Metropolitan Water Reclamation District of Greater Chicago

MONITORING AND RESEARCH DEPARTMENT

REPORT NO. 10-32

TUNNEL AND RESERVOIR PLAN

THORNTON TRANSITIONAL FLOOD CONTROL RESERVOIR

WATER QUALITY MONITORING WELLS

2009 ANNUAL GROUNDWATER MONITORING REPORT

June 2010

Protecting Our Water Environment

Metropolitan Water Reclamation District of Greater Chicago
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June 18, 2010

Ms. Marcia Willhite, Chief
Bureau of Water
Illinois Environmental Protection Agency
P. O. Box 19276
Springfield, IL 62794–9276

Dear Ms. Willhite:

Subject: Tunnel and Reservoir Plan, Thornton Transitional Flood Control Reservoir Water Quality Monitoring Wells, 2009 Annual Groundwater Monitoring Report

Enclosed are three copies of "Tunnel and Reservoir Plan, Thornton Transitional Flood Control Reservoir Water Quality Monitoring Wells, 2009 Annual Groundwater Monitoring Report."

Very truly yours,

Louis Kollias
Director
Monitoring and Research

LK:HZ:lf
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TUNNEL AND RESERVOIR PLAN
THORNTON TRANSITIONAL FLOOD CONTROL RESERVOIR
WATER QUALITY MONITORING WELLS
2009 ANNUAL GROUNDWATER MONITORING REPORT

Monitoring and Research Department
Louis Kollias, Director

June 2010

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INTRODUCTION

The purpose of this report is to meet the reporting requirements of the Illinois Environmental Protection Agency (IEPA) relative to annual flood control utilization of the Thornton Transitional Reservoir (Reservoir) for 2009. The specific informational requirements are described in the June 16, 2001, Scope of Work (SOW) for Groundwater Quality Monitoring of the Reservoir. The SOW was approved in a letter from the IEPA dated August 6, 2001.

The reporting requirements are found in Section 7 of the SOW. The requirements for the annual flood control utilization of the Reservoir shall include:

1. The year's monitoring well sample analysis results.

2. Reservoir content grab sample results.

3. Detailed review and comparison of the monitoring well sampling analysis results, utilizing the monitoring well statistical background determinations.

Objective

The objective of collecting groundwater quality data from the four monitoring wells QT-1, QT-2, QT-3, and QT-4 and Reservoir content grab samples is to assess any possible contamination of the monitoring wells which may result from seepage produced during the fill event for any of the parameters indicated in Table 2 of the SOW (Table 1).

Project Description

The Reservoir is in the West Lobe of the Thornton Quarry southeast of the intersection of the Tri-State Tollway and Halsted Street in Thornton, Illinois, as shown in Figure 1. The Reservoir is the final structural measure to be implemented for the Little Calumet River Watershed under the Natural Resources Conservation Service Little Calumet Watershed Plan of November 1998. The Reservoir provides 3.7 billion gallons (BG) of floodwater storage, which has been expanded from the planned 3.1 BG due to additional rock mining and provides sufficient volume to capture a 100-year storm event from Thorn Creek at a point just south of the Tri-State Tollway.

The project provides flood control benefits for 21 businesses and 4,400 residences, for an average benefit of $6.8 million per year. Within the Little Calumet watershed are the communities of Blue Island, Calumet City, Dixmoor, Dolton, Glenwood, Harvey, Lansing, Phoenix, Riverdale, and South Holland, which receive flood control benefits.

The Reservoir consists of a diversion structure at Thornton Creek, a 24-foot diameter dropshaft and 22-foot diameter conveyance tunnel to the Lower West Lobe of Thornton Quarry. The project also includes an 8-foot diameter tunnel connected to the Calumet Tunnel and Reservoir Plan System that will be utilized for Reservoir dewatering purposes only.

FIELD SAMPLING

There were seven diversion events at the Thornton Transitional Reservoir during the year 2009, February 27, 2009, March 8–12, 2009, April 28, 2009, May 15–16, 2009, October 23–24, 2009, October 30–November 1, 2009, and December 25–26, 2009. There was also a diversion that took place on December 27–29, 2008, but the data was not reported in the 2008 annual report because it was collected in 2009. The diversion events for December 2008 through December 2009 are summarized in Table 2.

During these events, in accordance with the SOW, samples were collected from the four groundwater quality monitoring wells surrounding the Reservoir and grab samples were taken from the Reservoir, except for those instances when sampling equipment was malfunctioning or access to the sampling locations was impossible due to natural causes. The parameters to be analyzed for are found in Table 1, which presents all the parameters listed in Table 2 of the SOW.

ANALYTICAL DATA RESULTS

Tables 3 through 10 contain the results of the analyses of the four water quality monitoring wells surrounding the Reservoir along with the calculated upper 95 percent confidence limits for the December 27–29, 2008, diversion events. The calculated upper 95 percent confidence limits were derived using ten samples from background monitoring between October 2002 and September 2004. These limits were updated from those using six samples collected from October 2002 and May 2003 which were reported in the Thornton Transitional Reservoir Pre-Operational Background Groundwater Quality Report (Research and Development Department Report No. 03-23). Tables 11 and 12 contain the results of the grab samples from the Reservoir for the December 27–29, 2008, diversion events. Tables 13 through 20 contain the results of the analyses of the four water quality monitoring wells surrounding the Reservoir along with the calculated upper 95 percent confidence limits for the February 27, 2009, and March 8–12 diversion events. The monitoring results of these two diversion events were grouped together as these events occurred in proximity. Tables 21 and 22 contain the results of the analyses of the grab samples from the Reservoir for the February 27, 2009, and March 8–12, 2009, diversion events. Tables 23 through 30 contain the results of the analyses of the four water quality monitoring wells surrounding the Reservoir along with the calculated upper 95 percent confidence limits for the April 28, 2009, and the May 15–16, 2009, diversion events. The monitoring results of these two diversion events were grouped together as these events occurred in proximity. Tables 31 and 32 contain the results of the analyses of the grab samples from the Reservoir for the April 28, 2009, and May 15–16, 2009, diversion events. Tables 33 through 40 contain the results of the analyses of the four water quality monitoring wells surrounding the Reservoir along with the calculated upper 95 percent confidence limits for the October 23–24 and October 30–November 1, 2009, diversion events. Tables 41 and 42 contain the results of the analyses of the grab samples from the Reservoir for the October 23–24 and October 30–November 1, 2009, diversion events.

DISCUSSION OF RESULTS

During six of the seven diversion events taking place in 2009, samples of both the surrounding water quality monitoring wells and the Reservoir itself were collected as long as there was water in the Reservoir per requirements of the SOW. Sampling for the December 25–26, 2009, diversion event could not be performed because access to the water quality monitoring wells and the Reservoir was blocked by heavy snow.

