Northeast Capital Industrial Association

2018 Groundwater Quality Monitoring

Beverly Channel Monitoring Wells

9 January 2019

307075-01608-400 – CA-REP-0001

Advisian
Suite 300, 8615 51 Ave
Edmonton, AB T6E 6A8 CANADA
Phone: +1 780 496 9055
Facsimile: +1 780 496 9575
www.advisian.com

Advisian
WorleyParsons Group

Project No. 307075-01608-400-CA-REP-0001 - 2018 Groundwater Quality Monitoring: Beverly Channel Monitoring Wells

Rev	Description	Originator Approval	Reviewer Approval	Project Manager Approval	Date
0	Issued As Final	D. Skoreyko	T. Butterfield	S. Gray	9-Jan-19

Disclaimer

The information presented in this document was compiled and interpreted exclusively for the purposes stated in Section 1.3 of the document. WorleyParsons Canada Services Ltd., operating as Advisian (Advisian) provided this report for Northeast Capital Industrial Association solely for the purpose noted above.

Advisian has exercised reasonable skill, care, and diligence to assess the information acquired during the preparation of this report, but makes no guarantees or warranties as to the accuracy or completeness of this information. The information contained in this report is based upon, and limited by, the circumstances and conditions acknowledged herein, and upon information available at the time of its preparation. The information provided by others is believed to be accurate but cannot be guaranteed.

Advisian does not accept any responsibility for the use of this report for any purpose other than that stated in Section 1.3 and does not accept responsibility to any third party for the use in whole or in part of the contents of this report. Any alternative use, including that by a third party, or any reliance on, or decisions based on this document, is the responsibility of the alternative user or third party.

Any questions concerning the information or its interpretation should be directed to Trevor Butterfield.

Contents

Tables within Text

Tables

Figures within Text

Figures

Appendices

1. Introduction

1.1 General

The Northeast Capital Industrial Association (NCIA) Beverly Channel Study Area is located within Sturgeon and Strathcona Counties and is comprised of Townships 54, 55, and 56, Ranges 21 and 22, W4M (Figure 1). Monitoring of the Beverly Channel's groundwater within the Study Area has been conducted since 2005. The objective of the groundwater monitoring program is to monitor for changes in groundwater flow and quality from the established baseline conditions in the study area. The monitoring well network in the NCIA Study Area consists of 13 wells completed in the Beverly Channel and one well completed within the bedrock (Figure 2).

1.2 Previous Work

Previous work conducted within the Study Area was described by Stantec Consulting Ltd. (Stantec; 2006a, 2006b, 2007, 2008, and 2009), WorleyParsons Canada Services Ltd. (WorleyParsons; 2010, 2011, 2012, 2013, 2014, and 2015) and Advisian (2016, and 2018) and is summarized as follows.

- Depth to the groundwater surface in the Beverly Channel has historically ranged from approximately 15 to 35 metres below ground surface (mbgs). Annual groundwater level fluctuations have generally been 1 m or less.
- The lateral groundwater flow gradient within the Beverly Channel has historically ranged from approximately 0.0005 to 0.005 m/m. Groundwater flow velocity has been estimated to vary from approximately 16 to 160 m/year in different areas of the Beverly Channel.
- Historically, sulphate concentrations have exceeded the applied guideline at MW-07, while total dissolved solids (TDS), iron, and manganese have exceeded the applied guidelines at several locations within the Study Area.
- Sodium concentrations have historically exceeded the applied guideline at MW-07 and MW-09.
- Chloride concentrations at MW-02 and MW-04 are higher than at other locations in the Beverly Channel. These chloride concentrations, nevertheless, are considered to be natural, reflecting the water quality in the underlying bedrock.

1.3 Scope of Work

The scope of the 2018 program was to conduct and report on annual groundwater levels and quality at the existing monitoring network completed in the Beverly Channel and underlying bedrock in the NCIA Study Area. The annual monitoring event occurred from July 31 to August 2, 2018. The 2018 program included the following tasks:

- field measurements of depth to groundwater at all monitoring wells;

- field measurements of groundwater electrical conductivity (EC), pH, and temperature;
- sampling of groundwater and submission for laboratory analysis; and
- preparation of a report summarizing the program methodology and results, and providing an analysis of the groundwater data.

A list of the chemical parameters analyzed for the 2018 monitoring program is provided in Section 3.2.2. Stable isotope analysis for hydrogen (^{2}H; deuterium) and oxygen (^{18}O) began in 2015 and has continued during the 2016, 2017 and 2018 monitoring events.

2. Physical Setting

2.1 Topography and Drainage

The Study Area encompasses residential, agricultural, and industrial areas. While local topography varies at each well location, the ground generally slopes toward the North Saskatchewan River, which crosses the Study Area from southwest to northeast. Surface drainage is expected to be generally toward the North Saskatchewan River or Astotin Creek, which ultimately discharges to the North Saskatchewan River (Figure 1).

2.2 Regional Geology and Hydrogeology

A detailed description of the geology and hydrogeology of the region was provided by Stantec (2006a). A brief summary is provided below.

Regional bedrock geology comprises Late Cretaceous-aged, marginal marine to non-marine, grey thick-bedded sandstone; grey and green mudstone; grey, clayey siltstone; coal beds; and rare intermittent ironstone beds of the Belly River Group or marine, dark grey blocky shale and silty shale; greenish glauconitic and grey clayey sandstone; thin concretionary ironstone and bentonitic beds of the Bearpaw Formation (Stein 1976; Prior et al. 2013). The Bearpaw Formation has been eroded over most of the Study Area but seems to be present in the southwest of the Study Area. The Bearpaw Formation is generally considered an aquitard. The Horseshoe Canyon Formation is present outside of the Study Area toward the southwest.

Quaternary deposits consisting of pre-glacial, glacial, lacustrine and aeolian sediments overlie the bedrock. The Beverly Channel is a major pre-glacial valley in the area that consists of buried sand and gravel deposits. The channel is roughly coincident with the present-day North Saskatchewan River Valley. Deposited in fast-flowing braided streams, the sand and gravels of the Beverly Channel form an important regional aquifer in the area.

Clay till is present above the Beverly Channel sand and gravels and clay overlies the clay till. The clay and clay till units provide an effective protective barrier for the Beverly Channel over much of the region. A saturated surficial sand unit may overlie the clay unit in some areas.

Aquifers can be found in the Belly River Group, the Beverly Channel, sand lenses in the till, and surficial sand and gravel deposits (Stein 1976). Aquifers within the Belly River Group exhibit TDS concentrations ranging from 1,000 to more than 6,000 mg/L (Stein 1976). Areas of high TDS concentrations are typically associated with high chloride and/or high sulphate content (Stein 1976).

The Beverly Channel is hydraulically connected to the North Saskatchewan River (Stein 1976). Mineralization in the Beverly Channel generally ranges from less than 500 to 3,000 mg/L TDS. Iron concentrations within the Channel can exceed 15 mg/L and iron staining and iron bacteria are common (Stein 1976).

2.3 Regional Groundwater Use and Quality

A water well search of the Study Area was conducted in October 2016. The Alberta Water Well Information Database indicated that there were 1,212 water well records within the Study Area (Appendix 1). The majority of the wells were listed for domestic use, but included also stock and municipal use (e.g. Village of Bruderheim). About 93% of the water well records had a depth between 1 and 80 m, with a median depth of 27.4 m. The existence and location of these water wells has not been field-verified. With the industrial development in the Heartland Area, many of the wells associated with the water well records are no longer in use and have been abandoned. There were 120 well records indicated as abandoned.

Based on the results of the water well search, groundwater analytical data are available for 439 of the 1,212 water well records. A subset of the available chemistry data summarizing the ranges and mean concentrations of select parameters compiled from available water well record chemistry data is provided in Table A. The summary does not include groundwater chemistry statistics from any new water wells that have been identified since analysis of the data presented in Table A was conducted.

Several water wells were identified as being completed within the Beverly Channel in the Study Area in Shell Canada Limited's (Shell) Environmental Impact Assessment for the Scotford Upgrader Expansion (Shell 2005). Water well chemistry data were unavailable for most of these water wells.

Table A Select Parameter Concentrations from Available Water Well Records

Parameter	Beverly Channel		Upper Bedrock	
	Range	Mean	Range	Mean
pH	7.3-8.5	8.1	7.8-8.7	8.0
Chloride (mg/L)	1-38	13.5	2-901	197
Sulphate (mg/L)	40-726	316	5-741	193
Iron (mg/L)	0.02-4.84	1.24	0.08-1.48	0.36
TDS (mg/L)	362-1,732	975	331-2,021	1,059
Sodium (mg/L)	54-417	200	8-825	274

Notable differences between the Beverly Channel and upper bedrock include chloride, sulphate, and iron concentrations. Within the Beverly Channel, mean chloride concentrations are lower while mean sulphate and iron concentrations are typically higher than in the upper bedrock.

3. Field Program

3.1 Monitoring Network

The monitoring network consists of 14 monitoring wells at 13 different locations within the Study Area, with one nested pair of monitoring wells (MW-02 and MW-02B) at one location in the Beverly Channel Aquifer and the bedrock below. Borehole logs are provided in Appendix 2.

3.2 Groundwater Sampling

Groundwater sampling was conducted according to Advisian's groundwater sampling protocols. The following procedures were followed during sampling of all monitoring wells.

- Prior to sampling, the static groundwater level was measured with an electric water level tape. The tape was cleaned by rinsing with distilled water after each reading.
- Wells were purged of standing water using a Waterra pump or a Geosub submersible pump. The temperature, pH, and EC of the water were monitored during purging. The wells were purged until these field-measured parameters stabilized.
- The pH meter was calibrated using pH 4, 7, and 10 buffer solutions while the EC meter was calibrated with a standard KCL solution of 1,413 µS/cm at 25°C prior to analyzing for field parameters.
- After purging and field measurements, groundwater samples were collected. Samples were collected in pre-cleaned bottles and vials provided by ALS Laboratory in Edmonton, Alberta.
    - Samples for dissolved metals, dissolved ammonia, and dissolved organic carbon (DOC) analyses were field-filtered using a 45 µm inline filter.
    - Preservatives were added to DOC, dissolved metals, and phenols sample bottles as directed by ALS.
    - Hydrocarbon parameter sample bottles were provided pre-charged with preservatives by ALS.
- Groundwater samples were placed in coolers with ice for transport to ALS.
- Quality assurance/quality control (QA/QC) for the field sampling program consisted of collecting one duplicate sample.
- Standard chain-of-custody (COC) protocols were followed.

3.2.1 Quality Assurance/Quality Control Procedures

The QA/QC procedures for the monitoring program were as follows.

- Thoroughly rinsing all equipment (e.g. water level tape and Geosub pump) with distilled water prior to monitoring and sampling a well.
- Storing samples in coolers maintained at approximately 4°C.
- Documentation of sample handling, transport, and delivery to the laboratory using appropriate COC procedures and documentation.

Groundwater samples were collected between July 31 and August 2, 2018. All groundwater samples were analyzed by ALS, with the exception of the stable isotopes, which ALS subcontracted to Isobrine Solutions Inc.

3.2.2 Analytical Schedule

The analytical schedule for each monitoring well is summarized in Table B. Groundwater samples from all monitoring wells were analyzed for the following:

- major ions/routine potability parameters, including EC, pH, total alkalinity, chloride, sulphate, iron, manganese, TDS, calcium, magnesium, potassium, sodium, bicarbonate, carbonate, hydroxide, fluoride, ion balance, DOC, nitrate-as-nitrogen, nitrite-as-nitrogen, and total ammonia;
- dissolved metal and trace element parameters, including aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, titanium, uranium, vanadium, and zinc;
- PHC parameters including benzene, toluene, ethylbenzene and xylene (BTEX), PHC F1 and F2;
- Volatile organic compounds (VOCs) including styrene and phenols; and
- deuterium and oxygen (^{2}H and ^{18}O) stable isotopes.

Table B 2018 Analytical Schedule

Monitoring Well	Major Ions/Routine Potability (see Table 3)	Dissolved metals & Trace Elements (see Table 4)	Petroleum Hydrocarbons (see Table 5)	Volatile Organic Compounds (see Table 6)	Isotopes (^{2}H and ^{18}O) (see Table 7)
MW-01	✓	✓	✓	✓	✓
MW-02	✓	✓	✓	✓	✓
MW-02B	✓	✓	✓	✓	✓
MW-03	✓	✓	✓	✓	✓
MW-04	✓	✓	✓	✓	✓
MW-05	✓	✓	✓	✓	✓
MW-06	✓	✓	✓	✓	✓
MW-07	✓	✓	✓	✓	✓
MW-08	✓	✓	✓	✓	✓
MW-09	✓	✓	✓	✓	✓
MW-10	✓	✓	✓	✓	✓
MW-11	✓	✓	✓	✓	✓
MW-12	✓	✓	✓	✓	✓
MW-13	✓	✓	✓	✓	✓

3.3 Assessment Criteria

Historically, groundwater from the Beverly Channel aquifer has been used for domestic, stock and municipal uses (e.g. Village of Bruderheim). As such, the Health Canada (2017) Guidelines for Canadian Drinking Water Quality (GCDWQ) have been included in the summary tables for the analytical results. Their purpose is to provide a general reference for the groundwater quality in the Beverly Channel Aquifer in light of the historical use, while also considering that the groundwater quality represents background conditions.

3.4 Data Analysis

3.4.1 Groundwater Monitoring Data

Upon completion of the field program, groundwater field measurements and analytical data were tabulated. Tables include a summary of historical parameters and minimum, maximum, and mean concentrations for each well. Select indicator parameters were then graphed and utilized for statistical and graphical analysis as described below.

3.4.1.1 Statistical and Graphical Analysis

A Mann-Kendall test is a non-parametric test for trend in a data set (Helsel and Hirsch 1992). The test evaluates whether parameter concentrations are monotonically rising or falling. Mann-Kendall analysis can be performed on a time series data set with at least four sampling points. Sen's Method is used to assess the rate of change (increase or decrease) in a trending data set (Gilbert 1987). Mann-Kendall and Sen's Method analyses were applied to chloride, fluoride, sulphate, iron, manganese, sodium, total dissolved solids, and dissolved organic carbon. pH was visually analyzed for potential trends.

Following completion of the statistical calculations, the data were evaluated, and trends were considered potentially significant if:

- the data set contained six or more data points;
- the data were visually monotonic;
- the Mann-Kendall probability was greater than 95% or the inferred confidence level was greater than 95% (p-value of two-tailed test was less than or equal to 0.05) and 50% of the sample results were greater than the reporting detection limit;
- Sen's normalized slope (in absolute % change per year) was 10% or greater; and
- Absolute slope (in mg/L/yr) was greater than:
  - 2 mg/L/yr for chloride, TDS, sulphate, and sodium;
  - 0.1 mg/L/yr for fluoride, iron, and manganese; and
  - 0.5 mg/L/yr for DOC.

Trends apparent from visual inspection of the graphical control charts, but not indicated statistically, were also noted.

3.4.1.2 High, Low, and Average Charts

The historical data for key indicator parameters at each monitoring well were summarized through charts that show the historical range (i.e. highest and lowest values) and the average (mean) value.

4. Results

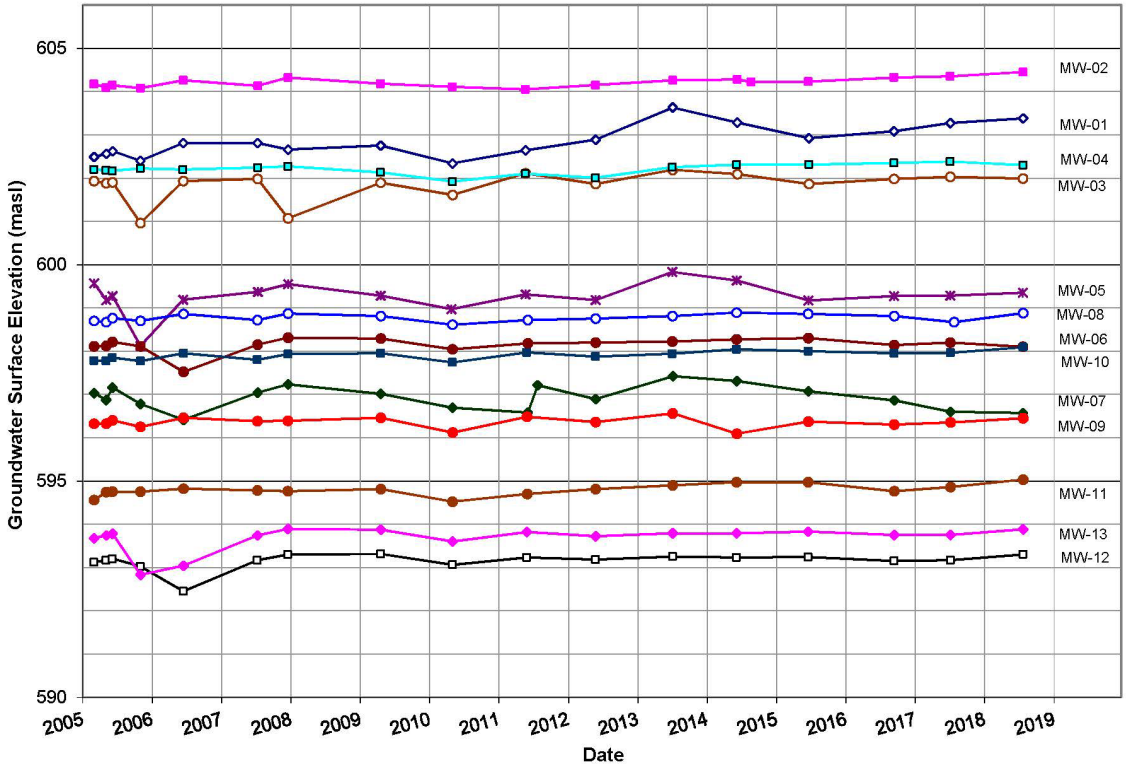
4.1 Groundwater Flow

4.1.1 Groundwater Surface Elevations

Groundwater level hydrographs are provided in Appendix 3 and summarized in Figure A. Groundwater surface elevations within the Beverly Channel ranged from 593.3 to 604.5 metres above sea level (masl) at MW-12 and MW-02, respectively. Groundwater surface elevations were consistent with historical values in the Beverly Channel.

The groundwater surface elevation at the monitoring well completed in the bedrock at MW-02B was 607.75 masl during the 2018 monitoring event (Table 1). This was consistent with the elevations observed in 2017 and approximately 4.9 m higher than in September 2016. This indicates that the groundwater surface elevation measured at MW-02B had not yet equilibrated after installation in 2016, but has since reached equilibrium.

Figure A Historical Groundwater Surface Elevations in Beverly Channel Monitoring Wells



4.1.2 Detailed Hydrographs

Level loggers were installed in four of the NCIA Beverly Channel monitoring wells as part of the conditions of an NCIA partner company's term water diversion license. Water levels were recorded daily and provided a high-resolution depiction of the fluctuations in the groundwater surface elevations within the Beverly Channel. High resolution hydrographs of groundwater surface elevations at MW-04, MW-05, MW-06, and MW-07 are presented in Appendix 3.

4.1.3 Lateral Groundwater Flow

Lateral groundwater flow in the Beverly Channel was consistent with previous analyses and was generally to the northwest towards the North Saskatchewan River (Figure 3). The lateral hydraulic gradient ranged from approximately 0.001 m/m in the north to 0.003 m/m in the south near MW-04. Based on the geometric mean hydraulic conductivity of 3.9×10^{-4} m/s, the hydraulic gradient of 0.001 and the assumed effective porosity of 0.25, the linear groundwater flow velocity in the north is approximately 50 m/year. Based on the geometric mean hydraulic conductivity of 2.0×10^{-4} m/s the hydraulic gradient of 0.003 and the assumed effective porosity of 0.25, the linear groundwater flow velocity in the south is approximately 75 m/year.

4.1.4 Vertical Groundwater Flow

The groundwater level in the bedrock (MW-02B; 607.75 masl) was higher than that in the Beverly Channel (MW-02; 604.45 masl). This indicated the potential for upward flow (discharge) from the bedrock to the Beverly Channel. The vertical hydraulic gradient between the bedrock and the Beverly Channel was approximately 0.34 m/m in August 2018 at the nest of monitoring wells MW-02/MW-02B.

4.2 Field-Measured Parameters

Field-measured parameters are presented in Table 2 and were mostly consistent with historical results. Groundwater temperatures at the Beverly Channel monitoring wells ranged from 6.2 to 7.7°C; EC values ranged from 805 to 1,970 µS/cm; and pH ranged from 6.87 to 7.4 in 2018.

Field parameters measured in the bedrock at MW-02B during the 2018 sampling event were: temperature of 7.2°C, EC of 2,250 µS/cm, and pH of 7.83. The EC was approximately half that measured in July 2017.

4.3 Groundwater Quality

Groundwater analytical results are presented in Tables 3, 4, 5, 6, and 7. Original laboratory analytical reports are included in Appendix 4. Hydrochemical control charts are provided in Appendix 5. A statistical table with basic statistical and Mann-Kendall analyses for indicator parameters is included in Appendix 6.

4.3.1 Select Inorganic Data

Select inorganic parameter data are presented in Tables 3 and 4. Results from the 2018 sampling event are summarized as follows.

- Iron and manganese concentrations were typically higher than the drinking water standards of 0.3 and 0.05 mg/L, respectively. Dissolved iron concentrations were above the historical ranges at four locations (MW-03, MW-05, MW-06, and MW-08). Dissolved manganese concentrations were above the historical ranges at five monitoring locations (MW-03, MW-05, MW-06, MW-08, and MW-12).
- TDS concentrations were within historical ranges at all monitoring wells in the NCIA Study Area. TDS concentrations continued to be less than 500 mg/L at monitoring wells MW-01 and MW-13, while they continued to be highest at MW-07 (1,890 mg/L).
- Dissolved sulphate concentrations were largely consistent with the historical ranges in the NCIA study area and remained less than the 500 mg/L guideline at all locations except MW-06 and MW-07. At monitoring well MW-06, sulphate concentrations have ranged from 420 to 560 mg/L and at MW-07 from 622 to 1,270 mg/L.
- Sodium concentrations continued to be generally within historical ranges at all wells completed in the Beverly Channel Aquifer (increased by 1 mg/L at MW-13). Sodium concentrations are typically below 200 mg/L; however, at monitoring wells MW-07 and MW-09, sodium concentrations have ranged from 189 to 320 mg/L.
- Chloride concentrations continued to be within historical ranges at all but MW-01 and MW-03. Chloride concentrations at MW-01 have increased from 3.02 mg/L in 2011 to 9.64 mg/L in 2018; and from 44.2 mg/L in 2011 to 60.8 mg/L in 2018 at MW-03. Typically, chloride concentrations have been less than 60 mg/L at all monitoring wells except MW-04, where they have ranged from 125 to 200 mg/L.

A comparison of the chemical composition of the waters at MW-02 and MW-02B during the 2018 sampling events is summarized as follows:

- The dissolved iron concentration at MW-02 was 7.79 mg/L while at MW-02B the dissolved iron concentration was 0.127 mg/L. The dissolved manganese concentrations at MW-02 and MW-02B were 0.39 and 0.1 mg/L, respectively. Dissolved iron continued to exceed the Health Canada (2017) drinking water guideline at MW-02. Dissolved manganese and TDS continued to exceed the Health Canada (2017) guideline at MW-02 and MW-02B.
- The sodium concentration at MW-02 (104 mg/L) was less than the Health Canada (2017) drinking water guideline (200 mg/L), while at MW-02B it was 691 mg/L, exceeding the Health Canada drinking water guideline.
- The chloride concentration at MW-02 was 61.2 mg/L in 2018, while the chloride concentration at MW-02B increased to 930 mg/L.
- Sulphate concentrations were 234 mg/L at MW-02 and <1.5 mg/L at MW-02B.
- TDS concentration remained within the historical ranges for 2018 and TDS concentrations at MW-02 remained approximately half of those observed at MW-02B (883 and 1,870 mg/L, respectively).

The fluctuating ion concentrations observed at MW-02 may be associated with interactions with groundwater with elevated ion concentrations from bedrock as characterized at monitoring well MW-02B. The downward vertical hydraulic gradient between MW-02 and MW-02B, indicative of the potential for upward groundwater flow from bedrock to the Beverly Channel, supports this hypothesis.

4.3.2 Dissolved Metals and Trace Elements

Dissolved metals and trace element parameters are presented in Table 4. Dissolved metals and trace element concentrations were generally within the historical ranges and were below the Health Canada (2017) drinking water guidelines at all monitoring wells (where guidelines exist), except for dissolved iron, manganese, sodium and aluminum. Dissolved aluminum exceeded the Health Canada (2017) drinking water guideline for the first time at MW-03 and MW-06.

In 2018, other minor deviations from historical ranges were noted in select parameters at some monitoring wells.

4.3.3 Petroleum Hydrocarbons (PHCs)

Petroleum hydrocarbon results are presented in Table 5. PHC concentrations were below their corresponding reporting detection limits (RDLs) at all monitoring wells in 2018.

4.3.4 Volatile Organic Compounds

Volatile organic compound results are presented in Table 6. Styrene and phenols were the VOCs analyzed in 2018. There was no styrene detected in the NCIA monitoring wells during the 2018 sampling event.

Phenols were detected at all monitoring wells, except MW-03, in 2018. The detections were within five times the RDL and are therefore not considered to be reliable detections. The dissolved phenols concentration in upper bedrock at MW-02B decreased from the previous year from 0.0014 to 0.001 mg/L.

4.3.5 Trends and Statistical Analysis

Mann-Kendall/Sen's slope analysis are presented in Appendix 6. Results are summarized in Table C below.

Table C Summarized Results from Mann-Kendall/Sen's Slope Analysis and Visual Inspections

Monitoring Station	Parameter	Mann-Kendall (Statistically Significant) Trend	Visual Trend Only
MW-01	Chloride	---	↑
MW-03	Chloride	---	↑
MW-04	Iron	↑	N/A
MW-04	Sulphate	---	↑
MW-05	Chloride	---	↑

Note: ↑ indicates an increasing trend, ↓ indicates a decreasing trend, - - - indicates no statistically significant trend. N/A = not applicable

4.4 Stable Isotopes

4.4.1 Background

Isotopes have become a common tool used in hydrological studies in the past half-century. For groundwater studies in particular, they are useful to quantify recharge and discharge processes, assess inter-aquifer flow processes, and determine possible sources and mechanisms of industrial pollution. The basic principle is that the stable isotopes of hydrogen and oxygen remain constant in infiltrated groundwater, as long as there are no phase changes or fractionation (changes in relative abundance of isotopes) along the flow path. In this way, these stable isotopes become conservative tracers in the groundwater system (Clark and Fritz 1997).

The main purpose of the analysis of hydrogen and oxygen stable isotopes, which was initiated in 2015, is to generate a baseline data set for the Beverly Channel monitoring network. Over time, once sufficient baseline data are accumulated, the stable isotopes will be used to help determine the origin(s) of groundwater at each of the monitoring locations in the Beverly Channel, the relative contribution of groundwater from bedrock, and whether sources associated with industrial activities could have contributed to changes in groundwater quality in the Beverly Channel.

The main processes that affect the oxygen and hydrogen isotopic composition of groundwater include evaporation and simple mixing at or below the surface (Sidle 1998). Relationships known as local meteoric water lines (LMWLs) have been defined to characterize isotope ratios for precipitation in certain geographical areas. Historical International Atomic Energy Agency (IAEA) data of isotope ratios have thus been used to define the Edmonton LMWL, which is mathematically expressed as follows (Lemay 2002):

$$\delta^2\mathrm{H} = 7.66\,\delta^{18}\mathrm{O} - 1.00$$

The local meteoric water line provides a reference for the relative abundance of the stable isotopes and, thus, the possible origin of the water. For example, waters in ponds that experience evaporation would be expected to have an enrichment of the stable isotopes (as they are heavier) and plot below and to the right of the LMWL. Moreover, evaporated water will plot below the LMWL along a local evaporation line (LEL) which intersects the LMWL at the point representative of the isotopic composition of the original, un-evaporated water. For lakes in central Alberta, the LEL from regression of data sets from 2008 and 2009 were as follows (Gibson et al. 2016):

$$2008\text{: } \delta^2\mathrm{H} = 5.42\,\delta^{18}\mathrm{O} - 46.16$$

$$2009\text{: } \delta^2\mathrm{H} = 5.22\,\delta^{18}\mathrm{O} - 47.63$$

4.4.2 Results

Laboratory analytical results for stable isotopes oxygen-18 (^{18}O) and deuterium (^{2}H) from sampling in 2018 are presented in Table 7. The isotope ratios of oxygen in water ($\delta^{18}O_{water}$) for the Beverly Channel monitoring wells ranged from -18.62 to -16.03 ‰ at MW-03 and MW-05, respectively. The isotope ratios of deuterium in water ($\delta^{2}H_{water}$) ranged from -148.5 to -132.6 ‰ also at MW-03 and MW-05, respectively.

The delta (δ) values are reported as per mill (‰) differences relative to Vienna Standard Mean Ocean Water (VSMOW), the IAEA standard defining the isotopic composition of fresh water. The δ values were reported by the laboratory according to the following relationship:

$$\delta_{sample} = \left(\frac{R_x}{R_{VSMOW}} - 1\right) * 1000$$

where R_x and R_{VSMOW} are the ratios of the heavier to the lighter isotope in the sample and standard, respectively (Kendall and McDonnell 1998).

Figure B shows a plot that includes the Edmonton LMWL, the IAEA data used to generate the Edmonton LMWL, the central Alberta lake LELs, and the isotope data from the Beverly Channel monitoring wells and the bedrock monitoring well. On Figure B, the 2015 through 2018 analytical data for the Beverly Channel monitoring wells, and the 2016 and 2018 analytical data for the bedrock monitoring well generally plot below and to the right of the Edmonton LMWL. Moreover, the data plot along the lake LELs.

These results would appear to suggest that groundwater in the Beverly Channel has a varying influence from different sources. On the light-end of the ^{18}O-^{2}H ranges, the groundwater appears to be mostly influenced from direct surface infiltration (e.g. MW-03). On the heavier-end of the ^{18}O-^{2}H ranges, there may be a higher relative contribution of bedrock groundwater or a higher relative contribution of evaporated surface water, or both.

Chloride concentrations may be used as the distinguishing parameter to determine which source may be of greater influence, as is shown in Figure C. For example, the isotope-chloride relationship may be indicating a higher relative contribution of bedrock groundwater at MW-04 and a higher relative contribution of surface water at MW-05.

Figure B Comparison of Stable Isotope Results with the Edmonton LMWL

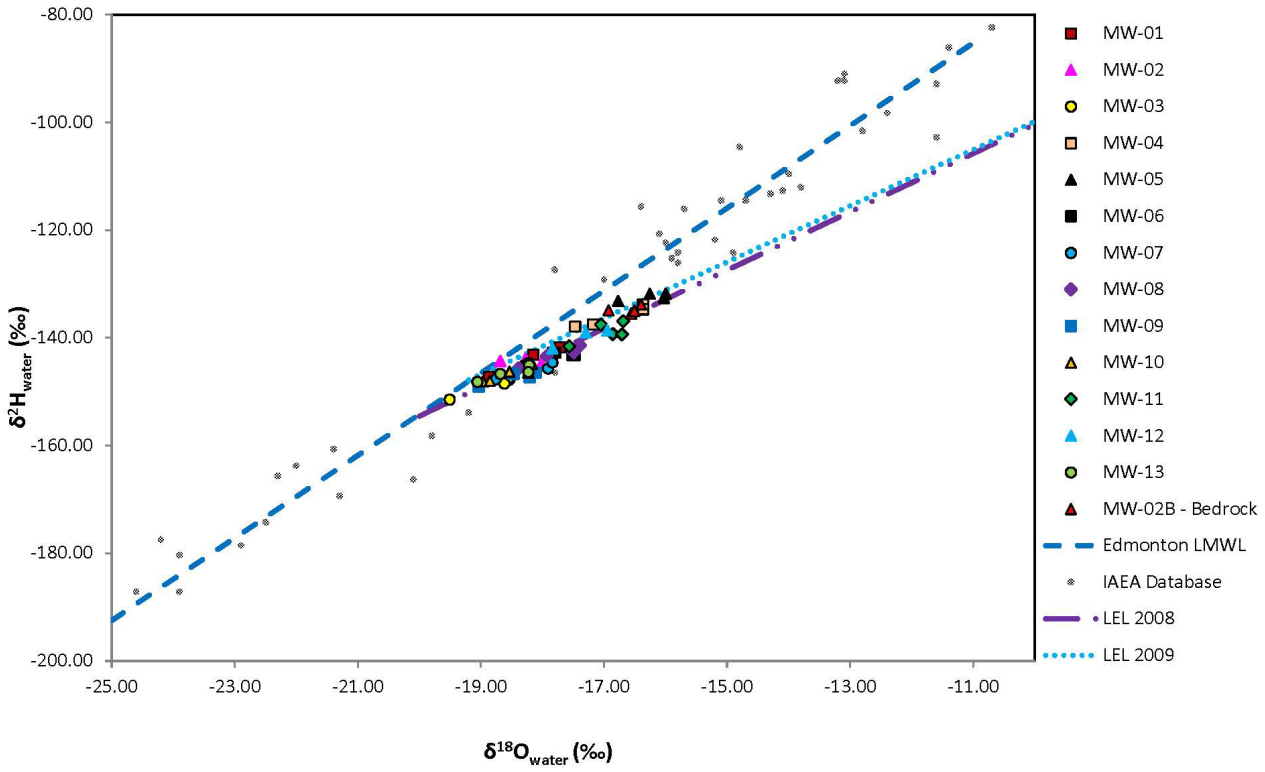
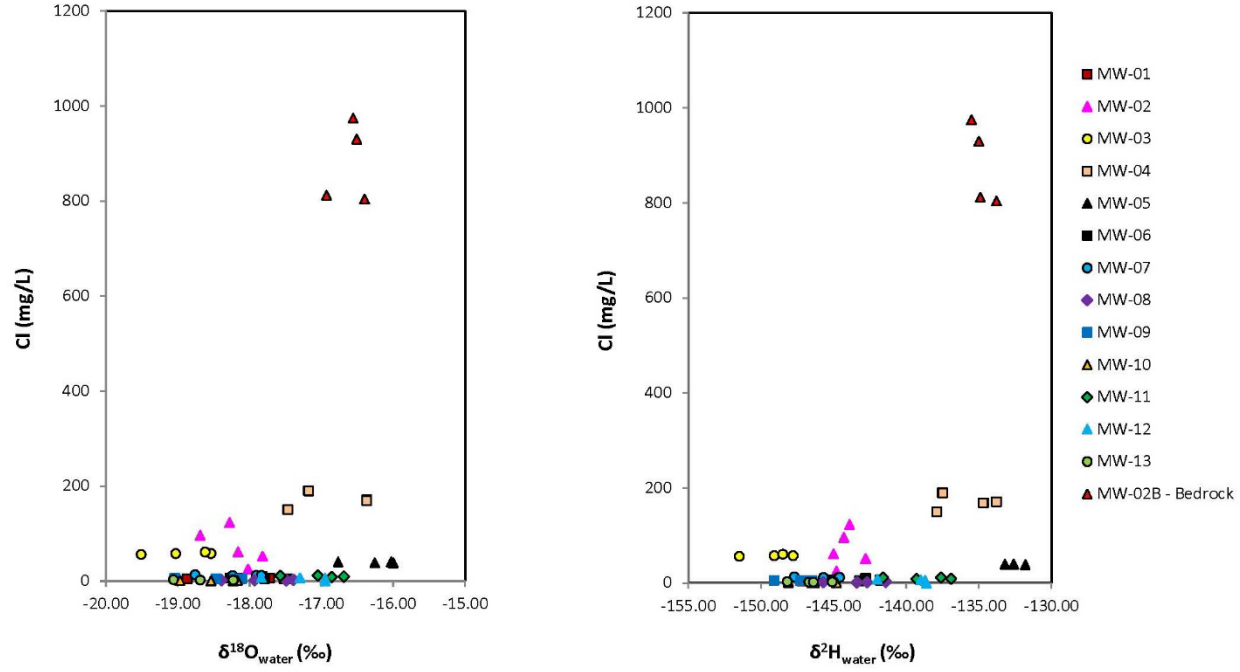


Figure C Comparison of Stable Isotope Results with Chloride Concentrations



4.5 QA/QC Results and Summary

After reviewing U.S. Environmental Protection Agency (EPA) data validation guidelines for field duplicate criteria, Zeiner (1994) indicated that the relative precent difference (RPD) between sample and duplicate results should be less than 20 percent for aqueous samples. When the sample, or sample duplicate values are less than five times the RDL, the absolute value of the difference of the results should be less than or equal to the RDL for aqueous samples (Zeiner 1994). A comparison of duplicate sample collected from MW-11 indicated that all results met the above criteria with the exception of dissolved aluminum (26.2%).

American Public Health Association (APHA) et al. (2005) indicate an ion balance of ± 10% is typically acceptable. Values outside the commonly acceptable limits may arise for a number of reasons (e.g. analytical interference, unknown constituents, or reporting errors). Ion balance results were within this criterion (Table 3).

Phenols detections above the RDL in the 2018 groundwater quality results are not considered to be reliable and do not indicate a negative impact to the overall groundwater quality in the Beverly Channel. The 4-aminoantipyrine (4-AAP) colourimetric method employed for phenols analysis has previously been shown to be inaccurate, resulting in false positive results which are not reliable or repeatable in inter-laboratory duplicate analysis. Maxxam (Loescher 2016, pers. Comm.) has indicated that the 4-AAP method has serious limitations, including:

- a number of phenolic compounds, including some with regulatory guidelines, are not recovered by the method;
- sulphur compounds can cause positive interference with the method, falsely raising the phenols concentration; and
- the method also measures a range of naturally occurring phenolics, which could also falsely raise the concentration.

Based on the poor reproducibility of phenols results with the 4-AAP method and the noted limitations of the method, the 4-AAP phenols results are not considered reliable and will not be discussed within this report.

5. Discussion of Key Groundwater Quality Indicators

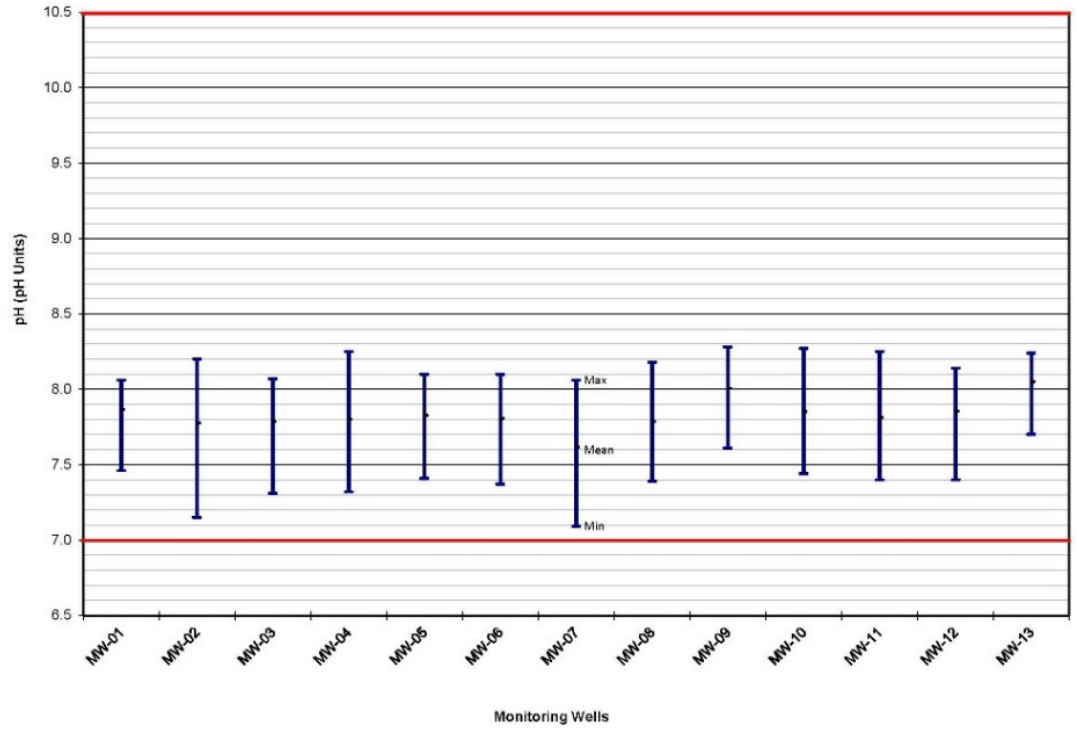
5.1 pH

Hem (1992) indicated that most groundwater has pH values ranging from approximately 6.0 to 8.5, while river water in areas not influenced by pollution reportedly have a pH range of 6.5 to 8.5.

The GCDWQ guideline suggests an acceptable pH range of 7.0 to 10.5 (Health Canada 2017), indicated by the red lines on Figure D. As there are no specific health effects noted on which to base the limits for the pH of drinking water, this guideline is an aesthetic objective (AO) rather than a maximum acceptable concentration (MAC). At a pH below 6.5, corrosion effects may become significant in the drinking water supply and distribution system, and at a pH above 8.5, encrustations and scaling may become an issue (Health Canada 1979a).

In the Beverly Channel, since the groundwater monitoring began in 2005, laboratory-measured groundwater pH values ranged from 7.09 to 8.28 (Figure D) and were within the range of natural waters as defined by Hem (1992) and within AO guideline range established by Health Canada (2017). Field-measured pH, which is generally more indicative of in-situ conditions, has historically ranged from 6.87 to 7.77 in the Beverly Channel monitoring wells.

Figure D High, Low, and Average Values of pH in Beverly Channel Monitoring Wells (done)

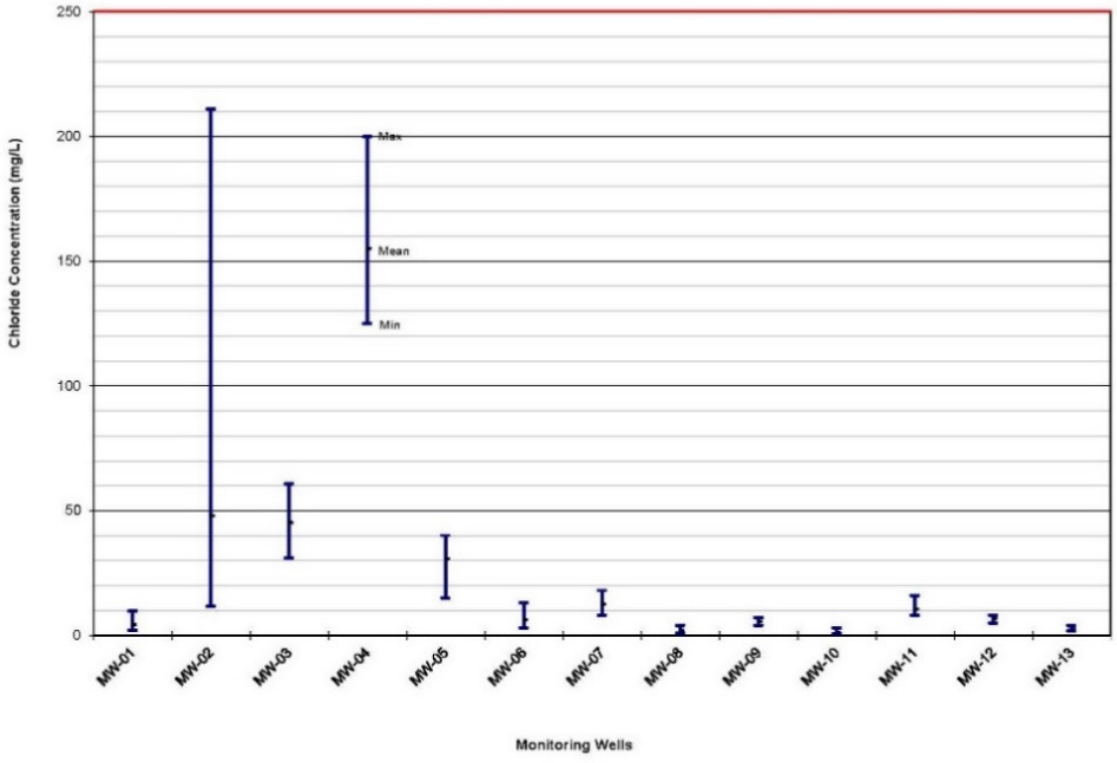


5.2 Chloride

Chloride is an inorganic, non-reactive ion that occurs widely in nature. When introduced into groundwater, chloride is highly mobile and difficult to remove due to its high solubility (Health Canada 1979b) and is generally utilized as an indicator of groundwater contamination. Typical anthropogenic uses of chloride include control of ice and snow, effluents from chemical industries, oil well operations, sewage, irrigation drainage, and refuse leachates. Chloride concentrations in Quaternary and bedrock groundwater are typically less than 50 mg/L in Sturgeon and Strathcona Counties (Hydrogeological Consultants Ltd. [HCL] 2001a and 2001b) but can be naturally elevated in regional discharge areas.

Health Canada (2017) suggests an AO guideline of less than or equal to 250 mg/L for chloride (indicated by the red line on Figure E) to minimize undesirable taste. At higher concentrations, chloride may also cause corrosion in distribution systems (Health Canada 1979b).

Figure E **High, Low, and Average Values of Chloride Concentrations in Beverly Channel Monitoring Wells**



Chloride concentrations in the Beverly Channel Aquifer are typically less than 60 mg/L and in several monitoring wells less than 10 mg/L. Elevated chloride concentrations between 125 and 200 mg/L have been observed at MW-04 and are considered natural, reflecting mixing of water quality with underlying bedrock (WorleyParsons 2010). There were no statistically significant trends of increasing or decreasing chloride concentration detected in 2018. Visually, chloride concentrations are increasing at MW-01, MW-03, and MW-05.

Prior to 2014, chloride concentrations at MW-02 (Figure A6-2) were relatively stable below 40 mg/L. Between 2014 and 2016 there were fluctuations in the chloride concentration, increasing to a maximum of 211 mg/L in 2014. Chloride concentrations at this location have been decreasing since 2016 and have returned to the previous pre-2014 historical range.

It appears that the fluctuations at MW-02 may be indicating mixing of Beverly Channel and bedrock groundwater (804 to 975 mg/L at MW-02B). The inferred upward component of groundwater flow between the bedrock and overlying Beverly Channel Aquifer at MW-02 and MW-02B provides evidence that such mixing could be occurring.

5.3 Sulphate

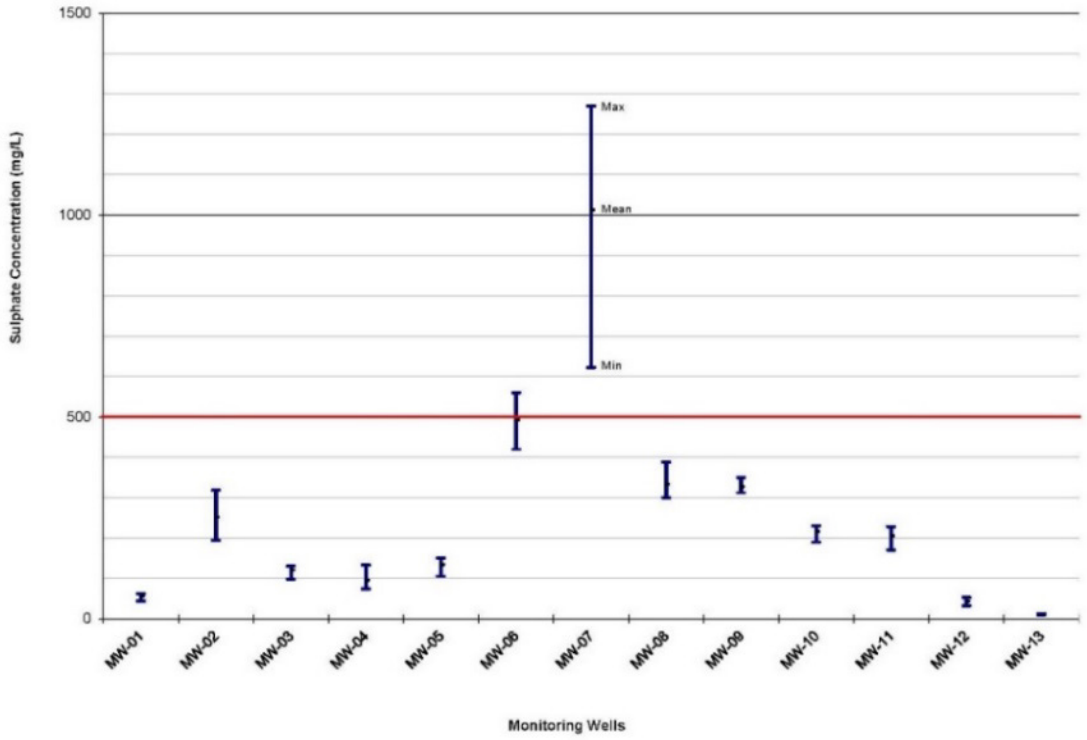
Sources of sulphur that can be found in the natural environment include certain igneous rock minerals, evaporite sediment (e.g., gypsum), and geothermal water (Hem 1992). Anthropogenic sources of sulphate are mainly introduced by the combustion of fuels and the smelting of ores (Hem 1992). Industrial uses of sulphur, usually in the form of sulphuric acid, include production of fertilizer, manufacturing of chemicals, dyes, glass, paper, soaps, textiles, fungicides, insecticides, astringents and emetics (review by Health Canada 1987).

The Health Canada (2017) AO guideline for sulphate is less than or equal to 500 mg/L (indicated by the red line on Figure F). This value is based on taste considerations, although there is the possibility of adverse physiological effects at higher concentrations.

In the NCIA Study area, background sulphate concentrations are generally less than 100 mg/L in the surficial sand deposits, range from 100 to over 1,000 mg/L in shallow bedrock, and range from less than 1,000 to over 4,000 mg/L in till and clay deposits (BA Energy Inc. 2004; Komex International Ltd. [Komex] 2006; Petro-Canada Oil Sands Inc. [PCOSI] 2006; Shell 2005, 2007; TOTAL E&P Canada Inc. [TOTAL] 2007). Monitoring well MW-07 has sulphate concentrations in the range of about 600 to 1,300 mg/L, which is similar to concentrations observed in the shallow bedrock.

There were no statistically significant trends in sulphate concentrations detected in 2018. The sulphate concentration is visually increasing at MW-04; however, the magnitude of the change is similar to historical variations in sulphate concentrations at other monitoring locations. Therefore, the observed sulphate concentrations are considered to reflect background conditions and natural variations in the Beverly Channel within the NCIA Study Area.

Figure F **High, Low, and Average Values of Sulphate Concentrations in Beverly Channel Monitoring Wells**



5.4 Dissolved Iron

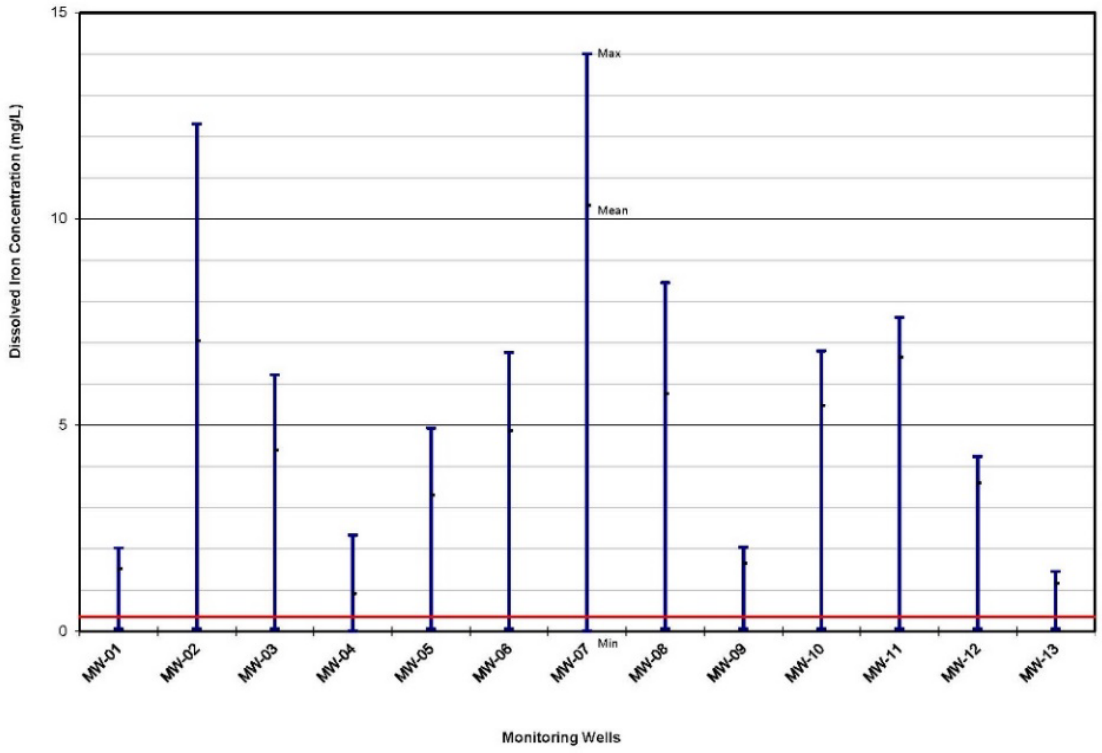
When iron is released into water, it is generally re-precipitated nearby as sedimentary species involving sulphide, carbonate, oxide or oxyhydroxide (Hem 1992). The availability of iron to aqueous solutions is strongly affected by environmental conditions, particularly the oxidation/reduction capacity and pH. Iron is also present in organic wastes, and in plant debris in soils (Hem 1992), which can then be released into groundwater via biodegradation processes. In aerated waters, the concentration of iron is seldom high (Health Canada 1978a).

