REPORT

October 2014

REPORT ON

Pumping Test Results
St. Pierre Road and Route 200
Limoges Water System Expansion
Nation Municipality, Ontario

Submitted to:
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APPENDICES

1.0 INTRODUCTION

Golder Associates Ltd. (Golder Associates) was retained by The Corporation of the Nation Municipality, to provide consulting services in support of a hydrogeological investigation to obtain information for an additional groundwater supply for the Village of Limoges. Test wells TW13-3, PW14-4, TW14-5 and PW14-6 were drilled near the southwest corner of St. Pierre Road and Route 200 in Russell Township, Ontario, as shown on **Figure 1**. The purpose of this report is to present the results and interpretation of the hydraulic testing work and water quality results. Additionally, this report provides design pumping rates.

A 14-day pumping test was carried out at TW13-3 from March 24 to April 7, 2014. Based upon the results of this pumping test, two additional test wells were drilled, of which test well PW14-4 was drilled to serve as a future communal water supply pumping well on the piece of property where TW13-3 was drilled and TW14-5 was drilled on a property further south. Twenty-four hour pumping tests were conducted on test well PW14-4 and test well TW14-5 in June of 2014 and on test well PW14-6 in August of 2014.

The purpose of these tests was to confirm the appropriate long term pumping rate for these wells and to determine the local aquifer characteristics in support of a communal water supply. The methodology, results, and analysis of the tests are described herein.

2.0 METHODOLOGY

The test wells and the five monitoring wells (BH13-1A, BH13-2A, BH11-2, BH11-3 and BH11-4) were instrumented with pressure transducers that recorded water levels continuously at preset intervals for the stepped rate and pumping test as well as the recovery period. Manual measurements of groundwater levels were also taken frequently in each of the wells during pumping and recovery. All field observations were collected by qualified Golder technical staff. The pumping rate on each well was monitored by visual inspection of an orifice weir.

2.1 Test Well TW13-3

Test well TW13-3 was constructed by Allan Wright Water Wells using air-rotary drilling techniques from November 13 to 14, 2013. TW13-3 was constructed as a 150 mm diameter well. The hole was drilled to a total depth of 30.6 metres below ground surface. The borehole was equipped with a steel well casing though the upper silt and clay unit to a depth of approximately 21.6 metres below ground surface. Below this depth the borehole was equipped with a stainless steel well screen to a depth of approximately 29.9 metres below ground surface.

Groundwater monitors installed in nearby boreholes were monitored to observe the aquifer response to the pumping test. Details for the pumping well and monitoring wells are summarized below.

Well ID	Type of Well	Lateral Distance to Pumping Well [m]	Top of Interval [mbgs]	Bottom of Interval [mbgs]	Screened Unit
TW13-3	Pumping	-	21.3	29.9	Sand
BH13-1A	Monitoring	10	26.4	29.4	Sand
BH13-2A	Monitoring	435	31.0	33.2	Sand
BH11-2	Monitoring	185	22.5	26.3	Sand
BH11-3	Monitoring	375	19.2	23.7	Silty Clay / Silty Sand
BH11-4	Monitoring	220	22.0	26.1	Sand

An initial pumping test was conducted from November 20 to 23, 2013. Test well TW3-3 was pumped at a rate of 17.3 litres per second (L/s) for a period of 72 hours. The drawdown at the end of this initial test indicated that this pumping rate would be unsustainable in the long term.

A second pumping test on test well TW13-3 began on March 24, 2014, with a stepped rate test to determine well efficiency and the flow rate for the longer term pumping test. The step test involved measuring drawdown in the pumping well over an increasing range of pumping rates. Three steps were completed, at pumping rates of 7.9 L/s, 10.1 L/s, and 12.0 L/s. Each rate was maintained for a period of two hours. At the end of the six hour stepped rate test a hydraulic head drawdown of approximately six metres was observed at TW13-3.

Following the six hour stepped rate test, the pumping rate was increased to 14.8 L/s. This rate was maintained for a period of 46 hours, during which time drawdown at TW13-3 reached approximately 9.4 metres. As drawdown at TW13-3 was continuing to increase under the applied rate of 14.8 L/s, several adjustments were

made to the pumping rate in an attempt to reach a rate that would permit long term pumping of the well (i.e., to achieve a pumping rate for which could be maintained for the 14-day period or longer). The pumping rates and periods for which they were applied are summarized below and shown on **Figure 2**.

Pumping Rate (Litres per Second)	Duration (Hours)	Drawdown at TW13-3 at end of Period (metres)
13.9	17	9.6
13.3	47	10.1
12.8	80	10.5
12.3	42	10.6
11.7	23	10.3
11.2	1	10.0
11.7	74	10.6
11.2	4	10.3

Pumping was terminated on April 7, 2014 following 14 days of pumping. Water level measurements were collected for a 16 day period after the pump was shut off (between April 7 and April 23, 2014).

2.2 Test Well PW14-4

Test well PW14-4 was constructed by Allan Wright Water Wells using air-rotary drilling techniques from May 20 to 21, 2014. PW14-4 was constructed as a 205 mm diameter well. The hole was drilled to a total depth of 30.6 metres below ground surface. The borehole was equipped with a steel well casing though the upper silt and clay unit to a depth of approximately 21.5 metres below ground surface. Below this depth the borehole was equipped with a stainless steel well screen to a depth of approximately 30.2 metres below ground surface.

Groundwater monitors installed in nearby boreholes were monitored to observe the aquifer response to the pumping test. Details for the pumping well and monitoring wells are summarized below.

Well ID	Type of Well	Lateral Distance to Pumping Well [m]	Top of Interval [mbgs]	Bottom of Interval [mbgs]	Screened Unit
PW14-4	Pumping	-	21.5	30.2	Sand
BH13-1A	Monitoring	23	26.4	29.4	Sand
BH13-2A	Monitoring	420	31.0	33.2	Sand
TW13-3	Test	20	21.3	29.9	Sand
BH11-1	Monitoring	435	19.9	26.7	Sand
BH11-2	Monitoring	200	22.5	26.3	Sand
BH11-3	Monitoring	355	19.2	23.7	Silty Clay / Silty Sand
BH11-4	Monitoring	225	22.0	26.1	Sand

The pumping test began on June 5, 2014, with a stepped rate test to determine well efficiency and the flow rate for the longer term pumping test. Two steps were completed, at pumping rates of 8.0 L/s and 10.0 L/s. Each rate was maintained for a period of one hour. At the end of the two hour stepped rate test a hydraulic head drawdown of approximately 6.2 metres was observed at PW14-4.

Following the two hour stepped rate test, the pumping rate was increased to 11.2 L/min. This rate was maintained for a period of 22 hours, during which time drawdown at PW14-4 reached approximately 7.5 metres. The pumping rates and periods for which they were applied are summarized below and shown on **Figure 7**.

Pumping Rate (Litres per Second)	Duration (Hours)	Drawdown at PW14-4 at end of Period (metres)
8.0	1	5.1
10.0	1	6.2
11.2	22	7.5

Pumping was terminated on June 6, 2014 following 24 hours of pumping. Water level measurements were collected for a 4 day period after the pump was shut off (between June 6 and June 10, 2014).

2.3 Test Well TW14-5

Test well TW14-5 was constructed by Allan Wright Water Wells using air-rotary drilling techniques from May 25 to 26, 2014. TW14-5 was constructed as a 150 mm diameter borehole. The hole was drilled to a total depth of 29.3 metres below ground surface. The borehole was equipped with a steel well casing though the upper silt and clay unit to a depth of approximately 19.0 metres below ground surface. Below this depth the borehole was equipped with a stainless steel well screen to a depth of approximately 28.4 metres below ground surface.

Groundwater monitors installed in nearby boreholes were monitored to observe aquifer response to the pumping test. Details for the pumping well and monitoring wells are summarized below.

Well ID	Type of Well	Lateral Distance to Pumping Well [m]	Top of Interval [mbgs]	Bottom of Interval [mbgs]	Screened Unit
TW14-5	Pumping	-	19.0	28.4	Sand
BH13-1A	Monitoring	415	26.4	29.4	Sand
BH13-2A	Monitoring	25	31.0	33.2	Sand
TW13-3	Test	410	21.3	29.9	Sand
PW14-4	Production	395	21.5	30.2	Sand
BH11-1	Monitoring	825	19.9	26.7	Sand
BH11-2	Monitoring	585	22.5	26.3	Sand
BH11-3	Monitoring	50	19.2	23.7	Silty Clay / Silty Sand
BH11-4	Monitoring	600	22.0	26.1	Sand

The pumping test began on June 23, 2014, with a stepped rate test to determine well efficiency and the optimum flow rate for the longer term pumping test. Two steps were completed, at pumping rates of 7.9 L/s and 10.0 L/s. Each rate was maintained for a period of one hour. At the end of the two hour stepped rate test a hydraulic head drawdown of approximately 1.2 metres was observed at TW14-5.

Following the two hour stepped rate test, the pumping rate was increased to 11.4 L/min. This rate was maintained for a period of 23 hours, during which time drawdown at TW14-5 reached approximately 2.3 metres. The pumping rates and periods for which they were applied are summarized below and shown on **Figure 12**.

Pumping Rate (Litres per Second)	Duration (Hours)	Drawdown at TW14-5 at end of Period (metres)
7.9	1	0.9
10.0	1	1.2
11.4	23	2.3

Pumping was terminated on June 24, 2014 following 25 hours of pumping. Water level measurements were collected for a 3 day period after the pump was shut off (between June 24 and June 27, 2014).

2.4 Test Well PW14-6

Test well PW14-6 was constructed by Allan Wright Water Wells using air-rotary drilling techniques from August 12 to 13, 2014. PW14-6 was constructed as a 205 mm diameter borehole. The hole was drilled to a total depth of 30.5 metres below ground surface. The borehole was equipped with a steel well casing though the upper silt and clay unit to a depth of approximately 21.5 metres below ground surface. Below this depth the borehole was equipped with a stainless steel well screen to a depth of approximately 30 metres below ground surface.

Groundwater monitors installed in nearby boreholes were monitored to observe aquifer response to the pumping test. Details for the pumping well and monitoring wells are summarized below.

Well ID	Type of Well	Lateral Distance to Pumping Well [m]	Top of Interval [mbgs]	Bottom of Interval [mbgs]	Screened Unit
PW14-6	Pumping	-	21.5	30.0	Sand
TW14-5	Test	25	19.0	28.4	Sand
BH13-1A	Monitoring	420	26.4	29.4	Sand
BH13-2A	Monitoring	20	31.0	33.2	Sand
TW13-3	Test	420	21.3	29.9	Sand
BH11-3	Monitoring	55	19.2	23.7	Silty Clay / Silty Sand

At the homeowner's request, the groundwater level was also measured in the bedrock well at 772 St. Pierre Road (Lalande well) during the pumping and recovery periods.

The pumping test began on August 26, 2014, with a stepped rate test to determine well efficiency and the optimum flow rate for the longer term pumping test. Two steps were completed, at pumping rates of 8.0 L/s and 10.0 L/s. Each rate was maintained for a period of one hour. At the end of the two hour stepped rate test a hydraulic head drawdown of approximately 2.4 metres was observed at PW14-6.

Following the two hour stepped rate test, the pumping rate was increased to 11.2 L/min. This rate was maintained for a period of 22 hours, during which time drawdown at PW14-6 reached approximately 4.0 metres. The pumping rates and periods for which they were applied are summarized below and shown on **Figure 12**.

Pumping Rate (Litres per Second)	Duration (Hours)	Drawdown at PW14-6 at end of Period (metres)
8.0	1	1.7
10.0	1	2.4
11.2	22	4.0

Pumping was terminated on August 27, 2014 following 24 hours of pumping. Water level measurements were collected for a 3 day period after the pump was shut off (between August 27 and August 29, 2014).

2.5 Groundwater Sampling

Groundwater samples were regularly tested in the field for conductivity, pH, temperature and turbidity. Groundwater samples were collected at appropriate intervals during the pumping tests to assist in the design of treatment options for the expansion to the water treatment system. Samples were collected at specified intervals during the test and submitted to a laboratory for analysis of a suite of groundwater parameters commonly used to evaluate drinking water quality (subdivision package), as summarized in the following table. The final samples collected from TW13-3 and TW14-5 were submitted to a laboratory for analysis of the parameters in Tables 1, 2, 3 (gross alpha, gross beta and tritium only) and 4 from Regulation 169/03, also known as the Ontario Drinking Water Quality Standards (ODWQS), and for the parameters used to evaluate aesthetic objectives and operational guidelines in Ontario.

Test Well	Date and Time	Hours since Start of Pumping	Sample and Analysis Type
TW13-3	2013/11/21 11:15	20	subdivision package
	2013/11/22 9:55	43	subdivision package
	2013/11/23 14:23 (chemistry) 2013/11/23 15:06 (microbiology)	71	ODWQS Tables 1, 2, 3, 4
PW14-4	2014/06/05 14:45	2	subdivision package
	2014/06/06 12:45	24	subdivision package
TW14-5	2014/06/23 13:42	2	subdivision package
	2014/06/24 11:40	24	ODWQS Tables 1, 2, 3, 4
PW14-6	2014/08/26 11:10	2	subdivision package
	2014/08/27 9:35	24	subdivision package

3.0 PUMPING TEST RESULTS

3.1 Test Well TW13-3

A time-drawdown plot for TW13-3 during the pumping test is included in **Figure 2**. The maximum drawdown observed during the pumping period was 10.6 m. This drawdown was achieved at approximately 334 hours from the start of pumping, and occurred while the well was being pumped at 11.7 L/s.

Time-drawdown plots for the observation wells have also been included in **Figure 2**. Maximum drawdown amounts at each of the observation wells are summarized below.

Well ID	Maximum Drawdown (metres)	Time of Maximum Drawdown from start of pumping (hours)
BH13-1A	6.6	335
BH13-2A	4.2	334
BH11-2	4.5	338
BH11-3	4.2	338
BH11-4	3.9	335

Time-drawdown plots for TW13-3 and the five observation wells during the recovery period after pump shut-off have been included in **Figure 3**. Water levels in TW13-3 and the five observation wells began to recover soon after the pump was shut off. Following 16 days of recovery, water levels at TW13-3 and the five observation wells had recovered to within 0.18 to 0.37 metres of the initial water levels.

The Cooper-Jacob (1946) method was used to project results of the pumping test over longer periods of pumping. Time-drawdown data for TW13-3 was plotted on a log-linear plot which is included in **Figure 4**. A straight line was fitted to the final 100 hours of the test (excluding the final four hours). This line is representative of the approximate trend in drawdown with time for TW13-3 under a pumping rate of 11.7 L/s. A projection of this line to 20 years of pumping results in a total drawdown in TW13-3 of approximately 18 metres.

Throughout the pumping test, the observed drawdown at TW13-3 was slightly higher than would be expected given the drawdown observed in nearby monitoring wells. To quantify this difference the maximum drawdown observed at each well was plotted against the radial distance from TW13-3 on a log-linear plot (included in **Figure 5)**. The Cooper-Jacob distance drawdown method was used to project a straight line through the observation wells (as shown on **Figure 5**) to a small radial distance. The difference between the projected line and the observed drawdown in TW13-3 is likely due to issues with well efficiency, which result in the drawdown at TW13-3 being greater than predicted. Results show that with 100% well efficiency, drawdown in TW13-3 would be approximately 0.9 metres smaller.

Improved efficiency of TW13-3 could result in both a lower initial magnitude of drawdown and a reduction in the rate of drawdown with time. For example, a log-linear plot of time-drawdown data at observation well BH13-1A is included in **Figure 6**. The slope of the best fit line through the data is 0.91 (in comparison to 1.15 for TW13-3). A projection of this line to 20 years of pumping would result in drawdown of approximately 12 metres at BH13-1A. If improved well efficiency could be accomplished at TW13-3, a similar magnitude of drawdown could

possibly be expected. As we have observed with this aquifer in the past (Golder, 2014) the annual freshet recharges the aquifer annually. Therefore, the analysis represents a conservative scenario, that is, we expect the drawdown cycle to reset annually, based upon the projected drawdown after 1 to 2 years of pumping (14.3 to 15.1 metres), rather than the 20 year projections.

3.2 Test Well PW14-4

A time-drawdown plot for PW14-4 during the pumping test is included in **Figure 7**. The maximum drawdown observed during the pumping period was 7.5 m. This drawdown was achieved at approximately 24 hours from the start of pumping, and occurred while the well was being pumped at 11.2 L/s.

Time-drawdown plots for the observation wells have also been included in **Figure 7**. Maximum drawdown amounts at each of the observation wells are summarized below.

Well ID	Maximum Drawdown (metres)	Time of Maximum Drawdown from start of pumping (hours)
BH13-1A	2.4	24
BH13-2A	1.0	24
TW13-3	2.7	24
BH11-1	0.7	34
BH11-2	1.0	30
BH11-3	1.1	25
BH11-4	0.8	25

Time-drawdown plots for PW14-4 and the seven observation wells during the recovery period after pump shut-off have been included in **Figure 8**. Water levels in PW14-4 and the seven observation wells began to recover soon after the pump was shut off. Following 93 hours of recovery, water levels at PW14-4 and the seven observation wells had recovered to within 0.3 to 0.7 metres of the initial water levels.

The Cooper-Jacob (1946) method was used to project results of the pumping test over longer periods of pumping. Time-drawdown data for PW14-4 was plotted on a log-linear plot which is included in **Figure 9**. A straight line was fitted to the final 16 hours of the test. This line is representative of the approximate trend in drawdown with time for PW14-4 under a pumping rate of 11.2 L/s. A projection of this line to 20 years of pumping results in a total drawdown in PW14-4 of approximately 12.5 metres.

Throughout the pumping test, the observed drawdown at PW14-4 was slightly higher than would be expected given the drawdown observed in nearby monitoring wells. To quantify this difference the maximum drawdown observed at each well was plotted against the radial distance from PW14-4 on a log-linear plot (included in **Figure 10**). The Cooper-Jacob distance drawdown method was used to project a straight line through the observation wells (as shown on **Figure 10**) to a small radial distance. The difference between the projected line and the observed drawdown in PW14-4 is likely due to issues with well efficiency, which result in the drawdown at PW14-4 being greater than predicted. Results show that with 100% well efficiency, drawdown in PW14-4 would be approximately 1.9 metres smaller.

Improved efficiency of PW14-4 could result in both a lower initial magnitude of drawdown and a reduction in the rate of drawdown with time. For example, a log-linear plot of time-drawdown data at observation well BH13-1A is included in **Figure 11**. The slope of the best fit line through the data is 0.45 (in comparison to 0.57 for PW14-4). A projection of this line to 20 years of pumping would result in drawdown of approximately 6.4 metres at BH13-1A. If improved well efficiency could be accomplished at PW14-4, a similar magnitude of drawdown could possibly be expected. Therefore the analysis represents a conservative scenario, that is, we expect the drawdown cycle to reset annually, based upon the projected drawdown after 1 to 2 years of pumping (10.8 to 11.2 metres), rather than the 20 year projections.

3.3 Test Well TW14-5

A time-drawdown plot for TW14-5 during the pumping test is included in **Figure 12**. The maximum drawdown observed during the pumping period was 2.3 m. This drawdown was achieved at approximately 25 hours from the start of pumping, and occurred while the well was being pumped at 11.4 L/s.

Time-drawdown plots for the observation wells have also been included in **Figure 12**. Maximum drawdown amounts at each of the observation wells are summarized below.

Well ID	Maximum Drawdown (metres)	Time of Maximum Drawdown from start of pumping (hours)
BH13-1A	1.0	25
BH13-2A	1.5	25
TW13-3	1.0	25
BH11-1	0.5	45
BH11-2	0.7	34
BH11-3	1.5	25
BH11-4	0.6	28

Time-drawdown plots for TW14-5 and the seven observation wells during the recovery period after pump shut-off have been included in **Figure 13**. Water levels in TW14-5 and the seven observation wells began to recover soon after the pump was shut off. Following 3 days of recovery, water levels at TW14-5 and the seven observation wells had recovered to within 0.4 to 0.6 metres of the initial water levels.

The Cooper-Jacob (1946) method was used to project results of the pumping test over longer periods of pumping. Time-drawdown data for TW14-5 was plotted on a log-linear plot which is included in **Figure 14**. A straight line was fitted to the final 16 hours of the test. This line is representative of the approximate trend in drawdown with time for TW14-5 under a pumping rate of 11.4 L/s. A projection of this line to 20 years of pumping results in a total drawdown in TW14-5 of approximately 7.3 metres. As we have observed with this aquifer in the past (Golder, 2014) the annual freshet recharges the aquifer annually. Therefore the analysis represents a conservative scenario, that is, we expect the drawdown cycle to reset annually, based upon the projected drawdown after 1 to 2 years of pumping (5.6 to 6.0 metres), rather than the 20 year projections.

3.4 Test Well PW14-6

A time-drawdown plot for PW14-6 during the pumping test is included in **Figure 15**. The maximum drawdown observed during the pumping period was 4.0 m. This drawdown was achieved at approximately 24 hours from the start of pumping, and occurred while the well was being pumped at 11.2 L/s.

Time-drawdown plots for the observation wells have also been included in **Figure 15**. Maximum drawdown amounts at each of the observation wells are summarized below.

Well ID	Maximum Drawdown (metres)	Time of Maximum Drawdown from start of pumping (hours)
BH13-1A	1.1	24
BH13-2A	1.9	24
TW13-3	1.1	24
TW14-5	1.7	24
BH11-3	1.7	24
Lalande Bedrock	0.9	24

Time-drawdown plots for PW14-6 and the six observation wells during the recovery period after pump shut-off have been included in **Figure 16.** Water levels in PW14-6 and the six observation wells began to recover soon after the pump was shut off. Following 2 days of recovery, water levels at PW14-6 and the six observation wells had recovered to within 0.5 to 0.6 metres of the initial water levels.

The Cooper-Jacob (1946) method was used to project results of the pumping test over longer periods of pumping. Time-drawdown data for PW14-6 was plotted on a log-linear plot which is included in **Figure 17**. A straight line was fitted to the final 19 hours of the test. This line is representative of the approximate trend in drawdown with time for PW14-6 under a pumping rate of 11.2 L/s. A projection of this line to 20 years of pumping results in a total drawdown in PW14-6 of approximately 10 metres. As discussed in Section 3.3, the annual freshet recharges the aquifer annually. Therefore the analysis represents a conservative scenario, that is, we expect the drawdown cycle to reset annually, based upon the projected drawdown after 1 to 2 years of pumping (7.9 to 8.5 metres), rather than the 20 year projections.

4.0 GROUNDWATER ANALYTICAL TESTING RESULTS

The analytical results of the groundwater samples collected from the test wells, summarized in Table 1, indicate that the water generally meets the applicable standards, objectives or guidelines. Laboratory certificates of analysis are found in Appendix B.

The aesthetic objective for colour was exceeded in all samples. The pH of samples collected from TW13-3, PW14-4, TW14-5 and PW14-6 ranged from 8.33 to 8.89, slightly exceeding the operational guideline of 8.5. These results are similar to the water quality at the existing Limoges water supply wells.

The concentrations of methane measured in samples collected from TW13-3, PW14-4, TW14-5 and PW14-6 exceeded the aesthetic objective. Methane can be treated with standard water aeration processes. The occurrence of methane needs to be considered in the water treatment design and pump house design.

The concentration of organic nitrogen exceeded the operational guideline in the samples taken from TW13-3 (November 23, 2013) and TW14-5 (June 24, 2014). The ODWQS technical support document (Ontario Ministry of the Environment, 2006) states that:

> *"Organic nitrogen is calculated by the difference between the total Kjeldahl nitrogen and the ammonia nitrogen. High levels may be caused by septic tank or sewage effluent contamination. This form of contamination is often associated with some types of chlorine-worsened taste problems. Organic nitrogen at levels above 0.15 mg/L would be typically associated with DOC contribution of 0.6 mg/L. Organic nitrogen compounds frequently contain amine groups which can react with chlorine and severely reduce its disinfectant power. Certain chlorinated organic nitrogen compounds may be responsible for flavour problems that are associated with chlorophenol. Taste and odour problems are common with organic nitrogen levels greater than 0.15 mg/L."*

In this case given the isolated hydrogeologic setting, the organic nitrogen in the aquifer is considered to be from a naturally occurring condition in the aquifer. Water treatment will need to consider these levels.

The sodium concentrations in TW13-3, PW14-4 and TW14-5 ranged from 85 to 110 mg/L, and in PW14-6 ranged from 140 to 170 mg/L, throughout their respective pumping tests. The local Ministry of Health office should be notified when the sodium concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium-restricted diets.

The results of radionuclide analysis at TW13-3 indicated concentrations of 0.11 becquerels per litre (Bq/L) for gross alpha emissions, and 0.15 Bq/L for gross beta emissions. These values are below the ODWQS for all radionuclides except lead-210 (0.1 Bq/L) and thorium-232 (0.1 Bq/L). It should be noted that the gross alpha and gross beta concentrations were only slightly higher than their respective reportable detection limits (0.10 Bq/L and 0.10 Bq/L, respectively). For the purposes of confirming adherence to the ODWQS, further testing was carried out for those parameters with a standard less than 0.2 Bq/L, namely lead-210 and thorium 232. It is considered that artificial radionuclides would be absent in this natural water supply. The concentrations of lead-210 and thorium-232 were measured to be <0.10 Bq/L and <0.01 Bq/L, respectively, therefore the quality of the water tested meets the ODWQS radionuclide standards. Similarly, the concentration of gross beta emissions in the sample collected from TW14-5 was 0.35 Bq/L. Further testing was carried out for

those parameters with a standard less than 0.4 Bq/L, namely lead-210, thorium 232 and polonium-210. The concentrations of lead-210, thorium 232 and polonium-210 were measured to be <0.10 Bq/L, <0.01 Bq/L and <0.01 Bq/L, respectively, therefore the quality of the water tested meets the ODWQS radionuclide standards.

None of the remaining parameters analysed exceeded their respective criteria.

5.0 SUMMARY

It is anticipated that the first stage of water supply expansion for the Village of Limoges will involve an increase of the existing capacity (24.1 L/s) by a minimum of 40 L/s to 64.1 L/s. Based on the results of the pumping tests conducted on wells TW13-3, PW14-4 and TW14-5, it is anticipated that production wells on the two sites near the southwest corner of St. Pierre Road and Route 200 would each be capable of producing 11.2 L/s over the long term, for a total of 22.4 L/s increase above the existing capacity. Additional wells will be required to meet the entire desired increase above the existing capacity.

As shown by the much smaller drawdown observed during the 24-hour pumping tests on TW14-5 and PW14-6, locating future pumping wells in the coarser core material of the esker may allow for higher pumping rates to be sustained with smaller drawdown in the pumping well, meaning that fewer wells would be required. It may be advantageous to expend effort in locating the core of the esker (e.g., with a geophysical investigation) prior to locating future well sites to meet the remainder of the increase in capacity.

The laboratory analytical results indicate that the water quality measured in the wells is generally suitable for use in the water system expansion. The design of the water treatment system expansion will incorporate the water quality results to ensure that adequate treatment is provided.

6.0 LIMITATIONS

This report was prepared for the exclusive use of The Corporation of the Nation Municipality. The report, which specifically includes all tables, figures and appendices, is based on data gathered by Golder Associates Ltd., and information provided to Golder Associates Ltd. by others. The information provided by others has not been independently verified or otherwise examined by Golder Associates Ltd. to determine the accuracy or completeness. Golder Associates Ltd. has relied in good faith on this information and does not accept responsibility for any deficiency, misstatements, or inaccuracies contained in the information as a result of omissions, misinterpretation or fraudulent acts.

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8.0 REFERENCES

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Table 1 - Summary of Groundwater Analytical Results
Limoges Expansion

Parameter	Unit	(2) (1) ODWQS(169/03)-Health	(4) (3) ODWQS-AO	(6) (5) ODWQS-OG	TW13-3 21-Nov-2013 13-3	TW13-3 22-Nov-2013 13-3B	TW13-3 23-Nov-2013 13-3C	PW14-4 05-Jun-2014 14-4A	PW14-4 06-Jun-2014 14-4B	TW14-5 23-Jun-2014 14-5A	TW14-5 24-Jun-2014 14-5B	PW14-6 26-Aug-2014 S-1	PW14-6 27-Aug-2014 S-2
Bacterial													
Background Colonies	CFU/100mL	--	--	--	--	--	--	--	0	--	0	--	18
Coliform	mg/l	0 (7)	--	--	--	--	0	--	0	--	0	--	0
Escherichia coli	CFU/100mL	0	--	--	--	--	0	--	0	--	0	--	0
General Chemistry													
Alkalinity (Total as CaCO3)	mg/l	--	--	500	230	220	220	200	210	240	220	280	260
Ammonia Nitrogen	mg/l	--	--	--	0.33	0.33	0.38	0.38	0.30	0.56	0.49	0.85	0.76
Chloride, dissolved	mg/l	--	250	--	29	27	26	16	19	70	41	120	87
Color	color unit	--	5	--	15	13	14	13	13	14	13	16	16
Conductivity	uS/cm	--	--	--	510	500	500	430	450	660	--	900	760
Conductivity (Field)	uS/cm	--	--	--	492	463	438	424	460	582	484	834	643
Cyanide (free)	mg/l	0.2	--	--	--	--	<0.0020	--	--	--	<0.0020	--	--
Dissolved Organic Carbon	mg/l	--	5	--	4.1	4.1	3.9	3.3	3.4	4.0	4.0	4.9	4.4
Fluoride	mg/l	1.5	--	--	0.74	0.73	0.71	0.61	0.63	0.45	0.41	0.67	0.57
Hardness, Calcium Carbonate	mg/l	--	--	100	67	63	70	78	73	78	78	51	53
Ion Balance	%	--	--	--	1.50	0.800	4.17	2.05	0.0800	1.23	--	0.440	1.52
Nitrate as N	mg/l	10	--	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite as N	mg/l	1	--	--	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrogen, Nitrate-Nitrite	mg/l	10	--	--	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrogen, Organic	mg/l	--	--	0.15	--	--	*0.2*	--	--	--	*0.5*	--	--
Nitrogen, Total Kjeldahl	mg/l	--	--	--	0.68	0.53	0.54	0.60	0.64	0.64	0.96	1.1	1.0
pH	-	--	--	8.5	8.43	8.33	8.48	8.42	8.44	8.42	8.42	*8.64*	*8.58*
pH (Field)	-	--	--	8.5	*8.75*	*8.77*	*8.89*	8.45	*8.65*	*8.68*	8.45	8.48	*8.51*
Sulfate, dissolved	mg/l	--	500 (10)	--	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sulfide	mg/l	--	0.05 (11)	--	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Tannin & Lignin	mg/l	--	--	--	0.5	0.5	0.6	0.5	0.5	0.6	--	0.7	0.6
Temperature (Field)	deg c	--	15	--	8.5	8.8	8.5	10.9	11.2	10.1	10.1	11.1	11.8
Total Dissolved Solids	mg/l	--	500	--	250	268	472	258	268	352	310	486	418
Turbidity	ntu	--	5 (12)	-- (13)	<0.2	<0.2	0.5	<0.2	<0.2	<0.2	<0.2	<0.2	0.3
Turbidity (Field)	ntu	--	5 (12)	-- (13)	0.38	0.27	0.25	0.67	3.22	--	0.64	1.05	0.24
Metals													
Aluminum, dissolved	mg/l	--	--	0.1	--	--	<0.0050	--	--	--	<0.0050	--	--
Antimony, dissolved	mg/l	0.006	--	--	--	--	<0.00050	--	--	--	<0.00050	--	--
Arsenic, dissolved	mg/l	0.025	--	--	--	--	<0.0010	--	--	--	<0.0010	--	--
Barium, dissolved	mg/l	1	--	--	--	--	0.37	--	--	--	0.33	--	--
Boron, dissolved	mg/l	5	--	--	--	--	0.28	--	--	--	0.19	--	--
Cadmium, dissolved	mg/l	0.005	--	--	--	--	<0.00010	--	--	--	<0.00010	--	--
Calcium, dissolved	mg/l	--	--	--	16	15	17	20.1	18	16	17	9.9	10
Chromium, dissolved	mg/l	0.05	--	--	--	--	<0.0050	--	--	--	<0.0050	--	--
Copper, dissolved	mg/l	--	1	--	--	--	0.0015	--	--	--	<0.0010	--	--
Iron, dissolved	mg/l	--	0.3	--	0.09	0.08	0.08	0.13	0.11	0.12	0.11	0.11	0.11
Lead, dissolved	mg/l	0.01	--	--	--	--	0.0017	--	--	--	<0.00050	--	--
Magnesium, dissolved	mg/l	--	--	--	6.4	5.9	6.5	6.74	6.5	9.1	8.5	6.4	6.8
Manganese, dissolved	mg/l	--	0.05	--	<0.01	<0.01	0.0054	0.0075	0.0070	0.01	0.0094	<0.01	<0.01
Mercury	mg/l	0.001	--	--	--	--	<0.00010	--	--	--	<0.00010	--	--
Potassium, dissolved	mg/l	--	--	--	5	5	4.8	4.4	4.6	7	6.4	8	7
Selenium, dissolved	mg/l	0.01	--	--	--	--	<0.0020	--	--	--	<0.0020	--	--
Sodium, dissolved	mg/l	--	200 (14)	--	88	86	95	71	72	110	85	170	140
Uranium, dissolved	mg/l	0.02	--	--	--	--	<0.00010	--	--	--	<0.00010	--	--
Zinc, dissolved	mg/l	--	5	--	--	--	0.0052	--	--	--	<0.0050	--	--

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Radiological													
Lead-210	Bq/l	0.1	--	--	--	--	<0.10	--	--	--	<0.10	--	--
Polonium-210	Bq/l	0.2	--	--	--	--	--	--	--	--	<0.010	--	--
Radioactivity (gross alpha)	Bq/l	--	--	--	--	--	0.11 (15)	--	--	--	<0.10	--	--
Radioactivity (gross beta)	Bq/l	--	--	--	--	--	0.15 (16)	--	--	--	0.35	--	--
Thorium-232	Bq/l	0.1	--	--	--	--	<0.01	--	--	--	<0.01	--	--
Tritium (Hydrogen-3)	Bq/l	7000	--	--	--	--	<15	--	--	--	<15	--	--
Petroleum Hydrocarbons													
Benzene	mg/l	0.005	--	--	--	--	<0.00010	--	--	--	<0.00010	--	--
Ethylbenzene	mg/l	--	0.0024	--	--	--	<0.00010	--	--	--	<0.00010	--	--
m,p-Xylenes	mg/l	--	--	--	--	--	<0.00010	--	--	--	<0.00010	--	--
o-Xylene	mg/l	--	--	--	--	--	<0.00010	--	--	--	<0.00010	--	--
Toluene	mg/l	--	0.024	--	--	--	<0.00020	--	--	--	<0.00020	--	--
Xylenes, Total	mg/l	--	0.3	--	--	--	<0.00010	--	--	--	<0.00010	--	--
Phenols													
2,3,4,6-Tetrachlorophenol	mg/l	0.1	0.001	--	--	--	<0.00050	--	--	--	<0.00050	--	--
2,4,6-Trichlorophenol	mg/l	0.005	0.002	--	--	--	<0.00050	--	--	--	<0.00050	--	--
2,4-Dichlorophenol	mg/l	0.9	0.0003	--	--	--	<0.00050	--	--	--	<0.00050	--	--
Pentachlorophenol	mg/l	0.06	0.03	--	--	--	<0.00050	--	--	--	<0.00050	--	--
Phenolics, Total Recoverable	mg/l	--	--	--	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	--	<0.0010	<0.0010
Semi-VOCs													
2,4,5-T	mg/l	0.28	0.02	--	--	--	<0.0010	--	--	--	<0.0010	--	--
3-(3,4-Dichlorophenyl)-1,1-dimethylurea	mg/l	0.15	--	--	--	--	<0.01	--	--	--	<0.01	--	--
Abathion	mg/l	--	--	--	--	--	<0.01	--	--	--	<0.01	--	--
Benzo[a]pyrene	mg/l	0.00001	--	--	--	--	<0.0000090	--	--	--	<0.0000090	--	--
N-Nitrosodimethylamine	mg/l	0.000009	--	--	--	--	<0.000002	--	--	--	<0.000002	--	--
VOCs													
1,1-Dichloroethylene	mg/l	0.014	--	--	--	--	<0.00010	--	--	--	<0.00010	--	--
1,2-Dichlorobenzene	mg/l	0.2	0.003	--	--	--	<0.00020	--	--	--	<0.00020	--	--
1,2-Dichloroethane	mg/l	0.005	--	--	--	--	<0.00020	--	--	--	<0.00020	--	--
1,4-Dichlorobenzene	mg/l	0.005	0.001	--	--	--	<0.00020	--	--	--	<0.00020	--	--
Bromodichloromethane	mg/l	--	--	--	--	--	<0.00010	--	--	--	<0.00010	--	--
Bromoform	mg/l	--	--	--	--	--	<0.00020	--	--	--	<0.00020	--	--
Carbon Tetrachloride	mg/l	0.005	--	--	--	--	<0.00010	--	--	--	<0.00010	--	--
Chlorobenzene	mg/l	0.08	0.03	--	--	--	<0.00010	--	--	--	<0.00010	--	--
Chloroform	mg/l	--	--	--	--	--	<0.00010	--	--	--	<0.00010	--	--
Dibromochloromethane	mg/l	--	--	--	--	--	<0.00020	--	--	--	<0.00020	--	--
Methane	l/m3	--	3	--	--	--	14	9.6	7.6	20	20	11	23
Methane	mg/l	--	3	--	--	--	9.5	6.3	5.0	13	13	7.0	15
Methylene Chloride	mg/l	0.05	--	--	--	--	0.00175	--	--	--	<0.00050	--	--
Nitrilotriacetate	mg/l	--	--	--	--	--	<0.05	--	--	--	<0.05	--	--
Tetrachloroethylene	mg/l	0.03	--	--	--	--	<0.00010	--	--	--	<0.00010	--	--
Trichloroethene	mg/l	0.005	--	--	--	--	<0.00010	--	--	--	<0.00010	--	--
Trihalomethanes (total)	mg/l	0.1 (17)	--	--	--	--	<0.00020	--	--	--	<0.00020	--	--
Vinyl Chloride	mg/l	0.002	--	--	--	--	<0.00020	--	--	--	<0.00020	--	--

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PCBs													
Polychlorinated Biphenyls	mg/l	0.003	--	--	--	--	<0.00005	--	--	--	<0.00005	--	--
Dioxin_Furans													
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/l	--	--	--	--	--	2.4	--	--	--	2.3	--	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/l	--	--	--	--	--	<2.24 (8)	--	--	--	<1.22	--	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/l	--	--	--	--	--	<1.36	--	--	--	<1.41	--	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/l	--	--	--	--	--	<1.34	--	--	--	<1.12	--	--
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/l	--	--	--	--	--	<1.14	--	--	--	<1.14	--	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/l	--	--	--	--	--	<1.43	--	--	--	<1.19	--	--
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/l	--	--	--	--	--	<1.07	--	--	--	<1.09	--	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/l	--	--	--	--	--	<1.26	--	--	--	<0.983	--	--
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/l	--	--	--	--	--	<1.24	--	--	--	<1.15	--	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/l	--	--	--	--	--	<1.97	--	--	--	<1.50	--	--
1,2,3,7,8-Pentachlorodibenzofuran	pg/l	--	--	--	--	--	<1.20	--	--	--	<1.54	--	--
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/l	--	--	--	--	--	<1.23	--	--	--	<1.08	--	--
2,3,4,7,8-Pentachlorodibenzofuran	pg/l	--	--	--	--	--	<1.25	--	--	--	<1.50	--	--
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/l	--	--	--	--	--	<1.71	--	--	--	<1.12	--	--
2,3,7,8-Tetrachlorodibenzofuran	pg/l	--	--	--	--	--	<1.67	--	--	--	<1.17	--	--
Heptachlorinated Dibenzo-p-dioxins, Total	pg/l	--	--	--	--	--	4.0	--	--	--	2.3	--	--
Heptachlorinated Dibenzofurans, Total	pg/l	--	--	--	--	--	3.2	--	--	--	<1.31	--	--
Hexachlorinated Dibenzo-p-dioxins, Total	pg/l	--	--	--	--	--	<1.34	--	--	--	<1.87 (8)	--	--
Hexachlorinated Dibenzofurans, Total	pg/l	--	--	--	--	--	<1.17	--	--	--	<1.12	--	--
Octachlorodibenzo-p-dioxin	pg/l	--	--	--	--	--	19	--	--	--	<3.36 (8)	--	--
Octachlorodibenzofuran	pg/l	--	--	--	--	--	7	--	--	--	1	--	--
Pentachlorinated Dibenzo-p-dioxins, Total	pg/l	--	--	--	--	--	<1.97	--	--	--	<1.50	--	--
Pentachlorinated Dibenzofurans, Total	pg/l	--	--	--	--	--	<1.51 (9)	--	--	--	--	--	--
Tetrachlorinated Dibenzo-p-dioxins, Total	pg/l	--	--	--	--	--	<1.71	--	--	--	<1.59 (8)	--	--
Tetrachlorinated Dibenzofurans, Total	pg/l	--	--	--	--	--	<1.67	--	--	--	<1.17	--	--
TOTAL TETRACHLORODIBENZO-FURAN	pg/l	--	--	--	--	--	--	--	--	--	<1.17	--	--