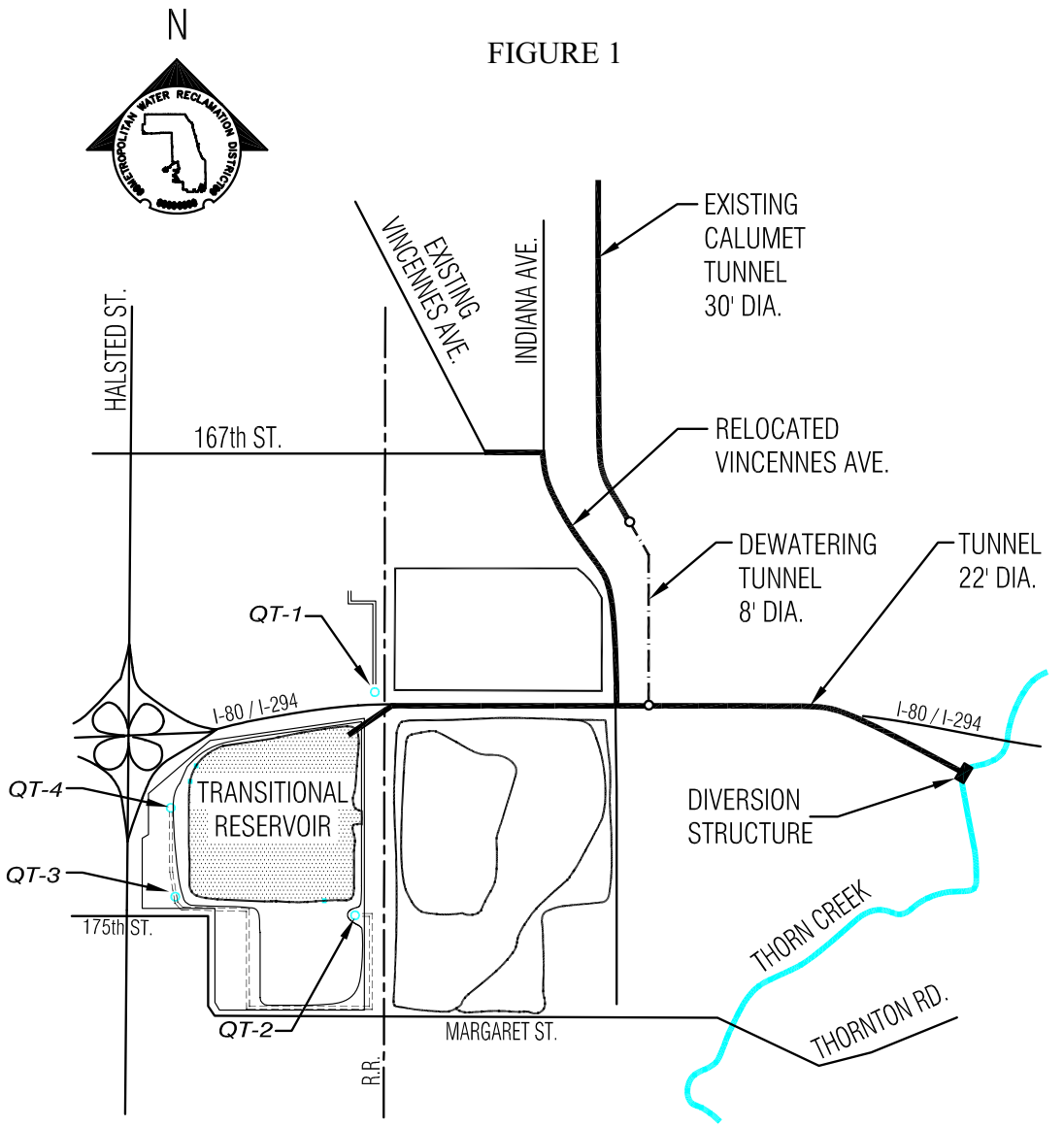
During the December 27–29, 2008, fill event, the upper 95 percent confidence limit from the background sampling was exceeded for the following parameters: QT-1 (Tables 3 and 4) chloride and lead, QT-2 (Tables 5 and 6) iron, lead, barium, and manganese, QT-3 (Tables 7 and 8) chloride, lead, sulfate, and total dissolved solids. No exceedance was observed from QT-4 (Tables 9 and 10). There was a slight decrease in the number of parameters that exceeded the corresponding upper 95 percent confidence limit from the background sampling towards the end of this fill event on January 8, 2009.

During the February 27, 2009, and March 8–12, 2009, fill events the upper 95 percent confidence limit from the background sampling was exceeded for the following parameters: QT-1 (Tables 13 and 14) chloride, lead, chromium, and manganese, QT-2 (Tables 15 and 16) lead and manganese, QT-3 (Tables 17 and 18) chloride, lead, sulfate, total dissolved solids, and manganese; and QT-4 (Tables 19 and 20) lead. A last set of samples from the water quality monitoring wells for these fill events were collected on April 16, 2009, by which the Reservoir was dewatered. Although the number of parameters decreased, there were some parameters that exceeded the upper 95 percent confidence limit from the background sampling after the Reservoir was dewatered, and these parameters were chloride and lead from QT-1 and chloride, sulfate, total dissolved solids, and manganese from QT-3.

During the April 28, 2009, and May 15–16, 2009, fill events, the upper 95 percent confidence limits from the background sampling were exceeded for the following parameters: QT-1 (Tables 23 and 24) chloride and lead, QT-2 (Tables 25 and 26) lead, QT-3 (Tables 27 and 28) chloride, lead, sulfate, total dissolved solids, and manganese, and QT-4 (Table 29 and 30) lead. No samples from the water quality monitoring wells were collected after the Reservoir was dewatered following these fill events.

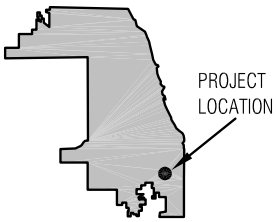
During the October 23–24, 2009, and October 30–November 1 2009, fill events the upper 95 percent confidence limit from the background sampling was exceeded for the following parameters: QT-1 (Table 33 and 34) chloride, copper, lead, chromium, and manganese, QT-2 (Tables 35 and 36) iron, lead, and manganese, QT-3 (Tables 37 and 38) chloride, sulfate, and chromium. No excursions were observed for QT-4. The Reservoir was dewatered by November 18, 2009. The last sampling event took place on November 12, 2009. There were some parameters that exceeded the upper 95 percent confidence limit from the background sampling towards the end of these fill events, and these parameters were chloride, lead, and total dissolved solids from QT-1, iron and lead from QT-2, and chloride and sulfate from QT-3.