The Health Canada (2017) AO guideline for iron in drinking water is less than or equal to 0.3 mg/L (indicated by the red line on Figure G). This objective is aimed to minimize objectionable taste and appearance, as well as inefficiency in distribution systems that can result from the precipitation of insoluble hydroxides and the development of slime produced by iron oxidizing bacteria.

Within the Beverly Channel, elevated dissolved iron concentrations are generally expected. Stein (1976) indicated that dissolved iron concentrations in excess of 15 mg/L were not uncommon. HCL (2001a) reported dissolved iron concentrations in excess of 7 mg/L for a Beverly Channel water supply well for the Village of Bruderheim. Dissolved iron concentrations in the Beverly Channel monitoring wells range from non-detectable values to about 14 mg/L (Figure G).

The statistically significant increasing dissolved iron concentration trend observed at MW-04 in 2018 was primarily due to the bi-modal distribution of iron concentrations observed at this location (i.e., initially lower concentrations less than or equal to 0.173 mg/L from 2005 to 2011, then higher concentrations ranging from 1.39 to 2.33 mg/L from 2012 to 2018). Dissolved iron concentrations at MW-04 remained within the lower end of the expected concentration range at the Beverly Channel monitoring wells (Figure G).

Figure G **High, Low, and Average Values of Iron Concentrations in Beverly Channel Monitoring Wells**



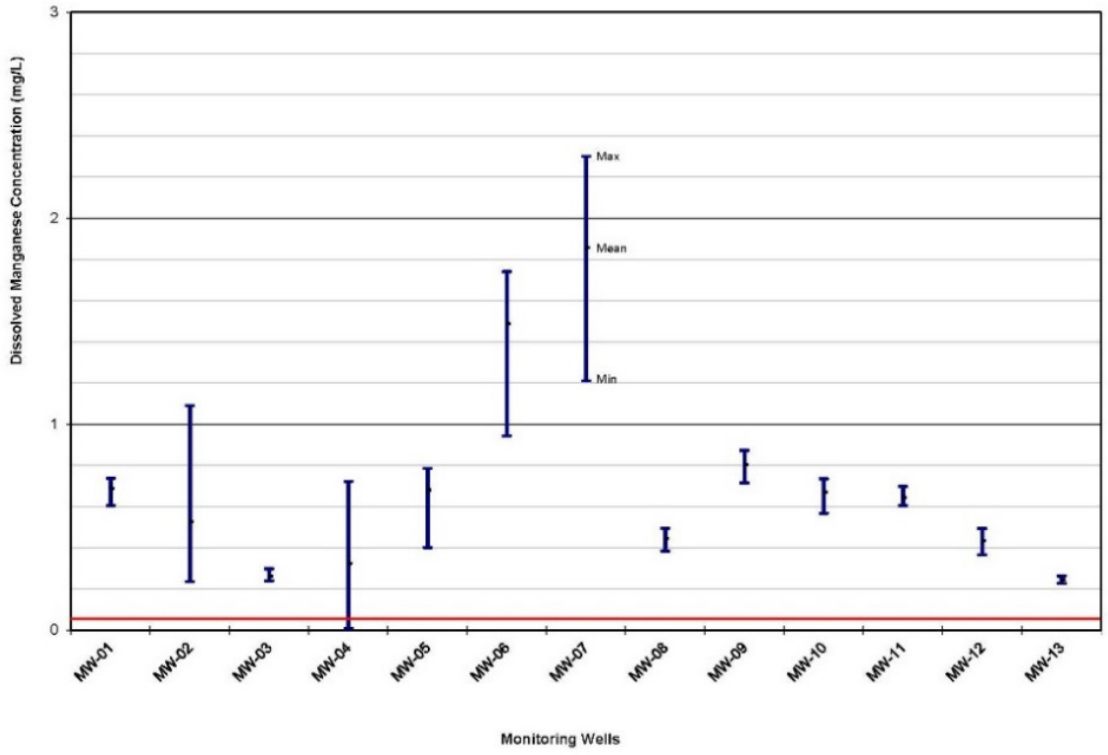
5.5 Dissolved Manganese

Manganese is most often present as a component of dioxide, carbonate or silicate minerals (Health Canada 1979c), and many igneous and metamorphic minerals contain manganese as a minor constituent (Hem 1992). Similar to iron, the presence of dissolved manganese in water is dependent on both redox and pH conditions, although it is somewhat more stable toward oxidation than ferrous iron (Hem 1992).

Health Canada (2017) suggests an AO guideline of less than or equal to 0.05 mg/L (indicated by the red line on Figure H) to minimize staining, undesirable tastes in beverages, and minimize the accumulation of microbial growths in distribution systems (black precipitates; Health Canada 1979c). Higher concentrations of manganese are expected to be more prevalent in groundwater than surface water due to the higher likelihood of reducing conditions in the subsurface (Health Canada 1979c).

The manganese concentrations in the Beverly Channel are within the combined range of surface water/groundwater manganese concentrations from data compiled by Hem (1992). Generally, manganese concentrations may be expected to be higher in the Beverly Channel than in shallower geological units as there is a higher likelihood of reducing conditions with depth. On average, the lowest concentrations of manganese were measured at monitoring wells MW-03, MW-04, and MW-13; the highest concentrations occurred at MW-06 and MW-07.

Figure H **High, Low, and Average Values of Manganese Concentrations in Beverly Channel Monitoring Wells**



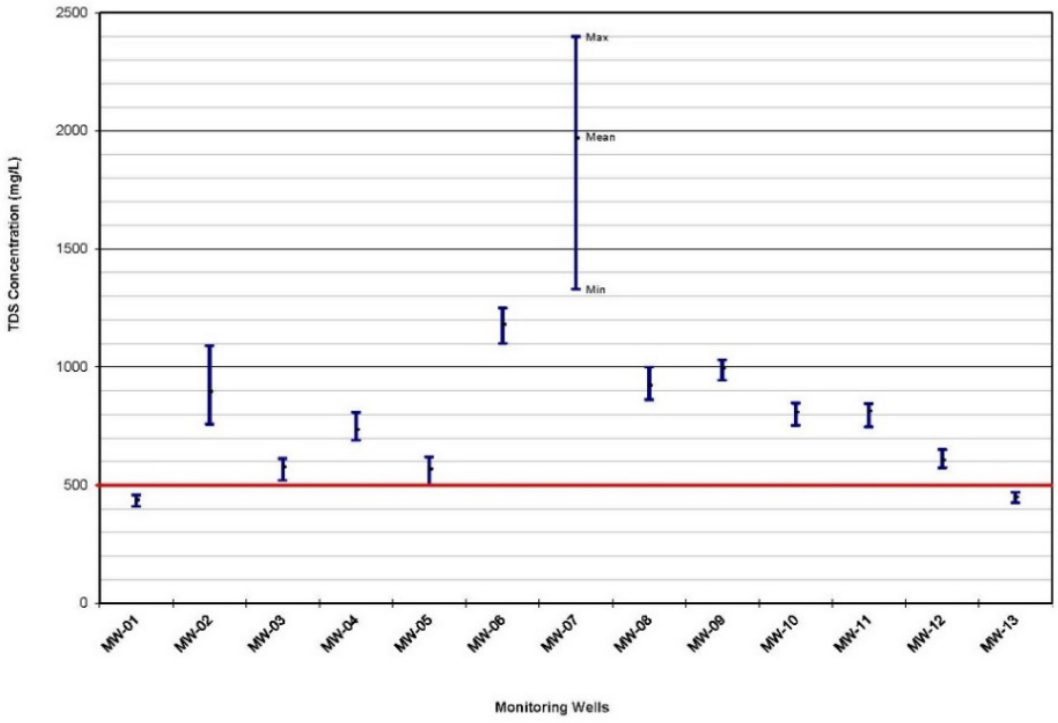
5.6 Total Dissolved Solids

TDS are dissolved constituents which comprise inorganic salts, primarily the major cations and anions used for groundwater characterization, nitrate (when introduced by agricultural use), and small amounts of organic matter (Health Canada 1978b). Sources of TDS include natural mineral sources, sewage, urban and agricultural runoff and industrial water (Health Canada 1978b). Concentrations of TDS resulting from mineral dissolution vary with the solubility of the minerals present.

Health Canada (2017) suggests an AO of less than or equal to 500 mg/L for TDS (indicated by the red line on Figure I) to minimize hardness, unpalatability, mineral deposition and corrosion (Health Canada 1978b). Recent data on health effects associated with the ingestion of TDS in drinking water is limited and the data that are available are unclear; however, some individual components of TDS (e.g. chloride, sodium, and nitrate) can affect human health (Health Canada 1978b; as updated 1991).

TDS concentrations within the Beverly Channel monitoring well network range from 410 to 2,400 mg/L, with only two monitoring wells with a TDS of less than 500 mg/L (MW-01 and MW-13). This is generally consistent with TDS values in excess of 1,000 mg/L reported by HCL (2001a and 2001b) for the Beverly Channel. The higher TDS concentration at MW-07 may be related to local groundwater discharge from bedrock. The TDS concentration in the bedrock at MW-02B was 1,900 mg/L in 2018, consistent with the generally reported range of 1,000 to 2,000 mg/L (Stein 1976) in the area. TDS concentrations in groundwater may exceed 3,000 mg/L in some areas (HCL 2001a and 2001b).

Figure I **High, Low, and Average Values of TDS Concentrations in Beverly Channel Monitoring Wells**



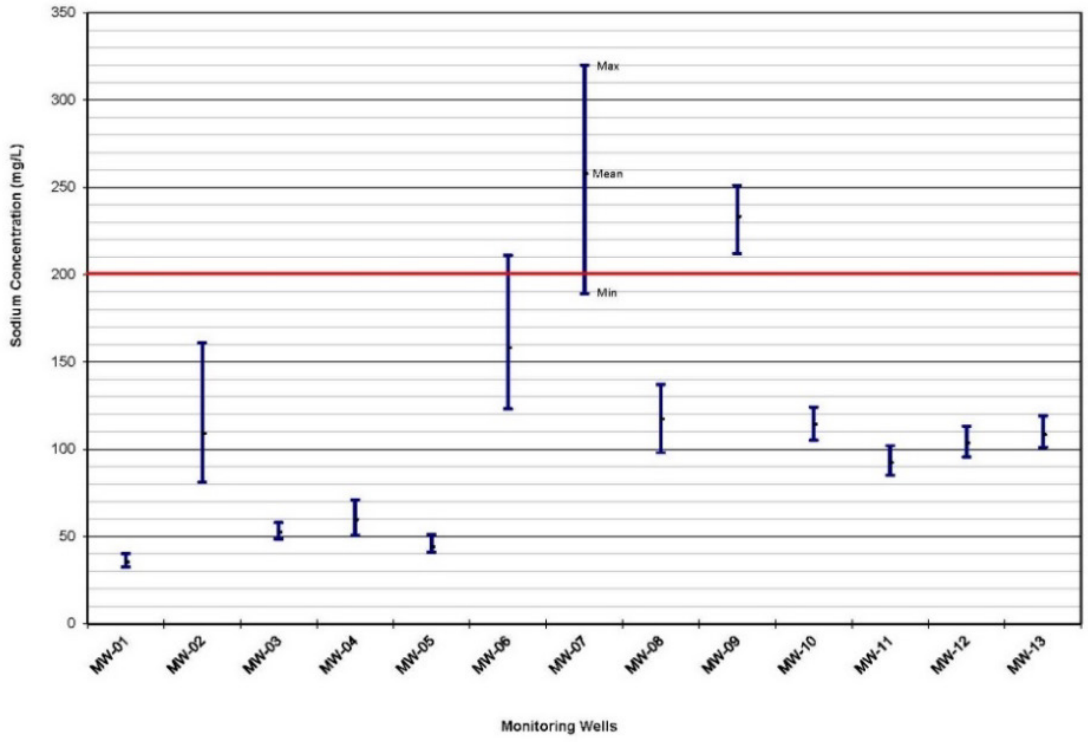
5.7 Sodium

Sodium may be present in feldspar minerals, which can release sodium into water through weathering. Sodium may be present as readily soluble salts, such as those left behind in the uplift of land surface or decline of sea level (Hem 1992). Anthropogenic sources of sodium include the use of salt for de-icing, brine disposal or leakage from oil wells, and water reuse for irrigation purposes (Hem 1992). Other potential anthropogenic sources include sewage and industrial effluents, and the use of sodium compounds for corrosion control and water-softening processes (Health Canada 1979d).

Health Canada (2017) suggests an AO of less than or equal to 200 mg/L for sodium (indicated by the red line in Figure J). The human body has effective mechanisms to control sodium levels therefore; sodium is not acutely toxic in the normal range of environmental or dietary concentrations (Health Canada 1979d). However, there is a relation in the human body between fluid volume and sodium retention, and changes in sodium intake may result in disturbances such as changes in hypertension, congestive cardiac failure, renal disease, cirrhosis, toxaemia of pregnancy, and Meniere's disease (Health Canada 1979d).

Sodium concentrations within the Beverly Channel have ranged from approximately 33 to 320 mg/L (Figure J). Monitoring wells MW-06, MW-07, and MW-09 have elevated sodium concentrations compared to other monitoring wells. The elevated concentrations could be due to the proximity of the monitoring well in relation to the bedrock, where sodium concentrations are generally higher.

Figure J **High, Low, and Average Values of Sodium Concentrations in Beverly Channel Monitoring Wells**



6. Summary and Recommendations

Annual groundwater quality monitoring of the Beverly Channel Aquifer was completed for the NCIA in July and August 2018. Results are summarized as follows.

- Lateral groundwater flow was generally to the northwest. The hydraulic gradient ranged from 0.001 to 0.003 m/m and the linear groundwater flow velocity ranged from 50 to 75m/year in 2018.
- Groundwater met the Health Canada (2017) AO guideline of 7 to 10.5 for pH at all monitoring wells as measured by laboratory analysis. Reported field- and laboratory-measured pH values for 2018 were generally within historical ranges.
- Chloride concentrations were generally below 50 mg/L and within historical ranges. Elevated chloride concentrations reported at MW-04 are considered natural and potentially illustrate the influence of well screen proximity to bedrock (WorleyParsons 2010). This interpretation is supported by isotopic values at this location. No statistically increasing trends of chloride were detected in 2018. Visually, chloride concentrations were increasing at MW-01, MW-03, and MW-05 in 2018.
- A visually increasing trend in sulphate was observed at MW-04 in 2018; however, the magnitude of the change is similar to historical sulphate variations observed at other monitoring locations and is considered to reflect natural variations in the Beverly Channel in the NCIA study area .
- A statistically significant increasing trend in dissolved iron was again detected at MW-04 in 2018. However; this trend was primarily due to the bi-modal distribution of iron concentrations observed at this location and concentrations remained within the lower end of the expected concentration range at the Beverly Channel monitoring wells.
- Dissolved iron, manganese, TDS, and sodium appear to be naturally elevated in the Beverly Channel within the NCIA Study Area. While elevated, their concentrations remain well within naturally occurring ranges for groundwater within Sturgeon and Strathcona County (Stein 1976; HCL 2001a, 2001b).
- The elevated sulphate concentration at MW-07 was considered to be naturally occurring. Other parameters, including dissolved iron, manganese, TDS, and sodium, are also generally higher at MW-07 than at other wells in the monitoring network. These elevated concentrations at MW-07 are likely natural and could be caused by interactions with bedrock material.
- No PHCs were detected during the 2018 sampling events.
- No styrene was detected in the NCIA monitoring wells in 2018. Dissolved phenols were detected at all Beverly Channel monitoring wells except MW-03 in 2018. Phenol detections were within five times the RDL and were therefore not considered to be reliable detections. Dissolved phenols were again detected at MW-02B (completed in bedrock). The concentration decreased from the previous year from 0.0014 to 0.0010 mg/L.
- Analysis of oxygen (^{18}O) and deuterium (^{2}H) stable isotope results suggest that groundwater in the Beverly Channel has a varying influence from different sources. On the light-end of the ^{18}O-^{2}H ranges, the groundwater appears to be mostly influenced from direct surface infiltration (e.g. MW-03). On the

heavier-end of the ^{18}O-^{2}H ranges, there may be a higher relative contribution of bedrock groundwater or a higher relative contribution of evaporated surface water, or both.

- The vertical hydraulic gradient between the bedrock and Beverly Channel Aquifer was calculated at the nested pair (MW-02 and MW-02B). Results from the 2018 sampling event indicated a potential for upward flow from the bedrock toward the overlying Beverly Channel Aquifer under a vertical gradient of 0.34 m/m. Fluctuating and increasing (i.e., chloride) concentrations at MW-02 are indicative of mixed bedrock and Beverly Channel groundwater quality.

Recommendations are as follows:

- Based on the understanding that NCIA has approval from Alberta Environment and Parks to reduce the monitoring frequency to bi-annually, bi-annual groundwater monitoring should next be completed in 2020. The analytical schedule should be the same as completed in 2018 (Table B).

7. Closure

We trust that this report satisfies your current requirements and provides suitable documentation for your records. If you have any questions or require further details, please contact the undersigned at any time.

Report Prepared by:

Daniel Skoreyko, M.Sc., Geol.I.T.
Hydrogeologist

Senior Review by:

PROFESSIONAL GEOSCIENTIST TREVOR R. BUTTERFIELD ALBERTA
Jan-09-2019

PERMIT TO PRACTICE:
WORLEYPARSONS CANADA SERVICES LTD.
Signature
Date 09 JAN 2019
PERMIT NUMBER: P 0725
The Association of Professional Engineers and Geoscientists of Alberta

Trevor Butterfield, M.Sc., P.Geo.
Principal Hydrogeologist

Advisian, Americas

8. References

Advisian, 2016. 2016 Groundwater Quality Monitoring – Beverly Channel Monitoring Wells. Project No. 307076-01608-200. December 2016.

Advisian, 2018. 2017 Groundwater Quality Monitoring – Beverly Channel Monitoring Wells. Project No. 307076-01608-300. February 2018.

APHA (American Public Health Association), AWWA (American Water Works Association), and WEF (Water Environment Federation), 2005. Standard Methods for the Examination of Water and Wastewater, 21st ed. American Public Health Association, Washington, D.C.

BA Energy Inc., 2004. BA Energy Heartland Upgrader, Project Application and Environmental Impact Assessment. May 2004.

Clark, I.D., and Fritz, P., 1997. Environmental Isotopes in Hydrogeology. Lewis Publishers, New York.

Gibson, J.J., Birks, S.J., Yi, Y., 2016. Stable Isotope Mass Balance of Lakes: A Contemporary Perspective. Quaternary Science Reviews 131 316-328.

Gilbert, R.O., 1987. Statistical Methods for Environmental Pollution Monitoring. John Wiley & Sons Inc. Canada.

Health Canada, 1978a. Iron. Guidelines for Canadian Drinking Water Quality: Supporting Documentation. December 1978, updated November 1987.

Health Canada, 1978b. Total Dissolved Solids (TDS). Guidelines for Canadian Drinking Water Quality: Supporting Documentation. September 1978, updated January 1991.

Health Canada, 1979a. pH. Guidelines for Canadian Drinking Water Quality: Supporting Documentation. May 1979, reprinted 1995.

Health Canada, 1979b. Chloride. Technical document – Chemical/Physical Parameters. April 1979, updated November 1987.

Health Canada, 1979c. Manganese. Guidelines for Canadian Drinking Water Quality: Supporting Documentation. May 1979, updated November 1987.

Health Canada, 1979d. Sodium. Guidelines for Canadian Drinking Water Quality: Supporting Documentation. May 1979, updated December 1992.

Health Canada, 1987. Sulphate. Guidelines for Canadian Drinking Water Quality: Supporting Documentation. November 1987, updated September 1994.

Health Canada, 2017. Guidelines for Canadian Drinking Water Quality. Prepared by the Federal-Provincial-Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Health and the Environment. February 2017.

Helsel, D.R., and Hirsch, R.M., 1992. Statistical Methods in Water Resources. Elsevier Science Publishing Company Inc. New York, New York.

Hem, J.D., 1992. Study and Interpretation of the Chemical Characteristics of Natural Water, 3rd Edition. United States Geological Survey Water Supply Paper 2254.

HCL (Hydrogeological Consultants Ltd.), 2001a. Strathcona County, Regional Groundwater Assessment. April 2001.

HCL (Hydrogeological Consultants Ltd.), 2001b. Sturgeon County, Regional Groundwater Assessment. September 2001.

Kendall, C. and McDonnell, J.J. (eds.), 1998. Isotope Tracers in Catchment Hydrology. Elsevier Science B.V., Amsterdam. pp. 51-86.

Komex (Komex International Ltd.), 2006. Hydrogeological Assessment, Proposed Upgrader. Report prepared for North West Upgrading Inc. January 2006.

Lemay, T.G., 2002. Geochemical and isotope data for formation water from selected wells, Cretaceous to Quaternary succession, Athabasca Oil Sands (in situ) Area, Alberta; Alberta Energy and Utilities Board, EUB/AGS Geo-Note 2002-02.

Loescher 2016, Personal Communication

PCOSI (Petro-Canada Oil Sands Inc.), 2006. Application for Approval of the Sturgeon Upgrader. Submitted to Alberta Energy and Utilities Board and Alberta Environment. December 2006. Section 11: Groundwater.

Prior, G.J., Hathway, B., Glombick, P.M., Pană, D.I., Banks, C.J., Hay, D.C., Schneider, C.L., Grobe, M., Elgr, R. and Weiss, J.A., 2013: Bedrock geology of Alberta; Alberta Energy Regulator, AER/AGS Map 600, scale 1:1 000 000.

Shell (Shell Canada Limited), 2005. Application for Approval of the Scotford Upgrader Expansion Project. Submitted to Alberta Energy and Utilities Board and Alberta Environment. April 2005. Section 11: Groundwater.

Shell (Shell Canada Limited), 2007. Application for Approval of the Shell Scotford Upgrader 2 Project. Submitted to Alberta Energy and Utilities Board and Alberta Environment. July 2007. Section 11: Groundwater.

Sidle, W., 1998. Environmental isotopes for resolution of hydrology problems. Environmental Monitoring and Assessment, 52, 389—410.

Stantec (Stantec Consulting Ltd.), 2006a. Regional Groundwater Quality Study of the Beverly Channel in the Fort Saskatchewan Area – Phase II. Prepared for Northeast Capital Industrial Association (NCIA). October 2006. File 1102-17094. Website accessed March 15, 2010: http://www.ncia.ab.ca/documents/NCIA%20Phase%20II%20Report%20_Final_.pdf.

Stantec (Stantec Consulting Ltd.), 2006b. Spring, 2006 Groundwater Monitoring Field Program. Prepared for Northeast Capital Industrial Association (NCIA). November 16, 2006. File 110217444. Website: http://www.ncia.ab.ca/documents/Spring2006GroundwaterUpdateRAWDATA.pdf. Accessed March 15, 2010.

Stantec (Stantec Consulting Ltd.), 2007. Spring, 2007 Groundwater Monitoring Field Program. Prepared for Northeast Capital Industrial Association (NCIA). December 11, 2007. File 110217663. Website: http://www.ncia.ab.ca/documents/Spring2007GroundwaterUpdateRAWDATA.pdf. Accessed March 15, 2010.

Stantec (Stantec Consulting Ltd.), 2008. Fall, 2007 Groundwater Monitoring Field Program. Prepared for Northeast Capital Industrial Association (NCIA). May 9, 2008. File 110217729. Website: http://www.ncia.ab.ca/documents/PartBFall2007GroundwaterUpdateReportRAWDATA.pdf. Accessed March 15, 2010.

Stantec (Stantec Consulting Ltd.), 2009. Spring, 2009 Groundwater Monitoring Field Program. Prepared for Northeast Capital Industrial Association (NCIA). June 1, 2009. File 1102-17990. Website: http://www.ncia.ab.ca/documents/Spring2009GroundwaterUpdateRAWDATA.pdf. Accessed March 15, 2010.

Stein, R., 1976. Hydrogeology of the Edmonton Area (Northeast Segment), Alberta. Alberta Research Council Report 76-1. 21 p.

TOTAL (TOTAL E&P Canada Inc.), 2007. Integrated Application for Approval of the TOTAL Upgrader. Submitted to Alberta Energy and Utilities Board and Alberta Environment. December 2007. Section 7: Groundwater.

WorleyParsons (WorleyParsons Canada Services Ltd.), 2010. 2010 Groundwater Quality Monitoring – Beverly Channel Monitoring Wells. Project No. E00100101. August 2010.

WorleyParsons (WorleyParsons Canada Services Ltd.), 2011. 2011 Groundwater Quality Monitoring – Beverly Channel Monitoring Wells. Project No. E00100102. September 2011.

WorleyParsons (WorleyParsons Canada Services Ltd.), 2012. 2012 Groundwater Quality Monitoring – Beverly Channel Monitoring Wells. Project No. 307075-01129. October 2012.

WorleyParsons (WorleyParsons Canada Services Ltd.), 2013. 2013 Groundwater Quality Monitoring – Beverly Channel Monitoring Wells. Project No. 307076-06086. September 2013.

WorleyParsons (WorleyParsons Canada Services Ltd.), 2014. 2014 Groundwater Quality Monitoring – Beverly Channel Monitoring Wells. Project No. 307076-06086. September 2014.

WorleyParsons (WorleyParsons Canada Services Ltd.), 2015. 2015 Groundwater Quality Monitoring – Beverly Channel Monitoring Wells. Project No. 307076-01608-100. December 2015.

Zeiner, S.T., 1994. Realistic Criteria for the Evaluation of Field Duplicate Field Results. Proceedings of Superfund XV, November 29-December 1, 1994. Sheraton Washington Hotel, Washington, D.C.

Tables

Advisian
WorleyParsons Group

Table 1

Monitoring Well Installation Details: Datum/Groundwater Surface Elevations and Hydraulic Conductivities

PROJECT No.: 307075-01608

Monitoring Station	Status	Easting (m)	Northing (m)	Longitude (Dec °)	Latitude (Dec °)	Ground Elevation (masl)	Datum Elevation (masl)	Surveyed Stickup (m)	Total Depth of Piezometer (mbgs)	Bottom of Piezometer Elevation (masl)	Depth Interval of Screen (mbgs)	Elevation Interval of Screen (masl)	Depth Interval of Sand (mbgs)	Elevation Interval of Sand (masl)	Date (dd-mmm-yyyy)	Depth to Groundwater (mbtoc)	Depth to Groundwater (mbgs)	Groundwater Surface Elevation (masl)	Depth to Bottom of Well (mbtoc)	Hydraulic Conductivity (m/s)	Lithology	Completion Interval	Comments
Groundwater Monitoring																							
MW-01	**Active**	N/M	N/M	350335.040000	5951040.450000	617.52	618.04	0.52	19.80	597.72	15.50 - 19.80	602.02 - 597.72	14.30 - 19.80	603.22 - 597.72	07-Mar-2005	15.55	15.03	602.49	N/M	6.8e-005	Sand and Gravel		
															04-May-2005	15.48	14.96	602.56	N/M				
															06-Jun-2005	15.42	14.90	602.62	N/M				
															17-Nov-2005	15.64	15.12	602.40	N/M				
															15-Jun-2006	15.23	14.71	602.81	N/M				
															12-Jul-2007	15.23	14.71	602.81	N/M				
															19-Dec-2007	15.38	14.86	602.66	N/M				
															21-Apr-2009	15.29	14.77	602.75	N/M				
															05-May-2010	15.70	15.18	602.34	N/M				
															25-May-2011	15.40	14.88	602.64	N/M				
															29-May-2012	15.15	14.63	602.89	20.14				
															10-Jul-2013	14.41	13.89	603.63	19.56				
															16-Jun-2014	14.76	14.24	603.28	19.30				
															29-Jun-2015	15.12	14.60	602.92	19.27				
															19-Sep-2016	14.96	14.44	603.08	20.14				
															13-Jul-2017	14.77	14.25	603.27	20.43				
															01-Aug-2018	14.66	14.14	603.38	20.33				
MW-02	**Active**	N/M	N/M	352457.800000	5950583.370000	630.71	631.31	0.60	33.80	596.91	27.60 - 33.80	603.11 - 596.91	26.20 - 33.80	604.51 - 596.91	07-Mar-2005	27.14	26.54	604.17	N/M	0.00018	Sand and Gravel		
															04-May-2005	27.22	26.62	604.09	N/M				
															06-Jun-2005	27.17	26.57	604.14	N/M				
															17-Nov-2005	27.23	26.63	604.08	N/M				
															15-Jun-2006	27.05	26.45	604.26	N/M				
															13-Jul-2007	27.18	26.58	604.13	N/M				
															19-Dec-2007	26.99	26.39	604.32	N/M				
															21-Apr-2009	27.13	26.53	604.18	N/M				
															05-May-2010	27.20	26.60	604.11	N/M				
															25-May-2011	27.26	26.66	604.05	N/M				
															29-May-2012	27.16	26.56	604.15	27.16				
															10-Jul-2013	27.05	26.45	604.26	34.30				
															16-Jun-2014	27.03	26.43	604.28	34.17				
															28-Aug-2014	27.09	26.49	604.22	34.18				
															25-Jun-2015	27.08	26.48	604.23	34.17				
															19-Sep-2016	26.99	26.39	604.32	34.21				
															13-Jul-2017	26.96	26.36	604.35	34.50				
															25-Sep-2017	26.94	26.34	604.37	N/M				
															02-Aug-2018	26.86	26.26	604.45	34.22				
MW-03	**Active**	N/M	N/M	353030.210000	5952940.900000	623.79	624.43	0.64	29.60	594.19	25.00 - 29.60	598.79 - 594.19	23.50 - 29.60	600.29 - 594.19	08-Mar-2005	22.50	21.86	601.93	N/M	0.00022	Sand and Gravel		
															04-May-2005	22.55	21.91	601.88	N/M				
															06-Jun-2005	22.53	21.89	601.90	N/M				
															17-Nov-2005	23.47	22.83	600.96	N/M				
															15-Jun-2006	22.50	21.86	601.93	N/M				
															12-Jul-2007	22.45	21.81	601.98	N/M				
															19-Dec-2007	23.36	22.72	601.07	N/M				
															21-Apr-2009	22.54	21.90	601.89	N/M				
															06-May-2010	22.82	22.18	601.61	N/M				
															25-May-2011	22.32	21.68	602.11	N/M				
															29-May-2012	22.57	21.93	601.86	30.12				
															10-Jul-2013	22.24	21.60	602.19	30.21				
															16-Jun-2014	22.34	21.70	602.09	30.08				
															29-Jun-2015	22.57	21.93	601.86	30.08				
															19-Sep-2016	22.45	21.81	601.98	30.12				

Table 1

Monitoring Well Installation Details: Datum/Groundwater Surface Elevations and Hydraulic Conductivities

PROJECT No.: 307075-01608

Monitoring Station	Status	Easting (m)	Northing (m)	Longitude (Dec °)	Latitude (Dec °)	Ground Elevation (masl)	Datum Elevation (masl)	Surveyed Stickup (m)	Total Depth of Piezometer (mbgs)	Bottom of Piezometer Elevation (masl)	Depth Interval of Screen (mbgs)	Elevation Interval of Screen (masl)	Depth Interval of Sand (mbgs)	Elevation Interval of Sand (masl)	Date (dd-mmm-yyyy)	Depth to Groundwater (mbtoc)	Depth to Groundwater (mbgs)	Groundwater Surface Elevation (masl)	Depth to Bottom of Well (mbtoc)	Hydraulic Conductivity (m/s)	Lithology	Completion Interval	Comments
MW-03 (Cont.)															13-Jul-2017	22.40	21.76	602.03	30.11				
															31-Jul-2018	22.44	21.80	601.99	30.09				
MW-04	**Active**	N/M	N/M	354823.410000	5953959.760000	620.25	620.79	0.54	26.20	594.05	21.60 - 26.20	598.65 - 594.05	19.50 - 26.20	600.75 - 594.05	08-Mar-2005	18.59	18.05	602.20	N/M	0.00018	Sand and Gravel		
															04-May-2005	18.61	18.07	602.18	N/M				
															06-Jun-2005	18.62	18.08	602.17	N/M				
															17-Nov-2005	18.57	18.03	602.22	N/M				
															14-Jun-2006	18.59	18.05	602.20	N/M				
															13-Jul-2007	18.55	18.01	602.24	N/M				
															19-Dec-2007	18.52	17.98	602.27	N/M				
															21-Apr-2009	18.66	18.12	602.13	N/M				
															06-May-2010	18.87	18.33	601.92	N/M				
															07-Jun-2011	18.70	18.16	602.09	N/M				
															30-May-2012	18.78	18.24	602.01	26.93				
															09-Jul-2013	18.54	18.00	602.25	27.80				
															13-Jun-2014	18.48	17.94	602.31	26.75				
															29-Jun-2015	18.48	17.94	602.31	26.72				
															19-Sep-2016	18.44	17.90	602.35	26.90				
															13-Jul-2017	18.41	17.87	602.38	27.48				
															31-Jul-2018	18.49	17.95	602.30	26.69				
MW-05	**Active**	N/M	N/M	354293.740000	5954889.460000	624.28	624.89	0.61	31.40	592.88	26.80 - 31.40	597.48 - 592.88	28.40 - 31.40	595.88 - 592.88	08-Mar-2005	25.32	24.71	599.57	N/M		Gravel		
															04-May-2005	25.71	25.10	599.18	N/M				
															06-Jun-2005	25.62	25.01	599.27	N/M				
															17-Nov-2005	26.77	26.16	598.12	N/M				
															14-Jun-2006	25.70	25.09	599.19	N/M				
															13-Jul-2007	25.52	24.91	599.37	N/M				
															19-Dec-2007	25.34	24.73	599.55	N/M				
															21-Apr-2009	25.61	25.00	599.28	N/M				
															29-Apr-2010	25.92	25.31	598.97	N/M				
															25-May-2011	25.58	24.97	599.31	N/M				
															29-May-2012	25.71	25.10	599.18	30.83				
															08-Jul-2013	25.06	24.45	599.83	30.88				
															13-Jun-2014	25.26	24.65	599.63	30.66				
															25-Jun-2015	25.72	25.11	599.17	30.67				
															19-Sep-2016	25.62	25.01	599.27	30.86				
															13-Jul-2017	25.61	25.00	599.28	30.66				
															31-Jul-2018	25.54	24.93	599.35	30.30				
MW-06	**Active**	N/M	N/M	361559.340000	5958812.220000	629.61	630.28	0.67	39.00	590.61	34.40 - 39.00	595.21 - 590.61	32.90 - 39.00	596.71 - 590.61	08-Mar-2005	32.17	31.50	598.11	N/M	0.00015	Sand and Gravel		
															04-May-2005	32.16	31.49	598.12	N/M				
															06-Jun-2005	32.07	31.40	598.21	N/M				
															17-Nov-2005	32.17	31.50	598.11	N/M				
															16-Jun-2006	32.76	32.09	597.52	N/M				
															12-Jul-2007	32.13	31.46	598.15	N/M				
															19-Dec-2007	31.97	31.30	598.31	N/M				
															22-Apr-2009	31.99	31.32	598.29	N/M				
															05-May-2010	32.24	31.57	598.04	N/M				
															07-Jun-2011	32.10	31.43	598.18	N/M				
															29-May-2012	32.08	31.41	598.20	39.24				
															08-Jul-2013	32.06	31.39	598.22	39.70				
															12-Jun-2014	32.01	31.34	598.27	39.17				
															25-Jun-2015	31.98	31.31	598.30	39.20				
															20-Sep-2016	32.14	31.47	598.14	39.08				
															13-Jul-2017	32.08	31.41	598.20	39.06				
															31-Jul-2018	32.18	31.51	598.10	38.95				

Advisian
WorleyParsons Group

Table 1

Monitoring Well Installation Details: Datum/Groundwater Surface Elevations and Hydraulic Conductivities

PROJECT No.: 307075-01608

Monitoring Station	Status	Easting (m)	Northing (m)	Longitude (Dec °)	Latitude (Dec °)	Ground Elevation (masl)	Datum Elevation (masl)	Surveyed Stickup (m)	Total Depth of Piezometer (mbgs)	Bottom of Piezometer Elevation (masl)	Depth Interval of Screen (mbgs)	Elevation Interval of Screen (masl)	Depth Interval of Sand (mbgs)	Elevation Interval of Sand (masl)	Date (dd-mmm-yyyy)	Depth to Groundwater (mbtoc)	Depth to Groundwater (mbgs)	Groundwater Surface Elevation (masl)	Depth to Bottom of Well (mbtoc)	Hydraulic Conductivity (m/s)	Lithology	Completion Interval Comments
MW-07	**Active**	N/M	N/M	359089.700000	5959604.240000	630.41	631.01	0.60	43.90	586.51	37.80 - 43.90	592.61 - 586.51	36.30 - 43.90	594.11 - 586.51	09-Mar-2005	33.98	33.38	597.03	N/M		Sand and Gravel	
															04-May-2005	34.14	33.54	596.87	N/M			
															06-Jun-2005	33.85	33.25	597.16	N/M			
															17-Nov-2005	34.23	33.63	596.78	N/M			
															16-Jun-2006	34.60	34.00	596.41	N/M			
															12-Jul-2007	33.97	33.37	597.04	N/M			
															19-Dec-2007	33.78	33.18	597.23	N/M			
															22-Apr-2009	34.00	33.40	597.01	N/M			
															05-May-2010	34.32	33.72	596.69	N/M			
															08-Jun-2011	34.43	33.83	596.58	N/M			
															28-Jul-2011	33.80	33.20	597.21	N/M			
															30-May-2012	34.12	33.52	596.89	44.66			
															11-Jul-2013	33.59	32.99	597.42	42.00			
															13-Jun-2014	33.70	33.10	597.31	42.00			
															25-Jun-2015	33.94	33.34	597.07	42.00			
															20-Sep-2016	34.15	33.55	596.86	42.00			
															14-Jul-2017	34.41	33.81	596.60	41.86			
															31-Jul-2018	34.44	33.84	596.57	44.56			
MW-08	**Active**	N/M	N/M	363133.770000	5961204.950000	625.87	626.44	0.57	33.50	592.37	30.50 - 33.50	595.37 - 592.37	28.70 - 33.50	597.17 - 592.37	09-Mar-2005	27.74	27.17	598.70	N/M	0.00095	Gravel	
															04-May-2005	27.77	27.20	598.67	N/M			
															06-Jun-2005	27.68	27.11	598.76	N/M			
															15-Nov-2005	27.74	27.17	598.70	N/M			
															16-Jun-2006	27.58	27.01	598.86	N/M			
															11-Jul-2007	27.72	27.15	598.72	N/M			
															19-Dec-2007	27.57	27.00	598.87	N/M			
															22-Apr-2009	27.63	27.06	598.81	N/M			
															05-May-2010	27.83	27.26	598.61	N/M			
															07-Jun-2011	27.72	27.15	598.72	N/M			
															30-May-2012	27.69	27.12	598.75	34.07			
															09-Jul-2013	27.63	27.06	598.81	31.17			
															12-Jun-2014	27.55	26.98	598.89	34.00			
															24-Jun-2015	27.58	27.01	598.86	34.24			
															20-Sep-2016	27.63	27.06	598.81	34.02			
															02-Aug-2017	27.77	27.20	598.67	34.00			
															01-Aug-2018	27.56	26.99	598.88	33.94			
MW-09	**Active**	N/M	N/M	361003.460000	5962032.280000	624.06	624.73	0.67	36.60	587.46	32.00 - 36.60	592.06 - 587.46	30.50 - 36.60	593.56 - 587.46	09-Mar-2005	28.41	27.74	596.32	N/M	0.00041	Gravel, Sand and Gravel	
															04-May-2005	28.41	27.74	596.32	N/M			
															06-Jun-2005	28.33	27.66	596.40	N/M			
															17-Nov-2005	28.48	27.81	596.25	N/M			
															16-Jun-2006	28.27	27.60	596.46	N/M			
															11-Jul-2007	28.35	27.68	596.38	N/M			
															18-Dec-2007	28.34	27.67	596.39	N/M			
															22-Apr-2009	28.27	27.60	596.46	N/M			
															06-May-2010	28.61	27.94	596.12	N/M			
															02-Jun-2011	28.25	27.58	596.48	N/M			
															29-May-2012	28.37	27.70	596.36	37.06			
															10-Jul-2013	28.17	27.50	596.56	37.25			
															13-Jun-2014	28.64	27.97	596.09	36.70			
															25-Jun-2015	28.36	27.69	596.37	37.07			
															20-Sep-2016	28.43	27.76	596.30	36.77			
															14-Jul-2017	28.38	27.71	596.35	37.08			
															01-Aug-2018	28.28	27.61	596.45	37.03			

Advisian
WorleyParsons Group

Table 1

Monitoring Well Installation Details: Datum/Groundwater Surface Elevations and Hydraulic Conductivities

PROJECT No.: 307075-01608

Monitoring Station	Status	Easting (m)	Northing (m)	Longitude (Dec °)	Latitude (Dec °)	Ground Elevation (masl)	Datum Elevation (masl)	Surveyed Stickup (m)	Total Depth of Piezometer (mbgs)	Bottom of Piezometer Elevation (masl)	Depth Interval of Screen (mbgs)	Elevation Interval of Screen (masl)	Depth Interval of Sand (mbgs)	Elevation Interval of Sand (masl)	Date (dd-mmm-yyyy)	Depth to Groundwater (mbtoc)	Depth to Groundwater (mbgs)	Groundwater Surface Elevation (masl)	Depth to Bottom of Well (mbtoc)	Hydraulic Conductivity (m/s)	Lithology	Completion Interval Comments
MW-10	**Active**	N/M	N/M	364954.620000	5963505.110000	624.06	624.67	0.61	41.80	582.26	35.70 - 41.80	588.36 - 582.26	N/A	N/A	09-Mar-2005	26.89	26.28	597.78	N/M		Gravel, Sand and Gravel	
															04-May-2005	26.90	26.29	597.77	N/M			
															06-Jun-2005	26.82	26.21	597.85	N/M			
															16-Nov-2005	26.90	26.29	597.77	N/M			
															16-Jun-2006	26.72	26.11	597.95	N/M			
															11-Jul-2007	26.87	26.26	597.80	N/M			
															18-Dec-2007	26.74	26.13	597.93	N/M			
															22-Apr-2009	26.72	26.11	597.95	N/M			
															05-May-2010	26.93	26.32	597.74	N/M			
															02-Jun-2011	26.70	26.09	597.97	N/M			
															30-May-2012	26.80	26.19	597.87	41.78			
															09-Jul-2013	26.73	26.12	597.94	42.87			
															12-Jun-2014	26.63	26.02	598.04	41.79			
															24-Jun-2015	26.67	26.06	598.00	41.79			
															20-Sep-2016	26.72	26.11	597.95	41.86			
															14-Jul-2017	26.71	26.10	597.96	41.71			
															01-Aug-2018	26.58	25.97	598.09	41.72			
MW-11	**Active**	N/M	N/M	362564.360000	5965300.710000	624.49	625.16	0.67	44.20	580.29	38.10 - 44.20	586.39 - 580.29	35.10 - 47.20	589.39 - 577.29	10-Mar-2005	30.60	29.93	594.56	N/M	0.00015	Sand and Gravel	
															04-May-2005	30.42	29.75	594.74	N/M			
															06-Jun-2005	30.41	29.74	594.75	N/M			
															16-Nov-2005	30.41	29.74	594.75	N/M			
															16-Jun-2006	30.34	29.67	594.82	N/M			
															11-Jul-2007	30.38	29.71	594.78	N/M			
															18-Dec-2007	30.40	29.73	594.76	N/M			
															22-Apr-2009	30.35	29.68	594.81	N/M			
															05-May-2010	30.64	29.97	594.52	N/M			
															02-Jun-2011	30.46	29.79	594.70	N/M			
															30-May-2012	30.35	29.68	594.81	44.78			
															10-Jul-2013	30.26	29.59	594.90	44.88			
															12-Jun-2014	30.19	29.52	594.97	45.31			
															24-Jun-2015	30.19	29.52	594.97	45.34			
															20-Sep-2016	30.40	29.73	594.76	45.07			
															14-Jul-2017	30.30	29.63	594.86	44.23			
															01-Aug-2018	30.13	29.46	595.03	44.73			
MW-12	**Active**	N/M	N/M	366805.930000	5968379.850000	625.46	626.07	0.61	38.10	587.36	35.10 - 38.10	590.36 - 587.36	33.50 - 38.10	591.96 - 587.36	10-Mar-2005	32.95	32.34	593.12	N/M	0.00014	Sand, Sand and Gravel	
															04-May-2005	32.90	32.29	593.17	N/M			
															06-Jun-2005	32.87	32.26	593.20	N/M			
															16-Nov-2005	33.05	32.44	593.02	N/M			
															16-Jun-2006	33.62	33.01	592.45	N/M			
															11-Jul-2007	32.90	32.29	593.17	N/M			
															18-Dec-2007	32.77	32.16	593.30	N/M			
															22-Apr-2009	32.76	32.15	593.31	N/M			
															06-May-2010	33.01	32.40	593.06	N/M			
															02-Jun-2011	32.84	32.23	593.23	N/M			
															29-May-2012	32.89	32.28	593.18	38.72			
															10-Jul-2013	32.82	32.21	593.25	39.45			
															12-Jun-2014	32.84	32.23	593.23	38.70			
															24-Jun-2015	32.83	32.22	593.24	38.71			
															20-Sep-2016	32.92	32.31	593.15	38.70			
															14-Jul-2017	32.90	32.29	593.17	38.55			
															01-Aug-2018	32.77	32.16	593.30	38.50			

Advisian
WorleyParsons Group

Table 1

Monitoring Well Installation Details: Datum/Groundwater Surface Elevations and Hydraulic Conductivities

PROJECT No.: 307075-01608

Monitoring Station	Status	Easting (m)	Northing (m)	Longitude (Dec °)	Latitude (Dec °)	Ground Elevation (masl)	Datum Elevation (masl)	Surveyed Stickup (m)	Total Depth of Piezometer (mbgs)	Bottom of Piezometer Elevation (masl)	Depth Interval of Screen (mbgs)	Elevation Interval of Screen (masl)	Depth Interval of Sand (mbgs)	Elevation Interval of Sand (masl)	Date (dd-mmm-yyyy)	Depth to Groundwater (mbtoc)	Depth to Groundwater (mbgs)	Groundwater Surface Elevation (masl)	Depth to Bottom of Well (mbtoc)	Hydraulic Conductivity (m/s)	Lithology	Completion Interval	Comments
MW-13	**Active**	N/M	N/M	365292.720000	5968147.120000	625.65	626.28	0.63	40.50	585.15	37.50 - 40.50	588.15 - 585.15	36.00 - 40.50	589.65 - 585.15	10-Mar-2005	32.60	31.97	593.68	N/M		Gravel		
															04-May-2005	32.54	31.91	593.74	N/M				
															06-Jun-2005	32.50	31.87	593.78	N/M				
															16-Nov-2005	33.45	32.82	592.83	N/M				
															16-Jun-2006	33.24	32.61	593.04	N/M				
															11-Jul-2007	32.54	31.91	593.74	N/M				
															18-Dec-2007	32.39	31.76	593.89	N/M				
															22-Apr-2009	32.41	31.78	593.87	N/M				
															06-May-2010	32.68	32.05	593.60	N/M				
															02-Jun-2011	32.46	31.83	593.82	N/M				
															30-May-2012	32.56	31.93	593.72	41.07				
															10-Jul-2013	32.49	31.86	593.79	41.14				
															12-Jun-2014	32.49	31.86	593.79	41.00				
															24-Jun-2015	32.45	31.82	593.83	41.23				
															20-Sep-2016	32.53	31.90	593.75	40.98				
															14-Jul-2017	32.53	31.90	593.75	41.53				
															01-Aug-2018	32.40	31.77	593.88	40.80				
MW-02B	**Active**	N/M	N/M	50604.050000	5950323.210000	630.67	631.38	0.71	N/A	N/A	N/A	N/A	N/A	N/A	20-Sep-2016	28.50	27.79	602.88	40.35				
															13-Jul-2017	23.87	23.16	607.51	41.90				
															25-Sep-2017	24.16	23.45	607.22	N/M				
															02-Aug-2018	23.63	22.92	607.75	41.80				

NOTES:
1. Data may be entered to the nearest mm, but are reported above to the nearest cm.□
   Apparent rounding errors may occasionally occur in calculated fields (e.g. Groundwater Surface Elevation).
2. All coordinates are provided in the coordinate system.
3. N/M - Denotes not measured.
4. N/A - Denotes not available.
5. masl - Denotes metres above sea level.
6. mbgs - Denotes metres below ground surface.
7. mbtoc - Denotes metres below top of PVC casing.

Advisian
WorleyParsons Group

Table 2

Groundwater Analytical Results: Field Measurements

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Status	Electrical Conductivity (uS/cm)	pH (pH Units)	Temperature (ºC)	Sample Comment
Groundwater Monitoring						
MW-01	05-May-2010	Active	749	6.95	5.6	
	25-May-2011		741	7.11	7.6741	
	29-May-2012		749	6.88	7.6	
	10-Jul-2013		720	7.21	6.8	Clear
	16-Jun-2014		765	7.38	7.0	Clear
	29-Jun-2015		708	7.37	7.8	Colourless
	19-Sep-2016		716	7.17	8.6	Clear
	13-Jul-2017		824	7.21	7.9	Brown/Silty
	01-Aug-2018		805	7.04	6.4	Clear
MW-02	05-May-2010	Active	1306	7.04	4.8	
	25-May-2011		1397	7.02	8.3	
	29-May-2012		1023	7.49	7.3	
	29-Jul-2013		1161	7.10	10.9	Cloudy brown
	16-Jun-2014		1298	7.19	6.7	Clear, orange
	28-Aug-2014		1355	7.12	7.0	Clear
	25-Jun-2015		1238	7.05	7.6	Light brown
	19-Sep-2016		1217	6.96	8.7	Clear
	13-Jul-2017		1412	6.92	7.6	Clear
	29-Sep-2017		1403	7.26	12.4	
	02-Aug-2018		1406	6.87	6.2	Clear
MW-03	06-May-2010	Active	974	7.14	6.6	
	25-May-2011		976	7.08	8.9	Clear
	29-May-2012		958	7.72	8.3	
	10-Jul-2013		966	7.14	8.4	Cloudy brown
	16-Jun-2014		1003	7.35	8.2	Clear
	29-Jun-2015		947	7.25	8.5	Colourless (clear)
	19-Sep-2016		935	7.04	9.7	Clear
	13-Jul-2017		1071	7.16	8.6	Cloudy
	31-Jul-2018		963	7.05	7.7	brown/cloudy
MW-04	06-May-2010	Active	1213	7.14	8.2	
	07-Jun-2011		1230	7.12	8.1	Clear
	30-May-2012		1420	7.14	7.8	
	09-Jul-2013		1216	7.10	8.3	Clear
	13-Jun-2014		1289	7.27	8.0	Clear, yellow
	29-Jun-2015		1186	7.20	9.3	Clear
	19-Sep-2016		1331	7.09	8.7	Clear
	13-Jul-2017		1412	7.04	7.7	Clear
	31-Jul-2018		1262	7.11	6.7	Clear
MW-05	29-Apr-2010	Active	985	7.08	7.6	
	25-May-2011		1070	7.06	8.3	
	29-May-2012		982	7.28	9.7	
	08-Jul-2013		987	7.34	7.1	Silty
	13-Jun-2014		1004	7.41	7.6	Light grey
	25-Jun-2015		935	7.35	8.0	Light brown
	19-Sep-2016		958	7.16	8.1	Clear
	13-Jul-2017		1103	7.04	7.7	Brown/Silty
	31-Jul-2018		953	7.23	6.5	Clear, changed foot valve

Advisian
WorleyParsons Group

Table 2

Groundwater Analytical Results: Field Measurements

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Status	Electrical Conductivity (uS/cm)	pH (pH Units)	Temperature (ºC)	Sample Comment
MW-06	06-May-2010	Active	1773	7.21	5.7	
	07-Jun-2011		1762	7.215	11.1	
	29-May-2012		1699	7.29	7.6	
	08-Jul-2013		1683	7.23	8.6	Clear
	12-Jun-2014		1755	7.33	8.6	Clear
	25-Jun-2015		1637	7.36	10.8	Clear
	20-Sep-2016		1562	7.12	7.9	Brown and silty
	13-Jul-2017		1564	7.19	7.4	Brown/Silty
	31-Jul-2018		1470	7.17	6.3	Clear
MW-07	05-May-2010	Active	2640	6.91	7.2	
	08-Jun-2011		1750	7.73	6.6	
	28-Jul-2011		2680	7.11	7.2	
	30-May-2012		2540	7.04	8.1	
	11-Jul-2013		2610	6.98	7.5	Clear
	13-Jun-2014		2910	7.12	9.1	Clear. F14-01
	25-Jun-2015		2570	7.06	8.8	Clear
	20-Sep-2016		2370	6.95	10.0	Clear
	14-Jul-2017		3520	6.92	7.5	Clear
	31-Jul-2018		1970	6.91	6.8	Clear
MW-08	05-May-2010	Active	1359	7.09	5.4	
	07-Jun-2011		1378	7.408	9	Slight silt
	30-May-2012		1363	7.31	7.3	
	09-Jul-2013		1198	7.34	6.9	Clear / Silty
	12-Jun-2014		1387	7.41	7.3	Murky brown
	24-Jun-2015		1327	7.30	7.6	Colourless
	20-Sep-2016		1268	7.31	7.5	Clear
	02-Aug-2017		1525	7.26	6.7	Minor Silt
	01-Aug-2018		1465	7.02	6.4	Clear
MW-09	06-May-2010	Active	1538	7.35	6.8	
	02-Jun-2011		1548	7.49	9.1	Very silty
	29-May-2012		1507	7.43	7.7	
	10-Jul-2013		1463	7.43	8.9	Cloudy brown
	13-Jun-2014		1537	7.67	7.1	Light brown
	25-Jun-2015		1427	7.59	7.7	Light grey
	20-Sep-2016		1396	7.46	7.9	Cloudy
	14-Jul-2017		1647	7.52	7.2	Cloudy
	01-Aug-2018		1516	7.40	6.5	Clear
MW-10	05-May-2010	Active	1287	7.11	6.6	
	25-May-2011		1192	7.36	9.1	Clear
	30-May-2012		1267	7.29	7.4	
	09-Jul-2013		1247	7.24	7.0	Clear
	12-Jun-2014		1292	7.42	7.8	Clear. D14-01
	24-Jun-2015		1242	7.36	7.9	Colourless
	20-Sep-2016		1162	7.21	8.1	Clear
	14-Jul-2017		1355	7.20	7.1	Clear
	01-Aug-2018		1235	7.19	7.1	Clear
MW-11	05-May-2010	Active	1303	7.06	7.2	
	03-Jun-2011		1341	7.42	6.9	
	30-May-2012		1282	7.19	9.8	
	10-Jul-2013		1258	7.18	7.4	Silty grey
	12-Jun-2014		1322	7.38	7.3	Cloudy brown
	24-Jun-2015		1241	7.26	7.3	light grey
	20-Sep-2016		1156	7.04	8.2	Clear

Advisian
WorleyParsons Group

Table 2

Groundwater Analytical Results: Field Measurements

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Status	Electrical Conductivity (uS/cm)	pH (pH Units)	Temperature (ºC)	Sample Comment
MW-11 (Cont.)	14-Jul-2017		1448	7.11	7.2	Clear
	01-Aug-2018		1430	7.08	6.2	Clear
MW-12	06-May-2010	Active	1032	7.32	5.1	
	02-Jun-2011		983	6.95	8.7	Clear
	29-May-2012		1024	7.37	7.3	
	10-Jul-2013		998	7.34	6.1	Murky brown
	12-Jun-2014		1020	7.42	7.6	Cloudy brown
	24-Jun-2015		992	7.3	6.6	Colourless
	20-Sep-2016		941	7.18	7.6	Brown and silty
	14-Jul-2017		1135	7.19	6.6	Cloudy, Minor Silt
	01-Aug-2018		1025	7.25	7.4	brown/cloudy
MW-13	06-May-2010	Active	776	7.53	7	
	02-Jun-2011		841	7.06	8.5	Clear
	30-May-2012		733	7.69	6.9	
	10-Jul-2013		759	7.60	10.1	Cloudy brown
	12-Jun-2014		775	7.77	7.2	Cloudy brown
	24-Jun-2015		734	7.69	7.0	Colourless
	20-Sep-2016		741	7.45	7.4	Brown and silty
	14-Jul-2017		934	7.60	7.0	Brown/Silty
	01-Aug-2018		809	7.39	6.2	brown/cloudy
MW-02B	20-Sep-2016	Active	2770	7.84	8.0	Brown and silty
	13-Jul-2017		4230	7.93	8.8	Brown Silty
	29-Sep-2017		3740	8.27	7.9	
	02-Aug-2018		2250	7.83	7.2	cloudy,changed foot valve

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.
3. Highlighting indicates parameters above applied guideline/criteria.
4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.