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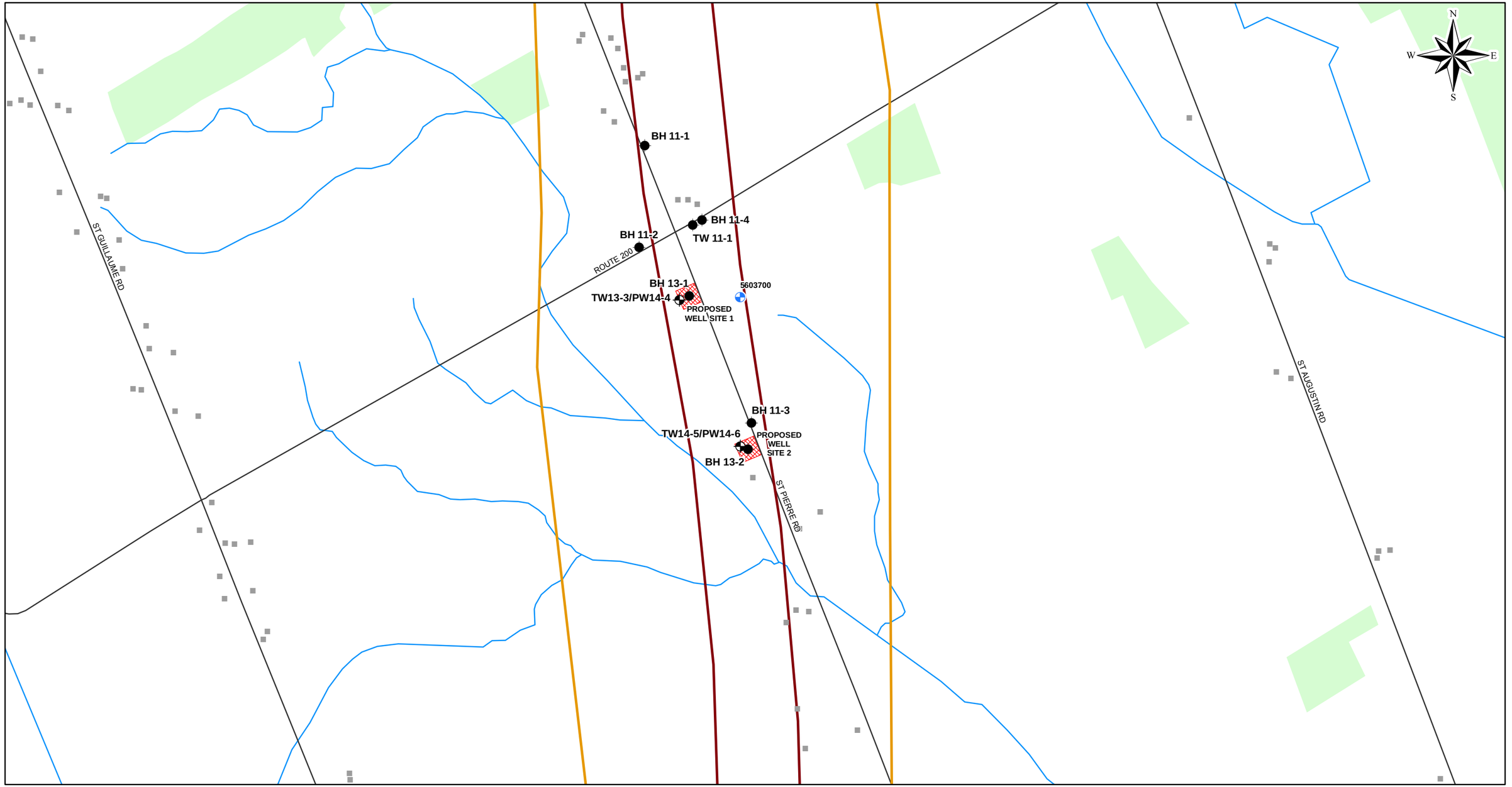
Pesticides													
2,4-D	mg/l	0.1	--	--	--	--	<0.0010	--	--	--	<0.0010	--	--
4,4-DDD	mg/l	--	--	--	--	--	<0.000006	--	--	--	<0.000006	--	--
4,4-DDE	mg/l	--	--	--	--	--	<0.000006	--	--	--	<0.000006	--	--
4,4-DDT	mg/l	--	--	--	--	--	<0.000006	--	--	--	<0.000006	--	--
Alachlor	mg/l	0.005	--	--	--	--	<0.00050	--	--	--	<0.00050	--	--
Aldicarb	mg/l	0.009	--	--	--	--	<0.0050	--	--	--	<0.0050	--	--
Aldrin	mg/l	--	--	--	--	--	<0.000006	--	--	--	<0.000006	--	--
Aldrin + dieldrin	mg/l	0.0007	--	--	--	--	<0.000006	--	--	--	<0.000006	--	--
alpha-Chlordane	mg/l	--	--	--	--	--	<0.000006	--	--	--	<0.000006	--	--
Atrazine	mg/l	--	--	--	--	--	<0.00050	--	--	--	<0.00050	--	--
Atrazine + Desethyl-atrazine	mg/l	--	--	--	--	--	--	--	--	--	<0.0010	--	--
Atrazine and metabolites	mg/l	0.005	--	--	--	--	<0.0010	--	--	--	--	--	--
Azinphos-methyl	mg/l	0.02	--	--	--	--	<0.002	--	--	--	<0.002	--	--
Bendiocarb	mg/l	0.04	--	--	--	--	<0.0020	--	--	--	<0.0020	--	--
Bromoxynil	mg/l	0.005	--	--	--	--	<0.00050	--	--	--	<0.00050	--	--
Carbofuran	mg/l	0.09	--	--	--	--	<0.0050	--	--	--	<0.0050	--	--
Chlordane	mg/l	--	--	--	--	--	<0.000006	--	--	--	<0.000006	--	--
Chlordane, technical mixture	mg/l	0.007	--	--	--	--	<0.000006	--	--	--	<0.000006	--	--
Chlorpyrifos	mg/l	0.09	--	--	--	--	<0.0010	--	--	--	<0.0010	--	--
Cyanazine	mg/l	0.01	--	--	--	--	<0.0010	--	--	--	<0.0010	--	--
DDT+ metabolites	mg/l	0.03	--	--	--	--	--	--	--	--	<0.000006	--	--
DDT, Total	mg/l	0.03	--	--	--	--	<0.000006	--	--	--	--	--	--
De-ethylated atrazine	mg/l	--	--	--	--	--	<0.00050	--	--	--	<0.00050	--	--
Diazinon	mg/l	0.02	--	--	--	--	<0.0010	--	--	--	<0.0010	--	--
Dicamba	mg/l	0.12	--	--	--	--	<0.0010	--	--	--	<0.0010	--	--
Diclofop-methyl	mg/l	0.009	--	--	--	--	<0.00090	--	--	--	<0.00090	--	--
Dieldrin	mg/l	--	--	--	--	--	<0.000006	--	--	--	<0.000006	--	--
Dimethoate	mg/l	0.02	--	--	--	--	<0.0025	--	--	--	<0.0025	--	--
Dinoseb	mg/l	0.01	--	--	--	--	<0.0010	--	--	--	<0.0010	--	--
Diquat Dibromide	mg/l	0.07	--	--	--	--	<0.007	--	--	--	<0.007	--	--
gamma-hexachlorocyclohexane	mg/l	0.004	--	--	--	--	<0.000006	--	--	--	<0.000006	--	--
Glyphosate	mg/l	0.28	--	--	--	--	<0.01	--	--	--	<0.01	--	--
Heptachlor	mg/l	--	--	--	--	--	<0.000006	--	--	--	<0.000006	--	--
Heptachlor & Heptachlor epoxide	mg/l	0.003	--	--	--	--	<0.000006	--	--	--	<0.000006	--	--
Heptachlor Epoxide	mg/l	--	--	--	--	--	<0.000006	--	--	--	<0.000006	--	--
Malathion	mg/l	0.19	--	--	--	--	<0.0050	--	--	--	<0.0050	--	--
Methoxychlor	mg/l	0.9	--	--	--	--	<0.00002	--	--	--	<0.00002	--	--
Metolachlor	mg/l	0.05	--	--	--	--	<0.00050	--	--	--	<0.00050	--	--
Metribuzin	mg/l	0.08	--	--	--	--	<0.0050	--	--	--	<0.0050	--	--
o,p'-DDD	mg/l	--	--	--	--	--	--	--	--	--	<0.000006	--	--
o,p'-DDE	mg/l	--	--	--	--	--	--	--	--	--	<0.000006	--	--
o,p'-DDT	mg/l	--	--	--	--	--	<0.000006	--	--	--	<0.000006	--	--
Oxychlordane	mg/l	--	--	--	--	--	<0.000006	--	--	--	<0.000006	--	--
Paraquat	mg/l	0.01	--	--	--	--	<0.001	--	--	--	<0.001	--	--
Parathion	mg/l	0.05	--	--	--	--	<0.0010	--	--	--	<0.0010	--	--
Parathion, methyl	mg/l	--	--	--	--	--	<0.0010	--	--	--	<0.0010	--	--
Phorate	mg/l	0.002	--	--	--	--	<0.00050	--	--	--	<0.00050	--	--
Picloram	mg/l	0.19	--	--	--	--	<0.0050	--	--	--	<0.0050	--	--
Prometryn	mg/l	0.001	--	--	--	--	<0.00025	--	--	--	<0.00025	--	--
Sevin	mg/l	0.09	--	--	--	--	<0.0050	--	--	--	<0.0050	--	--
Simazine	mg/l	0.01	--	--	--	--	<0.0010	--	--	--	<0.0010	--	--
Terbufos	mg/l	0.001	--	--	--	--	<0.00050	--	--	--	<0.00050	--	--
Triallate	mg/l	0.23	--	--	--	--	<0.0010	--	--	--	<0.0010	--	--
Trifluralin	mg/l	0.045	--	--	--	--	<0.0010	--	--	--	<0.0010	--	--

Footnotes:
Tables should be read in conjunction with the accompanying document.
< value = Indicates parameter not detected above laboratory method detection limit.
> value = Indicates parameter detected above equipment analytical range.
-- Chemical not analyzed or criteria not defined.
Grey background indicates exceedances.
(1) Ontario Drinking Water Quality Standards - Health Based Standards (June 2003, revised June 2006).
(2) Bold Font = Parameter concentration greater than ODWQS(169/03)-Health
(3) Ontario Drinking Water Quality Standards - Aesthetic Objectives. Aesthetic Objectives are established for parameters that may impair the taste, odour or colour of water or which may interfere with good water quality control practices. For certain parameters, both aesthetic objectives and health-related MACs have been derived (June 2003, revised June 2006).
(4) Underlined Font = Parameter concentration greater than ODWQS-AO
(5) Ontario Drinking Water Quality Standards - Operational Guidelines. Operational Guidelines are established for parameters that, if not controlled, may negatively affect the efficient and effective treatment, disinfection and distribution of the water (June 2003, revised June 2006).
(6) Italic Font = Parameter concentration greater than ODWQS-OG
(7) Reporting units and Guideline units are not convertible into each other.
(8) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
(9) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.EMPC / DPE - Diphenylether interference present caused dibenzofuran detected to become a "non-detect" with an elevated detection limit.
(10) There may be a laxative effect in some individuals when sulphate levels exceed 500 mg/L.
(11) The OWDQS for sulfide is expressed as H2S.
(12) Applicable for all waters at the point of consumption.
(13) The Operational Guidelines for filtration processes are provided as performance criteria in the Procedure for Disinfection of Drinking Water in Ontario.
(14) The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the sodium concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.
(15) Std. Dev. 0.03
(16) Std. Dev. 0.02
(17) This standard is expressed as a running annual average.



LEGEND

- DOMESTIC WATER WELLS IDENTIFIED WITHIN 500 m of TW13-3
- APPROXIMATE LOCATION OF PROPOSED TEST WELL/PRODUCTION WELL
- APPROXIMATE BOREHOLE LOCATION IN PLAN, PREVIOUS INVESTIGATIONS
- BUILDING POINT
- ROAD
- WATERCOURSE
- APPROXIMATE EXTENT OF ESKER CORE
- APPROXIMATE EXTENT OF ESKER INCLUDING SAND FLANKS
- WOODED AREA
- PROPOSED WELL SITE

300 150 0 300

SCALE 1:10,000 METRES

NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 12-1127-0115/1.3/1.3.5

REFERENCE

BASE DATA - MNR NRVIS, OBTAINED 2011 AND CANMAP V2008.4, DMTI SPATIAL INC.
PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM
ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2010
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 18

PROJECT

LIMOGES WATER EXPANSION
PUMPING TESTS AT TW13-3, PW14-4 AND TW14-5
CATEGORY 2 PTTW APPLICATION

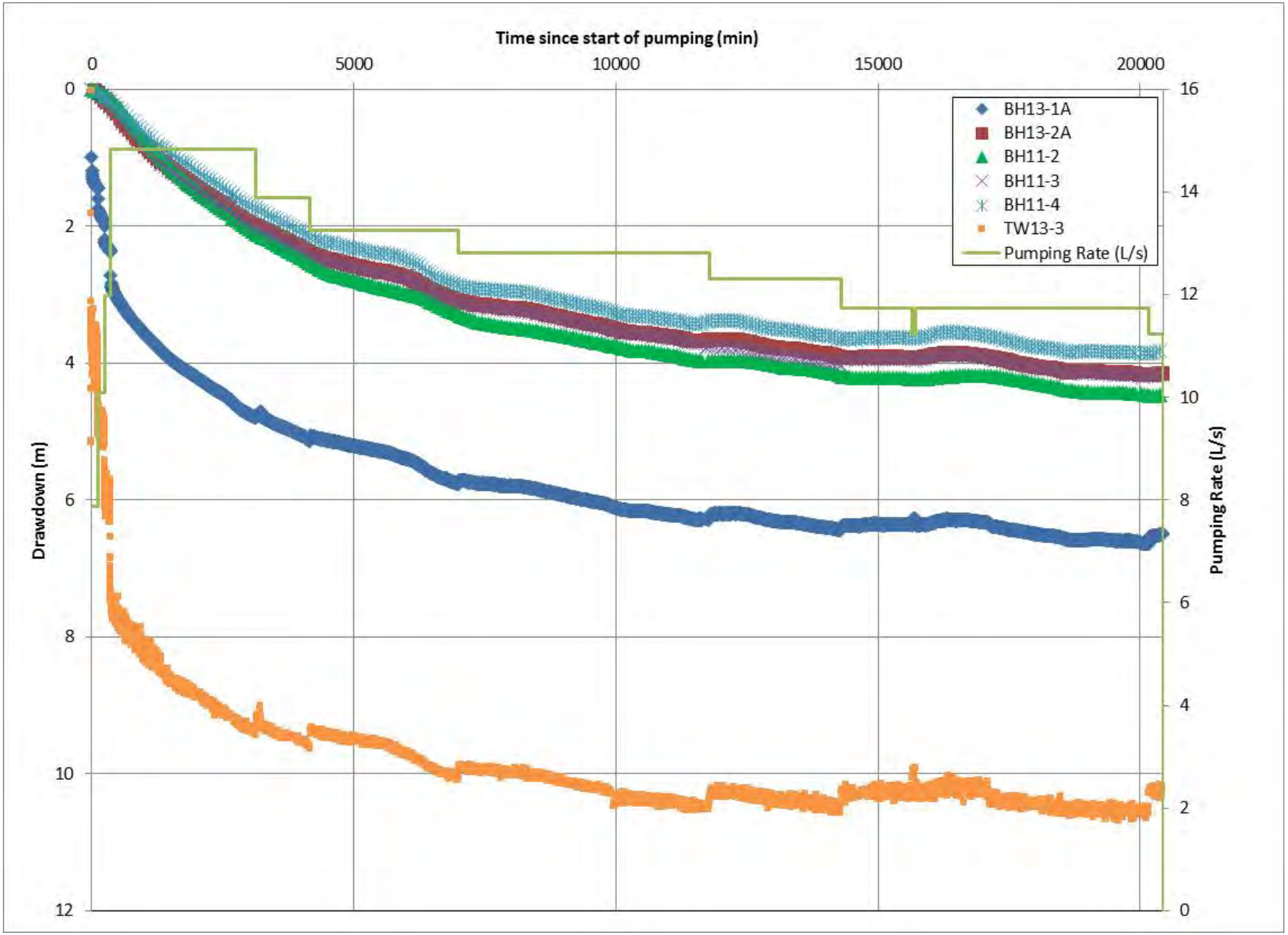
TITLE

SITE PLAN

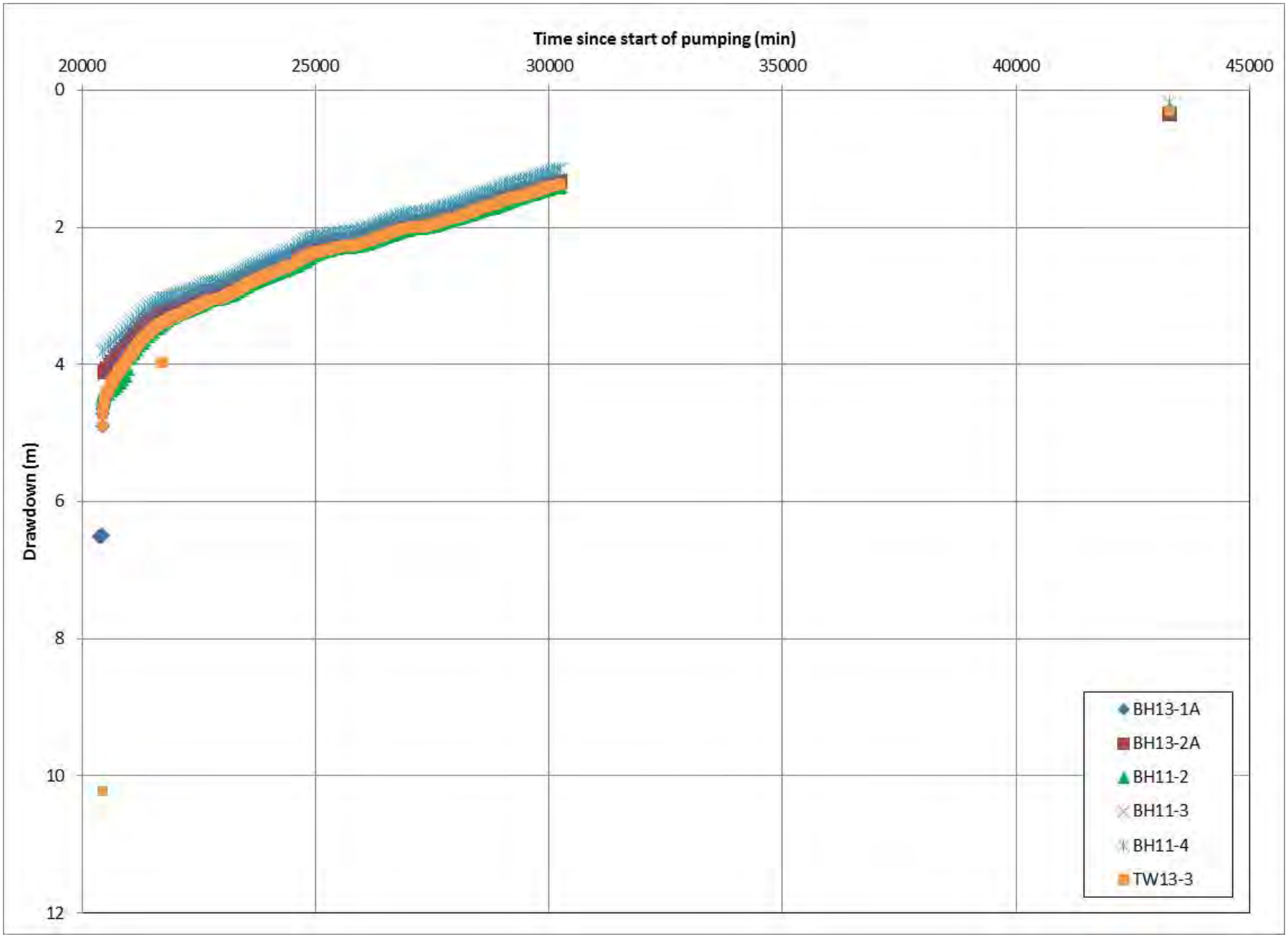
Golder Associates
Ottawa, Ontario

PROJECT No. 12-1127-0115			SCALE AS SHOWN	REV. 0.0
DESIGN	CAMC	2014-07-02	FIGURE 1	
GIS	BR	2014-07-03		
CHECK	CAMC	2014-07-03		
REVIEW	BJV	2014-10-03		

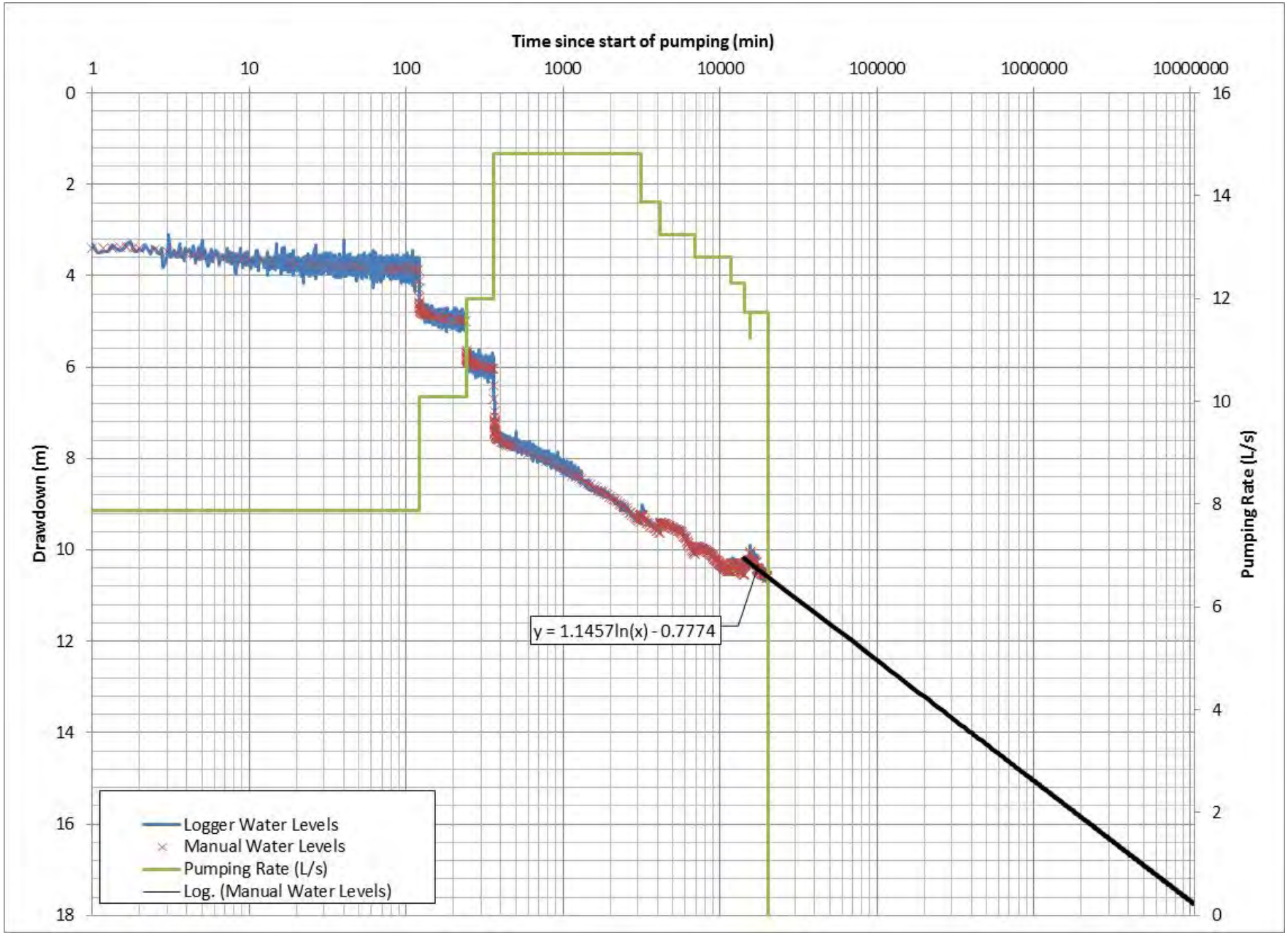
Path: N:\Active\2012\1127 - Geosciences\12-1127-0115 Nation Limoges Expansion\10_Spatial_IM\MXDs\Reporting\Phase 1.3-PumpTests_TW13-3_PW14-4_TW14-5\121127011 5-1.3.5-01.mxd



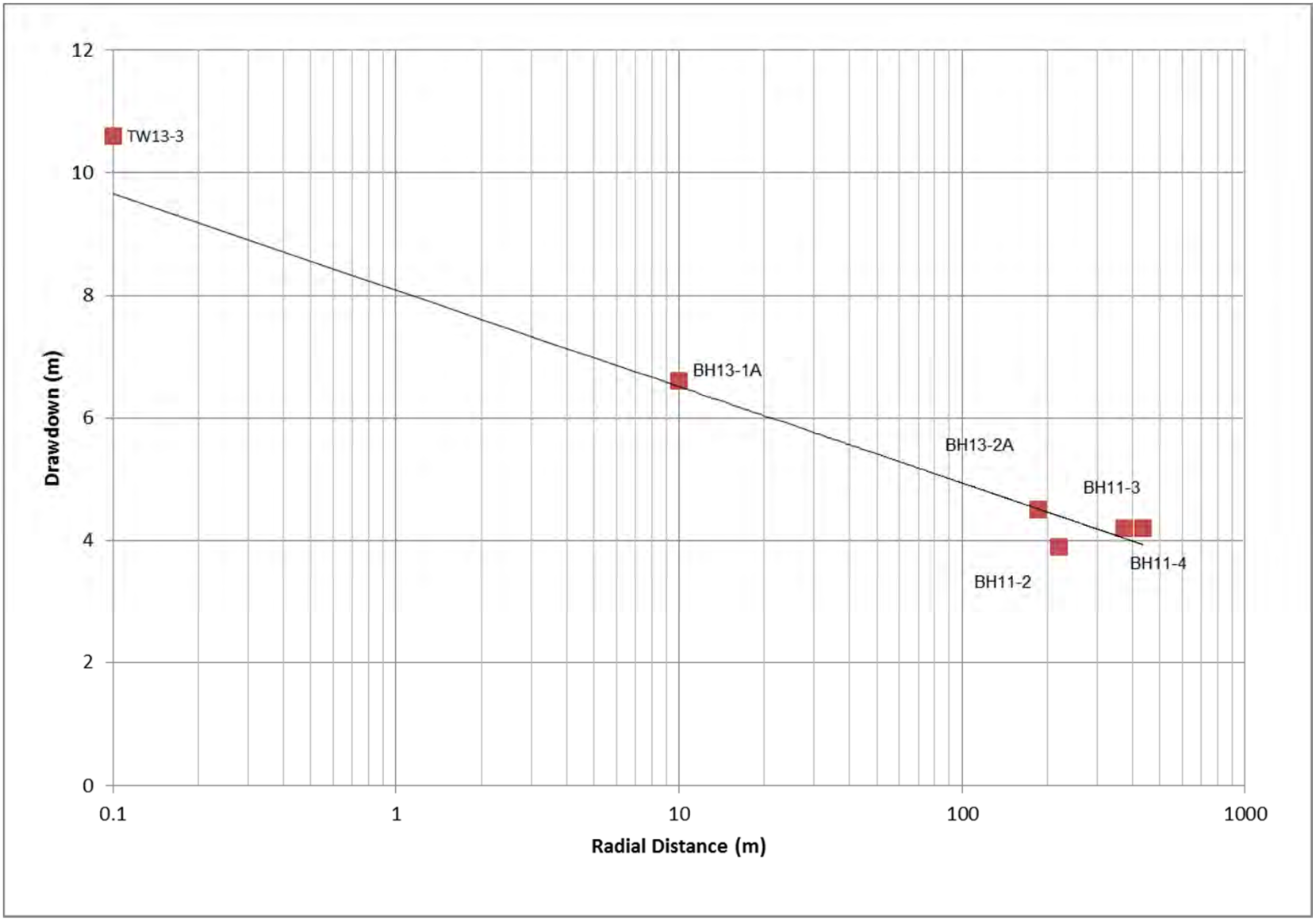
Golder Associates	CREATED MIB	PROJECT	14-Day Pumping Test at TW13-3 Nation Municipality	
	CHECKED BJV	TITLE	Time-Drawdown Plots (Pumping)	
	REVIEWED BJV	DATE Oct 2014	PROJECT NO. 12-1127-0115	FIGURE 2



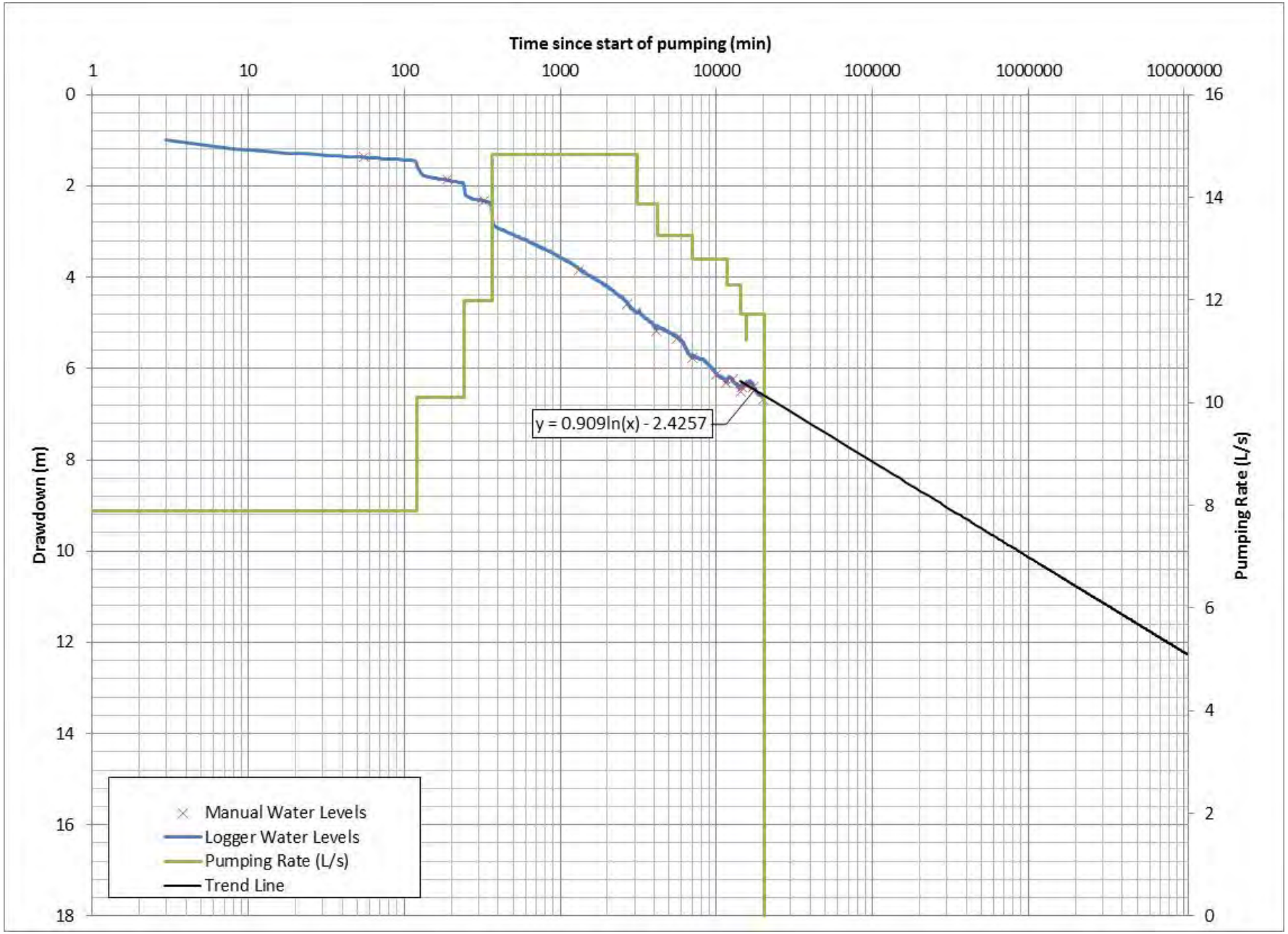
Golder Associates	CREATED MIB	PROJECT	14-Day Pumping Test at TW13-3 Nation Municipality
	CHECKED BJV	TITLE	Time-Drawdown Plots (Recovery)
	REVIEWED BJV	DATE Oct 2014	PROJECT NO. 12-1127-0115 FIGURE 3



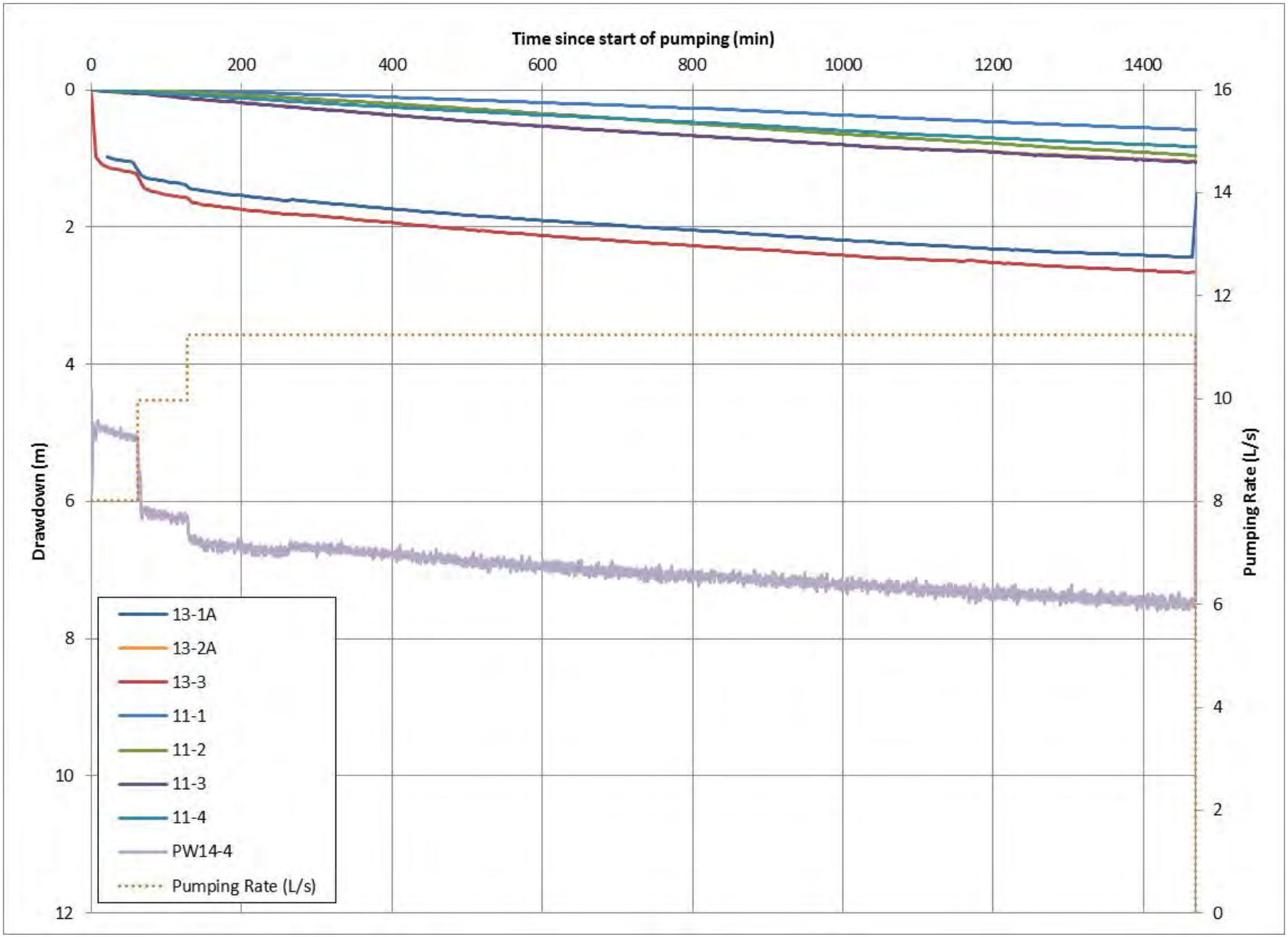
Golder Associates	CREATED MIB	PROJECT 14-Day Pumping Test at TW13-3 Nation Municipality		
	CHECKED BJV	TITLE Cooper-Jacob Analysis for TW13-3		
	REVIEWED BJV	DATE Oct 2014	PROJECT NO. 12-1127-0115	FIGURE 4



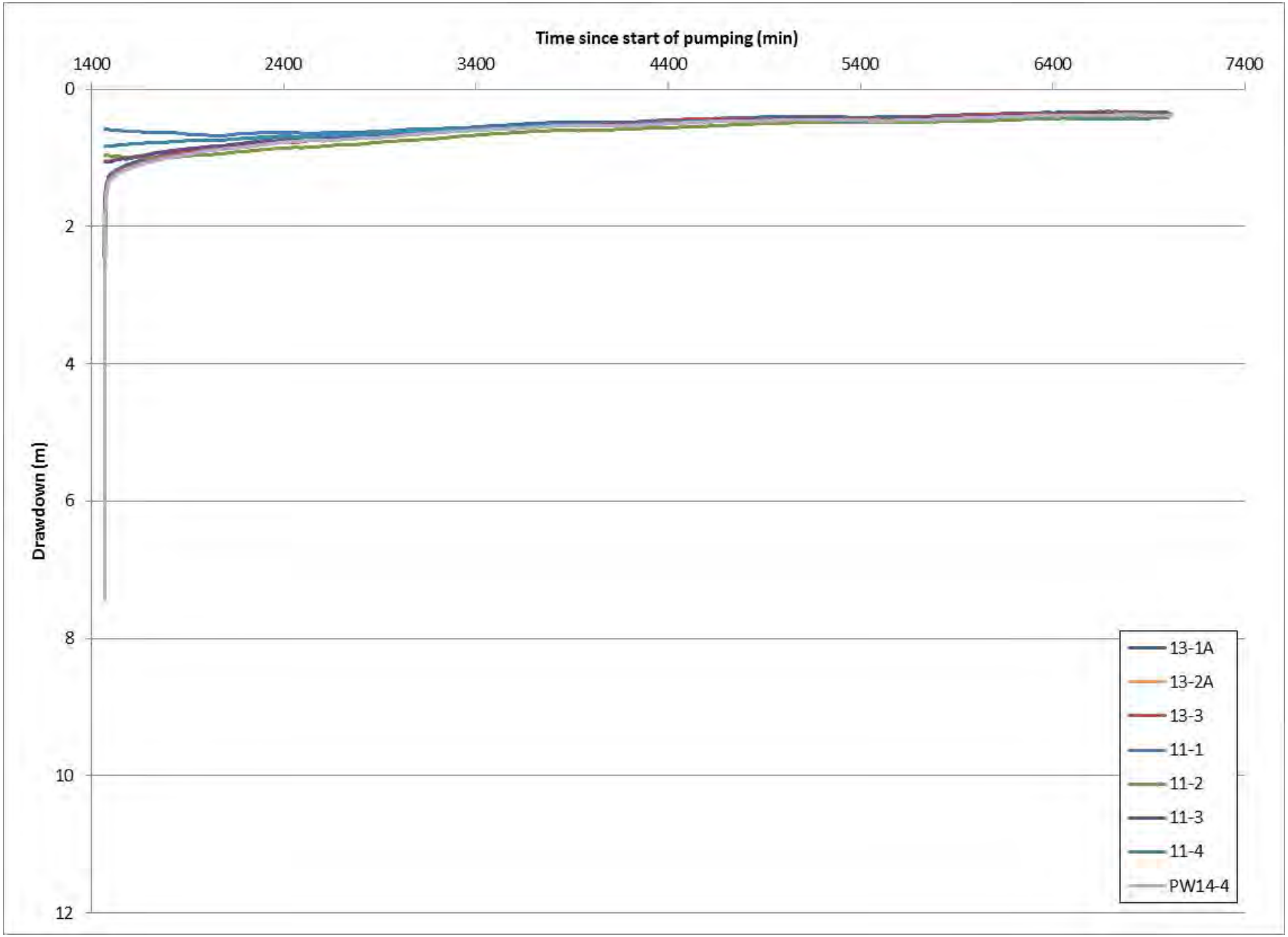
Golder Associates	CREATED MIB	PROJECT	14-Day Pumping Test at TW13-3 Nation Municipality
	CHECKED BJV	TITLE	Cooper-Jacob Distance-Drawdown Analysis
	REVIEWED BJV	DATE Oct 2014	PROJECT NO. 12-1127-0115 FIGURE 5



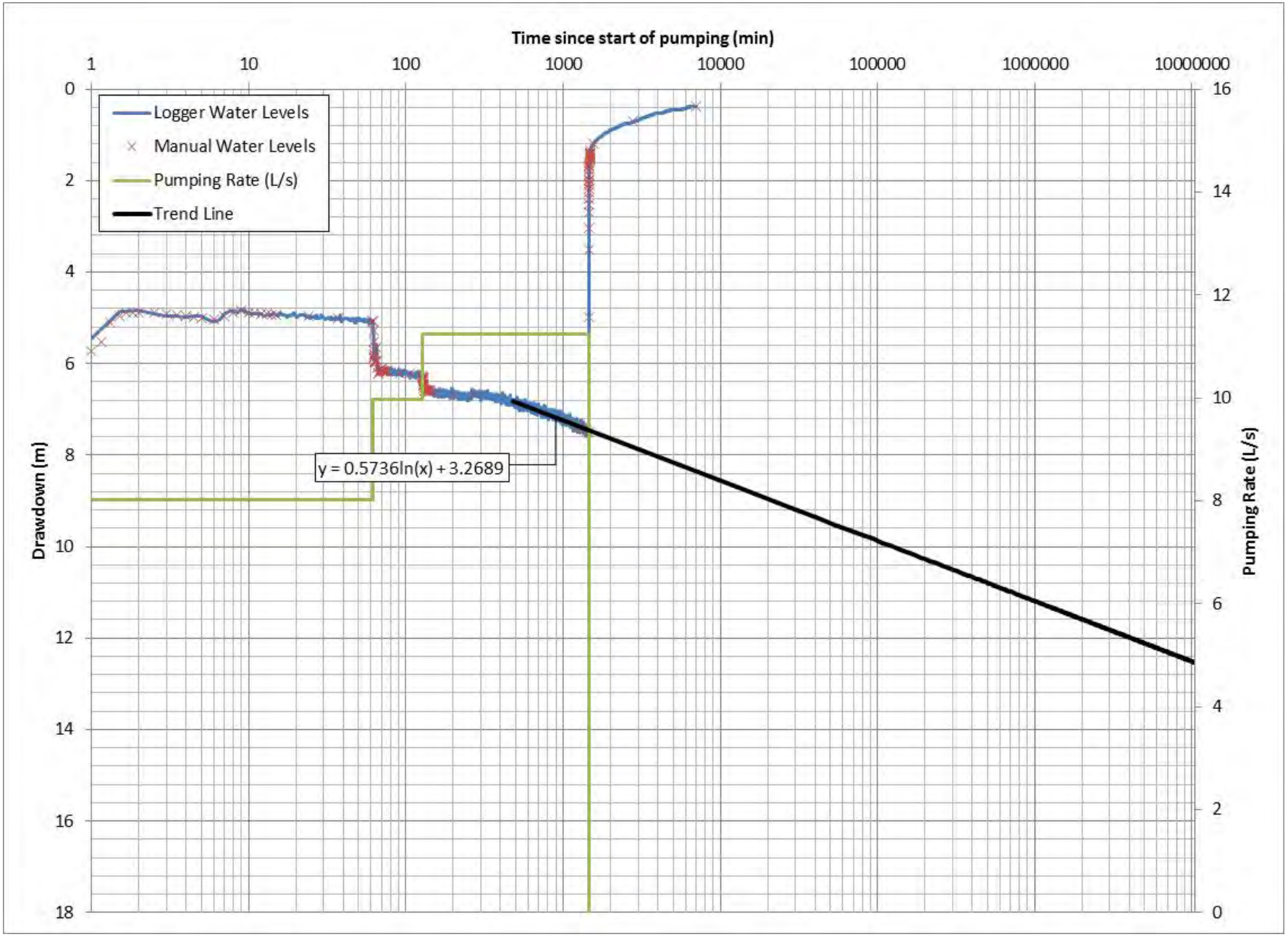
Golder Associates	CREATED MIB	PROJECT 14-Day Pumping Test at TW13-3 Nation Municipality		
	CHECKED BJV	TITLE Cooper-Jacob Analysis for BH13-1A		
	REVIEWED BJV	DATE Oct 2014	PROJECT NO. 12-1127-0115	FIGURE 6