FIGURE 1



LOCATION MAP
Scale: NTS

MWRD SERVICE AREA



LEGEND

- Monitoring Well
- New Access Road
- Existing Access Road (to be improved)

THORNTON TRANSITIONAL RESERVOIR
MONITORING WELL LOCATIONS

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO
ENGINEERING DEPARTMENT
11-03 PLANNING JJK

TABLE 1: LIST OF PARAMETERS TO BE ANALYZED ACCORDING TO TABLE 2 FROM THE SCOPE OF WORK APPROVED BY THE ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

Column A	Column B
Arsenic	Barium
Boron	Cadmium
Chloride	Chromium
Copper	Cyanide
Fecal Coliform	Fluoride
Iron	Manganese
Lead	Nickel
Mercury	Silver
Phenols	Temperature
Sulfate	Nitrate
Total Dissolved Solids	5-Day Biochemical Oxygen Demand
Ammonia	21-Day Biochemical Oxygen Demand

TABLE 2: SUMMARY OF DIVERSIONS TO THE THORNTON TRANSITIONAL FLOOD CONTROL RESERVOIR FROM DECEMBER 2008 THROUGH DECEMBER 2009

Date of Diversion	Volume Transferred to Thornton Transitional Reservoir (million gallons)	Number of Weeks of Sample Collection
December 27–29, 2008	1,046	2
February 27, 2009	129	1
March 8–12, 2009	1,951	6
April 28, 2009	187	1
May 15–16, 2009	170	1
October 23–24, 2009	151	1
October 30–Nov.1, 2009	1,054	2
December 25–26, 2009	145	0

TABLE 3: PARAMETERS FROM COLUMN A OF TABLE 1 FOR WATER QUALITY WELL QT-1 DURING DECEMBER 27–29, 2008, FILL EVENT

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
12/31/08	<0.050	0.213	586	<0.010	<1	20.95	0.016	<0.20	<5	480	2,182	0.32
1/8/09	<0.050	0.197	711	<0.010	<1	17.65	0.045	<0.20	<5	431	2,190	0.31
Reporting Limits	0.050	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10
Upper 95% Confidence Limits	*	NA	552	0.018	NA	47.61	0.015	*	NA	489	2,279	NA
Excursion during Fill	No**		Yes	No		No	Yes	No**		No	No	
Excursion at End of Fill	No**		Yes	No		No	Yes	No**		No	No	

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate report limit.

TABLE 4: PARAMETERS FROM COLUMN B OF TABLE 1 FOR WATER QUALITY WELL QT-1 DURING DECEMBER 27–29, 2008, FILL EVENT

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
12/31/08	0.0840	<0.010	<0.0030	<0.005	0.36	0.1309	<0.010	<0.003	11.6	<0.020	<2	4
1/8/09	0.0908	<0.010	0.0031	<0.005	0.35	0.0750	<0.010	<0.003	7.4	<0.020	<2	2
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.0030	0.010	0.003	NA	0.020	2	2
Upper 95% Confidence Limits	0.0963	*	0.0050	*	0.57	0.1460	NA	*	NA	0.024	NA	NA
Excursion during Fill	No	No**	No	No**	No	No		No**		No		
Excursion at End of Fill	No	No**	No	No**	No	No		No**		No		

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate report limit.

TABLE 5: PARAMETERS FROM COLUMN A OF TABLE 1 FOR WATER QUALITY WELL QT-2 DURING DECEMBER 27–29, 2008, FILL EVENT

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
12/31/08	<0.050	0.432	213	<0.010	33	6.85	0.032	<0.20	<5	481	1,278	0.14
1/8/09	<0.050	0.112	199	<0.010	3	1.28	0.037	<0.20	<5	315	1,044	0.04
Reporting Limits	0.050	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10
Upper 95% Confidence Limits	*	NA	420	0.027	NA	4.50	0.015	0.23	NA	718	2,485	NA
Excursion during Fill	No**		No	No		Yes	Yes	No		No	No	
Excursion at End of Fill	No**		No	No		No	Yes	No		No	No	

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate report limit.

TABLE 6: PARAMETERS FROM COLUMN B OF TABLE 1 FOR WATER QUALITY WELL QT-2 DURING DECEMBER 27–29, 2008, FILL EVENT

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
12/31/08	0.1001	<0.010	<0.0030	<0.005	0.27	0.2923	0.034	<0.003	11.5	<0.020	<2	3
1/8/09	0.0345	<0.010	<0.0030	<0.005	0.27	0.0670	0.014	<0.003	7.5	0.055	<2	2
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.0030	0.010	0.003	NA	0.020	2	2
Upper 95% Confidence Limits	0.0742	*	0.007	*	0.35	0.0574	NA	*	NA	4.416	NA	NA
Excursion during Fill	Yes	No**	No	No**	No	Yes		No**		No		
Excursion at End of Fill	No	No**	No	No**	No	Yes		No**		No		

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate report limit.

TABLE 7: PARAMETERS FROM COLUMN A OF TABLE 1 FOR WATER QUALITY WELL QT-3 DURING DECEMBER 27–29, 2008, FILL EVENT

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
12/31/08	<0.050	0.175	240	<0.010	<1	21.40	0.023	<0.20	<5	340	1,306	0.38
1/8/09	<0.050	0.125	236	<0.010	<1	20.72	0.060	<0.20	<5	310	1,250	0.38
Reporting Limits	0.05	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10
Upper 95% Confidence Limits	*	NA	180	0.022	NA	30.59	*	*	NA	224	1,270	NA
Excursion during Fill	No**		Yes	No		No	Yes**	No**		Yes	Yes	
Excursion at End of Fill	No**		Yes	No		No	Yes**	No**		Yes	No	

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate report limit.

TABLE 8: PARAMETERS FROM COLUMN B OF TABLE 1 FOR WATER QUALITY WELL QT-3 DURING DECEMBER 27–29, 2008, FILL EVENT

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
12/31/08	0.0957	<0.010	<0.0030	<0.005	0.21	0.1597	<0.010	<0.003	10.9	<0.020	<2	4
1/8/09	0.0843	<0.010	<0.0030	<0.005	0.19	0.1980	<0.010	<0.003	7.3	<0.020	<2	3
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.0030	0.010	0.003	NA	0.020	2	2
Upper 95% Confidence Limits	0.1000	*	0.0070	*	0.38	0.1793	NA	0.0196	NA	0.331	NA	NA
Excursion during Fill	No	No**	No	No**	No	No		No		No		
Excursion at End of Fill	No	No**	No	No**	No	Yes		No		No		

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate report limit.

TABLE 9: PARAMETERS FROM COLUMN A OF TABLE 1 FOR WATER QUALITY WELL QT-4 DURING DECEMBER 27–29, 2008, FILL EVENT

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
12/31/08	<0.050	0.321	394	<0.010	<1	20.37	0.015	<0.20	<5	252	1,466	0.45
1/8/09	<0.050	0.299	404	<0.010	<1	16.74	0.015	<0.20	<5	249	1,430	0.26
Reporting Limits	0.05	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10
Upper 95% Confidence Limits	*	NA	611	0.073	NA	31.51	0.024	*	NA	300	1,873	NA
Excursion during Fill	No**		No	No		No	No	No		No	No	
Excursion at End of Fill	No**		No	No		No	No	No		No	No	

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate report limit.