Advisian
WorleyParsons Group

Table 3

Groundwater Analytical Results: Indicator Analysis Parameters

PROJECT No.: 307075-01608

		Anions					Cations							General							Inorganic Nitrogen Compounds						Ion Balance				Miscellaneous
Monitoring Station	Date (dd-mmm-yyyy)	Bicarbonate (mg/L)	Carbonate (mg/L)	Chloride (mg/L)	Sulphate (mg/L)	Hydroxide (mg/L)	Calcium (mg/L)	Iron (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Fluoride (mg/L)	Alkalinity (Total; as $CaCO_3$) (mg/L)	Alkalinity (PP; as $CaCO_3$) (mg/L)	Electrical Conductivity (uS/cm)	Hardness (Total; as $CaCO_3$) (mg/L)	pH (pH Units)	Total Dissolved Solids (mg/L)	Total Dissolved Solids (Calculated) (mg/L)	Ammonia (Total; as N) (mg/L)	Nitrate (mg/L)	Nitrate (as N) (mg/L)	Nitrite (mg/L)	Nitrite (as N) (mg/L)	Nitrite-plus-Nitrate (as N) (mg/L)	Cation Sum (meq/L)	Anion Sum (meq/L)	Ion Balance (%)	Ion Balance (Balance)	Dissolved Organic Carbon (mg/L)
Canadian Drinking Water AO Guidelines 2017		---	---	250	500	---	---	0.3	---	0.05	---	200	---	---	---	---	---	(7 - 10.5)	500	500	---	---	---	---	---	---	---	---	---	---	---	---
Canadian Drinking Water MAC Guidelines 2017		---	---	---	---	---	---	---	---	---	---	---	1.5	---	---	---	---	---	---	---	---	45	10	3.2	1	10	---	---	---	---	---	---
Groundwater Monitoring																																
MW-01	07-Mar-2005	444	< 5	4	57.4	< 5	94.6	**1.02**	24.8	**0.605**	3.1	40	0.19	364	---	762	338	7.7	---	442	0.39	---	< 0.1	---	< 0.05	< 0.1	---	---	100	---	3
	17-Nov-2005	451	< 5	4	61.1	< 5	94.8	**1.67**	26.9	**0.662**	2.3	36	0.13	370	---	760	347	7.9	---	447	0.212	---	< 0.1	---	< 0.05	< 0.1	---	---	97.6	---	3
	15-Jun-2006	448	< 5	4	56.8	< 5	99.7	**1.81**	27.3	**0.7**	2.9	37	0.14	367	---	748	361	8	---	448	0.274	---	< 0.1	---	< 0.05	< 0.1	---	---	103	---	3
	12-Jul-2007	445	< 5	3	54.6	< 5	95.1	**1.84**	26.1	**0.664**	2.3	33	0.13	365	---	718	345	7.8	---	433	0.185	---	< 0.1	---	< 0.05	< 0.1	---	---	98.6	---	3
	19-Dec-2007	470	< 1	2	60	< 1	87	< 0.06	23	**0.67**	2.2	34	0.2	390	---	770	310	7.8	---	442	0.26	---	< 0.2	---	< 0.06	< 0.2	---	---	0.87	---	2
	21-Apr-2009	450	< 0.5	5	44	< 0.5	84	< 0.06	24	**0.66**	2.4	36	0.14	370	---	770	310	7.67	---	410	0.22	---	0.003	---	< 0.003	0.003	---	---	93	---	2.3
	05-May-2010	453	< 5.0	3.46	62.0	< 5.0	98.6	**2.02**	28.4	**0.730**	---	38.1	0.150	371	---	762	363	8.06	---	456	0.221	---	< 0.050	---	< 0.050	< 0.071	---	---	102	---	3.0
	25-May-2011	446	< 5.0	3.02	57.1	< 5.0	91.1	**1.53**	25.4	**0.675**	2.68	33.3	0.109	366	---	768	332	8.04	---	432	0.271	---	< 0.050	---	< 0.050	< 0.071	---	---	94.9	---	3.4
	29-May-2012	450	< 5.0	3.13	56.2	< 5.0	93.0	**1.57**	23.7	**0.694**	2.70	35.0	0.106	369	---	769	330	8.00	---	435	0.228	---	< 0.050	---	< 0.050	< 0.071	---	---	94.7	---	3.1
	10-Jul-2013	438	< 5.0	3.49	52.3	< 5.0	96.5	**1.82**	26.2	**0.729**	2.71	36.0	0.124	359	---	727	349	7.94	445	433	---	---	< 0.050	---	< 0.050	< 0.071	---	---	103	---	3.5
	16-Jun-2014	408	< 5.0	4.58	59.8	< 5.0	87.2	**1.92**	26.4	**0.737**	2.80	32.7	0.119	334	---	677	326	7.94	470	414	---	---	< 0.050	---	< 0.020	< 0.054	---	---	99.4	---	4.5
	29-Jun-2015	450	< 0.50	4.7	57	< 0.50	97	**1.9**	27	**0.71**	2.6	37	0.15	370	< 0.50	760	350	7.46	460	450	---	0.069	0.016	< 0.033	< 0.010	< 0.020	8.9	8.8	---	1.0	2.5
	19-Sep-2016	434	< 5.0	5.46	54.6	< 5.0	92.8	**1.76**	26.0	**0.699**	2.63	32.5	0.114	356	---	744	339	7.87	449	428	---	---	< 0.020	---	< 0.010	< 0.022	---	---	98.1	---	4.3
	13-Jul-2017	453	< 5.0	6.27	52.2	< 5.0	91.5	**1.93**	27.0	**0.714**	2.66	36.2	0.121	372	---	709	340	7.76	489	459	---	---	< 0.020	---	< 0.010	< 0.022	---	---	91.6	---	2.4
	01-Aug-2018	430	< 5.0	9.64	54.0	< 5.0	89.8	**1.94**	27.4	**0.690**	2.61	35.3	0.133	353	---	727	337	8.05	---	431	---	---	< 0.020	---	< 0.010	< 0.022	---	---	98.7	---	2.63
MW-02	07-Mar-2005	514	< 5	13	227	< 5	113	0.275	34.5	**0.236**	6.8	111	0.21	422	---	1210	424	7.7	---	**759**	1.75	---	0.1	---	< 0.05	0.1	---	---	101	---	8
	17-Nov-2005	575	< 5	38	270	< 5	125	0.085	51.3	**0.671**	7.2	120	0.11	471	---	1400	523	7.9	---	**894**	1.34	---	< 0.1	---	< 0.05	< 0.1	---	---	98.4	---	6
	15-Jun-2006	629	< 5	23	274	< 5	162	**3.19**	55.4	**1.09**	5.5	95	0.09	516	---	1420	633	7.9	---	**925**	1.17	---	< 0.1	---	< 0.05	< 0.1	---	---	102	---	5
	13-Jul-2007	630	< 5	12	263	< 5	154	**8.72**	54.4	**0.841**	4.3	83	0.09	516	---	1360	609	7.9	---	**880**	0.756	---	< 0.1	---	< 0.05	< 0.1	---	---	98.7	---	6
	19-Dec-2007	660	< 1	13	290	< 1	140	< 0.06	46	**0.7**	4.5	83	0.1	540	---	1400	530	7.4	---	**895**	0.1	---	< 0.2	---	< 0.06	< 0.2	---	---	0.84	---	5
	21-Apr-2009	610	< 0.5	18	230	< 0.5	130	**1.5**	44	**0.53**	4.4	81	0.08	500	---	1400	500	7.36	---	**810**	0.56	---	0.005	---	< 0.003	0.005	---	---	89	---	4.1
	05-May-2010	597	< 5.0	11.6	268	< 5.0	147	**9.35**	54.0	**0.505**	---	87.2	0.094	489	---	1290	589	7.97	---	**866**	0.539	---	< 0.050	---	< 0.050	< 0.071	---	---	100	---	5.4
	25-May-2011	628	< 5.0	22.3	318	< 5.0	141	**9.25**	51.3	**0.434**	4.25	97.9	< 0.050	515	---	1500	563	7.90	---	**944**	0.728	---	< 0.050	---	< 0.050	< 0.071	---	---	89.1	---	11.3
	30-May-2012	605	< 5.0	29.6	231	< 5.0	135	**8.07**	44.8	**0.431**	5.18	82.9	0.061	496	---	1350	522	7.80	---	**826**	0.538	---	< 0.050	---	< 0.050	< 0.071	---	---	91.0	---	4.9
	10-Jul-2013	588	< 5.0	24.2	194	< 5.0	172	**12.3**	56.4	**0.554**	5.25	161	0.080	482	---	1220	662	7.69	**805**	**902**	---	---	< 0.050	---	< 0.050	< 0.071	---	---	142	---	5.4
	16-Jun-2014	563	< 5.0	211	282	< 5.0	144	**10.8**	52.0	**0.446**	4.75	122	0.080	461	---	1850	574	8.02	**1180**	**1090**	---	---	< 0.050	---	< 0.020	< 0.054	---	---	80.2	---	4.5
	28-Aug-2014	590	< 5.0	41.9	211	< 5.0	139	**8.49**	48.5	**0.488**	4.66	90.8	0.067	484	---	1340	547	7.85	**861**	**826**	---	---	< 0.050	---	< 0.020	< 0.054	---	---	98.4	---	5.3
	25-Jun-2015	610	< 0.50	96	270 [#1]	< 0.50	150	**11**	55	**0.41**	4.7	160	0.078	500	< 0.50	1600	610	7.15	**930**	**1000**	---	< 0.044	< 0.010	< 0.033	< 0.010	< 0.020	20	18	---	1.1	4.7
	19-Sep-2016	575	< 5.0	123	241	< 5.0	157	**9.74**	53.9	**0.384**	4.73	150	< 0.040	471	---	1650	614	7.69	**1070**	**1010**	---	---	< 0.040	---	< 0.020	< 0.045	---	---	106	---	5.9
	13-Jul-2017	585	< 5.0	51.7	224	< 5.0	140	**7.99**	52.2	**0.372**	4.92	99.6	0.056	480	---	1310	565	7.63	**900**	**884**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	96.4	---	6.2
	29-Sep-2017	498	< 5.0	25.0	250	< 5.0	157	**11.2**	54.8	**0.467**	5.08	125	< 0.10	408	---	1220	618	8.14	---	**862**	---	---	< 0.10	---	< 0.050	< 0.11	---	---	127	---	5.4
	02-Aug-2018	585	< 5.0	61.6	234	< 5.0	140	**7.79**	51.0	**0.387**	4.67	104	0.102	479	---	1360	560	8.20	**909**	**883**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	97.7	---	7.01
MW-03	07-Mar-2005	442	< 5	31	113	< 5	106	**3.19**	36.1	**0.264**	3.5	56	0.14	362	---	937	413	7.4	---	**563**	0.38	---	< 0.1	---	< 0.05	< 0.1	---	---	103	---	5
	17-Nov-2005	445	< 5	35	122	< 5	104	**4.47**	36.4	**0.239**	3	54	0.1	365	---	949	410	7.8	---	**573**	0.306	---	< 0.1	---	< 0.05	< 0.1	---	---	98.1	---	4
	15-Jun-2006	439	< 5	35	116	< 5	109	**4.85**	36.6	**0.258**	3	52	0.1	360	---	943	423	8	---	**568**	0.359	---	< 0.1	---	< 0.05	< 0.1	---	---	102	---	3
	12-Jul-2007	440	< 5	36	122	< 5	108	**4.89**	37.7	**0.249**	3	55	0.11	361	---	930	425	8	---	**578**	0.291	---	< 0.1	---	< 0.05	< 0.1	---	---	102	---	3
	19-Dec-2007	460	< 1	35	130	< 1	98	< 0.06	32	**0.25**	2.7	49	0.1	380	---	960	370	7.7	---	**571**	0.06	---	< 0.2	---	< 0.06	< 0.2	---	---	0.87	---	3
	21-Apr-2009	430	< 0.5	35	98	< 0.5	92	< 0.06	32	**0.24**	2.8	51	0.11	350	---	950	360	7.57	---	**520**	0.33	---	0.009	---	< 0.003	0.009	---	---	95	---	2.5
	06-May-2010	435	< 5.0	44.3	124	< 5.0	104	**5.23**	36.8	**0.253**	---	52.3	0.117	357	---	967	411	8.03	---	**579**	0.339	---	< 0.050	---	< 0.050	< 0.071	---	---	96.4	---	5.3
	02-Jun-2011	433	< 5.0	44.2	120	< 5.0	115	**5.55**	40.1	**0.277**	3.20	52.7	0.105	355	---	1000	452	7.98	---	**588**	0.302	---	< 0.050	---	< 0.050	< 0.071	---	---	105	---	3.3
	29-May-2012	434	< 5.0	45.9	115	< 5.0	102	**4.83**	31.8	**0.246**	3.05	48.8	0.080	355	---	988	386	7.83	---	**560**	0.327	---	< 0.050	---	< 0.050	< 0.071	---	---	91.7	---	3.4
	10-Jul-2013	427	< 5.0	48.3	119	< 5.0	109	**5.36**	38.3	**0.274**	3.20	57.9	0.105	350	---	963	430	7.81	**608**	**586**	---	---	< 0.050	---	< 0.050	< 0.071	---	---	103	---	3.0
	16-Jun-2014	395	< 5.0	55.9	129	< 5.0	100	**5.13**	36.9	**0.263**	3.23	48.4	0.073	324	---	933	402	7.96	**612**	**568**	---	---	< 0.050	---	< 0.020	< 0.054	---	---	95.1	---	5.9
	29-Jun-2015	430	< 0.50	56	130	< 0.50	110	**5.4**	39	**0.27**	3.1	51	0.13	350	< 0.50	1000	440	7.31	**610**	**610**	---	< 0.044	< 0.010	< 0.033	< 0.010	< 0.020	11	11	---	1.0	3.5
	19-Sep-2016	423	< 5.0	57.7	123	< 5.0	121	**5.22**	38.5	**0.269**	3.14	50.1	0.079	347	---	1000	461	7.71	**630**	**602**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	103	---	5.1

Advisian
WorleyParsons Group

Table 3

Groundwater Analytical Results: Indicator Analysis Parameters

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Anions: Bicarbonate (mg/L)	Carbonate (mg/L)	Chloride (mg/L)	Sulphate (mg/L)	Hydroxide (mg/L)	Cations: Calcium (mg/L)	Iron (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Fluoride (mg/L)	General: Alkalinity (Total; as $CaCO_3$) (mg/L)	Alkalinity (PP; as $CaCO_3$) (mg/L)	Electrical Conductivity (uS/cm)	Hardness (Total; as $CaCO_3$) (mg/L)	pH (pH Units)	Total Dissolved Solids (mg/L)	Total Dissolved Solids (Calculated) (mg/L)	Inorganic Nitrogen Compounds: Ammonia (Total; as N) (mg/L)	Nitrate (mg/L)	Nitrate (as N) (mg/L)	Nitrite (mg/L)	Nitrite (as N) (mg/L)	Nitrite-plus-Nitrate (as N) (mg/L)	Ion Balance: Cation Sum (meq/L)	Anion Sum (meq/L)	Ion Balance (%)	Ion Balance (Balance)	Miscellaneous: Dissolved Organic Carbon (mg/L)
Canadian Drinking Water AO Guidelines 2017		---	---	250	500	---	---	0.3	---	0.05	---	200	---	---	---	---	---	(7 - 10.5)	500	500	---	---	---	---	---	---	---	---	---	---	---
Canadian Drinking Water MAC Guidelines 2017		---	---	---	---	---	---	---	---	---	---	---	1.5	---	---	---	---	---	---	---	---	45	10	3.2	1	10	---	---	---	---	---
MW-03 (Cont.)	13-Jul-2017	419	< 5.0	57.6	121	< 5.0	108	**5.50**	40.1	**0.282**	3.12	52.6	0.088	344	---	958	435	7.65	**629**	**612**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	95.1	---	3.8
(Duplicate)	13-Jul-2017	418	< 5.0	57.9	122	< 5.0	111	**5.20**	37.2	**0.260**	2.91	49.8	0.082	343	---	958	430	7.78	**631**	**609**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	93.3	---	3.5
	31-Jul-2018	405	< 5.0	60.8	128	< 5.0	97.0	**6.22**	41.9	**0.297**	3.41	56.1	0.102	332	---	941	415	8.07	---	**587**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	98.1	---	3.27
MW-04	08-Mar-2005	458	< 5	137	81.4	< 5	142	0.173	37.7	**0.152**	9.9	57	0.15	375	---	1200	510	7.5	---	**694**	< 0.05	---	0.8	---	< 0.05	0.8	---	---	98.5	---	1
	17-Nov-2005	449	< 5	157	87	< 5	147	0.104	40	**0.053**	9.5	59	0.12	368	---	1280	532	7.8	---	**726**	0.013	---	1.2	---	< 0.05	1.2	---	---	98.2	---	5
(Duplicate)	17-Nov-2005	452	< 5	157	89	< 5	147	0.105	40.4	**0.053**	9.7	60	0.12	371	---	1290	533	7.9	---	**731**	0.01	---	1.2	---	< 0.05	1.2	---	---	98.1	---	4
	14-Jun-2006	455	< 5	155	86.2	< 5	147	0.005	42.7	**0.13**	10.2	57	0.13	373	---	1280	543	7.7	---	**724**	0.007	---	0.5	---	< 0.05	0.5	---	---	99.4	---	4
	13-Jul-2007	449	< 5	190	84.5	< 5	154	< 0.005	43.6	0.009	10.4	68	0.14	368	---	1360	564	7.9	---	**774**	0.008	---	0.5	---	< 0.05	0.5	---	---	99.9	---	3
	19-Dec-2007	460	< 1	200	82	< 1	140	< 0.06	35	0.016	10	71	0.1	380	---	1400	500	7.7	---	**763**	0.01	---	0.6	---	< 0.06	0.6	---	---	0.9	---	3
	21-Apr-2009	450	< 0.5	150	74	< 0.5	140	< 0.06	37	0.03	9.4	63	0.14	370	---	1200	500	7.62	---	**690**	< 0.05	---	0.4	---	< 0.003	0.4	---	---	99	---	2.8
	06-May-2010	470	< 5.0	131	92.1	< 5.0	152	0.078	44.0	**0.258**	---	63.4	0.129	385	---	1220	561	8.01	---	**724**	< 0.050	---	0.090	---	< 0.050	0.090	---	---	107	---	3.0
	07-Jun-2011	482	< 5.0	125	88.9	< 5.0	140	0.028	41.3	**0.114**	8.78	50.7	0.119	395	---	1280	520	7.95	---	**693**	< 0.050	---	0.264	---	< 0.050	0.264	---	---	96.3	---	3.0
	30-May-2012	500	< 5.0	126	88.2	< 5.0	141	**1.47**	38.1	**0.722**	8.93	50.9	0.089	409	---	1280	509	7.88	---	**699**	< 0.050	---	< 0.050	---	< 0.050	< 0.071	---	---	92.8	---	3.2
(Duplicate)	30-May-2012	499	< 5.0	126	88.6	< 5.0	161	**1.73**	44.8	**0.861**	11.4	58.9	0.094	409	---	1280	587	7.94	---	**736**	< 0.050	---	< 0.050	---	< 0.050	< 0.071	---	---	107	---	3.3
	09-Jul-2013	493	< 5.0	129	87.8	< 5.0	154	**1.70**	44.0	**0.561**	10.8	55.8	0.082	404	---	1230	566	7.76	**761**	**724**	---	---	< 0.050	---	< 0.050	< 0.071	---	---	103	---	3.3
	13-Jun-2014	426	< 5.0	146	92.8	< 5.0	143	**1.39**	40.8	**0.494**	9.68	52.9	0.093	350	---	1190	525	8.10	**808**	**695**	---	---	< 0.050	---	< 0.020	< 0.054	---	---	100	---	3.0
	29-Jun-2015	480	< 0.50	150	100	< 0.50	150	**1.9**	44	**0.54**	9.5	59	0.13	390	< 0.50	1300	550	7.32	**780**	**750**	---	0.13	0.030	< 0.033	< 0.010	0.030	14	14	---	0.98	3.5
	19-Sep-2016	430	< 5.0	190	125	< 5.0	165	**2.33**	47.9	**0.621**	9.96	59.5	0.090	353	---	1410	609	7.76	**833**	**809**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	100	---	3.6
	13-Jul-2017	425	< 5.0	171	130	< 5.0	154	**2.24**	47.7	**0.616**	9.52	62.6	0.102	348	---	1290	581	7.78	**877**	**797**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	98.1	---	3.7
	31-Jul-2018	407	< 5.0	169	133	< 5.0	156	**2.19**	45.9	**0.548**	9.49	65.5	0.113	334	---	1280	579	8.25	---	**779**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	103	---	3.40
MW-05	08-Mar-2005	403	< 5	15	105	< 5	96.2	**1.14**	27.5	**0.402**	6.1	51	0.18	330	---	831	353	7.6	---	499	0.63	---	< 0.1	---	< 0.05	< 0.1	---	---	103	---	5
	17-Nov-2005	422	< 5	21	115	< 5	98.6	**3.31**	30.1	**0.531**	6.9	43	0.11	346	---	881	370	7.9	---	**522**	0.331	---	< 0.1	---	< 0.05	< 0.1	---	---	95.4	---	4
	14-Jun-2006	421	< 5	22	124	< 5	107	**3.48**	33.5	**0.583**	7.6	44	0.11	345	---	902	405	7.7	---	**545**	0.338	---	< 0.1	---	< 0.05	< 0.1	---	---	101	---	4
	13-Jul-2007	426	< 5	25	135	< 5	110	**4**	34.3	**0.682**	7.3	42	0.11	349	---	931	416	8.1	---	**563**	0.216	---	< 0.1	---	< 0.05	< 0.1	---	---	98.5	---	4
	19-Dec-2007	440	< 1	22	150	< 1	100	< 0.06	30	**0.66**	7.4	41	0.1	360	---	930	380	7.6	---	**566**	0.05	---	< 0.2	---	< 0.06	< 0.2	---	---	0.88	---	3
	21-Apr-2009	420	< 0.5	30	130	< 0.5	120	< 0.06	34	**0.72**	7.6	43	0.12	350	---	960	430	7.58	---	**570**	0.22	---	0.007	---	< 0.003	0.007	---	---	100	---	2.5
	29-Apr-2010	428	< 5.0	30.6	144	< 5.0	120	**3.39**	36.7	**0.758**	---	46.1	0.107	351	---	969	451	7.95	---	**596**	0.234	---	< 0.050	---	< 0.050	< 0.071	---	---	103	---	3.3
	25-May-2011	433	< 5.0	30.9	141	< 5.0	105	**3.82**	32.7	**0.657**	7.29	41.7	0.075	355	---	990	397	8.05	---	**572**	0.261	---	< 0.050	---	< 0.050	< 0.071	---	---	91.1	---	4.4
	29-May-2012	442	< 5.0	33.7	138	< 5.0	112	**3.83**	31.3	**0.707**	8.00	42.6	0.061	362	---	1000	409	7.93	---	**583**	0.233	---	< 0.050	---	< 0.050	< 0.071	---	---	92.3	---	6.9
	08-Jul-2013	448	< 5.0	36.3	139	< 5.0	118	**3.17**	33.5	**0.754**	8.61	42.9	0.092	367	---	998	433	7.83	**614**	**599**	---	---	< 0.050	---	< 0.050	< 0.071	---	---	95.3	---	4.1
	13-Jun-2014	341	< 5.0	37.8	143	< 5.0	117	**4.37**	34.8	**0.758**	8.31	42.0	0.073	279	---	853	435	8.00	**635**	**550**	---	---	< 0.050	---	< 0.020	< 0.054	---	---	111	---	6.6
	25-Jun-2015	450	< 0.50	40	150	< 0.50	120	**4.8**	38	**0.71**	8.4	47	0.10	370	< 0.50	980	450	7.41	**630**	**620**	---	0.065	0.015	< 0.033	< 0.010	< 0.020	12	11	---	1.0	3.2
	19-Sep-2016	406	< 5.0	38.4	137	< 5.0	121	**4.39**	36.3	**0.757**	7.99	43.3	0.076	333	---	987	452	7.85	**620**	**584**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	105	---	4.8
	13-Jul-2017	440	< 5.0	38.1	131	< 5.0	115	**4.82**	38.1	**0.742**	7.95	44.6	0.081	360	---	934	444	7.83	**644**	**610**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	95.7	---	4.1
	31-Jul-2018	403	< 5.0	40.0	136	< 5.0	93.2	**4.93**	39.4	**0.785**	9.13	46.5	0.099	331	---	905	395	8.08	---	**563**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	96.0	---	3.72
MW-06	08-Mar-2005	560	< 5	4	451	< 5	171	**2.92**	58.9	**1.32**	6.1	138	0.18	459	---	1580	670	7.5	---	**1100**	1.46	---	< 0.1	---	< 0.05	< 0.1	---	---	105	---	5
	17-Nov-2005	641	< 5	13	471	< 5	148	**2.96**	52	**0.943**	5	**211**	0.15	526	---	1780	584	8	---	**1220**	1.95	---	< 0.1	---	< 0.05	< 0.1	---	---	101	---	8
	16-Jun-2006	633	< 5	10	482	< 5	168	**3.58**	57.7	**1.01**	5.5	190	0.14	519	---	1700	657	7.7	---	**1220**	2.38	---	< 0.1	---	< 0.05	< 0.1	---	---	104	---	7
	12-Jul-2007	637	< 5	10	478	< 5	157	**4.5**	55.3	**1.28**	4.8	182	0.17	522	---	1760	620	7.9	---	**1200**	1.92	---	< 0.1	---	< 0.05	< 0.1	---	---	99.4	---	7
	19-Dec-2007	630	< 1	3	**560**	< 1	160	< 0.06	54	**1.5**	5	140	0.2	510	---	1700	620	7.7	---	**1230**	1.9	---	< 0.2	---	< 0.06	< 0.2	---	---	0.85	---	6
	22-Apr-2009	590	< 0.5	6	420	< 0.5	180	**5.7**	62	**1.7**	5.5	150	0.14	490	---	1700	710	7.47	---	**1100**	1.7	---	0.004	---	< 0.003	0.004	---	---	110	---	5.1
	06-May-2010	626	< 5.0	8.45	**520**	< 5.0	156	**5.38**	57.1	**1.39**	---	194	0.173	513	---	1770	625	8.06	---	**1250**	1.88	---	< 0.050	---	< 0.050	< 0.071	---	---	98.8	---	6.7
	07-Jun-2011	603	< 5.0	3.45	**501**	< 5.0	164	**5.55**	60.4	**1.64**	5.02	123	0.129	494	---	1760	658	7.96	---	**1150**	1.57	---	< 0.050	---	< 0.050	< 0.071	---	---	91.3	---	8.0
	29-May-2012	602	< 5.0	2.95	494	< 5.0	167	**6.02**	56.5	**1.70**	5.80	139	0.128	493	---	1730	650	7.81	---	**1160**	1.55	---	< 0.050	---	< 0.050	< 0.071	---	---	94.7	---	6.8
	08-Jul-2013	611	< 5.0	4.57	499	< 5.0	168	**5.84**	55.2	**1.72**	5.17	135	0.128	501	---	1720	647	7.81	**1240**	**1170**	---	---	< 0.050	---	< 0.050	< 0.071	---	---	92.2	---	6.4
	12-Jun-2014	528	< 5.0	6.67	**519**	< 5.0	163	**5.93**	57.6	**1.62**	5.56	152	0.119	433	---	1630	644	8.10	**1260**	**1160**	---	---	< 0.050	---	< 0.020	< 0.054	---	---	99.9	---	5.8
	25-Jun-2015	620	< 0.50	6.4	490 [#1]	< 0.50	160	**6.1**	60	**1.5**	5.8	180	0.15	510	< 0.50	1700	650	7.37	**1200**	**1200**	---	< 0.044	< 0.010	< 0.033	< 0.010	< 0.020	21	20	---	1.0	6.5
	20-Sep-2016	599	< 5.0	5.6	490	< 5.0	167	**5.88**	61.0	**1.63**	5.53	143	0.086	491	---	1720	668	7.84	**1180**	**1170**	---	---	< 0.040	---	< 0.020	< 0.045	---	---	97.7	---	9.0
	13-Jul-2017	598	< 5.0	4.81	494	< 5.0	157	**5.83**	58.9	**1.63**	5.12	143	0.136	490	---	1620	635	7.79	**1240**	**1180**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	91.7	---	7.7
	31-Jul-2018	564	< 5.0	4.41	**528**	< 5.0	172	**6.76**	67.2	**1.74**	5.62	153	0.170	462	---	1590	706	8.09	---	**1210**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	103	---	6.90

Advisian
WorleyParsons Group

Table 3

Groundwater Analytical Results: Indicator Analysis Parameters

PROJECT No.: 307075-01608

		Anions					Cations							General							Inorganic Nitrogen Compounds						Ion Balance				Miscellaneous
Monitoring Station	Date (dd-mmm-yyyy)	Bicarbonate (mg/L)	Carbonate (mg/L)	Chloride (mg/L)	Sulphate (mg/L)	Hydroxide (mg/L)	Calcium (mg/L)	Iron (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Fluoride (mg/L)	Alkalinity (Total; as $CaCO_3$) (mg/L)	Alkalinity (PP; as $CaCO_3$) (mg/L)	Electrical Conductivity (uS/cm)	Hardness (Total; as $CaCO_3$) (mg/L)	pH (pH Units)	Total Dissolved Solids (mg/L)	Total Dissolved Solids (Calculated) (mg/L)	Ammonia (Total; as N) (mg/L)	Nitrate (mg/L)	Nitrate (as N) (mg/L)	Nitrite (mg/L)	Nitrite (as N) (mg/L)	Nitrite-plus-Nitrate (as N) (mg/L)	Cation Sum (meq/L)	Anion Sum (meq/L)	Ion Balance (%)	Ion Balance (Balance)	Dissolved Organic Carbon (mg/L)
Canadian Drinking Water AO Guidelines 2017		---	---	250	500	---	---	0.3	---	0.05	---	200	---	---	---	---	---	(7 - 10.5)	500	500	---	---	---	---	---	---	---	---	---	---	---	---
Canadian Drinking Water MAC Guidelines 2017		---	---	---	---	---	---	---	---	---	---	---	1.5	---	---	---	---	---	---	---	---	45	10	3.2	1	10	---	---	---	---	---	---
MW-07	09-Mar-2005	664	< 5	13	**1130**	< 5	287	**10.4**	100	**1.88**	6.6	**287**	0.11	544	---	2680	1130	7.5	---	**2150**	2.24	---	0.1	---	< 0.05	0.1	---	---	102	---	5
	17-Nov-2005	666	< 5	16	**1010**	< 5	270	**10.9**	94.8	**1.83**	5.5	**268**	0.08	546	---	2670	1060	7.7	---	**1990**	2.03	---	< 0.1	---	< 0.05	< 0.1	---	---	102	---	6
	16-Jun-2006	661	< 5	15	**1010**	< 5	284	< 0.005	96.4	**1.86**	6.2	**269**	0.07	542	---	2530	1110	7.5	---	**2010**	2.28	---	0.1	---	< 0.05	0.1	---	---	105	---	6
	12-Jul-2007	641	< 5	12	**940**	< 5	257	**10.9**	89.8	**1.78**	4.6	**248**	0.09	526	---	2290	1010	7.6	---	**1870**	2.03	---	< 0.1	---	< 0.05	< 0.1	---	---	103	---	6
	19-Dec-2007	660	< 1	9	**1000**	< 1	220	< 0.06	72	**1.6**	5.1	**230**	0.1	540	---	2500	850	7.5	---	**1890**	0.26	---	< 0.2	---	< 0.06	< 0.2	---	---	0.84	---	6
	22-Apr-2009	730	< 0.5	18	**1200**	< 0.5	330	**14**	110	**2.3**	6.6	**320**	0.08	600	---	3000	1300	7.19	---	**2400**	2.5	---	0.004	---	< 0.003	0.004	---	---	110	---	6.6
	05-May-2010	657	< 5.0	13.2	**1040**	< 5.0	262	**12.5**	93.5	**1.90**	---	**274**	0.135	538	---	2600	1040	7.90	---	**2010**	2.33	---	< 0.050	---	< 0.050	< 0.071	---	---	100	---	5.8
	08-Jun-2011	537	< 5.0	8.07	**622**	< 5.0	178	**8.26**	68.8	**1.21**	4.38	189	0.116	440	---	1900	728	7.69	---	**1330**	1.83	---	< 0.050	---	< 0.050	< 0.071	---	---	104	---	11.5
	28-Jul-2011	659	< 5.0	11.8	**1020**	< 5.0	256	**11.7**	87.9	**1.84**	5.55	**245**	0.128	540	---	2670	1000	7.98	---	**1950**	2.39	---	< 0.050	---	< 0.050	< 0.071	---	---	95.2	---	6.3
	30-May-2012	648	< 5.0	12.6	**949**	< 5.0	247	**11.3**	80.4	**1.79**	6.96	**245**	0.093	531	---	2570	948	7.71	---	**1860**	2.22	---	< 0.050	---	< 0.050	< 0.071	---	---	96.9	---	6.0
	11-Jul-2013	716	< 5.0	11.5	**1020**	< 5.0	269	**12.1**	82.4	**1.87**	5.37	**241**	0.110	586	---	2680	1010	7.30	**2180**	**1980**	---	---	< 0.050	---	< 0.050	< 0.071	---	---	92.6	---	6.2
	13-Jun-2014	636	< 5.0	13.2	**1270**	< 5.0	289	**13.8**	97.9	**2.26**	6.09	**270**	0.047	521	---	2800	1120	8.06	**2320**	**2260**	---	---	< 0.050	---	< 0.020	< 0.054	---	---	92.3	---	5.8
	25-Jun-2015	690	< 0.50	13	**1100** [#1]	< 0.50	270	**13**	97	**1.9**	6.0	**280**	0.086	570	< 0.50	2700	1100	7.09	**2200**	**2100**	---	< 0.044	< 0.010	< 0.033	< 0.010	< 0.020	34	35	---	0.99	6.0
	20-Sep-2016	656	< 5.0	11.3	**1040**	< 5.0	283	**12.9**	97.8	**2.01**	6.02	**259**	0.042	537	---	2680	1110	7.64	**2200**	**2020**	---	---	< 0.040	---	< 0.020	< 0.045	---	---	103	---	7.2
	14-Jul-2017	639	< 5.0	11.6	**895**	< 5.0	249	**11.2**	83.7	**1.80**	5.45	**238**	0.058	524	---	2360	966	7.51	**2050**	**1820**	---	---	< 0.040	---	< 0.020	< 0.045	---	---	99.3	---	7.3
	31-Jul-2018	608	< 5.0	11.9	**964**	< 5.0	254	**12.3**	94.2	**1.88**	5.97	**264**	0.061	498	---	2310	1020	8.00	---	**1890**	---	---	< 0.040	---	< 0.020	< 0.045	---	---	106	---	6.27
MW-08	09-Mar-2005	593	< 5	3	369	< 5	147	**5.66**	45	**0.474**	6	137	0.13	486	---	1470	552	7.7	---	**999**	1.83	---	0.1	---	< 0.05	0.1	---	---	98.8	---	5
	15-Nov-2005	549	< 5	4	300	< 5	133	**5.16**	37.4	**0.384**	5.2	112	0.11	450	---	1310	486	7.5	---	**862**	1.5	---	< 0.1	---	< 0.05	< 0.1	---	---	95.9	---	6
	16-Jun-2006	594	< 5	3	341	< 5	161	**6.97**	44.2	**0.481**	6.1	132	0.09	487	---	1240	584	7.7	---	**980**	1.89	---	< 0.1	---	< 0.05	< 0.1	---	---	104	---	6
	11-Jul-2007	583	< 5	2	316	< 5	150	**7.29**	42.9	**0.454**	5	115	0.08	478	---	1390	551	7.9	---	**918**	1.61	---	< 0.1	---	< 0.05	< 0.1	---	---	100	---	7
	19-Dec-2007	630	< 1	2	370	< 1	130	< 0.06	36	**0.44**	5.4	120	0.1	520	---	1400	480	7.7	---	**977**	0.25	---	< 0.2	---	< 0.06	< 0.2	---	---	0.84	---	5
	21-Apr-2009	560	< 0.5	3	300	< 0.5	150	< 0.06	40	**0.45**	5.6	110	0.11	450	---	1400	530	7.62	---	**880**	1.7	---	0.007	---	< 0.003	0.007	---	---	100	---	5.3
	05-May-2010	558	< 5.0	1.43	333	< 5.0	146	**7.22**	43.2	**0.470**	---	122	0.130	458	---	1360	542	8.04	---	**927**	1.74	---	< 0.050	---	< 0.050	< 0.071	---	---	101	---	5.3
	07-Jun-2011	565	< 5.0	0.97	320	< 5.0	136	**5.41**	38.3	**0.411**	5.12	98.0	0.082	463	---	1400	497	7.95	---	**876**	1.71	---	< 0.050	---	< 0.050	< 0.071	---	---	89.8	---	10.3
	30-May-2012	560	< 5.0	0.86	308	< 5.0	135	**6.69**	35.0	**0.409**	5.69	107	0.084	459	---	1360	481	7.93	---	**867**	1.76	---	< 0.050	---	< 0.050	< 0.071	---	---	92.3	---	5.7
	09-Jul-2013	535	< 5.0	1.37	304	< 5.0	149	**6.47**	40.4	**0.415**	6.47	112	0.093	439	---	1290	538	7.96	**876**	**877**	---	---	< 0.050	---	< 0.050	< 0.071	---	---	104	---	5.5
	12-Jun-2014	474	< 5.0	1.23	345	< 5.0	144	**7.19**	38.5	**0.476**	5.95	110	0.083	388	---	1260	518	7.94	**938**	**878**	---	---	< 0.050	---	< 0.020	< 0.054	---	---	102	---	5.1
	24-Jun-2015	570	< 0.50	1.6	320 [#1]	< 0.50	150	**7.1**	42	**0.44**	5.7	120	0.10	470	< 0.50	1400	540	7.43	**950**	**930**	---	< 0.044	< 0.010	< 0.033	< 0.010	< 0.020	16	16	---	1.0	5.4
	20-Sep-2016	515	< 5.0	1.37	331	< 5.0	152	**6.96**	41.4	**0.441**	5.86	113	0.082	422	---	1370	550	7.86	**928**	**898**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	104	---	7.5
	02-Aug-2017	583	< 5.0	2.4	357	< 5.0	---	---	---	---	---	---	0.103	478	---	1460	540	7.39	**1010**	**987**	---	---	< 0.040	---	< 0.020	< 0.045	---	---	92.6	---	4.8
	01-Aug-2018	529	< 5.0	1.59	387	< 5.0	151	**8.45**	45.9	**0.495**	6.14	135	0.130	433	---	1360	566	8.18	---	**987**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	103	---	6.15
MW-09	09-Mar-2005	626	< 5	5	313	< 5	71.6	**1.11**	26	**0.714**	4.2	**226**	0.29	513	---	1520	286	7.9	---	**954**	1.81	---	0.1	---	< 0.05	0.1	---	---	93.2	---	5
(Duplicate)	09-Mar-2005	628	< 5	5	340	< 5	79.1	**1.07**	27.9	**0.705**	4.7	**243**	0.29	515	---	1520	312	7.9	---	**1010**	1.79	---	0.1	---	< 0.05	0.1	---	---	97.4	---	5
	17-Nov-2005	640	< 5	7	312	< 5	92.6	**1.4**	27.3	**0.752**	3.9	**227**	0.22	524	---	1550	344	8.1	---	**984**	1.85	---	< 0.1	---	< 0.05	< 0.1	---	---	98	---	6
	16-Jun-2006	644	< 5	7	316	< 5	98.1	**1.44**	27.7	**0.797**	3.9	**231**	0.23	528	---	1520	359	7.9	---	**1000**	2.09	---	< 0.1	---	< 0.05	< 0.1	---	---	99.9	---	8
	11-Jul-2007	656	< 5	6	322	< 5	94.9	**1.74**	27.6	**0.785**	3.3	**231**	0.21	538	---	1530	351	8.1	---	**1010**	1.8	---	< 0.1	---	< 0.05	< 0.1	---	---	97.9	---	7
	18-Dec-2007	670	< 1	4	350	< 1	83	< 0.06	22	**0.77**	3.5	**230**	0.2	550	---	1500	300	8	---	**1020**	0.23	---	< 0.2	---	< 0.06	< 0.2	---	---	0.86	---	9
	22-Apr-2009	630	< 0.5	6	330	< 0.5	97	**1.9**	27	**0.86**	4.1	**240**	0.22	520	---	1500	350	7.73	---	**1000**	1.9	---	0.005	---	< 0.003	0.005	---	---	100	---	5.5
	06-May-2010	639	< 5.0	5.57	342	< 5.0	93.1	**2.04**	27.8	**0.828**	---	**240**	0.251	524	---	1540	347	8.17	---	**1030**	2.02	---	< 0.050	---	< 0.050	< 0.071	---	---	98.4	---	5.6
(Duplicate)	06-May-2010	641	< 5.0	5.63	345	< 5.0	93.1	**2.03**	27.6	**0.832**	---	**246**	0.243	526	---	1540	346	8.17	---	**1040**	2.00	---	< 0.050	---	< 0.050	< 0.071	---	---	99.2	---	5.5
	02-Jun-2011	646	< 5.0	5.84	325	< 5.0	87.4	**1.46**	25.2	**0.754**	4.09	**212**	< 0.050	530	---	1580	322	8.17	---	**978**	2.05	---	< 0.050	---	< 0.050	< 0.071	---	---	90.0	---	8.0
(Duplicate)	02-Jun-2011	646	< 5.0	5.64	325	< 5.0	89.5	**1.29**	26.0	**0.773**	4.16	**220**	< 0.050	530	---	1570	331	8.22	---	**988**	2.09	---	< 0.050	---	< 0.050	< 0.071	---	---	93.0	---	7.1
	29-May-2012	643	< 5.0	4.82	319	< 5.0	88.3	**1.89**	23.7	**0.784**	4.22	**226**	0.184	527	---	1550	318	8.04	---	**982**	2.02	---	< 0.050	---	< 0.050	< 0.071	---	---	94.1	---	6.0
	10-Jul-2013	644	< 5.0	5.29	327	< 5.0	96.2	**1.94**	26.8	**0.842**	4.06	**251**	0.203	527	---	1530	351	7.89	**1030**	**1030**	---	---	< 0.050	---	< 0.050	< 0.071	---	---	103	---	5.9
	13-Jun-2014	525	< 5.0	5.39	341	< 5.0	87.8	**1.85**	25.6	**0.868**	4.23	**222**	0.199	430	---	1390	325	8.12	**1030**	**944**	---	---	< 0.050	---	< 0.020	< 0.054	---	---	102	---	5.8
	25-Jun-2015	620	< 0.50	5.6	320 [#1]	< 0.50	93	**2.0**	28	**0.80**	4.2	**250**	0.24	500	< 0.50	1500	350	7.61	**1000**	**1000**	---	0.14	0.031	< 0.033	< 0.010	0.031	18	17	---	1.1	5.4
	20-Sep-2016	598	< 5.0	5.0	318	< 5.0	97.0	**1.93**	27.5	**0.822**	4.08	**231**	0.157	490	---	1530	355	8.07	**1030**	**977**	---	---	< 0.040	---	< 0.020	< 0.045	---	---	104	---	7.2
(Duplicate)	20-Sep-2016	626	< 5.0	4.9	319	< 5.0	97.4	**1.88**	27.3	**0.795**	4.04	**223**	0.158	513	---	1530	356	8.10	**1040**	**984**	---	---	< 0.040	---	< 0.020	< 0.045	---	---	99.2	---	7.1
	14-Jul-2017	650	< 5.0	5.18	325	< 5.0	90.0	**1.96**	27.1	**0.872**	3.92	**240**	0.216	533	---	1440	336	8.04	**1030**	**1030**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	95.6	---	6.9
	01-Aug-2018	556	< 5.0	5.20	347	< 5.0	93.1	**2.01**	28.2	**0.813**	4.04	**242**	0.250	456	---	1420	349	8.28	---	**993**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	107	---	6.57

