0.00105	<0.00119	<0.00115	<0.00139	<0.00126	<0.00105	0.00137	
Acenaphthene	0.42	0.077	0.000836	<0.000784	<0.000687	<0.000664	<0.000629	<0.000716	<0.000689	<0.000836	<0.000753	<0.000629	<0.000681	
Anthracene	2.1	BRL	0.000836	<0.000784	<0.000687	<0.000664	<0.000629	<0.000716	<0.000689	<0.000836	<0.000753	<0.000629	<0.000681	
Benzo[a]anthracene	0.00013	BRL	0.000836	<0.000784	<0.000687	<0.000664	<0.000629	<0.000716	<0.000689	<0.000836	<0.000753	<0.000629	<0.000681	
Benzo[a]pyrene	0.0002	BRL	0.00279	<0.00261	<0.00229	<0.00221	<0.0021	<0.00239	<0.0023	<0.00279	<0.00251	<0.0021	<0.00227	
Benzo[b]fluoranthene	0.00018	BRL	0.00279	<0.00261	<0.00229	<0.00221	<0.0021	<0.00239	<0.0023	<0.00279	<0.00251	<0.0021	<0.00227	
Benzo[k]fluoranthene	0.00017	BRL	0.00279	<0.00261	<0.00229	<0.00221	<0.0021	<0.00239	<0.0023	<0.00279	<0.00251	<0.0021	<0.00227	
Benzoic acid	28	BRL	0.0557	<0.0522	<0.0458	<0.0442	<0.0419	<0.0477	<0.0459	<0.0557	<0.0502	<0.0419	<0.0454	
Bis(2-ethylhexyl)phthalate	0.006	0.0052	0.0279	<0.0261	<0.0229	<0.0221	<0.021	<0.0239	<0.023	<0.0279	0.0294	<0.021	<0.0227	

TABLE 5 (Continued): ANALYSIS OF GROUNDWATER SAMPLED AT MONITORING WELLS TB-118 THROUGH TB-124, THE MAIN QUARRY SUMP, AND THE THORNTON COMPOSITE RESERVOIR DURING THE ANNUAL MONITORING EVENT IN OCTOBER 2021

Parameter	Part 620 Groundwater Standard	Maximum Background	Lab RL ¹	Well								Sump	Reservoir
				TB-118	TB-119	TB-120	TB-121	TB-122	TB-123	TB-123D ²	TB-124		
Concentration (mg/L)													
Chrysene	0.012	BRL	0.000836	<0.000784	<0.000687	<0.000664	<0.000629	<0.000716	<0.000689	<0.000836	<0.000753	<0.000629	<0.000681
Dibenz[a,h]anthracene	0.0003	BRL	0.00279	<0.00261	<0.00229	<0.00221	<0.0021	<0.00239	<0.0023	<0.00279	<0.00251	<0.0021	<0.00227
Diethyl phthalate	5.6	BRL	0.00836	<0.00784	<0.00687	<0.00664	<0.00629	<0.00716	<0.00689	<0.00836	<0.00753	<0.00629	<0.00681
Di-n-butyl phthalate	0.7	BRL	0.0139	<0.0131	<0.0114	<0.0111	<0.0105	<0.0119	<0.0115	<0.0139	<0.0126	<0.0105	<0.0113
Fluoranthene	0.28	0.113	0.00139	<0.00131	<0.00114	<0.00111	<0.00105	<0.00119	<0.00115	<0.00139	<0.00126	<0.00105	<0.00113
Fluorene	0.28	BRL	0.000836	<0.000784	<0.000687	<0.000664	<0.000629	<0.000716	<0.000689	<0.000836	<0.000753	<0.000629	<0.000681
Hexachlorocyclopentadiene	0.05	BRL	0.0209	<0.0196	<0.0172	<0.0166	<0.0157	<0.0179	<0.0172	<0.0209	<0.0188	<0.0157	<0.017
Indeno[1,2,3-cd]pyrene	0.00043	BRL	0.00279	<0.00261	<0.00229	<0.00221	<0.0021	<0.00239	<0.0023	<0.00279	<0.00251	<0.0021	<0.00227
Naphthalene	0.14	BRL	0.00557	<0.00522	<0.00458	<0.00442	<0.00419	<0.00477	<0.00459	<0.00557	<0.00502	<0.00419	<0.00454
Pentachlorophenol	0.001	0.169	0.0418	<0.0392	<0.0343	<0.0332	<0.0315	<0.0358	<0.0344	<0.0418	<0.0377	<0.0314	<0.034
Phenolics, Total	0.1	0.062	0.05	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	0.0538	<0.0500	<0.0500
Pyrene	0.21	0.126	0.00139	<0.00131	<0.00114	<0.00111	<0.00105	<0.00119	<0.00115	<0.00139	<0.00126	<0.00105	<0.00113
Radioactivity													
pCi/L													
Radium-226	20	4.31	0.36	3.43	2.97	0.6	0.42	1.64	2.44	0.86	0.63	0.51	<0.36
Radium-228	20	2.58	0.74	0.57	1.03	<0.43	1.87	<0.43	<0.51	<0.52	<0.74	1.22	0.69