TABLE 10: PARAMETERS FROM COLUMN B OF TABLE 1 FOR WATER QUALITY WELL QT-4 DURING DECEMBER 27–29, 2008, FILL EVENT

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
12/31/08	0.0930	<0.010	<0.003	<0.005	0.26	0.1475	<0.010	<0.003	13.1	<0.020	<2	4
1/8/09	0.0940	<0.010	<0.003	<0.005	0.26	0.1170	<0.010	<0.003	7.2	0.052	<2	3
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.0030	0.010	0.003	NA	0.020	2	2
Upper 95% Confidence Limits	0.1576	*	0.074	*	0.37	0.2332	NA	0.0043	NA	0.262	NA	NA
Excursion during Fill	No	No**	No	No**	No	No	No			No		
Excursion at End of Fill	No	No**	No	No**	No	No	No			No		

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate report limit.

TABLE 11: PARAMETERS FROM COLUMN A OF TABLE 1 FOR THORNTON TRANSITIONAL RESERVOIR DURING DECEMBER 27–29, 2008, FILL EVENT

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
12/30/08	<0.050	<0.045	180	<0.010	3,800	3.58	0.031	<0.20	<5	26.24	424	0.25
1/7/09*												
1/15/09**												
Reporting Limits	0.05	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10

NA = No analytical results.
*Sample could not be collected because the reservoir was frozen.
**Reservoir was dry, no sample was collected.

TABLE 12: PARAMETERS FROM COLUMN B OF TABLE 1 FOR THORNTON TRANSITIONAL RESERVOIR DURING DECEMBER 27–29, 2008, FILL EVENT

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
12/30/08 1/7/09* 1/15/09**	0.0287	<0.010	0.0078	<0.005	0.17	0.0674	<0.010	<0.003	3.5	1.018	5	4
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.0030	0.010	0.003	NA	0.020	2	2

NA = No analytical results.

*Sample could not be collected because the reservoir was frozen.

**Reservoir was dry, no sample was collected.

TABLE 13: PARAMETERS FROM COLUMN A OF TABLE 1 FOR WATER QUALITY WELL QT-1 DURING FEBRUARY 27, 2009, AND MARCH 8–12, 2009, FILL EVENTS

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
3/4/09	<0.05	0.204	725	<0.010	<1	17.20	0.043	<0.20	<5	424	2,182	0.36
3/12/09	<0.05	0.232	757	<0.010	<1	8.89	0.049	<0.20	<5	397	2,222	0.37
3/19/09	<0.05	0.161	720	<0.010	<1	20.83	0.045	<0.20	<5	435	2,000	0.40
3/26/09	<0.05	0.195	752	<0.010	<1	15.65	0.046	<0.20	<5	411	2,248	0.40
4/2/09	<0.05	0.227	750	<0.010	<1	18.63	0.041	<0.20	<5	436	1,958	0.33
4/9/09	<0.05	0.259	747	<0.010	<1	4.58	0.040	<0.20	<5	436	1,792	0.27
4/16/09	<0.05	0.224	781	<0.010	<1	15.90	0.047	<0.20	<5	389	2,216	0.27
Reporting Limits	0.050	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10
Upper 95% Confidence Limits	*	NA	552	0.018	NA	47.61	0.015	*	NA	489	2,279	NA
Excursion during Fill	No**		Yes	No		No	Yes	No**		No	No	
Excursion after Dewatering	No**		Yes	No		No	Yes	No**		No	No	

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 14: PARAMETERS FROM COLUMN B OF TABLE 1 FOR WATER QUALITY WELL QT-1 DURING FEBRUARY 27, 2009, AND MARCH 8–12, 2009, FILL EVENTS

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
3/4/09	0.0901	<0.010	0.0173	<0.005	0.37	0.0890	<0.010	<0.003	11.7	<0.020	<2	<2
3/12/09	0.0794	<0.010	<0.0030	<0.005	0.35	0.1500	<0.010	<0.003	11.4	<0.020	<2	3
3/19/09	0.0874	<0.010	<0.0030	<0.005	0.25	0.1210	<0.010	<0.003	12.0	<0.020	<2	2
3/26/09	0.0892	<0.010	<0.0030	<0.005	0.35	0.0840	<0.010	<0.003	12.1	<0.020	<2	3
4/2/09	0.0920	<0.010	<0.0030	<0.005	0.27	0.1040	<0.010	<0.003	12.3	<0.020	<2	3
4/9/09	0.0894	<0.010	<0.0030	<0.005	0.27	0.0490	<0.010	<0.003	12.6	<0.020	<2	3
4/16/09	0.0890	<0.010	<0.0030	<0.005	0.38	0.0910	<0.010	<0.003	12.5	<0.020	4	4
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.0030	0.010	0.003	NA	0.020	2	2
Upper 95% Confidence Limits	0.0963	*	0.005	*	0.57	0.1460	NA	*	NA	0.024	NA	NA
Excursion during Fill	No	No**	Yes	No**	No	Yes		No**		No		
Excursion after Dewatering	No	No**	No	No**	No	No		No**		No		

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 15: PARAMETERS FROM COLUMN A OF TABLE 1 FOR WATER QUALITY WELL QT-2 DURING FEBRUARY 27, 2009, AND MARCH 8–12, 2009, FILL EVENTS

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
3/4/09	<0.050	0.185	209	<0.010	<1	3.66	0.041	<0.20	<5	463	1,258	<0.10
3/12/09	<0.050	0.151	159	<0.010	36	2.65	0.042	<0.20	<5	336	942	<0.10
3/19/09	<0.050	0.059	104	<0.010	3	5.65	0.043	<0.20	<5	176	536	0.14
3/26/09	<0.050	0.110	128	<0.010	3	1.80	0.060	<0.20	<5	230	708	<0.10
4/2/09	<0.050	0.106	125	<0.010	1	2.54	0.046	<0.20	<5	212	714	<0.10
4/9/09	<0.050	0.109	126	<0.010	<1	2.66	<0.015	<0.20	<5	211	826	<0.10
4/16/09	<0.050	0.129	132	<0.010	<1	1.85	<0.015	<0.20	<5	282	938	<0.10
Reporting Limits	0.050	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10
Upper 95% Confidence Limits	*	NA	420	0.027	NA	4.50	0.015	0.23	NA	718	2,485	NA
Excursion during Fill	No**		No	No		No	Yes	No		No	No	
Excursion after Dewatering	No**		No	No		No	No	No		No	No	

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 16: PARAMETERS FROM COLUMN B OF TABLE 1 FOR WATER QUALITY WELL QT-2 DURING FEBRUARY 27, 2009, AND MARCH 8–12, 2009, FILL EVENTS