Advisian
WorleyParsons Group

Table 3

Groundwater Analytical Results: Indicator Analysis Parameters

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Anions: Bicarbonate (mg/L)	Carbonate (mg/L)	Chloride (mg/L)	Sulphate (mg/L)	Hydroxide (mg/L)	Cations: Calcium (mg/L)	Iron (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Fluoride (mg/L)	General: Alkalinity (Total; as $CaCO_3$) (mg/L)	Alkalinity (PP; as $CaCO_3$) (mg/L)	Electrical Conductivity (uS/cm)	Hardness (Total; as $CaCO_3$) (mg/L)	pH (pH Units)	Total Dissolved Solids (mg/L)	Total Dissolved Solids (Calculated) (mg/L)	Inorganic Nitrogen Compounds: Ammonia (Total; as N) (mg/L)	Nitrate (mg/L)	Nitrate (as N) (mg/L)	Nitrite (mg/L)	Nitrite (as N) (mg/L)	Nitrite-plus-Nitrate (as N) (mg/L)	Ion Balance: Cation Sum (meq/L)	Anion Sum (meq/L)	Ion Balance (%)	Ion Balance (Balance)	Miscellaneous: Dissolved Organic Carbon (mg/L)
Canadian Drinking Water AO Guidelines 2017		---	---	250	500	---	---	0.3	---	0.05	---	200	---	---	---	---	---	(7 - 10.5)	500	500	---	---	---	---	---	---	---	---	---	---	---
Canadian Drinking Water MAC Guidelines 2017		---	---	---	---	---	---	---	---	---	---	---	1.5	---	---	---	---	---	---	---	---	45	10	3.2	1	10	---	---	---	---	---
MW-10	09-Mar-2005	628	< 5	< 1	221	< 5	131	**5.29**	36.1	**0.639**	5.3	117	0.18	514	---	1270	476	7.7	---	**819**	1.68	---	0.1	---	< 0.05	0.1	---	---	99.7	---	5
	16-Nov-2005	634	< 5	3	222	< 5	129	**5.49**	35.2	**0.642**	5	108	0.12	520	---	1260	467	7.5	---	**814**	1.36	---	< 0.1	---	< 0.05	< 0.1	---	---	93.8	---	6
	16-Jun-2006	641	< 5	2	212	< 5	139	**5.89**	37.8	**0.67**	5.6	119	0.13	525	---	1120	503	7.7	---	**831**	1.76	---	< 0.1	---	< 0.05	< 0.1	---	---	103	---	6
	11-Jul-2007	651	< 5	2	208	< 5	132	**5.93**	36.9	**0.656**	4.7	110	0.12	533	---	1270	482	8	---	**814**	1.65	---	< 0.1	---	< 0.05	< 0.1	---	---	97.2	---	5
	18-Dec-2007	660	< 1	< 1	230	< 1	120	< 0.06	29	**0.64**	4.8	110	0.2	540	---	1300	410	7.8	---	**822**	1.8	---	< 0.2	---	< 0.06	< 0.2	---	---	0.84	---	5
	22-Apr-2009	620	< 0.5	2	190	< 0.5	140	**5.9**	36	**0.71**	5.6	120	0.14	510	---	1300	490	7.51	---	**800**	1.8	---	0.005	---	< 0.003	0.005	---	---	110	---	4.7
	05-May-2010	633	< 5.0	0.73	227	< 5.0	139	**6.80**	39.1	**0.735**	---	124	0.169	519	---	1270	508	8.07	---	**847**	1.71	---	< 0.050	---	< 0.050	< 0.071	---	---	104	---	5.1
	02-Jun-2011	607	< 5.0	1.19	206	< 5.0	113	**3.89**	30.2	**0.566**	5.58	105	< 0.050	497	---	1260	407	8.04	---	**759**	1.60	---	< 0.050	---	< 0.050	< 0.071	---	---	89.9	---	6.7
	30-May-2012	639	< 5.0	0.53	211	< 5.0	127	**5.98**	31.6	**0.655**	5.79	111	0.113	524	---	1290	447	7.89	---	**801**	1.79	---	< 0.050	---	< 0.050	< 0.071	---	---	93.5	---	5.9
	09-Jul-2013	638	< 5.0	0.68	215	< 5.0	141	**6.11**	37.3	**0.729**	6.22	118	0.107	523	---	1250	506	8.09	**833**	**832**	---	---	< 0.050	---	< 0.050	< 0.071	---	---	103	---	5.4
(Duplicate)	09-Jul-2013	643	< 5.0	0.85	216	< 5.0	142	**6.03**	36.7	**0.710**	5.96	115	0.115	527	---	1250	506	8.04	**837**	**833**	---	---	< 0.050	---	< 0.050	< 0.071	---	---	101	---	5.4
	12-Jun-2014	507	< 5.0	0.67	229	< 5.0	125	**6.10**	34.2	**0.689**	5.79	108	0.110	416	---	1110	453	8.05	**845**	**752**	---	---	< 0.050	---	< 0.020	< 0.054	---	---	106	---	6.9
(Duplicate)	12-Jun-2014	543	< 5.0	0.82	229	< 5.0	124	**6.08**	34.5	**0.740**	5.84	110	0.104	445	---	1140	452	8.04	**834**	**771**	---	---	< 0.050	---	< 0.020	< 0.054	---	---	102	---	5.0
	24-Jun-2015	640	< 0.50	1.1	210 [#1]	< 0.50	130	**6.3**	36	**0.67**	5.8	120	0.16	520	< 0.50	1300	480	7.44	**850**	**820**	---	< 0.044	< 0.010	< 0.033	< 0.010	< 0.020	15	15	---	1.0	5.1
(Duplicate)	24-Jun-2015	630	< 0.50	1.2	200 [#1]	< 0.50	130	**6.4**	36	**0.67**	5.6	120	0.14	520	< 0.50	1300	480	7.41	**840**	**820**	---	< 0.044	< 0.010	< 0.033	< 0.010	< 0.020	15	15	---	1.0	5.2
	20-Sep-2016	619	< 5.0	0.66	222	< 5.0	131	**6.01**	35.9	**0.676**	5.74	111	0.114	508	---	1270	475	7.90	**825**	**811**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	97.8	---	6.6
	14-Jul-2017	640	< 5.0	0.62	218	< 5.0	117	**5.98**	36.1	**0.674**	5.49	115	0.139	525	---	1200	441	7.85	**834**	**828**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	89.5	---	6.4
	01-Aug-2018	585	< 5.0	0.75	229	< 5.0	130	**6.51**	38.8	**0.692**	5.58	119	0.187	480	---	1200	484	8.27	---	**811**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	104	---	6.12
MW-11	10-Mar-2005	642	< 5	8	196	< 5	150	**6.89**	45.8	**0.668**	4.9	92	0.14	526	---	1270	563	7.7	---	**813**	1.5	---	0.1	---	< 0.05	0.1	---	---	104	---	15
	16-Nov-2005	654	< 5	16	199	< 5	140	**6.95**	42.5	**0.628**	4.5	85	0.09	536	---	1270	525	7.4	---	**809**	1.41	---	< 0.1	---	< 0.05	< 0.1	---	---	93.4	---	7
	16-Jun-2006	672	< 5	11	194	< 5	153	**7.23**	45.7	**0.659**	4.8	92	0.09	551	---	1100	570	7.7	---	**831**	1.56	---	< 0.1	---	< 0.05	< 0.1	---	---	101	---	7
	11-Jul-2007	662	< 5	8	193	< 5	143	**7.15**	45.3	**0.632**	3.9	88	0.09	542	---	1280	544	8	---	**806**	1.43	---	< 0.1	---	< 0.05	< 0.1	---	---	98.6	---	8
	18-Dec-2007	680	< 1	10	210	< 1	130	< 0.06	38	**0.61**	4.3	87	0.1	560	---	1300	480	7.7	---	**810**	0.2	---	< 0.2	---	< 0.06	< 0.2	---	---	0.87	---	6
	22-Apr-2009	640	< 0.5	10	170	< 0.5	150	**7**	45	**0.67**	4.9	91	0.11	530	---	1300	560	7.51	---	**800**	1.5	---	0.003	---	< 0.003	0.003	---	---	110	---	5.5
	05-May-2010	650	< 5.0	15.2	212	< 5.0	144	**7.61**	45.9	**0.663**	---	98.1	0.132	533	---	1290	549	8.04	---	**840**	1.48	---	< 0.050	---	< 0.050	< 0.071	---	---	99.1	---	6.0
	02-Jun-2011	653	< 5.0	9.69	203	< 5.0	148	**6.99**	46.4	**0.687**	5.36	96.0	< 0.050	536	---	1320	561	8.00	---	**830**	1.55	---	< 0.050	---	< 0.050	< 0.071	---	---	102	---	6.8
	30-May-2012	648	< 5.0	8.71	202	< 5.0	134	**6.82**	38.7	**0.605**	5.34	87.9	0.067	531	---	1300	494	7.90	---	**795**	1.51	---	< 0.050	---	< 0.050	< 0.071	---	---	91.8	---	6.6
	10-Jul-2013	640	< 5.0	8.92	213	< 5.0	147	**7.52**	44.7	**0.697**	5.09	102	0.105	525	---	1270	551	7.93	**828**	**836**	---	---	< 0.050	---	< 0.050	< 0.071	---	---	103	---	6.2
	12-Jun-2014	473	< 5.0	14.1	227	< 5.0	136	**7.07**	41.5	**0.672**	5.32	89.0	0.074	388	---	1090	510	7.99	**856**	**746**	---	---	< 0.050	---	< 0.020	< 0.054	---	---	110	---	5.6
	24-Jun-2015	640	< 0.50	11	210 [#1]	< 0.50	140	**7.4**	45	**0.62**	5.0	97	0.11	520	< 0.50	1300	540	7.42	**850**	**830**	---	< 0.044	< 0.010	< 0.033	< 0.010	< 0.020	16	15	---	1.0	6.3
	20-Sep-2016	595	< 5.0	11.4	221	< 5.0	148	**6.91**	44.3	**0.609**	4.97	90.7	0.087	488	---	1270	552	7.87	**845**	**813**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	103	---	7.5
	14-Jul-2017	650	< 5.0	8.40	215	< 5.0	138	**6.84**	43.7	**0.618**	4.59	92.8	0.087	533	---	1220	525	7.77	**839**	**845**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	91.6	---	7.3
	01-Aug-2018	593	< 5.0	9.38	228	< 5.0	148	**7.33**	45.1	**0.626**	4.77	96.4	0.126	486	---	1210	555	8.25	---	**823**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	105	---	6.77
(Duplicate)	01-Aug-2018	615	< 5.0	9.67	229	< 5.0	132	**7.23**	44.8	**0.627**	4.82	96.0	0.126	504	---	1230	514	7.98	---	**819**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	96.3	---	6.54
MW-12	10-Mar-2005	636	< 5	6	45.9	< 5	95.7	**2.78**	27.9	**0.365**	5	106	0.13	521	---	1000	354	7.9	---	**600**	1.39	---	0.1	---	< 0.05	0.1	---	---	102	---	6
	16-Nov-2005	712	< 5	8	52.5	< 5	94.9	**3.37**	28.5	**0.402**	5.2	111	0.07	584	---	1020	354	7.4	---	**651**	1.2	---	< 0.1	---	< 0.05	< 0.1	---	---	92.7	---	7
	16-Jun-2006	669	< 5	7	44.2	< 5	100	**3.76**	29.1	**0.436**	5.1	106	0.07	549	---	904	370	7.8	---	**621**	1.34	---	< 0.1	---	< 0.05	< 0.1	---	---	100	---	7
	11-Jul-2007	670	< 5	7	42.4	< 5	95.4	**3.77**	29.2	**0.422**	4.2	101	0.08	550	---	1020	358	8	---	**609**	1.16	---	< 0.1	---	< 0.05	< 0.1	---	---	97.4	---	7
	18-Dec-2007	700	< 1	5	43	< 1	82	< 0.06	23	**0.4**	4.3	99	< 0.1	570	---	1000	300	7.8	---	**601**	0.29	---	< 0.2	---	< 0.06	< 0.2	---	---	0.84	---	7
	22-Apr-2009	650	< 0.5	8	32	< 0.5	98	**4.1**	29	**0.45**	4.9	110	0.09	540	---	1000	360	7.66	---	**610**	1.3	---	0.005	---	< 0.003	0.005	---	---	110	---	6.4
	06-May-2010	667	< 5.0	7.05	46.8	< 5.0	96.4	**4.24**	30.2	**0.456**	---	109	0.114	547	---	1030	365	8.13	---	**623**	1.32	---	< 0.050	---	< 0.050	< 0.071	---	---	100	---	10.5
	02-Jun-2011	662	< 5.0	6.40	44.6	< 5.0	98.1	**3.34**	30.9	**0.450**	4.86	95.4	0.071	543	---	1050	372	8.14	---	**606**	1.31	---	0.054	---	< 0.050	< 0.071	---	---	97.9	---	13.5
	30-May-2012	660	< 5.0	6.25	43.3	< 5.0	89.8	**4.14**	25.6	**0.435**	5.23	95.7	0.076	541	---	1030	330	8.03	---	**591**	1.32	---	< 0.050	---	< 0.050	< 0.071	---	---	91.5	---	6.6
	10-Jul-2013	649	< 5.0	6.89	44.4	< 5.0	101	**3.99**	28.9	**0.457**	5.00	113	0.083	532	---	1000	371	7.89	**628**	**618**	---	---	< 0.050	---	< 0.050	< 0.071	---	---	106	---	6.9
	12-Jun-2014	598	< 5.0	7.20	47.4	< 5.0	93.8	**3.88**	27.7	**0.462**	5.14	97.6	0.064	490	---	915	348	8.02	**619**	**573**	---	---	< 0.050	---	< 0.020	< 0.054	---	---	103	---	8.3
	24-Jun-2015	660	< 0.50	7.7	45	< 0.50	93	**4.0**	29	**0.42**	5.0	110	0.084	540	< 0.50	1000	350	7.63	**620**	**620**	---	0.047	0.011	< 0.033	< 0.010	< 0.020	12	12	---	1.0	6.8
	20-Sep-2016	646	< 5.0	6.53	43.5	< 5.0	94.9	**4.21**	28.4	**0.442**	4.76	98.2	0.063	530	---	1000	354	7.93	**615**	**594**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	98.2	---	7.4
	14-Jul-2017	---	---	---	---	---	94.1	**4.18**	27.9	**0.437**	4.53	98.9	---	---	---	---	---	---	**614**	---	---	---	---	---	---	---	---	---	---	---	6.1
	02-Aug-2017	639	< 5.0	6.42	43.4	< 5.0	86.0	---	26.9	---	4.61	95.7	0.114	524	---	1010	326	7.43	---	**597**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	89.4	---	---
	01-Aug-2018	648	< 5.0	5.75	38.9	< 5.0	81.2	**4.17**	31.3	**0.493**	5.66	111	0.103	531	---	969	332	8.06	---	**593**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	100	---	7.24

Advisian
WorleyParsons Group

Table 3

Groundwater Analytical Results: Indicator Analysis Parameters

PROJECT No.: 307075-01608

		Anions					Cations							General							Inorganic Nitrogen Compounds						Ion Balance				Miscellaneous
Monitoring Station	Date (dd-mmm-yyyy)	Bicarbonate (mg/L)	Carbonate (mg/L)	Chloride (mg/L)	Sulphate (mg/L)	Hydroxide (mg/L)	Calcium (mg/L)	Iron (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Fluoride (mg/L)	Alkalinity (Total; as $CaCO_3$) (mg/L)	Alkalinity (PP; as $CaCO_3$) (mg/L)	Electrical Conductivity (uS/cm)	Hardness (Total; as $CaCO_3$) (mg/L)	pH (pH Units)	Total Dissolved Solids (mg/L)	Total Dissolved Solids (Calculated) (mg/L)	Ammonia (Total; as N) (mg/L)	Nitrate (mg/L)	Nitrate (as N) (mg/L)	Nitrite (mg/L)	Nitrite (as N) (mg/L)	Nitrite-plus-Nitrate (as N) (mg/L)	Cation Sum (meq/L)	Anion Sum (meq/L)	Ion Balance (%)	Ion Balance (Balance)	Dissolved Organic Carbon (mg/L)
Canadian Drinking Water AO Guidelines 2017		---	---	250	500	---	---	0.3	---	0.05	---	200	---	---	---	---	---	(7 - 10.5)	500	500	---	---	---	---	---	---	---	---	---	---	---	---
Canadian Drinking Water MAC Guidelines 2017		---	---	---	---	---	---	---	---	---	---	---	1.5	---	---	---	---	---	---	---	---	45	10	3.2	1	10	---	---	---	---	---	---
MW-13	10-Mar-2005	531	< 5	2	10.6	< 5	53.7	**0.818**	16.5	**0.263**	4.2	112	0.2	435	---	784	202	8.1	---	460	1.4	---	0.1	---	< 0.05	0.1	---	---	100	---	4
	16-Nov-2005	537	< 5	4	12.5	< 5	51.2	**1.08**	16.2	**0.243**	3.4	103	0.14	440	---	782	195	7.8	---	454	1.29	---	< 0.1	---	< 0.05	< 0.1	---	---	92.2	---	5
	16-Jun-2006	715	541	4	10.1	< 5	55.6	**1.19**	17.1	**0.256**	3.9	112	0.14	443	---	715	209	8	---	470	1.31	---	0.2	---	< 0.05	0.2	---	---	99.4	---	5
	11-Jul-2007	541	< 5	2	9.1	< 5	53	**1.26**	16.9	**0.252**	3.5	105	0.13	444	---	782	202	8.2	---	456	1.22	---	< 0.1	---	< 0.05	< 0.1	---	---	96.3	---	5
	18-Dec-2007	560	< 1	2	9	< 1	45	< 0.06	14	**0.25**	3.5	110	0.2	460	---	790	170	8	---	457	0.23	---	< 0.2	---	< 0.06	< 0.2	---	---	0.87	---	5
	22-Apr-2009	520	< 0.5	3	9	< 0.5	54	**1.3**	17	**0.26**	3.9	110	0.15	430	---	770	200	7.81	---	460	1.3	---	0.005	---	< 0.003	0.005	---	---	100	---	4.5
	06-May-2010	530	< 5.0	2.15	9.54	< 5.0	50.0	**1.45**	16.4	**0.249**	---	110	0.160	435	---	776	192	8.22	---	453	1.30	---	< 0.050	---	< 0.050	< 0.071	---	---	97.5	---	4.1
	02-Jun-2011	530	< 5.0	1.92	9.12	< 5.0	48.1	**1.25**	15.3	**0.231**	3.74	103	0.162	434	---	796	183	8.24	---	442	1.36	---	< 0.050	---	< 0.050	< 0.071	---	---	92.1	---	5.2
	30-May-2012	529	< 5.0	1.81	9.24	< 5.0	48.0	**1.33**	14.4	**0.238**	4.00	101	0.119	433	---	786	179	8.18	---	438	1.31	---	< 0.050	---	< 0.050	< 0.071	---	---	90.5	---	4.6
	10-Jul-2013	525	< 5.0	2.28	10.0	< 5.0	49.7	**1.17**	16.2	**0.252**	3.98	118	0.147	430	---	769	191	7.92	464	458	---	---	< 0.050	---	< 0.050	< 0.071	---	---	102	---	4.4
	12-Jun-2014	485	< 5.0	2.63	11.0	< 5.0	48.8	**1.30**	15.4	**0.245**	4.07	104	0.129	398	---	698	185	8.16	457	425	---	---	< 0.050	---	< 0.020	< 0.054	---	---	101	---	6.3
	24-Jun-2015	530	< 0.50	2.9	13	< 0.50	49	**1.3**	16	**0.24**	3.9	110	0.16	430	< 0.50	780	190	7.70	460	460	---	< 0.044	< 0.010	< 0.033	< 0.010	< 0.020	9.0	9.0	---	1.0	4.9
	20-Sep-2016	508	< 5.0	2.09	11.3	< 5.0	50.9	**1.33**	15.4	**0.235**	3.77	105	0.124	417	---	762	191	8.14	459	439	---	---	< 0.020	---	< 0.010	< 0.022	---	---	98.2	---	7.6
	14-Jul-2017	503	< 5.0	2.43	10.8	< 5.0	42.3	**1.29**	15.5	**0.227**	3.52	106	0.125	412	---	724	169	8.15	493	445	---	---	< 0.020	---	< 0.010	< 0.022	---	---	89.8	---	5.1
	01-Aug-2018	512	< 5.0	2.00	10.4	< 5.0	44.2	**1.38**	16.9	**0.237**	4.39	119	0.161	420	---	734	180	8.14	---	449	---	---	< 0.020	---	< 0.010	< 0.022	---	---	102	---	4.92
MW-02B	20-Sep-2016	357	< 5.0	**812**	41.7	< 5.0	40.4	< 0.050	8.75	**0.109**	4.85	**571**	0.41	293	---	3180	137	8.28	**1760**	**1650**	---	---	< 0.10	---	< 0.050	< 0.11	---	---	93.4	---	9.8
	14-Jul-2017	403	< 5.0	**804**	13.3	< 5.0	35.8	**0.687**	7.18	**0.200**	3.60	**589**	0.475	330	---	3210	119	8.29	**1850**	**1660**	---	---	< 0.040	---	< 0.020	< 0.045	---	---	93.8	---	7.9
	29-Sep-2017	372	10.4	**975**	5.8	< 5.0	37.2	**0.44**	7.34	**0.114**	4.0	**673**	0.42	322	---	3370	123	8.55	---	**1900**	---	---	< 0.10	---	< 0.050	< 0.11	---	---	93.4	---	10.2
	02-Aug-2018	389	11.3	**930**	< 1.5	< 5.0	35.8	0.127	6.95	**0.102**	4.00	**691**	0.73	338	---	3460	118	8.49	**1860**	**1870**	---	---	< 0.10	---	< 0.050	< 0.11	---	---	98.5	---	8.66
QA/QC																															
FIELD BLANK	05-May-2010	< 5.0	< 5.0	< 0.50	< 0.50	< 5.0	< 0.50	< 0.020	< 0.10	< 0.0050	---	< 0.50	< 0.050	< 5.0	---	1.07	< 1.0	**6.06**	---	< 1.0	< 0.050	---	< 0.050	---	< 0.050	< 0.071	---	---	LowTDS	---	< 1.0
	25-May-2011	< 5.0	< 5.0	< 0.50	< 0.50	< 5.0	< 0.50	< 0.020	< 0.10	< 0.0050	< 0.10	< 0.50	< 0.050	< 5.0	---	1.06	< 1.0	**6.02**	---	< 1.0	< 0.050	---	< 0.050	---	< 0.050	< 0.071	---	---	LowTDS	---	< 1.0
	09-Jul-2013	< 5.0	< 5.0	< 0.50	< 0.50	< 5.0	< 0.50	< 0.010	< 0.10	< 0.0020	< 0.10	< 1.0	< 0.020	< 2.0	---	1.90	< 1	**6.19**	< 10	< 1	---	---	< 0.050	---	< 0.050	< 0.071	---	---	Low TDS	---	3.5
	13-Jun-2014	< 5.0	< 5.0	< 0.50	< 0.50	< 5.0	< 0.50	< 0.010	< 0.10	< 0.0020	< 0.10	< 1.0	< 0.020	< 2.0	---	1.80	< 1	**5.52**	< 10	< 1	---	---	< 0.050	---	< 0.020	< 0.054	---	---	Low TDS	---	< 1.0
	25-Jun-2015	< 0.50	< 0.50	< 1.0	< 1.0	< 0.50	< 0.30	< 0.060	< 0.20	< 0.0040	< 0.30	< 0.50	< 0.050	< 0.50	< 0.50	< 1.0	< 0.50	**4.73**	< 10	< 10	---	< 0.044	< 0.010	< 0.033	< 0.010	< 0.020	0.018	0	---	< 0.010	0.56
	20-Sep-2016	< 5.0	< 5.0	< 0.50	< 0.30	< 5.0	< 0.050	< 0.010	< 0.0050	< 0.00010	< 0.050	< 0.050	< 0.020	< 2.0	---	< 2.0	< 1	**5.41**	< 10	< 1	---	---	< 0.020	---	< 0.010	< 0.022	---	---	Low TDS	---	< 1.0
	14-Jul-2017	---	---	---	---	---	< 0.050	< 0.010	< 0.0050	< 0.00010	< 0.050	0.102	---	---	---	---	---	---	< 10	---	---	---	---	---	---	---	---	---	---	---	< 1.0
	02-Aug-2017	< 5.0	< 5.0	< 0.50	< 0.30	< 5.0	0.110	---	0.0108	---	< 0.050	0.085	< 0.020	< 2.0	---	< 2.0	< 1	**6.17**	---	< 1	---	---	< 0.020	---	< 0.010	< 0.022	---	---	Low TDS	---	---
Relative Percent Difference (RPD) Report																															
MW-11	01-Aug-2018	593	< 5.0	9.38	228	< 5.0	148	**7.33**	45.1	**0.626**	4.77	96.4	0.126	486	---	1210	555	8.25	---	**823**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	105	---	6.77
(Duplicate)	01-Aug-2018	615	< 5.0	9.67	229	< 5.0	132	**7.23**	44.8	**0.627**	4.82	96.0	0.126	504	---	1230	514	7.98	---	**819**	---	---	< 0.020	---	< 0.010	< 0.022	---	---	96.3	---	6.54
RPD(%)		**3.6%**	**---**	**3.0%**	**0.4%**	**---**	**11.4%**	**1.4%**	**0.7%**	**0.2%**	**1.0%**	**0.4%**	**0.0%**	**3.6%**	**---**	**1.6%**	**7.7%**	**3.3%**	**---**	**0.5%**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**8.6%**	**---**	**3.5%**

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.

X 3. Highlighting indicates parameters above applied guideline/criteria.

4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.
6. Denotes values exceeding
   (Health Canada, February 2017. Guidelines for Canadian Drinking Water Quality. Aesthetic Objective.
   Summary Table. Prepared by the Federal-Provincial-Territorial Committee on Drinking Water
   of the Federal-Provincial-Territorial Committee on Health and the Environment)
7. Denotes values exceeding
   (Health Canada, February 2017. Guidelines for Canadian Drinking Water Quality. Maximum Acceptable Concentration.
   Summary Table. Prepared by the Federal-Provincial-Territorial Committee on Drinking Water
   of the Federal-Provincial-Territorial Committee on Health and the Environment)
8. Superscript [#1] - Detection limits raised due to dilution to bring analyte within the calibrated range.

Advisian
WorleyParsons Group

Table 4

Groundwater Analytical Results: Dissolved Metals and Trace Elements

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Bismuth (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
Canadian Drinking Water AO Guidelines 2017		**0.1**	---	---	---	---	---	---	---	---	---	**1**	**0.3**	---	---	**0.05**	---	---	---	---	---	---	---	---	---	---	---	---	---	**5**
Canadian Drinking Water MAC Guidelines 2017		---	**0.006**	**0.01**	**1**	---	---	**5**	**0.005**	**0.05**	---	---	---	**0.01**	---	---	**0.001**	---	---	---	**0.05**	---	---	---	---	---	---	---	**0.02**	---	---
Groundwater Monitoring																														
MW-01	07-Mar-2005	0.02	0.0008	0.0008	0.199	< 0.0005	< 0.00005	0.053	< 0.0001	0.0009	0.0017	< 0.0006	**1.02**	0.0004	---	**0.605**	< 0.0001	0.0007	0.0004	---	< 0.0004	---	< 0.0002	0.579	< 0.0005	< 0.0002	0.0013	0.0026	0.0003	0.004
	17-Nov-2005	0.01	0.0005	0.0009	0.143	< 0.0005	< 0.0001	0.046	< 0.0001	< 0.0004	0.0015	0.0007	**1.67**	< 0.0001	---	**0.662**	< 0.0001	0.0013	0.0012	---	< 0.0004	---	< 0.0002	0.551	< 0.0001	< 0.0002	0.0012	0.0023	0.0001	< 0.002
	15-Jun-2006	< 0.01	0.0006	0.0009	0.134	< 0.0005	< 0.00005	0.045	< 0.0001	0.0027	0.0008	< 0.0006	**1.81**	< 0.0001	---	**0.7**	< 0.0001	0.0004	< 0.0001	---	< 0.0004	---	< 0.0002	0.554	< 0.00005	< 0.0002	0.001	0.0022	< 0.0001	0.005
	12-Jul-2007	< 0.01	0.0004	0.0009	0.127	< 0.0005	< 0.00005	0.054	< 0.0001	0.0011	0.0009	< 0.0006	**1.84**	< 0.0001	---	**0.664**	< 0.0001	0.0009	0.003	---	0.0005	---	< 0.0002	0.558	< 0.00005	< 0.0002	0.0008	0.0022	< 0.0001	< 0.002
	19-Dec-2007	< 0.001	< 0.0002	< 0.001	0.11	< 0.001	---	0.05	< 0.0002	< 0.001	0.0009	< 0.0002	< 0.06	< 0.0002	---	**0.67**	< 0.00005	0.0008	0.0027	---	< 0.001	---	< 0.0001	0.53	< 0.0002	< 0.001	0.001	0.0024	< 0.001	< 0.003
	21-Apr-2009	< 0.001	< 0.0002	0.0008	---	< 0.001	---	---	< 0.000005	< 0.001	0.0008	0.0005	< 0.06	< 0.0002	---	**0.66**	0.000001	0.0004	0.0009	---	< 0.0002	---	< 0.0001	---	< 0.0002	< 0.001	< 0.001	0.0021	< 0.001	< 0.003
	05-May-2010	< 0.0050	< 0.00040	0.00095	0.132	< 0.00050	---	0.053	< 0.00010	< 0.0050	0.00088	< 0.0010	**2.02**	< 0.00010	---	**0.730**	< 0.00010	0.00046	0.0025	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	0.00081	0.00209	< 0.00010	< 0.0020
	25-May-2011	0.0051	< 0.00040	0.00093	0.147	< 0.00050	---	< 0.050	< 0.00010	< 0.0050	0.00084	0.0017	**1.53**	< 0.00010	---	**0.675**	< 0.000020	0.00039	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00205	0.00016	0.0074
	29-May-2012	< 0.0050	< 0.00040	0.00088	0.120	< 0.00050	---	< 0.050	< 0.00010	< 0.0050	0.00068	< 0.0010	**1.57**	< 0.00010	---	**0.694**	< 0.000020	0.000423	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00194	< 0.00010	0.0034
	10-Jul-2013	< 0.0050	< 0.00040	0.00098	0.147	< 0.00050	---	< 0.050	< 0.00010	< 0.0050	0.00075	< 0.0010	**1.82**	< 0.00010	---	**0.729**	< 0.000020	0.000360	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00223	< 0.00010	< 0.0030
	16-Jun-2014	< 0.0050	< 0.00040	0.00092	0.144	< 0.00050	---	< 0.050	< 0.00010	< 0.0050	0.00072	< 0.0010	**1.92**	< 0.00010	---	**0.737**	< 0.0000050	0.000281	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00212	< 0.00010	< 0.0030
	29-Jun-2015	0.0038	< 0.00060	0.00079	0.13	< 0.0010	---	0.051	< 0.000020	< 0.0010	0.00076	0.00046	**1.9**	< 0.00020	0.027	**0.71**	---	0.00038	0.00091	< 0.10	< 0.00020	7.1	< 0.00010	0.55	< 0.00020	< 0.0010	< 0.0010	0.0021	< 0.0010	< 0.0030
	19-Sep-2016	< 0.0010	< 0.00010	0.00095	0.137	< 0.00010	---	0.054	< 0.0000050	< 0.00010	0.00073	< 0.00020	**1.76**	< 0.000050	---	**0.699**	< 0.0000050	0.000264	0.00100	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.00199	< 0.00050	0.0013
	13-Jul-2017	< 0.0010	< 0.00010	0.00088	0.131	< 0.00010	---	0.050	< 0.0000050	< 0.00010	0.00069	< 0.00020	**1.93**	< 0.000050	---	**0.714**	< 0.0000050	0.000177	0.00084	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.00209	< 0.00050	< 0.0010
	01-Aug-2018	< 0.0050	< 0.00050	0.00094	0.127	---	---	0.088	< 0.000025	< 0.00050	---	< 0.0010	**1.94**	< 0.00025	---	**0.690**	< 0.0000050	---	< 0.0025	---	< 0.00025	---	< 0.000050	---	---	---	---	0.00176	---	< 0.0050
MW-02	07-Mar-2005	0.02	0.001	0.0025	0.204	< 0.0005	< 0.00005	0.12	< 0.0001	0.0013	0.0008	0.0015	0.275	0.0004	---	**0.236**	0.0001	0.0046	< 0.0001	---	0.0008	---	< 0.0002	1.03	< 0.0005	< 0.0002	0.0012	0.0032	0.0017	0.004
	17-Nov-2005	0.03	0.0006	0.0014	0.152	< 0.0005	< 0.0001	0.189	< 0.0001	< 0.0004	0.0031	0.0021	0.085	< 0.0001	---	**0.671**	< 0.0001	0.0148	0.0644	---	0.0006	---	< 0.0002	1.54	0.00006	< 0.0002	0.0015	0.0053	0.0005	< 0.002
	15-Jun-2006	< 0.01	0.0007	0.0024	0.107	< 0.0005	0.00005	0.152	< 0.0001	0.004	0.0031	0.0011	**3.19**	< 0.0001	---	**1.09**	< 0.0001	0.0009	0.0012	---	0.0005	---	< 0.0002	1.46	< 0.00005	< 0.0002	0.0012	0.0023	< 0.0001	0.1012
	13-Jul-2007	< 0.01	0.0005	0.0036	0.0749	< 0.0005	< 0.00005	0.136	< 0.0001	< 0.0004	0.0032	0.0007	**8.72**	< 0.0001	---	**0.841**	< 0.0001	0.0008	0.0055	---	< 0.0004	---	< 0.0002	1.46	< 0.00005	< 0.0002	0.0011	0.0019	< 0.0001	< 0.002
	19-Dec-2007	< 0.001	< 0.0002	0.003	0.04	< 0.001	---	0.13	< 0.0002	0.004	0.0026	0.0005	< 0.06	0.0003	---	**0.7**	< 0.00005	0.0006	0.0046	---	< 0.001	---	< 0.0001	1.3	< 0.0002	< 0.001	0.002	0.0014	0.002	< 0.003
	21-Apr-2009	< 0.001	< 0.0002	0.0038	---	< 0.001	---	---	< 0.000005	< 0.001	0.0017	0.0002	**1.5**	< 0.0002	---	**0.53**	0.000001	0.0005	0.0019	---	< 0.0002	---	< 0.0001	---	< 0.0002	< 0.001	< 0.001	0.0014	< 0.001	< 0.003
	05-May-2010	< 0.0050	< 0.00040	0.00369	0.0544	< 0.00050	---	0.144	< 0.00010	< 0.0050	0.00157	< 0.0010	**9.35**	< 0.00010	---	**0.505**	< 0.00010	0.00041	0.0043	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	0.00104	0.00139	< 0.00010	0.0044
	25-May-2011	< 0.0050	< 0.00040	0.00327	0.0420	< 0.00050	---	0.135	< 0.00010	< 0.0050	0.00100	< 0.0010	**9.25**	< 0.00010	---	**0.434**	< 0.000020	0.00040	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00114	< 0.00010	0.0025
	30-May-2012	0.0106	< 0.00040	0.00312	0.0586	< 0.00050	---	0.133	< 0.00010	< 0.0050	0.00103	< 0.0010	**8.07**	< 0.00010	---	**0.431**	< 0.000020	0.000615	0.0027	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00123	< 0.00010	0.0031
	10-Jul-2013	< 0.0050	< 0.00040	0.00340	0.0850	< 0.00050	---	0.200	< 0.00010	< 0.0050	0.00072	< 0.0010	**12.3**	< 0.00010	---	**0.554**	< 0.000020	0.000324	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00102	< 0.00010	< 0.0030
	16-Jun-2014	< 0.0050	< 0.00040	0.00319	0.0659	< 0.00050	---	0.163	< 0.00010	< 0.0050	0.00059	< 0.0010	**10.8**	< 0.00010	---	**0.446**	< 0.0000050	0.00037	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00060	0.00097	< 0.00020	< 0.0030
	28-Aug-2014	< 0.0050	< 0.00040	0.00302	0.0686	---	---	0.144	< 0.00010	< 0.0050	---	< 0.0010	**8.49**	< 0.00010	---	**0.488**	0.0000059	---	< 0.0020	---	< 0.00040	---	< 0.00010	---	---	---	---	0.00132	---	< 0.0030
	25-Jun-2015	0.0035	< 0.00060	0.0028	0.092	< 0.0010	---	0.21	< 0.000020	< 0.0010	0.00043	< 0.00020	**11**	< 0.00020	0.078	**0.41**	---	0.00036	0.00072	< 0.10	< 0.00020	8.5	< 0.00010	1.5	< 0.00020	< 0.0010	< 0.0010	0.00086	< 0.0010	< 0.0030
	19-Sep-2016	< 0.0020	< 0.00020	0.00322	0.114	< 0.00020	---	0.235	< 0.000010	< 0.00020	0.00035	< 0.00040	**9.74**	< 0.00010	---	**0.384**	< 0.0000050	0.00048	< 0.0010	---	< 0.00010	---	< 0.000020	---	< 0.000020	---	< 0.00060	0.000897	< 0.0010	0.0042
	13-Jul-2017	< 0.0010	< 0.00010	0.00345	0.124	< 0.00010	---	0.150	< 0.0000050	< 0.00010	0.00057	< 0.00020	**7.99**	0.000078	---	**0.372**	< 0.0000050	0.000337	0.00105	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.00127	< 0.00050	< 0.0010
	29-Sep-2017	< 0.0010	< 0.00010	0.00336	0.191	< 0.00010	---	0.183	< 0.0000050	< 0.00010	0.00038	< 0.00020	**11.2**	< 0.000050	---	**0.467**	< 0.0000050	0.000496	0.00091	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.000912	< 0.00050	< 0.0010
	02-Aug-2018	< 0.0050	< 0.00050	0.00329	0.129	---	---	0.194	< 0.000025	< 0.00050	---	< 0.0010	**7.79**	< 0.00025	---	**0.387**	< 0.0000050	---	< 0.0025	---	< 0.00025	---	< 0.000050	---	---	---	---	0.00119	---	< 0.0050
MW-03	07-Mar-2005	< 0.01	0.0007	0.0012	0.0744	< 0.0005	< 0.00005	0.128	< 0.0001	0.0009	0.0012	< 0.0006	**3.19**	< 0.0001	---	**0.264**	< 0.0001	0.0008	< 0.0001	---	< 0.0004	---	< 0.0002	0.811	< 0.0005	< 0.0002	0.001	0.0007	< 0.0001	0.003
	17-Nov-2005	0.01	0.0006	0.0014	0.0418	< 0.0005	0.00009	0.119	< 0.0001	< 0.0004	0.0008	0.0008	**4.47**	< 0.0001	---	**0.239**	< 0.0001	0.0015	0.0003	---	0.0005	---	< 0.0002	0.828	< 0.0001	< 0.0002	0.0019	0.0007	< 0.0001	< 0.002
	15-Jun-2006	< 0.01	0.0006	0.0013	0.0411	< 0.00045	< 0.00005	0.109	< 0.0001	0.0029	0.0008	0.0007	**4.85**	< 0.0001	---	**0.258**	< 0.0001	0.0007	< 0.0001	---	0.0005	---	< 0.0002	0.845	< 0.00005	< 0.0002	0.001	0.0007	< 0.0001	0.01
	12-Jul-2007	< 0.01	0.0004	0.0014	0.0379	< 0.0005	< 0.00005	0.115	< 0.0001	0.0012	0.0008	< 0.0006	**4.89**	0.0005	---	**0.249**	0.00009	0.0029	< 0.00001	---	< 0.0002	---	< 0.0002	0.001	0.0007	0.882	< 0.00005	0.0002	< 0.001	< 0.002
	19-Dec-2007	< 0.001	< 0.0002	< 0.001	0.03	< 0.001	---	0.11	< 0.0002	0.002	0.0008	0.0002	< 0.06	0.0002	---	**0.25**	< 0.00005	0.0012	0.0042	---	< 0.001	---	< 0.0001	0.82	< 0.0002	< 0.001	0.002	0.0006	0.001	< 0.003
	21-Apr-2009	< 0.001	< 0.0002	0.0013	---	< 0.001	---	---	< 0.000005	< 0.001	0.0006	0.0007	< 0.06	< 0.0002	---	**0.24**	0.000001	0.0007	0.001	---	< 0.0002	---	< 0.0001	---	< 0.0002	< 0.001	< 0.001	0.0006	< 0.001	< 0.003
	06-May-2010	< 0.0050	< 0.00040	0.00154	0.0380	< 0.00050	---	0.116	< 0.00010	< 0.0050	0.00076	< 0.0010	**5.23**	< 0.00010	---	**0.253**	< 0.00010	0.00079	0.0027	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	0.00079	0.00056	0.00036	< 0.0020
	02-Jun-2011	< 0.0050	< 0.00040	0.00141	0.0389	< 0.00050	---	0.103	< 0.00010	< 0.0050	0.00061	< 0.0010	**5.55**	< 0.00010	---	**0.277**	< 0.000020	0.00056	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00058	< 0.00010	< 0.0020
	29-May-2012	< 0.0050	< 0.00040	0.00132	0.0350	< 0.00050	---	0.088	< 0.00010	< 0.0050	0.00062	< 0.0010	**4.83**	< 0.00010	---	**0.246**	< 0.000020	0.000535	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00051	< 0.00010	< 0.0030
	10-Jul-2013	< 0.0050	< 0.00040	0.00147	0.0431	< 0.00050	---	0.098	< 0.00010	< 0.0050	0.00073	< 0.0010	**5.36**	< 0.00010	---	**0.274**	< 0.000020	0.000682	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00064	< 0.00010	< 0.0030
	16-Jun-2014	< 0.0050	< 0.00040	0.00143	0.0428	< 0.00050	---	0.097	< 0.00010	< 0.0050	0.00070	< 0.0010	**5.13**	< 0.00010	---	**0.263**	< 0.0000050	0.000496	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00058	< 0.00010	< 0.0030
	29-Jun-2015	0.0031	< 0.00060	0.0014	0.043	< 0.0010	---	0.12	< 0.000020	< 0.0010	0.00074	0.00036	**5.4**	< 0.00020	0.042	**0.27**	---	0.00073	0.00083	< 0.10	< 0.00020	8.4	< 0.00010	0.88	< 0.00020	< 0.0010	< 0.0010	0.00059	< 0.0010	0.0097
	19-Sep-2016	< 0.0010	< 0.00010	0.00154	0.0426	< 0.00010	---	0.122	< 0.0000050	< 0.00010	0.00069	< 0.00020	**5.22**	< 0.000050	---	**0.269**	< 0.0000050	0.000443	0.00098	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.000561	< 0.00050	< 0.0010
	13-Jul-2017	< 0.0010	< 0.00010	0.00148	0.0431	< 0.00010	---	0.105	< 0.0000050	< 0.00010	0.00071	< 0.00020	**5.50**	0.000094	---	**0.282**	< 0.0000050	0.000371	0.00096	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.000619	< 0.00050	< 0.0010
(Duplicate)	13-Jul-2017	< 0.0010	< 0.00010	0.00138	0.0437	< 0.00010	---	0.111	< 0.0000050	< 0.00010	0.00066	< 0.00020	**5.20**	0.000090	---	**0.260**	< 0.0000050	0.000407	0.00088	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.000597	< 0.00050	< 0.0010
	31-Jul-2018	**0.327**	< 0.00010	0.00197	0.0523	---	---	0.098	0.0000156	0.00088	---	0.00126	**6.22**	0.000295	---	**0.297**	< 0.0000050	---	0.00232	---	< 0.000050	---	< 0.000010	---	---	---	---	0.000478	---	0.0029

Advisian
WorleyParsons Group

Table 4

Groundwater Analytical Results: Dissolved Metals and Trace Elements

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Bismuth (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
Canadian Drinking Water AO Guidelines 2017		**0.1**	---	---	---	---	---	---	---	---	---	**1**	**0.3**	---	---	**0.05**	---	---	---	---	---	---	---	---	---	---	---	---	---	**5**
Canadian Drinking Water MAC Guidelines 2017		---	**0.006**	**0.01**	**1**	---	---	**5**	**0.005**	**0.05**	---	---	---	**0.01**	---	---	**0.001**	---	---	---	**0.05**	---	---	---	---	---	---	**0.02**	---	---
MW-04	08-Mar-2005	< 0.01	0.0009	0.0011	0.0737	< 0.0005	< 0.00005	0.101	< 0.0001	0.0018	0.0007	0.0008	0.173	0.0002	---	**0.152**	< 0.0001	0.0005	< 0.0001	---	0.0006	---	< 0.0002	0.561	< 0.0005	< 0.0002	0.0007	0.0029	< 0.0001	0.004
	17-Nov-2005	< 0.01	0.0007	0.0006	0.0809	< 0.0005	0.00007	0.093	< 0.0001	0.0007	0.0049	0.0012	0.104	< 0.0001	---	**0.053**	0.0002	0.003	0.014	---	0.0009	---	< 0.0002	0.616	< 0.0001	< 0.0002	0.0004	0.0025	< 0.0001	0.029
(Duplicate)	17-Nov-2005	0.01	0.0006	0.0007	0.0817	< 0.0005	0.00005	0.097	< 0.0001	0.0009	0.0051	0.0012	0.105	< 0.0001	---	**0.053**	0.0001	0.0028	0.0132	---	0.0009	---	< 0.0002	0.609	< 0.0001	< 0.0002	0.0004	0.0026	< 0.0001	0.032
	14-Jun-2006	< 0.01	0.0008	0.0006	0.764	< 0.0005	< 0.00005	0.092	< 0.0001	0.0017	< 0.0001	0.0009	0.005	< 0.0001	---	**0.13**	< 0.0001	0.0005	0.0007	---	0.001	---	< 0.0002	0.585	< 0.00005	< 0.0002	0.0003	0.0028	0.0022	0.005
	13-Jul-2007	< 0.01	< 0.0004	0.0008	0.085	< 0.0005	< 0.00005	0.1	< 0.0001	0.0047	0.0001	< 0.0006	< 0.005	< 0.0001	---	0.009	0.0002	0.0005	0.0042	---	0.0006	---	< 0.0002	0.59	0.00024	< 0.0002	0.0004	0.0027	0.0009	0.005
	19-Dec-2007	< 0.001	< 0.0002	< 0.001	0.08	< 0.001	---	0.09	< 0.0002	0.001	< 0.0003	0.0006	< 0.06	0.0002	---	0.016	< 0.00005	0.0006	0.0052	---	< 0.001	---	< 0.0001	0.61	< 0.0002	< 0.001	0.002	0.0023	< 0.001	< 0.003
	21-Apr-2009	< 0.001	< 0.0002	< 0.0002	---	< 0.001	---	---	0.000024	< 0.001	< 0.0003	0.0009	< 0.06	< 0.0002	---	0.03	0.000003	0.0004	0.0021	---	< 0.0002	---	< 0.0001	---	< 0.0002	< 0.001	< 0.001	0.0029	< 0.001	< 0.003
	06-May-2010	< 0.0050	< 0.00040	0.00117	0.0843	< 0.00050	---	0.098	< 0.00010	< 0.0050	0.00054	< 0.0010	0.078	< 0.00010	---	**0.258**	< 0.00010	0.00038	0.0047	---	0.00106	---	< 0.00010	---	< 0.000050	---	0.00046	0.00284	0.00072	< 0.0020
	07-Jun-2011	< 0.0050	< 0.00040	< 0.00040	0.0832	< 0.00050	---	0.090	< 0.00010	< 0.0050	0.00015	< 0.0010	0.028	< 0.00010	---	**0.114**	< 0.000020	0.00038	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00333	< 0.00010	< 0.0020
	30-May-2012	0.0135	< 0.00040	0.00054	0.0954	< 0.00050	---	0.086	< 0.00010	< 0.0050	0.00088	< 0.0010	**1.47**	< 0.00010	---	**0.722**	< 0.000020	0.000398	0.0024	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00396	< 0.00010	< 0.0030
(Duplicate)	30-May-2012	0.0112	< 0.00040	0.00059	0.0967	< 0.00050	---	0.087	< 0.00010	< 0.0050	0.00088	< 0.0010	**1.73**	< 0.00010	---	**0.861**	< 0.000020	0.000326	0.0022	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	0.00041	0.00404	< 0.00010	< 0.0030
	09-Jul-2013	< 0.0050	< 0.00040	0.00065	0.103	< 0.00050	---	0.091	< 0.00010	< 0.0050	0.00058	< 0.0010	**1.70**	< 0.00010	---	**0.561**	< 0.000020	0.000359	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00392	< 0.00010	< 0.0030
	13-Jun-2014	< 0.0050	< 0.00040	0.00053	0.109	< 0.00050	---	0.069	< 0.00010	< 0.0050	0.00035	< 0.0010	**1.39**	< 0.00010	---	**0.494**	< 0.0000050	0.000297	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00390	< 0.00010	< 0.0030
	29-Jun-2015	0.0035	< 0.00060	0.00057	0.11	< 0.0010	---	0.094	< 0.000020	< 0.0010	0.00042	< 0.00020	**1.9**	< 0.00020	0.041	**0.54**	---	0.00039	0.0018	< 0.10	< 0.00020	4.9	< 0.00010	0.63	< 0.00020	< 0.0010	< 0.0010	0.0038	< 0.0010	< 0.0030
	19-Sep-2016	< 0.0010	< 0.00010	0.00062	0.123	< 0.00010	---	0.094	< 0.0000050	< 0.00010	0.00044	< 0.00020	**2.33**	< 0.000050	---	**0.621**	< 0.0000050	0.000220	0.00221	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.00348	< 0.00050	< 0.0010
	13-Jul-2017	< 0.0010	< 0.00010	0.00077	0.118	< 0.00010	---	0.087	< 0.0000050	< 0.00010	0.00043	< 0.00020	**2.24**	0.000073	---	**0.616**	< 0.0000050	0.000189	0.00210	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.00357	< 0.00050	< 0.0010
	31-Jul-2018	< 0.0050	< 0.00050	0.00079	0.108	---	---	0.093	< 0.000025	< 0.00050	---	< 0.0010	**2.19**	< 0.00025	---	**0.548**	< 0.0000050	---	0.0026	---	< 0.00025	---	< 0.000050	---	---	---	---	0.00330	---	< 0.0050
MW-05	08-Mar-2005	< 0.01	0.0008	0.0035	0.0618	< 0.0005	< 0.00005	0.14	< 0.0001	0.0009	0.0008	< 0.0006	**1.14**	0.0002	---	**0.402**	< 0.0001	0.0022	< 0.0001	---	0.0004	---	< 0.0002	0.71	< 0.0005	< 0.0002	0.0008	0.0014	0.0002	0.003
	17-Nov-2005	< 0.01	0.0005	0.0081	0.0564	< 0.0005	0.00006	0.116	< 0.0001	< 0.0004	0.001	0.0007	**3.31**	< 0.0001	---	**0.531**	< 0.0001	0.0029	0.0022	---	0.0004	---	< 0.0002	0.667	< 0.0001	< 0.0002	0.0009	0.0008	0.0001	< 0.002
	14-Jun-2006	< 0.01	0.0007	0.0051	0.454	< 0.0005	< 0.00005	0.081	< 0.0001	0.0016	0.0007	0.0006	**3.48**	< 0.0001	---	**0.583**	< 0.0001	0.0013	0.0002	---	< 0.0004	---	< 0.0002	0.659	< 0.00005	< 0.0002	0.0005	0.0007	0.0008	0.004
	13-Jul-2007	< 0.01	0.0005	0.0018	0.0455	< 0.0005	< 0.00005	0.052	< 0.0001	0.0005	0.0008	0.0009	**4**	< 0.0001	---	**0.682**	< 0.0001	0.0006	0.0034	---	0.0005	---	< 0.0002	0.684	< 0.00005	< 0.0002	0.0006	0.0007	< 0.0001	0.005
	19-Dec-2007	< 0.001	< 0.0002	0.001	0.04	< 0.001	---	0.06	< 0.0002	0.003	0.0007	< 0.0002	< 0.06	0.0002	---	**0.66**	< 0.00005	0.0005	0.0029	---	< 0.001	---	< 0.0001	0.63	< 0.0002	< 0.001	0.002	0.0007	0.001	< 0.003
	21-Apr-2009	< 0.001	< 0.0002	0.0014	---	< 0.001	---	---	< 0.000005	< 0.001	0.0007	0.0008	< 0.06	< 0.0002	---	**0.72**	0.000001	0.0006	0.0014	---	< 0.0002	---	< 0.0001	---	< 0.0002	< 0.001	< 0.001	0.0007	< 0.001	< 0.003
	29-Apr-2010	< 0.0050	0.00052	0.00170	0.0478	< 0.00050	---	0.064	< 0.00010	< 0.0050	0.00082	< 0.0010	**3.39**	< 0.00010	---	**0.758**	< 0.00010	0.00063	0.0039	---	0.00086	---	< 0.00010	---	< 0.000050	---	0.00088	0.00070	0.00017	0.0025
	25-May-2011	< 0.0050	< 0.00040	0.00159	0.0552	< 0.00050	---	0.052	< 0.00010	< 0.0050	0.00075	< 0.0010	**3.82**	< 0.00010	---	**0.657**	< 0.000020	0.00042	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00066	< 0.00010	< 0.0020
	29-May-2012	< 0.0050	< 0.00040	0.00107	0.0455	< 0.00050	---	< 0.050	< 0.00010	< 0.0050	0.00067	< 0.0010	**3.83**	< 0.00010	---	**0.707**	< 0.000020	0.000321	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00063	< 0.00010	< 0.0030
	08-Jul-2013	< 0.0050	< 0.00040	0.00136	0.0547	< 0.00050	---	0.050	< 0.00010	< 0.0050	0.00082	< 0.0010	**3.17**	< 0.00010	---	**0.754**	< 0.000020	0.000414	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00060	< 0.00010	0.0049
	13-Jun-2014	< 0.0050	< 0.00040	0.00173	0.0486	< 0.00050	---	< 0.050	< 0.00010	< 0.0050	0.00081	< 0.0010	**4.37**	< 0.00010	---	**0.758**	< 0.0000050	0.000415	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00071	< 0.00010	< 0.0030
	25-Jun-2015	< 0.0030	< 0.00060	0.0018	0.051	< 0.0010	---	0.059	< 0.000020	< 0.0010	0.00084	0.00056	**4.8**	< 0.00020	0.041	**0.71**	---	0.00054	0.00091	< 0.10	< 0.00020	6.6	< 0.00010	0.69	< 0.00020	< 0.0010	< 0.0010	0.00072	< 0.0010	0.0034
	19-Sep-2016	< 0.0010	< 0.00010	0.00122	0.0504	< 0.00010	---	0.057	< 0.0000050	< 0.00010	0.00076	< 0.00020	**4.39**	< 0.000050	---	**0.757**	< 0.0000050	0.000272	0.00130	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.000706	< 0.00050	0.0013
	13-Jul-2017	0.0022	< 0.00010	0.00200	0.0515	< 0.00010	---	0.055	< 0.0000050	< 0.00010	0.00084	< 0.00020	**4.82**	< 0.000050	---	**0.742**	< 0.0000050	0.000296	0.00127	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.000755	< 0.00050	< 0.0010
	31-Jul-2018	0.0015	< 0.00010	0.00251	0.0520	---	---	0.045	< 0.0000050	< 0.00010	---	< 0.00020	**4.93**	< 0.000050	---	**0.785**	< 0.0000050	---	0.00125	---	< 0.000050	---	< 0.000010	---	---	---	---	0.000532	---	0.0013
MW-06	08-Mar-2005	< 0.01	0.0009	0.0042	0.071	< 0.0005	< 0.00005	0.148	< 0.0001	0.0035	0.0012	0.0011	**2.92**	0.0004	---	**1.32**	< 0.0001	0.0014	< 0.0001	---	0.0005	---	< 0.0002	1.2	< 0.0005	< 0.0002	0.0008	0.0023	0.0002	0.004
	17-Nov-2005	0.01	0.0005	0.0038	0.0557	< 0.0005	0.00006	0.16	< 0.0001	< 0.0004	0.0012	0.0012	**2.96**	< 0.0001	---	**0.943**	< 0.0001	0.0015	0.0004	---	0.0005	---	< 0.0002	1.26	< 0.0001	< 0.0002	0.0015	0.0015	0.0001	< 0.002
	16-Jun-2006	< 0.01	0.0009	0.0034	0.0666	< 0.0005	< 0.00005	0.149	< 0.0001	0.0015	0.0007	0.0014	**3.58**	< 0.0001	---	**1.01**	< 0.0001	0.0014	< 0.0001	---	0.0007	---	< 0.0002	1.28	< 0.0005	< 0.0002	0.001	0.0016	< 0.001	0.008
	12-Jul-2007	< 0.01	0.0005	0.0042	0.043	< 0.0005	< 0.00005	0.159	< 0.0001	0.0014	0.0009	0.0014	**4.5**	< 0.0001	---	**1.28**	< 0.0001	0.0016	0.006	---	< 0.0004	---	< 0.00021	1.42	< 0.0005	< 0.0002	0.0014	0.0016	< 0.0001	0.003
	19-Dec-2007	< 0.001	< 0.0002	0.003	0.03	< 0.001	---	0.13	< 0.0002	0.002	0.0008	0.0011	< 0.06	0.0002	---	**1.5**	< 0.00005	0.0012	0.0052	---	< 0.001	---	< 0.0001	1.4	< 0.0002	< 0.001	0.002	0.0018	0.001	< 0.003
	22-Apr-2009	< 0.001	< 0.0002	0.005	---	< 0.001	---	---	0.000009	< 0.001	0.0004	< 0.0002	**5.7**	< 0.0002	---	**1.7**	< 0.000001	0.001	0.0015	---	< 0.0002	---	< 0.0001	---	< 0.0002	< 0.001	< 0.001	0.0017	< 0.001	< 0.003
	06-May-2010	< 0.0050	< 0.00040	0.00507	0.0353	< 0.00050	---	0.150	< 0.00010	< 0.0050	0.00052	0.0012	**5.38**	< 0.00010	---	**1.39**	< 0.00010	0.00094	0.0039	---	0.00041	---	< 0.00010	---	< 0.000050	---	0.00125	0.00146	0.00016	0.0063
	07-Jun-2011	0.0288	< 0.00040	0.00570	0.0309	< 0.00050	---	0.138	< 0.00010	< 0.0050	0.00036	< 0.0010	**5.55**	< 0.00010	---	**1.64**	< 0.000020	0.00080	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	0.00063	0.00180	0.00016	< 0.0020
	29-May-2012	0.0104	< 0.00040	0.00525	0.0265	< 0.00050	---	0.122	< 0.00010	< 0.0050	0.00030	< 0.0010	**6.02**	< 0.00010	---	**1.70**	< 0.000020	0.000878	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00173	< 0.00010	0.0036
	08-Jul-2013	< 0.0050	< 0.00040	0.00544	0.0315	< 0.0010	---	0.123	< 0.00010	< 0.0050	0.00036	< 0.0010	**5.84**	< 0.00010	---	**1.72**	< 0.000020	0.00097	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.00010	---	< 0.00060	0.00158	< 0.00020	< 0.0030
	12-Jun-2014	< 0.0050	< 0.00040	0.00505	0.0315	< 0.00050	---	0.112	< 0.00010	< 0.0050	0.00030	< 0.0010	**5.93**	< 0.00010	---	**1.62**	< 0.0000050	0.00084	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00060	0.00169	< 0.00020	< 0.0030
	25-Jun-2015	< 0.0030	< 0.00060	0.0045	0.033	< 0.0010	---	0.15	< 0.000020	< 0.0010	< 0.00030	< 0.00020	**6.1**	< 0.00020	0.11	**1.5**	---	0.0010	< 0.00050	0.18	< 0.00020	7.6	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.0016	< 0.0010	< 0.0030
	20-Sep-2016	< 0.0020	< 0.00020	0.00556	0.0303	< 0.00020	---	0.147	< 0.000010	< 0.00020	0.00025	< 0.00040	**5.88**	< 0.00010	---	**1.63**	< 0.0000050	0.00089	< 0.0010	---	< 0.00010	---	< 0.000020	---	< 0.000020	---	< 0.00060	0.00179	< 0.0010	< 0.0020
	13-Jul-2017	0.0124	< 0.00020	0.00532	0.0276	< 0.00020	---	0.132	< 0.000010	< 0.00020	0.00027	< 0.00040	**5.83**	< 0.00010	---	**1.63**	< 0.0000050	0.00090	< 0.0010	---	< 0.00010	---	< 0.000020	---	< 0.000020	---	< 0.00060	0.00174	< 0.0010	< 0.0020
	31-Jul-2018	**0.131**	< 0.00050	0.00607	0.0322	---	---	0.148	< 0.000025	< 0.00050	---	< 0.0010	**6.76**	< 0.00025	---	**1.74**	< 0.0000050	---	< 0.0025	---	< 0.00025	---	< 0.000050	---	---	---	---	0.00166	---	< 0.0050
MW-07	09-Mar-2005	< 0.01	0.0008	0.0017	0.0733	< 0.0005	< 0.00005	0.366	< 0.0001	0.0017	0.0026	0.0024	**10.4**	0.0004	---	**1.88**	< 0.0001	0.001	< 0.0001	---	0.0008	---	< 0.0002	2.49	< 0.0005	< 0.0002	0.0012	0.0018	< 0.0001	0.006
	17-Nov-2005	< 0.01	0.0007	0.0019	0.053	< 0.0005	0.00005	0.311	< 0.0001	< 0.0004	0.002	0.0018	**10.9**	< 0.0001	---	**1.83**	< 0.0001	0.001	< 0.0001	---	< 0.0004	---	< 0.0002	2.45	< 0.0001	< 0.0002	0.0009	0.0017	< 0.0001	< 0.002
	16-Jun-2006	< 0.01	0.0007	0.0022	0.0543	< 0.0005	< 0.00005	0.312	< 0.0001	0.0018	0.0012	0.0023	< 0.005	< 0.0001	---	**1.86**	< 0.0001	0.0008	< 0.0001	---	0.0007	---	< 0.0002	2.58	< 0.00005	< 0.0002	0.001	0.0017	< 0.0001	0.006
	12-Jul-2007	< 0.01	0.0005	0.0027	0.0596	< 0.0005	< 0.00005	0.289	< 0.0001	0.0011	0.0014	0.0015	**10.9**	< 0.0001	---	**1.78**	< 0.0001	0.0012	0.0056	---	0.0008	---	< 0.0002	2.49	< 0.00005	< 0.0002	0.0011	0.0016	< 0.0001	0.002
	19-Dec-2007	< 0.001	< 0.0002	0.001	0.04	< 0.001	---	0.26	< 0.0002	0.004	0.0013	0.0016	< 0.06	0.0003	---	**1.6**	< 0.00005	0.0011	0.0059	---	< 0.001	---	< 0.0001	2.2	< 0.0002	< 0.001	0.002	0.0014	0.002	0.003
	22-Apr-2009	< 0.001	< 0.0002	0.0021	---	< 0.001	---	---	0.000016	< 0.001	0.0013	0.0007	**14**	< 0.0002	---	**2.3**	< 0.000001	0.0004	0.0024	---	< 0.0002	---	< 0.0001	---	< 0.0002	< 0.001	< 0.001	0.0016	< 0.001	< 0.003
	05-May-2010	< 0.0050	< 0.00040	0.00361	0.0490	< 0.00050	---	0.279	< 0.00010	< 0.0050	0.00128	0.0014	**12.5**	< 0.00010	---	**1.90**	< 0.00010	0.00097	0.0056	---	0.00127	---	< 0.00010	---	< 0.000050	---	0.00109	0.00156	< 0.00010	0.0057
	08-Jun-2011	< 0.0050	< 0.00040	0.00570	0.0954	< 0.00050	---	0.215	< 0.00010	< 0.0050	0.00116	< 0.0010	**8.26**	< 0.00010	---	**1.21**	< 0.000020	0.00151	0.0021	---	< 0.00040	---	< 0.00010	---	0.000071	---	0.00030	0.00138	< 0.00010	0.0050
	28-Jul-2011	< 0.0050	< 0.00040	0.00333	0.0483	---	---	0.262	< 0.00010	< 0.0050	---	< 0.0010	**11.7**	< 0.00010	---	**1.84**	< 0.000020	---	< 0.0020	---	< 0.00040	---	< 0.00010	---	---	---	---	0.00152	---	< 0.0030