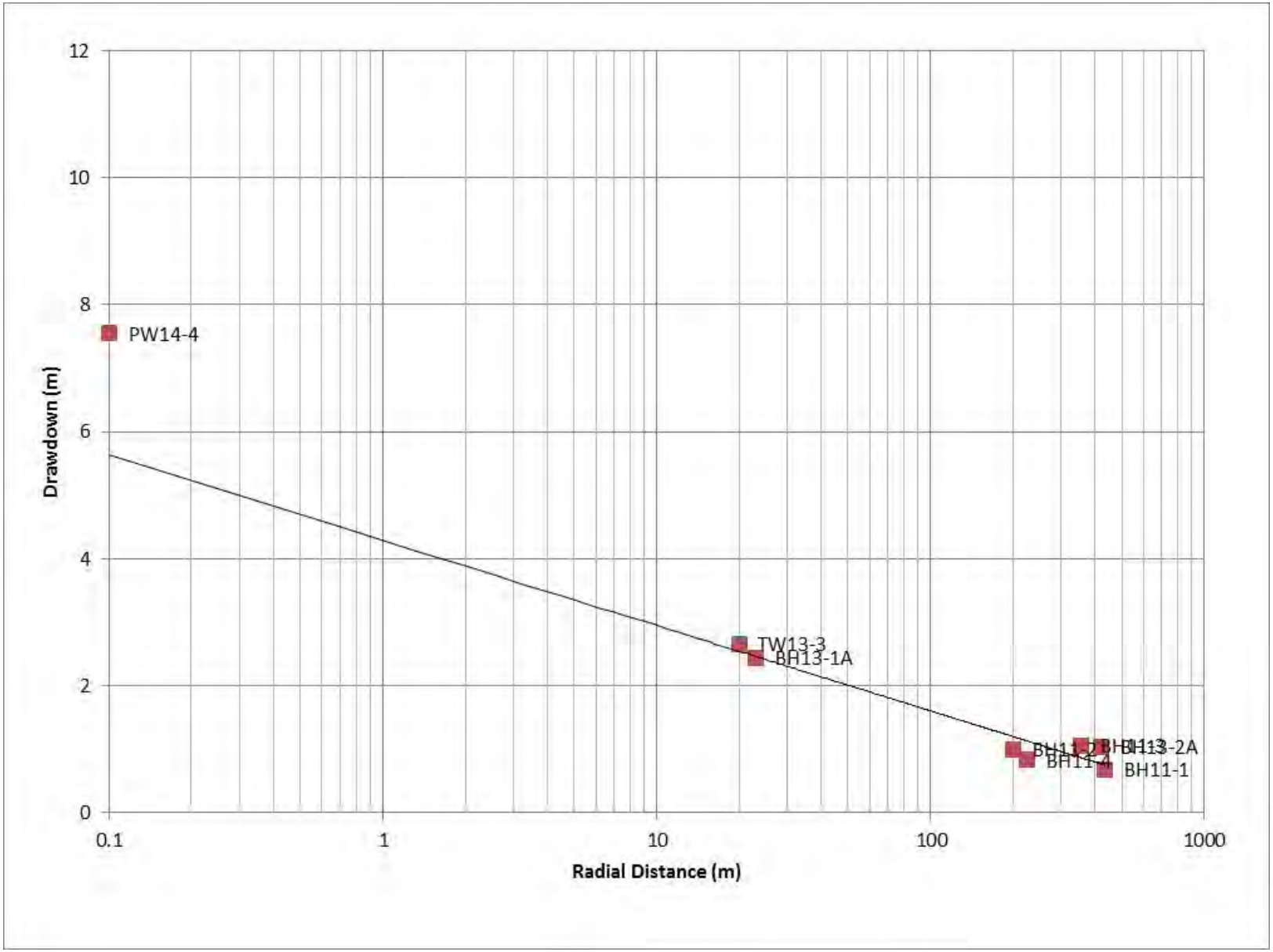
Golder Associates	CREATED CAMC	PROJECT	24-Hour Pumping Test at PW14-4 Nation Municipality
	CHECKED BJV	TITLE	Time-Drawdown Plots (Pumping)
	REVIEWED BJV	DATE Oct 2014	PROJECT NO. 12-1127-0115 FIGURE 7



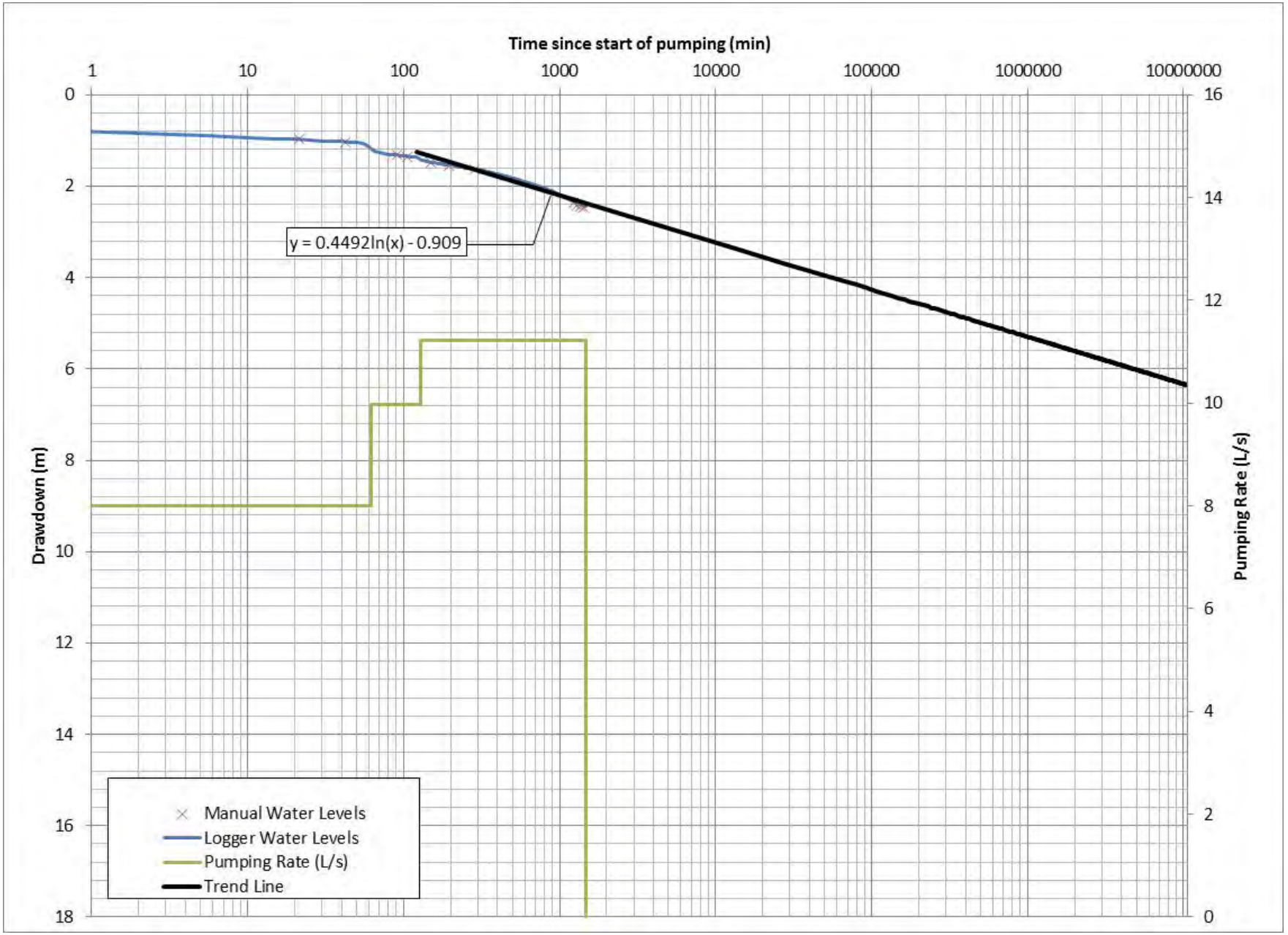
Golder Associates	CREATED CAMC	PROJECT	24-Hour Pumping Test at PW14-4 Nation Municipality	
	CHECKED BJV	TITLE	Time-Drawdown Plots (Recovery)	
	REVIEWED BJV	DATE Oct 2014	PROJECT NO. 12-1127-0115	FIGURE 8



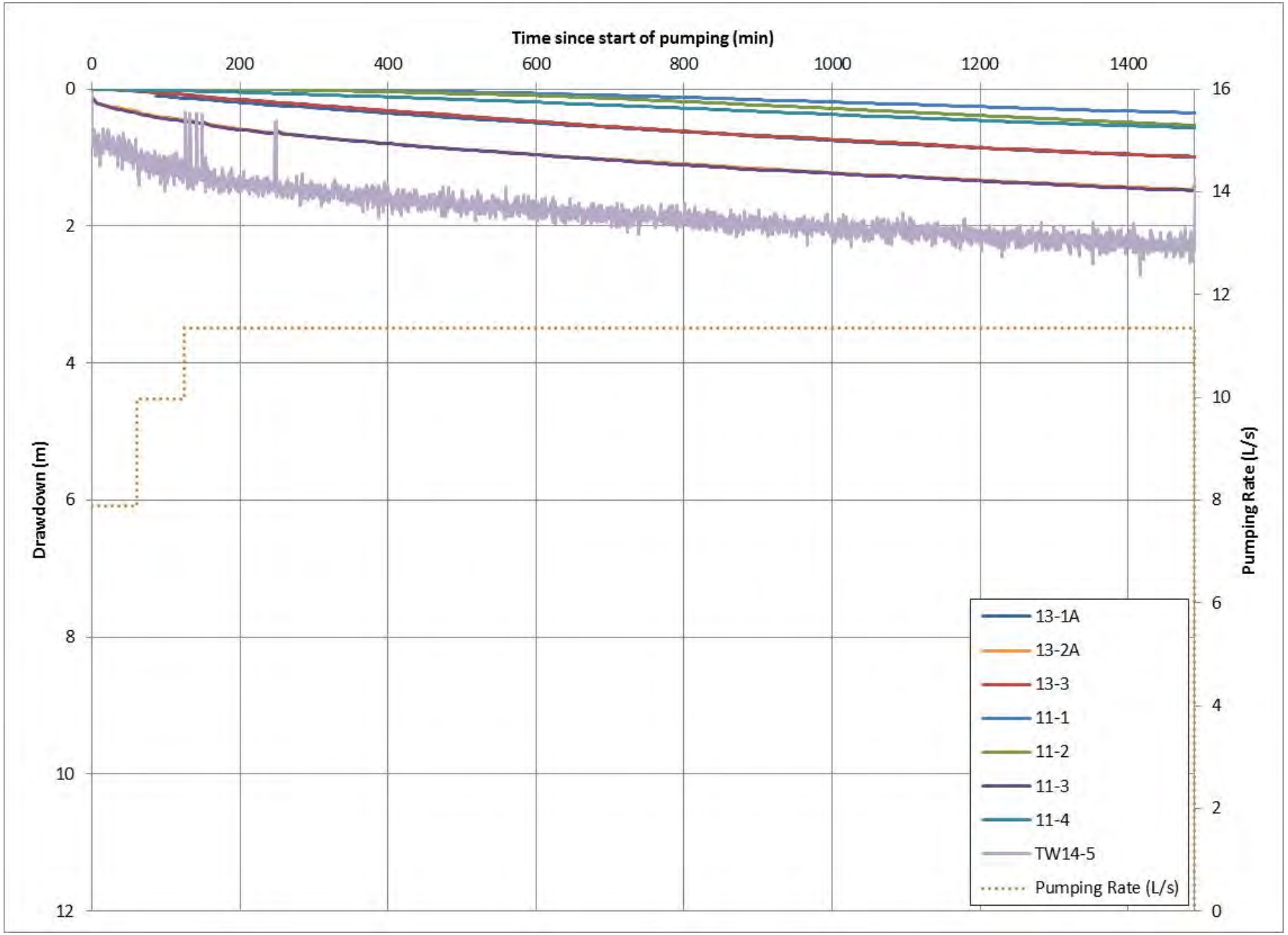
Golder Associates	CREATED: CAMC	PROJECT: 24-Hour Pumping Test at PW14-4 Nation Municipality	
	CHECKED: BJV	TITLE: Cooper-Jacob Analysis for PW14-4	
	REVIEWED: BJV	DATE: Oct 2014	PROJECT NO.: 12-1127-0115 FIGURE 9



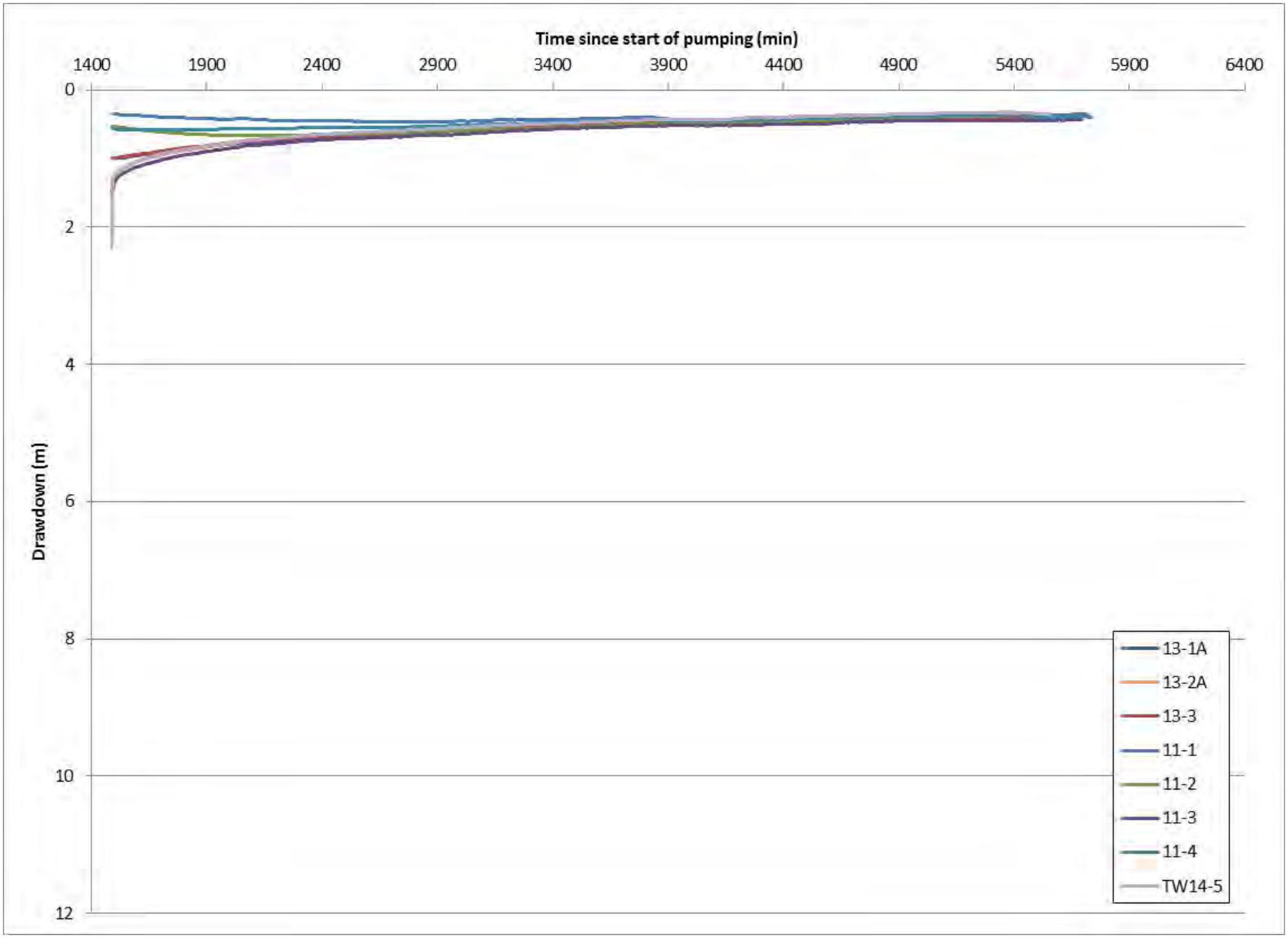
Golder Associates	CREATED CAMC	PROJECT	24-Hour Pumping Test at PW14-4 Nation Municipality
	CHECKED BJV	TITLE	Cooper-Jacob Distance-Drawdown Analysis
	REVIEWED BJV	DATE Oct 2014	PROJECT NO. 12-1127-0115 FIGURE 10



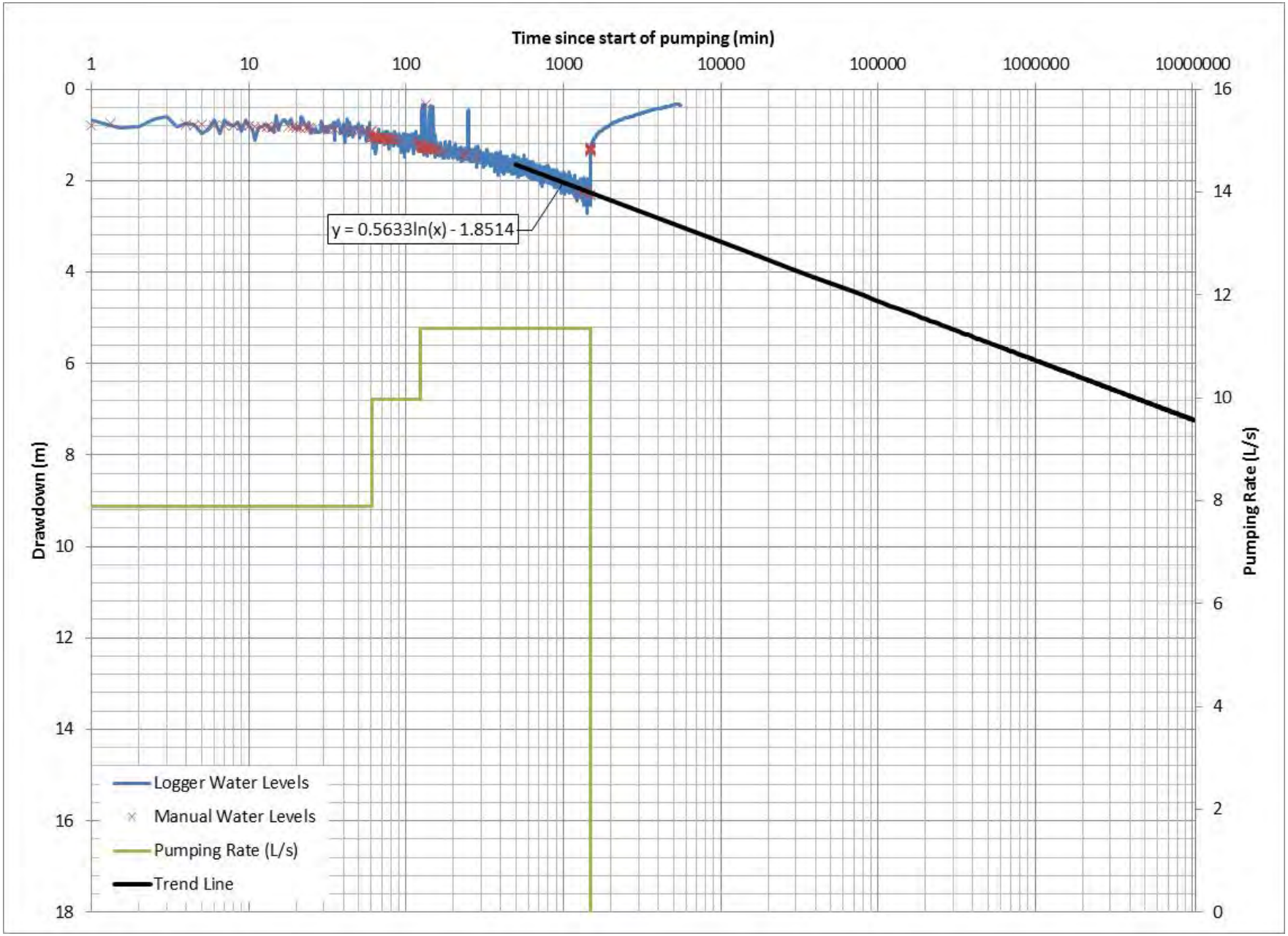
Golder Associates	CREATED CAMC	PROJECT	24-Hour Pumping Test at PW14-4 Nation Municipality
	CHECKED BJV	TITLE	Cooper-Jacob Analysis for BH13-1A
	REVIEWED BJV	DATE Oct 2014	PROJECT NO. 12-1127-0115 FIGURE 11



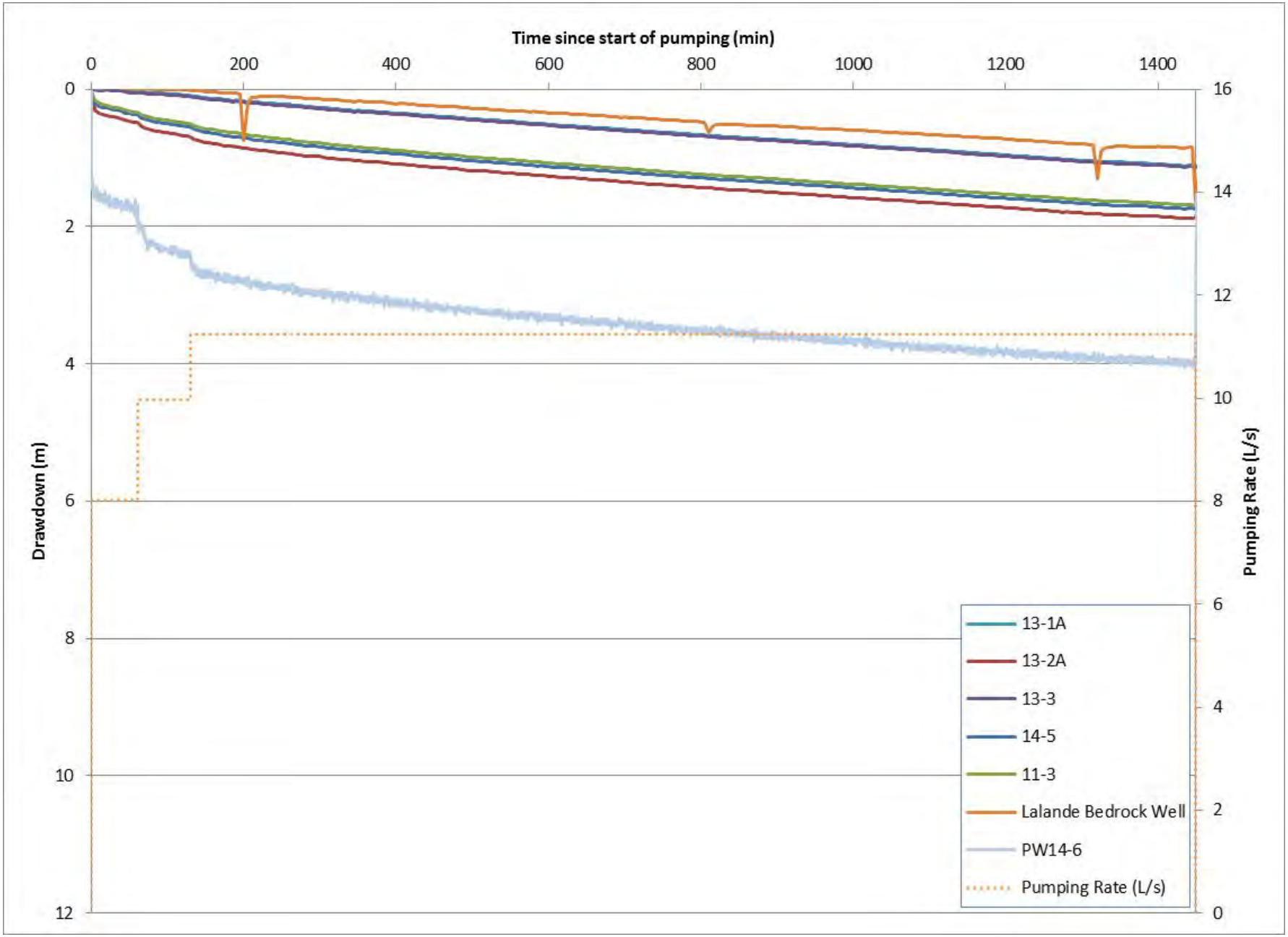
Golder Associates	CREATED CAMC	PROJECT	24-Hour Pumping Test at TW14-5 Nation Municipality
	CHECKED BJV	TITLE	Time-Drawdown Plots (Pumping)
	REVIEWED BJV	DATE Oct 2014	PROJECT NO. 12-1127-0115 FIGURE 12



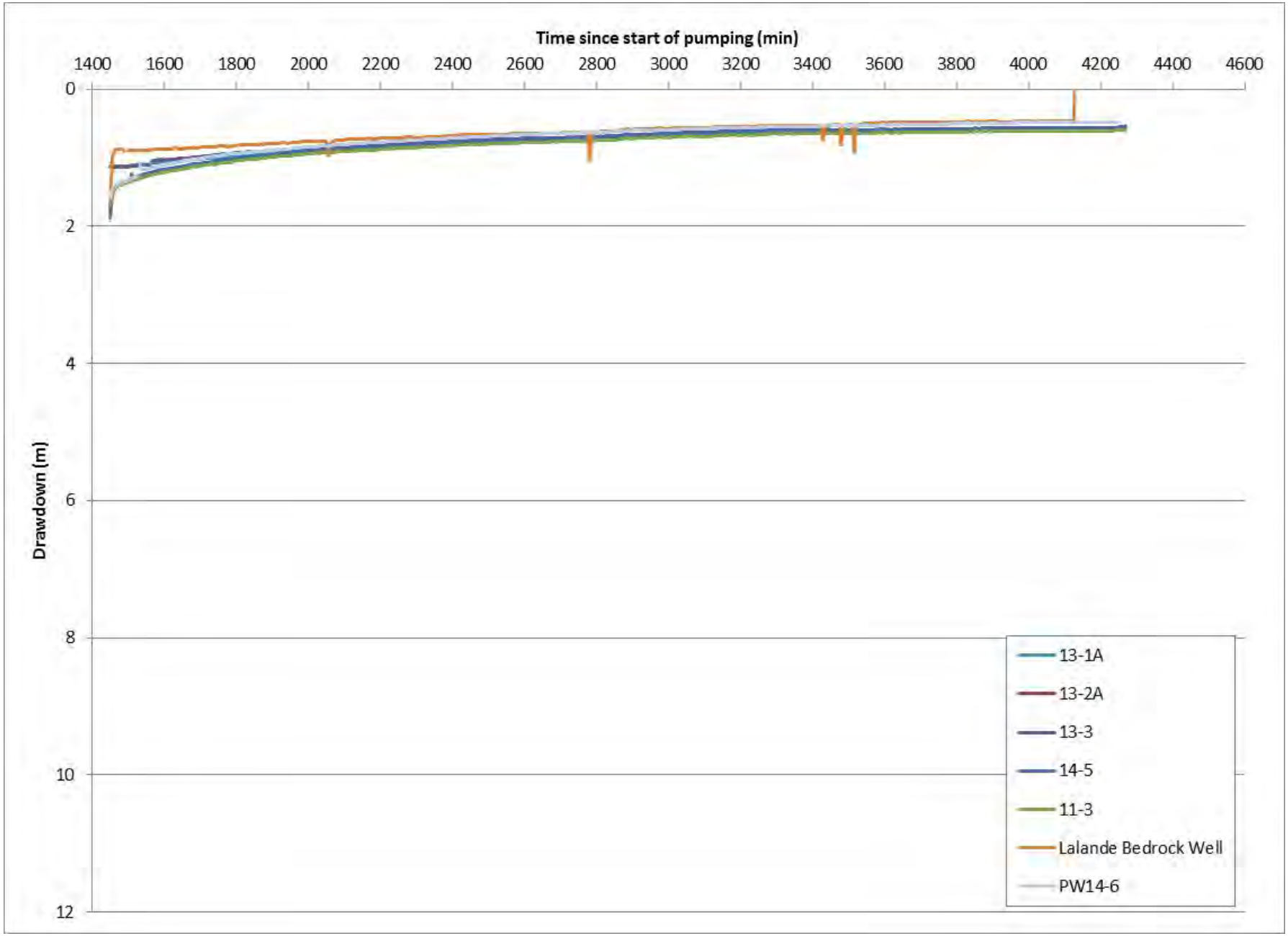
Golder Associates	CREATED CAMC	PROJECT 24-Hour Pumping Test at TW14-5 Nation Municipality		
	CHECKED BJV	TITLE Time-Drawdown Plots (Recovery)		
	REVIEWED BJV	DATE Oct 2014	PROJECT NO. 12-1127-0115	FIGURE 13



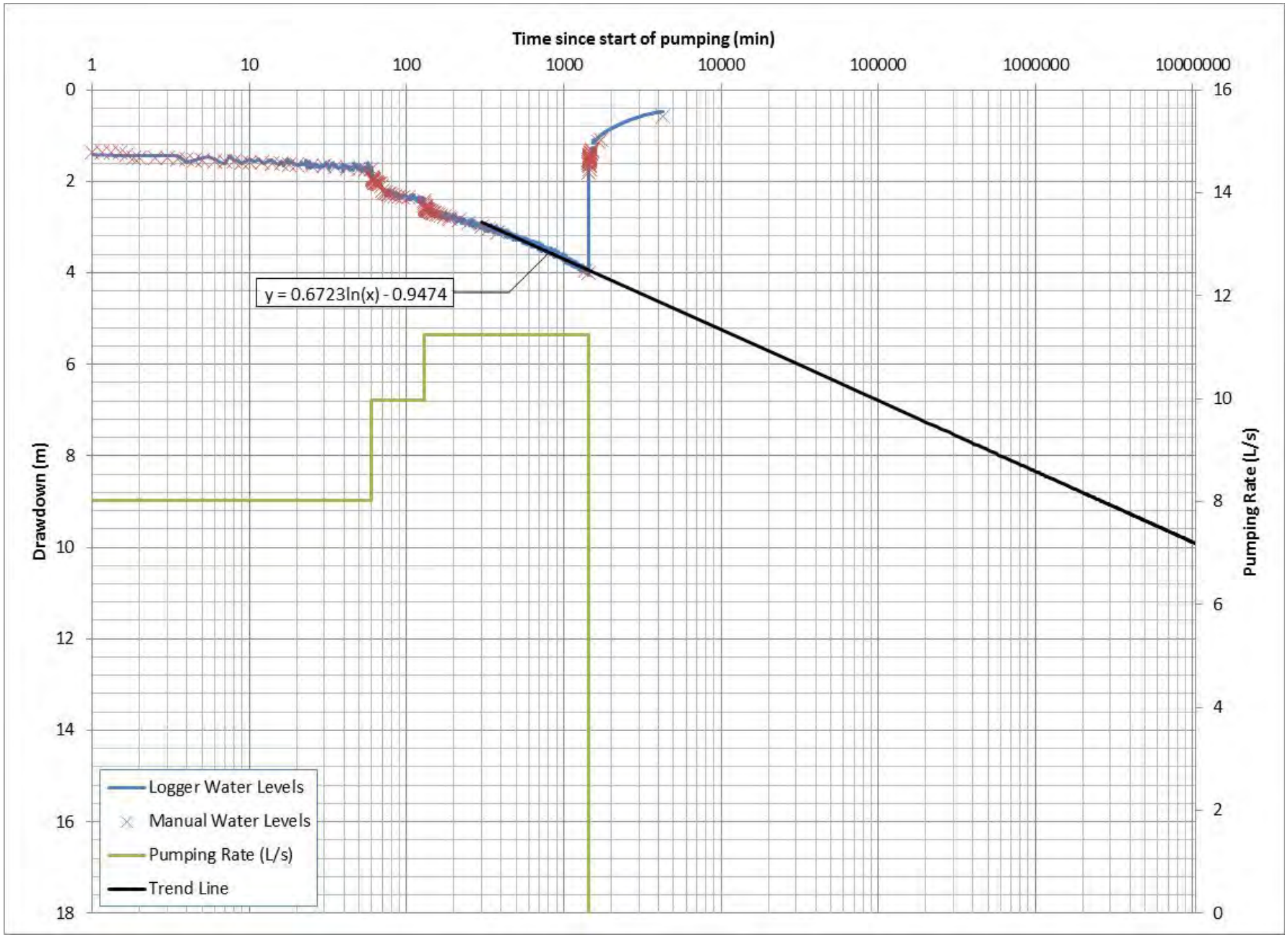
Golder Associates	CREATED CAMC	PROJECT	24-Hour Pumping Test at TW14-5 Nation Municipality	
	CHECKED BJV	TITLE	Cooper-Jacob Analysis for TW14-5	
	REVIEWED BJV	DATE Oct 2014	PROJECT NO. 12-1127-0115	FIGURE 14



Golder Associates	CREATED CAMC	PROJECT	24-Hour Pumping Test at PW14-6 Nation Municipality
	CHECKED BJV	TITLE	Time-Drawdown Plots (Pumping)
	REVIEWED BJV	DATE Oct 2014	PROJECT NO. 12-1127-0115 FIGURE 15



Golder Associates	CREATED CAMC	PROJECT	24-Hour Pumping Test at PW14-6 Nation Municipality
	CHECKED BJV	TITLE	Time-Drawdown Plots (Recovery)
	REVIEWED BJV	DATE Oct 2014	PROJECT NO. 12-1127-0115 FIGURE 16



PROJECT	24-Hour Pumping Test at PW14-6 Nation Municipality		
Golder Associates	CREATED CAMC	TITLE	Cooper-Jacob Analysis for PW14-6
	CHECKED BJV		
	REVIEWED BJV	DATE Oct 2014	PROJECT NO. 12-1127-0115 FIGURE 17

APPENDIX A

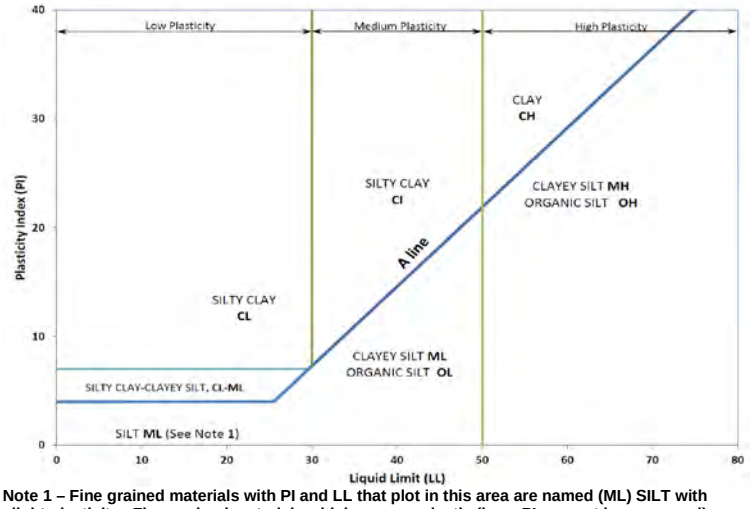
Borehole Logs

METHOD OF SOIL CLASSIFICATION

The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group	Type of Soil		Gradation or Plasticity	$Cu = \frac{D_{60}}{D_{10}}$	$Cc = \frac{(D_{30})^2}{D_{10} x D_{60}}$	Organic Content	USCS Group Symbol	Group Name
INORGANIC (Organic Content ≤30% by mass)	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with ≤12% fines (by mass)	Poorly Graded	<4	≤1 or ≥3	≤30%	GP	GRAVEL
				Well Graded	≥4	1 to 3		GW	GRAVEL
			Gravels with >12% fines (by mass)	Below A Line	n/a			GM	SILTY GRAVEL
				Above A Line	n/a			GC	CLAYEY GRAVEL
		SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	Sands with ≤12% fines (by mass)	Poorly Graded	<6	≤1 or ≥3		SP	SAND
				Well Graded	≥6	1 to 3		SW	SAND
			Sands with >12% fines (by mass)	Below A Line	n/a			SM	SILTY SAND
				Above A Line	n/a			SC	CLAYEY SAND

Organic or Inorganic	Soil Group	Type of Soil		Laboratory Tests	Field Indicators					Organic Content	USCS Group Symbol	Primary Name
					Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)			
INORGANIC (Organic Content ≤30% by mass)	FINE-GRAINED SOILS (≥50% by mass is smaller than 0.075 mm)	SILTS (Non-Plastic or PI and LL plot below A-Line on Plasticity Chart below)		Liquid Limit <50	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT
					Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SILT
					Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT
				Liquid Limit ≥50	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	MH	CLAYEY SILT
					None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	OH	ORGANIC SILT
		CLAYS (PI and LL plot above A-Line on Plasticity Chart below)		Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0% to 30% (see Note 2)	CL	SILTY CLAY
				Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium		CI	SILTY CLAY
				Liquid Limit ≥50	None	High	Shiny	<1 mm	High		CH	CLAY
HIGHLY ORGANIC SOILS (Organic Content >30% by mass)		Peat and mineral soil mixtures								30% to 75%	PT	SILTY PEAT, SANDY PEAT
		Predominantly peat, may contain some mineral soil, fibrous or amorphous peat								75% to 100%		PEAT



Note 1 – Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are named SILT.
Note 2 – For soils with <5% organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.

Dual Symbol — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML.
For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between "clean" and "dirty" sand or gravel.
For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML.
A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to ~~or~~ indicate~~s~~ a range of similar soil types within a stratum.

ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (*i.e.,* SAND and GRAVEL, SAND and CLAY)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.).

Cone Penetration Test (CPT)

An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
FS	Foil sample
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size
TP	Thin-walled, piston – note size
WS	Wash sample

SOIL TESTS

w	water content
PL , w_p	plastic limit
LL , w_L	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, Gs)
DS	direct shear test
GS	specific gravity
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight

1. Tests which are anisotropically consolidated prior to shear are shown as CAD, CAU.

NON-COHESIVE (COHESIONLESS) SOILS

Compactness[2]

Term	SPT 'N' (blows/0.3m)[1]
Very Loose	0 - 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects.
2. Definition of compactness descriptions based on SPT 'N' ranges from Terzaghi and Peck (1967) and correspond to typical average N_{60} values.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N'[1] (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.

Water Content

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	3.1416
ln x	natural logarithm of x
$\log_{10}$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
υ	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
σ_1, σ_2, σ_3	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation

* Density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

(a) Index Properties (continued)

w	water content
w_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index = $(w_l - w_p)$
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
c_v	coefficient of consolidation (vertical direction)
c_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = tan δ
c′	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p′	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

Notes: 1 $\tau = c' + \sigma' \tan \phi'$

2 shear strength = (compressive strength)/2

LITHOLOGICAL AND GEOTECHNICAL ROCK DESCRIPTION TERMINOLOGY

WEATHERINGS STATE

Fresh: no visible sign of weathering

Faintly weathered: weathering limited to the surface of major discontinuities.

Slightly weathered: penetrative weathering developed on open discontinuity surfaces but only slight weathering of rock material.

Moderately weathered: weathering extends throughout the rock mass but the rock material is not friable.

Highly weathered: weathering extends throughout rock mass and the rock material is partly friable.

Completely weathered: rock is wholly decomposed and in a friable condition but the rock and structure are preserved.

BEDDING THICKNESS

Description	Bedding Plane Spacing
Very thickly bedded	Greater than 2 m
Thickly bedded	0.6 m to 2 m
Medium bedded	0.2 m to 0.6 m
Thinly bedded	60 mm to 0.2 m
Very thinly bedded	20 mm to 60 mm
Laminated	6 mm to 20 mm
Thinly laminated	Less than 6 mm

JOINT OR FOLIATION SPACING

Description	Spacing
Very wide	Greater than 3 m
Wide	1 m to 3 m
Moderately close	0.3 m to 1 m
Close	50 mm to 300 mm
Very close	Less than 50 mm

GRAIN SIZE

Term	Size*
Very Coarse Grained	Greater than 60 mm
Coarse Grained	2 mm to 60 mm
Medium Grained	60 microns to 2 mm
Fine Grained	2 microns to 60 microns
Very Fine Grained	Less than 2 microns

Note: * Grains greater than 60 microns diameter are visible to the naked eye.

CORE CONDITION

Total Core Recovery (TCR)
The percentage of solid drill core recovered regardless of quality or length, measured relative to the length of the total core run.

Solid Core Recovery (SCR)
The percentage of solid drill core, regardless of length, recovered at full diameter, measured relative to the length of the total core run.

Rock Quality Designation (RQD)
The percentage of solid drill core, greater than 100 mm length, recovered at full diameter, measured relative to the length of the total core run. RQD varied from 0% for completely broken core to 100% for core in solid sticks.

DISCONTINUITY DATA

Fracture Index
A count of the number of discontinuities (physical separations) in the rock core, including both naturally occurring fractures and mechanically induced breaks caused by drilling.

Dip with Respect to Core Axis
The angle of the discontinuity relative to the axis (length) of the core. In a vertical borehole a discontinuity with a 90^{o} angle is horizontal.

Description and Notes
An abbreviation description of the discontinuities, whether naturally occurring separations such as fractures, bedding planes and foliation planes or mechanically induced features caused by drilling such as ground or shattered core and mechanically separated bedding or foliation surfaces. Additional information concerning the nature of fracture surfaces and infillings are also noted.