¹Laboratory reporting limit. Where analyses for the same parameter had different RLs, the maximum RL is shown.

²Duplicate sample.

³No existing limit.

⁴Below reporting limit in background monitoring samples.

⁵Not 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 FILL EVENT NINE MONITORING IN OCTOBER 2021

Parameter	Unit	Part 620			Well								
		Groundwater Standard	Maximum Background	Lab RL ¹	TB-118	TB-119	TB-120	TB-121	TB-122	TB-123	TB-124	TB-124D ²	Sump
pH		6.5–9.0	8.4	NL ³	7.7	7.6	7.8	8.2	8.0	8.2	9.2	9.2	8.3
EC	mS/m	NL	415	NL	135	125	112	127	121	143	261	261	130
TDS	mg/L	1,200	2,960	25	1,590	598	762	1,078	1,020	462	1,128	1,120	1,144
TOC	"	NL	1	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	34.2	32.9	<5.0
Chloride	"	200	1,230	1	479	73	178	325	278	62	183	182	169
Sulfate	"	400	890	1	NDR ⁴	111	NDR ⁴	186	NDR ⁴	124	NDR ⁴	NDR ⁴	447
Ammonia as N	"	NL	ND ⁵	0.3	0.49	0.57	1.63	0.66	0.56	0.66	1.70	1.69	<0.300
Total Phenol	"	0.1	0.06	0.005	<0.005	<0.005	<0.005	NDR ⁶	<0.005	<0.005	0.036	NC ⁷	<0.005
Fecal Coliform	CFU/100 mL	NL	<1	1	<1	4	<1	<1	<1	<1	<1	<1	<10
Ag	mg/L	0.05	0.003	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
B	"	2	3.8	0.005	0.630	0.801	0.995	0.867	2.29	0.359	0.508	0.507	1.549
Be	"	0.004	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Co	"	1	0.035	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.013	<0.002	<0.002	<0.002
Cr	"	0.1	86.4	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Cu	"	0.65	0.004	0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	0.006	0.006	<0.002
Mn	"	0.15	0.183	0.002	0.005	0.005	0.037	0.003	0.003	<0.002	0.004	0.003	0.002
Se	"	0.05	0.008	0.004	<0.004	<0.004	<0.004	<0.004	0.004	0.004	<0.004	<0.004	<0.004
V	"	0.049	<0.010	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zn	"	5	10	0.01	0.016	0.029	4.19	0.028	<0.010	<0.010	4.55	3.88	0.015
Ca	"	NL	276	0.5	182	88.2	57.5	141	76.0	117	30.9	29.8	78.2
Mg	"	NL	153	0.5	88.9	45.4	23.1	72.9	39.2	100	<0.50	<0.50	41.9

¹Laboratory reporting limit.

²Duplicate sample.

³No existing limit.

⁴No data reportable. Storage refrigerator temperature outside acceptable range.

⁵Not determined.

⁶No data reportable. Chemical preservation did not meet method requirements.

⁷Aliquot inadvertently not collected.

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 FILL EVENT NINE MONITORING IN NOVEMBER 2021