Advisian
WorleyParsons Group

Table 4

Groundwater Analytical Results: Dissolved Metals and Trace Elements

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Bismuth (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
Canadian Drinking Water AO Guidelines 2017		**0.1**	---	---	---	---	---	---	---	---	---	**1**	**0.3**	---	---	**0.05**	---	---	---	---	---	---	---	---	---	---	---	---	---	**5**
Canadian Drinking Water MAC Guidelines 2017		---	**0.006**	**0.01**	**1**	---	---	**5**	**0.005**	**0.05**	---	---	---	**0.01**	---	---	**0.001**	---	---	---	**0.05**	---	---	---	---	---	---	**0.02**	---	---
MW-07 (Cont.)	30-May-2012	0.0116	< 0.00040	0.00376	0.0544	< 0.00050	---	0.240	< 0.00010	< 0.0050	0.00104	< 0.0010	**11.3**	< 0.00010	---	**1.79**	< 0.000020	0.000974	0.0026	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00143	< 0.00010	< 0.0030
	11-Jul-2013	< 0.0050	< 0.00050	0.00382	0.0466	< 0.0025	---	0.276	< 0.00010	< 0.0050	0.00097	< 0.0010	**12.1**	< 0.00025	---	**1.87**	< 0.000020	0.00088	< 0.0020	---	< 0.00050	---	< 0.00010	---	< 0.00025	---	< 0.0015	0.00140	< 0.00050	< 0.0050
	13-Jun-2014	< 0.0050	< 0.00050	0.00319	0.0298	< 0.00050	---	0.226	< 0.00010	< 0.0050	0.00105	< 0.0010	**13.8**	< 0.00025	---	**2.26**	< 0.0000050	0.00067	< 0.0020	---	< 0.00050	---	< 0.00010	---	< 0.000050	---	< 0.0015	0.00170	< 0.00050	< 0.0050
	25-Jun-2015	< 0.0030	< 0.00060	0.0038	0.047	< 0.0010	---	0.29	< 0.000020	< 0.0010	0.0010	< 0.00020	**13**	< 0.00020	0.16	**1.9**	---	0.0010	0.0011	< 0.10	< 0.00020	8.0	< 0.00010	2.6	< 0.00020	< 0.0010	< 0.0010	0.0016	< 0.0010	< 0.0030
	20-Sep-2016	< 0.0050	< 0.00050	0.00383	0.0416	< 0.00050	---	0.300	< 0.000025	< 0.00050	0.00088	< 0.0010	**12.9**	< 0.00025	---	**2.01**	< 0.0000050	0.00078	< 0.0025	---	< 0.00025	---	< 0.000050	---	< 0.000050	---	< 0.0015	0.00159	< 0.0025	< 0.0050
	14-Jul-2017	< 0.0020	< 0.00020	0.00442	0.0503	< 0.00020	---	0.264	< 0.000010	< 0.00020	0.00086	< 0.00040	**11.2**	< 0.00010	---	**1.80**	< 0.0000050	0.00109	< 0.0010	---	< 0.00010	---	< 0.000020	---	< 0.000020	---	< 0.00060	0.00147	< 0.0010	< 0.0020
	31-Jul-2018	< 0.0050	< 0.00050	0.00505	0.0518	---	---	0.282	< 0.000025	< 0.00050	---	< 0.0010	**12.3**	< 0.00025	---	**1.88**	< 0.0000050	---	< 0.0025	---	< 0.00025	---	< 0.000050	---	---	---	---	0.00138	---	< 0.0050
MW-08	09-Mar-2005	< 0.01	0.0006	0.0042	0.084	< 0.0005	< 0.00005	0.244	< 0.0001	0.0011	0.0008	0.001	**5.66**	0.0004	---	**0.474**	< 0.0001	0.0012	< 0.0001	---	0.0004	---	< 0.0002	1.4	< 0.0005	< 0.0002	0.0008	0.0011	< 0.0001	0.003
	15-Nov-2005	< 0.01	0.0005	0.0046	0.115	< 0.0005	0.00009	0.184	< 0.0001	0.0005	0.0009	0.001	**5.16**	< 0.0001	---	**0.384**	< 0.0001	0.0025	< 0.0001	---	0.0005	---	< 0.0002	1.27	< 0.0001	< 0.0002	0.001	0.0015	< 0.0001	< 0.002
	16-Jun-2006	< 0.01	0.0006	0.0044	0.0629	< 0.0005	< 0.00005	0.206	< 0.0001	0.0012	0.0004	0.0011	**6.97**	< 0.0001	---	**0.481**	< 0.0001	0.0011	< 0.0001	---	< 0.0004	---	< 0.0002	1.45	< 0.00005	< 0.0002	0.0008	0.0009	< 0.0001	0.006
	11-Jul-2007	< 0.01	0.0005	0.0052	0.0519	< 0.0005	< 0.00005	0.176	< 0.0001	0.0016	0.0005	0.0012	**7.29**	< 0.0001	---	**0.454**	< 0.0001	0.0016	0.0031	---	< 0.0004	---	< 0.0002	1.59	< 0.00005	< 0.0002	0.0012	0.0008	0.0004	0.004
	19-Dec-2007	< 0.001	< 0.0002	0.002	0.03	< 0.001	---	0.17	< 0.0002	0.003	0.0004	0.0006	< 0.06	0.0002	---	**0.44**	< 0.00005	0.0014	0.0036	---	< 0.001	---	< 0.0001	1.4	< 0.0002	< 0.001	0.002	0.0008	0.001	< 0.003
	21-Apr-2009	< 0.001	< 0.0002	0.0062	---	< 0.001	---	---	< 0.000005	< 0.001	< 0.0003	0.0016	< 0.06	< 0.0002	---	**0.45**	< 0.000001	0.002	0.0017	---	< 0.0002	---	< 0.0001	---	< 0.0002	< 0.001	< 0.001	0.0007	< 0.001	< 0.003
	05-May-2010	< 0.0050	< 0.00040	0.00672	0.0675	< 0.00050	---	0.179	< 0.00010	< 0.0050	0.00035	< 0.0010	**7.22**	< 0.00010	---	**0.470**	< 0.00010	0.00168	0.0027	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	0.00094	0.00072	0.00017	0.0163
	07-Jun-2011	< 0.0050	< 0.00040	0.00667	0.0614	< 0.00050	---	0.180	< 0.00010	< 0.0050	0.00036	< 0.0010	**5.41**	< 0.00010	---	**0.411**	< 0.000020	0.00154	0.0025	---	0.00159	---	< 0.00010	---	< 0.000050	---	0.00144	0.00080	0.00018	0.0116
	30-May-2012	0.0104	< 0.00040	0.00600	0.0499	< 0.00050	---	0.154	< 0.00010	< 0.0050	0.00018	< 0.0010	**6.69**	< 0.00010	---	**0.409**	< 0.000020	0.00137	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00069	< 0.00010	0.0042
	09-Jul-2013	< 0.0050	< 0.00040	0.00767	0.0639	< 0.00050	---	0.163	< 0.00010	< 0.0050	0.00018	< 0.0010	**6.47**	< 0.00010	---	**0.415**	< 0.000020	0.00175	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00067	< 0.00010	< 0.0030
	12-Jun-2014	< 0.0050	< 0.00040	0.00675	0.0551	< 0.00050	---	0.130	< 0.00010	< 0.0050	0.00017	< 0.0010	**7.19**	< 0.00010	---	**0.476**	< 0.0000050	0.00129	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00071	< 0.00010	< 0.0030
	24-Jun-2015	< 0.0030	< 0.00060	0.0054	0.055	< 0.0010	---	0.18	< 0.000020	< 0.0010	< 0.00030	< 0.00020	**7.1**	< 0.00020	0.092	**0.44**	---	0.0014	< 0.00050	< 0.10	< 0.00020	7.7	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.00067	< 0.0010	< 0.0030
	20-Sep-2016	< 0.0010	< 0.00010	0.00700	0.0658	< 0.00010	---	0.183	0.0000056	< 0.00010	0.00016	< 0.00020	**6.96**	< 0.000050	---	**0.441**	< 0.0000050	0.00108	0.00053	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.000699	< 0.00050	0.0015
	02-Aug-2017	0.0053	< 0.00010	0.00530	0.0318	< 0.00010	---	0.204	< 0.0000050	< 0.00010	0.00018	< 0.00020	---	< 0.000050	---	---	< 0.0000050	0.00103	< 0.00050	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.000683	< 0.00050	< 0.0010
	01-Aug-2018	< 0.0050	< 0.00050	0.00513	0.0274	---	---	0.201	< 0.000025	< 0.00050	---	< 0.0010	**8.45**	< 0.00025	---	**0.495**	< 0.0000050	---	< 0.0025	---	< 0.00025	---	< 0.000050	---	---	---	---	0.000728	---	< 0.0050
MW-09	09-Mar-2005	**0.14**	0.0007	0.0019	0.0608	< 0.0005	< 0.00005	0.339	< 0.0001	0.0016	0.0011	0.001	**1.11**	0.0001	---	**0.714**	< 0.0001	0.0019	0.0002	---	< 0.0004	---	< 0.0002	0.843	< 0.0005	< 0.0002	0.0058	0.0019	0.0005	0.003
(Duplicate)	09-Mar-2005	**0.12**	0.0007	0.0019	0.0616	< 0.0005	< 0.00005	0.332	< 0.0001	0.0012	0.0012	0.001	**1.07**	0.0003	---	**0.705**	< 0.0001	0.0019	0.0002	---	< 0.0004	---	< 0.0002	0.841	< 0.0005	< 0.0002	0.0059	0.0018	0.0004	0.004
	17-Nov-2005	0.02	0.0006	0.0018	0.052	< 0.0005	< 0.0001	0.294	< 0.0001	0.0006	0.0023	0.0011	**1.4**	< 0.0001	---	**0.752**	< 0.0001	0.0038	0.0087	---	0.0005	---	< 0.0002	0.869	< 0.0001	< 0.0002	0.0038	0.0015	0.0002	< 0.002
	16-Jun-2006	< 0.01	0.0006	0.0018	0.0389	< 0.0005	< 0.00005	0.289	< 0.0001	0.0013	0.0011	0.0012	**1.44**	< 0.0001	---	**0.797**	< 0.0001	0.0015	< 0.0001	---	< 0.0004	---	< 0.0002	0.861	< 0.00005	< 0.0002	0.0008	0.0014	< 0.0001	0.005
	11-Jul-2007	< 0.01	0.0004	0.002	0.0302	< 0.0005	< 0.00005	0.26	< 0.0001	0.0016	0.0009	0.0008	**1.74**	< 0.0001	---	**0.785**	< 0.0001	0.0017	0.003	---	< 0.0004	---	< 0.0002	0.961	< 0.00005	< 0.0002	0.0009	0.0014	0.0005	< 0.002
	18-Dec-2007	< 0.001	< 0.0002	0.002	0.02	< 0.001	---	0.26	< 0.0002	< 0.001	0.0009	0.0008	< 0.06	< 0.0002	---	**0.77**	< 0.00005	0.0018	0.0023	---	< 0.001	---	< 0.0001	0.81	< 0.0002	< 0.001	0.002	0.0014	< 0.001	0.003
	22-Apr-2009	**0.1**	< 0.0002	0.0023	---	< 0.001	---	---	0.000008	< 0.001	0.0008	0.0003	**1.9**	< 0.0002	---	**0.86**	< 0.000001	0.0016	0.0017	---	< 0.0002	---	< 0.0001	---	< 0.0002	< 0.001	0.005	0.0012	< 0.001	< 0.003
	06-May-2010	< 0.0050	< 0.00040	0.00255	0.0250	< 0.00050	---	0.267	< 0.00010	< 0.0050	0.00085	< 0.0010	**2.04**	< 0.00010	---	**0.828**	< 0.00010	0.00158	0.0027	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	0.00078	0.00121	< 0.00010	< 0.0020
(Duplicate)	06-May-2010	< 0.0050	< 0.00040	0.00257	0.0247	< 0.00050	---	0.261	< 0.00010	< 0.0050	0.00086	< 0.0010	**2.03**	< 0.00010	---	**0.832**	< 0.00010	0.00154	0.0027	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	0.00077	0.00120	< 0.00010	0.0020
	02-Jun-2011	< 0.0050	< 0.00040	0.00280	0.0294	< 0.00050	---	0.255	< 0.00010	< 0.0050	0.00128	< 0.0010	**1.46**	< 0.00010	---	**0.754**	< 0.000020	0.00156	< 0.0020	---	< 0.00040	---	0.00013	---	< 0.000050	---	< 0.00030	0.00132	0.00012	0.0020
(Duplicate)	02-Jun-2011	< 0.0050	< 0.00040	0.00272	0.0296	< 0.00050	---	0.237	< 0.00010	< 0.0050	0.00126	< 0.0010	**1.29**	< 0.00010	---	**0.773**	< 0.000020	0.00152	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00128	0.00015	< 0.0020
	29-May-2012	0.0112	< 0.00040	0.00234	0.0209	< 0.00050	---	0.226	< 0.00010	< 0.0050	0.00080	< 0.0010	**1.89**	< 0.00010	---	**0.784**	< 0.000020	0.00143	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00121	< 0.00010	0.0030
	10-Jul-2013	< 0.0050	< 0.00040	0.00237	0.0243	< 0.0010	---	0.249	< 0.00010	< 0.0050	0.00138	< 0.0010	**1.94**	< 0.00010	---	**0.842**	< 0.000020	0.00154	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.00010	---	< 0.00060	0.00138	< 0.00020	< 0.0030
	13-Jun-2014	< 0.0050	< 0.00040	0.00232	0.0224	< 0.00050	---	0.196	< 0.00010	< 0.0050	0.00120	< 0.0010	**1.85**	< 0.00010	---	**0.868**	< 0.0000050	0.00131	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00132	< 0.00010	< 0.0030
	25-Jun-2015	< 0.0030	< 0.00060	0.0020	0.023	< 0.0010	---	0.27	< 0.000020	< 0.0010	0.0011	< 0.00020	**2.0**	< 0.00020	0.081	**0.80**	---	0.0016	0.00051	< 0.10	< 0.00020	6.4	< 0.00010	0.88	< 0.00020	< 0.0010	< 0.0010	0.0013	< 0.0010	< 0.0030
	20-Sep-2016	< 0.0020	< 0.00020	0.00249	0.0227	< 0.00020	---	0.285	< 0.000010	< 0.00020	0.00118	< 0.00040	**1.93**	< 0.00010	---	**0.822**	< 0.0000050	0.00161	< 0.0010	---	< 0.00010	---	< 0.000020	---	< 0.000020	---	< 0.00060	0.00131	< 0.0010	< 0.0020
(Duplicate)	20-Sep-2016	< 0.0020	< 0.00020	0.00240	0.0227	< 0.00020	---	0.281	< 0.000010	< 0.00020	0.00117	< 0.00040	**1.88**	< 0.00010	---	**0.795**	< 0.0000050	0.00155	< 0.0010	---	< 0.00010	---	< 0.000020	---	< 0.000020	---	< 0.00060	0.00129	< 0.0010	< 0.0020
	14-Jul-2017	< 0.0010	< 0.00010	0.00260	0.0223	< 0.00010	---	0.258	< 0.0000050	< 0.00010	0.00157	< 0.00020	**1.96**	< 0.000050	---	**0.872**	< 0.0000050	0.000861	0.00096	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.00130	< 0.00050	< 0.0010
	01-Aug-2018	< 0.0050	< 0.00050	0.00243	0.0199	---	---	0.268	< 0.000025	< 0.00050	---	< 0.0010	**2.01**	< 0.00025	---	**0.813**	< 0.0000050	---	< 0.0025	---	< 0.00025	---	< 0.000050	---	---	---	---	0.00117	---	< 0.0050
MW-10	09-Mar-2005	< 0.01	0.0007	0.003	0.0296	< 0.0005	< 0.00005	0.209	< 0.0001	0.0012	0.0003	0.0007	**5.29**	0.0004	---	**0.639**	< 0.0001	0.0009	< 0.0001	---	< 0.0004	---	< 0.0002	1.29	< 0.0005	< 0.0002	0.0008	0.0019	< 0.0001	0.003
	16-Nov-2005	< 0.01	0.0006	0.0037	0.0331	< 0.0005	< 0.0001	0.202	< 0.0001	< 0.0004	0.0005	0.0009	**5.49**	< 0.0001	---	**0.642**	< 0.0001	0.001	< 0.0001	---	0.0006	---	< 0.0002	1.43	< 0.0001	< 0.0002	0.0008	0.0015	< 0.0001	< 0.002
	16-Jun-2006	< 0.01	0.0006	0.0036	0.0319	< 0.0005	< 0.00005	0.187	< 0.0001	0.0011	0.0003	0.0009	**5.89**	< 0.0001	---	**0.67**	< 0.0001	0.0009	< 0.0001	---	< 0.0004	---	< 0.0002	1.41	< 0.00005	< 0.0002	0.0007	0.0014	< 0.0001	0.009
	11-Jul-2007	< 0.01	0.0005	0.0039	0.0291	< 0.0005	< 0.00005	0.168	< 0.0001	0.0015	0.0004	0.0008	**5.93**	< 0.0001	---	**0.656**	< 0.0001	0.0009	0.003	---	< 0.0004	---	< 0.0002	1.55	< 0.00005	< 0.0002	0.0007	0.0013	0.0004	0.015
	18-Dec-2007	< 0.001	< 0.0002	0.002	0.02	< 0.001	---	0.16	< 0.0002	< 0.001	0.0005	0.0006	< 0.06	< 0.0002	---	**0.64**	< 0.00005	0.0011	0.0029	---	< 0.001	---	< 0.0001	1.3	< 0.0002	< 0.001	0.002	0.0014	< 0.001	< 0.003
	22-Apr-2009	< 0.001	< 0.0002	0.0044	---	< 0.001	---	---	0.000007	< 0.001	< 0.0003	0.0006	**5.9**	< 0.0002	---	**0.71**	< 0.000001	0.0009	0.001	---	< 0.0002	---	< 0.0001	---	< 0.0002	< 0.001	< 0.001	0.0011	< 0.001	< 0.003
	05-May-2010	< 0.0050	< 0.00040	0.00459	0.0290	< 0.00050	---	0.177	< 0.00010	< 0.0050	0.00044	0.0015	**6.80**	< 0.00010	---	**0.735**	< 0.00010	0.00097	0.0029	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	0.00083	0.00115	< 0.00010	0.0023
	02-Jun-2011	< 0.0050	< 0.00040	0.00287	0.0321	< 0.00050	---	0.170	< 0.00010	< 0.0050	0.00031	< 0.0010	**3.89**	< 0.00010	---	**0.566**	< 0.000020	0.00481	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00133	0.00021	0.0030
	30-May-2012	0.0139	< 0.00040	0.00420	0.0273	< 0.00050	---	0.150	< 0.00010	< 0.0050	0.00032	< 0.0010	**5.98**	< 0.00010	---	**0.655**	< 0.000020	0.000884	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00113	< 0.00010	< 0.0030
	09-Jul-2013	< 0.0050	< 0.00040	0.00485	0.0295	< 0.00050	---	0.162	< 0.00010	< 0.0050	0.00032	< 0.0010	**6.11**	< 0.00010	---	**0.729**	< 0.000020	0.000870	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00116	< 0.00010	< 0.0030
(Duplicate)	09-Jul-2013	< 0.0050	< 0.00040	0.00479	0.0293	< 0.00050	---	0.159	< 0.00010	< 0.0050	0.00031	< 0.0010	**6.03**	< 0.00010	---	**0.710**	< 0.000020	0.000863	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00115	< 0.00010	< 0.0030
	12-Jun-2014	< 0.0050	< 0.00040	0.00463	0.0282	< 0.00050	---	0.127	< 0.00010	< 0.0050	0.00031	< 0.0010	**6.10**	< 0.00010	---	**0.689**	< 0.0000050	0.000770	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00117	< 0.00010	< 0.0030
(Duplicate)	12-Jun-2014	< 0.0050	< 0.00040	0.00450	0.0293	< 0.00050	---	0.129	< 0.00010	< 0.0050	0.00032	< 0.0010	**6.08**	< 0.00010	---	**0.740**	< 0.0000050	0.000782	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00112	< 0.00010	< 0.0030
	24-Jun-2015	< 0.0030	< 0.00060	0.0039	0.030	< 0.0010	---	0.18	< 0.000020	< 0.0010	0.00030	< 0.00020	**6.3**	< 0.00020	0.10	**0.67**	---	0.00088	0.00085	< 0.10	< 0.00020	7.1	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.0012	< 0.0010	< 0.0030
(Duplicate)	24-Jun-2015	< 0.0030	< 0.00060	0.0040	0.030	< 0.0010	---	0.17	< 0.000020	< 0.0010	0.00031	< 0.00020	**6.4**	< 0.00020	0.10	**0.67**	---	0.00087	0.00083	< 0.10	< 0.00020	7.1	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030

Advisian
WorleyParsons Group

Table 4

Groundwater Analytical Results: Dissolved Metals and Trace Elements

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Bismuth (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
Canadian Drinking Water AO Guidelines 2017		**0.1**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**1**	**0.3**	**---**	**---**	**0.05**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**5**
Canadian Drinking Water MAC Guidelines 2017		**---**	**0.006**	**0.01**	**1**	**---**	**---**	**5**	**0.005**	**0.05**	**---**	**---**	**---**	**0.01**	**---**	**---**	**0.001**	**---**	**---**	**---**	**0.05**	**---**	**---**	**---**	**---**	**---**	**---**	**0.02**	**---**	**---**
MW-10 (Cont.)	20-Sep-2016	< 0.0010	< 0.00010	0.00468	0.0300	< 0.00010	---	0.180	< 0.0000050	< 0.00010	0.00031	< 0.00020	**6.01**	< 0.000050	---	**0.676**	< 0.0000050	0.000633	0.00092	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.00113	< 0.00050	< 0.0010
	14-Jul-2017	< 0.0010	< 0.00010	0.00457	0.0311	< 0.00010	---	0.154	< 0.0000050	< 0.00010	0.00032	< 0.00020	**5.98**	0.000056	---	**0.674**	< 0.0000050	0.000458	0.00087	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.00112	< 0.00050	< 0.0010
	01-Aug-2018	0.0192	< 0.00050	0.00453	0.0295	---	---	0.176	< 0.000025	< 0.00050	---	< 0.0010	**6.51**	< 0.00025	---	**0.692**	< 0.0000050	---	< 0.0025	---	< 0.00025	---	< 0.000050	---	---	---	---	0.00111	---	0.0168
MW-11	10-Mar-2005	< 0.01	0.0008	0.0022	0.0494	< 0.0005	< 0.00005	0.189	< 0.0001	0.0011	0.0006	< 0.0006	**6.89**	< 0.0001	---	**0.668**	< 0.0001	0.001	< 0.0001	---	< 0.0004	---	< 0.0002	1.27	< 0.0005	< 0.0002	0.0008	0.0012	0.0001	0.004
	16-Nov-2005	0.02	0.0006	0.0025	0.0466	< 0.0005	0.00008	0.227	< 0.0001	0.0006	0.0007	0.0009	**6.95**	< 0.0001	---	**0.628**	< 0.0001	0.0009	< 0.0001	---	< 0.0004	---	< 0.0002	1.24	< 0.0001	< 0.0002	0.001	0.0012	< 0.0001	< 0.002
	16-Jun-2006	< 0.01	0.0006	0.0022	0.044	< 0.0005	< 0.00005	0.205	< 0.0001	0.0013	0.0003	0.0009	**7.23**	< 0.0001	---	**0.659**	< 0.0001	0.0006	< 0.0001	---	0.0004	---	< 0.0002	1.22	< 0.00005	< 0.0002	0.001	0.0011	< 0.0001	0.009
	11-Jul-2007	< 0.01	0.0004	0.0023	0.0377	< 0.0005	< 0.00005	0.186	< 0.0001	0.0016	0.0004	< 0.0006	**7.15**	< 0.0001	---	**0.632**	< 0.0001	0.0007	0.0027	---	< 0.0004	---	< 0.0002	1.35	< 0.00005	< 0.0002	0.0024	0.0011	0.0004	< 0.002
	18-Dec-2007	< 0.001	< 0.0002	< 0.001	0.03	< 0.001	---	0.18	< 0.0002	< 0.001	0.0006	0.0008	< 0.06	< 0.0002	---	**0.61**	< 0.00005	0.001	0.0027	---	< 0.001	---	< 0.0001	1.1	< 0.0002	< 0.001	0.003	0.0013	< 0.001	< 0.003
	22-Apr-2009	< 0.001	< 0.0002	0.0024	---	< 0.001	---	---	0.000009	< 0.001	0.0004	0.0007	**7**	< 0.0002	---	**0.67**	0.000001	0.0007	0.0008	---	< 0.0002	---	< 0.0001	---	< 0.0002	< 0.001	< 0.001	0.001	< 0.001	< 0.003
	05-May-2010	< 0.0050	< 0.00040	0.00259	0.0396	< 0.00050	---	0.189	< 0.00010	< 0.0050	0.00047	< 0.0010	**7.61**	< 0.00010	---	**0.663**	< 0.00010	0.00072	0.0027	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	0.00102	0.00100	< 0.00010	0.0023
	02-Jun-2011	< 0.0050	< 0.00040	0.00239	0.0423	< 0.00050	---	0.199	< 0.00010	< 0.0050	0.00047	0.0017	**6.99**	< 0.00010	---	**0.687**	< 0.0000020	0.00061	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00109	0.00010	0.0105
	30-May-2012	0.0106	< 0.00040	0.00232	0.0386	< 0.00050	---	0.161	< 0.00010	< 0.0050	0.00038	< 0.0010	**6.82**	< 0.00010	---	**0.605**	< 0.0000020	0.000669	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00100	< 0.00010	< 0.0030
	10-Jul-2013	< 0.0050	< 0.00040	0.00260	0.0424	< 0.00050	---	0.173	< 0.00010	< 0.0050	0.00036	< 0.0010	**7.52**	< 0.00010	---	**0.697**	< 0.0000020	0.000700	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00116	< 0.00010	< 0.0030
	12-Jun-2014	< 0.0050	< 0.00040	0.00255	0.0421	< 0.00050	---	0.135	< 0.00010	< 0.0050	0.00030	< 0.0010	**7.07**	< 0.00010	---	**0.672**	< 0.0000050	0.000539	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	0.00119	0.00099	< 0.00010	< 0.0030
	24-Jun-2015	< 0.0030	< 0.00060	0.0022	0.043	< 0.0010	---	0.19	< 0.000020	< 0.0010	< 0.00030	< 0.00020	**7.4**	< 0.00020	0.079	**0.62**	---	0.00065	< 0.00050	< 0.10	< 0.00020	8.0	< 0.00010	1.2	< 0.00020	< 0.0010	< 0.0010	0.0010	< 0.0010	< 0.0030
	20-Sep-2016	< 0.0010	< 0.00010	0.00262	0.0415	< 0.00010	---	0.206	< 0.0000050	< 0.00010	0.00028	< 0.00020	**6.91**	< 0.000050	---	**0.609**	< 0.0000050	0.000471	< 0.00050	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.000977	< 0.00050	< 0.0010
	14-Jul-2017	< 0.0010	< 0.00010	0.00246	0.0405	< 0.00010	---	0.187	< 0.0000050	< 0.00010	0.00027	< 0.00020	**6.84**	0.000051	---	**0.618**	< 0.0000050	0.000359	< 0.00050	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.00104	< 0.00050	< 0.0010
	01-Aug-2018	0.0082	< 0.00050	0.00257	0.0388	---	---	0.198	< 0.000025	0.00325	---	< 0.0010	**7.33**	< 0.00025	---	**0.626**	< 0.0000050	---	< 0.0025	---	< 0.00025	---	< 0.000050	---	---	---	---	0.000950	---	< 0.0050
(Duplicate)	01-Aug-2018	0.0063	< 0.00050	0.00247	0.0393	---	---	0.194	< 0.000025	< 0.00050	---	< 0.0010	**7.23**	< 0.00025	---	**0.627**	< 0.0000050	---	< 0.0025	---	< 0.00025	---	< 0.000050	---	---	---	---	0.000839	---	< 0.0050
MW-12	10-Mar-2005	< 0.01	0.0008	0.0022	0.153	< 0.0005	< 0.00005	0.234	< 0.0001	0.0038	0.0008	< 0.0006	**2.78**	0.0004	---	**0.365**	< 0.0001	0.0015	< 0.0001	---	< 0.0004	---	< 0.0002	0.915	< 0.0005	< 0.0002	0.0011	0.001	< 0.0001	0.01
	16-Nov-2005	< 0.01	0.0005	0.0026	0.182	< 0.0005	0.00006	0.282	< 0.0001	< 0.0004	0.001	0.0008	**3.37**	< 0.0001	---	**0.402**	< 0.0001	0.0013	< 0.0001	---	< 0.0004	---	< 0.0002	0.903	< 0.0001	< 0.0002	0.0008	0.0011	< 0.0001	< 0.002
	16-Jun-2006	< 0.01	0.0006	0.0023	0.178	< 0.0005	< 0.00005	0.251	< 0.00012	0.0016	0.0007	< 0.0006	**3.76**	< 0.0001	---	**0.436**	< 0.0001	0.0012	< 0.0001	---	< 0.0004	---	< 0.0002	0.925	< 0.00005	< 0.0002	0.0008	0.001	< 0.0001	0.007
	11-Jul-2007	< 0.01	0.0005	0.0025	0.146	< 0.0005	< 0.00005	0.233	< 0.001	0.0015	0.0012	< 0.0006	**3.77**	< 0.0001	---	**0.422**	< 0.0001	0.0017	0.0033	---	< 0.0004	---	< 0.0002	0.972	< 0.00005	< 0.0002	0.0007	0.0009	0.0004	0.004
	18-Dec-2007	< 0.001	< 0.0002	0.002	0.1	< 0.001	---	0.22	< 0.0002	< 0.001	0.0007	< 0.0002	< 0.06	< 0.0002	---	**0.4**	0.00007	0.0014	0.0021	---	< 0.001	---	< 0.0001	0.84	< 0.0002	< 0.001	0.002	0.0011	< 0.001	< 0.003
	22-Apr-2009	< 0.001	< 0.0002	0.0026	---	< 0.001	---	---	0.000006	< 0.001	0.0006	0.0008	**4.1**	< 0.0002	---	**0.45**	0.000001	0.0012	0.0012	---	< 0.0002	---	< 0.0001	---	< 0.0002	< 0.001	< 0.001	0.0008	< 0.001	< 0.003
	06-May-2010	< 0.0050	< 0.00040	0.00285	0.143	< 0.00050	---	0.242	< 0.00010	< 0.0050	0.00065	< 0.0010	**4.24**	< 0.00010	---	**0.456**	< 0.00010	0.00115	0.0022	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	0.00081	0.00083	< 0.00010	< 0.0020
	02-Jun-2011	< 0.0050	< 0.00040	0.00199	0.130	< 0.00050	---	0.244	< 0.00010	< 0.0050	0.00043	< 0.0010	**3.34**	< 0.00010	---	**0.450**	< 0.0000020	0.00102	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00087	< 0.00010	0.0021
	30-May-2012	0.0146	< 0.00040	0.00267	0.112	< 0.00050	---	0.219	< 0.00010	< 0.0050	0.00046	< 0.0010	**4.14**	< 0.00010	---	**0.435**	< 0.0000020	0.00121	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00085	< 0.00010	< 0.0030
	10-Jul-2013	< 0.0050	< 0.00040	0.00285	0.143	< 0.00050	---	0.227	< 0.00010	< 0.0050	0.00045	< 0.0010	**3.99**	< 0.00010	---	**0.457**	< 0.0000020	0.00115	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00094	< 0.00010	< 0.0030
	12-Jun-2014	< 0.0050	< 0.00040	0.00266	0.125	< 0.00050	---	0.178	< 0.00010	< 0.0050	0.00044	< 0.0010	**3.88**	< 0.00010	---	**0.462**	< 0.0000050	0.000921	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00080	< 0.00010	0.0044
	24-Jun-2015	< 0.0030	< 0.00060	0.0022	0.12	< 0.0010	---	0.24	0.000020	< 0.0010	0.00039	< 0.00020	**4.0**	< 0.00020	0.068	**0.42**	---	0.0010	0.0015	< 0.10	< 0.00020	7.3	< 0.00010	0.90	< 0.00020	< 0.0010	< 0.0010	0.00075	< 0.0010	< 0.0030
	20-Sep-2016	0.0024	< 0.00010	0.00280	0.125	< 0.00010	---	0.245	< 0.0000050	< 0.00010	0.00041	< 0.00020	**4.21**	< 0.000050	---	**0.442**	< 0.0000050	0.000685	0.00062	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.000810	< 0.00050	< 0.0010
	14-Jul-2017	< 0.0010	< 0.00010	0.00268	0.122	< 0.00010	---	0.237	< 0.0000050	< 0.00010	0.00037	< 0.00020	**4.18**	< 0.000050	---	**0.437**	< 0.0000050	0.000594	0.00052	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.000867	< 0.00050	< 0.0010
	01-Aug-2018	0.0446	< 0.00010	0.00315	0.124	---	---	0.191	< 0.0000050	0.00013	---	0.00024	**4.17**	0.000063	---	**0.493**	< 0.0000050	---	0.00076	---	< 0.000050	---	< 0.000010	---	---	---	---	0.000667	---	0.0015
MW-13	10-Mar-2005	< 0.01	0.0008	0.0012	0.389	< 0.0005	< 0.00005	0.258	< 0.0001	0.0048	0.0008	< 0.0006	**0.818**	0.0002	---	**0.263**	< 0.0001	0.0023	0.0009	---	< 0.0004	---	< 0.0002	0.57	< 0.0005	< 0.0002	0.0006	0.0008	< 0.0001	0.005
	16-Nov-2005	0.07	0.0006	0.0016	0.413	< 0.0005	< 0.0001	0.301	< 0.0001	0.0007	0.0033	0.0007	**1.08**	0.0002	---	**0.243**	0.0001	0.0027	0.0015	---	0.0005	---	< 0.0002	0.542	< 0.0001	< 0.0002	0.0006	0.0009	< 0.0001	< 0.002
	16-Jun-2006	< 0.01	0.0006	0.0014	0.424	< 0.0005	< 0.00005	0.273	< 0.0001	0.0011	0.0007	< 0.0006	**1.19**	< 0.0001	---	**0.256**	< 0.0001	0.0021	< 0.0001	---	< 0.0004	---	< 0.0002	0.553	< 0.00005	< 0.0002	0.0006	0.0008	< 0.0001	0.009
	11-Jul-2007	< 0.01	0.0004	0.0014	0.428	< 0.0005	< 0.00005	0.246	< 0.0001	0.0016	0.0009	< 0.0006	**1.26**	< 0.0001	---	**0.252**	< 0.0001	0.0023	0.0022	---	< 0.0004	---	< 0.0002	0.58	< 0.00005	< 0.0002	0.0006	0.0008	0.0004	< 0.002
	18-Dec-2007	< 0.001	< 0.0002	0.001	0.29	< 0.001	---	0.25	< 0.0002	< 0.001	0.0009	< 0.0002	< 0.06	< 0.0002	---	**0.25**	0.00007	0.0028	0.0016	---	< 0.001	---	< 0.0001	0.5	< 0.0002	< 0.001	0.002	0.0009	< 0.001	< 0.003
	22-Apr-2009	< 0.001	< 0.0002	0.0015	---	< 0.001	---	---	0.000005	< 0.001	0.0007	0.0003	**1.3**	< 0.0002	---	**0.26**	< 0.000001	0.0022	0.0012	---	< 0.0002	---	< 0.0001	---	< 0.0002	< 0.001	< 0.001	0.0007	< 0.001	< 0.003
	06-May-2010	< 0.0050	< 0.00040	0.00162	0.407	< 0.00050	---	0.254	< 0.00010	< 0.0050	0.00092	< 0.0010	**1.45**	< 0.00010	---	**0.249**	< 0.00010	0.00219	0.0021	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	0.00070	0.00069	< 0.00010	< 0.0020
	02-Jun-2011	< 0.0050	< 0.00040	0.00157	0.411	< 0.00050	---	0.265	< 0.00010	< 0.0050	0.00062	< 0.0010	**1.25**	< 0.00010	---	**0.231**	< 0.0000020	0.00194	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00073	< 0.00010	< 0.0020
	30-May-2012	< 0.0050	< 0.00040	0.00140	0.354	< 0.00050	---	0.197	< 0.00010	< 0.0050	0.00065	< 0.0010	**1.33**	< 0.00010	---	**0.238**	< 0.0000020	0.00180	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00063	< 0.00010	< 0.0030
	10-Jul-2013	< 0.0050	< 0.00040	0.00176	0.462	< 0.00050	---	0.221	< 0.00010	< 0.0050	0.00128	< 0.0010	**1.17**	< 0.00010	---	**0.252**	< 0.0000020	0.00484	0.0112	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	0.00075	< 0.00010	< 0.0030
	12-Jun-2014	0.0371	< 0.00040	0.00179	0.420	< 0.00050	---	0.196	< 0.00010	< 0.0050	0.00074	< 0.0010	**1.30**	< 0.00010	---	**0.245**	< 0.0000050	0.00183	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	0.00148	0.00069	0.00013	< 0.0030
	24-Jun-2015	< 0.0030	< 0.00060	0.0014	0.40	< 0.0010	---	0.26	< 0.000020	< 0.0010	0.00062	< 0.00020	**1.3**	< 0.00020	0.048	**0.24**	---	0.0022	0.00086	< 0.10	< 0.00020	6.0	< 0.00010	0.52	< 0.00020	< 0.0010	< 0.0010	0.00065	< 0.0010	< 0.0030
	20-Sep-2016	0.0023	< 0.00010	0.00167	0.394	< 0.00010	---	0.266	< 0.0000050	< 0.00010	0.00064	< 0.00020	**1.33**	< 0.000050	---	**0.235**	0.000212	0.00157	0.00090	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.000664	< 0.00050	< 0.0010
	14-Jul-2017	< 0.0010	< 0.00010	0.00152	0.393	< 0.00010	---	0.217	< 0.0000050	< 0.00010	0.00062	< 0.00020	**1.29**	< 0.000050	---	**0.227**	< 0.0000050	0.00113	0.00081	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	0.000615	< 0.00050	< 0.0010
	01-Aug-2018	< 0.0010	< 0.00010	0.00193	0.473	---	---	0.222	< 0.0000050	< 0.00010	---	< 0.00020	**1.38**	< 0.000050	---	**0.237**	< 0.0000050	---	0.00083	---	< 0.000050	---	< 0.000010	---	---	---	---	0.000547	---	< 0.0010
MW-02B	20-Sep-2016	0.0076	< 0.00050	0.00141	0.497	< 0.00050	---	0.651	< 0.000025	< 0.00050	< 0.00050	< 0.0010	< 0.050	< 0.00025	---	**0.109**	< 0.0000050	0.0157	< 0.0025	---	< 0.00025	---	< 0.000050	---	< 0.000050	---	< 0.0015	0.00449	< 0.0025	0.0065
	14-Jul-2017	0.0160	< 0.00050	0.00707	0.646	0.00325	---	0.705	0.00297	0.00321	0.00328	0.0032	**0.687**	0.00317	---	**0.200**	< 0.0000050	0.0112	0.0035	---	0.00332	---	< 0.000050	---	0.00580	---	< 0.0015	0.00601	0.0034	0.0088
	29-Sep-2017	< 0.0050	< 0.00050	0.00379	0.719	< 0.00050	---	0.765	< 0.000025	< 0.00050	< 0.00050	< 0.0010	**0.44**	< 0.00025	---	**0.114**	< 0.0000050	0.00900	< 0.0025	---	< 0.00025	---	< 0.000050	---	< 0.000050	---	< 0.0015	0.00225	< 0.0025	< 0.0050
	02-Aug-2018	0.0294	< 0.00050	0.00432	0.851	---	---	0.723	< 0.000025	< 0.00050	---	< 0.0010	0.127	< 0.00025	---	**0.102**	0.000221	---	< 0.0025	---	< 0.00025	---	< 0.000050	---	---	---	---	0.00132	---	< 0.0050

Advisian
WorleyParsons Group

Table 4

Groundwater Analytical Results: Dissolved Metals and Trace Elements

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Bismuth (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
Canadian Drinking Water AO Guidelines 2017		**0.1**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**1**	**0.3**	**---**	**---**	**0.05**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**5**
Canadian Drinking Water MAC Guidelines 2017		**---**	**0.006**	**0.01**	**1**	**---**	**---**	**5**	**0.005**	**0.05**	**---**	**---**	**---**	**0.01**	**---**	**---**	**0.001**	**---**	**---**	**---**	**0.05**	**---**	**---**	**---**	**---**	**---**	**---**	**0.02**	**---**	**---**
QA/QC																														
FIELD BLANK	05-May-2010	< 0.0050	< 0.00040	< 0.00040	< 0.0050	< 0.00050	---	< 0.050	< 0.00010	< 0.0050	< 0.00010	< 0.0010	< 0.020	< 0.00010	---	< 0.0050	< 0.00010	< 0.00010	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	< 0.00010	< 0.00010	< 0.0020
	25-May-2011	< 0.0050	< 0.00040	< 0.00040	< 0.0050	< 0.00050	---	< 0.050	< 0.00010	< 0.0050	< 0.00010	< 0.0010	< 0.020	< 0.00010	---	< 0.0050	< 0.000020	< 0.00010	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	< 0.00010	< 0.00010	< 0.0020
	09-Jul-2013	< 0.0050	< 0.00040	< 0.00040	< 0.0050	< 0.00050	---	< 0.050	< 0.00010	< 0.0050	< 0.00010	< 0.0010	< 0.010	< 0.00010	---	< 0.0020	< 0.000020	< 0.000050	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	< 0.00010	< 0.00010	< 0.0030
	13-Jun-2014	< 0.0050	< 0.00040	< 0.00040	< 0.0050	< 0.00050	---	< 0.050	< 0.00010	< 0.0050	< 0.00010	< 0.0010	< 0.010	< 0.00010	---	< 0.0020	< 0.0000050	< 0.000050	< 0.0020	---	< 0.00040	---	< 0.00010	---	< 0.000050	---	< 0.00030	< 0.00010	< 0.00010	< 0.0030
	25-Jun-2015	< 0.0030	< 0.00060	< 0.00020	< 0.010	< 0.0010	---	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.00020	< 0.060	< 0.00020	< 0.020	< 0.0040	---	< 0.00020	< 0.00050	< 0.10	< 0.00020	< 0.10	< 0.00010	< 0.020	< 0.00020	< 0.0010	< 0.0010	< 0.00010	< 0.0010	< 0.0030
	20-Sep-2016	< 0.0010	< 0.00010	< 0.00010	< 0.000050	< 0.00010	---	0.012	< 0.0000050	< 0.00010	< 0.00010	< 0.00020	< 0.010	< 0.000050	---	< 0.00010	< 0.0000050	< 0.000050	< 0.00050	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	< 0.000010	< 0.00050	< 0.0010
	14-Jul-2017	< 0.0010	< 0.00010	< 0.00010	< 0.000050	< 0.00010	---	< 0.010	< 0.0000050	< 0.00010	< 0.00010	0.00027	< 0.010	< 0.000050	---	< 0.00010	< 0.0000050	< 0.000050	< 0.00050	---	< 0.000050	---	< 0.000010	---	< 0.000010	---	< 0.00030	< 0.000010	< 0.00050	< 0.0010
Relative Percent Difference (RPD) Report																														
MW-11	01-Aug-2018	0.0082	< 0.00050	0.00257	0.0388	---	---	0.198	< 0.000025	0.00325	---	< 0.0010	**7.33**	< 0.00025	---	**0.626**	< 0.0000050	---	< 0.0025	---	< 0.00025	---	< 0.000050	---	---	---	---	0.000950	---	< 0.0050
(Duplicate)	01-Aug-2018	0.0063	< 0.00050	0.00247	0.0393	---	---	0.194	< 0.000025	< 0.00050	---	< 0.0010	**7.23**	< 0.00025	---	**0.627**	< 0.0000050	---	< 0.0025	---	< 0.00025	---	< 0.000050	---	---	---	---	0.000839	---	< 0.0050
RPD(%)		26.2%	**---**	**4.0%**	**1.3%**	**---**	**---**	**2.0%**	**---**	**---**	**---**	**---**	**1.4%**	**---**	**---**	**0.2%**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**12.4%**	**---**	**---**

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.

X 3. Highlighting indicates parameters above applied guideline/criteria.