Abbreviations

JN	Joint	PL	Planar
FLT	Fault	CU	Curved
SH	Shear	UN	Undulating
VN	Vein	IR	Irregular
FR	Fracture	K	Slickensided
SY	Stylolite	PO	Polished
BD	Bedding	SM	Smooth
FO	Foliation	SR	Slightly Rough
CO	Contact	RO	Rough
AXJ	Axial Joint	VR	Very Rough
KV	Karstic Void		
MB	Mechanical Break		

PROJECT: 13-1127-0048

RECORD OF BOREHOLE: 13-1

SHEET 1 OF 3

LOCATION: N 5016849.3 ;E 475584.2

BORING DATE: March 26-27, 2013

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) WATER CONTENT PERCENT (Wp W Wl; 20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		71.47							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL		0.05							Bentonite Seal
		Very loose to loose brown SILTY fine SAND				GRAB	-				
				70.50							
1		Stiff to firm red brown SILTY CLAY, occasional grey brown silty sand seam		0.97	1	SS	4				
2					2	SS	WH				
3					3	73 TP	PM				Native Backfill
				67.51							
4		Firm to soft grey SILTY CLAY, occasional grey silty fine sand seam		3.96							
5					4	SS	WR				
6					5	73 TP	WR				Standpipe 'C'
7											
8					6	SS	PM				
9					7	73 TP	WR			C	
10											Native Backfill
11					8	SS	WR				
12					9	73 TP	WR				
				58.36							
13		Firm to stiff grey SILTY CLAY		13.11							
14					10	SS	WR				
15											Standpipe 'B'

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: HEC

CHECKED: CK

PROJECT: 13-1127-0048

RECORD OF BOREHOLE: 13-1

SHEET 2 OF 3

LOCATION: N 5016849.3 ;E 475584.2

BORING DATE: March 26-27, 2013

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
15	Power Auger 200 mm Diam. (Hollow Stem)	*--- CONTINUED FROM PREVIOUS PAGE ---*									
		Firm to stiff grey SILTY CLAY			11	73 TP	WR				Standpipe 'B'
16											
17					12	SS	PM				
				54.25 / 17.22							
		Firm to sfiff grey SILTY CLAY to CLAYEY SILT, with grey fine sand seams									
18					13	SS	WR				
19								>96			
				52.06 / 19.41							
		Loose to compact grey fine to medium SAND									
20					14	SS	29			M	Native Backfill
21											
22											
23					15	SS	4				
24											
25	Rotary Drill NW Casing				16	SS	20				
26											Pentlandite
27											Silica Sand
28											
29											38 mm Diam. PVC #10 Slot Screen 'A'
											Cave
30		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 75

LOGGED: HEC

CHECKED: CK

Golder Associates

MIS-BHS 001 1311270048.GPJ GAL-MIS.GDT 10/03/14 JM

PROJECT: 13-1127-0048

RECORD OF BOREHOLE: 13-1

SHEET 3 OF 3

LOCATION: N 5016849.3 ;E 475584.2

BORING DATE: March 26-27, 2013

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
30		*--- CONTINUED FROM PREVIOUS PAGE ---*		41.29							
	Rotary Drill / NQ Core	Grey SAND and GRAVEL, trace silt and clay, with cobbles (GLACIAL TILL)		30.18	17	NQ RC	DD				Cave
31				40.20	C1	NQ RC	DD				
		Slightly weathered dark grey to black SHALE BEDROCK, with grey limestone interbeds		31.27 39.90							
		End of Borehole		31.57							
32											W.L. in Standpipe 'C' at Elev. 70.7 m on May 30, 2013
33											W.L. in Standpipe 'B' at Elev. 70.3 m on May 30, 2013
34											W.L. in Standpipe 'A' at Elev. 67.0 m on May 30, 2013
35											
36											
37											
38											
39											
40											
41											
42											
43											
44											
45											

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: HEC

CHECKED: CK

MIS-BHS 001 1311270048.GPJ GAL-MIS.GDT 10/03/14 JM

PROJECT: 13-1127-0048

RECORD OF DRILLHOLE: 13-1

SHEET 1 OF 1

LOCATION: N 5016849.3 ;E 475584.2

DRILLING DATE: March 26-27, 2013

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 55

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU- Curved; UN- Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	COLOUR / % RETURN / FLUSH	RECOVERY: TOTAL CORE %	RECOVERY: SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jcon	Jr	Ja	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	
		BEDROCK SURFACE		40.20																
	RD NQ	Slightly weathered dark grey to black SHALE BEDROCK, with grey limestone interbeds		31.27 / 39.90	1	100														Cave
		End of Drillhole		31.57																
32																				W.L. in Standpipe 'C' at Elev. 70.7 m on May 30, 2013
33																				W.L. in Standpipe 'B' at Elev. 70.3 m on May 30, 2013
34																				W.L. in Standpipe 'A' at Elev. 67.0 m on May 30, 2013
35																				
36																				
37																				
38																				
39																				
40																				
41																				
42																				
43																				
44																				
45																				
46																				

DEPTH SCALE

1 : 75

LOGGED: HEC

CHECKED: CK

Golder Associates

MIS-RCK 004 1311270048.GPJ GAL-MISS.GDT 10/03/14 JM

PROJECT: 13-1127-0048

RECORD OF BOREHOLE: 13-2

SHEET 1 OF 3

LOCATION: N 5016439.6 ;E 475740.8

BORING DATE: April 1-4, 2013

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) WATER CONTENT PERCENT (Wp W Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		71.10							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL		0.08							Bentonite Seal
		Loose grey brown SILTY fine SAND									
1				70.03	1	SS	6				
		Stiff to firm red brown to grey brown SILTY CLAY		1.07							Native Backfill
2					2	SS	WH				
					3	73 TP	PH				Standpipe 'C'
3					4	SS	WH				
4											
				66.53							
		Firm to soft grey to red grey SILTY CLAY, occasional grey silty sand seam		4.57	5	73 TP	PM			C	
5											
6					6	SS	2				Native Backfill
7											
8					7	73 TP	PM			C	
9											
					8	SS	WH				
10											Standpipe 'B'
11					9	73 TP	PM			C	
12											
					10	SS	PM				
13											Native Backfill
14					11	73 TP	WR			C	
				56.47							
		Firm to stiff grey SILTY CLAY		14.63							
15											

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: HEC

CHECKED: CK

PROJECT: 13-1127-0048

RECORD OF BOREHOLE: 13-2

SHEET 2 OF 3

LOCATION: N 5016439.6 ;E 475740.8

BORING DATE: April 1-4, 2013

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Q - ●, U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT; Wp, W, Wl	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
15	Power Auger 200 mm Diam. (Hollow Stem)	Firm to stiff grey SILTY CLAY			12	SS	WH				
16											
17					13	73 TP	WR				
18											
19				52.03	14	SS	PM	>96 +			
		Very dense grey fine to medium SAND		19.07							
20					15	SS	82				
21											
22											Native Backfill
				48.24							
23	Rotary Drill NW Casing	Compact grey fine to medium SAND		22.86	16	SS	30			M	
24											
25											
				45.19							
26		Dense to very dense grey SAND and GRAVEL, trace silt and clay, with cobbles and boulders (GLACIAL TILL)		25.91	17	SS	32			MH	
27											
28											
29					18	SS	54				
30											Pentlandite
		CONTINUED NEXT PAGE									

DEPTH SCALE

1 : 75

LOGGED: HEC

CHECKED: CK

Golder Associates

MIS-BHS 001 1311270048.GPJ GAL-MIS.GDT 10/03/14 JM

PROJECT: 13-1127-0048

RECORD OF BOREHOLE: 13-2

SHEET 3 OF 3

LOCATION: N 5016439.6 ;E 475740.8

BORING DATE: April 1-4, 2013

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
30	Rotary Drill / NW Casing	Dense to very dense grey SAND and GRAVEL, trace silt and clay, with cobbles and boulders (GLACIAL TILL)									Pentlandite
31											Silica Sand
32					19	NQ RC	DD				38 mm Diam. PVC #10 Slot Screen 'A'
33	Rotary Drill / NQ Core			37.85							
		Slightly weathered to fresh laminated to medium bedded dark grey to black SHALE BEDROCK, with grey limestone interbeds		33.25							
34					C1	NQ RC	DD				Bentonite Seal
				36.48							
		End of Borehole		34.62							
35											W.L. in Standpipe 'C' at Elev. 70.1 m on May 30, 2013
36											W.L. in Standpipe 'B' at Elev. 70.1 m on May 30, 2013
											W.L. in Standpipe 'A' at Elev. 66.8 m on May 30, 2013
37											
38											
39											
40											
41											
42											
43											
44											
45											

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: HEC

CHECKED: CK

MIS-BHS 001 1311270048.GPJ GAL-MIS.GDT 10/03/14 JM

PROJECT: 13-1127-0048

RECORD OF DRILLHOLE: 13-2

SHEET 1 OF 1

LOCATION: N 5016439.6 ;E 475740.8

DRILLING DATE: April 1-4, 2013

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 55

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU- Curved; UN- Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	COLOUR % RETURN / FLUSH	RECOVERY: TOTAL CORE %	RECOVERY: SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jcon	Jr	Ja	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	
		BEDROCK SURFACE		37.85																
34	Rotary Drill / NQ Core	Slightly weathered to fresh laminated to medium bedded dark grey to black SHALE BEDROCK, with grey limestone interbeds		33.25	1	100														Bentonite Seal
		End of Drillhole		36.48 34.62																
35																				W.L. in Standpipe 'C' at Elev. 70.1 m on May 30, 2013
36																				W.L. in Standpipe 'B' at Elev. 70.1 m on May 30, 2013
37																				W.L. in Standpipe 'A' at Elev. 66.8 m on May 30, 2013
38																				
39																				
40																				
41																				
42																				
43																				
44																				
45																				
46																				
47																				
48																				

DEPTH SCALE
1 : 75

Golder Associates

LOGGED: HEC
CHECKED: CK

MIS-RCK 004 1311270048.GPJ GAL-MISS.GDT 10/03/14 JM

TW13-3

Ontario — Ministry of the Environment

Well Tag No. (Plate Sticker Below): **Tag#: A153095**

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Measurements recorded in: [X] Metric [ ] Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	
	CORP. OF THE NATION MUNICIPALITY		[ ] Well Constructed by Well Owner

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
958 ROUTE 500 W RR#3	CASSELMAN	ON	K0A1M0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
732 ST. PIERRE ROAD	RUSSELL	16	6

County/District/Municipality	City/Town/Village	Province	Postal Code
PRESCOTT & RUSSELL	EMBRUN / LIMOGES	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	475566	5016832		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
BROWN	TOPSOIL	SILT CLAY		0	.9m
RED	CLAY	SILT		.9	3.9
GREY	CLAY		SOFT	3.9	13.6
GREY	CLAY		SOFT TO FIRM	13.6	19.2
GREY	SAND	SILT CLAY		19.2	20.7
GREY	SAND		FINE TO MED	20.7	30.2
BLACK	SHALE			30.2	30.6

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
0	16.8m	BENTONITE GROUT	1850 Lbs.

Method of Construction

[ ] Cable Tool [ ] Diamond
[X] Rotary (Conventional) [ ] Jetting
[ ] Rotary (Reverse) [ ] Driving
[ ] Boring [ ] Digging
[ ] Air percussion
[ ] Other, specify

Well Use

[ ] Public [ ] Commercial [ ] Not used
[ ] Domestic [X] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[ ] Industrial
[ ] Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.5	STEEL	.219	+.6	21.3
14	STEEL	.219	20.3	21.3

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
15	S STEEL	.020	22.6	29.9m
15	S STEEL	.016	21.3	22.6

Status of Well

[X] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[ ] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[ ] Abandoned, other, specify
[ ] Other, specify

Water Details

Water found at Depth (m/ft)	Kind of Water	Gas	Other, specify
29.9m	[ ] Fresh [X] Untested	[ ]	
	[ ] Fresh [ ] Untested	[ ]	
	[ ] Fresh [ ] Untested	[ ]	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	6	40 cm
6	30	32 cm

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
ALLAN WRIGHT WATER WELLS	5528

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
4121 Hwy 93	HILLSDALE	ON	L0L1V0	awwwsbell@hotmail.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
705 835 5646	ALLAN WRIGHT	2976		

Results of Well Yield Testing

After test of well yield, water was:
[X] Clear and sand free
[ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 18.9 m

Pumping rate (l/min / GPM): 1041 L/m

Duration of pumping: 72 hrs + 0 min

Final water level end of pumping (m/ft): 16.66 m

If flowing give rate (l/min / GPM): —

Recommended pump depth (m/ft):

Recommended pump rate (l/min / GPM):

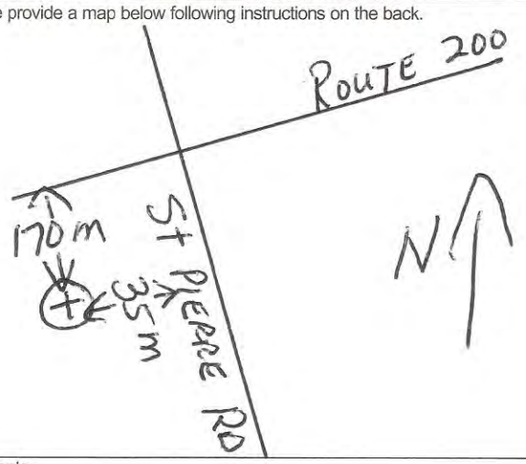
Well production (l/min / GPM):

Disinfected? [X] Yes [ ] No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	5.89m		
1	12.70	1	
2	13.02	2	
3	13.26	3	
4	13.37	4	
5	13.47	5	
10	13.71	10	
15	13.82	15	
20	13.88	20	
25	13.91	25	
30	13.95	30	
40	14.02	40	
50	14.51	50	
60	14.68	60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well owner's information package delivered: [ ] Yes [X] No

Date Package Delivered: —

Date Work Completed: 2013/11/24

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Ontario Ministry of the Environment

Well Tag Number (Place Sticker and/or Print Below) **Tag#: A153126**

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Measurements recorded in: [X] Metric [ ] Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
CORP. OF THE NATION MUNICIPALITY			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
958 ROUTE 500 W RR3	CASSELMAN	ON	K0A1M0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
732 ST PIERRE ROAD	RUSSELL	16	6

County/District/Municipality	City/Town/Village	Province	Postal Code
PRESCOTT & RUSSELL	EMBRUN/LIMOGES	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	575589	5016835		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
BROWN	TOPSOIL	SILT CLAY		0	.9 m
RED	CLAY	SILT		.9	3.9
GREY	CLAY		SOFT	3.9	13.6
GREY	CLAY		SOFT TO FIRM	13.6	19.2
GREY	SAND	SILT	CLAY LAYERS	19.2	20.7
GREY	SAND		FINE TO MED.	20.7	30.2
BLACK	SHALE			30.2	30.6

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	15 m	BENTONITE GROUT	800 Ltr
15	16.5	HOLEPLUG.	30 KG.

Results of Well Yield Testing

After test of well yield, water was: [X] Clear and sand free [ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ___ hrs + ___ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

Well production (l/min / GPM)

Disinfected? [X] Yes [ ] No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level	4.92		
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Method of Construction

[ ] Cable Tool [ ] Diamond [X] Rotary (Conventional) [ ] Jetting [ ] Rotary (Reverse) [ ] Driving [ ] Boring [ ] Digging [ ] Air percussion [ ] Other, specify

Well Use

[ ] Public [ ] Commercial [ ] Not used [ ] Domestic [X] Municipal [ ] Dewatering [ ] Livestock [ ] Test Hole [ ] Monitoring [ ] Irrigation [ ] Cooling & Air Conditioning [ ] Industrial [ ] Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
205 mm	STEEL	.322	+.6	21.5
200 mm	S STEEL	0.5/0.7	21.5	20.5

Status of Well

[X] Water Supply [ ] Replacement Well [ ] Test Hole [ ] Recharge Well [ ] Dewatering Well [ ] Observation and/or Monitoring Hole [ ] Alteration (Construction) [ ] Abandoned, Insufficient Supply [ ] Abandoned, Poor Water Quality [ ] Abandoned, other, specify [ ] Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To
20 cm	S STEEL	020	25.5	30.2
20 cm	S STEEL	016	21.5	25.5

Map of Well Location

Please provide a map below following instructions on the back.

Water Details

Water found at Depth	Kind of Water
21 m (m/ft)	[ ] Fresh [X] Untested [ ] Gas [ ] Other, specify
(m/ft)	[ ] Fresh [ ] Untested [ ] Gas [ ] Other, specify
(m/ft)	[ ] Fresh [ ] Untested [ ] Gas [ ] Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	30.6	40 cm

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
ALLAN WRIGHT WATER WELLS	5528

Business Address (Street Number/Name)	Municipality
4121 HWY 93	HILLSDALE

Province	Postal Code	Business E-mail Address
ON	L0L1V0	awww@bellnet.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
7058355646	GAVIN WRIGHT

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2976	[signature]	Y Y Y Y M M D D

Comments:

Well owner's information package delivered	Date Package Delivered	Date Work Completed
[ ] Yes [ ] No	Y Y Y Y M M D D	Y Y Y Y M M D D

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Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: [X] Metric [ ] Imperial

Well Tag No. (Place Sticker and Print Below) **Tag#: A153127**

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	Well Constructed by Well Owner
	CORP OF THE NATION MUNICIPALITY		[ ]

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
958 ROUTE 500W RR#3	CASSELMAN	ON	K0A1M0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
732 ST PIERRE ROAD	RUSSELL	16	6

County/District/Municipality	City/Town/Village	Province	Postal Code
PRESCOTT & RUSSELL	EMBRUN / LIMOGES	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	475726	5016463		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
	TOPSOIL			0	1.5
RED	CLAY			1.5	4.6
GREY	CLAY			4.6	6.1
RED/GREY	CLAY	SILT LAYERS.		6.1	15.5
BLUE	CLAY			15.5	18.0
GREY	SAND			18.0	26.8
GREY	SAND GRAVEL			26.8	29.0
BLACK	SHALE			29.0	29.3

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	12m	BENTONITE GROUT	500Lbs
12	13m	HOLE PLUG	20KG.

Method of Construction

[ ] Cable Tool [ ] Diamond
[X] Rotary (Conventional) [ ] Jetting
[ ] Rotary (Reverse) [ ] Driving
[ ] Boring [ ] Digging
[ ] Air percussion
[ ] Other, specify

Well Use

[ ] Public [ ] Commercial [ ] Not used
[ ] Domestic [X] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[ ] Industrial
[ ] Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.5	STEEL	.219	+.6	19.0
14	STEEL	.219	18.0	19.0

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
15	S STEEL	025	27.4	28.4
15	S STEEL	020	19.0	27.4

Status of Well

[ ] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[X] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[ ] Abandoned, other, specify
[ ] Other, specify

Water Details

Water found at Depth (m/ft)	Kind of Water	Hole Diameter Depth From (m/ft)	Depth To (m/ft)	Diameter (cm/in)
19m [ ] Gas	[ ] Fresh [X] Untested [ ] Other, specify	0	29.0	26cm
[ ] Gas	[ ] Fresh [ ] Untested [ ] Other, specify			
[ ] Gas	[ ] Fresh [ ] Untested [ ] Other, specify			

Results of Well Yield Testing

After test of well yield, water was:
[X] Clear and sand free
[ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

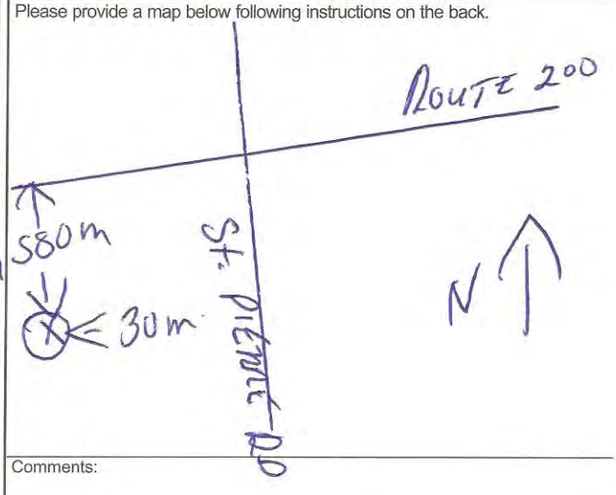
Well production (l/min / GPM)

Disinfected? [X] Yes [ ] No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	4.76			
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
ALLAN WRIGHT WATER WELLS	5528

Business Address (Street Number/Name)	Municipality
4121 HWY 93	HILLDALE

Province	Postal Code	Business E-mail Address
ON	L0M1V0	awww@bellnet.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
705 835 5646	GAUTHIER, WRIGHT

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2976		

Well owner's information package delivered: [ ] Yes [ ] No

Date Package Delivered: Y Y Y Y M M D D

Date Work Completed: Y Y Y Y M M D D

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Audit No. Z 176872

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Ontario — Ministry of the Environment

Well Tag No. (Place Sticker and/or Print Below) **Tag#: A153120**

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Measurements recorded in: [X] Metric [ ] Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
	CORP. OF THE NATION MUNICIPALITY		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
958 ROUTE 500 W RR 3	CASSELMAN	ON	K0A 1M0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
732 ST PIERRE RD.	RUSSELL	16	6

County/District/Municipality	City/Town/Village	Province	Postal Code
PRESCOTT + RUSSELL	EMBRUN/LIMOGES	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	475919	5016346		14-6

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
	TOPSOIL			0	1.5
RED	CLAY			1.5	4.5
GREY	CLAY	SILT LAYERS		4.5	15.5
BLUE	CLAY			15.5	17.5
GREY	SAND			17.5	27.5
GREY	SAND	GRAVEL		27.5	30.1
BLACK	SHALE			30.1	30.5

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
0	16.8m	BENSONITE GROUT	850 Ltr.

Method of Construction

[ ] Cable Tool [ ] Diamond
[X] Rotary (Conventional) [ ] Jetting
[ ] Rotary (Reverse) [ ] Driving
[ ] Boring [ ] Digging
[ ] Air percussion
[ ] Other, specify

Well Use

[ ] Public [ ] Commercial [ ] Not used
[ ] Domestic [X] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[ ] Industrial
[ ] Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
205mm	STEEL	.322	+.6	21.5
200mm	S STEEL	0 SLOT	20.5	21.5

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
200mm	S STEEL	035	28.5	30.0
200mm	S STEEL	020	21.5	28.5

Status of Well

[X] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[ ] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[ ] Abandoned, other, specify
[ ] Other, specify

Water Details

Water found at Depth (m/ft)	Kind of Water	
21 (m/ft)	[ ] Fresh [X] Untested [ ] Gas [ ] Other, specify	
(m/ft)	[ ] Fresh [ ] Untested [ ] Gas [ ] Other, specify	
(m/ft)	[ ] Fresh [ ] Untested [ ] Gas [ ] Other, specify	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	30.5	40cm

Results of Well Yield Testing

After test of well yield, water was:
[X] Clear and sand free
[ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM): 11.2 L/m

Duration of pumping: 24 hrs + ____ min

Final water level end of pumping (m/ft): 9.22 m

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

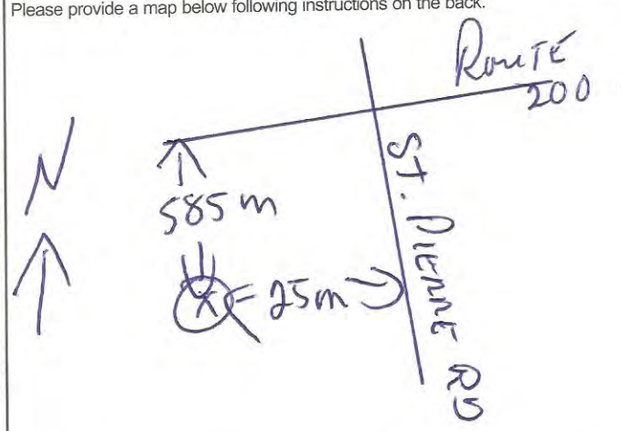
Well production (l/min / GPM)

Disinfected? [X] Yes [ ] No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	5.22		
1	7.78	1	6.78
2	7.81	2	6.77
3	7.83	3	6.74
4	7.83	4	6.73
5	7.84	5	6.71
10	7.87	10	6.85
15	7.90	15	6.65
20	7.92	20	6.65
25	7.94	25	6.63
30	7.94	30	6.61
40	7.98	40	6.59
50	8.02	50	6.54
60	8.03	60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
ALAN WRIGHT WATER WELLS	5528

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
4121 Hwy 93	HILLSDALE	ON	L0L 1V0	awwwc@bellnet.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
7058356946	WRIGHT, ALAN	2976		

Well owner's information package delivered: [ ] Yes [X] No

Date Package Delivered: ____

Date Work Completed: 2014/08/29

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Audit No. Z 176896

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APPENDIX B

Maxxam Analytics Inc. and Exova Certificates of Analysis

TW13-3 Pumping Test

EXOVA OTTAWA

Certificate of Analysis

Client: Golder Associates Ltd. (Ottawa)
32 Steacie Drive
Kanata, ON
K2K 2A9
Attention: Ms. Caitlin Cooke
PO#:
Invoice to: Golder Associates Ltd. (Ottawa)

Report Number: 1325868
Date Submitted: 2013-11-25
Date Reported: 2013-11-26
Project: 12-1127-0115
COC #: 13188

Dear Caitlin Cooke:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

Krista Quantrill
2013.11.26
12:56:14 -05'00'

APPROVAL: _____

Krista Quantrill
Laboratory Supervisor, Microbiology

VA OTTAWA

Certificate of Analysis

Golder Associates Ltd. (Ottawa)
32 Steacie Drive
Kanata, ON
K2K 2A9
Ms. Caitlin Cooke

Golder Associates Ltd. (Ottawa)

Report Number: 1325868
Date Submitted: 2013-11-25
Date Reported: 2013-11-26
Project: 12-1127-0115
COC #: 13188

Analyte	MRL	Units	Guideline	Lab I.D. 1074879 Sample Matrix Water Sample Type Sampling Date 2013-11-23 Sample I.D. 13-3C
Escherichia Coli	0	ct/100mL	MAC-0	0
Total Coliforms	0	ct/100mL	MAC-0	0

Maxxam

Success Through Science®

Your Project #: 12-1127-0115
Site#: 12-1127-0115
Your C.O.C. #: 44374901, 443749-01-01

Attention: Caitlin Cooke
Golder Associates Ltd
32 Steacie Dr
Kanata, ON
K2K 2A9

Report Date: 2014/01/16
This report supersedes all previous reports with the same Maxxam job number

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B3K3319
Received: 2013/11/25, 09:05

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity (1)	1	N/A	2013/11/27	CAM SOP-00448	SM 2320B
Chloride by Automated Colourimetry (1)	1	N/A	2013/11/27	CAM SOP-00463	EPA 325.2
Colour (1)	1	N/A	2013/11/27	CAM SOP-00412	APHA 2120
Conductivity (1)	1	N/A	2013/11/27	CAM SOP-00414	SM 2510
Free (WAD) Cyanide (1)	1	N/A	2013/11/28	CAM SOP-00457	Ontario MOE CN-E3015
Dioxins/Furans in Water (EPS 1/RM/23) (1,3)	1	2013/12/06	2013/12/12	BRL SOP-00410	EPS 1/RM/23 mod
Diuron, Guthion, Temephos (1)	1	2013/11/29	2013/12/02	CAM SOP-00306	EPA 532
Dissolved Organic Carbon (DOC) (1,4)	1	N/A	2013/11/26	CAM SOP-00446	SM 5310 B
Diquat / Paraquat (1)	1	2013/11/27	2013/11/28	CAM SOP-00327	EPA 549.2, Rev1,1997
Fluoride (1)	1	2013/11/26	2013/11/27	CAM SOP-00449	APHA 4500FC
Dissolved Gases in Water in mg/L units (1)	1	N/A	2013/11/26		
Glyphosate (1)	1	2013/11/28	2013/11/29	CAM SOP-00305	HPLC in-house method
Hardness (calculated as CaCO3) (1)	1	N/A	2013/11/28	CAM SOP 00102	SM 2340 B
Mercury in Water by CVAA (1)	1	2013/11/28	2013/11/29	CAM SOP-00453	SW-846 7470A
Lab Filtered Metals Analysis by ICP (1)	1	2013/11/27	2013/11/28	CAM SOP-00408	SW-846 6010C
Metals Analysis by ICPMS (as received) (1,5)	1	2013/11/28	2013/11/29	CAM SOP-00447	EPA 6020
Ion Balance (% Difference) (1)	1	N/A	2013/12/13		
Dissolved Methane in Water (1)	1	N/A	2013/11/29	CAM SOP-00219 Modified Combustible Gas Indicator Method	J.of Chrom.Sci.May98
Uranium and Thorium Isotopes in Water (2)	1	N/A	2014/01/07	BQL SOP-00001	Neutron Activation
NDMA in Water (MSABN-3291Amod) (1)	1	2013/11/29	2013/12/04	BRL SOP 0400, 0401	MOE MSABN-3291A mod
Total Ammonia-N (1)	1	N/A	2013/11/28	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (1,6)	1	N/A	2013/11/29	CAM SOP-00440	SM 4500 NO3I/NO2B
Nitrilotriacetic Acid (NTA) (1)	1	2013/11/27	2013/11/27	CAM SOP-00411	EPA 430.1
OC Pesticides (Selected) & PCB (1,7)	1	2013/11/28	2013/11/28	CAM SOP-00307	SW846 8081, 8082
OC Pesticides Summed Parameters (1)	1	N/A	2013/11/26	CAM SOP-00307	SW846 8081, 8082
ODWS - Semi-Volatiles (1)	1	2013/11/29	2013/11/30	CAM SOP-00301	EPA 8270 modified
Organic Nitrogen (1)	1	N/A	2013/11/30	APHA Standard Methods	SM4500
pH (1)	1	N/A	2013/11/27	CAM SOP-00413	SM 4500H+ B
Phenols (4AAP) (1)	1	N/A	2013/11/29	CAM SOP-00444	MOE ROPHEN-E3179
Gross Alpha and Gross Beta (2)	1	N/A	2013/12/03	BQL SOP-00008	GFPC
Lead 210 (2)	1	N/A	2014/01/08	BQL SOP-00008	GFPC
Tritium by Liquid Scintillation Counting (2)	1	N/A	2013/11/27	BQL SOP-00009	LSC
Sulphate by Automated Colourimetry (1)	1	N/A	2013/11/27	CAM SOP-00464	EPA 375.4
Sulphide (1)	1	N/A	2013/11/26	CAM SOP-00455	SM 4500-S G
Tannins & Lignins (1)	1	N/A	2013/11/27	CAM SOP-00410	SM 5550B
Total Dissolved Solids (TDS calc) (1)	1	N/A	2013/11/28		
Total Dissolved Solids (1)	1	N/A	2013/11/26	CAM SOP-00428	APHA 2540C

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Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Total Kjeldahl Nitrogen in Water (1)	1	2013/11/28	2013/11/30	CAM SOP-00454	EPA 351.2 Rev 2
Turbidity (1)	1	N/A	2013/11/26	CAM SOP-00417	APHA 2130B
VOCs (Drinking Water) (1)	1	N/A	2013/11/28	CAM SOP-00226	EPA 8260

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) This test was performed by Maxxam Analytics Mississauga
(2) This test was performed by Maxxam - Becquerel
(3) Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.
(4) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(5) Metals analysis was performed on the sample 'as received'.
(6) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.
(7) Chlordane (Total) = Alpha Chlordane + Gamma Chlordane

Encryption Key

Parnian Baber
16 Jan 2014 09:57:29 -05:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Parnian Baber, Project Manager
Email: pbaber@maxxam.ca
Phone# (613) 274-0573

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

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RESULTS OF ANALYSES OF WATER

Maxxam ID		UA7509	UA7509		
Sampling Date		2013/11/23 14:23	2013/11/23 14:23		
	Units	**13-3C**	**13-3C Lab-Dup**	**RDL**	**QC Batch**
RADIONUCLIDE					
Gross Alpha	Bq/L	0.11(1)	0.14(1)	0.10	3436052
Gross Beta	Bq/L	0.15(2)	0.27(2)	0.10	3436052
Lead-210	Bq/L	<0.10		0.10	3469709
Thorium-232	Bq/L	<0.01		0.01	3473844
Tritium	Bq/L	<15	<15	15	3437945
Calculated Parameters					
Calculated TDS	mg/L	300		1.0	3434581
Hardness (CaCO3)	mg/L	70		1.0	3435199
Ion Balance (% Difference)	%	4.17		N/A	3457294
Total Organic Nitrogen	mg/L	0.2		0.1	3435246
Inorganics					
Total Ammonia-N	mg/L	0.38		0.050	3437442
Colour	TCU	14		2	3436690
Conductivity	umho/cm	500		1.0	3437998
Total Dissolved Solids	mg/L	472		10	3436783
Fluoride (F-)	mg/L	0.71	0.71	0.10	3437214
Free Cyanide	mg/L	<0.0020		0.0020	3436668
Total Kjeldahl Nitrogen (TKN)	mg/L	0.54		0.10	3439020
Dissolved Organic Carbon	mg/L	3.9	3.9	0.20	3436443
pH	pH	8.48	8.33		3437215
Phenols-4AAP	mg/L	<0.0010		0.0010	3437614
Dissolved Sulphate (SO4)	mg/L	<1		1	3437550
Sulphide	mg/L	<0.020		0.020	3434645
Tannins & Lignins	mg/L	0.6	0.6	0.2	3438413
Turbidity	NTU	0.5	0.4	0.2	3437037
Alkalinity (Total as CaCO3)	mg/L	220	220	1.0	3437213
Dissolved Chloride (Cl)	mg/L	26		1	3437551
Nitrite (N)	mg/L	<0.010		0.010	3437208
Nitrate (N)	mg/L	<0.10		0.10	3437208
Nitrate + Nitrite	mg/L	<0.10		0.10	3437208
Miscellaneous Parameters					
NTA	mg/L	<0.05	<0.05	0.05	3437323

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - Std. Dev. 0.03
(2) - Std. Dev. 0.02

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PERMANENT GASES (WATER)

Maxxam ID		UA7509	UA7509		
Sampling Date		2013/11/23 14:23	2013/11/23 14:23		
	Units	**13-3C**	**13-3C Lab-Dup**	**RDL**	**QC Batch**
Fixed Gases					
Methane	L/m3	14	13	0.005	3440704
Calculated Methane	mg/L	9.5		0.003	3435245

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		UA7509	UA7509		
Sampling Date		2013/11/23 14:23	2013/11/23 14:23		
	Units	**13-3C**	**13-3C Lab-Dup**	**RDL**	**QC Batch**
Metals					
. Aluminum (Al)	ug/L	<5.0		5.0	3439548
. Antimony (Sb)	ug/L	<0.50		0.50	3439548
. Arsenic (As)	ug/L	<1.0		1.0	3439548
. Barium (Ba)	ug/L	370		2.0	3439548
. Boron (B)	ug/L	280		10	3439548
. Cadmium (Cd)	ug/L	<0.10		0.10	3439548
Dissolved Calcium (Ca)	mg/L	17	17	0.05	3437485
. Calcium (Ca)	ug/L	16000		200	3439548
. Chromium (Cr)	ug/L	<5.0		5.0	3439548
. Copper (Cu)	ug/L	1.5		1.0	3439548
Dissolved Iron (Fe)	mg/L	0.08	0.08	0.02	3437485
. Iron (Fe)	ug/L	<100		100	3439548
. Lead (Pb)	ug/L	1.7		0.50	3439548
Dissolved Magnesium (Mg)	mg/L	6.5	6.5	0.05	3437485
. Magnesium (Mg)	ug/L	6200		50	3439548
Dissolved Manganese (Mn)	mg/L	<0.01	<0.01	0.01	3437485
. Manganese (Mn)	ug/L	5.4		2.0	3439548
Mercury (Hg)	mg/L	<0.00010		0.00010	3439491
Dissolved Potassium (K)	mg/L	5	6	1	3437485
. Potassium (K)	ug/L	4800		200	3439548
. Selenium (Se)	ug/L	<2.0		2.0	3439548
Dissolved Sodium (Na)	mg/L	95	95	0.5	3437485
. Sodium (Na)	ug/L	78000		100	3439548
. Uranium (U)	ug/L	<0.10		0.10	3439548
. Zinc (Zn)	ug/L	5.2		5.0	3439548

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		UA7509		
Sampling Date		2013/11/23 14:23		
	Units	**13-3C**	**RDL**	**QC Batch**
Semivolatile Organics				
2,3,4,6-Tetrachlorophenol	ug/L	<0.50	0.50	3440386
2,4,5-T	ug/L	<1.0	1.0	3440386
2,4,6-Trichlorophenol	ug/L	<0.50	0.50	3440386
2,4-D	ug/L	<1.0	1.0	3440386
2,4-Dichlorophenol	ug/L	<0.50	0.50	3440386
Alachlor	ug/L	<0.50	0.50	3440386
Aldicarb	ug/L	<5.0	5.0	3440386
Atrazine	ug/L	<0.50	0.50	3440386
Des-ethyl atrazine	ug/L	<0.50	0.50	3440386
Atrazine + Desethyl-atrazine	ug/L	<1.0	1.0	3440386
Bendiocarb	ug/L	<2.0	2.0	3440386
Bromoxynil	ug/L	<0.50	0.50	3440386
Carbaryl	ug/L	<5.0	5.0	3440386
Carbofuran	ug/L	<5.0	5.0	3440386
Chlorpyrifos (Dursban)	ug/L	<1.0	1.0	3440386
Cyanazine (Bladex)	ug/L	<1.0	1.0	3440386
Diazinon	ug/L	<1.0	1.0	3440386
Dicamba	ug/L	<1.0	1.0	3440386
Diclofop-methyl	ug/L	<0.90	0.90	3440386
Dimethoate	ug/L	<2.5	2.5	3440386
Dinoseb	ug/L	<1.0	1.0	3440386
Malathion	ug/L	<5.0	5.0	3440386
Metolachlor	ug/L	<0.50	0.50	3440386
Metribuzin (Sencor)	ug/L	<5.0	5.0	3440386
Ethyl Parathion	ug/L	<1.0	1.0	3440386
Pentachlorophenol	ug/L	<0.50	0.50	3440386
Phorate	ug/L	<0.50	0.50	3440386
Picloram	ug/L	<5.0	5.0	3440386
Prometryne	ug/L	<0.25	0.25	3440386
Simazine	ug/L	<1.0	1.0	3440386
Terbufos	ug/L	<0.50	0.50	3440386
Triallate	ug/L	<1.0	1.0	3440386
Trifluralin	ug/L	<1.0	1.0	3440386
Benzo(a)pyrene	ug/L	<0.0090	0.0090	3440386
Methyl parathion	ug/L	<1.0	1.0	3440386

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		UA7509		
Sampling Date		2013/11/23 14:23		
	Units	**13-3C**	**RDL**	**QC Batch**
Surrogate Recovery (%)				
2,4,6-Tribromophenol	%	61		3440386
2,4-Dichlorophenyl Acetic Acid	%	66		3440386
2-Fluorobiphenyl	%	44		3440386
D14-Terphenyl (FS)	%	90		3440386
D5-Nitrobenzene	%	52		3440386

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Sampler Initials: CHM

VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID		UA7509		
Sampling Date		2013/11/23 14:23		
	Units	**13-3C**	**RDL**	**QC Batch**
Volatile Organics				
1,1-Dichloroethylene	ug/L	<0.10	0.10	3434811
1,2-Dichlorobenzene	ug/L	<0.20	0.20	3434811
1,2-Dichloroethane	ug/L	<0.20	0.20	3434811
1,4-Dichlorobenzene	ug/L	<0.20	0.20	3434811
Benzene	ug/L	<0.10	0.10	3434811
Bromodichloromethane	ug/L	<0.10	0.10	3434811
Bromoform	ug/L	<0.20	0.20	3434811
Carbon Tetrachloride	ug/L	<0.10	0.10	3434811
Chlorobenzene	ug/L	<0.10	0.10	3434811
Chloroform	ug/L	<0.10	0.10	3434811
Dibromochloromethane	ug/L	<0.20	0.20	3434811
Methylene Chloride(Dichloromethane)	ug/L	1.75	0.50	3434811
Ethylbenzene	ug/L	<0.10	0.10	3434811
Tetrachloroethylene	ug/L	<0.10	0.10	3434811
Toluene	ug/L	<0.20	0.20	3434811
Trichloroethylene	ug/L	<0.10	0.10	3434811
Vinyl Chloride	ug/L	<0.20	0.20	3434811
o-Xylene	ug/L	<0.10	0.10	3434811
p+m-Xylene	ug/L	<0.10	0.10	3434811
Xylene (Total)	ug/L	<0.10	0.10	3434811
Total Trihalomethanes	ug/L	<0.20	0.20	3434811
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	98		3434811
D4-1,2-Dichloroethane	%	101		3434811
D8-Toluene	%	99		3434811

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Sampler Initials: CHM

PESTICIDES & HERBICIDES BY HPLC (WATER)

Maxxam ID		UA7509	UA7509		
Sampling Date		2013/11/23 14:23	2013/11/23 14:23		
	Units	**13-3C**	**13-3C Lab-Dup**	**RDL**	**QC Batch**
Pesticides & Herbicides					
Glyphosate	ug/L	<10	<10	10	3439490
Diquat	ug/L	<7		7	3437258
Diuron	ug/L	<10		10	3441537
Guthion (Azinphos-methyl)	ug/L	<2		2	3441537
Paraquat	ug/L	<1		1	3437258
Temephos	ug/L	<10		10	3441537

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ORGANOCHLORINATED PESTICIDES BY GC-ECD (WATER)

Maxxam ID		UA7509		
Sampling Date		2013/11/23 14:23		
	Units	**13-3C**	**RDL**	**QC Batch**
Calculated Parameters				
Aldrin + Dieldrin	ug/L	<0.006	0.006	3435197
Chlordane (Total)	ug/L	<0.006	0.006	3435197
Heptachlor + Heptachlor epoxide	ug/L	<0.006	0.006	3435197
o,p-DDT + p,p-DDT	ug/L	<0.006	0.006	3435197
Pesticides & Herbicides				
Lindane	ug/L	<0.006	0.006	3438941
Heptachlor	ug/L	<0.006	0.006	3438941
Aldrin	ug/L	<0.006	0.006	3438941
Heptachlor epoxide	ug/L	<0.006	0.006	3438941
Oxychlordane	ug/L	<0.006	0.006	3438941
g-Chlordane	ug/L	<0.006	0.006	3438941
a-Chlordane	ug/L	<0.006	0.006	3438941
Dieldrin	ug/L	<0.006	0.006	3438941
p,p-DDE	ug/L	<0.006	0.006	3438941
p,p-DDD	ug/L	<0.006	0.006	3438941
o,p-DDT	ug/L	<0.006	0.006	3438941
p,p-DDT	ug/L	<0.006	0.006	3438941
Methoxychlor	ug/L	<0.02	0.02	3438941
Surrogate Recovery (%)				
2,4,5,6-Tetrachloro-m-xylene	%	64		3438941
Decachlorobiphenyl	%	81		3438941

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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DIOXINS AND FURANS BY HRMS (WATER)

Maxxam ID		UA7509		
Sampling Date		2013/11/23 14:23		
	Units	**13-3C**	**RDL**	**QC Batch**
Dioxins & Furans				
2,3,7,8-Tetra CDD	pg/L	<1.71	11.5	3455122
1,2,3,7,8-Penta CDD	pg/L	<1.97	11.5	3455122
1,2,3,4,7,8-Hexa CDD	pg/L	<1.34	11.5	3455122
1,2,3,6,7,8-Hexa CDD	pg/L	<1.43	11.5	3455122
1,2,3,7,8,9-Hexa CDD	pg/L	<1.26	11.5	3455122
1,2,3,4,6,7,8-Hepta CDD	pg/L	2.4	11.5	3455122
Octa CDD	pg/L	19	115	3455122
Total Tetra CDD	pg/L	<1.71	11.5	3455122
Total Penta CDD	pg/L	<1.97	11.5	3455122
Total Hexa CDD	pg/L	<1.34	11.5	3455122
Total Hepta CDD	pg/L	4.0	11.5	3455122
2,3,7,8-Tetra CDF	pg/L	<1.67	11.5	3455122
1,2,3,7,8-Penta CDF	pg/L	<1.20	11.5	3455122
2,3,4,7,8-Penta CDF	pg/L	<1.25	11.5	3455122
1,2,3,4,7,8-Hexa CDF	pg/L	<1.14	11.5	3455122
1,2,3,6,7,8-Hexa CDF	pg/L	<1.07	11.5	3455122
2,3,4,6,7,8-Hexa CDF	pg/L	<1.23	11.5	3455122
1,2,3,7,8,9-Hexa CDF	pg/L	<1.24	11.5	3455122
1,2,3,4,6,7,8-Hepta CDF	pg/L	<2.24 (1)	11.5	3455122
1,2,3,4,7,8,9-Hepta CDF	pg/L	<1.36	11.5	3455122
Octa CDF	pg/L	7	115	3455122
Total Tetra CDF	pg/L	<1.67	11.5	3455122
Total Penta CDF	pg/L	<1.51 (2)	11.5	3455122
Total Hexa CDF	pg/L	<1.17	11.5	3455122
Total Hepta CDF	pg/L	3.2	11.5	3455122

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
(2) - EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

EMPC / DPE - Diphenylether interference present caused dibenzofuran detected to become a "non-detect" with an elevated detection limit.