Parameter	Unit	Part 620 Groundwater Standard	Maximum Background	Lab RL ¹	Well								Sump
					TB-118	TB-119	TB-119D ²	TB-120	TB-121	TB-122	TB-123	TB-124	
pH		6.5 - 9.0	8.4	NL ³	7.6	7.4	7.4	8.1	7.9	7.7	7.9	10.2	9.0
EC	mS/m	NL	415	NL	115	108	108	205	133	114	123	275	131
TDS	mg/L	1,200	2,960	25	1,578	660	610	804	1,156	1,004	652	1,096	1,210
TOC	"	NL	1	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	32.5	<5.0
Chloride	"	200	1,230	1	516	73	73	189	320	290	64	186	171
Sulfate	"	400	890	1	223	109	109	132	196	110	129	345	440
Ammonia as N	"	NL	ND ⁴	0.3	0.53	0.51	0.51	1.26	0.67	0.57	0.63	1.62	<0.30
Total Phenol	"	0.1	0.06	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.037	<0.005
Fecal Coliform	CFU/100 mL	NL	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<10
Ag	mg/L	0.05	0.003	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
B	"	2	3.8	0.005	0.628	0.832	0.811	0.939	0.867	1.99	1.60	0.492	0.327
Be	"	0.004	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Co	"	1	0.035	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.011
Cr	"	0.1	86.4	0.004	0.005	<0.004	<0.004	0.006	<0.004	0.005	<0.004	<0.004	<0.004
Cu	"	0.65	0.004	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.006	<0.002
Mn	"	0.15	0.183	0.002	0.005	0.006	0.005	0.039	0.003	0.003	0.003	0.002	<0.002
Se	"	0.05	0.008	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
V	"	0.049	<0.010	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zn	"	5	10	0.01	0.014	<0.010	<0.010	3.54	<0.010	0.012	0.029	2.66	<0.010
Ca	"	NL	276	0.5	185	88.3	89.0	58.6	143	79.6	81.4	29.0	119
Mg	"	NL	153	0.5	90.2	43.9	44.3	24.1	74.6	41.1	42.6	<0.50	99.7

¹Laboratory reporting limit.

²Duplicate sample.

³No existing limit.

⁴Not determined.

TABLE 8: 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 TEN MONITORING IN DECEMBER 2021

Parameter	Unit	Part 620			Well								Sump	Sump-D ²
		Groundwater Standard	Maximum Background	Lab RL ¹	TB-118	TB-119	TB-120	TB-121	TB-122	TB-123	TB-124			
pH		6.5 - 9.0	8.4	NL ³	7.6	7.5	8.1	8.0	7.7	7.5	10.3	9.0	9.0	
EC	mS/m	NL	415	NL	115	116	204	128	109	119	269	131	131	
TDS	mg/L	1,200	2,960	25	1,288	536	942	1,000	924	516	1,104	1,152	1,080	
TOC	"	NL	1	5	NDR ⁴	NDR ⁴	NDR ⁴	<5.0	NDR ⁴	<5.0	21.8	<5.0	<5.0	
Chloride	"	200	1,230	1	462	72	216	309	283	63	184	189	186	
Sulfate	"	400	890	1	211	109	157	191	108	127	337	444	439	
Ammonia as N	"	NL	ND ⁵	0.3	0.52	0.54	1.22	0.62	0.53	0.64	1.72	<0.30	<0.30	
Total Phenol	"	0.1	0.06	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.029	<0.005	<0.005	
Fecal Coliform	CFU/100 mL	NL	<1	1	<1	<1	<1	<1	<1	<1	<1	<10	<10	
Ag	mg/L	0.05	0.003	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	
B	"	2	3.8	0.005	0.639	0.779	1.15	0.832	1.93	1.51	0.498	0.340	0.348	
Be	"	0.004	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Co	"	1	0.035	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.011	0.011	
Cr	"	0.1	86.4	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	
Cu	"	0.65	0.004	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.002	
Mn	"	0.15	0.183	0.002	0.005	0.005	0.034	0.003	0.003	0.002	<0.002	<0.002	<0.002	
Se	"	0.05	0.008	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	
V	"	0.049	<0.010	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Zn	"	5	10	0.01	0.031	0.019	1.69	<0.010	0.014	<0.010	1.66	<0.010	<0.010	
Ca	"	NL	276	0.5	181	89.5	63.5	143	82.4	80.8	52.0	123	122	
Mg	"	NL	153	0.5	87.7	45.6	26.9	73.8	42.0	42.7	<0.50	106	105	

¹Laboratory reporting limit.

²Duplicate sample.

³No existing limit.

⁴No data reportable. Chemical preservation did not meet method requirements.

⁵Not 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.
- Black & Veatch, 2016c, “Revised Groundwater Monitoring Plan, Groundwater Protection System for Thornton Composite Reservoir,” prepared for the Metropolitan Water Reclamation District of Greater Chicago, May 2016.
- Illinois EPA, 2012, 35 Illinois Administrative Code (IAC) Part 620 Class I Groundwater Standards, 2012.
- Illinois Pollution Control Board, 2013, Illinois Administrative Code Title 35: Environmental Protection, Subtitle F: Potable Water Supplies, Chapter I: Pollution Control Board, Part 620 – Groundwater Quality, October 7, 2013.