4. Highlighting indicates non-detect parameters above applied guideline/criteria.

5. Highlighting indicates parameters at applied guideline/criteria.

6. Denotes values exceeding
(Health Canada, February 2017. Guidelines for Canadian Drinking Water Quality. Aesthetic Objective.
Summary Table. Prepared by the Federal-Provincial-Territorial Committee on Drinking Water
of the Federal-Provincial-Territorial Committee on Health and the Environment)

7. Denotes values exceeding
(Health Canada, February 2017. Guidelines for Canadian Drinking Water Quality. Maximum Acceptable Concentration.
Summary Table. Prepared by the Federal-Provincial-Territorial Committee on Drinking Water
of the Federal-Provincial-Territorial Committee on Health and the Environment)

Advisian
WorleyParsons Group

Table 5

Groundwater Analytical Results: Petroleum Hydrocarbons (PHCs)

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (Total) (mg/L)	Styrene (mg/L)	PHC F1 (C_6-C_{10}) - BTEX (mg/L)	PHC F2 (C_{10}-C_{16}) (mg/L)
Canadian Drinking Water AO Guidelines 2017		---	0.024	0.0016	0.02	---	---	---
Canadian Drinking Water MAC Guidelines 2017		0.005	0.06	0.14	0.09	---	---	---
Groundwater Monitoring								
MW-01	07-Mar-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	17-Nov-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	15-Jun-2006	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	12-Jul-2007	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	19-Dec-2007	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	21-Apr-2009	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	05-May-2010	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	25-May-2011	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	29-May-2012	---	---	---	---	---	---	< 0.25
	10-Jul-2013	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	16-Jun-2014	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	29-Jun-2015	< 0.00040	< 0.00040	< 0.00040	< 0.00080	---	< 0.10	< 0.10
	19-Sep-2016	< 0.00050	0.00112	< 0.00050	0.00253	< 0.0010	< 0.10	< 0.10
	13-Jul-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	01-Aug-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
MW-02	07-Mar-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	17-Nov-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	15-Jun-2006	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	13-Jul-2007	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	19-Dec-2007	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	21-Apr-2009	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	05-May-2010	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	25-May-2011	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	30-May-2012	---	---	---	---	---	---	< 0.25
	10-Jul-2013	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	0.31
	16-Jun-2014	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	28-Aug-2014	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	25-Jun-2015	< 0.00040	< 0.00040	< 0.00040	< 0.00080	---	< 0.10	0.10
	19-Sep-2016	< 0.00050	0.00099	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	13-Jul-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	29-Sep-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.00050	< 0.10	< 0.10
	02-Aug-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
MW-03	07-Mar-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	17-Nov-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	15-Jun-2006	< 0.0005	0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	12-Jul-2007	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	19-Dec-2007	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	21-Apr-2009	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	06-May-2010	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	02-Jun-2011	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	29-May-2012	---	---	---	---	---	---	< 0.25
	10-Jul-2013	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	16-Jun-2014	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	29-Jun-2015	< 0.00040	< 0.00040	< 0.00040	< 0.00080	---	< 0.10	< 0.10
	19-Sep-2016	< 0.00050	0.00309	< 0.00050	0.00234	< 0.0010	< 0.10	< 0.10
	13-Jul-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
(Duplicate)	13-Jul-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	31-Jul-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10

Table 5

Groundwater Analytical Results: Petroleum Hydrocarbons (PHCs)

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (Total) (mg/L)	Styrene (mg/L)	PHC F1 (C_6-C_{10}) - BTEX (mg/L)	PHC F2 (C_{10}-C_{16}) (mg/L)
Canadian Drinking Water AO Guidelines 2017		---	0.024	0.0016	0.02	---	---	---
Canadian Drinking Water MAC Guidelines 2017		0.005	0.06	0.14	0.09	---	---	---
MW-04	08-Mar-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	17-Nov-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
(Duplicate)	17-Nov-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	14-Jun-2006	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	13-Jul-2007	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	19-Dec-2007	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	21-Apr-2009	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	06-May-2010	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	07-Jun-2011	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	30-May-2012	---	---	---	---	---	---	< 0.25
(Duplicate)	30-May-2012	---	---	---	---	---	---	< 0.25
	09-Jul-2013	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	13-Jun-2014	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	29-Jun-2015	< 0.00040	< 0.00040	< 0.00040	< 0.00080	---	< 0.10	< 0.10
	19-Sep-2016	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	13-Jul-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	31-Jul-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
MW-05	08-Mar-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	17-Nov-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	14-Jun-2006	< 0.0005	0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	13-Jul-2007	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	19-Dec-2007	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	21-Apr-2009	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	29-Apr-2010	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	25-May-2011	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	29-May-2012	---	---	---	---	---	---	< 0.25
	08-Jul-2013	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	13-Jun-2014	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	25-Jun-2015	< 0.00040	< 0.00040	< 0.00040	< 0.00080	---	< 0.10	< 0.10
	19-Sep-2016	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	13-Jul-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	31-Jul-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
MW-06	08-Mar-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	17-Nov-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	16-Jun-2006	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	12-Jul-2007	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	19-Dec-2007	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	22-Apr-2009	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	06-May-2010	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	07-Jun-2011	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	29-May-2012	---	---	---	---	---	---	< 0.25
	08-Jul-2013	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	12-Jun-2014	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	25-Jun-2015	< 0.00040	< 0.00040	< 0.00040	< 0.00080	---	< 0.10	< 0.10
	20-Sep-2016	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	13-Jul-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	31-Jul-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
MW-07	09-Mar-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	17-Nov-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	16-Jun-2006	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	12-Jul-2007	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	19-Dec-2007	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	22-Apr-2009	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	05-May-2010	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	08-Jun-2011	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25

Advisian
WorleyParsons Group

Table 5

Groundwater Analytical Results: Petroleum Hydrocarbons (PHCs)

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (Total) (mg/L)	Styrene (mg/L)	PHC F1 (C_6-C_{10}) - BTEX (mg/L)	PHC F2 (C_{10}-C_{16}) (mg/L)
Canadian Drinking Water AO Guidelines 2017		---	0.024	0.0016	0.02	---	---	---
Canadian Drinking Water MAC Guidelines 2017		0.005	0.06	0.14	0.09	---	---	---
MW-07 (Cont.)	28-Jul-2011	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	30-May-2012	---	---	---	---	---	---	< 0.25
	11-Jul-2013	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	13-Jun-2014	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	25-Jun-2015	< 0.00040	< 0.00040	< 0.00040	< 0.00080	---	< 0.10	< 0.10
	20-Sep-2016	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	14-Jul-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	31-Jul-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
MW-08	09-Mar-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	15-Nov-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	16-Jun-2006	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	11-Jul-2007	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	19-Dec-2007	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	21-Apr-2009	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	05-May-2010	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	07-Jun-2011	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	30-May-2012	---	---	---	---	---	---	< 0.25
	09-Jul-2013	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	12-Jun-2014	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	24-Jun-2015	< 0.00040	< 0.00040	< 0.00040	< 0.00080	---	< 0.10	< 0.10
	20-Sep-2016	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	02-Aug-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	01-Aug-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
MW-09	09-Mar-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
(Duplicate)	09-Mar-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	17-Nov-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	16-Jun-2006	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	11-Jul-2007	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	18-Dec-2007	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	22-Apr-2009	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	0.3
	06-May-2010	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
(Duplicate)	06-May-2010	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	02-Jun-2011	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
(Duplicate)	02-Jun-2011	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	29-May-2012	---	---	---	---	---	---	< 0.25
	10-Jul-2013	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	13-Jun-2014	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	25-Jun-2015	< 0.00040	< 0.00040	< 0.00040	< 0.00080	---	< 0.10	< 0.10
	20-Sep-2016	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
(Duplicate)	20-Sep-2016	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	14-Jul-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	01-Aug-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
MW-10	09-Mar-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	16-Nov-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	16-Jun-2006	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	11-Jul-2007	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	18-Dec-2007	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	22-Apr-2009	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	05-May-2010	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	02-Jun-2011	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	30-May-2012	---	---	---	---	---	---	< 0.25
	09-Jul-2013	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
(Duplicate)	09-Jul-2013	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	12-Jun-2014	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
(Duplicate)	12-Jun-2014	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25

Advisian
WorleyParsons Group

Table 5

Groundwater Analytical Results: Petroleum Hydrocarbons (PHCs)

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (Total) (mg/L)	Styrene (mg/L)	PHC F1 (C_6-C_{10}) - BTEX (mg/L)	PHC F2 (C_{10}-C_{16}) (mg/L)
Canadian Drinking Water AO Guidelines 2017		---	0.024	0.0016	0.02	---	---	---
Canadian Drinking Water MAC Guidelines 2017		0.005	0.06	0.14	0.09	---	---	---
MW-10 (Cont.)	24-Jun-2015	< 0.00040	< 0.00040	< 0.00040	< 0.00080	---	< 0.10	< 0.10
(Duplicate)	24-Jun-2015	< 0.00040	< 0.00040	< 0.00040	< 0.00080	---	< 0.10	< 0.10
	20-Sep-2016	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	14-Jul-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	01-Aug-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
MW-11	10-Mar-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	16-Nov-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	16-Jun-2006	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	11-Jul-2007	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	18-Dec-2007	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	22-Apr-2009	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	05-May-2010	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	02-Jun-2011	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	30-May-2012	---	---	---	---	---	---	< 0.25
	10-Jul-2013	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	12-Jun-2014	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	24-Jun-2015	< 0.00040	< 0.00040	< 0.00040	< 0.00080	---	< 0.10	< 0.10
	20-Sep-2016	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	14-Jul-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	01-Aug-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
(Duplicate)	01-Aug-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
MW-12	10-Mar-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	16-Nov-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	16-Jun-2006	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	11-Jul-2007	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	18-Dec-2007	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	22-Apr-2009	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	06-May-2010	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	02-Jun-2011	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	30-May-2012	---	---	---	---	---	---	< 0.25
	10-Jul-2013	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	12-Jun-2014	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	24-Jun-2015	< 0.00040	< 0.00040	< 0.00040	< 0.00080	---	< 0.10	< 0.10
	20-Sep-2016	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	02-Aug-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	01-Aug-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
MW-13	10-Mar-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	16-Nov-2005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	16-Jun-2006	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	11-Jul-2007	< 0.0005	< 0.0005	< 0.0005	< 0.0005	---	< 0.1	< 0.05
	18-Dec-2007	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	22-Apr-2009	< 0.0004	< 0.0004	< 0.0004	< 0.0008	---	< 0.1	< 0.1
	06-May-2010	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	02-Jun-2011	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	30-May-2012	---	---	---	---	---	---	< 0.25
	10-Jul-2013	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	12-Jun-2014	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	24-Jun-2015	< 0.00040	< 0.00040	< 0.00040	< 0.00080	---	< 0.10	< 0.10
	20-Sep-2016	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	14-Jul-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	01-Aug-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
MW-02B	20-Sep-2016	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	14-Jul-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	29-Sep-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.00050	< 0.10	< 0.10
	02-Aug-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10

Advisian
WorleyParsons Group

Table 5

Groundwater Analytical Results: Petroleum Hydrocarbons (PHCs)

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (Total) (mg/L)	Styrene (mg/L)	PHC F1 (C_6-C_{10}) - BTEX (mg/L)	PHC F2 (C_{10}-C_{16}) (mg/L)
Canadian Drinking Water AO Guidelines 2017		**---**	**0.024**	**0.0016**	**0.02**	**---**	**---**	**---**
Canadian Drinking Water MAC Guidelines 2017		**0.005**	**0.06**	**0.14**	**0.09**	**---**	**---**	**---**
QA/QC								
FIELD BLANK	05-May-2010	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	25-May-2011	< 0.00050	< 0.00075	< 0.00050	< 0.001	---	< 0.10	< 0.25
	30-May-2012	---	---	---	---	---	---	< 0.25
	09-Jul-2013	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	13-Jun-2014	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.25
	25-Jun-2015	< 0.00040	< 0.00040	< 0.00040	< 0.00080	---	< 0.10	< 0.10
	20-Sep-2016	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
	02-Aug-2017	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
Relative Percent Difference (RPD) Report								
MW-11	01-Aug-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
(Duplicate)	01-Aug-2018	< 0.00050	< 0.00050	< 0.00050	< 0.00071	< 0.0010	< 0.10	< 0.10
RPD(%)		---	---	---	---	---	---	---

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.

X 3. Highlighting indicates parameters above applied guideline/criteria.

4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.
6. Denotes values exceeding
(Health Canada, February 2017. Guidelines for Canadian Drinking Water Quality. Aesthetic Objective. Summary Table. Prepared by the Federal-Provincial-Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Health and the Environment)
7. Denotes values exceeding
(Health Canada, February 2017. Guidelines for Canadian Drinking Water Quality. Maximum Acceptable Concentration. Summary Table. Prepared by the Federal-Provincial-Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Health and the Environment)

Advisian
WorleyParsons Group

Table 6

Groundwater Analytical Results: Volatile Organic Compounds (VOCs)

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Hydrocarbons: Styrene (mg/L)	Phenols: Phenols (mg/L)
Groundwater Monitoring			
MW-01	07-Mar-2005	---	< 0.001
	17-Nov-2005	---	< 0.001
	15-Jun-2006	---	< 0.001
	12-Jul-2007	---	< 0.001
	19-Dec-2007	---	0.002
	21-Apr-2009	---	0.003
	05-May-2010	< 0.0010	< 0.0010
	25-May-2011	< 0.0010	< 0.0010
	29-May-2012	---	< 0.0010
	10-Jul-2013	< 0.0010	< 0.0010
	16-Jun-2014	< 0.0010	< 0.0010
	29-Jun-2015	---	< 0.0020
	19-Sep-2016	< 0.0010	< 0.0010
	13-Jul-2017	< 0.0010	< 0.0010
	01-Aug-2018	< 0.0010	0.0016
MW-02	07-Mar-2005	---	< 0.001
	17-Nov-2005	---	< 0.001
	15-Jun-2006	---	< 0.001
	13-Jul-2007	---	0.002
	19-Dec-2007	---	0.002
	21-Apr-2009	---	0.002
	05-May-2010	< 0.0010	< 0.0010
	25-May-2011	< 0.0010	< 0.0010
	30-May-2012	---	< 0.0010
	10-Jul-2013	< 0.0010	< 0.0010
	16-Jun-2014	< 0.0010	< 0.0010
	28-Aug-2014	< 0.0010	< 0.0010
	25-Jun-2015	---	< 0.0020
	19-Sep-2016	< 0.0010	< 0.0010
	13-Jul-2017	< 0.0010	< 0.0010
	29-Sep-2017	< 0.00050	< 0.0010
	02-Aug-2018	< 0.0010	0.0013
MW-03	07-Mar-2005	---	< 0.001
	17-Nov-2005	---	< 0.001
	15-Jun-2006	---	< 0.001
	12-Jul-2007	---	< 0.001
	19-Dec-2007	---	0.002
	21-Apr-2009	---	0.003
	06-May-2010	< 0.0010	< 0.0010
	02-Jun-2011	< 0.0010	< 0.0010
	29-May-2012	---	< 0.0010
	10-Jul-2013	< 0.0010	< 0.0010
	16-Jun-2014	< 0.0010	< 0.0010
	29-Jun-2015	---	< 0.0020
	19-Sep-2016	< 0.0010	< 0.0010
	13-Jul-2017	< 0.0010	< 0.0010
(Duplicate)	13-Jul-2017	< 0.0010	< 0.0010
	31-Jul-2018	< 0.0010	< 0.0010

Table 6

Groundwater Analytical Results: Volatile Organic Compounds (VOCs)

PROJECT No.: 307075-01608

		Hydrocarbons	Phenols
Monitoring Station	Date (dd-mmm-yyyy)	Styrene (mg/L)	Phenols (mg/L)
MW-04	08-Mar-2005	---	< 0.001
	17-Nov-2005	---	< 0.001
(Duplicate)	17-Nov-2005	---	< 0.001
	14-Jun-2006	---	< 0.001
	13-Jul-2007	---	< 0.001
	19-Dec-2007	---	0.002
	21-Apr-2009	---	< 0.002
	06-May-2010	< 0.0010	< 0.0010
	07-Jun-2011	< 0.0010	< 0.0010
	30-May-2012	---	< 0.0010
(Duplicate)	30-May-2012	---	< 0.0010
	09-Jul-2013	< 0.0010	< 0.0010
	13-Jun-2014	< 0.0010	< 0.0010
	29-Jun-2015	---	< 0.0020
	19-Sep-2016	< 0.0010	< 0.0010
	13-Jul-2017	< 0.0010	< 0.0010
	31-Jul-2018	< 0.0010	0.0012
MW-05	08-Mar-2005	---	< 0.001
	17-Nov-2005	---	< 0.001
	14-Jun-2006	---	< 0.001
	13-Jul-2007	---	0.002
	19-Dec-2007	---	< 0.001
	21-Apr-2009	---	0.003
	29-Apr-2010	< 0.0010	< 0.0010
	25-May-2011	< 0.0010	< 0.0010
	29-May-2012	---	< 0.0010
	08-Jul-2013	< 0.0010	< 0.0010
	13-Jun-2014	< 0.0010	< 0.0010
	25-Jun-2015	---	< 0.0020
	19-Sep-2016	< 0.0010	< 0.0010
	13-Jul-2017	< 0.0010	< 0.0010
	31-Jul-2018	< 0.0010	0.0013
MW-06	08-Mar-2005	---	< 0.001
	17-Nov-2005	---	< 0.001
	16-Jun-2006	---	< 0.001
	12-Jul-2007	---	< 0.001
	19-Dec-2007	---	0.002
	22-Apr-2009	---	0.003
	06-May-2010	< 0.0010	< 0.0010
	07-Jun-2011	< 0.0010	< 0.0010
	29-May-2012	---	< 0.0010
	08-Jul-2013	< 0.0010	< 0.0010
	12-Jun-2014	< 0.0010	< 0.0010
	25-Jun-2015	---	< 0.0020
	20-Sep-2016	< 0.0010	< 0.0010
	13-Jul-2017	< 0.0010	< 0.0010
	31-Jul-2018	< 0.0010	0.0012
MW-07	09-Mar-2005	---	< 0.001
	17-Nov-2005	---	< 0.001
	16-Jun-2006	---	< 0.001
	12-Jul-2007	---	< 0.001
	19-Dec-2007	---	0.002
	22-Apr-2009	---	0.003

Table 6

Groundwater Analytical Results: Volatile Organic Compounds (VOCs)

PROJECT No.: 307075-01608

		Hydrocarbons	Phenols
Monitoring Station	Date (dd-mmm-yyyy)	Styrene (mg/L)	Phenols (mg/L)
MW-07 (Cont.)	05-May-2010	< 0.0010	< 0.0010
	08-Jun-2011	< 0.0010	0.0020
	28-Jul-2011	< 0.0010	< 0.0010
	30-May-2012	---	< 0.0010
	11-Jul-2013	< 0.0010	0.0017
	13-Jun-2014	< 0.0010	< 0.0010
	25-Jun-2015	---	< 0.0020
	20-Sep-2016	< 0.0010	< 0.0010
	14-Jul-2017	< 0.0010	< 0.0010
	31-Jul-2018	< 0.0010	0.0013
MW-08	09-Mar-2005	---	< 0.001
	15-Nov-2005	---	< 0.001
	16-Jun-2006	---	< 0.001
	11-Jul-2007	---	< 0.001
	19-Dec-2007	---	0.001
	21-Apr-2009	---	0.002
	05-May-2010	< 0.0010	< 0.0010
	07-Jun-2011	< 0.0010	0.0016
	30-May-2012	---	< 0.0010
	09-Jul-2013	< 0.0010	< 0.0010
	12-Jun-2014	< 0.0010	< 0.0010
	24-Jun-2015	---	< 0.0020
	20-Sep-2016	< 0.0010	< 0.0010
	02-Aug-2017	< 0.0010	< 0.0010
	01-Aug-2018	< 0.0010	0.0010
MW-09	09-Mar-2005	---	< 0.001
(Duplicate)	09-Mar-2005	---	< 0.001
	17-Nov-2005	---	< 0.001
	16-Jun-2006	---	< 0.001
	11-Jul-2007	---	< 0.001
	18-Dec-2007	---	0.002
	22-Apr-2009	---	0.003
	06-May-2010	< 0.0010	< 0.0010
(Duplicate)	06-May-2010	< 0.0010	< 0.0010
	02-Jun-2011	< 0.0010	< 0.0010
(Duplicate)	02-Jun-2011	< 0.0010	< 0.0010
	29-May-2012	---	< 0.0010
	10-Jul-2013	< 0.0010	< 0.0010
	13-Jun-2014	< 0.0010	< 0.0010
	25-Jun-2015	---	< 0.0020
	20-Sep-2016	< 0.0010	< 0.0010
(Duplicate)	20-Sep-2016	< 0.0010	< 0.0010
	14-Jul-2017	< 0.0010	< 0.0010
	01-Aug-2018	< 0.0010	0.0015
MW-10	09-Mar-2005	---	< 0.001
	16-Nov-2005	---	< 0.001
	16-Jun-2006	---	< 0.001
	11-Jul-2007	---	< 0.001
	18-Dec-2007	---	0.002
	22-Apr-2009	---	0.002
	05-May-2010	< 0.0010	< 0.0010
	02-Jun-2011	< 0.0010	0.0018
	30-May-2012	---	< 0.0010

Table 6

Groundwater Analytical Results: Volatile Organic Compounds (VOCs)

PROJECT No.: 307075-01608

		Hydrocarbons	Phenols
Monitoring Station	**Date (dd-mmm-yyyy)**	**Styrene (mg/L)**	**Phenols (mg/L)**
MW-10 (Cont.)	09-Jul-2013	< 0.0010	< 0.0010
(Duplicate)	09-Jul-2013	< 0.0010	< 0.0010
	12-Jun-2014	< 0.0010	< 0.0010
(Duplicate)	12-Jun-2014	< 0.0010	< 0.0010
	24-Jun-2015	---	< 0.0020
(Duplicate)	24-Jun-2015	---	< 0.0020
	20-Sep-2016	< 0.0010	< 0.0010
	14-Jul-2017	< 0.0010	< 0.0010
	01-Aug-2018	< 0.0010	0.0011
MW-11	10-Mar-2005	---	< 0.001
	16-Nov-2005	---	< 0.001
	16-Jun-2006	---	< 0.001
	11-Jul-2007	---	< 0.001
	18-Dec-2007	---	0.002
	22-Apr-2009	---	0.004
	05-May-2010	< 0.0010	< 0.0010
	02-Jun-2011	< 0.0010	< 0.0010
	30-May-2012	---	< 0.0010
	10-Jul-2013	< 0.0010	< 0.0010
	12-Jun-2014	< 0.0010	< 0.0010
	24-Jun-2015	---	< 0.0020
	20-Sep-2016	< 0.0010	< 0.0010
	14-Jul-2017	< 0.0010	< 0.0010
	01-Aug-2018	< 0.0010	0.0011
(Duplicate)	01-Aug-2018	< 0.0010	< 0.0010
MW-12	10-Mar-2005	---	< 0.001
	16-Nov-2005	---	< 0.001
	16-Jun-2006	---	< 0.001
	11-Jul-2007	---	< 0.001
	18-Dec-2007	---	0.002
	22-Apr-2009	---	0.003
	06-May-2010	< 0.0010	< 0.0010
	02-Jun-2011	< 0.0010	< 0.0010
	30-May-2012	---	< 0.0010
	10-Jul-2013	< 0.0010	< 0.0010
	12-Jun-2014	< 0.0010	< 0.0010
	24-Jun-2015	---	< 0.0020
	20-Sep-2016	< 0.0010	< 0.0010
	14-Jul-2017	---	< 0.0010
	02-Aug-2017	< 0.0010	---
	01-Aug-2018	< 0.0010	0.0017
MW-13	10-Mar-2005	---	< 0.001
	16-Nov-2005	---	< 0.001
	16-Jun-2006	---	< 0.001
	11-Jul-2007	---	0.001
	18-Dec-2007	---	< 0.001
	22-Apr-2009	---	0.003
	06-May-2010	< 0.0010	< 0.0010
	02-Jun-2011	< 0.0010	< 0.0010
	30-May-2012	---	< 0.0010
	10-Jul-2013	< 0.0010	< 0.0010
	12-Jun-2014	< 0.0010	< 0.0010
	24-Jun-2015	---	< 0.0020

Advisian
WorleyParsons Group

Table 6

Groundwater Analytical Results: Volatile Organic Compounds (VOCs)

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	Hydrocarbons: Styrene (mg/L)	Phenols: Phenols (mg/L)
MW-13 (Cont.)	20-Sep-2016	< 0.0010	< 0.0010
	14-Jul-2017	< 0.0010	< 0.0010
	01-Aug-2018	< 0.0010	0.0013
MW-02B	20-Sep-2016	< 0.0010	0.0101
	14-Jul-2017	< 0.0010	< 0.0010
	29-Sep-2017	< 0.00050	0.0014
	02-Aug-2018	< 0.0010	0.0010
QA/QC			
FIELD BLANK	05-May-2010	< 0.0010	< 0.0010
	25-May-2011	< 0.0010	< 0.0010
	09-Jul-2013	< 0.0010	< 0.0010
	13-Jun-2014	< 0.0010	< 0.0010
	25-Jun-2015	---	< 0.0020
	20-Sep-2016	< 0.0010	< 0.0010
	14-Jul-2017	---	< 0.0010
	02-Aug-2017	< 0.0010	---
Relative Percent Difference (RPD) Report			
MW-11	01-Aug-2018	< 0.0010	0.0011
(Duplicate)	01-Aug-2018	< 0.0010	< 0.0010
RPD(%)		---	---

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.

X 3. Highlighting indicates parameters above applied guideline/criteria.

4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.

Advisian
WorleyParsons Group

Table 7

Groundwater Analytical Results: Isotopes

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	delta ^{18}O (H_2O) (‰)	delta ^{2}H (H_2O) (‰)
Groundwater Monitoring			
MW-01	29-Jun-2015	-18.87	-147.2
	19-Sep-2016	-18.15	-143.1
	13-Jul-2017	-17.72	-141.8
	01-Aug-2018	-17.83	-142.8
MW-02	25-Jun-2015	-18.69	-144.3
	19-Sep-2016	-18.28	-143.9
	13-Jul-2017	-17.82	-142.8
	29-Sep-2017	-18.02	-144.8
	02-Aug-2018	-18.16	-145
MW-03	29-Jun-2015	-19.51	-151.5
	19-Sep-2016	-19.03	-149.1
	13-Jul-2017	-18.54	-147.8
(Duplicate)	14-Jul-2017	-18.55	-147.5
	31-Jul-2018	-18.62	-148.5
MW-04	29-Jun-2015	-17.47	-137.9
	19-Sep-2016	-17.18	-137.5
	13-Jul-2017	-16.37	-133.8
	31-Jul-2018	-16.37	-134.7
MW-05	25-Jun-2015	-16.77	-133.2
	19-Sep-2016	-16.26	-131.8
	13-Jul-2017	-16	-131.8
	31-Jul-2018	-16.03	-132.6
MW-06	25-Jun-2015	-18.27	-145.3
	20-Sep-2016	-17.79	-142.8
	13-Jul-2017	-17.48	-143.2
	31-Jul-2018	-17.52	-143.2
MW-07	25-Jun-2015	-18.76	-147.7
	20-Sep-2016	-18.24	-144.7
	14-Jul-2017	-17.91	-145.7
	31-Jul-2018	-17.84	-144.6
MW-08	24-Jun-2015	-18.39	-145.7
	20-Sep-2016	-17.93	-143.4
	02-Aug-2017	-17.39	-141.4
	01-Aug-2018	-17.49	-142.7
MW-09	25-Jun-2015	-19.04	-149.1
	20-Sep-2016	-18.47	-146.7
(Duplicate)	20-Sep-2016	-18.48	-146.6
	14-Jul-2017	-18.21	-147.3
	01-Aug-2018	-18.11	-146.5
MW-10	24-Jun-2015	-18.97	-148.1
(Duplicate)	24-Jun-2015	-18.86	-148
	20-Sep-2016	-18.54	-146.3
	14-Jul-2017	-18.23	-146.5
	01-Aug-2018	-18.17	-144.8
MW-11	24-Jun-2015	-17.57	-141.6
	20-Sep-2016	-17.05	-137.6
	14-Jul-2017	-16.86	-139.3
	01-Aug-2018	-16.69	-136.9
(Duplicate)	01-Aug-2018	-16.71	-139.4

Advisian
WorleyParsons Group

Table 7

Groundwater Analytical Results: Isotopes

PROJECT No.: 307075-01608

Monitoring Station	Date (dd-mmm-yyyy)	delta ^{18}O (H_2O) (‰)	delta ^{2}H (H_2O) (‰)
MW-12	24-Jun-2015	-17.84	-142
	20-Sep-2016	-17.3	-139
	14-Jul-2017	-16.95	-138.6
	01-Aug-2018	-16.95	-138.7
MW-13	24-Jun-2015	-19.06	-148.2
	20-Sep-2016	-18.69	-146.7
	14-Jul-2017	-18.22	-145.1
	01-Aug-2018	-18.23	-146.4
MW-02B	20-Sep-2016	-16.93	-134.9
	14-Jul-2017	-16.4	-133.8
	29-Sep-2017	-16.56	-135.5
	02-Aug-2018	-16.51	-135
QA/QC			
FIELD BLANK	25-Jun-2015	-20.20	-153.2
	20-Sep-2016	-18.73	-143.5
	14-Jul-2017	-19.35	-148.8
Relative Percent Difference (RPD) Report			
MW-11	01-Aug-2018	-16.69	-136.9
(Duplicate)	01-Aug-2018	-16.71	-139.4
RPD(%)		**0.1%**	**1.8%**

NOTES:

1. --- in detail data row(s) denotes parameter not analyzed.

Figures

340000
360000
380000
5960000
Twp. 57
Twp. 56
Twp. 55
Twp. 54
Rge. 25
Rge. 24
Rge. 23
Rge. 22
Rge. 21
Rge. 20
Rge. 19
Bon Accord
Gibbons
STURGEON COUNTY
Astotin Creek
Broederheim
Star
LAMONT COUNTY
Lamont
Dow Chemical Industrial Complex
Namao
Fort Saskatchewan
STRATHCONA COUNTY
Lancaster Park
I. D. NO. 13 (ELK ISLAND)
Range Road 215
Range Road 210
Range Road 212
Range Road 205A
Manning Dr
Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

Study Area
County Boundaries

0 2.5 5
Kilometers
1:150,000
NAD 1983 UTM Zone 12N

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

SITE LOCATION

OneWay to zero harm

Date:	Drawn by:	Edited by:	App'd by:
26-OCT-18	T.G.	L.F.	T.B.

Advisian WorleyParsons Group

WorleyParsons Project No. 307075-01608-400

FIG No 1 | REV A

PLOT DATE & TIME: 21/09/2015 1:54:41 PM USER NAME: linda.lilay
SAVE DATE & TIME: 26/10/2018 8:48:03 AM ISSUING OFFICE: EDMONTON GIS

FILE LOCATION: Q:\PROJECTS\NCIA\Beverly Channel\MXDs\307075-01608.400\Site_Location_RevA.mxd

FILE LOCATION: Q:\PROJECTS\NCIA\Beverly Channel\MXDs\307075-01608.400\MonitoringWellLocations_RevA.mxd

PLOT DATE & TIME: 16/09/2015 10:52:41 AM USER NAME: linda.flury
SAVE DATE & TIME: 26/10/2018 8:54:01 AM ISSUING OFFICE: EDMONTON GIS

350000 360000 370000

6980000 6970000 5960000 5950000 5940000

Twp. 57 Twp. 56 Twp. 55 Twp. 54 Twp. 53

MW-13 MW-12 MW-11 MW-10 MW-09 MW-08 MW-07 MW-06 MW-05 MW-04 MW-03 MW-01 MW-02 MW-02B

Rge. 23 Rge. 22 Rge. 21 Rge. 20

Study Area
Beverly Channel
Beverly Channel Monitoring Well
Bedrock Monitoring Well

0 2.5 5
Kilometres
1:125,000
NAD 1983 UTM Zone 12N

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

MONITORING WELL LOCATIONS

Date: 26-OCT-18	Drawn by: T.G.	Edited by: L.F.	App'd by: T.B. .

OneWay™ to zero harm

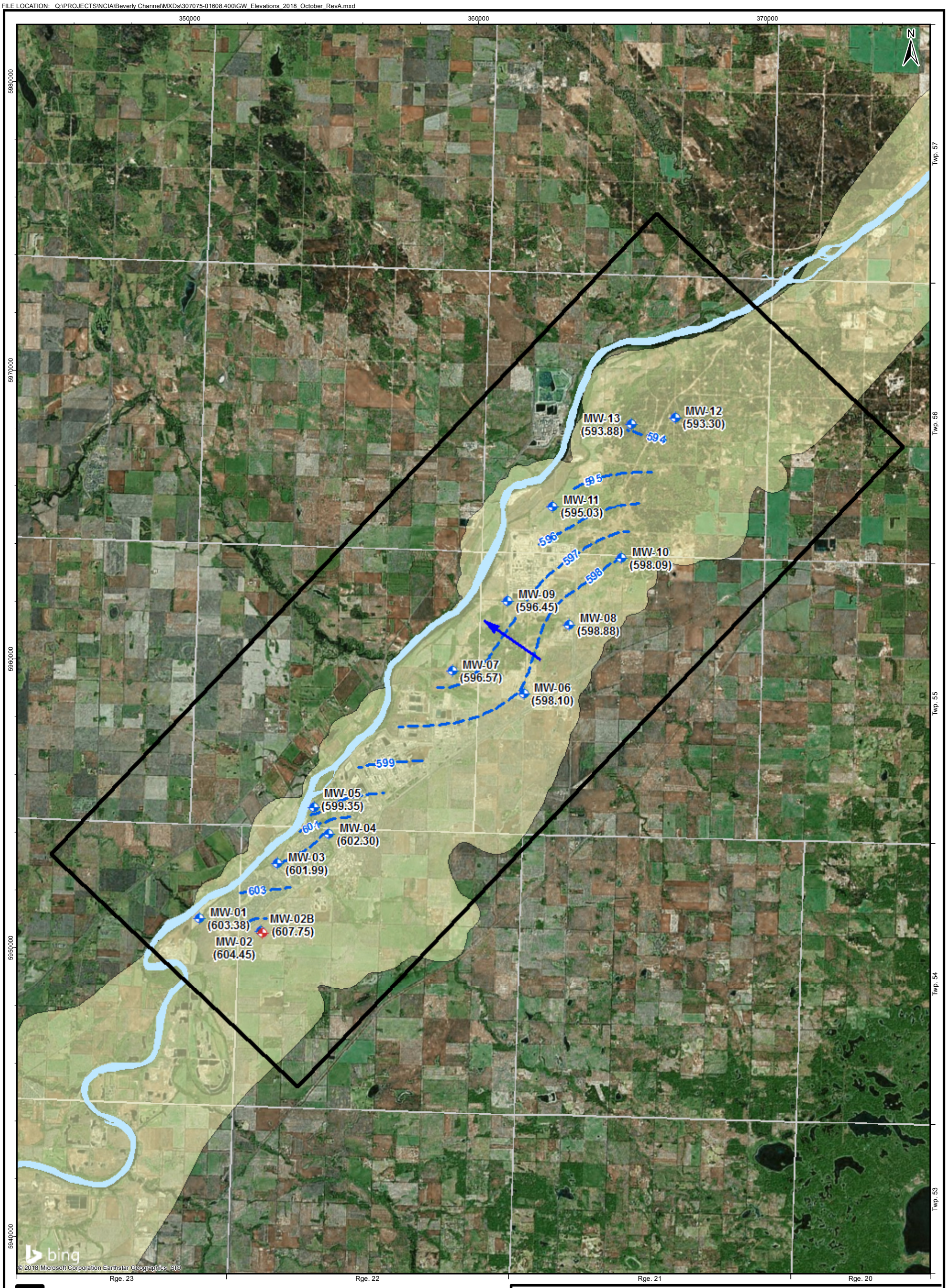
Advisian WorleyParsons Group

WorleyParsons Project No. 307075-01608-400

FIG No 2 REV A

FILE LOCATION: Q:\PROJECTS\NCIA\Beverly Channel\MXDs\307075-01608.400\GW_Elevations_2018_October_RevA.mxd

PLOT DATE & TIME: 16/09/2015 10:56:06 AM
SAVE DATE & TIME: 29/10/2018 2:30:33 PM
USER NAME: linda.flury
ISSUING OFFICE: EDMONTON GIS



Study Area

Beverly Channel

Beverly Channel Monitoring Well

Bedrock Monitoring Well

Groundwater Surface Elevation Contour (masl)

Inferred Groundwater Flow Direction

(602.30) Groundwater Surface Elevation (masl) Measured 31-Jul-2018 and 01-Aug-2018

0 2.5 5

Kilometres

1:125,000

NAD 1983 UTM Zone 12N

NOTE: MW-02B NOT INCLUDED FOR GROUNDWATER FLOW INTERPRETATION

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

2018 GROUNDWATER SURFACE ELEVATIONS

Date:	Drawn by:	Edited by:	App'd by:
29-OCT-18	T.G.	L.F.	T.B.

OneWay to zero harm

Advisian WorleyParsons Group

WorleyParsons Project No. 307075-01608-400

FIG No 3

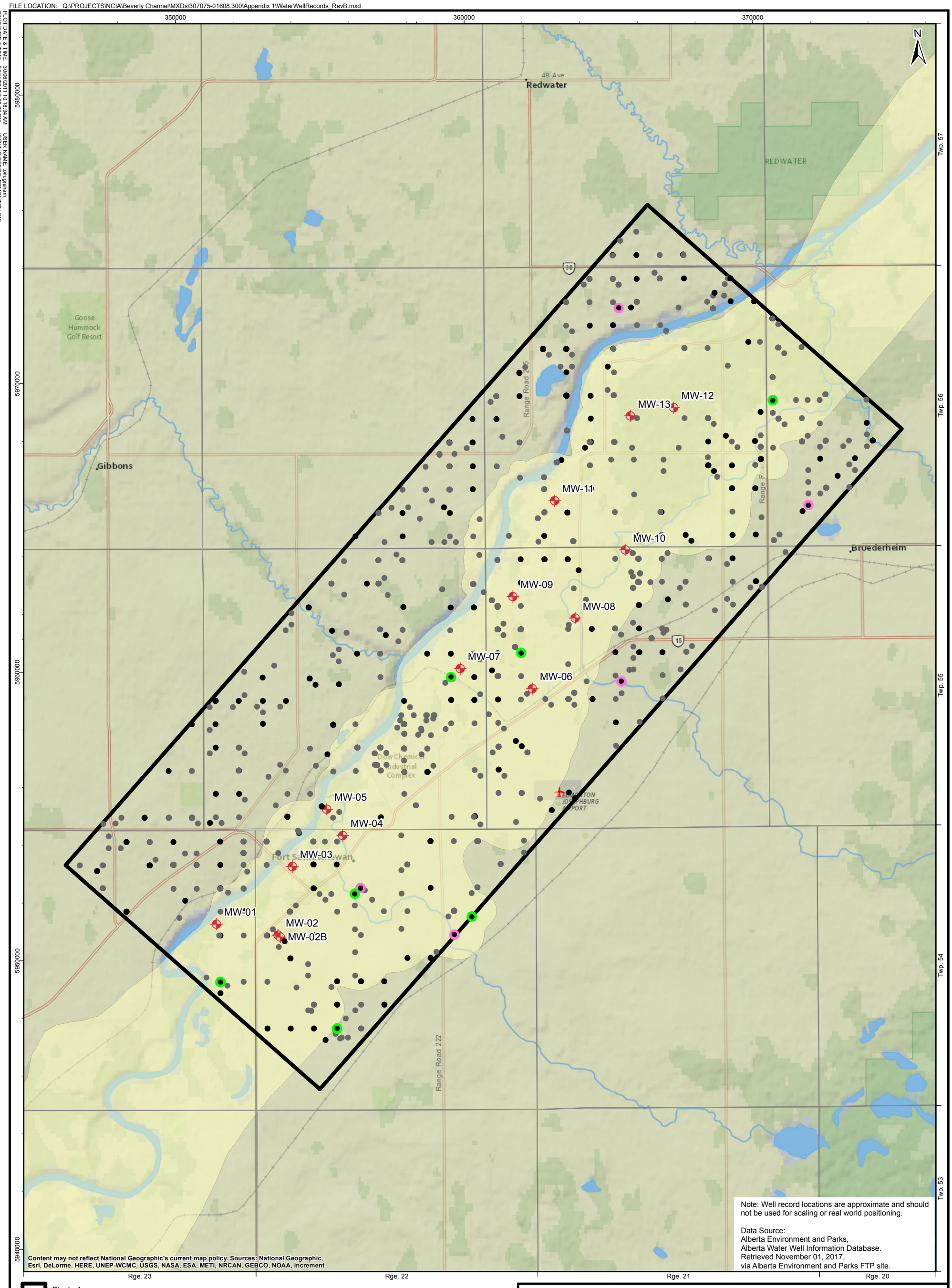
REV A

Appendices

Appendix 1 Water Well Records

FILE LOCATION: Q:\PROJECTS\NCIA\Beverly Channel\MXDs\307075-01608.300\Appendix 1\WaterWellRecords_RevB.mxd

PLOT DATE & TIME: 30/06/2011 10:18:34 AM USER NAME: tom.graham
SAVE DATE & TIME: 30/11/2017 3:23:22 PM ISSUING OFFICE: EDMONTON GIS



Note: Well record locations are approximate and should not be used for scaling or real world positioning.

Data Source:
Alberta Environment and Parks,
Alberta Water Well Information Database.
Retrieved November 01, 2017,
via Alberta Environment and Parks FTP site.

- Study Area
- Beverly Channel
- NCIA Monitoring Well
- Chemistry Exists - Bedrock
- Chemistry Exists - Beverly Channel
- Chemistry Exists
- No Chemistry

0 2.5 5
Kilometres
1:125,000
NAD 1983 UTM Zone 12N

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2017 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

WATER WELL RECORDS WITHIN THE STUDY AREA

Date:	Drawn by:	Edited by:	App'd by:
30-NOV-17	P.K.	T.G.	.

WorleyParsons Project No.
307075-01608-300

FIG No
A1 - 1

REV
B

OneWay to zero harm

Advision
WorleyParsons Group

FILE LOCATION: Q:\PROJECTS\NCIA\Beverly Channel\MXDs\307075-01608.200\307075_01608_200-WR-A1-1_ww_search-REVA.mxd

PLOT DATE & TIME: 30/06/2011 10:18:34 AM USER NAME: linda.flury
SAVE DATE & TIME: 24/10/2016 12:11:52 PM ISSUING OFFICE: EDMONTON GIS

360000

6980000

5960000

5940000

Rge. 23 Rge. 22 Rge. 21 Rge. 20

Twp. 57 Twp. 56 Twp. 55 Twp. 54 Twp. 53

N

MW-01
MW-02
MW-02B
MW-03
MW-04
MW-05
MW-06
MW-07
MW-08
MW-09
MW-10
MW-11
MW-12
MW-13

Redwater
Gibbons
Bruderheim
Josephburg

Township Road 574
Township Road 572
Township Road 570
Township Road 564
Township Road 562
Township Road 554
Township Road 550
Township Road 544
Township Road 542
Township Road 540

Range Road 233
Range Road 230
Range Road 224
Range Road 223
Range Road 220
Range Road 215A
Range Road 214
Range Road 213
Range Road 212
Range Road 211
Range Road 210
Range Road 204
Range Road 203

44 St
125 St
17 St NE
759 Ave NE
195 Ave NE
Manning Dr NE
Manning Dr NW
89 Ave
Boyd Lake Rd

Victoria Trail
North Saskatchewan River
Trappers Lake
Elk Island National
FORT SASKATCHEWAN INDUSTRIAL PARK
EASTGATE BUSINESS PARK
PINEVIEW
CLOVER BAR

© 2010 NAVTEQ © AND © 2016 Microsoft Corporation

- Chemistry Exists - Bedrock
- Chemistry Exists - Beverly Channel
- Chemistry Exists
- No Chemistry
- NCIA Monitoring Well
- Study Area
- Townships
- Beverly Channel

0 1 2 3 4 5
Kilometres
1:125,000
NAD 1983 UTM Zone 12N

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2016 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

WATER WELL RECORDS WITHIN THE STUDY AREA

Date:	Drawn by:	Edited by:	App'd by:
24-OCT-16	P.K.	L.F.	.