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DIOXINS AND FURANS BY HRMS (WATER)

Maxxam ID		UA7509		
Sampling Date		2013/11/23 14:23		
	Units	**13-3C**	**RDL**	**QC Batch**
Surrogate Recovery (%)				
C13-1234678 HeptaCDD	%	128		3455122
C13-1234678 HeptaCDF	%	95		3455122
C13-123678 HexaCDD	%	88		3455122
C13-123678 HexaCDF	%	81		3455122
C13-12378 PentaCDD	%	93		3455122
C13-12378 PentaCDF	%	105		3455122
C13-2378 TetraCDD	%	54		3455122
C13-2378 TetraCDF	%	53		3455122
C13-OCDD	%	102		3455122

SEMI-VOLATILE ORGANICS BY HRMS (WATER)

Maxxam ID		UA7509		
Sampling Date		2013/11/23 14:23		
	Units	**13-3C**	**RDL**	**QC Batch**
NDMA/D/F/MIB/GEO				
N-Nitrosodimethylamine	ug/L	<0.002	0.002	3440973
Surrogate Recovery (%)				
D6-N-Nitrosodimethylamine	%	26		3440973

RDL = Reportable Detection Limit
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Client Project #: 12-1127-0115

Sampler Initials: CHM

Test Summary

Maxxam ID UA7509
Sample ID 13-3C
Matrix Water

Collected 2013/11/23
Shipped
Received 2013/11/25

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3437213	N/A	2013/11/27	Surinder Rai
Chloride by Automated Colourimetry	AC	3437551	N/A	2013/11/27	Alina Dobreanu
Colour	SPEC	3436690	N/A	2013/11/27	Christine Pham
Conductivity	COND	3437998	N/A	2013/11/27	Surinder Rai
Free (WAD) Cyanide	TECH/CN	3436668	N/A	2013/11/28	Xuanhong Qiu
Dioxins/Furans in Water (EPS 1/RM/23)	HRMS/MS	3455122	2013/12/06	2013/12/12	Owen Cosby
Diuron, Guthion, Temephos	LC/UV	3441537	2013/11/29	2013/12/02	James Lee
Dissolved Organic Carbon (DOC)	TOCV/NDIR	3436443	N/A	2013/11/26	Anastasia Hamanov
Diquat / Paraquat	LC/UV	3437258	2013/11/27	2013/11/28	James Lee
Fluoride	F	3437214	2013/11/26	2013/11/27	Surinder Rai
Dissolved Gases in Water in mg/L units		3435245	N/A	2013/11/26	Automated Statchk
Glyphosate	LC/FLU	3439490	2013/11/28	2013/11/29	Hanna Kloc
Hardness (calculated as CaCO3)		3435199	N/A	2013/11/28	Automated Statchk
Mercury in Water by CVAA	CVAA	3439491	2013/11/28	2013/11/29	Lawrence Cheung
Lab Filtered Metals Analysis by ICP	ICP	3437485	2013/11/27	2013/11/28	Jolly John
Metals Analysis by ICPMS (as received)	ICP/MS	3439548	2013/11/28	2013/11/29	Prempal Bhatti
Ion Balance (% Difference)	CALC	3457294	N/A	2013/12/13	Automated Statchk
Dissolved Methane in Water	GC/FID	3440704	N/A	2013/11/29	Bhushan Borole
Uranium and Thorium Isotopes in Water	GS	3473844	N/A	2014/01/07	Robert Allen
NDMA in Water (MSABN-3291Amod)	HRMS/MS	3440973	2013/11/29	2013/12/04	Vica Cioranic
Total Ammonia-N	LACH/NH4	3437442	N/A	2013/11/28	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3437208	N/A	2013/11/29	Shobhana Bavisiya
Nitrilotriacetic Acid (NTA)	SPEC	3437323	2013/11/27	2013/11/27	Elsamma Alex
OC Pesticides (Selected) & PCB	GC/ECD	3438941	2013/11/28	2013/11/28	Farahnaz Somwaru
OC Pesticides Summed Parameters	CALC	3435197	N/A	2013/11/26	Automated Statchk
ODWS - Semi-Volatiles	GC/MS	3440386	2013/11/29	2013/11/30	Wendy Zhao
Organic Nitrogen	CALC	3435246	N/A	2013/11/30	Automated Statchk
pH	PH	3437215	N/A	2013/11/27	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3437614	N/A	2013/11/29	Bramdeo Motiram
Gross Alpha and Gross Beta	GFPC	3436052	N/A	2013/12/03	Stuart Lam
Lead 210	GFPC	3469709	N/A	2014/01/08	Stuart Lam
Tritium by Liquid Scintillation Counting	LSC	3437945	N/A	2013/11/27	Stuart Lam
Sulphate by Automated Colourimetry	AC	3437550	N/A	2013/11/27	Alina Dobreanu
Sulphide	ISE/S	3434645	N/A	2013/11/26	Neil Dassanayake

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Maxxam Job #: B3K3319
Report Date: 2014/01/16

Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

Test Summary

Tannins & Lignins	SPEC	3438413	N/A	2013/11/27	Birenkumar Patel
Total Dissolved Solids (TDS calc)	CALC	3434581	N/A	2013/11/28	Automated Statchk
Total Dissolved Solids	SLDS	3436783	N/A	2013/11/26	Niki Shah
Total Kjeldahl Nitrogen in Water	AC	3439020	2013/11/28	2013/11/30	Chandra Nandlal
Turbidity	TURB	3437037	N/A	2013/11/26	Lemeneh Addis
VOCs (Drinking Water)	P&T/MS	3434811	N/A	2013/11/28	Sarah Lam

Maxxam ID UA7509 Dup
Sample ID 13-3C
Matrix Water

Collected 2013/11/23
Shipped
Received 2013/11/25

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3437213	N/A	2013/11/27	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	3436443	N/A	2013/11/26	Anastasia Hamanov
Fluoride	F	3437214	2013/11/26	2013/11/27	Surinder Rai
Glyphosate	LC/FLU	3439490	2013/11/28	2013/11/29	Hanna Kloc
Lab Filtered Metals Analysis by ICP	ICP	3437485	2013/11/27	2013/11/28	Jolly John
Dissolved Methane in Water	GC/FID	3440704	N/A	2013/11/29	Bhushan Borole
Nitrilotriacetic Acid (NTA)	SPEC	3437323	2013/11/27	2013/11/27	Elsamma Alex
pH	PH	3437215	N/A	2013/11/27	Surinder Rai
Gross Alpha and Gross Beta	GFPC	3436052	N/A	2013/12/03	Stuart Lam
Tritium by Liquid Scintillation Counting	LSC	3437945	N/A	2013/11/28	Stuart Lam
Tannins & Lignins	SPEC	3438413	N/A	2013/11/27	Birenkumar Patel
Turbidity	TURB	3437037	N/A	2013/11/26	Lemeneh Addis

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Package 1	7.0°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

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Client Project #: 12-1127-0115

Sampler Initials: CHM

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3434645	Sulphide	2013/11/26	88	80 - 120	88	80 - 120	<0.020	mg/L	NC	20		
3434811	4-Bromofluorobenzene	2013/11/27	103	70 - 130	104	70 - 130	95	%				
3434811	D4-1,2-Dichloroethane	2013/11/27	101	70 - 130	102	70 - 130	100	%				
3434811	D8-Toluene	2013/11/27	102	70 - 130	102	70 - 130	99	%				
3434811	1,1-Dichloroethylene	2013/11/28	98	70 - 130	103	70 - 130	<0.10	ug/L	NC	30		
3434811	1,2-Dichlorobenzene	2013/11/28	105	70 - 130	108	70 - 130	<0.20	ug/L	NC	30		
3434811	1,2-Dichloroethane	2013/11/28	94	70 - 130	98	70 - 130	<0.20	ug/L	NC	30		
3434811	1,4-Dichlorobenzene	2013/11/28	103	70 - 130	108	70 - 130	<0.20	ug/L	NC	30		
3434811	Benzene	2013/11/28	90	70 - 130	95	70 - 130	<0.10	ug/L	NC	30		
3434811	Bromodichloromethane	2013/11/28	NC	70 - 130	100	70 - 130	<0.10	ug/L	NC	30		
3434811	Bromoform	2013/11/28	107	70 - 130	111	70 - 130	<0.20	ug/L	NC	30		
3434811	Carbon Tetrachloride	2013/11/28	95	70 - 130	99	70 - 130	<0.10	ug/L	NC	30		
3434811	Chlorobenzene	2013/11/28	101	70 - 130	107	70 - 130	<0.10	ug/L	NC	30		
3434811	Chloroform	2013/11/28	NC	70 - 130	95	70 - 130	<0.10	ug/L	NC	30		
3434811	Dibromochloromethane	2013/11/28	NC	70 - 130	109	70 - 130	<0.20	ug/L	NC	30		
3434811	Methylene Chloride(Dichloromethane)	2013/11/28	86	70 - 130	90	70 - 130	<0.50	ug/L	NC	30		
3434811	Ethylbenzene	2013/11/28	99	70 - 130	105	70 - 130	<0.10	ug/L	NC	30		
3434811	Tetrachloroethylene	2013/11/28	104	70 - 130	110	70 - 130	<0.10	ug/L	NC	30		
3434811	Toluene	2013/11/28	93	70 - 130	98	70 - 130	<0.20	ug/L	NC	30		
3434811	Trichloroethylene	2013/11/28	94	70 - 130	99	70 - 130	<0.10	ug/L	NC	30		
3434811	Vinyl Chloride	2013/11/28	77	70 - 130	84	70 - 130	<0.20	ug/L	NC	30		
3434811	o-Xylene	2013/11/28	102	70 - 130	109	70 - 130	<0.10	ug/L	NC	30		
3434811	p+m-Xylene	2013/11/28	107	70 - 130	110	70 - 130	<0.10	ug/L	NC	30		
3434811	Xylene (Total)	2013/11/27					<0.10	ug/L				
3434811	Total Trihalomethanes	2013/11/28					<0.20	ug/L	NC	30		
3436052	Gross Alpha	2013/12/03			98	60 - 140	<0.10	Bq/L	NC(1)	N/A		
3436052	Gross Beta	2013/12/03			89	70 - 130	<0.10	Bq/L	NC(2)	N/A		
3436443	Dissolved Organic Carbon	2013/11/26	92	80 - 120	89	80 - 120	0.23, RDL=0.20	mg/L	1.1	20		
3436668	Free Cyanide	2013/11/28	106	80 - 120	105	80 - 120	<0.0020	mg/L	NC	20		
3436690	Colour	2013/11/27			99	85 - 115	<2	TCU	NC	25		
3436783	Total Dissolved Solids	2013/11/26					<10	mg/L	2.6	25	98	90 - 110
3437037	Turbidity	2013/11/26					<0.2	NTU	NC	20	100	85 - 115
3437208	Nitrite (N)	2013/11/29	102	80 - 120	102	80 - 120	<0.010	mg/L	NC	25		
3437208	Nitrate (N)	2013/11/29	NC	80 - 120	98	80 - 120	<0.10	mg/L	2.5	25		
3437213	Alkalinity (Total as CaCO3)	2013/11/27			94	85 - 115	<1.0	mg/L	1.6	25		
3437214	Fluoride (F-)	2013/11/27	109	80 - 120	100	80 - 120	<0.10	mg/L	0.5	20		
3437258	Diquat	2013/11/28	78	50 - 130	82	50 - 130	<7	ug/L	NC	40		
3437258	Paraquat	2013/11/28	56	50 - 130	70	50 - 130	<1	ug/L	NC	40		
3437323	NTA	2013/11/27	108	75 - 125	103	75 - 125	<0.05	mg/L	NC	25		
3437442	Total Ammonia-N	2013/11/28	101	80 - 120	102	85 - 115	<0.050	mg/L	NC	20		

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QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3437485	Dissolved Calcium (Ca)	2013/11/28	NC	80 - 120	95	80 - 120	<0.05	mg/L	0.08	25		
3437485	Dissolved Iron (Fe)	2013/11/28	95	80 - 120	104	80 - 120	<0.02	mg/L	NC	25		
3437485	Dissolved Magnesium (Mg)	2013/11/28	NC	80 - 120	93	80 - 120	<0.05	mg/L	0.0009	25		
3437485	Dissolved Manganese (Mn)	2013/11/28	91	80 - 120	94	80 - 120	<0.01	mg/L	NC	25		
3437485	Dissolved Potassium (K)	2013/11/28	NC	80 - 120	95	80 - 120	<1	mg/L	2.7	25		
3437485	Dissolved Sodium (Na)	2013/11/28	NC	80 - 120	96	80 - 120	<0.5	mg/L	0.2	25		
3437550	Dissolved Sulphate (SO4)	2013/11/27	NC	75 - 125	97	80 - 120	<1	mg/L	0.0002	20		
3437551	Dissolved Chloride (Cl)	2013/11/27	92	80 - 120	104	80 - 120	<1	mg/L	2.0	20		
3437614	Phenols-4AAP	2013/11/29	99	80 - 120	100	85 - 115	<0.0010	mg/L	NC	25		
3437945	Tritium	2013/11/28			107	92 - 108	<15	Bq/L	NC	N/A		
3437998	Conductivity	2013/11/27			101	85 - 115	<1.0	umho/cm	0.3	25		
3438413	Tannins & Lignins	2013/11/27	105	80 - 120	102	80 - 120	<0.2	mg/L	NC	25		
3438941	2,4,5,6-Tetrachloro-m-xylene	2013/11/28	83	30 - 130	67	30 - 130	72	%				
3438941	Decachlorobiphenyl	2013/11/28	110	30 - 130	93	30 - 130	90	%				
3438941	Lindane	2013/11/28	89	30 - 130	76	30 - 130	<0.006	ug/L	1.3	40		
3438941	Heptachlor	2013/11/28	92	30 - 130	109	30 - 130	<0.006	ug/L	1.8	40		
3438941	Aldrin	2013/11/28	90	30 - 130	71	30 - 130	<0.006	ug/L	2.8	40		
3438941	Heptachlor epoxide	2013/11/28	104	30 - 130	88	30 - 130	<0.006	ug/L	1.1	40		
3438941	Oxychlordane	2013/11/28	90	30 - 130	76	30 - 130	<0.006	ug/L	7.6	40		
3438941	g-Chlordane	2013/11/28	115	30 - 130	90	30 - 130	<0.006	ug/L	1.1	40		
3438941	a-Chlordane	2013/11/28	103	30 - 130	86	30 - 130	<0.006	ug/L	0	40		
3438941	Dieldrin	2013/11/28	120	30 - 130	118	30 - 130	<0.006	ug/L	2.5	40		
3438941	p,p-DDE	2013/11/28	104	30 - 130	105	30 - 130	<0.006	ug/L	5.9	40		
3438941	p,p-DDD	2013/11/28	106	30 - 130	93	30 - 130	<0.006	ug/L	1.1	40		
3438941	o,p-DDT	2013/11/28	101	30 - 130	81	30 - 130	<0.006	ug/L	1.2	40		
3438941	p,p-DDT	2013/11/28	111	30 - 130	93	30 - 130	<0.006	ug/L	1.1	40		
3438941	Methoxychlor	2013/11/28	105	30 - 130	90	30 - 130	<0.02	ug/L	3.3	40		
3438941	2,4,5,6-Tetrachloro-m-xylene DUP	2013/11/28			67	30 - 130						
3438941	2,4,5,6-Tetrachloro-m-xylene DUP	2013/11/28			67	30 - 130						
3438941	Decachlorobiphenyl DUP	2013/11/28			92	30 - 130						
3438941	Decachlorobiphenyl DUP	2013/11/28			80	30 - 130						
3438941	Lindane DUP	2013/11/28			75	30 - 130						
3438941	Heptachlor DUP	2013/11/28			111	30 - 130						
3438941	Aldrin DUP	2013/11/28			73	30 - 130						
3438941	Heptachlor epoxide DUP	2013/11/28			89	30 - 130						
3438941	Oxychlordane DUP	2013/11/28			82	30 - 130						
3438941	g-Chlordane DUP	2013/11/28			91	30 - 130						
3438941	a-Chlordane DUP	2013/11/28			86	30 - 130						
3438941	Dieldrin DUP	2013/11/28			121	30 - 130						
3438941	p,p-DDE DUP	2013/11/28			99	30 - 130						

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QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3438941	p,p-DDD DUP	2013/11/28			92	30 - 130						
3438941	o,p-DDT DUP	2013/11/28			82	30 - 130						
3438941	p,p-DDT DUP	2013/11/28			92	30 - 130						
3438941	Methoxychlor DUP	2013/11/28			93	30 - 130						
3439020	Total Kjeldahl Nitrogen (TKN)	2013/11/30	NC	80 - 120	97	80 - 120	<0.10	mg/L	0.2	20	99	80 - 120
3439490	Glyphosate	2013/11/29	95	50 - 130	102	50 - 130	<10	ug/L	NC	40		
3439491	Mercury (Hg)	2013/11/29	100	80 - 120	108	80 - 120	<0.00010	mg/L	NC	20		
3439548	. Aluminum (Al)	2013/11/29	98	80 - 120	104	80 - 120	<5.0	ug/L	0.9	20		
3439548	. Antimony (Sb)	2013/11/29	105	80 - 120	103	80 - 120	<0.50	ug/L	NC	20		
3439548	. Arsenic (As)	2013/11/29	98	80 - 120	100	80 - 120	<1.0	ug/L	NC	20		
3439548	. Barium (Ba)	2013/11/29	102	80 - 120	99	80 - 120	<2.0	ug/L	5.3	20		
3439548	. Boron (B)	2013/11/29	95	80 - 120	94	80 - 120	<10	ug/L	NC	20		
3439548	. Cadmium (Cd)	2013/11/29	103	80 - 120	101	80 - 120	<0.10	ug/L	NC	20		
3439548	. Calcium (Ca)	2013/11/29	NC	80 - 120	103	80 - 120	<200	ug/L	1.4	20		
3439548	. Chromium (Cr)	2013/11/29	102	80 - 120	105	80 - 120	<5.0	ug/L	NC	20		
3439548	. Copper (Cu)	2013/11/29	97	80 - 120	102	80 - 120	<1.0	ug/L	NC	20		
3439548	. Iron (Fe)	2013/11/29	98	80 - 120	101	80 - 120	<100	ug/L	NC	20		
3439548	. Lead (Pb)	2013/11/29	100	80 - 120	100	80 - 120	<0.50	ug/L	NC	20		
3439548	. Magnesium (Mg)	2013/11/29	95	80 - 120	102	80 - 120	<50	ug/L	0.2	20		
3439548	. Manganese (Mn)	2013/11/29	102	80 - 120	106	80 - 120	<2.0	ug/L	NC	20		
3439548	. Potassium (K)	2013/11/29	100	80 - 120	103	80 - 120	<200	ug/L	0.4	20		
3439548	. Selenium (Se)	2013/11/29	100	80 - 120	102	80 - 120	<2.0	ug/L	NC	20		
3439548	. Sodium (Na)	2013/11/29	NC	80 - 120	102	80 - 120	<100	ug/L	0.6	20		
3439548	. Uranium (U)	2013/11/29	102	80 - 120	101	80 - 120	<0.10	ug/L	NC	20		
3439548	. Zinc (Zn)	2013/11/29	98	80 - 120	103	80 - 120	<5.0	ug/L	NC	20		
3440386	2,4,6-Tribromophenol	2013/11/29	65	30 - 130	86	30 - 130	96	%				
3440386	2,4-Dichlorophenyl Acetic Acid	2013/11/29	65	30 - 130	85	30 - 130	92	%				
3440386	2-Fluorobiphenyl	2013/11/29	53	30 - 130	67	30 - 130	76	%				
3440386	D14-Terphenyl (FS)	2013/11/29	69	30 - 130	89	30 - 130	105	%				
3440386	D5-Nitrobenzene	2013/11/29	53	30 - 130	72	30 - 130	87	%				
3440386	2,3,4,6-Tetrachlorophenol	2013/11/29	73	30 - 130	98	30 - 130	<0.50	ug/L	12.4	40		
3440386	2,4,5-T	2013/11/29	84	30 - 130	103	30 - 130	<1.0	ug/L	15.0	40		
3440386	2,4,6-Trichlorophenol	2013/11/29	61	30 - 130	81	30 - 130	<0.50	ug/L	14.3	40		
3440386	2,4-D	2013/11/29	78	30 - 130	95	30 - 130	<1.0	ug/L	14.7	40		
3440386	2,4-Dichlorophenol	2013/11/29	58	30 - 130	76	30 - 130	<0.50	ug/L	15.0	40		
3440386	Alachlor	2013/11/29	75	40 - 130	101	40 - 130	<0.50	ug/L	17.1	40		
3440386	Aldicarb	2013/11/29	70	70 - 130	85	70 - 130	<5.0	ug/L	10.4	40		
3440386	Atrazine	2013/11/29	70	30 - 130	93	30 - 130	<0.50	ug/L	10.7	40		
3440386	Des-ethyl atrazine	2013/11/29	50	30 - 130	51	30 - 130	<0.50	ug/L	7.6	40		
3440386	Atrazine + Desethyl-atrazine	2013/11/29	60	30 - 130	72	30 - 130	<1.0	ug/L	3.9	40		

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Client Project #: 12-1127-0115

Sampler Initials: CHM

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3440386	Bendiocarb	2013/11/29	86	40 - 130	106	40 - 130	<2.0	ug/L	8.3	40		
3440386	Bromoxynil	2013/11/29	77	40 - 130	100	40 - 130	<0.50	ug/L	11.8	40		
3440386	Carbaryl	2013/11/29	95	40 - 130	116	40 - 130	<5.0	ug/L	8.8	40		
3440386	Carbofuran	2013/11/29	90	40 - 130	109	40 - 130	<5.0	ug/L	9.0	40		
3440386	Chlorpyrifos (Dursban)	2013/11/29	81	40 - 130	105	40 - 130	<1.0	ug/L	12.8	40		
3440386	Cyanazine (Bladex)	2013/11/29	56	40 - 130	72	40 - 130	<1.0	ug/L	3.0	40		
3440386	Diazinon	2013/11/29	79	40 - 130	101	40 - 130	<1.0	ug/L	11.4	40		
3440386	Dicamba	2013/11/29	75	30 - 130	98	30 - 130	<1.0	ug/L	16.4	40		
3440386	Diclofop-methyl	2013/11/29	80	40 - 130	103	40 - 130	<0.90	ug/L	13.9	40		
3440386	Dimethoate	2013/11/29	77	40 - 130	92	40 - 130	<2.5	ug/L	6.3	40		
3440386	Dinoseb	2013/11/29	77	40 - 130	99	40 - 130	<1.0	ug/L	9.4	40		
3440386	Malathion	2013/11/29	78	40 - 130	101	40 - 130	<5.0	ug/L	13.7	40		
3440386	Metolachlor	2013/11/29	75	40 - 130	95	40 - 130	<0.50	ug/L	10.2	40		
3440386	Metribuzin (Sencor)	2013/11/29	73	40 - 130	98	40 - 130	<5.0	ug/L	10.6	40		
3440386	Ethyl Parathion	2013/11/29	80	40 - 130	98	40 - 130	<1.0	ug/L	10.1	40		
3440386	Pentachlorophenol	2013/11/29	66	25 - 130	86	25 - 130	<0.50	ug/L	11.7	40		
3440386	Phorate	2013/11/29	65	40 - 130	85	40 - 130	<0.50	ug/L	11.7	40		
3440386	Picloram	2013/11/29	45	10 - 130	37	10 - 130	<5.0	ug/L	7.8	40		
3440386	Prometryne	2013/11/29	74	30 - 130	96	30 - 130	<0.25	ug/L	10.3	40		
3440386	Simazine	2013/11/29	62	40 - 130	83	40 - 130	<1.0	ug/L	11.6	40		
3440386	Terbufos	2013/11/29	59	40 - 130	83	40 - 130	<0.50	ug/L	15.2	40		
3440386	Triallate	2013/11/29	75	40 - 130	98	40 - 130	<1.0	ug/L	10.4	40		
3440386	Trifluralin	2013/11/29	87	40 - 130	111	40 - 130	<1.0	ug/L	10.0	40		
3440386	Benzo(a)pyrene	2013/11/29	82	30 - 130	103	30 - 130	<0.0090	ug/L	10.2	40		
3440386	Methyl parathion	2013/11/29	89	30 - 130	110	30 - 130	<1.0	ug/L	8.0	40		
3440386	2,4,6-Tribromophenol DUP	2013/11/29			75	30 - 130						
3440386	2,4-Dichlorophenyl Acetic Acid DUP	2013/11/29			74	30 - 130						
3440386	2-Fluorobiphenyl DUP	2013/11/29			58	30 - 130						
3440386	D14-Terphenyl (FS) DUP	2013/11/29			79	30 - 130						
3440386	D5-Nitrobenzene DUP	2013/11/29			62	30 - 130						
3440386	2,3,4,6-Tetrachlorophenol DUP	2013/11/29			86	30 - 130						
3440386	2,4,5-T DUP	2013/11/29			89	30 - 130						
3440386	2,4,6-Trichlorophenol DUP	2013/11/29			70	30 - 130						
3440386	2,4-D DUP	2013/11/29			82	30 - 130						
3440386	2,4-Dichlorophenol DUP	2013/11/29			65	30 - 130						
3440386	Alachlor DUP	2013/11/29			85	40 - 130						
3440386	Aldicarb DUP	2013/11/29			77	70 - 130						
3440386	Atrazine DUP	2013/11/29			84	30 - 130						
3440386	Des-ethyl atrazine DUP	2013/11/29			55	30 - 130						
3440386	Atrazine + Desethyl-atrazine DUP	2013/11/29			69	30 - 130						

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Maxxam Job #: B3K3319
Report Date: 2014/01/16

Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3440386	Bendiocarb DUP	2013/11/29			98	40 - 130						
3440386	Bromoxynil DUP	2013/11/29			89	40 - 130						
3440386	Carbaryl DUP	2013/11/29			106	40 - 130						
3440386	Carbofuran DUP	2013/11/29			100	40 - 130						
3440386	Chlorpyrifos (Dursban) DUP	2013/11/29			92	40 - 130						
3440386	Cyanazine (Bladex) DUP	2013/11/29			70	40 - 130						
3440386	Diazinon DUP	2013/11/29			90	40 - 130						
3440386	Dicamba DUP	2013/11/29			83	30 - 130						
3440386	Diclofop-methyl DUP	2013/11/29			89	40 - 130						
3440386	Dimethoate DUP	2013/11/29			86	40 - 130						
3440386	Dinoseb DUP	2013/11/29			90	40 - 130						
3440386	Malathion DUP	2013/11/29			88	40 - 130						
3440386	Metolachlor DUP	2013/11/29			85	40 - 130						
3440386	Metribuzin (Sencor) DUP	2013/11/29			88	40 - 130						
3440386	Ethyl Parathion DUP	2013/11/29			89	40 - 130						
3440386	Pentachlorophenol DUP	2013/11/29			77	25 - 130						
3440386	Phorate DUP	2013/11/29			76	40 - 130						
3440386	Picloram DUP	2013/11/29			34	10 - 130						
3440386	Prometryne DUP	2013/11/29			87	30 - 130						
3440386	Simazine DUP	2013/11/29			74	40 - 130						
3440386	Terbufos DUP	2013/11/29			71	40 - 130						
3440386	Triallate DUP	2013/11/29			89	40 - 130						
3440386	Trifluralin DUP	2013/11/29			100	40 - 130						
3440386	Benzo(a)pyrene DUP	2013/11/29			93	30 - 130						
3440386	Methyl parathion DUP	2013/11/29			101	30 - 130						
3440704	Methane	2013/11/29					<0.005	L/m3	9.2	30		
3440973	D6-N-Nitrosodimethylamine	2013/12/04			41	10 - 85	34	%				
3440973	D6-N-Nitrosodimethylamine DUP	2013/12/04			39	10 - 85						
3440973	N-Nitrosodimethylamine	2013/12/04			117	10 - 150	<0.002	ug/L	6.5	25		
3440973	N-Nitrosodimethylamine DUP	2013/12/04			110	10 - 150						
3441537	Diuron	2013/12/02	104	40 - 130	101	40 - 130	<10	ug/L	NC	40		
3441537	Guthion (Azinphos-methyl)	2013/12/02	111	40 - 130	108	40 - 130	<2	ug/L	NC	40		
3441537	Temephos	2013/12/02	76	40 - 130	93	40 - 130	<10	ug/L	NC	40		
3455122	C13-1234678 HeptaCDD	2013/12/12			127	30 - 130	127	%				
3455122	C13-1234678 HeptaCDF	2013/12/12			96	30 - 130	99	%				
3455122	C13-123678 HexaCDD	2013/12/12			93	30 - 130	92	%				
3455122	C13-123678 HexaCDF	2013/12/12			90	30 - 130	83	%				
3455122	C13-12378 PentaCDD	2013/12/12			102	30 - 130	98	%				
3455122	C13-12378 PentaCDF	2013/12/12			123	30 - 130	109	%				
3455122	C13-2378 TetraCDD	2013/12/12			68	30 - 130	60	%				

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Golder Associates Ltd
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QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3455122	C13-2378 TetraCDF	2013/12/12			71	30 - 130	61	%				
3455122	C13-OCDD	2013/12/12			97	30 - 130	108	%				
3455122	2,3,7,8-Tetra CDD	2013/12/12			116	80 - 140	<1.35	pg/L				
3455122	1,2,3,7,8-Penta CDD	2013/12/12			116	80 - 140	<2.21	pg/L				
3455122	1,2,3,4,7,8-Hexa CDD	2013/12/12			107	80 - 140	<0.894	pg/L				
3455122	1,2,3,6,7,8-Hexa CDD	2013/12/12			112	80 - 140	<0.960	pg/L				
3455122	1,2,3,7,8,9-Hexa CDD	2013/12/12			113	80 - 140	<0.843	pg/L				
3455122	1,2,3,4,6,7,8-Hepta CDD	2013/12/12			109	80 - 140	<1.04	pg/L				
3455122	Octa CDD	2013/12/12			114	80 - 140	6, RDL=111	pg/L				
3455122	2,3,7,8-Tetra CDF	2013/12/12			117	80 - 140	<1.30	pg/L				
3455122	1,2,3,7,8-Penta CDF	2013/12/12			91	80 - 140	<1.07	pg/L				
3455122	2,3,4,7,8-Penta CDF	2013/12/12			98	80 - 140	<1.12	pg/L				
3455122	1,2,3,4,7,8-Hexa CDF	2013/12/12			115	80 - 140	<0.915	pg/L				
3455122	1,2,3,6,7,8-Hexa CDF	2013/12/12			111	80 - 140	<0.861	pg/L				
3455122	2,3,4,6,7,8-Hexa CDF	2013/12/12			118	80 - 140	<0.985	pg/L				
3455122	1,2,3,7,8,9-Hexa CDF	2013/12/12			115	80 - 140	<0.999	pg/L				
3455122	1,2,3,4,6,7,8-Hepta CDF	2013/12/12			111	80 - 140	<1.07	pg/L				
3455122	1,2,3,4,7,8,9-Hepta CDF	2013/12/12			114	80 - 140	<1.38	pg/L				
3455122	Octa CDF	2013/12/12			113	80 - 140	1, RDL=111	pg/L				
3455122	Total Tetra CDD	2013/12/12					<1.35	pg/L				
3455122	Total Penta CDD	2013/12/12					<2.21	pg/L				
3455122	Total Hexa CDD	2013/12/12					<1.15 (3)	pg/L				
3455122	Total Hepta CDD	2013/12/12					<1.04	pg/L				
3455122	Total Tetra CDF	2013/12/12					<1.30	pg/L				
3455122	Total Penta CDF	2013/12/12					<1.10	pg/L				
3455122	Total Hexa CDF	2013/12/12					<0.937	pg/L				

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Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3455122	Total Hepta CDF	2013/12/12					1.8, RDL=11.1	pg/L				
3469709	Lead-210	2014/01/08			101	89 - 111	<0.10	Bq/L				

N/A = Not Applicable
RDL = Reportable Detection Limit
RPD = Relative Percent Difference
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.
(1) - Std. Dev. 0.03
(2) - Std. Dev. 0.02
(3) - EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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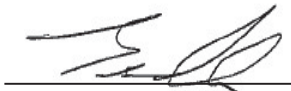
Validation Signature Page

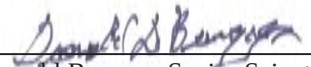
Maxxam Job #: B3K3319

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

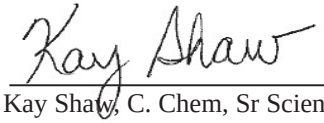


Brad Newman, Scientific Specialist

Cristina Carriere, Scientific Services



Donald Burgess, Senior Scientific Specialist



Kay Shaw, C. Chem, Sr Scientific Specialist, HRMS Services

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Validation Signature Page

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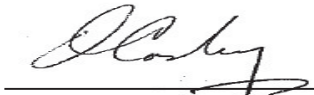
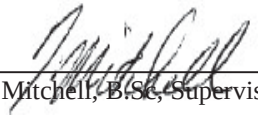


Owen Cosby, BSc.C.Chem, Supervisor, HRMS Services

Steven Simpson, Becquerel



Tom Mitchell, B.Sc, Supervisor, Compressed Gases

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-653-6266 Fax:(905) 817-5779 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#14090 Golder Associates Ltd	Company Name:		Quotation #:	B37015	MAXXAM JOB #:	BOTTLE ORDER #:
Contact Name:	Central Accounting	Contact Name:	Caitlin Cooke	P.O. #:			443749
Address:	32 Steacie Dr Kanata ON K2K 2A9	Address:		Project #:	12-1127-0115	CHAIN OF CUSTODY #:	PROJECT MANAGER:
Phone:	(613)592-9600 Fax: (613)592-9601	Phone:	Fax:	Project Name:		C#443749-01-01	Parnian Baber
Email:	AccountsPayable_Maxxam@golder.com, OttawaAc	Email:	ccooke@golder.com	Site #:	12-1127-0115		
				Sampled By:	CHM		

Regulation 153 (2011): ☐ Table 1 ☐ Table 2 ☐ Table 3 ☐ Table ___ ☐ Res/Park ☐ Ind/Comm ☐ Agri/Other ☐ Medium/Fine ☐ Coarse ☐ For RSC

Other Regulations: ☐ CCME ☐ Reg. 558 ☐ MISA ☐ PWQO ☐ Other ___ ☐ Sanitary Sewer Bylaw ☐ Storm Sewer Bylaw Municipality ___

SPECIAL INSTRUCTIONS

Include Criteria on Certificate of Analysis (Y/N)? ___

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: ☐
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: ___ Time Required: ___
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	ANALYSIS REQUESTED (Please be specific): ODWQS - TABLE 1,2,3,4	# of Bottles	Comments
1		13-3C	13-11-23	14:23	GW	N	N	X	30	Mercury is field filtered
2										
3										
4										
5										
6										
7										
8										
9										
10										

25-Nov-13 09:05
Parnian Baber
B3K3319
KP2 OTT-001

REC'D IN OTTAWA

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted	Laboratory Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
Cameron McNaughton	13/11/25	9:00	A Habibzadeh	13/11/25	09:05			8 1 7 1 6	Present	✓	
									Intact		

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Clien

on ice

Maxxam

Success Through Science®

Your Project #: 12-1127-0115
Site#: 12-1127-0115
Your C.O.C. #: 44374801, 443748-01-01

Attention: Caitlin Cooke
Golder Associates Ltd
32 Steacie Dr
Kanata, ON
K2K 2A9

Report Date: 2013/11/29

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B3K2930
Received: 2013/11/22, 11:45

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity (1)	2	N/A	2013/11/25	CAM SOP-00448	SM 2320B
Chloride by Automated Colourimetry (1)	2	N/A	2013/11/25	CAM SOP-00463	EPA 325.2
Colour (1)	2	N/A	2013/11/25	CAM SOP-00412	APHA 2120
Conductivity (1)	2	N/A	2013/11/25	CAM SOP-00414	SM 2510
Dissolved Organic Carbon (DOC) (1,2)	2	N/A	2013/11/26	CAM SOP-00446	SM 5310 B
Fluoride (1)	2	2013/11/23	2013/11/25	CAM SOP-00449	APHA 4500FC
Hardness (calculated as CaCO3) (1)	2	N/A	2013/11/28	CAM SOP 00102	SM 2340 B
Dissolved Metals Analysis by ICP (1)	2	2013/11/28	2013/11/28	CAM SOP-00408	SW-846 6010C
Ion Balance (% Difference) (1)	2	N/A	2013/11/28		
Total Ammonia-N (1)	2	N/A	2013/11/26	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (1,3)	2	N/A	2013/11/28	CAM SOP-00440	SM 4500 NO3I/NO2B
pH (1)	2	N/A	2013/11/25	CAM SOP-00413	SM 4500H+ B
Phenols (4AAP) (1)	2	N/A	2013/11/29	CAM SOP-00444	MOE ROPHEN-E3179
Sulphate by Automated Colourimetry (1)	2	N/A	2013/11/25	CAM SOP-00464	EPA 375.4
Sulphide (1)	2	N/A	2013/11/26	CAM SOP-00455	SM 4500-S G
Tannins & Lignins (1)	2	N/A	2013/11/26	CAM SOP-00410	SM 5550B
Total Dissolved Solids (1)	2	N/A	2013/11/25	CAM SOP-00428	APHA 2540C
Total Kjeldahl Nitrogen in Water (1)	2	2013/11/26	2013/11/28	CAM SOP-00454	EPA 351.2 Rev 2
Turbidity (1)	2	N/A	2013/11/23	CAM SOP-00417	APHA 2130B

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

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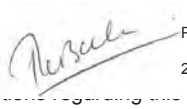
(1) This test was performed by Maxxam Analytics Mississauga
(2) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key



Parnian Baber

29 Nov 2013 16:25:04 -05:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Parnian Baber, Project Manager
Email: pbaber@maxxam.ca
Phone# (613) 274-0573

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 1

Maxxam Job #: B3K2930
Report Date: 2013/11/29

Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

RESULTS OF ANALYSES OF WATER

Maxxam ID		UA3923	UA3923		UA3924	UA3924		
Sampling Date		2013/11/21 11:15	2013/11/21 11:15		2013/11/22 09:55	2013/11/22 09:55		
	Units	**13-3**	**13-3 Lab-Dup**	**QC Batch**	**13-3B**	**13-3B Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters								
Hardness (CaCO3)	mg/L	67		3433793	63		1.0	3433793
Ion Balance (% Difference)	%	1.50		3433794	0.800		N/A	3433794
Inorganics								
Total Ammonia-N	mg/L	0.33		3435181	0.33		0.050	3435183
Colour	TCU	15		3434045	13		2	3434045
Conductivity	umho/cm	510		3434024	500	500	1.0	3434024
Total Dissolved Solids	mg/L	250	260	3435252	268		10	3435252
Fluoride (F-)	mg/L	0.74		3434025	0.73	0.72	0.10	3434025
Total Kjeldahl Nitrogen (TKN)	mg/L	0.68		3435951	0.53		0.10	3435951
Dissolved Organic Carbon	mg/L	4.1	4.1	3435171	4.1		0.20	3435171
pH	pH	8.43		3434026	8.33	8.34		3434026
Phenols-4AAP	mg/L	<0.0010		3437610	<0.0010		0.0010	3437610
Dissolved Sulphate (SO4)	mg/L	<1		3434057	<1		1	3434057
Sulphide	mg/L	<0.020		3434645	<0.020		0.020	3434645
Tannins & Lignins	mg/L	0.5		3434881	0.5	0.5	0.2	3434881
Turbidity	NTU	<0.2		3433823	<0.2		0.2	3433823
Alkalinity (Total as CaCO3)	mg/L	230		3434023	220	220	1.0	3434023
Dissolved Chloride (Cl)	mg/L	29		3434055	27		1	3434055
Nitrite (N)	mg/L	<0.010		3434050	<0.010		0.010	3434050
Nitrate (N)	mg/L	<0.10		3434050	<0.10		0.10	3434050
Nitrate + Nitrite	mg/L	<0.10		3434050	<0.10		0.10	3434050

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B3K2930
Report Date: 2013/11/29

Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		UA3923	UA3924		
Sampling Date		2013/11/21 11:15	2013/11/22 09:55		
	Units	**13-3**	**13-3B**	**RDL**	**QC Batch**
Metals					
Dissolved Calcium (Ca)	mg/L	16	15	0.05	3439115
Dissolved Iron (Fe)	mg/L	0.09	0.08	0.02	3439115
Dissolved Magnesium (Mg)	mg/L	6.4	5.9	0.05	3439115
Dissolved Manganese (Mn)	mg/L	<0.01	<0.01	0.01	3439115
Dissolved Potassium (K)	mg/L	5	5	1	3439115
Dissolved Sodium (Na)	mg/L	88	86	0.5	3439115

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B3K2930
Report Date: 2013/11/29

Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

Test Summary

Maxxam ID UA3923
Sample ID 13-3
Matrix Water

Collected 2013/11/21
Shipped
Received 2013/11/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3434023	N/A	2013/11/25	Surinder Rai
Chloride by Automated Colourimetry	AC	3434055	N/A	2013/11/25	Alina Dobreanu
Colour	SPEC	3434045	N/A	2013/11/25	Christine Pham
Conductivity	COND	3434024	N/A	2013/11/25	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	3435171	N/A	2013/11/26	Anastasia Hamanov
Fluoride	F	3434025	2013/11/23	2013/11/25	Surinder Rai
Hardness (calculated as CaCO3)		3433793	N/A	2013/11/28	Automated Statchk
Dissolved Metals Analysis by ICP	ICP	3439115	2013/11/28	2013/11/28	Ramiz Saad
Ion Balance (% Difference)	CALC	3433794	N/A	2013/11/28	Automated Statchk
Total Ammonia-N	LACH/NH4	3435181	N/A	2013/11/26	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3434050	N/A	2013/11/28	Shobhana Bavisiya
pH	PH	3434026	N/A	2013/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3437610	N/A	2013/11/29	Bramdeo Motiram
Sulphate by Automated Colourimetry	AC	3434057	N/A	2013/11/25	Alina Dobreanu
Sulphide	ISE/S	3434645	N/A	2013/11/26	Neil Dassanayake
Tannins & Lignins	SPEC	3434881	N/A	2013/11/26	Elsamma Alex
Total Dissolved Solids	SLDS	3435252	N/A	2013/11/25	Niki Shah
Total Kjeldahl Nitrogen in Water	AC	3435951	2013/11/26	2013/11/28	Chandra Nandlal
Turbidity	TURB	3433823	N/A	2013/11/23	Lemeneh Addis

Maxxam ID UA3923 Dup
Sample ID 13-3
Matrix Water

Collected 2013/11/21
Shipped
Received 2013/11/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dissolved Organic Carbon (DOC)	TOCV/NDIR	3435171	N/A	2013/11/26	Anastasia Hamanov
Total Dissolved Solids	SLDS	3435252	N/A	2013/11/25	Niki Shah

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Maxxam Job #: B3K2930
Report Date: 2013/11/29

Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

Test Summary

Maxxam ID UA3924
Sample ID 13-3B
Matrix Water

Collected 2013/11/22
Shipped
Received 2013/11/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3434023	N/A	2013/11/25	Surinder Rai
Chloride by Automated Colourimetry	AC	3434055	N/A	2013/11/25	Alina Dobreanu
Colour	SPEC	3434045	N/A	2013/11/25	Christine Pham
Conductivity	COND	3434024	N/A	2013/11/25	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	3435171	N/A	2013/11/26	Anastasia Hamanov
Fluoride	F	3434025	2013/11/23	2013/11/25	Surinder Rai
Hardness (calculated as CaCO3)		3433793	N/A	2013/11/28	Automated Statchk
Dissolved Metals Analysis by ICP	ICP	3439115	2013/11/28	2013/11/28	Ramiz Saad
Ion Balance (% Difference)	CALC	3433794	N/A	2013/11/28	Automated Statchk
Total Ammonia-N	LACH/NH4	3435183	N/A	2013/11/26	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3434050	N/A	2013/11/28	Shobhana Bavisiya
pH	PH	3434026	N/A	2013/11/25	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3437610	N/A	2013/11/29	Bramdeo Motiram
Sulphate by Automated Colourimetry	AC	3434057	N/A	2013/11/25	Alina Dobreanu
Sulphide	ISE/S	3434645	N/A	2013/11/26	Neil Dassanayake
Tannins & Lignins	SPEC	3434881	N/A	2013/11/26	Elsamma Alex
Total Dissolved Solids	SLDS	3435252	N/A	2013/11/25	Niki Shah
Total Kjeldahl Nitrogen in Water	AC	3435951	2013/11/26	2013/11/28	Chandra Nandlal
Turbidity	TURB	3433823	N/A	2013/11/23	Lemeneh Addis

Maxxam ID UA3924 Dup
Sample ID 13-3B
Matrix Water

Collected 2013/11/22
Shipped
Received 2013/11/22

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3434023	N/A	2013/11/25	Surinder Rai
Conductivity	COND	3434024	N/A	2013/11/25	Surinder Rai
Fluoride	F	3434025	2013/11/23	2013/11/25	Surinder Rai
pH	PH	3434026	N/A	2013/11/25	Surinder Rai
Tannins & Lignins	SPEC	3434881	N/A	2013/11/26	Elsamma Alex

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Maxxam Job #: B3K2930
Report Date: 2013/11/29

Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

Package 1	1.3°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Cooler custody seal was present and intact.