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
3/4/09	0.0436	<0.010	0.0053	<0.005	0.28	0.0460	0.013	<0.003	13.9	<0.020	<2	<2
3/12/09	0.0314	<0.010	<0.0030	<0.005	0.26	0.1760	0.012	<0.003	13.0	0.066	<2	2
3/19/09	0.0194	<0.010	<0.0030	<0.005	0.24	0.1190	<0.010	<0.003	13.5	0.107	<2	<2
3/26/09	0.0254	<0.010	<0.0030	<0.005	0.26	0.0830	<0.010	<0.003	12.8	<0.020	<2	2
4/2/09	0.0271	<0.010	<0.0030	<0.005	0.27	0.0760	<0.010	<0.003	12.8	<0.020	<2	2
4/9/09	0.0246	<0.010	<0.0030	<0.005	0.27	0.0650	<0.010	<0.003	14.2	<0.020	<2	<2
4/16/09	0.0320	<0.010	<0.0030	<0.005	0.28	0.0420	<0.010	<0.003	13.7	<0.020	<2	2
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.0030	0.010	0.003	NA	0.020	2	2
Upper 95% Confidence Limits	0.0742	*	0.007	*	0.35	0.0574	NA	*	NA	4.416	NA	NA
Excursion during Fill	No	No**	No	No**	No	Yes		No**		No		
Excursion after Dewatering	No	No**	No	No**	No	No		No**		No		

NA = Not applicable.

*Values below reporting limits.

**Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 17: PARAMETERS FROM COLUMN A OF TABLE 1 FOR WATER QUALITY WELL QT-3 DURING FEBRUARY 27, 2009, AND MARCH 8–12, 2009, FILL EVENTS

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
3/4/09	<0.050	0.117	232	<0.010	<1	17.05	0.040	<0.20	<5	310	1,242	0.26
3/12/09	<0.050	0.134	233	<0.010	<1	12.74	0.034	<0.20	<5	315	1,278	0.27
3/19/09	<0.050	0.092	232	<0.010	<1	20.94	0.045	<0.20	<5	318	1,276	0.24
3/26/09	<0.050	0.088	247	<0.010	<1	23.17	0.076	<0.20	<5	314	1,294	0.29
4/2/09	<0.050	0.125	241	<0.010	<1	24.46	0.060	<0.20	5	321	1,286	0.25
4/9/09	<0.050	0.126	245	<0.010	<1	20.46	<0.015	<0.20	<5	334	1,266	0.20
4/16/09	<0.050	0.108	248	<0.010	<1	23.53	<0.015	<0.20	<5	296	1,290	0.27
Reporting Limits	0.050	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10
Upper 95% Confidence Limits	*	NA	180	0.022	NA	30.59	*	*	NA	224	1,270	NA
Excursion during Fill	No**		Yes	No		No	Yes**	No**		Yes	Yes	
Excursion after Dewatering	No**		Yes	No		No	No**	No**		Yes	Yes	

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 18: PARAMETERS FROM COLUMN B OF TABLE 1 FOR WATER QUALITY WELL QT-3 DURING FEBRUARY 27, 2009, AND MARCH 8–12, 2009, FILL EVENTS

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
3/4/09	0.0787	<0.010	<0.0030	<0.005	0.18	0.1687	<0.010	<0.003	11.2	<0.020	<2	2
3/12/09	0.0736	<0.010	<0.0030	<0.005	0.22	0.2200	<0.010	<0.003	10.9	<0.020	<2	2
3/19/09	0.0828	<0.010	<0.0030	<0.005	0.19	0.3621	<0.010	<0.003	10.7	<0.020	<2	2
3/26/09	0.0889	<0.010	<0.0030	<0.005	0.20	0.2736	<0.010	<0.003	11.6	<0.020	<2	3
4/2/09	0.0918	<0.010	<0.0030	<0.005	0.21	0.2574	<0.010	<0.003	12.0	<0.020	<2	2
4/9/09	0.0914	<0.010	<0.0030	<0.005	0.19	0.2702	<0.010	<0.003	11.8	<0.020	<2	2
4/16/09	0.0911	<0.010	<0.0030	<0.005	0.20	0.2593	<0.010	<0.003	11.9	<0.020	4	3
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.0030	0.010	0.003	NA	0.020	2	2
Upper 95% Confidence Limits	0.1000	*	0.007	*	0.38	0.1793	NA	0.0196	NA	0.331	NA	NA
Excursion during Fill	No	No**	No		No	Yes		No		No		
Excursion after Dewatering	No	No**	No		No	Yes		No		No		

NA = not applicable

*Values below reporting limits.

**Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 19: PARAMETERS FROM COLUMN A OF TABLE 1 FOR WATER QUALITY WELL QT-4 DURING FEBRUARY 27, 2009, AND MARCH 8–12, 2009, FILL EVENTS

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
3/4/09	<0.050	0.310	421	<0.010	<1	20.24	0.047	<0.20	<5	252	1,452	0.36
3/12/09	<0.050	0.312	406	<0.010	<1	16.78	0.046	<0.20	<5	252	1,490	0.37
3/19/09	<0.050	0.322	393	<0.010	<1	8.96	0.049	<0.20	<5	255	1,420	0.37
3/26/09	<0.050	0.328	376	<0.010	<1	18.21	0.083	<0.20	<5	252	1,388	0.40
4/2/09	<0.050	0.354	381	<0.010	<1	19.64	0.066	<0.20	5	239	1,420	0.41
4/9/09	<0.050	0.395	381	<0.010	<1	1.56	<0.015	<0.20	<5	261	1,404	0.37
4/16/09	<0.050	0.366	378	<0.010	<1	17.33	<0.015	<0.20	<5	251	1,424	0.43
Reporting Limits	0.050	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10
Upper 95% Confidence Limits	*	NA	611	0.073	NA	31.51	0.024	*	NA	300	1,873	NA
Excursion during Fill	No**		No	No		No	Yes	No**		No	No	
Excursion after Dewatering	No**		No	No		No	No	No**		No	No	

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 20: PARAMETERS FROM COLUMN B OF TABLE 1 FOR WATER QUALITY WELL QT-4 DURING FEBRUARY 27, 2009, AND MARCH 8–12, 2009, FILL EVENTS

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
3/4/09	0.0975	<0.010	<0.0030	<0.005	0.33	0.1342	<0.010	<0.003	12.4	<0.020	<2	2
3/12/09	0.0973	<0.010	<0.0030	<0.005	0.28	0.1303	<0.010	<0.003	12.6	<0.020	<2	2
3/19/09	0.0900	<0.010	<0.0030	<0.005	0.25	0.1046	<0.010	<0.003	12.6	<0.020	<2	2
3/26/09	0.0922	<0.010	<0.0030	<0.005	0.25	0.1443	<0.010	<0.003	13.0	<0.020	<2	3
4/2/09	0.0968	<0.010	<0.0030	<0.005	0.25	0.2059	<0.010	<0.003	13.2	<0.020	<2	2
4/9/09	0.0889	<0.010	<0.0030	<0.005	0.25	0.0704	<0.010	<0.003	13.4	<0.020	<2	2
4/16/09	0.0936	<0.010	<0.0030	<0.005	0.27	0.1607	<0.010	<0.003	13.2	<0.020	3	3
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.0030	0.010	0.003	NA	0.020	2	2
Upper 95% Confidence Limits	0.1576	*	0.074	*	0.37	0.2332	NA	0.0043	NA	0.262	NA	NA
Excursion during Fill	No	No**	No	No**	No	No	No		No			
Excursion after Dewatering	No	No**	No	No**	No	No	No		No			

NA = Not applicable.