OneWay to zero harm

Advision WorleyParsons Group

WorleyParsons Project No. 307076-1608-200

FIG No A1 - 1

REV A

Advisian
WorleyParsons Group

Appendix A1-1

Water Well Records Within the Study Area

WELL ID	LOCATION					WELL DEPTH (m)	PERFORATIONS 1 (m)		PERFORATIONS 2 (m)		PERFORATIONS 3 (m)		SCREENINGS 1 (m)		SCREENINGS 2 (m)		DATE		WELL OWNER	PROPOSED USE	TYPE OF WORK	DRILL METHOD	CHEMISTRY
	LSD	SECTION	TOWNSHIP	RANGE	MERIDIAN		FROM	TO	FROM	TO	FROM	TO	FROM	TO	FROM	TO	COMPLETED	ABANDONED					
42021	13	24	56	21	4														ALTA ENV		Unknown	Unknown	No Chemistry
0042022	4	14	56	21	4																Unknown	Unknown	No Chemistry
0261198	SE	07	055	22	4	1.8													HERDER, H		Chemistry	Hand Dug	Chemistry Exists
0261609	10	18	055	22	4	792.5											11/08/1953		MID-WESTERN #10-18		Oil Exploratory	Unknown	No Chemistry
0261734	04	27	55	22	4	256.3											22/05/1953		IMPERIAL OIL LTD #AO282-6		Oil Exploratory	Unknown	No Chemistry
0261824	04	34	55	22	4	295.7											22/05/1953		IMPERIAL OIL LTD #AO282 4		Oil Exploratory	Unknown	No Chemistry
0261829	01	3	56	22	4	268.2											13/05/1953		IMPERIAL OIL LTD #AO190-173		Oil Exploratory	Unknown	No Chemistry
0261847	04	36	55	22	4	299.0											21/05/1953		IMPERIAL OIL LTD		Oil Exploratory	Unknown	No Chemistry
0263716	16	12	056	21	4	42.7							34.1	35.7			17/11/1975		BRUDERHEIM, TOWN OF #15-75		Unknown	Unknown	No Chemistry
1421800	8	14	55	22	4														KEYERA				No Chemistry
1716347	2	27	55	21	4														LEDCOR				No Chemistry
1716349	2	27	55	21	4														LEDCOR				No Chemistry
1716350	2	27	55	21	4														LEDCOR				No Chemistry
1716352	2	27	55	21	4														LEDCOR				No Chemistry
1690170	SE	12	55	22	4	38.7							35.4	38.4			23/10/2014		CORMODE-DICKSON	Commercial	New Well	Rotary - Mud	No Chemistry
0261191	SE	07	055	22	4	6.1													HERDER, H	Contamination Invest.	Chemistry	Hand Dug	Chemistry Exists
1270077	07	10	055	22	4	21.6							17.1	20.1			25/05/1998		DOW CHEMICAL CANADA LTD	Contamination Invest.	New Well	Drilled	No Chemistry
1270078	07	10	055	22	4	24.7							19.2	22.3			25/05/1998		DOW CHEMICAL CANADA LTD	Contamination Invest.	New Well	Drilled	No Chemistry
1270079	07	10	055	22	4	27.1							20.7	23.8			26/05/1998		DOW CHEMICAL CANADA LTD	Contamination Invest.	New Well	Rotary	No Chemistry
1270080	07	10	055	22	4	24.4							18.9	21.9			27/05/1998		DOW CHEMICAL CANADA LTD	Contamination Invest.	New Well	Rotary	No Chemistry
1270081	07	10	055	22	4	29.6							22.3	25.3			27/05/1998		DOW CHEMICAL CANADA LTD	Contamination Invest.	New Well	Rotary	No Chemistry
1270082	07	10	055	22	4	28.3							22.6	25.6			28/05/1998		DOW CHEMICAL CANADA LTD	Contamination Invest.	New Well	Rotary	No Chemistry
1270083	07	10	055	22	4	28.0							22.6	25.6			23/06/1998		DOW CHEMICAL CANADA LTD	Contamination Invest.	New Well	Rotary	No Chemistry
1270084	07	10	055	22	4	30.5							24.1	27.4			25/06/1998		DOW CHEMICAL CANADA LTD	Contamination Invest.	New Well	Rotary	No Chemistry
1270085	07	10	055	22	4	24.7							20.7	23.8			24/06/1998		DOW CHEMICAL CANADA LTD	Contamination Invest.	New Well	Rotary	No Chemistry
1270086	07	10	055	22	4	13.4							10.1	11.6			29/09/1998		DOW CHEMICAL CANADA LTD	Contamination Invest.	New Well	Rotary	No Chemistry
1320051	1	35	56	21	4	11.9							8.5	10.1			04/11/2008		AMEC EARTH & ENVIRONMENTAL	Dewatering	New Well	Bored	No Chemistry
2088626	15	8	56	21	4	11.9							2.7	8.8			20/01/2014		CITY OF EDMONTON	Dewatering	New Well	Rotary - Air	No Chemistry
2088627	15	8	56	21	4	11.6											21/01/2014		CITY OF EDMONTON	Dewatering	New Well	Rotary - Air	No Chemistry
0040488	SE	19	055	21	4	13.4											02/02/1970		HEARTLAND PROPERTIES	Domestic	Old Well-Abandoned	Not Applicable	No Chemistry
0040835	NW	03	057	21	4	18.3	12.2	18.3									22/08/2001		LANE, COLLEEN	Domestic	New Well	Rotary	No Chemistry
0083363	06	05	055	21	4	35.1													WESTMAN, F.W.	Domestic	Chemistry	Drilled	Chemistry Exists
0083364	12	05	055	21	4	24.4											01/01/1920		COATTA, E.J.	Domestic	Federal Well Survey	Bored	No Chemistry
0083365	09	05	055	21	4	4.3													PICKETT, JACK	Domestic	Chemistry	Unknown	Chemistry Exists
0083367	NW	06	055	21	4	64.0											03/08/1979		GAUF, ROD	Domestic	New Well	Rotary	No Chemistry
0083368	NE	06	055	21	4	18.3													SCHNEIDER, EARL A.	Domestic	Chemistry	Bored	Chemistry Exists
0083372	SW	07	055	21	4	39.6													NEWMAN, WILBERT	Domestic	Chemistry	Drilled	Chemistry Exists
0083373	09	07	055	21	4	30.5													MELTON, OTIS	Domestic	Chemistry	Drilled	Chemistry Exists
0083374	12	07	055	21	4	24.4											01/01/1920		THORNE, A.	Domestic	Federal Well Survey	Drilled	No Chemistry
0083375	NW	07	055	21	4	54.9	48.8	54.9									12/09/1987		FINCH, E.	Domestic	New Well	Cable Tool	No Chemistry
0083376	NW	07	055	21	4	9.1													FINCH, EDWARD	Domestic	Chemistry	Drilled	Chemistry Exists
0083377	NE	07	055	21	4	9.1													ENGLISH, LESLIE	Domestic	Chemistry	Unknown	Chemistry Exists
0083379	15	07	055	21	4	81.1													GEISLINGER, W.	Domestic	Chemistry	Unknown	Chemistry Exists
0083383	NE	09	055	21	4	0.0													EDE, W.	Domestic	Chemistry	Unknown	No Chemistry
0083417	SW	15	055	21	4	54.9	48.8	54.9									08/06/1989		WHELAN, JAMES	Domestic	New Well	Rotary	No Chemistry
0083418	NE	15	055	21	4	91.4													ANWEILER, SAL	Domestic	Chemistry	Unknown	Chemistry Exists
0083419	NW	16	055	21	4	56.4													KREBS, BERNARD	Domestic	Chemistry	Unknown	Chemistry Exists
0083423	11	17	055	21	4	21.3							20.1	21.3			09/04/1985		CNR	Domestic	New Well	Rotary	No Chemistry
0083425	NE	17	055	21	4	82.3	70.1	82.3									17/08/1983		SCOTFORD COLONY	Domestic	New Well	Rotary	No Chemistry
0083426	NE	17	055	21	4	79.2													SCOTFORD HUTTERITE BRETHREN	Domestic	Chemistry	Unknown	Chemistry Exists
0083428	NE	17	055	21	4	36.6													SCOTFORD COLONY	Domestic	Chemistry	Unknown	Chemistry Exists
0083439	SW	18	055	21	4	45.7													DUECK, MICHAEL	Domestic	Chemistry	Unknown	No Chemistry
0083440	NW	18	055	21	4	5.5													MAGEE, GARY	Domestic	Chemistry	Unknown	Chemistry Exists
0083447	05	19	055	21	4	46.9													DZURNY, EMIL	Domestic	Chemistry	Unknown	Chemistry Exists
0083448	NW	19	055	21	4	6.1												01/01/2001	BACHLEITNER, CATHY	Domestic	Chemistry	Hand Dug	Chemistry Exists
0083449	NE	19	055	21	4	39.6							36.6	38.1			23/07/1975	01/01/2001	EDE, WILLIAM	Domestic	New Well	Rotary	Chemistry Exists
0083450	NE	19	055	21	4	61.0													OLSON, FRED	Domestic	Chemistry	Unknown	Chemistry Exists
0083451	NE	19	055	21	4	40.2							34.7	40.2			10/10/1981		EDE, W.J.	Domestic	New Well	Rotary	No Chemistry
0083452	NE	19	055	21	4	48.8													ENOS, AL	Domestic	Chemistry	Drilled	Chemistry Exists
0083453	NE	19	055	21	4	39.0													NEBEL, ROBERT	Domestic	Chemistry	Drilled	Chemistry Exists
0083455	15	19	055	21	4	11.6							10.1	11.3			11/05/1978		NEBEL, ROBERT	Domestic	New Well	Rotary	No Chemistry
0083458	NE	19	055	21	4	18.3													NYHUIS, ALBERT	Domestic	Chemistry	Hand Dug	Chemistry Exists
0083460	NE	19	055	21	4	9.1													DOIGE, J.F.	Domestic	Chemistry	Unknown	Chemistry Exists
0083461	NE	19	055	21	4	50.3													CAMERON, ED	Domestic	Chemistry	Unknown	Chemistry Exists
0083462	SE	20	055	21	4	99.4													CNR#BEAMER SPUR	Domestic	Chemistry	Unknown	Chemistry Exists
0083463	SE	20	055	21	4	0.0													CNR#SCOTFORD YARD	Domestic	Chemistry	Unknown	No Chemistry
0083467	NE	21	055	21	4	76.2													SCOTFORD HUTTERITE COLONY	Domestic	Chemistry	Unknown	Chemistry Exists
0083470	NW	22	055	21	4	64.0													LARSEN, SVEND	Domestic	Chemistry	Drilled	Chemistry Exists
0083471	NW	22	055	21	4	54.9													LARSEN, HELEN	Domestic	Chemistry	Unknown	Chemistry Exists
0083473	NE	22	055	21	4	18.3													CHERNICHAN, JOHN	Domestic	Chemistry	Bored	Chemistry Exists
0083500	SW	27	055	21	4	0.0													CHOLOWSKI, ALBERT	Domestic	Chemistry	Unknown	No Chemistry
0083501	SW	27	055	21	4	67.1													CHIPCHASE, G.	Domestic	Chemistry	Unknown	Chemistry Exists
0083502	NW	27	055	21	4	42.7													MILLWARD, DONALD	Domestic	Chemistry	Unknown	Chemistry Exists
0083503	NW	27	055	21	4	42.7													MILLWARD, DONALD	Domestic	Chemistry	Unknown	Chemistry Exists
0083505	SE	28	055	21	4	38.7													ROYCE, SIDNEY	Domestic	Chemistry	Drilled	Chemistry Exists
0083506	SE	28	055	21	4	24.4													ROYCE, SIDNEY	Domestic	Chemistry	Unknown	No Chemistry
0083510	SE	30	055	21	4	9.8													WATERS, DEAN	Domestic	Chemistry	Unknown	Chemistry Exists
0083511	SE	30	055	21	4	7.6												01/01/2001	DOCKSTEADER, ILEF	Domestic	Chemistry	Hand Dug	Chemistry Exists
0083512	SE	30	055	21	4	9.1													HARBOWAY, M.	Domestic	Chemistry	Hand Dug	Chemistry Exists
0083513	SE	30	055	21	4	14.3											15/02/1970		BALIMORE, WESLY	Domestic	New Well	Bored	No Chemistry
0083514	SE	30	055	21	4	6.1													ORDELL, RICHARD	Domestic	Chemistry	Unknown	Chemistry Exists
0083516	SE	30	055	21	4	12.2													WATERS, DEAN	Domestic	Chemistry	Drilled	Chemistry Exists
0083517	SE	30	055	21	4	45.7													WOUDENBURG, MARY	Domestic	Chemistry	Unknown	Chemistry Exists
0083518	SW	30	055	21	4	6.1											12/12/1968		DAYTON, GEORGE	Domestic	Chemistry	Bored	Chemistry Exists
0083519	SW	30	055	21	4	6.7													DEMEULE, LORETTA	Domestic	Chemistry	Hand Dug	Chemistry Exists
0083520	06	30	055	21	4	41.1							39.6	41.1			08/08/1984		MOSER, GEORGETTE	Domestic	New Well	Rotary	No Chemistry
0083521	03	30	055	21	4	13.4											02/02/1970		YARSHUK, PETE	Domestic	New Well	Bored	No Chemistry
0083522	SW	30	055	21	4	10.7													WIEBE, G.	Domestic	Chemistry	Unknown	Chemistry Exists
0083523	SW	30	055	21	4	9.1													DEMEULE, N.E.	Domestic	Chemistry	Drilled	Chemistry Exists
0083524	NW	30	055	21	4	6.7													BAKER, I.H.	Domestic	Chemistry	Drilled	Chemistry Exists
0083525	NW	30	055	21	4	7.3													LINING, DALE	Domestic	Chemistry	Bored	Chemistry Exists
0083526	NW	30	055	21	4	7.3													FRANCOUER, LARRY	Domestic	Chemistry	Unknown	Chemistry Exists
0083527	NW	30	055	21	4	9.1													BECK, LINDA	Domestic	Chemistry	Unknown	Chemistry Exists
0083528	NW	30	055	21	4	12.2													FRANCOUER, LARRY	Domestic	Chemistry	Drilled	Chemistry Exists
0083529	NW	30	055	21	4	9.8											30/11/1965		YANCHUK, PETE	Domestic	New Well	Bored	No Chemistry
0083531	NW	30	055	21	4	12.2											06/02/1970		YARSHUK, PETER	Domestic	New Well	Bored	No Chemistry
0083532	13	30	055	21	4	8.5											12/02/1970	01/01/2001	YARSHUK, PETER	Domestic	New Well	Bored	No Chemistry
0083533	SE	31	055	21	4	41.1													PCL BRAUN SIMONS LTD	Domestic	Chemistry	Unknown	Chemistry Exists
0083534	NE	31	055	21	4	39.6													PCL BRAUN SIMONS LTD	Domestic	Chemistry	Unknown	Chemistry Exists
0083536	NW	32	055	21	4	39.6													PCL BRAUN SIMONS LTD	Domestic	Chemistry	Unknown	Chemistry Exists
0083537	NW	32	055	21	4	39.6													PCL BRAUN SIMONS LTD	Domestic	Chemistry	Unknown	Chemistry Exists
0083538	NW	32	055	21	4	45.7													PCL BRAUN SIMONS LTD	Domestic	Chemistry	Unknown	Chemistry Exists
0083544	NE	32	055	21	4	46.3													VISSCHER, D.	Domestic	Chemistry	Unknown	Chemistry Exists
0083548	SW	34	055	21	4	15.2													RADKE, JAMES	Domestic	Chemistry	Drilled	Chemistry Exists
0083549	04	34	055	21	4	12.2											26/08/1975		RADKE, BEN	Domestic	New Well	Bored	No Chemistry
0083551	SW	34	055	21	4	0.0													RADKE	Domestic	Chemistry	Unknown	No Chemistry
0083552	05	34	055	21	4	35.1							32.0	35.1			09/02/1986		RADKE, J./ R.	Domestic	New Well	Rotary	No Chemistry
0083554	NW	34	055	21	4	18.3													PICKARD, WAYNE	Domestic	Chemistry	Drilled	Chemistry Exists
0083556	NW	34	055	21	4	39.6							34.4	36.0			01/10/1970		FISHER, GEORGE P.	Domestic	New Well	Rotary	No Chemistry
0083560	NW	34	055	21	4	42.7							36.6	42.7			14/08/1989		DAOUST, C.	Domestic	New Well	Rotary	No Chemistry
0083561	NE	34	055	21	4	30.5							28.3	29.9			05/06/1968		BERG, ALFRED	Domestic	New Well	Rotary	No Chemistry
0083564	NE	35	55	21	4	12.8													CHARBONNEAU, MARCEL	Domestic	Chemistry	Drilled	Chemistry Exists
0083570	SE	36	055	21	4	18.3													NAVRATIL, JOHN	Domestic	Chemistry	Bored	Chemistry Exists
0083571	SE	36	055	21	4	15.2													WIENS, LORI	Domestic	Chemistry	Unknown	Chemistry Exists
0083572	SW	36	055	21	4	39.6	37.8	39.6									07/04/1988		UNITED GRAIN GROWERS LTD	Domestic	New Well	Cable Tool	No Chemistry
0083573	NW	36	055	21	4	12.2													PROKOPCZAK, DAVID	Domestic	Chemistry	Unknown	Chemistry Exists
0083656	SE	16	055	21	4	48.2													RIETVELD, LEENDERT	Domestic	Chemistry	Drilled	Chemistry Exists
0090354	SE	27	055	21	4	54.9	39.0	42.7									01/08/1972		CHOLOWSKI, ALBERT	Domestic	New Well	Rotary	No Chemistry
0091494	04	06	056	20	4	6.1													SAMPERT, T.	Domestic	Federal Well Survey	Hand Dug	No Chemistry
0091496	SW	06	056	20	4	3.0													THORNE, KEITH	Domestic	Chemistry	Unknown	No Chemistry
0091498	NE	06	056	20	4	91.4													SCHRAM, GEORGE	Domestic	Chemistry	Unknown	Chemistry Exists
0091502	09	07	056	20	4	9.1													DRIESNER, D.	Domestic	Federal Well Survey	Bored	No Chemistry
0091504	SW	08	056	20	4	23.8													SCHRAM, ED	Domestic	Chemistry	Unknown	Chemistry Exists
0091506	16	08	056	20	4	75.0											15/11/1961		FREY, BERT W.	Domestic	New Well	Rotary	Chemistry Exists
0091507	NE	08	056	20	4	5.5													FREY, B.	Domestic	Chemistry	Unknown	No Chemistry
0091508	09	08	056	20	4	12.2											01/01/1920		FREY, J.	Domestic	Federal Well Survey	Bored	No Chemistry
0091550	SW	16	056	20	4	6.1													ROSNAU, N.	Domestic	Chemistry	Unknown	Chemistry Exists
0091553	12	16	056	20	4	19.5											20/03/1985		NEAVE, JOHN	Domestic	New Well	Bored	Chemistry Exists
0091554	02	17	56	20	4	34.1											06/05/1981		SAMPERT, RAY	Domestic	New Well	Bored	No Chemistry
0091558	SE	18	056	20	4	5.8													MCLELLAN, ARTHUR	Domestic	Chemistry	Unknown	Chemistry Exists
0091559	SE	18	056	20	4	6.7													MCLELLAN, ARTHUR	Domestic	Chemistry	Hand Dug	Chemistry Exists
0091561	SE	18	056	20	4	33.5											17/12/1981		MCLELLAN, ARTHUR L.	Domestic	New Well	Cable Tool	No Chemistry
0091562	SE	18	56	20	4	67.1											07/10/2000		HELMER, MURIEL/ABNER	Domestic	Old Well-Test	Not Applicable	Chemistry Exists
0091562	SE	18	56	20	4	67.1	61.0	67.1									31/12/1981		MCLELLAN, ARTHUR	Domestic	New Well	Rotary	Chemistry Exists
0091564	04	18	056	20	4	0.0													STELTER, A.	Domestic	Federal Well Survey	Hand Dug	No Chemistry
0091565	NW	18	056	20	4	12.2													SERINK, W.	Domestic	Chemistry	Bored	Chemistry Exists
0091566	11	18	056	20	4	14.9											17/06/1979		SERINK, W.	Domestic	New Well	Bored	No Chemistry
0091572	04	19	056	20	4	44.2											23/09/1978		SERINK, BILL	Domestic	New Well	Rotary	No Chemistry
0091573	12	19	056	20	4	10.4											01/07/1974		MATTHEWS, BILL	Domestic	New Well	Bored	Chemistry Exists
0100929	SW	08	056	20	4	7.9													SCHRAM, ED	Domestic	Chemistry	Hand Dug	Chemistry Exists
0100930	SE	08	056	20	4	9.1													KRAUSE, F.	Domestic	Chemistry	Unknown	Chemistry Exists
0100931	00	08	056	20	4	17.1													INKSTER, COLIN	Domestic	Chemistry	Unknown	Chemistry Exists
0100932	NE	08	056	20	4	19.5											14/07/1973		INKSTER, COLIN	Domestic	New Well	Bored	No Chemistry
0100943	SW	16	056	20	4	62.5	56.4	62.5									01/11/1973		ROSNAU, NEIL	Domestic	New Well	Cable Tool	Chemistry Exists
0100944	SW	16	056	20	4	93.0													ROSNAU, NEIL	Domestic	Chemistry	Unknown	Chemistry Exists
0100945	SW	16	056	20	4	24.7													BOWES, GEORGE	Domestic	Chemistry	Unknown	Chemistry Exists
0100946	SW	16	056	20	4	28.7											18/10/1977		ROSNAU, WESLEY	Domestic	New Well	Bored	Chemistry Exists
0100947	SW	20	056	20	4	45.7													BETTAC, E.	Domestic	Chemistry	Unknown	Chemistry Exists
0100948	SW	20	056	20	4	45.7													WATSON, D.	Domestic	Chemistry	Unknown	No Chemistry
0150309	SE	29	055	22	4	91.4											25/01/1990		GROOT, DON	Domestic	New Well	Combination	No Chemistry
0152373	WH	08	056	21	4	25.0											26/06/1990		MASCHMEYER, RAY	Domestic	New Well	Rotary	No Chemistry
0153167	SE	22	055	21	4	48.8							41.1	42.7			20/07/1990		POULIN, RODGER	Domestic	New Well	Rotary	No Chemistry
0154895	NW	16	055	21	4	48.8	42.7	48.8									13/10/1990		KREBS, BERNARD L.	Domestic	New Well	Rotary	No Chemistry
0156817	NW	07	054	22	4	67.1													ALLEN, GERALD	Domestic	Chemistry	Unknown	No Chemistry
0156870	NW	16	055	21	4	74.7													KREBS, BERNARD L.	Domestic	Chemistry	Rotary	Chemistry Exists
0156871	SE	30	055	21	4	9.8													HONISCH, VERNON	Domestic	Chemistry	Not Applicable	No Chemistry
0156872	SW	01	055	22	4	0.0													THEROUX, CHRIS	Domestic	Chemistry	Not Applicable	No Chemistry
0156874	00	20	055	22	4	8.5													LAMOUREUX, JOHN C./CRAIG, RAY	Domestic	Chemistry	Not Applicable	No Chemistry
0157040	NW	01	056	21	4	11.0													CHOLOWSKI, TOM	Domestic	Chemistry	Hand Dug	No Chemistry
0157041	NE	27	056	21	4	54.9													EASTWOOD, J.W.	Domestic	Chemistry	Not Applicable	No Chemistry
0158532	NE	08	054	22	4	14.0											07/07/1979		MAKUCH, PETER J.	Domestic	New Well	Bored	No Chemistry
0158533	NE	08	054	22	4	23.2											01/07/1972		OGDEN, WAYNE	Domestic	New Well	Bored	No Chemistry
0158577	NE	03	056	22	4	64.0	30.5	64.0									06/04/1968		KUGLER, ERIKA	Domestic	New Well	Rotary	No Chemistry
0159287	SE	05	055	22	4	14.6	8.2	14.6									10/07/1991		GODBOUT, ROMEO	Domestic	New Well	Bored	No Chemistry
0160456	NE	34	056	21	4	12.2													GORGICHUK, DIANA	Domestic	Chemistry	Not Applicable	No Chemistry
0160666	SE	30	055	21	4	8.5													SOWDEN, HELEN	Domestic	Chemistry	Not Applicable	No Chemistry
0160801	SE	16	054	22	4	5.5													BONOWICZ, KEN	Domestic	Chemistry	Not Applicable	No Chemistry
0161740	NE	08	054	22	4	30.5													OSTERLAND, JOYCE	Domestic	Chemistry	Not Applicable	No Chemistry
0161789	NE	19	056	21	4	7.6													MELTON, JAMES	Domestic	Chemistry	Not Applicable	No Chemistry
0161790	NW	27	056	21	4	3.7													JOHNSTON, DAVID	Domestic	Chemistry	Not Applicable	No Chemistry
0162337	09	4	57	21	4	22.9											26/05/2001		LANE, C.	Domestic	Old Well-Test	Not Applicable	No Chemistry
0162337	09	4	57	21	4	21.3							17.7	21.3			31/12/1991		LANE, C/EST OF M PICH	Domestic	Reconstructed	Not Applicable	No Chemistry
0162337	09	4	57	21	4	22.9							16.2	22.3			16/11/1991		LANE, C./EST OF M. PICH	Domestic	New Well	Cable Tool	No Chemistry
0165347	SE	34	054	23	4	24.4													MOAK, CARL A.	Domestic	Chemistry	Unknown	No Chemistry
0166298	NE	08	054	22	4	73.2	42.7	72.2									01/06/1992		TAPLEY, CAM	Domestic	New Well	Rotary	No Chemistry
0167085	NE	08	054	22	4	11.6													AMBLER, TERRY D.	Domestic	Chemistry	Unknown	No Chemistry
0167584	NW	25	055	21	4	61.0													PROKOPCZAK, WM	Domestic	Chemistry	Unknown	No Chemistry
0168098	16	08	054	22	4	14.6	4.3	9.8									25/06/1992		COOL, NORMAND	Domestic	New Well	Bored	No Chemistry
0168181	09	18	054	22	4	9.8	4.9	9.8									21/07/1992		DAKIN, DEXTER	Domestic	New Well	Bored	No Chemistry
0168267	NE	08	054	22	4	11.3	6.1	11.3									16/07/1992		DORLICH, HELGA	Domestic	New Well	Bored	No Chemistry
0169284	08	14	055	22	4	40.5							37.8	39.3			02/10/1992		FEDERATED PIPELINE LTD	Domestic	New Well	Rotary	No Chemistry
0169305	NE	08	054	22	4	9.4													DAKIN, DOREEN	Domestic	Chemistry	Unknown	No Chemistry
0169519	SW	02	057	21	4	3.0													SUDAYKO, MIKE	Domestic	Chemistry	Unknown	No Chemistry
0169601	SW	02	057	21	4	48.8													SUDAYKO, MIKE	Domestic	Chemistry	Unknown	No Chemistry
0193975	SW	30	055	21	4	42.7												01/01/2001	G&J TRAILER ENT	Domestic	Chemistry	Unknown	No Chemistry
0195146	NW	33	056	21	4	15.2											01/08/1973		PICH, PETER	Domestic	New Well	Bored	No Chemistry
0196672	SE	08	056	20	4	6.1													ALEXANDER, BOB	Domestic	Chemistry	Unknown	No Chemistry
0208911	SE	16	056	21	4	11.9	4.6	11.3									25/09/1992		HENKELMAN, PERCY	Domestic	New Well	Bored	No Chemistry
0224564	SE	18	056	20	4	42.7							35.4	41.5			09/10/1993		MCLELLAN, ART	Domestic	New Well	Rotary	No Chemistry
0225468	10	08	054	22	4	14.9	7.3	8.5	10.1	14.6							26/08/1993		HESKE, GERRY	Domestic	New Well	Bored	No Chemistry
0225474	09	08	054	22	4	14.9	6.1	12.2									27/08/1993		CLARK, DARCY	Domestic	New Well	Bored	No Chemistry
0231919	NW	13	054	23	4	31.7							29.3	31.7			20/12/1977		ESQUIRE HOMES LTD/FUNG, DR. G.	Domestic	New Well	Rotary	No Chemistry
0238531	NW	30	055	21	4	42.1	36.0	42.1									26/01/1994	01/01/2001	LEUENG, DALE	Domestic	New Well	Rotary	No Chemistry
0240644	NE	08	054	22	4	64.0	57.9	64.0									16/03/1994		GETSON, DON	Domestic	New Well	Cable Tool	No Chemistry
0240722	09	08	054	22	4	14.9	4.6	10.7									22/10/1993		MRASEK, DAVID	Domestic	New Well	Bored	No Chemistry
0240723	09	08	054	22	4	14.9	5.5	11.6									01/10/1993		BALANKO, RON	Domestic	New Well	Bored	No Chemistry
0241116	10	08	054	22	4	14.9	4.9	12.2									13/05/1994		BOWES, MURRAY	Domestic	New Well	Bored	No Chemistry
0260033	NE	07	054	22	4	59.7											01/01/1958		GALLOWAY, K.	Domestic	New Well	Cable Tool	Chemistry Exists
0260035	NW	08	054	22	4	61.0	48.8	57.9									22/09/1983		CHIMERA, WALTER	Domestic	New Well	Cable Tool	Chemistry Exists
0260037	NE	08	054	22	4	73.5											01/10/1973		GYDISH, ROBERT	Domestic	New Well	Cable Tool	Chemistry Exists
0260038	NE	08	054	22	4	73.2	47.5	73.2									08/03/1974		RAFUSE, A.J.	Domestic	New Well	Cable Tool	No Chemistry
0260039	NE	08	054	22	4	8.5											01/04/1971		SWANSON, K.	Domestic	New Well	Bored	No Chemistry
0260045	NE	08	054	22	4	73.2	45.7	73.2									16/06/1972		KALISTA, M.J.	Domestic	New Well	Cable Tool	Chemistry Exists
0260046	NE	08	054	22	4	9.1											28/08/1978		TOMPLINS, D.	Domestic	New Well	Bored	Chemistry Exists
0260048	NE	08	054	22	4	8.8											06/09/1979		THOME, MIKE	Domestic	New Well	Bored	No Chemistry
0260052	NE	08	054	22	4	9.1											27/10/1980		KROENTING, GREG	Domestic	New Well	Bored	Chemistry Exists
0260054	NE	08	054	22	4	10.1											30/04/1984		KENSON HLDG	Domestic	New Well	Bored	No Chemistry
0260058	NE	08	054	22	4	11.9											28/05/1986		HESKE, GERRY	Domestic	New Well	Bored	Chemistry Exists
0260171	SE	16	054	22	4	61.0	54.9	61.0									03/11/1988		BONOWICZ, JOE	Domestic	New Well	Cable Tool	Chemistry Exists

Appendix A1-1

Water Well Records Within the Study Area

WELL ID	LOCATION					WELL DEPTH (m)	PERFORATIONS 1 (m)		PERFORATIONS 2 (m)		PERFORATIONS 3 (m)		SCREENINGS 1 (m)		SCREENINGS 2 (m)		DATE		WELL OWNER	PROPOSED USE	TYPE OF WORK	DRILL METHOD	CHEMISTRY
	LSD	SECTION	TOWNSHIP	RANGE	MERIDIAN		FROM	TO	FROM	TO	FROM	TO	FROM	TO	FROM	TO	COMPLETED	ABANDONED					
0260194	NW	21	054	22	4	70.1	61.0	68.6									03/04/1985		GRAYMAN, LYLE	Domestic	New Well	Cable Tool	No Chemistry
0260203	NW	23	054	22	4	46.9	22.6	46.0									17/04/1984		MCEACHERN, MEL	Domestic	New Well	Rotary	Chemistry Exists
0260225	SW	27	54	22	4	50.3	33.5	47.2									20/12/1969		SHAREK, TONY	Domestic	New Well	Rotary	No Chemistry
0260227	NE	27	054	22	4	61.9	24.4	61.0									11/04/1967		SIMMONS, HECTOR	Domestic	New Well	Rotary	Chemistry Exists
0260229	NW	28	054	22	4	47.5											29/02/1960		DAVIS, DON	Domestic	New Well	Rotary	No Chemistry
0260230	NW	28	054	22	4	73.2	67.1	71.9									12/08/1976		ROBERT, VICTOR	Domestic	New Well	Rotary	Chemistry Exists
0260232	NW	28	054	22	4	27.4											20/08/1960		SNEDSTEAD	Domestic	New Well	Drilled	No Chemistry
0260233	NW	28	054	22	4	30.5											25/09/1960		STARK, R.	Domestic	New Well	Drilled	No Chemistry
0260234	NW	28	054	22	4	60.0											06/05/1970		PIERCE, E.	Domestic	New Well	Rotary	Chemistry Exists
0260235	NW	28	054	22	4	30.5											17/09/1959		BOHNET, HANS	Domestic	New Well	Rotary	Chemistry Exists
0260236	NW	28	054	22	4	30.5											07/10/1960		PETROSKI CONTRACTING	Domestic	New Well	Drilled	No Chemistry
0260237	NW	28	054	22	4	30.5											19/01/1961		WETZTREN, M.	Domestic	New Well	Cable Tool	Chemistry Exists
0260366	NW	28	054	22	4	76.8											26/10/1977		SHEPPARD, JOHN	Domestic	New Well	Rotary	No Chemistry
0260369	12	28	054	22	4	32.3							28.3	29.3			02/07/1959		HAMILTON, CALVIN	Domestic	New Well	Rotary	Chemistry Exists
0260375	NW	29	054	22	4	13.7													VLA	Domestic	Chemistry	Hand Dug	Chemistry Exists
0260383	SE	30	054	22	4	76.2													KREBS, D.	Domestic	Chemistry	Unknown	Chemistry Exists
0260386	SE	30	054	22	4	76.2											30/05/1968		KREBS, DON	Domestic	New Well	Rotary	No Chemistry
0260397	SE	32	054	22	4	24.4													CHOLOWSKI, GERALD	Domestic	Chemistry	Unknown	Chemistry Exists
0260425	SW	34	054	22	4	45.7													FLEMING, ERNEST	Domestic	Chemistry	Drilled	Chemistry Exists
0260441	NE	34	054	22	4	57.9													BARTELL, RICHARD	Domestic	Chemistry	Unknown	Chemistry Exists
0260447	NW	35	054	22	4	48.2											01/01/1912		SIMMONS, F.	Domestic	New Well	Drilled	No Chemistry
0260903	WH	13	054	23	4	3.7													MITHELL, DOUG	Domestic	Chemistry	Unknown	Chemistry Exists
0260906	NW	13	054	23	4	31.7							28.3	31.7			01/10/1977		OBRADOVICH, VUKSAN	Domestic	New Well	Rotary	Chemistry Exists
0260914	NW	13	054	23	4	82.3													ELLEFSON, NORM	Domestic	Chemistry	Cable Tool	Chemistry Exists
0260922	NW	13	054	23	4	82.3													GAVINCHUK, GEORGE	Domestic	Chemistry	Drilled	Chemistry Exists
0260948	NW	13	054	23	4	31.7							29.0	31.4			23/03/1978		PESKLEVIS, ALBERT	Domestic	New Well	Rotary	Chemistry Exists
0260972	NW	13	054	23	4	32.0							29.3	32.0			29/05/1979		KIEL, RUDY	Domestic	New Well	Rotary	Chemistry Exists
0260980	NW	13	054	23	4	31.7											04/07/1979		SIGURDSON, HOWARD	Domestic	New Well	Rotary	Chemistry Exists
0260987	NW	13	054	23	4	42.7							29.9	31.4			04/11/1980		MITCHELL, DOUGLAS B.	Domestic	New Well	Rotary	No Chemistry
0260996	NW	13	054	23	4	36.6													BERG, AARON	Domestic	Chemistry	Unknown	Chemistry Exists
0261001	NW	13	054	23	4	32.0							29.0	32.0			24/04/1980		BERG, AARON	Domestic	New Well	Rotary	No Chemistry
0261009	NE	13	054	23	4	12.2											01/01/1935		DAWSON, MAJ.	Domestic	Federal Well Survey	Hand Dug	No Chemistry
0261032	SE	01	055	22	4	45.7													SCHWANDT, E A	Domestic	Chemistry	Unknown	Chemistry Exists
0261039	SE	01	055	22	4	54.9													HANSEN, P E	Domestic	New Well	Unknown	No Chemistry
0261073	SE	01	055	22	4	0.0													WALLACE, J	Domestic	Chemistry	Unknown	Chemistry Exists
0261075	SE	01	055	22	4	0.0													BARR, F	Domestic	Chemistry	Unknown	Chemistry Exists
0261078	SE	01	055	22	4	121.9													BEST, S.	Domestic	Chemistry	Unknown	Chemistry Exists
0261082	SE	01	055	22	4	0.0													SCHLOSSER, D	Domestic	Chemistry	Unknown	Chemistry Exists
0261107	16	31	054	22	4	2.7													CAMERON, D.	Domestic	Chemistry	Unknown	Chemistry Exists
0261129	00	04	055	22	4	0.0													LAMOUREUX CHILDRENS HOME	Domestic	Chemistry	Hand Dug	Chemistry Exists
0261133	SE	05	055	22	4	11.3											14/09/1982		LAMOUREUX, J	Domestic	New Well	Bored	Chemistry Exists
0261139	SE	05	055	22	4	11.3											11/05/1959		LAMOUREUX, R	Domestic	New Well	Bored	Chemistry Exists
0261147	SW	06	055	22	4	39.6											01/07/1973		GABERT, B	Domestic	New Well	Cable Tool	No Chemistry
0261149	SE	06	055	22	4	73.2	43.3	49.4									15/07/1980		BOYCHUK, N	Domestic	New Well	Rotary	No Chemistry
0261151	03	06	055	22	4	8.2											01/01/1906		LAMOUREUX, A.L.	Domestic	Federal Well Survey	Hand Dug	No Chemistry
0261154	04	06	055	22	4	51.8													ZIMA, M	Domestic	Chemistry	Unknown	Chemistry Exists
0261182	NE	06	055	22	4	79.2													ELLIOTT, F	Domestic	Chemistry	Unknown	Chemistry Exists
0261187	09	06	055	22	4	18.3											01/01/1927		ADAMS, B.S.	Domestic	Federal Well Survey	Drilled	No Chemistry
0261202	SE	07	055	22	4	9.1													HERDER, H	Domestic	Chemistry	Drilled	Chemistry Exists
0261203	SE	07	055	22	4	82.3											26/08/1974	26/08/1974	JUKASZ, A.	Domestic	Dry Hole-Abandoned	Rotary	No Chemistry
0261213	NW	07	055	22	4	18.3											23/05/1969		CHRISTIANSEN, J.M.	Domestic	New Well	Bored	Chemistry Exists
0261220	NE	07	055	22	4	10.7													PRINS, W	Domestic	Chemistry	Unknown	Chemistry Exists
0261225	NE	07	055	22	4	11.6											21/10/1978		PRINS, W	Domestic	New Well	Bored	No Chemistry
0261250	10	09	055	22	4	19.8													KEITH, D	Domestic	Chemistry	Unknown	Chemistry Exists
0261348	SE	11	055	22	4	36.9							34.4	36.9			27/04/1978		WOUDENBERG, M.	Domestic	New Well	Rotary	No Chemistry
0261357	SE	11	055	22	4	79.2											01/08/1965		TIMNALL, C./V.	Domestic	New Well	Rotary	No Chemistry
0261368	SE	11	055	22	4	73.2													SHEWCHUK, S	Domestic	Chemistry	Unknown	Chemistry Exists
0261376	SE	11	055	22	4	61.0													HAREL, C.	Domestic	Chemistry	Unknown	Chemistry Exists
0261383	SE	11	055	22	4	121.9	103.6	121.9									20/10/1977		WOUDENBERG, M.	Domestic	New Well	Rotary	No Chemistry
0261396	SE	11	055	22	4	64.0													TINDALL, V	Domestic	Chemistry	Unknown	Chemistry Exists
0261398	SE	11	055	22	4	27.4													DENNIS, D.	Domestic	Chemistry	Unknown	Chemistry Exists
0261403	SW	11	055	22	4	54.9													SHEWCHUK, T	Domestic	Chemistry	Unknown	Chemistry Exists
0261446	NW	13	055	22	4	24.4													WOUDENBERG, M.	Domestic	Chemistry	Unknown	Chemistry Exists
0261447	NW	13	055	22	4	12.2													WOUDENBERG, M.	Domestic	Chemistry	Drilled	Chemistry Exists
0261449	NE	13	055	22	4	7.3											01/04/1971		BARON, F.	Domestic	New Well	Bored	No Chemistry
0261450	NE	13	055	22	4	7.3													MCARTHUR, DOUGLAS	Domestic	Chemistry	Unknown	Chemistry Exists
0261453	NE	13	055	22	4	7.3													DAWSON, J B	Domestic	Chemistry	Bored	Chemistry Exists
0261468	SW	14	055	22	4	64.0											01/04/1959			Domestic	New Well	Unknown	No Chemistry
0261493	NW	14	055	22	4	18.3													TAILLEFER, G	Domestic	Chemistry	Drilled	Chemistry Exists
0261513	SW	17	055	22	4	0.0													GRANT, G.	Domestic	Chemistry	Unknown	Chemistry Exists
0261521	NW	17	055	22	4	18.3													READNER, H	Domestic	Chemistry	Bored	Chemistry Exists
0261530	NE	17	055	22	4	115.8													RUSSEL, L	Domestic	Chemistry	Unknown	Chemistry Exists
0261542	SW	18	055	22	4	9.1													CURTIS, L	Domestic	Chemistry	Bored	Chemistry Exists
0261556	NW	18	055	22	4	8.2													CURTIS, R.	Domestic	Chemistry	Unknown	Chemistry Exists
0261563	NW	24	054	23	4	9.1														Domestic	Chemistry	Unknown	Chemistry Exists
0261564	NE	24	054	23	4	53.3											16/07/1980		MOLINEUX, RALPH/TABLER, PAUL	Domestic	New Well	Cable Tool	No Chemistry
0261567	SE	25	054	23	4	6.4													FT SASK LANDFILL #OBS WELL	Domestic	Chemistry	Unknown	Chemistry Exists
0261575	SE	25	054	23	4	36.0													BARRY, M	Domestic	Chemistry	Drilled	Chemistry Exists
0261578	NW	18	055	22	4	9.1													CURTIS, R.	Domestic	Chemistry	Unknown	Chemistry Exists
0261586	NW	18	055	22	4	0.0													CURTIS, R.L.	Domestic	Chemistry	Unknown	Chemistry Exists
0261587	NW	25	054	23	4	28.3													ORAM, JAMES M	Domestic	Chemistry	Unknown	Chemistry Exists
0261588	NW	25	054	23	4	12.8													VILLENEUVE, L	Domestic	Chemistry	Hand Dug	Chemistry Exists
0261589	NW	18	055	22	4	22.9													CURTIS, R.	Domestic	Chemistry	Unknown	Chemistry Exists
0261590	NW	25	054	23	4	0.0													MURPHY, H	Domestic	Chemistry	Drilled	Chemistry Exists
0261591	NW	18	055	22	4	15.2													CURTIS, R.	Domestic	Chemistry	Unknown	Chemistry Exists
0261593	NE	25	054	23	4	10.1													BYERS, D.H.	Domestic	Chemistry	Unknown	No Chemistry
0261598	NW	26	054	23	4	29.0	21.3	27.4									01/06/1969		MCGEACHY, JIM	Domestic	New Well	Rotary	No Chemistry
0261605	NE	26	054	23	4	73.2											07/06/1978		SIMPSON, TOM	Domestic	New Well	Rotary	No Chemistry
0261606	NE	18	055	22	4	0.0													ANWEILER, S.	Domestic	Chemistry	Unknown	Chemistry Exists
0261610	00	26	054	23	4	9.8													KIEL, RUDOLF	Domestic	Chemistry	Unknown	Chemistry Exists
0261614	SW	20	055	22	4	30.5											01/01/1960		CRAIG, R.S.	Domestic	Chemistry	Unknown	Chemistry Exists
0261615	SW	27	054	23	4	24.4													PENNY, STEPHEN	Domestic	Chemistry	Unknown	Chemistry Exists
0261618	01	21	055	22	4	10.4													DEMERS,	Domestic	Chemistry	Unknown	Chemistry Exists
0261619	SW	27	054	23	4	61.0	24.4	61.0									31/05/1978		FYITH, JAMES	Domestic	New Well	Rotary	Chemistry Exists
0261629	SW	27	054	23	4	29.9													FEDORAK, NESTOR	Domestic	Chemistry	Unknown	Chemistry Exists
0261635	SW	21	55	22	4	11.6											30/06/1975		COURCHESNE, L	Domestic	Chemistry	Bored	Chemistry Exists
0261639	SW	21	055	22	4	7.6													COURCHESNE, L	Domestic	Chemistry	Hand Dug	Chemistry Exists
0261640	03	21	055	22	4	91.4	79.2	91.4									08/04/1986		COURCHESNE, L E	Domestic	New Well	Rotary	Chemistry Exists
0261646	16	21	055	22	4	61.0											18/12/1962		DAMCHUK, J	Domestic	New Well	Rotary	No Chemistry
0261652	NE	21	055	22	4	0.0													GAUMONT, J R	Domestic	Chemistry	Unknown	No Chemistry
0261653	NW	22	055	22	4	0.0													RIVARD, K	Domestic	Chemistry	Unknown	Chemistry Exists
0261654	NE	22	055	22	4	97.5	85.3	97.5									26/11/1981		CNR	Domestic	New Well	Rotary	No Chemistry
0261657	NE	23	055	22	4	20.4													JOHNSTON, GARY	Domestic	Chemistry	Drilled	Chemistry Exists
0261660	SE	24	055	22	4	6.1													ESLER, J	Domestic	Chemistry	Hand Dug	Chemistry Exists
0261662	SW	24	055	22	4	12.2							5.8	7.3			23/07/1966		MCGEE, K.	Domestic	New Well	Rotary	Chemistry Exists
0261669	SW	24	055	22	4	4.6													MAGEE, K	Domestic	Chemistry	Bored	Chemistry Exists
0261670	04	24	055	22	4	4.3													SELTHGATE, G A	Domestic	Federal Well Survey	Hand Dug	No Chemistry
0261672	NW	24	055	22	4	30.5													MAGEE,, K	Domestic	Chemistry	Drilled	Chemistry Exists
0261675	NE	24	055	22	4	0.0													FISH & GAME ASSOC	Domestic	Chemistry	Unknown	Chemistry Exists
0261678	NE	28	054	23	4	13.1													PARENTEAU, L	Domestic	Chemistry	Bored	Chemistry Exists
0261681	NW	25	055	22	4	7.6													GAUMONT, M	Domestic	Chemistry	Unknown	Chemistry Exists
0261710	NE	25	055	22	4	76.2													GAUMONT, M	Domestic	New Well	Unknown	Chemistry Exists
0261716	NE	25	055	22	4	61.0													GAUMONT, M	Domestic	Chemistry	Unknown	Chemistry Exists
0261726	NW	26	055	22	4	54.9											01/01/1963		JIGOLYK, L.	Domestic	Chemistry	Unknown	Chemistry Exists
0261729	SE	27	055	22	4	6.1													BELAIR, R	Domestic	Chemistry	Unknown	Chemistry Exists
0261731	SE	27	055	22	4	96.0	50.3	96.0									14/10/1986		BELAIR, R	Domestic	New Well	Rotary	No Chemistry
0261737	SE	28	055	22	4	0.0													SAWCHUK, J	Domestic	Chemistry	Unknown	Chemistry Exists
0261738	NW	28	055	22	4	50.9											30/04/1965		GOUTBECK, P.	Domestic	New Well	Rotary	Chemistry Exists
0261742	SE	01	055	23	4	0.0													SERNA, VICTOR	Domestic	Chemistry	Unknown	Chemistry Exists
0261744	SE	01	055	23	4	0.0													SERNA, VICTOR	Domestic	Chemistry	Unknown	Chemistry Exists
0261745	SE	01	055	23	4	15.2													SERNA, VICTOR	Domestic	Chemistry	Unknown	Chemistry Exists
0261746	NW	28	055	22	4	30.5													BOHNET, H	Domestic	Chemistry	Drilled	Chemistry Exists
0261748	SE	01	055	23	4	15.2													SERNA, VICTOR	Domestic	Chemistry	Unknown	Chemistry Exists
0261750	NW	28	055	22	4	0.0													VAN BOOM, H.	Domestic	Chemistry	Unknown	Chemistry Exists
0261752	SE	01	055	23	4	94.5	61.0	94.5									01/09/1984		SERNA, VICTOR	Domestic	New Well	Rotary	Chemistry Exists
0261757	SE	01	055	23	4	48.8											21/08/1984		SERNA, VICTOR	Domestic	Dry Hole	Rotary	No Chemistry
0261759	SE	01	055	23	4	80.5											20/08/1984		SERNA, VICTOR	Domestic	Dry Hole	Rotary	No Chemistry
0261764	SW	01	055	23	4	24.4													PARADIS, F.	Domestic	Chemistry	Drilled	Chemistry Exists
0261769	SE	02	055	23	4	24.4													PARADIS, NORMAN	Domestic	Chemistry	Unknown	Chemistry Exists
0261771	SE	02	055	23	4	22.9													PARADIS, NORMAN	Domestic	Chemistry	Drilled	Chemistry Exists
0261813	SE	33	055	22	4	42.7													ALLISON, G	Domestic	Chemistry	Unknown	Chemistry Exists
0261820	SE	34	055	22	4	9.4													JIGOLYK, H.	Domestic	Chemistry	Unknown	Chemistry Exists
0261823	SH	34	055	22	4	9.8													CARROLL, T	Domestic	Chemistry	Unknown	Chemistry Exists
0261827	NE	34	055	22	4	45.7													HOLMES, S	Domestic	Chemistry	Drilled	Chemistry Exists
0261828	NE	34	055	22	4	39.6	27.4	39.6											HOLMES, R	Domestic	New Well	Cable Tool	No Chemistry
0261830	NW	35	055	22	4	49.7													DOSHEWNEK, G	Domestic	Chemistry	Drilled	Chemistry Exists
0261845	NW	35	055	22	4	51.8							24.4	42.7			12/05/1983		SYVENKY, P.	Domestic	New Well	Rotary	No Chemistry
0262011	02	33	054	23	4	37.5													STRAUSS, HOWARD	Domestic	Chemistry	Unknown	Chemistry Exists
0262057	SE	34	054	23	4	29.6													BLOWER, JERRY	Domestic	Chemistry	Bored	Chemistry Exists
0262061	SE	34	054	23	4	22.6											20/06/1975		NEWMAN, NELSON	Domestic	New Well	Bored	Chemistry Exists
0262070	SE	34	054	23	4	0.0													THIMER, ERIC	Domestic	Chemistry	Unknown	Chemistry Exists
0262074	SE	34	054	23	4	61.0													MARSH, JEROME L	Domestic	Chemistry	Rotary	Chemistry Exists
0262083	NW	34	054	23	4	76.2													MELNYCHUK, GEORGE G	Domestic	Chemistry	Drilled	Chemistry Exists
0262104	NW	34	054	23	4	24.4													PARADIS, GILBERT	Domestic	Chemistry	Unknown	Chemistry Exists
0262109	NE	34	054	23	4	61.0													MELNYCHUK, GEORGE G	Domestic	Chemistry	Unknown	Chemistry Exists
0262113	SE	35	054	23	4	76.2													DEVEREUX, J.R.	Domestic	Chemistry	Unknown	Chemistry Exists
0262141	SW	01	055	23	4	19.8											10/07/1920		PARDIS, W.	Domestic	Federal Well Survey	Backhoe	No Chemistry
0262261	SW	35	054	23	4	30.5													GAUMONT, P	Domestic	Chemistry	Unknown	Chemistry Exists
0262265	SW	35	054	23	4	28.3													KJENNER, GEORGE	Domestic	Chemistry	Drilled	Chemistry Exists
0262271	SW	35	054	23	4	16.8													L. PETERSON DEV LTD	Domestic	Chemistry	Hand Dug	Chemistry Exists
0262278	SW	35	054	23	4	21.3													L. PETERSON DEV LTD	Domestic	Chemistry	Hand Dug	Chemistry Exists
0262285	SW	35	054	23	4	36.6													HANES, ALBERT	Domestic	Chemistry	Unknown	Chemistry Exists
0262292	SW	35	054	23	4	42.7													HOFFSTETER, B.	Domestic	Chemistry	Unknown	Chemistry Exists
0262296	SW	35	054	23	4	25.9													HOFFSTETER, BEN	Domestic	Chemistry	Bored	Chemistry Exists
0262305	SW	35	054	23	4	31.1													FEDORAK, J	Domestic	Chemistry	Unknown	Chemistry Exists
0262314	SW	35	054	23	4	30.5													PALTZAT, MARVIN	Domestic	Chemistry	Bored	Chemistry Exists
0262324	SW	35	054	23	4	25.0											09/09/1980		BURAK, FRED	Domestic	New Well	Bored	Chemistry Exists
0262332	SW	35	054	23	4	54.9	42.7	54.9									07/06/1978		HORNES, ALBERT	Domestic	New Well	Rotary	No Chemistry
0262356	NW	35	054	23	4	19.8											01/08/1976		L. PETERSON DEV LTD	Domestic	Chemistry	Bored	Chemistry Exists
0262366	00	35	054	23	4	16.8													PALZAT, M.	Domestic	Chemistry	Drilled	No Chemistry
0262369	SE	36	054	23	4	80.5	73.2	79.2									03/11/1977		MAYRHUT, JAMES	Domestic	New Well	Rotary	No Chemistry
0262385	NW	36	054	23	4	20.1													NYHUIS, ALBERT	Domestic	Chemistry	Unknown	Chemistry Exists
0262393	NE	36	054	23	4	13.1											15/08/1986		GAUMONT, EMIL	Domestic	New Well	Bored	No Chemistry
0262397	NE	36	054	23	4	12.2													SEVNE, GEORGE	Domestic	Chemistry	Unknown	No Chemistry
0262468	SW	12	055	23	4	21.3											01/05/1968		STRAUSS, L.	Domestic	New Well	Rotary	Chemistry Exists
0262511	SE	13	055	23	4	13.4													COURCHESNE, RAY	Domestic	Chemistry	Drilled	Chemistry Exists
0263303	SE	01	056	21	4	12.2													GUENETTE, D	Domestic	Chemistry	Bored	Chemistry Exists
0263308	SW	01	056	21	4	14.0													TARON, D.E.	Domestic	Chemistry	Drilled	Chemistry Exists
0263315	SW	01	056	21	4	36.6													OLD, R/C	Domestic	Chemistry	Unknown	Chemistry Exists
0263327	SW	02	056	21	4	10.7													HALABEY, A	Domestic	Chemistry	Bored	Chemistry Exists
0263334	03	02	056	21	4	118.9											09/07/1965		HALABEY, ALEX	Domestic	New Well	Drilled	Chemistry Exists
0263375	SW	03	056	21	4	6.4											01/01/1973		HANNERMAN, R	Domestic	Chemistry	Unknown	Chemistry Exists
0263380	NE	03	056	21	4	39.6													VELTMAN, H	Domestic	Chemistry	Unknown	Chemistry Exists
0263474	SW	05	056	21	4	16.8													REED, D	Domestic	Chemistry	Drilled	Chemistry Exists
0263484	04	05	056	21	4	8.5											28/01/1970		YARSHUK, P	Domestic	New Well	Bored	No Chemistry
0263489	NW	13	054	23	4	33.5							30.8	32.3			05/02/1987		DOREJKO, GERRY	Domestic	New Well	Rotary	No Chemistry
0263492	NW	05	056	21	4	42.7											12/01/1961	28/02/1974	CHOLOWSKI, R.	Domestic	Old Well-Abandoned	Drilled	No Chemistry
0263502	NW	13	054	23	4	34.1							32.3	33.8			05/05/1981		NISBET, BOB	Domestic	New Well	Rotary	No Chemistry
0263525	NE	05	056	21	4	6.1													CHOLOWSKI, R.	Domestic	Chemistry	Bored	Chemistry Exists
0263543	NE	05	056	21	4	4.9													CHOLOWSKI, R.	Domestic	Chemistry	Unknown	Chemistry Exists
0263560	SW	08	056	21	4	48.8											01/04/1973		KOFLUK, D	Domestic	New Well	Rotary	Chemistry Exists
0263579	SW	08	056	21	4	25.0							22.9	24.4			11/11/1966		MASCHMEYER, R	Domestic	New Well	Rotary	No Chemistry
0263583	15	08	056	21	4	11.6													BRODIE, H.L.	Domestic	Chemistry	Unknown	Chemistry Exists
0263592	SW	09	056	21	4	0.0													LECHENKO #3 DRINKING WELL	Domestic	Chemistry	Unknown	Chemistry Exists
0263595	NE	11	056	21	4	64.6													NAURATIL, J	Domestic	Chemistry	Drilled	Chemistry Exists
0263633	09	11	056	21	4	10.7													NAVRATIL, J	Domestic	Chemistry	Bored	Chemistry Exists
0263640	NE	11	056	21	4	43.3							41.1	42.4			17/08/1984		ANDRUCHOW, E	Domestic	New Well	Rotary	Chemistry Exists
0263645	NE	11	056	21	4	36.6													O'BRIEN, N	Domestic	Chemistry	Unknown	Chemistry Exists
0263651	NE	11	056	21	4	18.0											20/06/1986		BREIT, E	Domestic	New Well	Backhoe	Chemistry Exists
0263676	SE	12	056	21	4	7.9													ESCH, G	Domestic	Chemistry	Hand Dug	Chemistry Exists
0263683	SE	12	056	21	4	91.4	79.2	91.4									05/11/1981		ESCH, G	Domestic	New Well	Rotary	No Chemistry
0263697	SE	12	056	21	4	0.0													MIZERA, T.	Domestic	Chemistry	Unknown	Chemistry Exists
0263707	SW	12	056	21	4	61.0													GABERT, M.	Domestic	Chemistry	Unknown	Chemistry Exists
0263714	NW	12	056	21	4	33.5													GABERT, M.	Domestic	Chemistry	Unknown	Chemistry Exists
0263736	SE	13	056	21	4	7.9													YOUNG, C.S.	Domestic	Chemistry	Unknown	Chemistry Exists
0263842	SE	14	056	21	4	3.7													SMART, D	Domestic	Chemistry	Hand Dug	Chemistry Exists
0263852	SW	2	56	22	4	61.0													NOEL, MAURICE	Domestic	Chemistry	Unknown	Chemistry Exists
0263854	NW	02	056	22	4	36.6													SANK, LLOYD	Domestic	Chemistry	Unknown	Chemistry Exists
0263867	SW	3	56	22	4	54.9													MELENKA, ALEX	Domestic	Chemistry	Unknown	Chemistry Exists
0263870	NE	14	056	21	4	10.7													HODGSON, G A	Domestic	Chemistry	Unknown	Chemistry Exists
0263877	NE	14	056	21	4	13.4											01/08/1972		HODGSON, G	Domestic	New Well	Bored	No Chemistry
0263883	NE	14	056	21	4	11.3													PERCY, G.	Domestic	Chemistry	Bored	Chemistry Exists
0263887	NE	14	056	21	4	48.8											17/05/1985		PERCY, G.	Domestic	New Well	Rotary	No Chemistry
0263910	NE	14	056	21	4	0.0													SMIBERT, R	Domestic	Chemistry	Unknown	No Chemistry
0263924	SW	16	056	21	4	0.0													KROPP, L.	Domestic	Spring	Not Applicable	Chemistry Exists
0263933	SW	16	056	21	4	0.0													BOLTON SCHOOL	Domestic	Chemistry	Unknown	Chemistry Exists
0263959	SW	16	056	21	4	9.1													MARQUARDT, E	Domestic	Chemistry	Drilled	Chemistry Exists
0263963	NW	16	056	21	4	6.7													BLENN	Domestic	Chemistry	Unknown	Chemistry Exists
0263969	NW	18	056	21	4	22.9													VISSCHER, H	Domestic	Chemistry	Unknown	Chemistry Exists