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Report Date: 2013/11/29

Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3433823	Turbidity	2013/11/23					<0.2	NTU	3.9	20	97	85 - 115
3434023	Alkalinity (Total as CaCO3)	2013/11/25			96	85 - 115	<1.0	mg/L	0.2	25		
3434024	Conductivity	2013/11/25			101	85 - 115	<1.0	umho/cm	0.2	25		
3434025	Fluoride (F-)	2013/11/25	103	80 - 120	98	80 - 120	<0.10	mg/L	0.9	20		
3434045	Colour	2013/11/25			100	85 - 115	<2	TCU	NC	25		
3434050	Nitrite (N)	2013/11/28	105	80 - 120	103	80 - 120	<0.010	mg/L	NC	25		
3434050	Nitrate (N)	2013/11/28	104	80 - 120	104	80 - 120	<0.10	mg/L	NC	25		
3434055	Dissolved Chloride (Cl)	2013/11/25	106	80 - 120	102	80 - 120	<1	mg/L	NC	20		
3434057	Dissolved Sulphate (SO4)	2013/11/25	NC	75 - 125	100	80 - 120	<1	mg/L	1.1	20		
3434645	Sulphide	2013/11/26	88	80 - 120	88	80 - 120	<0.020	mg/L	NC	20		
3434881	Tannins & Lignins	2013/11/26	105	80 - 120	102	80 - 120	<0.2	mg/L	NC	25		
3435171	Dissolved Organic Carbon	2013/11/26	96	80 - 120	98	80 - 120	<0.20	mg/L	0.3	20		
3435181	Total Ammonia-N	2013/11/26	106	80 - 120	99	85 - 115	<0.050	mg/L	NC	20		
3435183	Total Ammonia-N	2013/11/26	105	80 - 120	95	85 - 115	<0.050	mg/L	NC	20		
3435252	Total Dissolved Solids	2013/11/25					<10	mg/L	3.9	25	97	90 - 110
3435951	Total Kjeldahl Nitrogen (TKN)	2013/11/28	102	80 - 120	99	80 - 120	<0.10	mg/L	1.8	20	105	80 - 120
3437610	Phenols-4AAP	2013/11/29	95	80 - 120	102	85 - 115	<0.0010	mg/L	NC	25		
3439115	Dissolved Calcium (Ca)	2013/11/28	NC	80 - 120	102	80 - 120	<0.05	mg/L				
3439115	Dissolved Iron (Fe)	2013/11/28	98	80 - 120	103	80 - 120	<0.02	mg/L	2.1	25		
3439115	Dissolved Magnesium (Mg)	2013/11/28	NC	80 - 120	99	80 - 120	<0.05	mg/L				
3439115	Dissolved Manganese (Mn)	2013/11/28	86	80 - 120	100	80 - 120	<0.01	mg/L	NC	25		
3439115	Dissolved Potassium (K)	2013/11/28	89	80 - 120	99	80 - 120	<1	mg/L				
3439115	Dissolved Sodium (Na)	2013/11/28	NC	80 - 120	104	80 - 120	<0.5	mg/L				

N/A = Not Applicable
RPD = Relative Percent Difference
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

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Validation Signature Page

Maxxam Job #: B3K2930

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Cristina Carriere

Cristina Carriere, Scientific Services

==========

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Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-653-6266 Fax:(905) 817-5779 www.maxxam.ca

CHAIN OF C

22-Nov-13 11:45
Parnian Baber

B3K2930
J L ENV-739

Page 1 of 1

IMMEDIATE TES

Use Only:

BOTTLE ORDER #: 443748

CHAIN OF CUSTODY #: C#443748-01-01

PROJECT MANAGER: Parnian Baber

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:	
Company Name:	#14090 Golder Associates Ltd	Company Name:		Quotation #:	B37015
Contact Name:	Central Accounting	Contact Name:	Caitlin Cooke	P.O. #:	
Address:	32 Steacie Dr Kanata ON K2K 2A9	Address:		Project #:	12-1127-0115
Phone:	(613)592-9600 Fax: (613)592-9601	Phone:	Fax:	Project Name:	
Email:	AccountsPayable_Maxxam@golder.com, OttawaAc	Email:	ccooke@golder.com	Site #:	12-1127-0115
				Sampled By:	CHM

Regulation 153 (2011)
☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other
☐ Table ___ ☐ For RSC

Other Regulations
☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg. 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ___
☐ PWQO
☐ Other ___

SPECIAL INSTRUCTIONS

Include Criteria on Certificate of Analysis (Y/N)? ___

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT:
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____
Rush Confirmation Number: _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	ANALYSIS REQUESTED: SUBDIVISION SUPPLY PKG (NO BACTERIA)	# of Bottles	Comments
1		13-3	2013/11/21	11:15	GW	N	N	X	8	
2		13-3B	2013/11/22	09:55	GW	N	N	X	8	
3										
4										
5										
6										
7										
8										
9										REC'D IN OTTAWA
10										on ice

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
Cameron McNaughton	13/11/22	11:00	C. Bergeron	2013/11/22	11:45	
			Nikki Lapoz	2013/11/23	09:45	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	3/1/0	Present	X	
		Intact	X	

4/4/3°C 3/3/2°C

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Clier

PW14-4 Pumping Test

Your Project #: 12-1127-0115
Site#: 6239
Site Location: LIMOGES WELLS
Your C.O.C. #: 47286701, 472867-01-01

Attention: Caitlin Cooke
Golder Associates Ltd
32 Steacie Dr
Kanata, ON
K2K 2A9

Report Date: 2014/06/11
Report #: R3055556
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B496094
Received: 2014/06/06, 15:00

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity (1)	1	N/A	2014/06/08	CAM SOP-00448	SM 2320B
Chloride by Automated Colourimetry (1)	1	N/A	2014/06/09	CAM SOP-00463	EPA 325.2
Colour (1)	1	N/A	2014/06/10	CAM SOP-00412	APHA 2120
Conductivity (1)	1	N/A	2014/06/08	CAM SOP-00414	SM 2510
Dissolved Organic Carbon (DOC) (1,2)	1	N/A	2014/06/09	CAM SOP-00446	SM 5310 B
Fluoride (1)	1	2014/06/07	2014/06/08	CAM SOP-00449	APHA 4500FC
Dissolved Gases in Water in mg/L units (1)	1	N/A	2014/06/08		
Hardness (calculated as CaCO3) (1)	1	N/A	2014/06/11	CAM SOP 00102/00408/00447	SM 2340 B
Metals Analysis by ICPMS (as received) (1,3)	1	2014/06/10	2014/06/11	CAM SOP-00447	EPA 6020
Ion Balance (% Difference) (1)	1	N/A	2014/06/11		
Coliform/ E. coli, CFU/100mL (1)	1	N/A	2014/06/07	CAM SOP-00551	MOE E3407
Dissolved Methane in Water (1)	1	N/A	2014/06/09	CAM SOP-00219 Modified Combustible Gas Indicator Method	J.of Chrom.Sci.May98
Total Ammonia-N (1)	1	N/A	2014/06/11	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (1,4)	1	N/A	2014/06/09	CAM SOP-00440	SM 4500 NO3I/NO2B
pH (1)	1	N/A	2014/06/08	CAM SOP-00413	SM 4500H+ B
Phenols (4AAP) (1)	1	N/A	2014/06/10	CAM SOP-00444	MOE ROPHEN-E3179
Sulphate by Automated Colourimetry (1)	1	N/A	2014/06/09	CAM SOP-00464	EPA 375.4
Sulphide (1)	1	N/A	2014/06/10	CAM SOP-00455	SM 4500-S G
Tannins & Lignins (1)	1	N/A	2014/06/10	CAM SOP-00410	SM 5550B
Total Dissolved Solids (1)	1	N/A	2014/06/09	CAM SOP-00428	APHA 2540C
Total Kjeldahl Nitrogen in Water (1)	1	2014/06/09	2014/06/09	CAM SOP-00454	EPA 351.2 Rev 2
Turbidity (1)	1	N/A	2014/06/07	CAM SOP-00417	APHA 2130B

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The

Maxxam Job #: B496094
Report Date: 2014/06/11

Golder Associates Ltd
Client Project #: 12-1127-0115
Site Location: LIMOGES WELLS
Sampler Initials: CM

extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) This test was performed by Maxxam Analytics Mississauga
(2) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(3) Metals analysis was performed on the sample 'as received'.
(4) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Parnian Baber
11 Jun 2014 16:18:14 -04:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Parnian Baber, Project Manager
Email: pbaber@maxxam.ca
Phone# (613) 274-0573

==========

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Total cover pages: 2

Maxxam Job #: B496094
Report Date: 2014/06/11

Golder Associates Ltd
Client Project #: 12-1127-0115
Site Location: LIMOGES WELLS
Sampler Initials: CM

RESULTS OF ANALYSES OF WATER

Maxxam ID		WF2105		
Sampling Date		2014/06/06 12:45		
	Units	**14-4B**	**RDL**	**QC Batch**
Calculated Parameters				
Hardness (CaCO3)	mg/L	73	1.0	3631961
Ion Balance (% Difference)	%	0.0800	N/A	3631954
Inorganics				
Total Ammonia-N	mg/L	0.30	0.050	3634585
Colour	TCU	13	2	3633497
Conductivity	umho/cm	450	1.0	3633510
Total Dissolved Solids	mg/L	268	10	3633437
Fluoride (F-)	mg/L	0.63	0.10	3633511
Total Kjeldahl Nitrogen (TKN)	mg/L	0.64	0.10	3633741
Dissolved Organic Carbon	mg/L	3.4	0.20	3633428
pH	pH	8.44		3633512
Phenols-4AAP	mg/L	<0.0010	0.0010	3633818
Dissolved Sulphate (SO4)	mg/L	<1	1	3633494
Sulphide	mg/L	<0.020	0.020	3635544
Tannins & Lignins	mg/L	0.5	0.2	3632463
Turbidity	NTU	<0.2	0.2	3633407
Alkalinity (Total as CaCO3)	mg/L	210	1.0	3633509
Dissolved Chloride (Cl)	mg/L	19	1	3633493
Nitrite (N)	mg/L	<0.010	0.010	3633107
Nitrate (N)	mg/L	<0.10	0.10	3633107
Nitrate + Nitrite	mg/L	<0.10	0.10	3633107

PERMANENT GASES (WATER)

Maxxam ID		WF2105	WF2105		
Sampling Date		2014/06/06 12:45	2014/06/06 12:45		
	Units	**14-4B**	**14-4B Lab-Dup**	**RDL**	**QC Batch**
Fixed Gases					
Methane	L/m3	7.6	8.2	0.005	3634608
Calculated Methane	mg/L	5.0		0.003	3631960

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B496094
Report Date: 2014/06/11

Golder Associates Ltd
Client Project #: 12-1127-0115
Site Location: LIMOGES WELLS
Sampler Initials: CM

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		WF2105		
Sampling Date		2014/06/06 12:45		
	Units	**14-4B**	**RDL**	**QC Batch**
Metals				
. Calcium (Ca)	ug/L	18000	200	3635190
. Iron (Fe)	ug/L	110	100	3635190
. Magnesium (Mg)	ug/L	6500	50	3635190
. Manganese (Mn)	ug/L	7.0	2.0	3635190
. Potassium (K)	ug/L	4600	200	3635190
. Sodium (Na)	ug/L	72000	100	3635190

MICROBIOLOGY (WATER)

Maxxam ID		WF2105		
Sampling Date		2014/06/06 12:45		
	Units	**14-4B**	**RDL**	**QC Batch**
Microbiological				
Background	CFU/100mL	0	N/A	3633342
Total Coliforms	CFU/100mL	0	N/A	3633342
Escherichia coli	CFU/100mL	0	N/A	3633342

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B496094
Report Date: 2014/06/11

Golder Associates Ltd
Client Project #: 12-1127-0115
Site Location: LIMOGES WELLS
Sampler Initials: CM

Test Summary

Maxxam ID WF2105 **Collected** 2014/06/06
Sample ID 14-4B **Shipped**
Matrix Water **Received** 2014/06/06

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3633509	N/A	2014/06/08	Yogesh Patel
Chloride by Automated Colourimetry	AC	3633493	N/A	2014/06/09	Deonarine Ramnarine
Colour	SPEC	3633497	N/A	2014/06/10	Christine Pham
Conductivity	COND	3633510	N/A	2014/06/08	Yogesh Patel
Dissolved Organic Carbon (DOC)	TOCV/NDIR	3633428	N/A	2014/06/09	Elsamma Alex
Fluoride	F	3633511	2014/06/07	2014/06/08	Yogesh Patel
Dissolved Gases in Water in mg/L units		3631960	N/A	2014/06/08	Automated Statchk
Hardness (calculated as CaCO3)		3631961	N/A	2014/06/11	Automated Statchk
Metals Analysis by ICPMS (as received)	ICP/MS	3635190	2014/06/10	2014/06/11	Arefa Dabhad
Ion Balance (% Difference)	CALC	3631954	N/A	2014/06/11	Automated Statchk
Coliform/ E. coli, CFU/100mL	PL	3633342	N/A	2014/06/07	Sirimathie Aluthwala
Dissolved Methane in Water	GC/FID	3634608	N/A	2014/06/09	Bhushan Borole
Total Ammonia-N	LACH/NH4	3634585	N/A	2014/06/11	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3633107	N/A	2014/06/09	Surinder Rai
pH	PH	3633512	N/A	2014/06/08	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3633818	N/A	2014/06/10	Bramdeo Motiram
Sulphate by Automated Colourimetry	AC	3633494	N/A	2014/06/09	Deonarine Ramnarine
Sulphide	ISE/S	3635544	N/A	2014/06/10	Neil Dassanayake
Tannins & Lignins	SPEC	3632463	N/A	2014/06/10	Elsamma Alex
Total Dissolved Solids	SLDS	3633437	N/A	2014/06/09	Niki Shah
Total Kjeldahl Nitrogen in Water	AC	3633741	2014/06/09	2014/06/09	Sarabjit Raina
Turbidity	TURB	3633407	N/A	2014/06/07	Neil Dassanayake

Maxxam ID WF2105 Dup **Collected** 2014/06/06
Sample ID 14-4B **Shipped**
Matrix Water **Received** 2014/06/06

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dissolved Methane in Water	GC/FID	3634608	N/A	2014/06/09	Bhushan Borole

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Maxxam Job #: B496094
Report Date: 2014/06/11

Golder Associates Ltd
Client Project #: 12-1127-0115
Site Location: LIMOGES WELLS
Sampler Initials: CM

Package 1	6.7°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Custody seals were present and intact.

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Maxxam Job #: B496094
Report Date: 2014/06/11

Golder Associates Ltd
Client Project #: 12-1127-0115
Site Location: LIMOGES WELLS
Sampler Initials: CM

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3632463	Tannins & Lignins	2014/06/10	NC	80 - 120	95	80 - 120	<0.2	mg/L	1.1	25		
3633107	Nitrite (N)	2014/06/09	95	80 - 120	104	80 - 120	<0.010	mg/L	NC	25		
3633107	Nitrate (N)	2014/06/09	103	80 - 120	102	80 - 120	<0.10	mg/L	NC	25		
3633407	Turbidity	2014/06/07					<0.2	NTU	NC	20	99	85 - 115
3633428	Dissolved Organic Carbon	2014/06/09	91	80 - 120	98	80 - 120	<0.20	mg/L	1.1	20		
3633437	Total Dissolved Solids	2014/06/09					<10	mg/L	5.8	25	98	90 - 110
3633493	Dissolved Chloride (Cl)	2014/06/09	100	80 - 120	102	80 - 120	<1	mg/L	2.2	20		
3633494	Dissolved Sulphate (SO4)	2014/06/09	97	75 - 125	100	80 - 120	<1	mg/L	NC	20		
3633497	Colour	2014/06/10			99	85 - 115	<2	TCU	NC	25		
3633509	Alkalinity (Total as CaCO3)	2014/06/08			95	85 - 115	<1.0	mg/L	0.2	25		
3633510	Conductivity	2014/06/08			101	85 - 115	<1.0	umho/cm	0	25		
3633511	Fluoride (F-)	2014/06/08	105	80 - 120	100	80 - 120	<0.10	mg/L	0	20		
3633741	Total Kjeldahl Nitrogen (TKN)	2014/06/09	94	80 - 120	91	80 - 120	<0.10	mg/L	4.6	20	98	80 - 120
3633818	Phenols-4AAP	2014/06/10	105	80 - 120	105	85 - 115	<0.0010	mg/L	NC	20		
3634585	Total Ammonia-N	2014/06/11	99	80 - 120	97	85 - 115	<0.050	mg/L	NC	20		
3634608	Methane	2014/06/09					<0.005	L/m3	8.4	30		
3635190	. Calcium (Ca)	2014/06/11	NC	80 - 120	101	80 - 120	<200	ug/L	0.6	20		
3635190	. Iron (Fe)	2014/06/11	101	80 - 120	99	80 - 120	<100	ug/L	NC	20		
3635190	. Magnesium (Mg)	2014/06/11	NC	80 - 120	99	80 - 120	<50	ug/L	1.5	20		
3635190	. Manganese (Mn)	2014/06/11	102	80 - 120	100	80 - 120	<2.0	ug/L	NC	20		
3635190	. Potassium (K)	2014/06/11	104	80 - 120	104	80 - 120	<200	ug/L	NC	20		
3635190	. Sodium (Na)	2014/06/11	NC	80 - 120	100	80 - 120	<100	ug/L	2.3	20		
3635544	Sulphide	2014/06/10	84	80 - 120	91	80 - 120	<0.020	mg/L	NC	20		

N/A = Not Applicable
RPD = Relative Percent Difference
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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Validation Signature Page

Maxxam Job #: B496094

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Cristina Carriere, Scientific Services

Sirimathie Aluthwala, Campobello Micro

Tom Mitchell, B.Sc, Supervisor, Compressed Gases

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-653-6266 Fax:(905) 817-5779 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#14090 Golder Associates Ltd	Company Name:		Quotation #:	B37015	MAXXAM JOB #:	BOTTLE ORDER #:
Contact Name:	Central Accounting	Contact Name:	Caitlin Cooke	P.O. #:			472867
Address:	32 Steacie Dr Kanata ON K2K 2A9	Address:		Project #:	12-1127-0115	CHAIN OF CUSTODY #:	PROJECT MANAGER:
Phone:	(613)592-9600 Fax: (613)592-9601	Phone:	Fax:	Project Name:		C#472867-01-01	Parnian Baber
Email:	AccountsPayable_Maxxam@golder.com, OttawaAc	Email:	ccooke@golder.com	Site #:	Limoges Wells		
				Sampled By:	CHM		

Regulation 153 (2011): ☐ Table 1 ☐ Table 2 ☐ Table 3 ☐ Table ___ ☐ Res/Park ☐ Ind/Comm ☐ Agri/Other ☐ Medium/Fine ☐ Coarse ☐ For RSC

Other Regulations: ☐ CCME ☐ Reg. 558 ☐ MISA ☐ PWQO ☐ Other ☐ Sanitary Sewer Bylaw ☐ Storm Sewer Bylaw Municipality ___

SPECIAL INSTRUCTIONS

Include Criteria on Certificate of Analysis (Y/N)? ___

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: ☐
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: _____ Time Required: _____
Rush Confirmation Number: _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	B37015- SUBDIVISION SUPPLY PKG	# of Bottles	Comments
1		14-4B	2014/06/06	12:45	GW	N	N	X	11	-Includes Bacteria
2										Golder Site Facility Code:
3										6239
4										
5										
6										
7										
8										REC'D IN OTTAWA
9										
10										ONICE

6-Jun-14 15:00
Parnian Baber
B496094
CB2 OTT-001

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
[signature] / Cameron McNaughton	14/06/06	15:00	C.E. C. Bergeron	2014/06/10	15:00	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	5 1 8 1 7	Present	X	
		Intact	X	

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxamanalytics.com

Your Project #: 12-1127-0115
Site#: 6239
Site Location: LIMOGES WELLS
Your C.O.C. #: 47297601, 472976-01-01

Attention: Caitlin Cooke
Golder Associates Ltd
32 Steacie Dr
Kanata, ON
K2K 2A9

Report Date: 2014/06/16
Report #: R3060040
Version: 2

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B496151
Received: 2014/06/06, 15:00

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity (1)	1	N/A	2014/06/08	CAM SOP-00448	SM 2320B
Chloride by Automated Colourimetry (1)	1	N/A	2014/06/09	CAM SOP-00463	EPA 325.2
Colour (1)	1	N/A	2014/06/10	CAM SOP-00412	APHA 2120
Conductivity (1)	1	N/A	2014/06/08	CAM SOP-00414	SM 2510
Dissolved Organic Carbon (DOC) (1,2)	1	N/A	2014/06/10	CAM SOP-00446	SM 5310 B
Fluoride (1)	1	2014/06/07	2014/06/08	CAM SOP-00449	APHA 4500FC
Dissolved Gases in Water in mg/L units (1)	1	N/A	2014/06/09		
Hardness (calculated as CaCO3) (1)	1	N/A	2014/06/13	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Calcium and Magnesium (1)	1	2014/06/12	2014/06/13	CAM SOP-00408	SW-846 6010C
Metals Analysis by ICPMS (as received) (1,3)	1	2014/06/12	2014/06/15	CAM SOP-00447	EPA 6020
Ion Balance (% Difference) (1)	1	N/A	2014/06/16		
Dissolved Methane in Water (1)	1	N/A	2014/06/09	CAM SOP-00219 Modified Combustible Gas Indicator Method	J.of Chrom.Sci.May98
Total Ammonia-N (1)	1	N/A	2014/06/12	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (1,4)	1	N/A	2014/06/11	CAM SOP-00440	SM 4500 NO3I/NO2B
pH (1)	1	N/A	2014/06/08	CAM SOP-00413	SM 4500H+ B
Phenols (4AAP) (1)	1	N/A	2014/06/10	CAM SOP-00444	MOE ROPHEN-E3179
Sulphate by Automated Colourimetry (1)	1	N/A	2014/06/09	CAM SOP-00464	EPA 375.4
Sulphide (1)	1	N/A	2014/06/10	CAM SOP-00455	SM 4500-S G
Tannins & Lignins (1)	1	N/A	2014/06/10	CAM SOP-00410	SM 5550B
Total Dissolved Solids (1)	1	N/A	2014/06/09	CAM SOP-00428	APHA 2540C
Total Kjeldahl Nitrogen in Water (1)	1	2014/06/10	2014/06/11	CAM SOP-00454	EPA 351.2 Rev 2
Turbidity (1)	1	N/A	2014/06/08	CAM SOP-00417	APHA 2130B

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The

Maxxam Job #: B496151
Report Date: 2014/06/16

Golder Associates Ltd
Client Project #: 12-1127-0115
Site Location: LIMOGES WELLS
Sampler Initials: NW

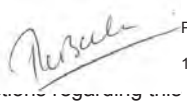
extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) This test was performed by Maxxam Analytics Mississauga
(2) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(3) Metals analysis was performed on the sample 'as received'.
(4) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key



Parnian Baber
16 Jun 2014 16:23:56 -04:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Parnian Baber, Project Manager
Email: pbaber@maxxam.ca
Phone# (613) 274-0573

==========

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Total cover pages: 2

Maxxam Job #: B496151
Report Date: 2014/06/16

Golder Associates Ltd
Client Project #: 12-1127-0115
Site Location: LIMOGES WELLS
Sampler Initials: NW

RESULTS OF ANALYSES OF WATER

Maxxam ID		WF2253		
Sampling Date		2014/06/05 14:45		
	Units	**14-4A**	**RDL**	**QC Batch**
Calculated Parameters				
Hardness (CaCO3)	mg/L	78	1.0	3631961
Ion Balance (% Difference)	%	2.05	N/A	3631954
Inorganics				
Total Ammonia-N	mg/L	0.38	0.050	3635756
Colour	TCU	13	2	3633497
Conductivity	umho/cm	430	1.0	3633510
Total Dissolved Solids	mg/L	258	10	3634475
Fluoride (F-)	mg/L	0.61	0.10	3633511
Total Kjeldahl Nitrogen (TKN)	mg/L	0.60	0.10	3636137
Dissolved Organic Carbon	mg/L	3.3	0.20	3635228
pH	pH	8.42		3633512
Phenols-4AAP	mg/L	<0.0010	0.0010	3634336
Dissolved Sulphate (SO4)	mg/L	<1	1	3633494
Sulphide	mg/L	<0.020	0.020	3635544
Tannins & Lignins	mg/L	0.5	0.2	3632463
Turbidity	NTU	<0.2	0.2	3633407
Alkalinity (Total as CaCO3)	mg/L	200	1.0	3633509
Dissolved Chloride (Cl)	mg/L	16	1	3633493
Nitrite (N)	mg/L	<0.010	0.010	3633488
Nitrate (N)	mg/L	<0.10	0.10	3633488
Nitrate + Nitrite	mg/L	<0.10	0.10	3633488

PERMANENT GASES (WATER)

Maxxam ID		WF2253		
Sampling Date		2014/06/05 14:45		
	Units	**14-4A**	**RDL**	**QC Batch**
Fixed Gases				
Methane	L/m3	9.6	0.005	3634608
Calculated Methane	mg/L	6.3	0.003	3631960

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B496151
Report Date: 2014/06/16

Golder Associates Ltd
Client Project #: 12-1127-0115
Site Location: LIMOGES WELLS
Sampler Initials: NW

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		WF2253		
Sampling Date		2014/06/05 14:45		
	Units	**14-4A**	**RDL**	**QC Batch**
Metals				
Dissolved Calcium (Ca)	mg/L	20.1	0.0500	3638339
. Calcium (Ca)	ug/L	18000	200	3638643
. Iron (Fe)	ug/L	130	100	3638643
Dissolved Magnesium (Mg)	mg/L	6.74	0.0500	3638339
. Magnesium (Mg)	ug/L	6700	50	3638643
. Manganese (Mn)	ug/L	7.5	2.0	3638643
. Potassium (K)	ug/L	4400	200	3638643
. Sodium (Na)	ug/L	71000	100	3638643

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B496151
Report Date: 2014/06/16

Golder Associates Ltd
Client Project #: 12-1127-0115
Site Location: LIMOGES WELLS
Sampler Initials: NW

Test Summary

Maxxam ID WF2253
Sample ID 14-4A
Matrix Water

Collected 2014/06/05
Shipped
Received 2014/06/06

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3633509	N/A	2014/06/08	Yogesh Patel
Chloride by Automated Colourimetry	AC	3633493	N/A	2014/06/09	Deonarine Ramnarine
Colour	SPEC	3633497	N/A	2014/06/10	Christine Pham
Conductivity	COND	3633510	N/A	2014/06/08	Yogesh Patel
Dissolved Organic Carbon (DOC)	TOCV/NDIR	3635228	N/A	2014/06/10	Anastasia Hamanov
Fluoride	F	3633511	2014/06/07	2014/06/08	Yogesh Patel
Dissolved Gases in Water in mg/L units		3631960	N/A	2014/06/09	Automated Statchk
Hardness (calculated as CaCO3)		3631961	N/A	2014/06/13	Automated Statchk
Dissolved Calcium and Magnesium	ICP	3638339	2014/06/12	2014/06/13	Jolly John
Metals Analysis by ICPMS (as received)	ICP/MS	3638643	2014/06/12	2014/06/15	Kevin Comerford
Ion Balance (% Difference)	CALC	3631954	N/A	2014/06/16	Automated Statchk
Dissolved Methane in Water	GC/FID	3634608	N/A	2014/06/09	Bhushan Borole
Total Ammonia-N	LACH/NH4	3635756	N/A	2014/06/12	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3633488	N/A	2014/06/11	Surinder Rai
pH	PH	3633512	N/A	2014/06/08	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3634336	N/A	2014/06/10	Bramdeo Motiram
Sulphate by Automated Colourimetry	AC	3633494	N/A	2014/06/09	Deonarine Ramnarine
Sulphide	ISE/S	3635544	N/A	2014/06/10	Neil Dassanayake
Tannins & Lignins	SPEC	3632463	N/A	2014/06/10	Elsamma Alex
Total Dissolved Solids	SLDS	3634475	N/A	2014/06/09	Niki Shah
Total Kjeldahl Nitrogen in Water	AC	3636137	2014/06/10	2014/06/11	Sarabjit Raina
Turbidity	TURB	3633407	N/A	2014/06/08	Neil Dassanayake

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Maxxam Job #: B496151
Report Date: 2014/06/16

Golder Associates Ltd
Client Project #: 12-1127-0115
Site Location: LIMOGES WELLS
Sampler Initials: NW

Package 1	8.7°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Cooler custody seal was present and intact.

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Maxxam Job #: B496151
Report Date: 2014/06/16

Golder Associates Ltd
Client Project #: 12-1127-0115
Site Location: LIMOGES WELLS
Sampler Initials: NW

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3632463	Tannins & Lignins	2014/06/10	NC	80 - 120	95	80 - 120	<0.2	mg/L	1.1	25		
3633407	Turbidity	2014/06/07					<0.2	NTU	NC	20	99	85 - 115
3633488	Nitrite (N)	2014/06/11	99	80 - 120	96	80 - 120	<0.010	mg/L	NC	25		
3633488	Nitrate (N)	2014/06/11	99	80 - 120	102	80 - 120	<0.10	mg/L	NC	25		
3633493	Dissolved Chloride (Cl)	2014/06/09	100	80 - 120	102	80 - 120	<1	mg/L	2.2	20		
3633494	Dissolved Sulphate (SO4)	2014/06/09	97	75 - 125	100	80 - 120	<1	mg/L	NC	20		
3633497	Colour	2014/06/10			99	85 - 115	<2	TCU	NC	25		
3633509	Alkalinity (Total as CaCO3)	2014/06/08			95	85 - 115	<1.0	mg/L	0.2	25		
3633510	Conductivity	2014/06/08			101	85 - 115	<1.0	umho/cm	0	25		
3633511	Fluoride (F-)	2014/06/08	105	80 - 120	100	80 - 120	<0.10	mg/L	0	20		
3634336	Phenols-4AAP	2014/06/10	105	80 - 120	98	85 - 115	<0.0010	mg/L	NC	20		
3634475	Total Dissolved Solids	2014/06/09					<10	mg/L	1.5	25	95	90 - 110
3634608	Methane	2014/06/09					<0.005	L/m3	8.4	30		
3635228	Dissolved Organic Carbon	2014/06/10	94	80 - 120	93	80 - 120	<0.20	mg/L	0.3	20		
3635544	Sulphide	2014/06/10	84	80 - 120	91	80 - 120	<0.020	mg/L	NC	20		
3635756	Total Ammonia-N	2014/06/12	NC	80 - 120	99	85 - 115	<0.050	mg/L	2.3	20		
3636137	Total Kjeldahl Nitrogen (TKN)	2014/06/11	90	80 - 120	88	80 - 120	0.11, RDL=0.10	mg/L	NC	20	99	80 - 120
3638339	Dissolved Calcium (Ca)	2014/06/13	104	80 - 120	99	80 - 120	<0.0500	mg/L				
3638339	Dissolved Magnesium (Mg)	2014/06/13	101	80 - 120	96	80 - 120	<0.0500	mg/L				
3638643	. Calcium (Ca)	2014/06/15	NC	80 - 120	100	80 - 120	<200	ug/L				
3638643	. Iron (Fe)	2014/06/15	104	80 - 120	103	80 - 120	<100	ug/L				
3638643	. Magnesium (Mg)	2014/06/15	103	80 - 120	104	80 - 120	<50	ug/L				
3638643	. Manganese (Mn)	2014/06/15	105	80 - 120	103	80 - 120	<2.0	ug/L				
3638643	. Potassium (K)	2014/06/15	103	80 - 120	100	80 - 120	<200	ug/L				
3638643	. Sodium (Na)	2014/06/15	NC	80 - 120	104	80 - 120	<100	ug/L				

N/A = Not Applicable
RDL = Reportable Detection Limit
RPD = Relative Percent Difference
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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Validation Signature Page

Maxxam Job #: B496151

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Cristina Carriere, Scientific Services

Tom Mitchell, B.Sc, Supervisor, Compressed Gases

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-653-6266 Fax:(905) 817-5779 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page of

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#14090 Golder Associates Ltd	Company Name:		Quotation #:	B37015	MAXXAM JOB #:	BOTTLE ORDER #: 472976
Contact Name:	Central Accounting	Contact Name:	Caitlin Cooke	P.O. #:			
Address:	32 Steacie Dr Kanata ON K2K 2A9	Address:		Project #:	12-1127-0115	CHAIN OF CUSTODY #: C#472976-01-01	PROJECT MANAGER: Parnian Baber
Phone:	(613)592-9600 Fax: (613)592-9601	Phone:	Fax:	Project Name:			
Email:	AccountsPayable_Maxxam@golder.com, OttawaAc	Email:	ccooke@golder.com	Site #:	Limoges Wells		
				Sampled By:	NW		

Regulation 153 (2011): ☐ Table 1 ☐ Table 2 ☐ Table 3 ☐ Table ___ ☐ Res/Park ☐ Ind/Comm ☐ Agri/Other ☐ Medium/Fine ☐ Coarse ☐ For RSC

Other Regulations: ☐ CCME ☐ Reg. 558 ☐ MISA ☐ PWQO ☐ Other ___ ☐ Sanitary Sewer Bylaw ☐ Storm Sewer Bylaw Municipality ___

SPECIAL INSTRUCTIONS

Include Criteria on Certificate of Analysis (Y/N)? ___

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: ☐
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: ___ Time Required: ___
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	ANALYSIS REQUESTED (Please be specific): B37015- SUBDIVISION SUPPLY PKG	# of Bottles	Comments
1		14-4A	June 5 2014	1445	GW	N	N	X	10	-no bacteria
2										Golder Site Facility Code:
3										6239
4										
5										
6										
7										
8										REC'D IN OTTAWA
9										
10										on ice

6-Jun-14 15:00
Parnian Baber
B496151
KP2 OTT-001

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
Cameron McNaughton	14/06/06	15:00	C. Bergeron	2014/06/06	15:00	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	7 1 7 1 2	Present	✓	
		Intact	✓	

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

TW14-5 Pumping Test

Maxxam

Success Through Science®

Your Project #: 12-1127-0115
Site#: Limoges Wells
Your C.O.C. #: 47489801, 474898-01-01

Attention: Caitlin Cooke
Golder Associates Ltd
32 Steacie Dr
Kanata, ON
K2K 2A9

Report Date: 2014/08/08
Report #: R3114696
Version: 5R

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B4A8672
Received: 2014/06/24, 15:07

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Alkalinity (1)	2	N/A	2014/06/26	CAM SOP-00448	SM 22 2320 B m
Chloride by Automated Colourimetry (1)	2	N/A	2014/06/26	CAM SOP-00463	EPA 325.2 m
Colour (1)	2	N/A	2014/06/26	CAM SOP-00412	SM 22 2120 m
Conductivity (1)	1	N/A	2014/06/26	CAM SOP-00414	SM 22 2510 m
Free (WAD) Cyanide (1)	1	N/A	2014/06/26	CAM SOP-00457	OMOE E3015 m
Dioxins/Furans in Water (EPS 1/RM/23) (1,3)	1	2014/07/03	2014/07/07	BRL SOP-00410	EPS 1/RM/23 m
Diuron, Guthion, Temephos (1)	1	2014/06/30	2014/06/30	CAM SOP-00306	EPA 532 m
Dissolved Organic Carbon (DOC) (1,4)	2	N/A	2014/06/26	CAM SOP-00446	SM 22 5310 B m
Diquat / Paraquat (1)	1	2014/06/26	2014/06/27	CAM SOP-00327	EPA 549.2 m
Fluoride (1)	2	2014/06/25	2014/06/26	CAM SOP-00449	SM 22 4500-F C m
Dissolved Gases in Water in mg/L units (1)	2	N/A	2014/06/26		
Glyphosate (1)	1	2014/06/27	2014/06/27	CAM SOP-00305	HPLC in-house method
Hardness (calculated as CaCO3) (1)	1	N/A	2014/07/03	CAM SOP 00102/00408/00447	SM 2340 B
Hardness (calculated as CaCO3) (1)	1	N/A	2014/07/08	CAM SOP 00102/00408/00447	SM 2340 B
Mercury in Water by CVAA (1)	1	2014/06/30	2014/06/30	CAM SOP-00453	EPA 7470A m
Dissolved Metals Analysis by ICP (1)	1	2014/07/02	2014/07/03	CAM SOP-00408	EPA 6010C m
Metals Analysis by ICPMS (as received) (1,5)	1	2014/07/02	2014/07/08	CAM SOP-00447	EPA 6020 m
Ion Balance (% Difference) (1)	1	N/A	2014/07/03		
Total Coliforms/ E. coli, CFU/100mL (1)	1	N/A	2014/06/25	CAM SOP-00551	MOE E3407
Dissolved Methane in Water (1)	2	N/A	2014/06/27	CAM SOP-00219 Modified Combustible Gas Indicator Method	RSKSOP-175 m
Uranium and Thorium Isotopes in Water (2)	1	N/A	2014/08/06	BQL SOP-00001	Neutron Activation
NDMA in Water (MSABN-3291Amod) (1)	1	2014/06/30	2014/07/07	BRL SOP 0400, 0401	OMOE MSABN-3291A m
Total Ammonia-N (1)	2	N/A	2014/07/02	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (1,6)	2	N/A	2014/06/26	CAM SOP-00440	SM 22 4500-NO3I/NO2B
Nitrilotriacetic Acid (NTA) (1)	1	2014/06/26	2014/06/30	CAM SOP-00411	EPA 430.1 m
OC Pesticides (Selected) & PCB (1,7)	1	2014/06/30	2014/07/04	CAM SOP-00307	EPA 8081/ 8082 m
OC Pesticides Summed Parameters (1)	1	N/A	2014/06/26	CAM SOP-00307	EPA 8081/8082 m
ODWS - Semi-Volatiles (1)	1	2014/06/28	2014/06/29	CAM SOP-00301	EPA 8270 m
Organic Nitrogen (1)	1	N/A	2014/07/02	APHA Standard Methods	SM 22 4500 m
pH (1)	2	N/A	2014/06/26	CAM SOP-00413	SM 4500H+ B
Phenols (4AAP) (1)	1	N/A	2014/06/27	CAM SOP-00444	OMOE E3179 m
Gross Alpha and Gross Beta (2)	1	N/A	2014/07/14	BQL SOP-00008	GFPC
Lead 210 (2)	1	N/A	2014/08/06	BQL SOP-00008	GFPC
Polonium-210 by Alpha Spectrometry (2)	1	N/A	2014/07/30	BQL SOP-00006	Alpha Spectrometry

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Maxxam Job #: B4A8672
Report Date: 2014/08/08

Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Tritium by Liquid Scintillation Counting (2)	1	N/A	2014/06/25	BQL SOP-00009	LSC
Sulphate by Automated Colourimetry (1)	2	N/A	2014/06/26	CAM SOP-00464	EPA 375.4 m
Sulphide (1)	2	N/A	2014/06/27	CAM SOP-00455	SM 22 4500-S G m
Tannins & Lignins (1)	1	N/A	2014/07/02	CAM SOP-00410	SM 22 5550 B m
Total Dissolved Solids (TDS calc) (1)	1	N/A	2014/07/08		
Total Dissolved Solids (1)	1	N/A	2014/06/26	CAM SOP-00428	SM 22 2540C m
Total Kjeldahl Nitrogen in Water (1)	2	2014/06/30	2014/07/02	CAM SOP-00454	EPA 351.2 m
Turbidity (1)	2	N/A	2014/06/25	CAM SOP-00417	SM 22 2130 B m
VOCs (Drinking Water) (1)	1	N/A	2014/06/27	CAM SOP-00226	EPA 8260

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) This test was performed by Maxxam Analytics Mississauga
(2) This test was performed by Maxxam - Becquerel
(3) Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.
(4) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(5) Metals analysis was performed on the sample 'as received'.
(6) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.
(7) Chlordane (Total) = Alpha Chlordane + Gamma Chlordane

Encryption Key

Parnian Baber
08 Aug 2014 10:41:44 -04:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Parnian Baber, Project Manager
Email: pbaber@maxxam.ca
Phone# (613) 274-0573

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section

Maxxam Job #: B4A8672
Report Date: 2014/08/08

Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 3

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Maxxam Job #: B4A8672
Report Date: 2014/08/08

Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

ODWQSOG TABLES 1, 2 AND 4 (WATER)