*Values below reporting limits.

**Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 21: PARAMETERS FROM COLUMN A OF TABLE 1 FOR THORNTON TRANSITIONAL RESERVOIR DURING FEBRUARY 27, 2009, AND MARCH 8–12, 2009, FILL EVENTS

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
3/5/09*												
3/12/09	<0.050	<0.045	77	<0.010	2,600	5.960	0.037	<0.20	<5	36	284	0.22
3/19/09	<0.050	<0.045	79	<0.010	170	4.720	0.034	<0.20	<5	39	286	0.29
3/27/09	<0.050	0.049	81	<0.010	<10	2.990	0.048	<0.20	<5	44	302	0.23
4/2/09	<0.050	0.060	88	<0.010	<10	1.850	0.035	<0.20	<5	58	346	0.18
4/9/09	<0.050	0.064	92	<0.010	<10	1.400	<0.015	<0.20	<5	65	368	0.13
4/16/09*												
Reporting Limits	0.050	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10

NA = Not applicable.
*Reservoir was dry, no sample was collected.

TABLE 22: PARAMETERS FROM COLUMN B OF TABLE 1 FOR THORNTON TRANSITIONAL RESERVOIR DURING FEBRUARY 27, 2009, AND MARCH 8–12, 2009, FILL EVENTS

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
3/5/09*												
3/12/09	0.0402	<0.010	0.0102	<0.005	0.20	0.0814	<0.010	<0.003	14.0	0.713	5	7
3/19/09	0.0374	<0.010	0.0064	<0.005	0.19	0.0648	<0.010	<0.003	8.7	0.685	4	6
3/27/09	0.0279	<0.010	0.0051	<0.005	0.20	0.0299	<0.010	<0.003	15.1	0.784	<2	5
4/2/09	0.0253	<0.010	<0.0030	<0.005	0.20	0.0168	<0.010	<0.003	15.9	0.775	4	7
4/9/09	0.0241	<0.010	<0.0030	<0.005	0.21	0.0129	<0.010	<0.003	14.6	0.790	3	5
4/16/09*												
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.0030	0.010	0.003	NA	0.020	2	2

NA = Not applicable.
*Reservoir was dry, no sample was collected.

TABLE 23: PARAMETERS FROM COLUMN A OF TABLE 1 FOR WATER QUALITY WELL QT-1 DURING APRIL 28, 2009, AND MAY 15–16, 2009, FILL EVENTS

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
5/1/09* 5/21/09	<0.050	0.225	797	<0.010	<1	18.450	0.036	<0.20	<5	428	2,240	0.32
Reporting Limits	0.050	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10
Upper 95% Confidence Limits	**	NA	552	0.018	NA	47.61	0.015	**	NA	489	2,279	NA
Excursion during Fill	No***		Yes	No		No	Yes	No***		No	No	

NA = Not applicable.
*Unable to sample the well because of generator malfunction.
**Values below reporting limits.
***Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 24: PARAMETERS FROM COLUMN B OF TABLE 1 FOR WATER QUALITY WELL QT-1 DURING APRIL 28, 2009, AND MAY 15–16, 2009, FILL EVENTS

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
5/1/09* 5/21/09	0.0883	<0.010	<0.0030	<0.005	0.35	0.0794	<0.010	<0.003	13.0	<0.020	<2	3
Reporting Limits	0.0030	0.010	0.003	0.005	0.10	0.0030	0.010	0.003	NA	0.020	2	2
Upper 95% Confidence Limits	0.0963	**	0.005	**	0.57	0.1460	NA	**	NA	0.024	NA	NA
Excursion during Fill	No	No***	No	No***	No	No		No***		No		

NA = Not applicable.

*Unable to sample the well because of generator malfunction.

**Values below reporting limits.

***Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 25: PARAMETERS FROM COLUMN A OF TABLE 1 FOR WATER QUALITY WELL QT-2 DURING APRIL 28, 2009, AND MAY 15–16, 2009, FILL EVENTS

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
5/1/09	<0.050	0.147	152	<0.010	<1	2.97	0.076	<0.20	<5	*	946	0.03
5/21/09	<0.050	0.152	168	<0.010	<1	2.74	0.023	<0.20	<5	333	956	<0.10
Reporting Limits	0.050	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10
Upper 95% Confidence Limits	**	NA	420	0.027	NA	4.50	0.015	0.23	NA	718	2,485	NA
Excursion during Fill	No***		No	No		No	Yes	No		No	No	

NA = Not applicable.

*Unable to perform analysis because sample was not delivered to the Calumet Water Reclamation Plant laboratory for analysis

**Values below reporting limits.

***Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 26: PARAMETERS FROM COLUMN B OF TABLE 1 FOR WATER QUALITY WELL QT-2 DURING APRIL 28, 2009, AND MAY 15–16, 2009, FILL EVENTS

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
5/1/09	0.0303	<0.010	<0.0030	<0.005	0.28	0.0410	<0.010	<0.003	13.4	0.130	4	2
5/21/09	0.0324	<0.010	<0.0030	<0.005	0.27	0.0348	<0.010	<0.003	14.3	0.025	<2	3
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.003	0.010	0.003	NA	0.020	2	2
Upper 95% Confidence Limits	0.0742	**	0.007	**	0.35	0.0574	NA	**	NA	4.416	NA	NA
Excursion during Fill	No	No***	No	No***	No	No		No***		No		

NA = Not applicable.

*Unable to perform analysis because sample was not delivered to the Calumet Water Reclamation Plant laboratory for analysis

**Values below reporting limits.

***Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 27: PARAMETERS FROM COLUMN A OF TABLE 1 FOR WATER QUALITY WELL QT-3 DURING APRIL 28, 2009, AND MAY 15–16, 2009, FILL EVENTS

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
5/1/09* 5/21/09	<0.050	0.212	253	<0.010	<1	13.00	0.027	<0.20	<5	307	1,296	0.27
Reporting Limits	0.050	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10
Upper 95% Confidence Limits	**	NA	180	0.022	NA	30.59	**	**	NA	224	1,270	NA
Excursion during Fill	No***		Yes	No		No	Yes***	No***		Yes	Yes	

NA = Not applicable.
*Unable to sample the well because of generator malfunction.
**Values below reporting limits.
***Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 28: PARAMETERS FROM COLUMN B OF TABLE 1 FOR WATER QUALITY WELL QT-3 DURING APRIL 28, 2009, AND MAY 15–16, 2009, FILL EVENTS

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
5/1/09* 5/21/09	0.0665	<0.010	<0.0030	<0.005	0.22	0.4502	<0.010	<0.0030	12.9	<0.020	<2	3
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.003	0.010	0.0030	NA	0.020	2	2
Upper 95% Confidence Limits	0.1000	**	0.007	**	0.38	0.1793	NA	0.0196	NA	0.331	NA	NA
Excursion during Fill	No	No***	No		No	Yes		No		No		

NA = Not applicable.