Maxxam ID		WK6658	WK6658		
Sampling Date		2014/06/24 11:40	2014/06/24 11:40		
	Units	**14-5B**	**14-5B Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters					
Calculated TDS	mg/L	310		1.0	3652374
Hardness (CaCO3)	mg/L	78		1.0	3652369
Total Organic Nitrogen	mg/L	0.5		0.1	3653147
Inorganics					
Total Ammonia-N	mg/L	0.49		0.050	3658852
Colour	TCU	13		2	3655571
Fluoride (F-)	mg/L	0.41		0.10	3655219
Free Cyanide	mg/L	<0.0020		0.0020	3655146
Total Kjeldahl Nitrogen (TKN)	mg/L	0.96		0.10	3659759
Dissolved Organic Carbon	mg/L	4.0		0.20	3655200
pH	pH	8.42			3655221
Dissolved Sulphate (SO4)	mg/L	<1		1	3655227
Sulphide	mg/L	<0.020		0.020	3655197
Turbidity	NTU	<0.2		0.2	3654559
Alkalinity (Total as CaCO3)	mg/L	220		1.0	3655214
Dissolved Chloride (Cl)	mg/L	41		1	3655226
Nitrite (N)	mg/L	<0.010		0.010	3655164
Nitrate (N)	mg/L	<0.10		0.10	3655164
Nitrate + Nitrite	mg/L	<0.10		0.10	3655164
Miscellaneous Parameters					
NTA	mg/L	<0.05		0.05	3654362
Fixed Gases					
Methane	L/m3	20	18	0.005	3657648

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B4A8672
Report Date: 2014/08/08

Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

ODWQSOG TABLES 1, 2 AND 4 (WATER)

Maxxam ID		WK6658	WK6658		
Sampling Date		2014/06/24 11:40	2014/06/24 11:40		
	Units	**14-5B**	**14-5B Lab-Dup**	**RDL**	**QC Batch**
Metals					
. Aluminum (Al)	ug/L	<5.0		5.0	3660974
. Antimony (Sb)	ug/L	<0.50		0.50	3660974
. Arsenic (As)	ug/L	<1.0		1.0	3660974
. Barium (Ba)	ug/L	330		2.0	3660974
. Boron (B)	ug/L	190		10	3660974
. Cadmium (Cd)	ug/L	<0.10		0.10	3660974
. Calcium (Ca)	ug/L	17000		200	3660974
. Chromium (Cr)	ug/L	<5.0		5.0	3660974
. Copper (Cu)	ug/L	<1.0		1.0	3660974
. Iron (Fe)	ug/L	110		100	3660974
. Lead (Pb)	ug/L	<0.50		0.50	3660974
. Magnesium (Mg)	ug/L	8500		50	3660974
. Manganese (Mn)	ug/L	9.4		2.0	3660974
Mercury (Hg)	mg/L	<0.00010		0.00010	3658900
. Potassium (K)	ug/L	6400		200	3660974
. Selenium (Se)	ug/L	<2.0		2.0	3660974
. Sodium (Na)	ug/L	85000		100	3660974
. Uranium (U)	ug/L	<0.10		0.10	3660974
. Zinc (Zn)	ug/L	<5.0		5.0	3660974

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B4A8672
Report Date: 2014/08/08

Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

ODWQSOG TABLES 1, 2 AND 4 (WATER)

Maxxam ID		WK6658	WK6658		
Sampling Date		2014/06/24 11:40	2014/06/24 11:40		
	Units	**14-5B**	**14-5B Lab-Dup**	**RDL**	**QC Batch**
Semivolatile Organics					
2,3,4,6-Tetrachlorophenol	ug/L	<0.50		0.50	3658874
2,4,5-T	ug/L	<1.0		1.0	3658874
2,4,6-Trichlorophenol	ug/L	<0.50		0.50	3658874
2,4-D	ug/L	<1.0		1.0	3658874
2,4-Dichlorophenol	ug/L	<0.50		0.50	3658874
Alachlor	ug/L	<0.50		0.50	3658874
Aldicarb	ug/L	<5.0		5.0	3658874
Atrazine	ug/L	<0.50		0.50	3658874
Des-ethyl atrazine	ug/L	<0.50		0.50	3658874
Atrazine + Desethyl-atrazine	ug/L	<1.0		1.0	3658874
Bendiocarb	ug/L	<2.0		2.0	3658874
Bromoxynil	ug/L	<0.50		0.50	3658874
Carbaryl	ug/L	<5.0		5.0	3658874
Carbofuran	ug/L	<5.0		5.0	3658874
Chlorpyrifos (Dursban)	ug/L	<1.0		1.0	3658874
Cyanazine (Bladex)	ug/L	<1.0		1.0	3658874
Diazinon	ug/L	<1.0		1.0	3658874
Dicamba	ug/L	<1.0		1.0	3658874
Diclofop-methyl	ug/L	<0.90		0.90	3658874
Dimethoate	ug/L	<2.5		2.5	3658874
Dinoseb	ug/L	<1.0		1.0	3658874
Malathion	ug/L	<5.0		5.0	3658874
Metolachlor	ug/L	<0.50		0.50	3658874
Metribuzin (Sencor)	ug/L	<5.0		5.0	3658874
Ethyl Parathion	ug/L	<1.0		1.0	3658874
Pentachlorophenol	ug/L	<0.50		0.50	3658874
Phorate	ug/L	<0.50		0.50	3658874
Picloram	ug/L	<5.0		5.0	3658874
Prometryne	ug/L	<0.25		0.25	3658874
Simazine	ug/L	<1.0		1.0	3658874
Terbufos	ug/L	<0.50		0.50	3658874
Triallate	ug/L	<1.0		1.0	3658874
Trifluralin	ug/L	<1.0		1.0	3658874
Benzo(a)pyrene	ug/L	<0.0090		0.0090	3658874
Methyl parathion	ug/L	<1.0		1.0	3658874

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Sampler Initials: CHM

ODWQSOG TABLES 1, 2 AND 4 (WATER)

Maxxam ID		WK6658	WK6658		
Sampling Date		2014/06/24 11:40	2014/06/24 11:40		
	Units	**14-5B**	**14-5B Lab-Dup**	**RDL**	**QC Batch**
Surrogate Recovery (%)					
2,4,6-Tribromophenol	%	87			3658874
2,4-Dichlorophenyl Acetic Acid	%	78			3658874
2-Fluorobiphenyl	%	74			3658874
D14-Terphenyl (FS)	%	105			3658874
D5-Nitrobenzene	%	68			3658874
Volatile Organics					
1,1-Dichloroethylene	ug/L	<0.10	<0.10	0.10	3654008
1,2-Dichlorobenzene	ug/L	<0.20	<0.20	0.20	3654008
1,2-Dichloroethane	ug/L	<0.20	<0.20	0.20	3654008
1,4-Dichlorobenzene	ug/L	<0.20	<0.20	0.20	3654008
Benzene	ug/L	<0.10	<0.10	0.10	3654008
Bromodichloromethane	ug/L	<0.10	<0.10	0.10	3654008
Bromoform	ug/L	<0.20	<0.20	0.20	3654008
Carbon Tetrachloride	ug/L	<0.10	<0.10	0.10	3654008
Chlorobenzene	ug/L	<0.10	<0.10	0.10	3654008
Chloroform	ug/L	<0.10	<0.10	0.10	3654008
Dibromochloromethane	ug/L	<0.20	<0.20	0.20	3654008
Methylene Chloride(Dichloromethane)	ug/L	<0.50	<0.50	0.50	3654008
Ethylbenzene	ug/L	<0.10	<0.10	0.10	3654008
Tetrachloroethylene	ug/L	<0.10	<0.10	0.10	3654008
Toluene	ug/L	<0.20	<0.20	0.20	3654008
Trichloroethylene	ug/L	<0.10	<0.10	0.10	3654008
Vinyl Chloride	ug/L	<0.20	<0.20	0.20	3654008
o-Xylene	ug/L	<0.10	<0.10	0.10	3654008
p+m-Xylene	ug/L	<0.10	<0.10	0.10	3654008
Xylene (Total)	ug/L	<0.10	<0.10	0.10	3654008
Total Trihalomethanes	ug/L	<0.20	<0.20	0.20	3654008
Surrogate Recovery (%)					
4-Bromofluorobenzene	%	95	96		3654008
D4-1,2-Dichloroethane	%	98	99		3654008
D8-Toluene	%	100	100		3654008

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B4A8672
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Golder Associates Ltd
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Sampler Initials: CHM

ODWQSOG TABLES 1, 2 AND 4 (WATER)

Maxxam ID		WK6658	WK6658		
Sampling Date		2014/06/24 11:40	2014/06/24 11:40		
	Units	**14-5B**	**14-5B Lab-Dup**	**RDL**	**QC Batch**
Pesticides & Herbicides					
Glyphosate	ug/L	<10		10	3657220
Diquat	ug/L	<7		7	3655955
Diuron	ug/L	<10		10	3659997
Guthion (Azinphos-methyl)	ug/L	<2		2	3659997
Paraquat	ug/L	<1		1	3655955
Temephos	ug/L	<10		10	3659997
Calculated Parameters					
Aldrin + Dieldrin	ug/L	<0.006		0.006	3652275
Chlordane (Total)	ug/L	<0.006		0.006	3652275
DDT+ Metabolites	ug/L	<0.006		0.006	3652275
Heptachlor + Heptachlor epoxide	ug/L	<0.006		0.006	3652275
Total PCB	ug/L	<0.05		0.05	3652275
Pesticides & Herbicides					
Lindane	ug/L	<0.006		0.006	3659647
Heptachlor	ug/L	<0.006		0.006	3659647
Aldrin	ug/L	<0.006		0.006	3659647
Heptachlor epoxide	ug/L	<0.006		0.006	3659647
Oxychlordane	ug/L	<0.006		0.006	3659647
g-Chlordane	ug/L	<0.006		0.006	3659647
a-Chlordane	ug/L	<0.006		0.006	3659647
Dieldrin	ug/L	<0.006		0.006	3659647
o,p-DDE	ug/L	<0.006		0.006	3659647
p,p-DDE	ug/L	<0.006		0.006	3659647
o,p-DDD	ug/L	<0.006		0.006	3659647
p,p-DDD	ug/L	<0.006		0.006	3659647
o,p-DDT	ug/L	<0.006		0.006	3659647
p,p-DDT	ug/L	<0.006		0.006	3659647
Methoxychlor	ug/L	<0.02		0.02	3659647
Surrogate Recovery (%)					
2,4,5,6-Tetrachloro-m-xylene	%	87			3659647
Decachlorobiphenyl	%	121			3659647

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Sampler Initials: CHM

ODWQSOG TABLES 1, 2 AND 4 (WATER)

Maxxam ID		WK6658	WK6658		
Sampling Date		2014/06/24 11:40	2014/06/24 11:40		
	Units	**14-5B**	**14-5B Lab-Dup**	**RDL**	**QC Batch**
Dioxins & Furans					
2,3,7,8-Tetra CDD	pg/L	<1.12		10.9	3666098
1,2,3,7,8-Penta CDD	pg/L	<1.50		10.9	3666098
1,2,3,4,7,8-Hexa CDD	pg/L	<1.12		10.9	3666098
1,2,3,6,7,8-Hexa CDD	pg/L	<1.19		10.9	3666098
1,2,3,7,8,9-Hexa CDD	pg/L	<0.983		10.9	3666098
1,2,3,4,6,7,8-Hepta CDD	pg/L	2.3		10.9	3666098
Octa CDD	pg/L	<3.36 (1)		109	3666098
Total Tetra CDD	pg/L	<1.59 (1)		10.9	3666098
Total Penta CDD	pg/L	<1.50		10.9	3666098
Total Hexa CDD	pg/L	<1.87 (1)		10.9	3666098
Total Hepta CDD	pg/L	2.3		10.9	3666098
2,3,7,8-Tetra CDF	pg/L	<1.17		10.9	3666098
1,2,3,7,8-Penta CDF	pg/L	<1.54		10.9	3666098
2,3,4,7,8-Penta CDF	pg/L	<1.50		10.9	3666098
1,2,3,4,7,8-Hexa CDF	pg/L	<1.14		10.9	3666098
1,2,3,6,7,8-Hexa CDF	pg/L	<1.09		10.9	3666098
2,3,4,6,7,8-Hexa CDF	pg/L	<1.08		10.9	3666098
1,2,3,7,8,9-Hexa CDF	pg/L	<1.15		10.9	3666098
1,2,3,4,6,7,8-Hepta CDF	pg/L	<1.22		10.9	3666098
1,2,3,4,7,8,9-Hepta CDF	pg/L	<1.41		10.9	3666098
Octa CDF	pg/L	1		109	3666098
Total Tetra CDF	pg/L	<1.17		10.9	3666098
Total Penta CDF	pg/L	<1.52		10.9	3666098
Total Hexa CDF	pg/L	<1.12		10.9	3666098
Total Hepta CDF	pg/L	<1.31		10.9	3666098

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) - EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

ODWQSOG TABLES 1, 2 AND 4 (WATER)

Maxxam ID		WK6658	WK6658		
Sampling Date		2014/06/24 11:40	2014/06/24 11:40		
	Units	**14-5B**	**14-5B Lab-Dup**	**RDL**	**QC Batch**
Surrogate Recovery (%)					
C13-1234678 HeptaCDD	%	97			3666098
C13-1234678 HeptaCDF	%	103			3666098
C13-123678 HexaCDD	%	114			3666098
C13-123678 HexaCDF	%	90			3666098
C13-12378 PentaCDD	%	92			3666098
C13-12378 PentaCDF	%	68			3666098
C13-2378 TetraCDD	%	78			3666098
C13-2378 TetraCDF	%	69			3666098
C13-OCDD	%	106			3666098
NDMA/D/F/MIB/GEO					
N-Nitrosodimethylamine	ug/L	<0.002		0.002	3659410
Surrogate Recovery (%)					
D6-N-Nitrosodimethylamine	%	33			3659410
Microbiological					
Background	CFU/100mL	0		N/A	3654648
Total Coliforms	CFU/100mL	0		N/A	3654648
Escherichia coli	CFU/100mL	0		N/A	3654648

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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RESULTS OF ANALYSES OF WATER

Maxxam ID		WK6657	WK6657	WK6658	WK6658		
Sampling Date		2014/06/23 13:42	2014/06/23 13:42	2014/06/24 11:40	2014/06/24 11:40		
	Units	**14-5A**	**14-5A Lab-Dup**	**14-5B**	**14-5B Lab-Dup**	**RDL**	**QC Batch**
RADIONUCLIDE							
Gross Alpha	Bq/L			<0.10	<0.10	0.10	3656192
Gross Beta	Bq/L			0.35	0.32	0.10	3656192
Lead-210	Bq/L			<0.10	<0.10	0.10	3692072
Polonium-210	Bq/L			<0.010	<0.010	0.010	3692068
Thorium-232	Bq/L			<0.01		0.01	3690702
Tritium	Bq/L			<15		15	3653180
Calculated Parameters							
Hardness (CaCO3)	mg/L	78				1.0	3652369
Ion Balance (% Difference)	%	1.23				N/A	3652370
Inorganics							
Total Ammonia-N	mg/L	0.56				0.050	3658852
Colour	TCU	14				2	3655571
Conductivity	umho/cm	660	660			1.0	3655218
Total Dissolved Solids	mg/L	352				10	3655645
Fluoride (F-)	mg/L	0.45	0.45			0.10	3655219
Total Kjeldahl Nitrogen (TKN)	mg/L	0.64				0.10	3659759
Dissolved Organic Carbon	mg/L	4.0				0.20	3655200
pH	pH	8.42	8.42				3655221
Phenols-4AAP	mg/L	<0.0010				0.0010	3655160
Dissolved Sulphate (SO4)	mg/L	<1				1	3655227
Sulphide	mg/L	<0.020				0.020	3655197
Tannins & Lignins	mg/L	0.6				0.2	3655631
Turbidity	NTU	<0.2				0.2	3654559
Alkalinity (Total as CaCO3)	mg/L	240	240			1.0	3655214
Dissolved Chloride (Cl)	mg/L	70				1	3655226
Nitrite (N)	mg/L	<0.010	<0.010			0.010	3655194
Nitrate (N)	mg/L	<0.10	<0.10			0.10	3655194
Nitrate + Nitrite	mg/L	<0.10	<0.10			0.10	3655194

N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B4A8672
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Golder Associates Ltd
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PERMANENT GASES (WATER)

Maxxam ID		WK6657	WK6658		
Sampling Date		2014/06/23 13:42	2014/06/24 11:40		
	Units	**14-5A**	**14-5B**	**RDL**	**QC Batch**
Fixed Gases					
Methane	L/m3	20		0.005	3657648
Calculated Methane	mg/L	13	13	0.003	3652654

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		WK6657	WK6657		
Sampling Date		2014/06/23 13:42	2014/06/23 13:42		
	Units	**14-5A**	**14-5A Lab-Dup**	**RDL**	**QC Batch**
Metals					
Dissolved Calcium (Ca)	mg/L	16	16	0.05	3661057
Dissolved Iron (Fe)	mg/L	0.12	0.12	0.02	3661057
Dissolved Magnesium (Mg)	mg/L	9.1	9.0	0.05	3661057
Dissolved Manganese (Mn)	mg/L	0.01	0.01	0.01	3661057
Dissolved Potassium (K)	mg/L	7	7	1	3661057
Dissolved Sodium (Na)	mg/L	110	110	0.5	3661057

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Sampler Initials: CHM

Test Summary

Maxxam ID WK6657
Sample ID 14-5A
Matrix Water

Collected 2014/06/23
Shipped
Received 2014/06/24

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3655214	N/A	2014/06/26	Yogesh Patel
Chloride by Automated Colourimetry	AC	3655226	N/A	2014/06/26	Deonarine Ramnarine
Colour	SPEC	3655571	N/A	2014/06/26	Christine Pham
Conductivity	COND	3655218	N/A	2014/06/26	Yogesh Patel
Dissolved Organic Carbon (DOC)	TOCV/NDIR	3655200	N/A	2014/06/26	Anastasia Hamanov
Fluoride	F	3655219	2014/06/25	2014/06/26	Yogesh Patel
Dissolved Gases in Water in mg/L units		3652654	N/A	2014/06/26	Automated Statchk
Hardness (calculated as CaCO3)		3652369	N/A	2014/07/03	Automated Statchk
Dissolved Metals Analysis by ICP	ICP	3661057	2014/07/02	2014/07/03	Jolly John
Ion Balance (% Difference)	CALC	3652370	N/A	2014/07/03	Automated Statchk
Dissolved Methane in Water	GC/FID	3657648	N/A	2014/06/27	Vasan Thiagarajah
Total Ammonia-N	LACH/NH4	3658852	N/A	2014/07/02	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3655194	N/A	2014/06/26	Anastasia Hamanov
pH	PH	3655221	N/A	2014/06/26	Yogesh Patel
Phenols (4AAP)	TECH/PHEN	3655160	N/A	2014/06/27	Bramdeo Motiram
Sulphate by Automated Colourimetry	AC	3655227	N/A	2014/06/26	Deonarine Ramnarine
Sulphide	ISE/S	3655197	N/A	2014/06/27	Neil Dassanayake
Tannins & Lignins	SPEC	3655631	N/A	2014/07/02	Elsamma Alex
Total Dissolved Solids	SLDS	3655645	N/A	2014/06/26	Deepak Sharma
Total Kjeldahl Nitrogen in Water	AC	3659759	2014/06/30	2014/07/02	Sarabjit Raina
Turbidity	TURB	3654559	N/A	2014/06/25	Lemeneh Addis

Maxxam ID WK6657 Dup
Sample ID 14-5A
Matrix Water

Collected 2014/06/23
Shipped
Received 2014/06/24

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3655214	N/A	2014/06/26	Yogesh Patel
Conductivity	COND	3655218	N/A	2014/06/26	Yogesh Patel
Fluoride	F	3655219	2014/06/25	2014/06/26	Yogesh Patel
Dissolved Metals Analysis by ICP	ICP	3661057	2014/07/02	2014/07/03	Jolly John
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3655194	N/A	2014/06/26	Anastasia Hamanov
pH	PH	3655221	N/A	2014/06/26	Yogesh Patel

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Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

Test Summary

Maxxam ID WK6658
Sample ID 14-5B
Matrix Water

Collected 2014/06/24
Shipped
Received 2014/06/24

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Alkalinity	PH	3655214	N/A	2014/06/26	Yogesh Patel
Chloride by Automated Colourimetry	AC	3655226	N/A	2014/06/26	Deonarine Ramnarine
Colour	SPEC	3655571	N/A	2014/06/26	Christine Pham
Free (WAD) Cyanide	TECH/CN	3655146	N/A	2014/06/26	Xuanhong Qiu
Dioxins/Furans in Water (EPS 1/RM/23)	HRMS/MS	3666098	2014/07/03	2014/07/07	Owen Cosby
Diuron, Guthion, Temephos	LC/UV	3659997	2014/06/30	2014/06/30	James Lee
Dissolved Organic Carbon (DOC)	TOCV/NDIR	3655200	N/A	2014/06/26	Anastasia Hamanov
Diquat / Paraquat	LC/UV	3655955	2014/06/26	2014/06/27	James Lee
Fluoride	F	3655219	2014/06/25	2014/06/26	Yogesh Patel
Dissolved Gases in Water in mg/L units		3652654	N/A	2014/06/26	Automated Statchk
Glyphosate	LC/FLU	3657220	2014/06/27	2014/06/27	Hanna Kloc
Hardness (calculated as CaCO3)		3652369	N/A	2014/07/08	Automated Statchk
Mercury in Water by CVAA	CVAA	3658900	2014/06/30	2014/06/30	Ron Morrison
Metals Analysis by ICPMS (as received)	ICP/MS	3660974	2014/07/02	2014/07/08	John Bowman
Total Coliforms/ E. coli, CFU/100mL	PL	3654648	N/A	2014/06/25	Sirimathie Aluthwala
Dissolved Methane in Water	GC/FID	3657648	N/A	2014/06/27	Vasan Thiagarajah
Uranium and Thorium Isotopes in Water	GS	3690702	N/A	2014/08/06	Blake Barber
NDMA in Water (MSABN-3291Amod)	HRMS/MS	3659410	2014/06/30	2014/07/07	Vica Cioranic
Total Ammonia-N	LACH/NH4	3658852	N/A	2014/07/02	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3655164	N/A	2014/06/26	Anastasia Hamanov
Nitrilotriacetic Acid (NTA)	SPEC	3654362	2014/06/26	2014/06/30	Elsamma Alex
OC Pesticides (Selected) & PCB	GC/ECD	3659647	2014/06/30	2014/07/04	Mahmudul Khan
OC Pesticides Summed Parameters	CALC	3652275	N/A	2014/06/26	Cristina Carriere
ODWS - Semi-Volatiles	GC/MS	3658874	2014/06/28	2014/06/29	Wendy Zhao
Organic Nitrogen	CALC	3653147	N/A	2014/07/02	Automated Statchk
pH	PH	3655221	N/A	2014/06/26	Yogesh Patel
Gross Alpha and Gross Beta	GFPC	3656192	N/A	2014/07/14	Jagdeep Kaur Masson
Lead 210	GFPC	3692072	N/A	2014/08/06	Jagdeep Kaur Masson
Polonium-210 by Alpha Spectrometry	AS	3692068	N/A	2014/07/30	Jagdeep Kaur Masson
Tritium by Liquid Scintillation Counting	LSC	3653180	N/A	2014/06/25	Danish Samad
Sulphate by Automated Colourimetry	AC	3655227	N/A	2014/06/26	Deonarine Ramnarine
Sulphide	ISE/S	3655197	N/A	2014/06/27	Neil Dassanayake
Total Dissolved Solids (TDS calc)	CALC	3652374	N/A	2014/07/08	Automated Statchk
Total Kjeldahl Nitrogen in Water	AC	3659759	2014/06/30	2014/07/02	Sarabjit Raina

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Sampler Initials: CHM

Test Summary

Turbidity	TURB	3654559	N/A	2014/06/25	Lemeneh Addis
VOCs (Drinking Water)	P&T/MS	3654008	N/A	2014/06/27	Sarah Lam

Maxxam ID WK6658 Dup
Sample ID 14-5B
Matrix Water

Collected 2014/06/24
Shipped
Received 2014/06/24

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dissolved Methane in Water	GC/FID	3657648	N/A	2014/06/27	Vasan Thiagarajah
Gross Alpha and Gross Beta	GFPC	3656192	N/A	2014/07/15	Jagdeep Kaur Masson
Lead 210	GFPC	3692072	N/A	2014/08/06	Jagdeep Kaur Masson
Polonium-210 by Alpha Spectrometry	AS	3692068	N/A	2014/07/30	Jagdeep Kaur Masson
VOCs (Drinking Water)	P&T/MS	3654008	N/A	2014/06/27	Sarah Lam

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Package 1	12.0°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Cooler custody seal was present and intact.

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QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3653180	Tritium	2014/06/26			99	92 - 108	<15	Bq/L	NC	N/A		
3654008	4-Bromofluorobenzene	2014/06/27	98	70 - 130	98	70 - 130	95	%				
3654008	D4-1,2-Dichloroethane	2014/06/27	98	70 - 130	97	70 - 130	95	%				
3654008	D8-Toluene	2014/06/27	104	70 - 130	104	70 - 130	103	%				
3654008	1,1-Dichloroethylene	2014/06/27	108	70 - 130	116	70 - 130	<0.10	ug/L	NC	30		
3654008	1,2-Dichlorobenzene	2014/06/27	100	70 - 130	106	70 - 130	<0.20	ug/L	NC	30		
3654008	1,2-Dichloroethane	2014/06/27	92	70 - 130	95	70 - 130	<0.20	ug/L	NC	30		
3654008	1,4-Dichlorobenzene	2014/06/27	95	70 - 130	101	70 - 130	<0.20	ug/L	NC	30		
3654008	Benzene	2014/06/27	93	70 - 130	97	70 - 130	<0.10	ug/L	NC	30		
3654008	Bromodichloromethane	2014/06/27	97	70 - 130	100	70 - 130	<0.10	ug/L	NC	30		
3654008	Bromoform	2014/06/27	97	70 - 130	101	70 - 130	<0.20	ug/L	NC	30		
3654008	Carbon Tetrachloride	2014/06/27	96	70 - 130	102	70 - 130	<0.10	ug/L	NC	30		
3654008	Chlorobenzene	2014/06/27	96	70 - 130	102	70 - 130	<0.10	ug/L	NC	30		
3654008	Chloroform	2014/06/27	NC	70 - 130	97	70 - 130	<0.10	ug/L	NC	30		
3654008	Dibromochloromethane	2014/06/27	101	70 - 130	104	70 - 130	<0.20	ug/L	NC	30		
3654008	Methylene Chloride(Dichloromethane)	2014/06/27	101	70 - 130	107	70 - 130	<0.50	ug/L	NC	30		
3654008	Ethylbenzene	2014/06/27	95	70 - 130	102	70 - 130	<0.10	ug/L	NC	30		
3654008	Tetrachloroethylene	2014/06/27	100	70 - 130	108	70 - 130	<0.10	ug/L	NC	30		
3654008	Toluene	2014/06/27	98	70 - 130	101	70 - 130	<0.20	ug/L	NC	30		
3654008	Trichloroethylene	2014/06/27	93	70 - 130	97	70 - 130	<0.10	ug/L	NC	30		
3654008	Vinyl Chloride	2014/06/27	94	70 - 130	102	70 - 130	<0.20	ug/L	NC	30		
3654008	o-Xylene	2014/06/27	96	70 - 130	102	70 - 130	<0.10	ug/L	NC	30		
3654008	p+m-Xylene	2014/06/27	98	70 - 130	103	70 - 130	<0.10	ug/L	NC	30		
3654008	Xylene (Total)	2014/06/27					<0.10	ug/L	NC	30		
3654008	Total Trihalomethanes	2014/06/27					<0.20	ug/L	NC	30		
3654362	NTA	2014/06/30	89	75 - 125	103	75 - 125	<0.05	mg/L	NC	25		
3654559	Turbidity	2014/06/25					<0.2	NTU	0.8	20	102	85 - 115
3655146	Free Cyanide	2014/06/26	96	80 - 120	101	80 - 120	<0.0020	mg/L	NC (1)	20		
3655160	Phenols-4AAP	2014/06/27	NC	80 - 120	100	85 - 115	<0.0010	mg/L	NC	20		
3655164	Nitrite (N)	2014/06/26	102	80 - 120	104	80 - 120	<0.010	mg/L	NC	25		
3655164	Nitrate (N)	2014/06/26	100	80 - 120	102	80 - 120	<0.10	mg/L	NC	25		
3655194	Nitrite (N)	2014/06/26	101	80 - 120	102	80 - 120	<0.010	mg/L	NC	25		
3655194	Nitrate (N)	2014/06/26	102	80 - 120	103	80 - 120	<0.10	mg/L	NC	25		
3655197	Sulphide	2014/06/27	84	80 - 120	92	80 - 120	<0.020	mg/L	NC	20		
3655200	Dissolved Organic Carbon	2014/06/26	94	80 - 120	99	80 - 120	<0.20	mg/L	2.6	20		
3655214	Alkalinity (Total as CaCO3)	2014/06/26			100	85 - 115	<1.0	mg/L	1.8	25		
3655218	Conductivity	2014/06/26			100	85 - 115	<1.0	umho/cm	0.3	25		
3655219	Fluoride (F-)	2014/06/26	98	80 - 120	99	80 - 120	<0.10	mg/L	NC	20		
3655221	pH	2014/06/26			101	98 - 103			0.02	N/A		
3655226	Dissolved Chloride (Cl)	2014/06/26	NC	80 - 120	101	80 - 120	<1	mg/L	0.3	20		

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QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3655227	Dissolved Sulphate (SO4)	2014/06/26	NC	75 - 125	103	80 - 120	<1	mg/L	0.3	20		
3655571	Colour	2014/06/26			98	85 - 115	<2	TCU	NC	25		
3655631	Tannins & Lignins	2014/07/02	107	80 - 120	94	80 - 120	<0.2	mg/L	NC	25		
3655645	Total Dissolved Solids	2014/06/26					<10	mg/L	4.2	25	98	90 - 110
3655955	Diquat	2014/06/27	95	50 - 130	107	50 - 130	<7	ug/L	NC	40		
3655955	Paraquat	2014/06/27	103	50 - 130	107	50 - 130	<1	ug/L	NC	40		
3656192	Gross Alpha	2014/07/15			101	60 - 140	<0.10	Bq/L	NC	N/A		
3656192	Gross Beta	2014/07/15			89	70 - 130	<0.10	Bq/L	NC	N/A		
3657220	Glyphosate	2014/06/27	56	50 - 130	107	50 - 130	<10	ug/L	NC	40		
3657648	Methane	2014/06/27					<0.005	L/m3	11.4	30		
3658852	Total Ammonia-N	2014/07/02	98	80 - 120	98	85 - 115	<0.050	mg/L	NC	20		
3658874	2,4,6-Tribromophenol	2014/06/29	89	30 - 130	93	30 - 130	98	%				
3658874	2,4-Dichlorophenyl Acetic Acid	2014/06/29	95	30 - 130	95	30 - 130	85	%				
3658874	2-Fluorobiphenyl	2014/06/29	76	30 - 130	80	30 - 130	81	%				
3658874	D14-Terphenyl (FS)	2014/06/29	101	30 - 130	100	30 - 130	108	%				
3658874	D5-Nitrobenzene	2014/06/29	70	30 - 130	73	30 - 130	78	%				
3658874	2,3,4,6-Tetrachlorophenol	2014/06/29	94	30 - 130	100	30 - 130	<0.50	ug/L	1.9	40		
3658874	2,4,5-T	2014/06/29	67	30 - 130	56	30 - 130	<1.0	ug/L	4.2	40		
3658874	2,4,6-Trichlorophenol	2014/06/29	77	30 - 130	82	30 - 130	<0.50	ug/L	1.7	40		
3658874	2,4-D	2014/06/29	65	30 - 130	58	30 - 130	<1.0	ug/L	0.4	40		
3658874	2,4-Dichlorophenol	2014/06/29	77	30 - 130	80	30 - 130	<0.50	ug/L	2.1	40		
3658874	Alachlor	2014/06/29	97	40 - 130	102	40 - 130	<0.50	ug/L	1.4	40		
3658874	Aldicarb	2014/06/29	88	70 - 130	92	70 - 130	<5.0	ug/L	2.1	40		
3658874	Atrazine	2014/06/29	97	30 - 130	101	30 - 130	<0.50	ug/L	0.5	40		
3658874	Des-ethyl atrazine	2014/06/29	49	30 - 130	51	30 - 130	<0.50	ug/L	2.3	40		
3658874	Atrazine + Desethyl-atrazine	2014/06/29	73	30 - 130	76	30 - 130	<1.0	ug/L	0.4	40		
3658874	Bendiocarb	2014/06/29	96	40 - 130	92	40 - 130	<2.0	ug/L	2.2	40		
3658874	Bromoxynil	2014/06/29	92	40 - 130	94	40 - 130	<0.50	ug/L	1.5	40		
3658874	Carbaryl	2014/06/29	110	40 - 130	106	40 - 130	<5.0	ug/L	1.9	40		
3658874	Carbofuran	2014/06/29	116	40 - 130	112	40 - 130	<5.0	ug/L	3.3	40		
3658874	Chlorpyrifos (Dursban)	2014/06/29	101	40 - 130	103	40 - 130	<1.0	ug/L	0.1	40		
3658874	Cyanazine (Bladex)	2014/06/29	81	40 - 130	77	40 - 130	<1.0	ug/L	5.1	40		
3658874	Diazinon	2014/06/29	94	40 - 130	96	40 - 130	<1.0	ug/L	1	40		
3658874	Dicamba	2014/06/29	72	30 - 130	69	30 - 130	<1.0	ug/L	2.0	40		
3658874	Diclofop-methyl	2014/06/29	104	40 - 130	103	40 - 130	<0.90	ug/L	1.9	40		
3658874	Dimethoate	2014/06/29	95	40 - 130	97	40 - 130	<2.5	ug/L	1.0	40		
3658874	Dinoseb	2014/06/29	91	40 - 130	92	40 - 130	<1.0	ug/L	2.0	40		
3658874	Malathion	2014/06/29	100	40 - 130	101	40 - 130	<5.0	ug/L	1.2	40		
3658874	Metolachlor	2014/06/29	100	40 - 130	102	40 - 130	<0.50	ug/L	0.02	40		
3658874	Metribuzin (Sencor)	2014/06/29	97	40 - 130	98	40 - 130	<5.0	ug/L	1.4	40		

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QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3658874	Ethyl Parathion	2014/06/29	108	40 - 130	108	40 - 130	<1.0	ug/L	0.2	40		
3658874	Pentachlorophenol	2014/06/29	85	25 - 130	89	25 - 130	<0.50	ug/L	0.9	40		
3658874	Phorate	2014/06/29	82	40 - 130	87	40 - 130	<0.50	ug/L	2.7	40		
3658874	Picloram	2014/06/29	21	10 - 130	23	10 - 130	<5.0	ug/L	10.2	40		
3658874	Prometryne	2014/06/29	104	30 - 130	102	30 - 130	<0.25	ug/L	1.3	40		
3658874	Simazine	2014/06/29	90	40 - 130	92	40 - 130	<1.0	ug/L	0.2	40		
3658874	Terbufos	2014/06/29	78	40 - 130	86	40 - 130	<0.50	ug/L	5.1	40		
3658874	Triallate	2014/06/29	89	40 - 130	93	40 - 130	<1.0	ug/L	1.9	40		
3658874	Trifluralin	2014/06/29	120	40 - 130	121	40 - 130	<1.0	ug/L	1.2	40		
3658874	Benzo(a)pyrene	2014/06/29	99	30 - 130	100	30 - 130	<0.0090	ug/L	1	40		
3658874	Methyl parathion	2014/06/29	105	30 - 130	108	30 - 130	<1.0	ug/L	0.2	40		
3658874	2,4,6-Tribromophenol DUP	2014/06/28			92	30 - 130						
3658874	2,4-Dichlorophenyl Acetic Acid DUP	2014/06/28			94	30 - 130						
3658874	2-Fluorobiphenyl DUP	2014/06/28			78	30 - 130						
3658874	D14-Terphenyl (FS) DUP	2014/06/28			102	30 - 130						
3658874	D5-Nitrobenzene DUP	2014/06/28			72	30 - 130						
3658874	2,3,4,6-Tetrachlorophenol DUP	2014/06/28			99	30 - 130						
3658874	2,4,5-T DUP	2014/06/28			59	30 - 130						
3658874	2,4,6-Trichlorophenol DUP	2014/06/28			81	30 - 130						
3658874	2,4-D DUP	2014/06/28			58	30 - 130						
3658874	2,4-Dichlorophenol DUP	2014/06/28			79	30 - 130						
3658874	Alachlor DUP	2014/06/28			100	40 - 130						
3658874	Aldicarb DUP	2014/06/28			90	70 - 130						
3658874	Atrazine DUP	2014/06/28			101	30 - 130						
3658874	Des-ethyl atrazine DUP	2014/06/28			53	30 - 130						
3658874	Atrazine + Desethyl-atrazine DUP	2014/06/28			77	30 - 130						
3658874	Bendiocarb DUP	2014/06/28			94	40 - 130						
3658874	Bromoxynil DUP	2014/06/28			95	40 - 130						
3658874	Carbaryl DUP	2014/06/28			108	40 - 130						
3658874	Carbofuran DUP	2014/06/28			116	40 - 130						
3658874	Chlorpyrifos (Dursban) DUP	2014/06/28			103	40 - 130						
3658874	Cyanazine (Bladex) DUP	2014/06/28			81	40 - 130						
3658874	Diazinon DUP	2014/06/28			96	40 - 130						
3658874	Dicamba DUP	2014/06/28			71	30 - 130						
3658874	Diclofop-methyl DUP	2014/06/28			105	40 - 130						
3658874	Dimethoate DUP	2014/06/28			98	40 - 130						
3658874	Dinoseb DUP	2014/06/28			91	40 - 130						
3658874	Malathion DUP	2014/06/28			102	40 - 130						
3658874	Metolachlor DUP	2014/06/28			102	40 - 130						
3658874	Metribuzin (Sencor) DUP	2014/06/28			97	40 - 130						

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QUALITY ASSURANCE REPORT

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QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3658874	Ethyl Parathion DUP	2014/06/28			109	40 - 130						
3658874	Pentachlorophenol DUP	2014/06/28			88	25 - 130						
3658874	Phorate DUP	2014/06/28			84	40 - 130						
3658874	Picloram DUP	2014/06/28			26	10 - 130						
3658874	Prometryne DUP	2014/06/28			103	30 - 130						
3658874	Simazine DUP	2014/06/28			92	40 - 130						
3658874	Terbufos DUP	2014/06/28			81	40 - 130						
3658874	Triallate DUP	2014/06/28			91	40 - 130						
3658874	Trifluralin DUP	2014/06/28			120	40 - 130						
3658874	Benzo(a)pyrene DUP	2014/06/28			99	30 - 130						
3658874	Methyl parathion DUP	2014/06/28			108	30 - 130						
3658900	Mercury (Hg)	2014/06/30	98	80 - 120	105	80 - 120	<0.00010	mg/L	NC	20		
3659410	D6-N-Nitrosodimethylamine	2014/07/07			36	10 - 85	32	%				
3659410	D6-N-Nitrosodimethylamine DUP	2014/07/07			30	10 - 85						
3659410	N-Nitrosodimethylamine	2014/07/07			84	10 - 150	<0.002	ug/L	6.3	25		
3659410	N-Nitrosodimethylamine DUP	2014/07/07			90	10 - 150						
3659647	2,4,5,6-Tetrachloro-m-xylene	2014/07/04	72	30 - 130	70	30 - 130	71	%				
3659647	Decachlorobiphenyl	2014/07/04	123	30 - 130	118	30 - 130	117	%				
3659647	Lindane	2014/07/04	96	30 - 130	88	30 - 130	<0.006	ug/L	1.1	40		
3659647	Heptachlor	2014/07/04	79	30 - 130	69	30 - 130	<0.006	ug/L	0	40		
3659647	Aldrin	2014/07/04	80	30 - 130	77	30 - 130	<0.006	ug/L	1.3	40		
3659647	Heptachlor epoxide	2014/07/04	102	30 - 130	94	30 - 130	<0.006	ug/L	1.1	40		
3659647	Oxychlordane	2014/07/04	92	30 - 130	85	30 - 130	<0.006	ug/L	1.2	40		
3659647	g-Chlordane	2014/07/04	102	30 - 130	94	30 - 130	<0.006	ug/L	1.1	40		
3659647	a-Chlordane	2014/07/04	100	30 - 130	92	30 - 130	<0.006	ug/L	0	40		
3659647	Dieldrin	2014/07/04	116	30 - 130	108	30 - 130	<0.006	ug/L	0.9	40		
3659647	o,p-DDE	2014/07/04	103	30 - 130	95	30 - 130	<0.006	ug/L	2.1	40		
3659647	p,p-DDE	2014/07/04	98	30 - 130	90	30 - 130	<0.006	ug/L	9.5	40		
3659647	o,p-DDD	2014/07/04	111	30 - 130	104	30 - 130	<0.006	ug/L	1	40		
3659647	p,p-DDD	2014/07/04	103	30 - 130	96	30 - 130	<0.006	ug/L	0	40		
3659647	o,p-DDT	2014/07/04	86	30 - 130	77	30 - 130	<0.006	ug/L	2.6	40		
3659647	p,p-DDT	2014/07/04	80	30 - 130	69	30 - 130	<0.006	ug/L	2.9	40		
3659647	Methoxychlor	2014/07/04	84	30 - 130	78	30 - 130	<0.02	ug/L	3.9	40		
3659647	2,4,5,6-Tetrachloro-m-xylene DUP	2014/07/04			69	30 - 130						
3659647	2,4,5,6-Tetrachloro-m-xylene DUP	2014/07/04			69	30 - 130						
3659647	Decachlorobiphenyl DUP	2014/07/04			118	30 - 130						
3659647	Decachlorobiphenyl DUP	2014/07/04			115	30 - 130						
3659647	Lindane DUP	2014/07/04			87	30 - 130						
3659647	Heptachlor DUP	2014/07/04			69	30 - 130						
3659647	Aldrin DUP	2014/07/04			76	30 - 130						

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			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3659647	Heptachlor epoxide DUP	2014/07/04			93	30 - 130						
3659647	Oxychlordane DUP	2014/07/04			84	30 - 130						
3659647	g-Chlordane DUP	2014/07/04			93	30 - 130						
3659647	a-Chlordane DUP	2014/07/04			92	30 - 130						
3659647	Dieldrin DUP	2014/07/04			107	30 - 130						
3659647	o,p-DDE DUP	2014/07/04			93	30 - 130						
3659647	p,p-DDE DUP	2014/07/04			99	30 - 130						
3659647	o,p-DDD DUP	2014/07/04			103	30 - 130						
3659647	p,p-DDD DUP	2014/07/04			96	30 - 130						
3659647	o,p-DDT DUP	2014/07/04			75	30 - 130						
3659647	p,p-DDT DUP	2014/07/04			67	30 - 130						
3659647	Methoxychlor DUP	2014/07/04			75	30 - 130						
3659759	Total Kjeldahl Nitrogen (TKN)	2014/07/02	NC	80 - 120	93	80 - 120	<0.10	mg/L	0.3	20	103	80 - 120
3659997	Diuron	2014/07/01	94	40 - 130	94	40 - 130	<10	ug/L	NC	40		
3659997	Guthion (Azinphos-methyl)	2014/07/01	102	40 - 130	98	40 - 130	<2	ug/L	NC	40		
3659997	Temephos	2014/07/01	90	40 - 130	88	40 - 130	<10	ug/L	NC	40		
3660974	. Aluminum (Al)	2014/07/08	98	80 - 120	95	80 - 120	<5.0	ug/L	NC	20		
3660974	. Antimony (Sb)	2014/07/08	108	80 - 120	102	80 - 120	<0.50	ug/L	NC	20		
3660974	. Arsenic (As)	2014/07/08	103	80 - 120	98	80 - 120	<1.0	ug/L	NC	20		
3660974	. Barium (Ba)	2014/07/08	105	80 - 120	100	80 - 120	<2.0	ug/L	1.1	20		
3660974	. Boron (B)	2014/07/08	100	80 - 120	95	80 - 120	<10	ug/L	NC	20		
3660974	. Cadmium (Cd)	2014/07/08	107	80 - 120	100	80 - 120	<0.10	ug/L	NC	20		
3660974	. Calcium (Ca)	2014/07/08	NC	80 - 120	99	80 - 120	<200	ug/L	2.0	20		
3660974	. Chromium (Cr)	2014/07/08	103	80 - 120	98	80 - 120	<5.0	ug/L	NC	20		
3660974	. Copper (Cu)	2014/07/08	99	80 - 120	99	80 - 120	<1.0	ug/L	NC	20		
3660974	. Iron (Fe)	2014/07/08	101	80 - 120	99	80 - 120	<100	ug/L	NC	20		
3660974	. Lead (Pb)	2014/07/08	100	80 - 120	97	80 - 120	<0.50	ug/L	NC	20		
3660974	. Magnesium (Mg)	2014/07/08	NC	80 - 120	95	80 - 120	<50	ug/L	1.5	20		
3660974	. Manganese (Mn)	2014/07/08	97	80 - 120	95	80 - 120	<2.0	ug/L	NC	20		
3660974	. Potassium (K)	2014/07/08	104	80 - 120	101	80 - 120	<200	ug/L	0.0004	20		
3660974	. Selenium (Se)	2014/07/08	105	80 - 120	101	80 - 120	<2.0	ug/L	NC	20		
3660974	. Sodium (Na)	2014/07/08	NC	80 - 120	98	80 - 120	<100	ug/L	2.2	20		
3660974	. Uranium (U)	2014/07/08	104	80 - 120	98	80 - 120	<0.10	ug/L	0.6	20		
3660974	. Zinc (Zn)	2014/07/08	100	80 - 120	100	80 - 120	<5.0	ug/L	0.8	20		
3661057	Dissolved Calcium (Ca)	2014/07/03	NC	80 - 120	103	80 - 120	<0.05	mg/L	1.3	25		
3661057	Dissolved Iron (Fe)	2014/07/03	103	80 - 120	105	80 - 120	<0.02	mg/L	3.6	25		
3661057	Dissolved Magnesium (Mg)	2014/07/03	NC	80 - 120	101	80 - 120	<0.05	mg/L	1.2	25		
3661057	Dissolved Manganese (Mn)	2014/07/03	100	80 - 120	102	80 - 120	<0.01	mg/L	NC	25		
3661057	Dissolved Potassium (K)	2014/07/03	NC	80 - 120	99	80 - 120	<1	mg/L	2.0	25		
3661057	Dissolved Sodium (Na)	2014/07/03	NC	80 - 120	104	80 - 120	<0.5	mg/L	1.3	25		

Maxxam Job #: B4A8672
Report Date: 2014/08/08

Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3666098	C13-1234678 HeptaCDD	2014/07/07			101	30 - 130	95	%				
3666098	C13-1234678 HeptaCDF	2014/07/07			101	30 - 130	101	%				
3666098	C13-123678 HexaCDD	2014/07/07			119	30 - 130	118	%				
3666098	C13-123678 HexaCDF	2014/07/07			93	30 - 130	89	%				
3666098	C13-12378 PentaCDD	2014/07/07			93	30 - 130	91	%				
3666098	C13-12378 PentaCDF	2014/07/07			69	30 - 130	71	%				
3666098	C13-2378 TetraCDD	2014/07/07			80	30 - 130	81	%				
3666098	C13-2378 TetraCDF	2014/07/07			71	30 - 130	74	%				
3666098	C13-OCDD	2014/07/07			110	30 - 130	101	%				
3666098	2,3,7,8-Tetra CDD	2014/07/07			94	80 - 140	<1.33	pg/L				
3666098	1,2,3,7,8-Penta CDD	2014/07/07			95	80 - 140	<1.48	pg/L				
3666098	1,2,3,4,7,8-Hexa CDD	2014/07/07			80	80 - 140	<1.46	pg/L				
3666098	1,2,3,6,7,8-Hexa CDD	2014/07/07			97	80 - 140	<1.56	pg/L				
3666098	1,2,3,7,8,9-Hexa CDD	2014/07/07			83	80 - 140	<1.29	pg/L				
3666098	1,2,3,4,6,7,8-Hepta CDD	2014/07/07			88	80 - 140	1.9, RDL=11.1	pg/L				
3666098	Octa CDD	2014/07/07			94	80 - 140	9, RDL=111	pg/L				
3666098	2,3,7,8-Tetra CDF	2014/07/07			98	80 - 140	<1.16	pg/L				
3666098	1,2,3,7,8-Penta CDF	2014/07/07			111	80 - 140	<1.46	pg/L				
3666098	2,3,4,7,8-Penta CDF	2014/07/07			116	80 - 140	<1.42	pg/L				
3666098	1,2,3,4,7,8-Hexa CDF	2014/07/07			123	80 - 140	<1.18	pg/L				
3666098	1,2,3,6,7,8-Hexa CDF	2014/07/07			113	80 - 140	<1.12	pg/L				
3666098	2,3,4,6,7,8-Hexa CDF	2014/07/07			100	80 - 140	<1.12	pg/L				
3666098	1,2,3,7,8,9-Hexa CDF	2014/07/07			103	80 - 140	<1.18	pg/L				
3666098	1,2,3,4,6,7,8-Hepta CDF	2014/07/07			103	80 - 140	<1.23	pg/L				
3666098	1,2,3,4,7,8,9-Hepta CDF	2014/07/07			93	80 - 140	<1.42	pg/L				
3666098	Octa CDF	2014/07/07			102	80 - 140	2, RDL=111	pg/L				
3666098	Total Tetra CDD	2014/07/07					<1.33	pg/L				
3666098	Total Penta CDD	2014/07/07					<1.48	pg/L				
3666098	Total Hexa CDD	2014/07/07					<1.72 (2)	pg/L				
3666098	Total Hepta CDD	2014/07/07					1.9, RDL=11.1	pg/L				
3666098	Total Tetra CDF	2014/07/07					<1.16	pg/L				
3666098	Total Penta CDF	2014/07/07					<1.44	pg/L				
3666098	Total Hexa CDF	2014/07/07					<1.15	pg/L				
3666098	Total Hepta CDF	2014/07/07					<1.32	pg/L				

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxamanalytics.com

Maxxam Job #: B4A8672
Report Date: 2014/08/08

Golder Associates Ltd
Client Project #: 12-1127-0115

Sampler Initials: CHM

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3692068	Polonium-210	2014/07/30			80	74 - 126	<0.010	Bq/L	NC	N/A		
3692072	Lead-210	2014/08/06			88	80 - 120	<0.10	Bq/L	NC	N/A		

N/A = Not Applicable
RDL = Reportable Detection Limit
RPD = Relative Percent Difference
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.
QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).
(1) - Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
(2) - EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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Validation Signature Page

Maxxam Job #: B4A8672

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Cristina Carriere, Scientific Services

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Owen Cosby, BSc.C.Chem, Supervisor, HRMS Services

Sirimathie Aluthwala, Campobello Micro

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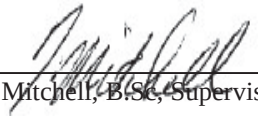
Validation Signature Page

Maxxam Job #: B4A8672

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Steven Simpson, Becquerel



Tom Mitchell, B.Sc, Supervisor, Compressed Gases

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-Free:800-563-6266 Fax:(905) 817-5777 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page of

INVOICE INFORMATION:		REPORT INFORMATION(if differs from invoice):		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#14090 Golder Associates Ltd	Company Name:		Quotation #:	B37015	Maxxam Job #:	Bottle Order #:
Contact Name:	Central Accounting	Contact Name:	Caitlin Cooke	P.O. #:			474898
Address:	32 Steacie Dr Kanata ON K2K 2A9	Address:		Project #:	12-1127-0115	Chain of Custody #:	Project Manager:
Phone:	(613) 592-9600 Fax: (613) 592-9601	Phone:	Fax:	Project Name:		C#474898-01-01	Parnian Baber
Email:	AccountsPayable_Maxxam@golder.com, OttawaAccou	Email:	ccooke@golder.com	Site #:	Limoges Wells		
				Sampled By:	CHM		

Regulation 153 (2011): ☐ Table1 ☐ Table2 ☐ Table3 ☐ Table ___ ☐ Res/Park ☐ Ind/Comm ☐ Agri/Other ☐ Medium/Fine ☐ Coarse ☐ For RSC

Other Regulations: ☐ CCME ☐ Reg 558. ☐ MISA ☐ PWQO ☐ Other ___ ☐ Sanitary Sewer Bylaw ☐ Storm Sewer Bylaw Municipality ___

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (Please be specific):

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: ☐
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: ___ Time Required: ___
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	B37015- SUBDIVISION SUPPLY PKG (no bacteria)	B37015-ODWQS - TABLE 1,2,3,4	# of Bottles	Comments
1		14-5A	23-Jun-2014	13:42	GW	N	N	X		10	
2		14-5B	24-Jun-2014	11:40	GW	N	N		X	28	- mercury & radionuclides Field Filtered
3											
4											
5											
6											
7											
8											
9											
10											

24-Jun-14 15:07
Parnian Baber
B4A8672
KP2 OTT-001

REC'D IN OTTAWA

on ice

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# jars used and not submitted
Cameron McNaughton / Cameron McNaughton	14/06/24	15:00	Kelsey Pilon Kelsey Pilon	14/06/24	15:07	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	CustodySeal	Yes	No
	4, 5, 4	Present	✓	
	4, 4, 5	Intact	✓	

13, 1, 12

White: Maxxam Yellow: Client

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

PW14-6 Pumping Test

Your Project #: 12-1127-0115
Site#: 12-1127-0115
Your C.O.C. #: 37420

Attention:Caitlin Cooke

Golder Associates Ltd
32 Steacie Dr
Kanata, ON
K2K 2A9

Report Date: 2014/09/04
Report #: R3144988
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4F6301
Received: 2014/08/27, 12:30

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity (1)	1	N/A	2014/08/29	CAM SOP-00448	SM 22 2320 B m
Chloride by Automated Colourimetry (1)	1	N/A	2014/08/29	CAM SOP-00463	EPA 325.2 m
Colour (1)	1	N/A	2014/09/02	CAM SOP-00412	SM 22 2120 m
Conductivity (1)	1	N/A	2014/08/29	CAM SOP-00414	SM 22 2510 m
Dissolved Organic Carbon (DOC) (1, 2)	1	N/A	2014/08/29	CAM SOP-00446	SM 22 5310 B m
Fluoride (1)	1	2014/08/28	2014/08/29	CAM SOP-00449	SM 22 4500-F C m
Dissolved Gases in Water in mg/L units (1)	1	N/A	2014/08/29		
Hardness (calculated as CaCO3) (1)	1	N/A	2014/09/04	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals Analysis by ICP (1)	1	2014/09/03	2014/09/04	CAM SOP-00408	EPA 6010C m
Metals Analysis by ICPMS (as received) (1, 3)	1	2014/09/02	2014/09/03	CAM SOP-00447	EPA 6020 m
Ion Balance (% Difference) (1)	1	N/A	2014/09/04		
Total Coliforms/ E. coli, CFU/100mL (1)	1	N/A	2014/08/28	CAM SOP-00551	MOE E3407
Dissolved Methane in Water (1)	1	N/A	2014/09/02	CAM SOP-00219 Modified Combustible Gas Indicator Method	RSKSOP-175 m
Total Ammonia-N (1)	1	N/A	2014/09/03	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (1, 4)	1	N/A	2014/08/29	CAM SOP-00440	SM 22 4500-NO3I/NO2B
pH (1)	1	N/A	2014/08/29	CAM SOP-00413	SM 4500H+ B
Phenols (4AAP) (1)	1	N/A	2014/09/02	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry (1)	1	N/A	2014/08/29	CAM SOP-00464	EPA 375.4 m
Sulphide (1)	1	N/A	2014/08/30	CAM SOP-00455	SM 22 4500-S G m
Tannins & Lignins (1)	1	N/A	2014/09/03	CAM SOP-00410	SM 22 5550 B m
Total Dissolved Solids (1)	1	N/A	2014/09/02	CAM SOP-00428	SM 22 2540C m
Total Kjeldahl Nitrogen in Water (1)	1	2014/09/03	2014/09/03	CAM SOP-00454	EPA 351.2 m
Turbidity (1)	1	N/A	2014/08/29	CAM SOP-00417	SM 22 2130 B m

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as

Your Project #: 12-1127-0115
Site#: 12-1127-0115
Your C.O.C. #: 37420

Attention:Caitlin Cooke

Golder Associates Ltd
32 Steacie Dr
Kanata, ON
K2K 2A9

Report Date: 2014/09/04
Report #: R3144988
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4F6301
Received: 2014/08/27, 12:30

outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Analytics Mississauga
(2) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(3) Metals analysis was performed on the sample 'as received'.
(4) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Gina Baybayan
04 Sep 2014 17:06:52 -04:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Parnian Baber, Project Manager
Email: pbaber@maxxam.ca
Phone# (613) 274-0573

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B4F6301
Report Date: 2014/09/04

Golder Associates Ltd
Client Project #: 12-1127-0115
Sampler Initials: DH

RESULTS OF ANALYSES OF WATER

Maxxam ID		XH7821	XH7821		
Sampling Date		2014/08/27 09:35	2014/08/27 09:35		
COC Number		37420	37420		
	Units	S-2	S-2 Lab-Dup	RDL	QC Batch
Calculated Parameters					
Hardness (CaCO3)	mg/L	53		1.0	3727131
Ion Balance (% Difference)	%	1.52		N/A	3726517
Inorganics					
Total Ammonia-N	mg/L	0.76		0.050	3733806
Colour	TCU	16	16	2	3729653
Conductivity	umho/cm	760		1.0	3729646
Total Dissolved Solids	mg/L	418	428	10	3732584
Fluoride (F-)	mg/L	0.57		0.10	3729647
Total Kjeldahl Nitrogen (TKN)	mg/L	1.0		0.10	3733771
Dissolved Organic Carbon	mg/L	4.4		0.20	3729209
pH	pH	8.58		N/A	3729649
Phenols-4AAP	mg/L	<0.0010	<0.0010	0.0010	3731621
Dissolved Sulphate (SO4)	mg/L	<1		1	3729571
Sulphide	mg/L	<0.020		0.020	3731650
Tannins & Lignins	mg/L	0.6		0.2	3728664
Turbidity	NTU	0.3		0.2	3729506
Alkalinity (Total as CaCO3)	mg/L	260		1.0	3729645
Dissolved Chloride (Cl)	mg/L	87		1	3729563
Nitrite (N)	mg/L	<0.010		0.010	3729543
Nitrate (N)	mg/L	<0.10		0.10	3729543
Nitrate + Nitrite	mg/L	<0.10		0.10	3729543

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Maxxam Job #: B4F6301
Report Date: 2014/09/04

Golder Associates Ltd
Client Project #: 12-1127-0115
Sampler Initials: DH

PERMANENT GASES (WATER)

Maxxam ID		XH7821	XH7821		
Sampling Date		2014/08/27 09:35	2014/08/27 09:35		
COC Number		37420	37420		
	Units	S-2	S-2 Lab-Dup	RDL	QC Batch
Fixed Gases					
Methane	L/m3	23	23	0.005	3733090
Calculated Methane	mg/L	15		0.003	3727298

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B4F6301
Report Date: 2014/09/04

Golder Associates Ltd
Client Project #: 12-1127-0115
Sampler Initials: DH

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		XH7821	XH7821		
Sampling Date		2014/08/27 09:35	2014/08/27 09:35		
COC Number		37420	37420		
	Units	S-2	S-2 Lab-Dup	RDL	QC Batch
Metals					
Dissolved Calcium (Ca)	mg/L	10	10	0.05	3733794
. Calcium (Ca)	ug/L	9700		200	3732380
Dissolved Iron (Fe)	mg/L	0.11	0.11	0.02	3733794
. Iron (Fe)	ug/L	120		100	3732380
Dissolved Magnesium (Mg)	mg/L	6.8	6.8	0.05	3733794
. Magnesium (Mg)	ug/L	6700		50	3732380
Dissolved Manganese (Mn)	mg/L	<0.01	<0.01	0.01	3733794
. Manganese (Mn)	ug/L	8.8		2.0	3732380
Dissolved Potassium (K)	mg/L	7	7	1	3733794
. Potassium (K)	ug/L	6800		200	3732380
Dissolved Sodium (Na)	mg/L	140	140	0.5	3733794
. Sodium (Na)	ug/L	140000		100	3732380

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Maxxam Job #: B4F6301
Report Date: 2014/09/04

Golder Associates Ltd
Client Project #: 12-1127-0115
Sampler Initials: DH

MICROBIOLOGY (WATER)

Maxxam ID		XH7821	
Sampling Date		2014/08/27 09:35	
COC Number		37420	
	Units	**S-2**	**QC Batch**
Microbiological			
Background	CFU/100mL	18	3728956
Total Coliforms	CFU/100mL	0	3728956
Escherichia coli	CFU/100mL	0	3728956
QC Batch = Quality Control Batch			

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Maxxam Job #: B4F6301
Report Date: 2014/09/04

Golder Associates Ltd
Client Project #: 12-1127-0115
Sampler Initials: DH

TEST SUMMARY

Maxxam ID: XH7821
Sample ID: S-2
Matrix: Water

Collected: 2014/08/27
Shipped:
Received: 2014/08/27

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	PH	3729645	N/A	2014/08/29	Surinder Rai
Chloride by Automated Colourimetry	AC	3729563	N/A	2014/08/29	Deonarine Ramnarine
Colour	SPEC	3729653	N/A	2014/09/02	Christine Pham
Conductivity	COND	3729646	N/A	2014/08/29	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	3729209	N/A	2014/08/29	Elsamma Alex
Fluoride	F	3729647	2014/08/28	2014/08/29	Surinder Rai
Dissolved Gases in Water in mg/L units		3727298	N/A	2014/08/29	Automated Statchk
Hardness (calculated as CaCO3)		3727131	N/A	2014/09/04	Automated Statchk
Dissolved Metals Analysis by ICP	ICP	3733794	2014/09/03	2014/09/04	Suban Kanapathippllai
Metals Analysis by ICPMS (as received)	ICP/MS	3732380	2014/09/02	2014/09/03	John Bowman
Ion Balance (% Difference)	CALC	3726517	N/A	2014/09/04	Automated Statchk
Total Coliforms/ E. coli, CFU/100mL	PL	3728956	N/A	2014/08/28	Maxima Hermanez
Dissolved Methane in Water	GC/FID	3733090	N/A	2014/09/02	Vasan Thiagarajah
Total Ammonia-N	LACH/NH4	3733806	N/A	2014/09/03	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3729543	N/A	2014/08/29	Anastasia Hamanov
pH	PH	3729649	N/A	2014/08/29	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3731621	N/A	2014/09/02	Bramdeo Motiram
Sulphate by Automated Colourimetry	AC	3729571	N/A	2014/08/29	Deonarine Ramnarine
Sulphide	ISE/S	3731650	N/A	2014/08/30	Neil Dassanayake
Tannins & Lignins	SPEC	3728664	N/A	2014/09/03	Birenkumar Patel
Total Dissolved Solids	SLDS	3732584	N/A	2014/09/02	Niki Shah
Total Kjeldahl Nitrogen in Water	AC	3733771	2014/09/03	2014/09/03	Sarabjit Raina
Turbidity	TURB	3729506	N/A	2014/08/29	Lemeneh Addis

Maxxam ID: XH7821 Dup
Sample ID: S-2
Matrix: Water

Collected: 2014/08/27
Shipped:
Received: 2014/08/27

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Colour	SPEC	3729653	N/A	2014/09/02	Christine Pham
Dissolved Metals Analysis by ICP	ICP	3733794	2014/09/03	2014/09/04	Suban Kanapathippllai
Dissolved Methane in Water	GC/FID	3733090	N/A	2014/09/03	Vasan Thiagarajah
Phenols (4AAP)	TECH/PHEN	3731621	N/A	2014/09/02	Bramdeo Motiram
Total Dissolved Solids	SLDS	3732584	N/A	2014/09/02	Niki Shah

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Maxxam Job #: B4F6301
Report Date: 2014/09/04

Golder Associates Ltd
Client Project #: 12-1127-0115
Sampler Initials: DH

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	8.0°C

Custody seal was not present or intact on the cooler.

Results relate only to the items tested.

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Maxxam Job #: B4F6301
Report Date: 2014/09/04

QUALITY ASSURANCE REPORT

Golder Associates Ltd
Client Project #: 12-1127-0115
Sampler Initials: DH

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3728664	Tannins & Lignins	2014/09/03	95	80 - 120	94	80 - 120	<0.2	mg/L	NC	25		
3729209	Dissolved Organic Carbon	2014/08/29	99	80 - 120	97	80 - 120	<0.20	mg/L	0.47	20		
3729506	Turbidity	2014/08/29					<0.2	NTU	5.2	20	100	85 - 115
3729543	Nitrate (N)	2014/08/29	101	80 - 120	100	80 - 120	<0.10	mg/L	NC	25		
3729543	Nitrite (N)	2014/08/29	106	80 - 120	104	80 - 120	<0.010	mg/L				
3729563	Dissolved Chloride (Cl)	2014/08/29	NC	80 - 120	104	80 - 120	<1	mg/L	2.4	20		
3729571	Dissolved Sulphate (SO4)	2014/08/29	NC	75 - 125	102	80 - 120	<1	mg/L	1.5	20		
3729645	Alkalinity (Total as CaCO3)	2014/08/29			96	85 - 115	<1.0	mg/L	0.024	25		
3729646	Conductivity	2014/08/29			101	85 - 115	<1.0	umho/cm	1.5	25		
3729647	Fluoride (F-)	2014/08/29	NC	80 - 120	99	80 - 120	<0.10	mg/L	0	20		
3729649	pH	2014/08/29			102	98 - 103			0.39	N/A		
3729653	Colour	2014/09/02			99	85 - 115	<2	TCU	0.81	25		
3731621	Phenols-4AAP	2014/09/02	100	80 - 120	100	85 - 115	<0.0010	mg/L	NC	20		
3731650	Sulphide	2014/08/30	99	80 - 120	95	80 - 120	<0.020	mg/L	NC	20		
3732380	. Calcium (Ca)	2014/09/03	NC	80 - 120	98	80 - 120	<200	ug/L				
3732380	. Iron (Fe)	2014/09/03	101	80 - 120	99	80 - 120	<100	ug/L				
3732380	. Magnesium (Mg)	2014/09/03	NC	80 - 120	99	80 - 120	<50	ug/L				
3732380	. Manganese (Mn)	2014/09/03	100	80 - 120	97	80 - 120	<2.0	ug/L				
3732380	. Potassium (K)	2014/09/03	104	80 - 120	102	80 - 120	<200	ug/L				
3732380	. Sodium (Na)	2014/09/03	99	80 - 120	99	80 - 120	100 ,RDL=100	ug/L	1.5	20		
3732584	Total Dissolved Solids	2014/09/02					<10	mg/L	2.4	25	100	90 - 110
3733090	Methane	2014/09/03					<0.005	L/m3	0.76	30		
3733771	Total Kjeldahl Nitrogen (TKN)	2014/09/03	104	80 - 120	94	80 - 120	<0.10	mg/L	3.3	20	94	80 - 120
3733794	Dissolved Calcium (Ca)	2014/09/04	NC	80 - 120	100	80 - 120	<0.05	mg/L	0	25		
3733794	Dissolved Iron (Fe)	2014/09/04	100	80 - 120	101	80 - 120	<0.02	mg/L	4.5	25		
3733794	Dissolved Magnesium (Mg)	2014/09/04	NC	80 - 120	99	80 - 120	<0.05	mg/L	0.31	25		
3733794	Dissolved Manganese (Mn)	2014/09/04	98	80 - 120	99	80 - 120	<0.01	mg/L	NC	25		
3733794	Dissolved Potassium (K)	2014/09/04	NC	80 - 120	98	80 - 120	<1	mg/L	0.63	25		
3733794	Dissolved Sodium (Na)	2014/09/04	NC	80 - 120	99	80 - 120	<0.5	mg/L	0.071	25		
3733806	Total Ammonia-N	2014/09/03	98	80 - 120	101	85 - 115	<0.050	mg/L	2.5	20		

N/A = Not Applicable

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Maxxam Job #: B4F6301
Report Date: 2014/09/04

QUALITY ASSURANCE REPORT(CONT'D)

Golder Associates Ltd
Client Project #: 12-1127-0115
Sampler Initials: DH

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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Maxxam Job #: B4F6301
Report Date: 2014/09/04

Golder Associates Ltd
Client Project #: 12-1127-0115
Sampler Initials: DH

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Maxima Hermanez, Senior Analyst

Tom Mitchell, B.Sc, Supervisor, Compressed Gases

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam 6740 Campobello Road, Mississauga, Ontario L5N 2L8 www.maxxam.ca
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266

CHAIN OF CUSTODY RECORD

37420 Page 1 of 1

INVOICE INFORMATION	REPORT INFORMATION (if differs from invoice)	PROJECT INFORMATION	TURNAROUND TIME (TAT) REQUIRED
Company Name: Golder Associates Ltd.	Company Name:	Quotation #: B37015	Regular TAT (5-7 days)
Contact Name: Central Accounting	Contact Name: Caitlin Cooke	P.O. #:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 32 Steacie Drive Kanata ON K2K 2C9	Address:	Project #: 12-1127-0115	Rush TAT (Applicable Surcharge)
		Site Location:	1 Day (100%)
Phone: 613-592-9600 Fax: 613-592-9601	Phone: Fax:	Site #:	2 Days (50%)
Email: AccountsPayable-Maxxam@golder.com	Email: ccooke@golder.com	Sampled By: D. Holtze	3-4 Days (25%)

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

REGULATION 153 (2011)	OTHER REGULATIONS
Table 1 / Res/Park / Med/Fine	CCME / Sanitary Sewer Bylaw
Table 2 / Ind/Comm / Coarse	MISA / Storm Sewer Bylaw
Table 3 / Agri/Other	PWQO / Municipality:
Table ___	Other (Specify):
FOR RSC (PLEASE CIRCLE) YES / NO	REG 558 (MINIMUM 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis (Y/N)? ____

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED: FIELD FILTERED (PLEASE CIRCLE) Metals / Hg / CrVI; B37015 Subdivision supply 13 bacteria

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	MATRIX	# OF CONT.
1	S-2	2014-08-27	9:35	GW	11
2					
3					
4					
5					
6					
7					
8					
9					
10					

Rush Confirmation #:

Date Required:

LABORATORY USE ONLY

CUSTODY SEAL (Y/N)		Temperature (°C) on Receipt
Present	N	8/8/8
Intact	N	
COOLING MEDIA PRESENT (Y / N)	Y	

COMMENTS / TAT COMMENTS

dissolved metals field filtered

REC'D IN OTTAWA

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME:	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME:	# JARS ... AND ... SUBM...
Dale Holtze [signature]	2014/08/27	12:30	[signature] Shawn Colbert	2014/08/27	12:30	

27-Aug-14 12:30
Parnian Baber
B4F6301
KP2 OTT-001

COC-1004 (11/13) - ENV ENG

Maxxam Analytics International Corporation o/a Maxxam Analytics

Your Project #: 12-1127-0115
Your C.O.C. #: 48259001, 482590-01-01

Attention:Caitlin Cooke

Golder Associates Ltd
32 Steacie Dr
Kanata, ON
K2K 2A9

Report Date: 2014/09/04
Report #: R3145218
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4F6542
Received: 2014/08/26, 17:05

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Alkalinity (1)	1	N/A	2014/08/29	CAM SOP-00448	SM 22 2320 B m
Chloride by Automated Colourimetry (1)	1	N/A	2014/08/29	CAM SOP-00463	EPA 325.2 m
Colour (1)	1	N/A	2014/09/02	CAM SOP-00412	SM 22 2120 m
Conductivity (1)	1	N/A	2014/08/29	CAM SOP-00414	SM 22 2510 m
Dissolved Organic Carbon (DOC) (1, 2)	1	N/A	2014/08/29	CAM SOP-00446	SM 22 5310 B m
Fluoride (1)	1	2014/08/28	2014/08/29	CAM SOP-00449	SM 22 4500-F C m
Dissolved Gases in Water in mg/L units (1)	1	N/A	2014/08/29		
Hardness (calculated as CaCO3) (1)	1	N/A	2014/09/02	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals Analysis by ICP (1)	1	2014/08/29	2014/09/02	CAM SOP-00408	EPA 6010C m
Metals Analysis by ICPMS (as received) (1, 3)	1	2014/08/29	2014/08/30	CAM SOP-00447	EPA 6020 m
Ion Balance (% Difference) (1)	1	N/A	2014/09/02		
Dissolved Methane in Water (1)	1	N/A	2014/09/02	CAM SOP-00219 Modified Combustible Gas Indicator Method	RSKSOP-175 m
Total Ammonia-N (1)	1	N/A	2014/08/29	CAM SOP-00441	EPA GS I-2522-90 m
Nitrate (NO3) and Nitrite (NO2) in Water (1, 4)	1	N/A	2014/08/29	CAM SOP-00440	SM 22 4500-NO3I/NO2B
pH (1)	1	N/A	2014/08/29	CAM SOP-00413	SM 4500H+ B
Phenols (4AAP) (1)	1	N/A	2014/09/02	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry (1)	1	N/A	2014/08/29	CAM SOP-00464	EPA 375.4 m
Sulphide (1)	1	N/A	2014/08/29	CAM SOP-00455	SM 22 4500-S G m
Tannins & Lignins (1)	1	N/A	2014/09/03	CAM SOP-00410	SM 22 5550 B m
Total Dissolved Solids (1)	1	N/A	2014/08/29	CAM SOP-00428	SM 22 2540C m
Total Kjeldahl Nitrogen in Water (1)	1	2014/09/02	2014/09/02	CAM SOP-00454	EPA 351.2 m
Turbidity (1)	1	N/A	2014/08/28	CAM SOP-00417	SM 22 2130 B m

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

Your Project #: 12-1127-0115
Your C.O.C. #: 48259001, 482590-01-01

Attention:Caitlin Cooke

Golder Associates Ltd
32 Steacie Dr
Kanata, ON
K2K 2A9

Report Date: 2014/09/04
Report #: R3145218
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4F6542
Received: 2014/08/26, 17:05

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Analytics Mississauga
(2) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(3) Metals analysis was performed on the sample 'as received'.
(4) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Madison Bingley
05 Sep 2014 09:39:02 -04:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Parnian Baber, Project Manager
Email: pbaber@maxxam.ca
Phone# (613) 274-0573

==========

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Maxxam Job #: B4F6542
Report Date: 2014/09/04

Golder Associates Ltd
Client Project #: 12-1127-0115
Sampler Initials: CC

RESULTS OF ANALYSES OF WATER

Maxxam ID		XH8861		
Sampling Date		2014/08/26		
COC Number		482590-01-01		
	Units	S-1	RDL	QC Batch
Calculated Parameters				
Hardness (CaCO3)	mg/L	51	1.0	3727460
Ion Balance (% Difference)	%	0.440	N/A	3726517
Inorganics				
Total Ammonia-N	mg/L	0.85	0.050	3728605
Colour	TCU	16	2	3726693
Conductivity	umho/cm	900	1.0	3729646
Total Dissolved Solids	mg/L	486	10	3729088
Fluoride (F-)	mg/L	0.67	0.10	3729647
Total Kjeldahl Nitrogen (TKN)	mg/L	1.1	0.10	3732375
Dissolved Organic Carbon	mg/L	4.9	0.20	3728904
pH	pH	8.64	N/A	3729649
Phenols-4AAP	mg/L	<0.0010	0.0010	3728953
Dissolved Sulphate (SO4)	mg/L	<1	1	3729640
Sulphide	mg/L	<0.020	0.020	3730098
Tannins & Lignins	mg/L	0.7	0.2	3728664
Turbidity	NTU	<0.2	0.2	3729045
Alkalinity (Total as CaCO3)	mg/L	280	1.0	3729645
Dissolved Chloride (Cl)	mg/L	120	1	3729639
Nitrite (N)	mg/L	<0.010	0.010	3729545
Nitrate (N)	mg/L	<0.10	0.10	3729545
Nitrate + Nitrite	mg/L	<0.10	0.10	3729545

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B4F6542
Report Date: 2014/09/04

Golder Associates Ltd
Client Project #: 12-1127-0115
Sampler Initials: CC

PERMANENT GASES (WATER)

Maxxam ID		XH8861		
Sampling Date		2014/08/26		
COC Number		482590-01-01		
	Units	S-1	RDL	QC Batch
Fixed Gases				
Methane	L/m3	11	0.005	3733090
Calculated Methane	mg/L	7.0	0.003	3727298

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B4F6542
Report Date: 2014/09/04

Golder Associates Ltd
Client Project #: 12-1127-0115
Sampler Initials: CC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		XH8861		
Sampling Date		2014/08/26		
COC Number		482590-01-01		
	Units	S-1	RDL	QC Batch
Metals				
Dissolved Calcium (Ca)	mg/L	9.9	0.05	3726712
. Calcium (Ca)	ug/L	9700	200	3729945
Dissolved Iron (Fe)	mg/L	0.11	0.02	3726712
. Iron (Fe)	ug/L	120	100	3729945
Dissolved Magnesium (Mg)	mg/L	6.4	0.05	3726712
. Magnesium (Mg)	ug/L	6500	50	3729945
Dissolved Manganese (Mn)	mg/L	<0.01	0.01	3726712
. Manganese (Mn)	ug/L	8.6	2.0	3729945
Dissolved Potassium (K)	mg/L	8	1	3726712
. Potassium (K)	ug/L	7400	200	3729945
Dissolved Sodium (Na)	mg/L	170	0.5	3726712
. Sodium (Na)	ug/L	180000	100	3729945

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B4F6542
Report Date: 2014/09/04

Golder Associates Ltd
Client Project #: 12-1127-0115
Sampler Initials: CC

TEST SUMMARY

Maxxam ID: XH8861
Sample ID: S-1
Matrix: Water

Collected: 2014/08/26
Shipped:
Received: 2014/08/26

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	PH	3729645	N/A	2014/08/29	Surinder Rai
Chloride by Automated Colourimetry	AC	3729639	N/A	2014/08/29	Deonarine Ramnarine
Colour	SPEC	3726693	N/A	2014/09/02	Christine Pham
Conductivity	COND	3729646	N/A	2014/08/29	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	3728904	N/A	2014/08/29	Elsamma Alex
Fluoride	F	3729647	2014/08/28	2014/08/29	Surinder Rai
Dissolved Gases in Water in mg/L units		3727298	N/A	2014/08/29	Automated Statchk
Hardness (calculated as CaCO3)		3727460	N/A	2014/09/02	Automated Statchk
Dissolved Metals Analysis by ICP	ICP	3726712	2014/08/29	2014/09/02	Suban Kanapathippllai
Metals Analysis by ICPMS (as received)	ICP/MS	3729945	2014/08/29	2014/08/30	Arefa Dabhad
Ion Balance (% Difference)	CALC	3726517	N/A	2014/09/02	Automated Statchk
Dissolved Methane in Water	GC/FID	3733090	N/A	2014/09/02	Vasan Thiagarajah
Total Ammonia-N	LACH/NH4	3728605	N/A	2014/08/29	Charles Opoku-Ware
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	3729545	N/A	2014/08/29	Anastasia Hamanov
pH	PH	3729649	N/A	2014/08/29	Surinder Rai
Phenols (4AAP)	TECH/PHEN	3728953	N/A	2014/09/02	Bramdeo Motiram
Sulphate by Automated Colourimetry	AC	3729640	N/A	2014/08/29	Deonarine Ramnarine
Sulphide	ISE/S	3730098	N/A	2014/08/29	Neil Dassanayake
Tannins & Lignins	SPEC	3728664	N/A	2014/09/03	Birenkumar Patel
Total Dissolved Solids	SLDS	3729088	N/A	2014/08/29	Bansari Ray
Total Kjeldahl Nitrogen in Water	AC	3732375	2014/09/02	2014/09/02	Sarabjit Raina
Turbidity	TURB	3729045	N/A	2014/08/28	Lemeneh Addis

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	8.7°C

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

Golder Associates Ltd
Client Project #: 12-1127-0115
Sampler Initials: CC

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
3726693	Colour	2014/09/02			98	85 - 115	<2	TCU	NC	25		
3726712	Dissolved Calcium (Ca)	2014/09/02	NC	80 - 120	104	80 - 120	0.24 ,RDL=0.05	mg/L	1.7	25		
3726712	Dissolved Iron (Fe)	2014/09/02	106	80 - 120	94	80 - 120	<0.02	mg/L	NC	25		
3726712	Dissolved Magnesium (Mg)	2014/09/02	NC	80 - 120	97	80 - 120	<0.05	mg/L	2.0	25		
3726712	Dissolved Manganese (Mn)	2014/09/02	104	80 - 120	102	80 - 120	<0.01	mg/L	NC	25		
3726712	Dissolved Potassium (K)	2014/09/02	NC	80 - 120	103	80 - 120	<1	mg/L	2.7	25		
3726712	Dissolved Sodium (Na)	2014/09/02	NC	80 - 120	100	80 - 120	<0.5	mg/L	2.2	25		
3728605	Total Ammonia-N	2014/08/29	NC	80 - 120	99	85 - 115	<0.050	mg/L	3.0	20		
3728664	Tannins & Lignins	2014/09/03	95	80 - 120	94	80 - 120	<0.2	mg/L	NC	25		
3728904	Dissolved Organic Carbon	2014/08/28	93	80 - 120	100	80 - 120	<0.20	mg/L	16	20		
3728953	Phenols-4AAP	2014/09/02	98	80 - 120	101	85 - 115	<0.0010	mg/L	NC	20		
3729045	Turbidity	2014/08/28					<0.2	NTU	18	20	97	N/A
3729088	Total Dissolved Solids	2014/08/29					<10	mg/L	1.6	25	100	90 - 110
3729545	Nitrate (N)	2014/08/29	96	80 - 120	100	80 - 120	<0.10	mg/L	0.25	25		
3729545	Nitrite (N)	2014/08/29	106	80 - 120	104	80 - 120	<0.010	mg/L	NC	25		
3729639	Dissolved Chloride (Cl)	2014/08/29	104	80 - 120	104	80 - 120	<1	mg/L	NC	20		
3729640	Dissolved Sulphate (SO4)	2014/08/29	105	75 - 125	102	80 - 120	<1	mg/L	NC	20		
3729645	Alkalinity (Total as CaCO3)	2014/08/29			96	85 - 115	<1.0	mg/L	0.024	25		
3729646	Conductivity	2014/08/29			101	85 - 115	<1.0	umho/cm	1.5	25		
3729647	Fluoride (F-)	2014/08/29	NC	80 - 120	99	80 - 120	<0.10	mg/L	0	20		
3729649	pH	2014/08/29			102	98 - 103			0.39	N/A		
3729945	. Calcium (Ca)	2014/08/30	100	80 - 120	99	80 - 120	<200	ug/L	1.5	20		
3729945	. Iron (Fe)	2014/08/30	98	80 - 120	99	80 - 120	<100	ug/L	NC	20		
3729945	. Magnesium (Mg)	2014/08/30	98	80 - 120	99	80 - 120	<50	ug/L	4.8	20		
3729945	. Manganese (Mn)	2014/08/30	96	80 - 120	98	80 - 120	<2.0	ug/L	NC	20		
3729945	. Potassium (K)	2014/08/30	103	80 - 120	98	80 - 120	<200	ug/L	1.9	20		
3729945	. Sodium (Na)	2014/08/30	NC	80 - 120	98	80 - 120	<100	ug/L	0.41	20		
3730098	Sulphide	2014/08/29	90	80 - 120	90	80 - 120	<0.020	mg/L	NC	20		
3732375	Total Kjeldahl Nitrogen (TKN)	2014/09/02	NC	80 - 120	103	80 - 120	<0.10	mg/L	8.5	20	96	80 - 120
3733090	Methane	2014/09/03					<0.005	L/m3	0.76	30		

N/A = Not Applicable

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QUALITY ASSURANCE REPORT(CONT'D)

Golder Associates Ltd
Client Project #: 12-1127-0115
Sampler Initials: CC

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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Golder Associates Ltd
Client Project #: 12-1127-0115
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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Tom Mitchell, B.Sc, Supervisor, Compressed Gases

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam IMMEDIATE TEST

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26-Aug-14 17:05
Parnian Baber
B4F6542
DKN ENV-641

Page 1 of 1

INVOICE INFORMATION:

Company Name: #14090 Golder Associates Ltd
Contact Name: Central Accounting
Address: 32 Steacie Dr
Kanata ON K2K 2A9
Phone: (613) 592-9600 Fax: (613) 592-9601
Email: AccountsPayable_Maxxam@golder.com, OttawaAccou

REPORT INFORMATION(if differs from invoice):

Company Name:
Contact Name: Caitlin Cooke
Address:
Phone: Fax:
Email: ccooke@golder.com

PROJECT INFORMATION:

Quotation #: B37015
P.O. #:
Project #: 12-1127-0115
Project Name:
Site #:
Sampled By: D. Holtze

Only:
Bottle Order #: 482590
Project Manager: Parnian Baber
C#482590-01-01

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ For RSC
☐ Table ___

Other Regulations
☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ___
☐ PWQO
☐ Other ___

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

Field Filtered (please circle): Metals / Hg / Cr VI

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	B37015- SUBDIVISION SUPPLY PKG WITH BACTERIA	B37015- SUBDIVISION SUPPLY PKG WITHOUT BACTERIA	# of Bottles	Comments
1		S-1	2014-08-26		GW		X	10	
2									
3									
4									
5									
6									
7									
8									REC'D IN OTTAWA
9									
10									ohice

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☐
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ (call lab for #)

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Dale Holtze Dale Holtze	14/08/26	17:05	Kelsey Piket Kelsey Piket	14/08/26	17:05	
			MAMS [illegible]	2014/08/27	09:24	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	9-9.8	Present		✓
		Intact	-	✓

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxam Yellow: Client

8/10/19

Maxxam Analytics International Corporation o/a Maxxam Analytics

As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

For more information, visit golder.com

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