*Unable to sample the well because of generator malfunction.

**Values below reporting limits.

***Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 29: PARAMETERS FROM COLUMN A OF TABLE 1 FOR WATER QUALITY WELL QT-4 DURING APRIL 28, 2009, AND MAY 15–16, 2009, FILL EVENTS

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
5/1/09* 5/21/09	<0.050	0.349	398	<0.010	<1	17.69	0.026	<0.20	<5	257	1,472	0.35
Reporting Limits	0.050	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10
Upper 95% Confidence Limits	**	NA	611	0.073	NA	31.51	0.024	**	NA	300	1,873	NA
Excursion during Fill	No***		No	No		No	Yes	No***		No	No	

NA = Not applicable.

*Unable to sample the well because of generator malfunction.

**Values below reporting limits.

***Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 30: PARAMETERS FROM COLUMN B OF TABLE 1 FOR WATER QUALITY WELL QT-4 DURING APRIL 28, 2009, AND MAY 15–16, 2009, FILL EVENTS

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
5/1/09* 5/21/09	0.0919	<0.010	<0.0030	<0.005	0.25	0.1940	<0.010	<0.003	13.3	<0.02	<2	4
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.003	0.010	0.003	NA	0.02	2	2
Upper 95% Confidence Limits	0.1576	**	0.074	**	0.37	0.2332	NA	0.0043	NA	0.262	NA	NA
Excursion during Fill	No	No***	No	No***	No	No	No			No		

NA = Not applicable.

*Unable to sample the well because of generator malfunction.

**Values below reporting limits.

***Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 31: PARAMETERS FROM COLUMN A OF TABLE 1 FOR THORNTON TRANSITIONAL RESERVOIR DURING APRIL 28, 2009, AND MAY 15–16, 2009, FILL EVENTS

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
4/29/09	<0.050	0.071	*	<0.010	6,700	3.61	0.022	<0.20	<5	50	340	0.21
5/8/09**												
5/18/09	<0.050	0.087	71	<0.010	99	1.09	0.015	<0.20	<5	80	374	0.22
5/29/09**												
Reporting Limits	0.05	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10

NA = Not applicable.
*Insufficient sample volume to perform analysis.
**Reservoir was dry, no sample was collected.

TABLE 32: PARAMETERS FROM COLUMN B OF TABLE 1 FOR THORNTON TRANSITIONAL RESERVOIR DURING APRIL 28, 2009, AND MAY 15–16, 2009, FILL EVENTS

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
4/29/09	0.0356	<0.010	0.0058	<0.005	*	0.077	<0.010	<0.0030	12.0	0.642	4	3
5/8/09**												
5/18/09	0.0246	<0.010	<0.0030	<0.005	0.27	0.025	<0.010	<0.003	17	1.529	4	6
5/29/09**												
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.003	0.010	0.0030	NA	0.020	2	2

NA = Not applicable.
*Insufficient sample volume to perform analysis.
**Reservoir was dry, no sample was collected.

TABLE 33: PARAMETERS FROM COLUMN A OF TABLE 1 FOR WATER QUALITY WELL QT-1 DURING OCTOBER 23–24, 2009, AND OCTOBER 30–NOVEMBER 1, 2009, FILL EVENTS

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
10/29/09	<0.050	0.235	842	0.020	<1	22.41	0.042	<0.20	<5	408	***	0.38
11/5/09	<0.050	0.244	868	<0.010	<1	18.07	0.034	<0.20	<5	382	2,164	0.35
11/12/09	<0.050	0.231	883	<0.010	<1	14.00	0.046	<0.20	<5	373	2,358	0.35
Reporting Limits	0.05	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10
Upper 95% Confidence Limits	*	NA	552	0.018	NA	47.61	0.015	*	NA	489	2,279	NA
Excursion during Fill	No**		Yes	Yes		No	Yes	No**		No	No	
Excursion at End of Fill	No**		Yes	No		No	Yes	No**		No	Yes	

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.
***Insufficient sample volume to perform analysis.

TABLE 34: PARAMETERS FROM COLUMN B OF TABLE 1 FOR WATER QUALITY WELL QT-1 DURING OCTOBER 23–24, 2009, AND OCTOBER 30–NOVEMBER 1, 2009, FILL EVENTS

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
10/29/09	0.0812	<0.010	<0.0030	<0.005	0.31	0.2500	<0.010	<0.0030	12.8	<0.020	<2	2
11/5/09	0.0853	<0.010	0.0056	<0.005	0.31	0.1350	<0.010	<0.0030	13.0	<0.020	<2	2
11/12/09	0.0844	<0.010	0.0042	<0.005	0.32	0.0550	<0.010	<0.0030	12.7	<0.020	<2	3
Reporting Limits	0.0030	0.010	0.003	0.005	0.10	0.0030	0.010	0.0030	NA	0.020	2	2
Upper 95% Confidence Limits	0.0963	*	0.005	*	0.57	0.1460	NA	*	NA	0.024	NA	NA
Excursion during Fill	No	No**	Yes	No**	No	Yes		No**		No		
Excursion at End of Fill	No	No**	No	No**	No	No		No**		No		

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.
***Insufficient sample volume to perform analysis.

TABLE 35: PARAMETERS FROM COLUMN A OF TABLE 1 FOR WATER QUALITY WELL QT-2 DURING OCTOBER 23–24, 2009, AND OCTOBER 30–NOVEMBER 1, 2009, FILL EVENTS

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
10/29/09	<0.050	0.256	235	<0.010	<1	3.03	0.048	<0.20	<5	548	1,322	0.13
11/5/09	<0.050	0.192	157	<0.010	1	10.52	0.060	<0.20	<5	233	1,336	0.10
11/12/09	<0.050	0.195	156	<0.010	<1	4.60	0.046	<0.20	<5	513	1,352	0.09
Reporting Limits	0.05	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10
Upper 95% Confidence Limits	*	NA	420	0.027	NA	4.50	0.015	0.230	NA	718	2,485	NA
Excursion during Fill	No**		No	No		Yes	Yes	No		No	No	
Excursion at End of Fill	No**		No	No		Yes	Yes	No		No	No	

NA = Not applicable.

*Values below reporting limits.

**Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 36: PARAMETERS FROM COLUMN B OF TABLE 1 FOR WATER QUALITY WELL QT-2 DURING OCTOBER 23–24, 2009, AND OCTOBER 30–NOVEMBER 1, 2009, FILL EVENTS

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
10/29/09	0.0498	<0.010	<0.0030	<0.005	0.28	0.0330	0.013	<0.003	13.1	<0.020	<2	2
11/5/09	0.0423	<0.010	0.0037	<0.005	0.23	0.2610	0.031	<0.003	12.9	<0.020	<2	2
11/12/09	0.0404	<0.010	<0.0030	<0.005	0.25	0.0700	0.021	<0.003	13.2	<0.020	<2	2
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.0030	0.010	0.003	NA	0.020	2	2
Upper 95% Confidence Limits	0.0742	*	0.007	*	0.35	0.0574	NA	*	NA	4.416	NA	NA
Excursion during Fill	No	No**	No	No**	No	Yes		No**		No		
Excursion at End of Fill	No	No**	No	No**	No	No		No**		No		

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 37: PARAMETERS FROM COLUMN A OF TABLE 1 FOR WATER QUALITY WELL QT-3 DURING OCTOBER 23–24, 2009, AND OCTOBER 30–NOVEMBER 1, 2009, FILL EVENTS

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
10/29/09	<0.050	0.274	267	<0.010	<1	3.43	<0.015	<0.20	<5	252	1,144	0.35
11/5/09	<0.050	0.247	256	<0.010	<1	12.88	<0.015	<0.20	<5	443	1,214	0.35
11/12/09	<0.050	0.236	264	<0.010	<1	12.11	<0.015	<0.20	<5	250	1,212	0.33
Reporting Limits	0.05	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10
Upper 95% Confidence Limits	*	NA	180	0.022	NA	30.59	*	*	NA	224	1,270	NA
Excursion during Fill	No**		Yes	No		No	No**	No**		Yes	No	
Excursion at End of Fill	No**		Yes	No		No	No**	No**		Yes	No	

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 38: PARAMETERS FROM COLUMN B OF TABLE 1 FOR WATER QUALITY WELL QT-3 DURING OCTOBER 23–24, 2009, AND OCTOBER 30–NOVEMBER 1, 2009, FILL EVENTS

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
10/29/09	0.0647	<0.010	<0.0030	<0.005	0.21	0.0550	<0.010	<0.0030	11.7	<0.020	<2	3
11/5/09	0.0643	<0.010	0.0085	<0.005	0.21	0.1200	<0.010	<0.0030	12.9	<0.020	<2	3
11/12/09	0.0713	<0.010	<0.0030	<0.005	0.20	0.1130	<0.010	<0.0030	11.9	<0.020	<2	3
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.0030	0.010	0.0030	NA	0.020	2	2
Upper 95% Confidence Limits	0.1000	*	0.007	*	0.38	0.1793	NA	0.0196	NA	0.331	NA	NA
Excursion during Fill	No	No**	Yes	No**	No	No	No			No		
Excursion at End of Fill	No	No**	No	No**	No	No	No			No		

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 39: PARAMETERS FROM COLUMN A OF TABLE 1 FOR WATER QUALITY WELL QT-4 DURING OCTOBER 23–24, 2009, AND OCTOBER 30–NOVEMBER 1, 2009, FILL EVENTS

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
10/29/09	<0.050	0.352	404	<0.010	<1	15.51	0.017	<0.20	<5	261	1,364	0.43
11/5/09	<0.050	0.358	383	<0.010	<1	18.88	0.021	<0.20	<5	248	1,386	0.38
11/12/09	<0.050	0.307	338	<0.010	<1	12.45	<0.015	<0.20	<5	246	1,328	0.38
Reporting Limits	0.05	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10
Upper 95% Confidence Limits	*	NA	611	0.073	NA	31.51	0.024	*	NA	300	1,873	NA
Excursion during Fill	No**		No	No		No	No	No**		No	No	
Excursion at End of Fill	No**		No	No		No	No	No**		No	No	

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 40: PARAMETERS FROM COLUMN B OF TABLE 1 FOR WATER QUALITY WELL QT-4 DURING OCTOBER 23–24, 2009, AND OCTOBER 30–NOVEMBER 1, 2009, FILL EVENTS

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
10/29/09	0.0908	<0.010	<0.0025	<0.005	0.22	0.125	<0.010	<0.003	14.5	<0.02	<2	2
11/5/09	0.0918	<0.010	0.0031	<0.005	0.23	0.176	<0.010	<0.003	13.7	<0.02	<2	2
11/12/09	0.0712	<0.010	<0.0025	<0.005	0.24	0.085	<0.010	<0.003	14.0	<0.02	<2	3
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.003	0.010	0.0030	NA	0.02	2	2
Upper 95% Confidence Limits	0.1576	*	0.074	*	0.37	0.2332	NA	0.0043	NA	0.262	NA	NA
Excursion during Fill	No	No**	No	No**	No	No	No		No			
Excursion at End of Fill	No	No**	No	No**	No	No	No		No			

NA = Not applicable.
*Values below reporting limits.
**Excursion of upper 95% confidence limits was calculated based on the appropriate reporting limit.

TABLE 41: PARAMETERS FROM COLUMN A OF TABLE 1 FOR THORNTON TRANSITIONAL RESERVOIR DURING OCTOBER 23–24, 2009, AND OCTOBER 30–NOVEMBER 1, 2009, FILL EVENTS

Date	Arsenic (mg/L)	Boron (mg/L)	Chloride (mg/L)	Copper (mg/L)	Fecal Coliform (cts/100 mL)	Iron (mg/L)	Lead (mg/L)	Mercury (µg/L)	Phenols (µg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Ammonia Nitrogen (mg/L)
10/26/09	<0.050	0.078	39	<0.010	1,100	2.09	0.016	<0.20	<5	49	258	0.10
11/3/09	<0.050	0.073	32	<0.010	440	1.63	<0.015	<0.20	<5	44	344	0.06
11/10/09	<0.050	0.081	38	<0.010	160	3.92	<0.015	<0.20	<5	49	240	0.08
11/18/09*												
Reporting Limits	0.050	0.045	0.5	0.010	NA	0.10	0.015	0.20	5	2	40	0.10

NA = Not applicable.
*Reservoir was dry, no sample was collected.

TABLE 42: PARAMETERS FROM COLUMN B OF TABLE 1 FOR THORNTON TRANSITIONAL RESERVOIR DURING OCTOBER 23–24, 2009, AND OCTOBER 30–NOVEMBER 1, 2009, FILL EVENTS

Date	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cyanide (mg/L)	Fluoride (mg/L)	Manganese (mg/L)	Nickel (mg/L)	Silver (mg/L)	Temperature °C	Nitrate Nitrogen (mg/L)	BOD_5 (mg/L)	BOD_{21} (mg/L)
10/26/09	0.0239	<0.010	0.0043	<0.005	0.21	0.042	<0.010	<0.003	12.0	1.020	3	7
11/3/09	0.0230	<0.010	0.0033	<0.005	0.19	0.026	<0.010	<0.003	15.1	0.707	4	11
11/10/09	0.0341	<0.010	0.0048	<0.005	0.20	0.078	<0.010	<0.003	14.2	0.636	3	6
11/18/09*												
Reporting Limits	0.0030	0.010	0.0030	0.005	0.10	0.003	0.010	0.003	NA	0.020	2	2

NA = Not applicable.
*Reservoir was dry, no sample was collected.