Appendix A1-1

Water Well Records Within the Study Area

WELL ID	LOCATION					WELL DEPTH (m)	PERFORATIONS 1 (m)		PERFORATIONS 2 (m)		PERFORATIONS 3 (m)		SCREENINGS 1 (m)		SCREENINGS 2 (m)		DATE		WELL OWNER	PROPOSED USE	TYPE OF WORK	DRILL METHOD	CHEMISTRY
	LSD	SECTION	TOWNSHIP	RANGE	MERIDIAN		FROM	TO	FROM	TO	FROM	TO	FROM	TO	FROM	TO	COMPLETED	ABANDONED					
0263970	NW	18	056	21	4	12.2													VISSCHER, H	Domestic	Chemistry	Unknown	Chemistry Exists
0263974	SE	19	056	21	4	9.1													CAMPBELL, R	Domestic	Chemistry	Hand Dug	Chemistry Exists
0263991	SW	19	056	21	4	22.9													SMULSKI, J.	Domestic	Chemistry	Unknown	Chemistry Exists
0263992	SW	19	56	21	4	18.9											20/06/1984		S V HALF DIAMOND RANCHES	Domestic	New Well	Bored	No Chemistry
0263993	NE	19	056	21	4	12.2													ROBINSON, J	Domestic	Chemistry	Unknown	Chemistry Exists
0263996	NE	19	056	21	4	8.5													ROBINSON, J	Domestic	Chemistry	Hand Dug	Chemistry Exists
0264112	SW	11	056	22	4	106.7	14.0	64.0									06/03/1980		BRIGGS, EARL	Domestic	Deepened	Cable Tool	No Chemistry
0264146	SW	12	056	22	4	0.0													SERINK, MIKE	Domestic	Chemistry	Unknown	No Chemistry
0264148	SE	20	056	21	4	54.9											01/08/1977		SAWYER, D	Domestic	Chemistry	Drilled	Chemistry Exists
0264150	SW	12	056	22	4	0.0													SERINK, MIKE	Domestic	Chemistry	Unknown	No Chemistry
0264151	NW	12	056	22	4	22.9											01/05/1968		MINCHOU, CLARENCE	Domestic	New Well	Unknown	Chemistry Exists
0264156	15	20	056	21	4	19.8											24/10/1958		FEDORAK, M	Domestic	New Well	Bored	No Chemistry
0264163	NE	12	056	22	4	76.2													PUCHALIK, NICK	Domestic	Chemistry	Drilled	Chemistry Exists
0264167	NE	20	056	21	4	24.4													FEDORAK, M	Domestic	Chemistry	Unknown	Chemistry Exists
0264173	SE	13	056	22	4	35.1							32.0	35.1			03/11/1989		DUPONT CAN	Domestic	New Well	Rotary	No Chemistry
0264176	16	20	056	21	4	0.0											01/01/1921		MYRON, S.	Domestic	Federal Well Survey	Drilled	No Chemistry
0264184	SW	13	056	22	4	76.2													BLOM, BERNARD	Domestic	Chemistry	Drilled	Chemistry Exists
0264187	SW	13	056	22	4	65.5													BLOM, KLAAS	Domestic	Chemistry	Unknown	Chemistry Exists
0264190	SE	21	056	21	4	16.5											12/05/1978		DEBAAN, J	Domestic	New Well-Abandoned	Rotary	No Chemistry
0264203	SE	21	056	21	4	57.9							12.8	14.3			12/09/1978		DEBAAN, J	Domestic	New Well	Rotary	No Chemistry
0264255	07	25	056	21	4	14.6											20/08/1984		ESSO RES	Domestic	New Well	Bored	Chemistry Exists
0264258	SE	26	056	21	4	39.0											12/05/1987		VAN INVEN, F.	Domestic	Unknown	Unknown	No Chemistry
0264263	SW	26	056	21	4	4.3													SAWATZKY, H	Domestic	Chemistry	Unknown	Chemistry Exists
0264268	SW	26	056	21	4	17.4	4.6	12.2									31/03/1988		SAWATZKI, W	Domestic	New Well	Bored	No Chemistry
0264277	09	27	056	21	4	61.0	50.3	56.4									24/07/1979		RYKMANS, H.	Domestic	New Well	Rotary	No Chemistry
0264286	SE	28	056	21	4	21.3													BELLAND, R.	Domestic	Chemistry	Drilled	Chemistry Exists
0264289	NW	28	056	21	4	4.6													RESEARCH COUNCIL #6-DRINKING	Domestic	Chemistry	Unknown	Chemistry Exists
0264290	SE	05	055	22	4	4.3													GODBOUT, VIVIAN	Domestic	Chemistry	Unknown	No Chemistry
0264293	SE	05	055	22	4	0.0													GAUMONT, GILBERTE	Domestic	Chemistry	Unknown	Chemistry Exists
0264297	NE	28	056	21	4	18.3													SHIPLEY, J.	Domestic	Chemistry	Auger	Chemistry Exists
0264298	NW	06	055	22	4	18.3													JESKE, O.	Domestic	Chemistry	Unknown	Chemistry Exists
0264304	NE	25	055	22	4	61.0													GAUMONT, MICHAEL #2	Domestic	Chemistry	Unknown	Chemistry Exists
0264305	SE	29	056	21	4	54.9													PACHALUCK, P.	Domestic	Chemistry	Unknown	Chemistry Exists
0264343	SE	29	056	21	4	7.6											15/08/1963		SMULSKI, J.	Domestic	New Well	Backhoe	No Chemistry
0264347	SE	29	056	21	4	76.2													KALISVAART, J/T	Domestic	Chemistry	Drilled	Chemistry Exists
0264357	SE	29	056	21	4	74.7											02/09/1961		PUCHALIK, P.	Domestic	Deepened	Drilled	Chemistry Exists
0264368	SE	29	056	21	4	14.0													PUCHALIK, P.	Domestic	Chemistry	Unknown	Chemistry Exists
0264384	SW	29	056	21	4	9.8													PUCHALIK, S.	Domestic	Chemistry	Unknown	Chemistry Exists
0264385	SW	29	056	21	4	0.0													PUCHALIK, S.	Domestic	Chemistry	Unknown	Chemistry Exists
0264386	SW	29	056	21	4	7.3											24/09/1958		PUCHALIK, S.	Domestic	New Well	Bored	Chemistry Exists
0264392	SW	29	056	21	4	0.0													PUCHALIK, S.#PUMPHOUSE WELL	Domestic	Chemistry	Unknown	Chemistry Exists
0264393	SW	29	056	21	4	13.7													PUCHALIK, S.	Domestic	Chemistry	Unknown	Chemistry Exists
0264396	NE	29	056	21	4	0.0													SAUNDERS, P	Domestic	Chemistry	Unknown	No Chemistry
0264424	SE	32	056	21	4	27.4													YAKIMETS, O	Domestic	Chemistry	Unknown	Chemistry Exists
0264437	SE	32	056	21	4	42.7	36.6	39.6									16/04/1980		YAKIMETES, O J	Domestic	New Well	Rotary	No Chemistry
0264466	01	33	056	21	4	19.5							17.7	18.9			01/05/1977		KUIPER, A/D	Domestic	New Well	Rotary	Chemistry Exists
0264491	NE	33	056	21	4	0.0													LUBEMSKI, K.	Domestic	Chemistry	Unknown	No Chemistry
0264507	04	34	056	21	4	15.2	3.7	4.6									12/06/1985		WOLANSKY, W	Domestic	New Well	Backhoe	Chemistry Exists
0264531	SW	34	056	21	4	61.0	15.2	24.4									30/03/1974		WOLANSKI, W.	Domestic	New Well	Rotary	Chemistry Exists
0264630	NW	34	056	21	4	24.4													MAHONEY, R.	Domestic	Chemistry	Unknown	Chemistry Exists
0264637	NE	34	056	21	4	32.0	26.5	32.0									10/03/1974		ANDERSON, K	Domestic	New Well	Rotary	Chemistry Exists
0264659	8	35	56	21	4	4.9													SCHILLER, J.	Domestic	Chemistry	Auger	Chemistry Exists
0264666	NW	35	056	21	4	4.3													HESS, R	Domestic	Chemistry	Jet	Chemistry Exists
0264680	SE	36	056	21	4	5.2													RUDKO, W.	Domestic	Chemistry	Unknown	Chemistry Exists
0264699	SW	36	56	21	4	7.3													DRABBLE, R.	Domestic	Chemistry	Unknown	Chemistry Exists
0264707	NW	36	056	21	4	9.1													MAKOWECKI, A	Domestic	Chemistry	Drilled	Chemistry Exists
0264712	NW	36	056	21	4	6.4													MAKOWECKI, A	Domestic	Chemistry	Hand Dug	Chemistry Exists
0264902	NE	08	054	22	4	79.9											24/06/1970		KENNEDY, CLIFF	Domestic	New Well	Rotary	Chemistry Exists
0264908	NE	08	054	22	4	54.9													KALISTA, JOE	Domestic	Chemistry	Drilled	Chemistry Exists
0264911	NE	08	054	22	4	9.1													ATTEW, ELAINE	Domestic	Chemistry	Bored	Chemistry Exists
0264913	NE	08	054	22	4	11.6													SPALLIN, K./L.	Domestic	Chemistry	Drilled	Chemistry Exists
0264915	NE	08	054	22	4	13.1											08/06/1979		LEVERSEDGE, DAN	Domestic	New Well	Bored	Chemistry Exists
0264921	NE	08	054	22	4	10.4													KENNEDY, C.A.	Domestic	Chemistry	Unknown	Chemistry Exists
0264923	NE	08	054	22	4	14.9											11/06/1979		KENNEDY, KEN	Domestic	New Well	Bored	Chemistry Exists
0265801	SW	02	057	21	4	27.4													MCCULLOUGH, DAVID	Domestic	Chemistry	Hand Dug	Chemistry Exists
0265802	SW	02	057	21	4	74.7											05/10/1981		ROMANIUK, ELI	Domestic	New Well	Rotary	No Chemistry
0265804	SW	02	057	21	4	3.0													MCCULLOUGH, DAVE	Domestic	Chemistry	Unknown	Chemistry Exists
0265805	SW	03	057	21	4	10.4											01/01/1940		LIBBEY, KATHERINE	Domestic	Chemistry	Drilled	Chemistry Exists
0265811	SE	04	057	21	4	30.5							25.0	27.4			03/08/1979		SCHWING, ROMAN	Domestic	New Well	Rotary	Chemistry Exists
0266031	SE	13	056	22	4	12.2													SCHROTER, RON	Domestic	Chemistry	Unknown	Chemistry Exists
0267205	SW	01	055	23	4	64.0	57.9	64.0									06/09/1976		ROLF, RON	Domestic	New Well	Rotary	No Chemistry
0271650	SE	05	055	22	4	59.4							57.0	58.5			13/07/1978		GODBOUT, ROMEO	Domestic	New Well	Rotary	No Chemistry
0271736	SW	36	054	23	4	39.3													SMITH, B.B.	Domestic	Chemistry	Drilled	Chemistry Exists
0273997	NW	36	054	23	4	24.4													BISSON, R	Domestic	Chemistry	Unknown	Chemistry Exists
0274006	EH	36	054	23	4	0.0													GAUMONT, E	Domestic	Chemistry	Unknown	Chemistry Exists
0274171	SE	05	055	22	4	14.9	8.2	12.8									19/08/1991		GILLARD, R	Domestic	New Well	Bored	No Chemistry
0274184	16	31	054	22	4	14.6											08/05/1989		BANDURA, E	Domestic	New Well	Bored	No Chemistry
0274248	SE	05	055	22	4	12.2											20/06/1985		LAMOUREUX, C	Domestic	New Well	Bored	Chemistry Exists
0274249	SE	05	055	22	4	14.6	9.1	12.8									24/03/1988		LAMOUREAX, R.	Domestic	New Well	Bored	No Chemistry
0274956	NE	05	055	21	4	41.1											05/09/1978		PICKETT, J	Domestic	New Well	Rotary	Chemistry Exists
0280645	NW	31	054	22	4	10.7											18/09/1980		LAMOUREUX HALL	Domestic	New Well	Bored	No Chemistry
0280650	SW	28	055	21	4	9.1													VISSCHER, D.	Domestic	Chemistry	Unknown	Chemistry Exists
0280651	00	04	055	22	4	15.2													FLEMING, E.B.	Domestic	Chemistry	Unknown	Chemistry Exists
0280653	SE	16	055	22	4	6.1													RANDON, J.R.	Domestic	Chemistry	Unknown	Chemistry Exists
0280654	SE	16	055	22	4	39.6													RANDON, J.R.	Domestic	Chemistry	Unknown	Chemistry Exists
0280657	SE	16	055	22	4	7.6													GEM SOD FARMS	Domestic	Chemistry	Hand Dug	Chemistry Exists
0280703	SE	09	055	22	4	17.4	7.6	15.2									26/04/1994		LAMOUREUX, ROBERT	Domestic	New Well	Bored	No Chemistry
0282099	NW	18	055	21	4	24.4													MAGEE, KEN	Domestic	Chemistry	Hand Dug	Chemistry Exists
0285787	NE	17	055	21	4	18.6							12.2	18.3			04/06/1996		HUTTERIAN BRETHREN	Domestic	New Well	Rotary	No Chemistry
0285789	NW	30	055	21	4	51.8							46.3	47.9			30/05/1995	01/01/2001	BENFELD, BILL	Domestic	New Well	Rotary	No Chemistry
0285792	SE	12	055	23	4	21.9	9.8	11.9	18.6	19.5							24/10/1996		PICKUNYK, NICK	Domestic	New Well	Bored	No Chemistry
0286113	WH	17	055	22	4	22.9											30/04/1968		READNER, HENRY #400-H	Domestic	New Well	Auger	No Chemistry
0286990	NE	08	054	22	4	85.3	43.9	85.3									07/01/1997		MARSHALL, RANDY	Domestic	New Well	Rotary	No Chemistry
0286991	SE	31	054	22	4	16.2	9.8	14.9									27/07/1996		GAUMONT, LARRAINE	Domestic	New Well	Bored	No Chemistry
0287800	NE	08	054	22	4	82.3	70.1	82.3									11/09/1996		RICE, LYALL	Domestic	New Well	Rotary	No Chemistry
0287802	NE	28	054	23	4	61.0											10/07/1997	10/07/1997	NORTH COUNTRY CATTLE CO	Domestic	Test Hole-Abandoned	Rotary	No Chemistry
0289102	NE	28	054	23	4	48.8	36.6	45.7									11/07/1997		NORTH COUNTRY CATTLE CO	Domestic	New Well	Rotary	No Chemistry
0289381	SE	09	055	22	4	73.2	61.0	73.2									19/05/1998		NANAKSAR, GURDWARA	Domestic	New Well	Rotary	No Chemistry
0290926	SE	12	055	23	4	23.8	6.7	9.1	16.2	17.1							20/05/1998		PICHUNYH, JACK	Domestic	New Well	Bored	No Chemistry
0290974	SE	28	054	22	4	39.6	33.5	39.6									07/10/1998		ROBERTSON, DALE	Domestic	New Well	Rotary	No Chemistry
0290979	SE	21	056	21	4	18.3	3.7	4.3	13.1	14.3	16.2	16.8					14/07/1998		MARQUARDT, BRENT	Domestic	New Well	Bored	No Chemistry
0292191	SE	33	055	22	4	47.2	39.6	45.7									26/04/1999		WESTRA, MARTIN/WESTRALIA FARM	Domestic	New Well	Rotary	No Chemistry
0293392	NW	31	055	21	4	24.4							19.8	21.3			13/09/1999		MCKAY, BRIAN	Domestic	New Well	Rotary	No Chemistry
0293774	SW	17	056	20	4	85.3	72.2	74.7	77.7	80.8							17/10/1999		SCHRAM, BARRY	Domestic	New Well	Rotary	No Chemistry
0293775	SW	17	056	20	4	123.4											12/10/1999	12/10/1999	SCHRAM, BARRY	Domestic	Dry Hole-Abandoned	Rotary	No Chemistry
0294342	SE	21	056	21	4	24.4	10.1	12.5	15.5	20.1	23.2	23.5					08/08/1998		SOOREE, DICK	Domestic	New Well	Bored	No Chemistry
0295164	SW	30	056	20	4	37.2	31.1	37.2									18/05/2000		SHILOH REBMAN YOUTH CAMP	Domestic	New Well	Rotary	No Chemistry
0297082	SE	33	054	23	4	36.6											21/06/2001	21/06/2001	STRAUSS, HOWARD #1	Domestic	Test Hole-Abandoned	Rotary	No Chemistry
0297083	SE	33	054	23	4	36.6	25.9	32.0									22/06/2001		STRAUSS, HOWARD	Domestic	New Well	Rotary	No Chemistry
0297115	NE	18	056	20	4	18.3											07/10/2000		MARTIN, BONNIE	Domestic	Old Well-Test	Unknown	No Chemistry
0297409	SW	30	056	20	4	82.3											18/05/2000	18/05/2001	SHILOH REBMAN YOUTH CAMP	Domestic	Dry Hole-Abandoned	Rotary	No Chemistry
0297410	SW	30	56	20	4	85.3	36.6	42.7	48.8	54.9	61.0	67.1					15/05/2000	16/05/2000	SHILOH REBMAN YOUTH CAMP #2	Domestic	New Well	Rotary	No Chemistry
0297411	SW	30	56	20	4	36.6	26.8	32.9									17/05/2000		SHILOH REBMAN YOUTH CAMP #3	Domestic	New Well	Rotary	No Chemistry
0297579	07	21	56	21	4	21.0	13.7	16.8									18/09/2001		MARQUARDT, B.	Domestic	New Well	Bored	No Chemistry
0297579	07	21	56	21	4	18.3												26/07/2007	MARQUARDT, BRENT & CINDY	Domestic	Old Well-Abandoned	Bored	No Chemistry
0297580	NE	21	056	21	4	21.0	13.7	16.8									19/09/2001		LEICHNER, WALTER	Domestic	New Well	Bored	No Chemistry
0299631	NW	07	055	21	4	71.0	63.1	69.2									17/05/2001		CHARTRAND, LOUIE/MARY	Domestic	New Well	Rotary	No Chemistry
1130470	NW	34	055	21	4	35.4	29.3	35.4									19/07/2007		HALLS AUTO PARTS	Domestic	New Well	Rotary	No Chemistry
1130875	11	13	54	23	4	41.1							27.4	33.5			08/11/2010		OYAMA, ROSE-ANN & SONNIE	Domestic	New Well	Combination	No Chemistry
1131346	SE	3	57	21	4	37.5							27.4	33.5			10/03/2016		FINNEGAN, LORNE & SHIRLEY	Domestic	New Well	Cable Tool	No Chemistry
1165834	NE	34	54	23	4	30.5	12.8	15.5	18.6	20.4	21.9	22.9					11/09/2014		PARADIS, GILBERT	Domestic	New Well	Combination	No Chemistry
1300079	NW	23	054	22	4	42.7	25.0	42.7									24/02/2005		MCEACHERN, MEL	Domestic	New Well	Rotary	No Chemistry
1370431	1	36	55	22	4	43.9							39.6	42.7			06/10/2010		YOUNG, CARL	Domestic	New Well	Combination	No Chemistry
1370496	5	22	55	21	4	37.2	30.5	37.2									25/10/2012		ROCQUE, SHANE	Domestic	New Well	Combination	No Chemistry
1370549	SW	30	56	20	4	36.6	29.0	35.1									30/06/2014		SHILOH YOUTH RANCH	Domestic	New Well	Combination	No Chemistry
1640316	16	14	54	23	4	15.2							12.2	15.2			05/11/2010		MOIZARD, ANDRE	Domestic	New Well	Rotary - Mud	No Chemistry
1690074	SE	01	055	22	4	59.4	51.8	57.9									13/05/1999		RASMUSSEN, RON	Domestic	New Well	Rotary	No Chemistry
1690085	NE	36	054	23	4	17.7	12.2	17.4									28/09/1999		NYHUIS, DAVE	Domestic	New Well	Rotary	No Chemistry
1690122	NE	24	55	22	4	18.0	4.6	12.2									17/10/2008		AUX-SABLE CANADA LTD	Domestic	New Well	Bored	No Chemistry
1690124	16	31	54	22	4	17.4	8.5	14.9									05/06/2008		LAMOUREUX, ART	Domestic	New Well	Bored	No Chemistry
1690166	1	1	55	22	4	52.4	45.7	51.8									11/08/2011		SCHOENLEBER, TIM	Domestic	New Well	Rotary - Mud	No Chemistry
1755005	SW	02	057	21	4	18.3	4.0	5.8									22/10/2002		SUDAYKO, MIKE	Domestic	New Well	Bored	No Chemistry
1755094	11	25	54	23	4	25.0	15.8	18.6									08/09/2009		KAM, IAN	Domestic	New Well	Bored	No Chemistry
1755120	SE	35	56	21	4	36.6	29.3	33.2									08/07/2011		BADRY, RICK	Domestic	New Well	Bored	No Chemistry
1795056	NE	08	054	22	4	93.0	67.1	93.0									18/07/2003		SUPINA, NICK	Domestic	New Well	Rotary	No Chemistry
1795213	NE	25	54	23	4	74.7											21/04/2009		KAM, IAN	Domestic	New Well	Rotary	No Chemistry
1795249	NW	25	54	23	4	74.7	48.8	73.2									21/04/2009		KAM, IAN	Domestic	New Well	Combination	No Chemistry
1888906	11	28	54	22	4	31.4							28.3	29.9			21/07/2009		KROHMAN, KURT	Domestic	New Well	Rotary	No Chemistry
1888958	1	36	54	23	4	73.2	61.0	73.2									24/06/2010		FIVE STAR POULTRY	Domestic	New Well	Rotary - Mud	No Chemistry
0264494	09	33	056	21	4	23.5											16/08/1961		SCURRY RAINBOW OIL LTD	Domestic & Industrial	New Well	Rotary	Chemistry Exists
0083010	13	25	055	21	4	27.4													HOFFMAN	Domestic & Stock	Federal Well Survey	Bored	No Chemistry
0083265	14	31	055	20	4	24.1											01/01/1915		FISHER, J.	Domestic & Stock	Federal Well Survey	Drilled	No Chemistry
0083366	02	06	055	21	4	16.5													BRICK, A.W.	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0083378	09	07	055	21	4	12.2													MAGEE, H.	Domestic & Stock	Federal Well Survey	Bored	No Chemistry
0083420	NE	16	055	21	4	51.8											23/04/1965		MOHR, GUS	Domestic & Stock	New Well	Jet	No Chemistry
0083433	NE	17	055	21	4	109.7	91.4	109.7									19/03/1986		SCOTFORD COLONY	Domestic & Stock	Deepened	Rotary	No Chemistry
0083435	NE	17	055	21	4	97.5	85.3	97.5									18/06/1985		SCOTFORD COLONY	Domestic & Stock	New Well	Rotary	No Chemistry
0083436	NE	17	055	21	4	79.9													SCOTFORD HUTTERITE BRETHREN	Domestic & Stock	Chemistry	Unknown	Chemistry Exists
0083437	NE	17	055	21	4	0.0													SCOTFORD COLONY	Domestic & Stock	Chemistry	Unknown	No Chemistry
0083438	03	18	055	21	4	12.2											01/01/1938		MOORE, T.	Domestic & Stock	Federal Well Survey	Bored	No Chemistry
0083459	NE	19	055	21	4	0.0													SPRUCE HILL HOG RANCH	Domestic & Stock	Chemistry	Unknown	No Chemistry
0083465	SE	21	055	21	4	64.0											12/09/1982		THOMAS, WARREN	Domestic & Stock	New Well	Rotary	No Chemistry
0083468	05	22	55	21	4	39.0											01/01/1915		LANGHAUSEN, J.	Domestic & Stock	Federal Well Survey	Drilled	No Chemistry
0083469	NW	22	055	21	4	51.8											01/04/1965		LARSEN, S.A.	Domestic & Stock	New Well	Cable Tool	No Chemistry
0083477	NW	23	055	21	4	36.6							35.4	36.6			02/07/1968		ARNDT, ERDMAN	Domestic & Stock	New Well	Rotary	No Chemistry
0083497	09	26	055	21	4	13.7											01/01/1933		FLUKER, R.	Domestic & Stock	Federal Well Survey	Bored	No Chemistry
0083499	05	27	055	21	4	30.5											01/01/1924		UNDERSCHULTZ, A.	Domestic & Stock	Federal Well Survey	Drilled	No Chemistry
0083535	01	32	055	21	4	0.0													MOHR, G.P.	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0083555	NW	34	055	21	4	42.7							38.1	39.9			01/09/1970		DAUST, CHARLIE	Domestic & Stock	New Well	Rotary	No Chemistry
0083563	04	35	055	21	4	30.5											01/01/1926		BERG, R.	Domestic & Stock	Federal Well Survey	Drilled	No Chemistry
0091495	04	06	056	20	4	17.1											16/04/1986		YAWORSKI, MIKE	Domestic & Stock	New Well	Bored	No Chemistry
0091499	16	06	056	20	4	68.0	48.8	68.0									12/04/1985		SCHRAM, GEORGE	Domestic & Stock	New Well	Rotary	Chemistry Exists
0091500	08	07	056	20	4	14.6											24/07/1981		SCHRAM, ELMER	Domestic & Stock	New Well	Bored	No Chemistry
0091503	04	08	056	20	4	7.6											01/01/1919		RISKE, E.	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0091505	13	08	056	20	4	17.7											18/07/1984		SAMPERT, ROGER	Domestic & Stock	New Well	Bored	Chemistry Exists
0091551	05	16	056	20	4	4.9											01/01/1930		KALAS	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0091552	04	16	056	20	4	6.7											01/01/1930		HENKLEMAN	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0091555	SE	17	056	20	4	19.2	4.3	17.4									19/08/1986		SAMPERT, RAY	Domestic & Stock	New Well	Bored	No Chemistry
0091560	SE	18	056	20	4	15.8											09/08/1978		MCLELLAN, ARTHUR	Domestic & Stock	New Well	Bored	No Chemistry
0091563	08	18	056	20	4	4.6											01/01/1925		KAUS, A.	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0091570	02	19	056	20	4	12.8													SCHUMAK, A.	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0091574	12	19	056	20	4	14.6											20/09/1985		MATTHEWS, B.	Domestic & Stock	New Well	Bored	No Chemistry
0091575	04	20	056	20	4	3.7											01/01/1917		WIKEHLERK	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0153068	NE	08	054	22	4	73.2	61.0	73.2									26/09/1988		BORYS, BILLIE	Domestic & Stock	New Well	Cable Tool	No Chemistry
0153696	13	36	56	21	4	45.7	36.6	45.7									14/04/1989		BOWERIN, CATHERINE	Domestic & Stock	New Well	Cable Tool	No Chemistry
0153768	NW	23	055	21	4	42.7							35.4	36.6			31/08/1990		ARNDT, R.E.	Domestic & Stock	New Well	Rotary	No Chemistry
0154442	SE	36	55	22	4	30.5							29.3	30.5			21/03/1990		STEFFLER, BEN/GERALD	Domestic & Stock	New Well	Rotary	No Chemistry
0158576	SW	08	056	20	4	21.0											25/09/1979		SCHRAM, EDWARD	Domestic & Stock	New Well	Bored	No Chemistry
0160258	SW	16	054	22	4	15.2	7.6	13.7									09/11/1991		BIZUK, MORRIS	Domestic & Stock	New Well	Bored	No Chemistry
0164457	NE	11	056	22	4	59.4	30.2	58.5									10/03/1992		BRIGGS, ALAN	Domestic & Stock	New Well	Rotary	No Chemistry
0166391	SE	17	054	22	4	12.2	6.1	10.7									28/06/1989		TWIGGE, MRS E.	Domestic & Stock	New Well	Bored	No Chemistry
0206702	NE	03	056	21	4	44.2							40.5	42.1			26/03/1993		VELTMAN, HERB	Domestic & Stock	New Well	Rotary	No Chemistry
0208867	SW	06	056	20	4	16.5	4.6	13.7									12/03/1993		YAWORSKI, MICHEAL	Domestic & Stock	New Well	Bored	No Chemistry
0220716	NE	17	055	21	4	105.2											20/09/1991		SCOTFORD COLONY	Domestic & Stock	Reconstructed	Cable Tool	No Chemistry
0231536	SW	02	055	23	4	67.1	57.9	64.0									09/08/1993		ARNDT, PETER	Domestic & Stock	New Well	Rotary	No Chemistry
0260034	NW	08	054	22	4	47.2											01/01/1925		ARBS, E.	Domestic & Stock	New Well	Drilled	No Chemistry
0260068	NW	09	054	22	4	30.5													MCEACHERN, J.	Domestic & Stock	Chemistry	Drilled	No Chemistry
0260172	04	16	054	22	4	6.7													FLEMING, J.	Domestic & Stock	New Well	Hand Dug	No Chemistry
0260174	13	16	054	22	4	24.4											01/01/1910		SPALAN, G.	Domestic & Stock	New Well	Drilled	No Chemistry
0260179	SW	17	054	22	4	61.0											01/01/1935		GALLOWY, P.	Domestic & Stock	New Well	Drilled	No Chemistry
0260181	13	17	054	22	4	25.9													PETERS, H.B.	Domestic & Stock	New Well	Bored	No Chemistry
0260192	NW	20	54	22	4	36.6							27.4	29.0			10/05/1966		STETSON, H.A.	Domestic & Stock	New Well	Rotary	Chemistry Exists
0260193	05	21	054	22	4	42.7											01/01/1920		ARMSTRONG, J.	Domestic & Stock	New Well	Drilled	No Chemistry
0260195	13	21	054	22	4	61.0											01/01/1928		ARMSTRONG, G.	Domestic & Stock	New Well	Drilled	No Chemistry
0260196	SE	22	054	22	4	37.2											29/11/1988		LA TRACE, DARLENE	Domestic & Stock	New Well	Rotary	Chemistry Exists
0260198	13	22	054	22	4	61.0											01/01/1916		ROTH, H.G.	Domestic & Stock	New Well	Drilled	No Chemistry
0260217	02	26	054	22	4	70.1	50.3	61.3									12/12/1966		SLATER, GRACE	Domestic & Stock	New Well	Rotary	Chemistry Exists
0260219	04	26	054	22	4	59.4	49.1	55.2									24/03/1969		KLAUTT, A.R.	Domestic & Stock	New Well	Drilled	No Chemistry
0260223	SW	26	054	22	4	61.0	47.9	61.0									04/10/1984		GALLOWAY, ED	Domestic & Stock	New Well	Cable Tool	No Chemistry
0260224	10	26	054	22	4	30.2											01/01/1930		BETHIEL, A.	Domestic & Stock	New Well	Drilled	No Chemistry
0260226	12	27	054	22	4	21.3													ROBERTSON, F.A.	Domestic & Stock	New Well	Bored	No Chemistry
0260228	05	28	054	22	4	30.5											01/01/1928		CRANSON, G.A.	Domestic & Stock	New Well	Drilled	No Chemistry
0260378	11	29	054	22	4	61.0											01/01/1911		ADAMSON, R.F.	Domestic & Stock	New Well	Drilled	No Chemistry
0260424	SE	32	054	22	4	6.1														Domestic & Stock	New Well	Hand Dug	No Chemistry
0260427	04	34	054	22	4	48.8											01/01/1930		LAWRENCE, F.B.	Domestic & Stock	New Well	Drilled	No Chemistry
0260438	13	34	054	22	4	54.9											01/01/1926		WALL, T.	Domestic & Stock	New Well	Drilled	No Chemistry
0260442	NE	34	054	22	4	42.7											21/11/1988		BARTEL, RICHARD	Domestic & Stock	New Well	Rotary	Chemistry Exists
0260928	NW	13	054	23	4	4.9													TURNBULL, R.J.	Domestic & Stock	Chemistry	Hand Dug	Chemistry Exists
0261215	12	07	055	22	4	5.5											01/01/1908		LAMOUREUX, A.	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry

Appendix A1-1

Water Well Records Within the Study Area

WELL ID	LOCATION					WELL DEPTH	PERFORATIONS 1 (m)		PERFORATIONS 2 (m)		PERFORATIONS 3 (m)		SCREENINGS 1 (m)		SCREENINGS 2 (m)		DATE		WELL OWNER	PROPOSED USE	TYPE OF WORK	DRILL METHOD	CHEMISTRY
	LSD	SECTION	TOWNSHIP	RANGE	MERIDIAN	(m)	FROM	TO	FROM	TO	FROM	TO	FROM	TO	FROM	TO	COMPLETED	ABANDONED					
0261229	07	08	055	22	4	9.1													ADDERHORD, A.	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0261231	SE	08	055	22	4	14.9	7.0	9.1	12.2	14.9							28/07/1988		COURCHESNE, R	Domestic & Stock	New Well	Bored	No Chemistry
0261392	08	11	055	22	4	61.0											01/01/1921		MAGEE, K	Domestic & Stock	Federal Well Survey	Drilled	No Chemistry
0261429	01	12	055	22	4	32.3											01/01/1922		BRICKRIDGE, A	Domestic & Stock	Federal Well Survey	Drilled	No Chemistry
0261433	04	13	055	22	4	111.3											01/01/1922		KELLY, G	Domestic & Stock	Federal Well Survey	Drilled	No Chemistry
0261595	03	26	054	23	4	4.9													PODHANIUK, W.	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0261602	12	18	055	22	4	6.4											01/01/1930		MCIASSIC, S	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0261651	09	21	055	22	4	11.0											01/01/1922		GAUMONT, A	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0261679	09	24	055	22	4	4.9											01/01/1932		THORNE, R E	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0261728	01	27	055	22	4	4.6													BELAIR, E C	Domestic & Stock	Chemistry	Hand Dug	Chemistry Exists
0261778	09	29	055	22	4	22.9											01/01/1931		LANGLOIS, G R	Domestic & Stock	Federal Well Survey	Bored	No Chemistry
0261821	08	34	055	22	4	60.0											01/01/1926		LA CHAPPELLE	Domestic & Stock	Federal Well Survey	Drilled	No Chemistry
0261822	SE	34	055	22	4	54.9	42.7	53.3									19/03/1984		JIGOLYK, H.	Domestic & Stock	New Well	Cable Tool	No Chemistry
0261844	13	35	055	22	4	22.9											01/01/1935		LECLAIRE, L	Domestic & Stock	Federal Well Survey	Bored	No Chemistry
0261886	09	01	056	21	4	4.6													SCHULTZ, E	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0262005	SE	33	054	23	4	42.7											03/11/1988	03/11/1988	STRAUSS, HOWARD #TEST HOLE	Domestic & Stock	Test Hole	Rotary	No Chemistry
0262018	SW	33	054	23	4	45.7											02/11/1988	02/11/1988	STRAUSS, HOWARD #TEST HOLE 2	Domestic & Stock	Test Hole	Rotary	No Chemistry
0262076	08	34	054	23	4	18.3											01/01/1928		PARRIDY, C.	Domestic & Stock	Federal Well Survey	Bored	No Chemistry
0262102	12	34	054	23	4	35.1											01/01/1921		SPEER, C.R.	Domestic & Stock	Federal Well Survey	Bored	No Chemistry
0262130	SE	35	054	23	4	79.2	67.1	79.2									22/11/1988		DEVEREUX, W	Domestic & Stock	New Well	Rotary	No Chemistry
0262341	SW	35	054	23	4	48.8	36.6	48.8									13/10/1981		HANES, ALBERT R	Domestic & Stock	New Well	Rotary	No Chemistry
0262348	SW	35	054	23	4	42.7	30.5	42.7									26/09/1988		HANES, ALBERT	Domestic & Stock	New Well	Rotary	No Chemistry
0262432	04	02	055	23	4	0.0													SPEER, C.R.	Domestic & Stock	Federal Well Survey	Bored	No Chemistry
0262523	SE	13	055	23	4	103.6	82.3	103.6									19/03/1983		KOZAK, NICK	Domestic & Stock	New Well	Rotary	Chemistry Exists
0263732	SE	13	056	21	4	42.1													WAGNER, J	Domestic & Stock	New Well	Cable Tool	No Chemistry
0263735	08	13	056	21	4	4.9											01/01/1927		WAGNER, J	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0263820	SW	13	056	21	4	47.2	35.1	47.2									09/05/1988		PROCHNAU, E.	Domestic & Stock	New Well	Rotary	No Chemistry
0263834	04	01	056	22	4	64.0											01/01/1929		MORROW, E.	Domestic & Stock	New Well	Drilled	No Chemistry
0263841	NW	01	056	22	4	34.4											10/12/1987		LAMOUREUX, RENALD	Domestic & Stock	New Well	Bored	Chemistry Exists
0263856	14	02	056	22	4	54.9											01/01/1924		TROTTER, J.	Domestic & Stock	New Well	Drilled	No Chemistry
0263863	10	02	056	22	4	10.7											01/01/1900		MCPIKE, T.	Domestic & Stock	New Well	Hand Dug	No Chemistry
0263896	NE	14	056	21	4	48.8							42.4	43.9			04/11/1988		HODGSON, G	Domestic & Stock	New Well	Rotary	No Chemistry
0263966	06	18	056	21	4	42.7											01/01/1922		MATHIEU, A	Domestic & Stock	Federal Well Survey	Drilled	No Chemistry
0263979	04	19	056	21	4	15.2											01/01/1921		TAYLOR, J	Domestic & Stock	Federal Well Survey	Drilled	No Chemistry
0264014	16	19	056	21	4	7.3											01/01/1930		SMOLSKI, D.	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0264143	SW	12	056	22	4	26.8											22/08/1985		SERINK, MIKE	Domestic & Stock	New Well	Bored	Chemistry Exists
0264170	02	13	056	22	4	10.7											01/01/1916		BERWICK, C.D.	Domestic & Stock	New Well	Hand Dug	No Chemistry
0264301	SE	22	055	22	4	14.3											25/06/1985		GODBOUT, N.	Domestic & Stock	New Well	Bored	No Chemistry
0264335	SE	29	056	21	4	70.1											02/06/1976		PUCHALIK, P.	Domestic & Stock	New Well	Cable Tool	Chemistry Exists
0264354	01	29	056	21	4	30.5													PUCHLUK, J.	Domestic & Stock	Federal Well Survey	Bored	No Chemistry
0264375	08	35	056	21	4	3.7													CONSARTO	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0264387	03	29	056	21	4	5.5													PUCHALACH	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0264395	09	29	056	21	4	12.2													KACHUK	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0264486	12	33	056	21	4	24.4													PSYCH	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0264503	04	34	056	21	4	3.7													MALOWNY	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0264662	04	35	056	21	4	19.2													ROMANIUK, E.	Domestic & Stock	Federal Well Survey	Bored	No Chemistry
0264672	SE	36	056	21	4	42.7	27.4	42.7									12/05/1976		CORNELIUS	Domestic & Stock	New Well	Cable Tool	No Chemistry
0264716	12	36	056	21	4	4.0													TKACHUK	Domestic & Stock	Federal Well Survey	Hand Dug	No Chemistry
0264931	NE	17	54	22	4													25/06/2012	ARMSTRONG, JIM	Domestic & Stock	Old Well - Abandoned	Unknown	Chemistry Exists
0265807	SE	04	057	21	4	30.5											02/12/1976		SAWKA, WALTER	Domestic & Stock	New Well	Cable Tool	Chemistry Exists
0266021	13	01	056	22	4	18.3											01/01/1934		YANCH, J.	Domestic & Stock	New Well	Bored	Chemistry Exists
0271540	NE	05	055	22	4	13.4											21/06/1985		GODBOUT, ROMEO	Domestic & Stock	New Well	Bored	No Chemistry
0274016	EH	36	054	23	4	17.7											25/04/1983		GAUMONT, C	Domestic & Stock	New Well	Bored	Chemistry Exists
0274028	EH	36	054	23	4	15.5	9.8	13.7									20/04/1989		GAUMONT, L	Domestic & Stock	New Well	Bored	No Chemistry
0280646	NE	36	054	23	4	14.3											19/10/1987		LAMOUREUX, JIM	Domestic & Stock	New Well	Bored	No Chemistry
0299620	SW	33	054	23	4	54.9	29.9	32.6	35.7	51.8							23/03/2002		HAZELAAR, HARVEY	Domestic & Stock	New Well	Rotary	No Chemistry
1911765	SW	02	057	21	4	79.2	71.0	77.1									27/02/2006	27/02/2006	SUNDAY KO, MIKE	Domestic & Stock	New Well	Rotary	No Chemistry
0083509	SE	29	055	21	4	45.7	41.8	44.8									24/06/1977		CF BRAUN CO	Industrial	New Well	Rotary	No Chemistry
0083539	NE	32	055	21	4	41.1							35.1	41.1			09/10/1981		PCL BRAUN SIMONS LTD #WELL4	Industrial	New Well	Rotary	Chemistry Exists
0083540	NE	32	055	21	4	41.1							35.7	41.1			06/10/1981		PCL BRAUN SIMONS LTD #HOLE5	Industrial	New Well	Rotary	No Chemistry
0083541	NE	32	055	21	4	42.7	40.2	42.7									20/08/1981		PCL BRAUN SIMONS LTD #HOLE1	Industrial	New Well	Rotary	No Chemistry
0083542	NE	32	055	21	4	42.7	40.2	42.7									02/09/1981		PCL BRAUN SIMONS LTD #HOLE2	Industrial	New Well	Rotary	No Chemistry
0083543	NE	32	055	21	4	42.7	40.5	42.7									25/08/1981		PCL BRAUN SIMONS LTD #HOLE3	Industrial	New Well	Rotary	No Chemistry
0083545	SE	34	055	21	4	54.9	0.3	54.9									19/10/1982		NORTHWESTERN UTILITIES	Industrial	New Well	Rotary	No Chemistry
0083546	SH	34	055	21	4	36.6													NORTHWESTERN UTILITIES	Industrial	Chemistry	Unknown	No Chemistry
0083565	01	36	055	21	4	24.4							18.0	22.6			15/11/1980		SHELL OIL	Industrial	New Well	Rotary	No Chemistry
0083566	01	36	055	21	4	24.4	20.4	21.9									16/11/1980		SHELL OIL	Industrial	New Well	Rotary	No Chemistry
0083567	01	36	055	21	4	45.7	40.2	41.5									17/11/1980		SHELL OIL	Industrial	New Well	Rotary	No Chemistry
0083568	02	36	055	21	4	15.2	11.9	13.1									18/11/1980		SHELL OIL	Industrial	New Well	Rotary	No Chemistry
0083569	01	36	055	21	4	30.5							13.1	18.9			06/11/1980		SHELL OIL	Industrial	New Well	Rotary	No Chemistry
0091601	03	30	056	20	4	954.0											21/12/1950		IMPERIAL OIL LTD	Industrial	Oil Exploratory	Rotary	No Chemistry
0152045	NW	10	055	22	4	37.8							34.7	37.8			08/12/1989		DOW CHEMICAL#MONITORING WELL	Industrial	New Well	Rotary	No Chemistry
0152046	NW	10	055	22	4	36.0							32.9	36.0			12/12/1989		DOW CHEMICAL#MONITORING WELL	Industrial	New Well	Rotary	No Chemistry
0152047	NW	10	055	22	4	41.1							38.1	41.1			10/12/1989		DOW CHEMICAL#MONITORING WELL	Industrial	New Well	Rotary	No Chemistry
0152048	NW	10	055	22	4	37.8							34.7	37.8			13/12/1989		DOW CHEMICAL#MONITORING WELL	Industrial	New Well	Rotary	No Chemistry
0260182	10	17	054	22	4	780.3											10/05/1954		TRIZONE OIL DEV CO LTD	Industrial	Oil Exploratory	Drilled	No Chemistry
0260380	10	29	054	22	4	751.3											02/10/1953		MID-WESTERN IND GAS LTD	Industrial	Oil Exploratory	Drilled	No Chemistry
0260402	NW	32	054	22	4	64.0											29/11/1956		PEACE RIVER GLASS	Industrial	New Well	Drilled	No Chemistry
0260408	NW	32	054	22	4	35.7	31.4	35.1									01/01/1955		PEACE RIVER GLASS	Industrial	New Well	Unknown	No Chemistry
0261083	00	02	055	22	4	44.2	33.5	39.6									24/02/1978		DOW CHEMICAL	Industrial	New Well	Unknown	No Chemistry
0261087	00	02	055	22	4	25.9	21.3	25.9									02/03/1978		DOW CHEMICALS	Industrial	New Well	Unknown	No Chemistry
0261092	00	02	055	22	4	42.7	39.6	42.7									08/03/1978		DOW CHEMICALS	Industrial	New Well	Unknown	No Chemistry
0261097	SE	03	055	22	4	64.0													CAN COMSTOCK LTD	Industrial	Chemistry	Unknown	Chemistry Exists
0261104	08	04	055	22	4	762.0											03/09/1962		MIDWESTERN IND GAS LTD #8-4	Industrial	New Well	Unknown	No Chemistry
0261247	06	09	055	22	4	765.0											03/12/1959		DOME PETRO LTD	Industrial	Oil Exploratory	Unknown	No Chemistry
0261344	10	10	055	22	4	1881.5											30/08/1966		DOW CHEMICAL #NACL	Industrial	Cathodic Protection	Unknown	No Chemistry
0261436	SW	13	055	22	4	4.9													DOW CHEMICAL	Industrial	Chemistry	Unknown	No Chemistry
0261496	11	14	055	22	4	39.6							33.2	35.1			14/09/1974		DOME PETRO	Industrial	New Well	Rotary	No Chemistry
0261535	10	17	055	22	4	967.7											12/06/1953		NORTHWESTERN UTILITIES LTD#5	Industrial	Unknown	Unknown	No Chemistry
0261682	04	36	55	22	4	299.0											21/05/1953		IMPERIAL OIL LTD #AO282-2	Industrial	Oil Exploratory	Unknown	No Chemistry
0261723	04	26	55	22	4	317.9											17/05/1953		IMPERIAL OIL LTD #AO282-1	Industrial	Oil Exploratory	Unknown	No Chemistry
0261736	16	27	055	22	4	304.5											21/05/1953		IMPERIAL OIL LTD #AO282-3	Industrial	Oil Exploratory	Unknown	No Chemistry
0261761	01	01	055	23	4	9.1													#SP. 1914497	Industrial	Flowing Shot Hole	Unknown	No Chemistry
0261825	12	34	055	22	4	304.5											13/05/1953		IMPERIAL OIL LTD #AO282 5	Industrial	Oil Exploratory	Unknown	No Chemistry
0261848	16	36	055	22	4	365.8											11/05/1946		IMPERIAL OIL LTD #615	Industrial	Oil Exploratory	Unknown	No Chemistry
0263838	03	1	56	22	4	1321.3											28/02/1951		LINGNORA GOLD MINES LTD	Industrial	Unknown	Drilled	No Chemistry
0263849	01	2	56	22	4	304.5											17/05/1953		IMPERIAL OIL LTD	Industrial	Oil Exploratory	Drilled	No Chemistry
0263860	13	02	056	22	4	286.5											18/05/1953		IMPERIAL OIL LTD	Industrial	Oil Exploratory	Drilled	No Chemistry
0263918	04	15	56	21	4	996.1											15/11/1950		SEABOARD OIL CO #4-15	Industrial	Oil Exploratory	Unknown	No Chemistry
0264108	01	11	56	22	4	286.5											14/05/1953		IMPERIAL OIL LTD	Industrial	Test Hole	Drilled	No Chemistry
0264153	04	13	056	22	4	0.0											11/08/1953		IMPERIAL OIL LTD	Industrial	Flowing Shot Hole	Unknown	No Chemistry
0264161	13	12	056	22	4	292.6											14/05/1953		IMPERIAL OIL LTD	Industrial	Test Hole	Drilled	No Chemistry
0264189	03	13	056	22	4	246.3														Industrial	Flowing Shot Hole	Drilled	No Chemistry
0280652	WH	11	055	22	4	29.0											19/07/1984		DOW CHEMICAL	Industrial	Cathodic Protection	Rotary	No Chemistry
0282100	NW	02	055	22	4	70.7											09/05/1984		DOW CHEMICAL#R-240-1	Industrial	New Well	Rotary	No Chemistry
0282101	SE	10	055	22	4	71.9											08/05/1984		DOW CHEMICAL#R-90-3	Industrial	New Well	Rotary	No Chemistry
0282102	SW	11	055	22	4	27.4											03/05/1984		DOW CHEMICAL #R-240-2	Industrial	New Well	Rotary	No Chemistry
0282103	NW	11	055	22	4	98.8											01/05/1984		DOW CHEMICAL #370-5	Industrial	New Well	Rotary	No Chemistry
0282104	NW	11	055	22	4	100.6											03/05/1984		DOW CHEMICAL #370-4	Industrial	New Well	Rotary	No Chemistry
0282105	NW	11	055	22	4	100.0											26/04/1984		DOW CHEMICAL #370-3	Industrial	New Well	Rotary	No Chemistry
0282106	NW	11	055	22	4	94.8											25/04/1984		DOW CHEMICAL #370-2	Industrial	New Well	Rotary	No Chemistry
0282117	SE	10	055	22	4	25.9											04/05/1984		DOW CHEMICAL #150-2	Industrial	New Well	Rotary	No Chemistry
0289172	EH	07	056	21	4	30.5											06/09/1997	06/09/1997	I.O.L. #1	Industrial	Test Hole-Abandoned	Rotary	No Chemistry
0289173	EH	17	056	21	4	15.2	11.9	13.4									09/09/1997	09/09/1997	I.O.L. #6	Industrial	Test Hole-Abandoned	Rotary	No Chemistry
0289174	EH	17	056	21	4	13.4											08/09/1997	08/09/1997	I.O.L. #5	Industrial	Test Hole-Abandoned	Rotary	No Chemistry
0289175	EH	17	056	21	4	14.9	11.9	14.9									06/09/1997	06/09/1997	I.O.L. #2	Industrial	Test Hole-Abandoned	Rotary	No Chemistry
0289176	EH	17	056	21	4	18.3	15.8	17.4									07/09/1997	07/09/1997	I.O.L. #3	Industrial	Test Hole-Abandoned	Rotary	No Chemistry
0289177	EH	17	056	21	4	15.2											08/09/1997	08/09/1997	I.O.L. #4	Industrial	Test Hole-Abandoned	Rotary	No Chemistry
0298284	SW	19	055	21	4	41.1														Industrial	Old Well-Abandoned	Not Applicable	No Chemistry
1270376	1	27	55	21	4	46.9	32.0	46.9									13/06/2016		INTERCHEM CANADA	Industrial	New Well	Combination	No Chemistry
1270378	1	27	55	21	4	30.5							22.3	24.4			07/06/2016		INTERCHEM CANADA	Industrial	New Well	Combination	No Chemistry
1270379	8	29	55	21	4	48.8							33.5	35.1			29/06/2016		PEMBINA MIDSTREAM LTD.	Industrial	New Well	Rotary - Mud	No Chemistry
1300178	12	5	56	21	4	39.6							31.4	34.4			18/04/2007		SHELL CANADA/THURBER ENG.	Industrial	New Well	Rotary	No Chemistry
1421784	2	14	55	22	4														KEYERA CORP	Industrial	New Well	Rotary - Mud	No Chemistry
1421795	7	14	55	22	4	48.8							37.1	42.1			30/10/2015		KEYERA CORP	Industrial	New Well	Rotary - Mud	No Chemistry
1421796	SE	14	55	22	4	48.8							37.2	42.2			24/10/2015		KEYERA CORP	Industrial	New Well	Rotary - Mud	No Chemistry
1421797	3	14	55	22	4	46.6							34.7	39.7			02/11/2015		KEYERA CORP	Industrial	New Well	Rotary - Mud	No Chemistry
1421798	4	14	55	22	4	45.7							34.0	39.1			06/11/2015		KEYERA CORP	Industrial	New Well	Rotary - Mud	No Chemistry
1421799	5	14	55	22	4	46.6							34.6	39.6			08/11/2015		KEYERA	Industrial	New Well	Rotary - Mud	No Chemistry
1421801	8	14	55	22	4	48.8							36.6	41.6			27/11/2015		KEYERA	Industrial	New Well	Rotary - Mud	No Chemistry
1575400	SE	18	56	21	4	47.2							16.8	47.2			25/10/2006		ACCESS PIPELINES	Industrial	New Well	Rotary	No Chemistry
1889277	5	18	55	21	4	49.4							36.9	43.0			02/03/2015		KEYERA CORP.	Industrial	New Well	Rotary - Mud	No Chemistry
0242397	SE	10	055	22	4	12.2											14/11/1978		DOW CHEMICAL	Investigation	Test Hole	Cable Tool	No Chemistry
0242398	NW	11	055	22	4	7.3	0.9	7.3									22/11/1978		DOW CHEMICAL	Investigation	New Well	Cable Tool	No Chemistry
0242399	NW	11	055	22	4	7.6	0.9	7.6									22/11/1978		DOW CHEMICAL	Investigation	New Well	Cable Tool	No Chemistry
0242400	NW	11	055	22	4	7.9	0.9	7.9									22/11/1978		DOW CHEMICAL	Investigation	New Well	Cable Tool	No Chemistry
0242401	NW	11	055	22	4	8.5	0.9	8.5									22/11/1978		DOW CHEMICAL	Investigation	New Well	Cable Tool	No Chemistry
0242402	NW	11	055	22	4	9.4	0.9	9.4									22/11/1978		DOW CHEMICAL	Investigation	New Well	Cable Tool	No Chemistry
0242403	NW	11	055	22	4	9.8	0.9	9.8									22/11/1978		DOW CHEMICAL	Investigation	New Well	Cable Tool	No Chemistry
0242404	NW	11	055	22	4	10.7	0.9	10.7									22/11/1978		DOW CHEMICAL	Investigation	New Well	Cable Tool	No Chemistry
0242405	NW	11	055	22	4	11.6	0.9	11.6									22/11/1978		DOW CHEMICAL	Investigation	New Well	Cable Tool	No Chemistry
0242406	SE	11	055	22	4	13.1											29/11/1978		DOW CHEMICAL	Investigation	New Well	Cable Tool	No Chemistry
0261846	NE	35	054	22	4	30.5											05/08/1976		ALTA ENV	Investigation	Test Hole	Unknown	No Chemistry
0281168	SH	06	056	21	4	36.6											11/05/1969		ALTA ENV #0294E	Investigation	Test Hole	Drilled	No Chemistry
0281169	09	33	056	21	4	19.8											18/04/1972		ALTA ENV #0792E	Investigation	Test Hole	Drilled	No Chemistry
0281170	09	32	055	21	4	47.2							40.5	42.1	45.1	46.3	09/05/1970		ALTA ENV #0499E	Investigation	Test Hole	Drilled	Chemistry Exists
0281173	SE	01	056	22	4	29.0											11/05/1969		ALTA ENV #0292E	Investigation	Test Hole	Drilled	No Chemistry
0042021	13	24	56	21	4	4.6							3.0	4.6			25/09/1991		ALTA ENV	Monitoring	New Well	Rotary	No Chemistry
0261254	SE	10	055	22	4	8.5											08/11/1978		DOW CHEMICAL #MONCTOUNGWELL	Monitoring	New Well	Cable Tool	No Chemistry
0261261	08	10	055	22	4	7.9											14/11/1978		DOW CHEMICAL LTD #8	Monitoring	Test Hole	Cable Tool	No Chemistry
0261265	07	10	055	22	4	33.5											08/11/1978		DOW CHEMICAL #6 MONITORING	Monitoring	Test Hole	Cable Tool	No Chemistry
0261271	NW	10	055	22	4	16.8							13.4	16.5			24/10/1989		DOW CHEMICAL	Monitoring	Test Hole	Rotary	No Chemistry
0261281	NW	10	055	22	4	18.0							13.7	16.8			21/10/1989		DOW CHEMICAL #1 MONITOR	Monitoring	Test Hole	Rotary	No Chemistry
0261285	NW	10	055	22	4	16.2							13.1	16.2			26/10/1989		DOW CHEMICAL	Monitoring	Test Hole	Rotary	No Chemistry
0261294	NW	10	055	22	4	16.5							13.4	16.5			26/10/1989		DOW CHEMICAL	Monitoring	Test Hole	Rotary	No Chemistry
0261297	NW	10	055	22	4	18.0							14.9	18.0			26/10/1989		DOW CHEMICAL	Monitoring	Test Hole	Rotary	No Chemistry
0261302	10	10	055	22	4	5.2											09/04/1979		DOW CHEMICAL #21	Monitoring	Test Hole	Cable Tool	No Chemistry
0261321	10	10	055	22	4	4.9											09/04/1979		DOW CHEMICAL #22 MONITORING W	Monitoring	Test Hole	Cable Tool	No Chemistry
0261340	09	10	055	22	4	5.8											09/04/1979		DOW CHEMICAL	Monitoring	Test Hole	Cable Tool	No Chemistry
0261414	NW	11	055	22	4	36.6							34.1	35.7			27/08/1980		DOW CHEMICAL	Monitoring	Test Hole	Rotary	No Chemistry
0261420	NW	11	055	22	4	39.6							36.0	37.5			25/08/1980		DOW CHEMICAL	Monitoring	Test Hole	Rotary	No Chemistry
0261423	NE	11	055	22	4	39.6											27/11/1978		DOW CHEMICAL #10 MONITORING W	Monitoring	Test Hole	Cable Tool	No Chemistry
0261427	NE	11	055	22	4	7.3	0.9	7.3									22/11/1978		DOW CHEMICAL #12 MONITORING W	Monitoring	Test Hole	Cable Tool	No Chemistry
0261428	10	11	055	22	4	7.3	0.9	7.3									22/11/1978		DOW CHEMICAL #13 MONITORING W	Monitoring	Test Hole	Cable Tool	No Chemistry
0261460	SW	14	055	22	4	6.1							4.6	6.1					DOME PETRO#BRINE UGS PITSITE 1	Monitoring	Chemistry	Unknown	Chemistry Exists
0261475	SW	14	055	22	4	6.1							4.6	6.1					DOME PETRO#BRINE UGS PITSITE 2	Monitoring	Chemistry	Unknown	Chemistry Exists
0261485	SW	14	055	22	4	6.1							4.6	6.1					DOME PETRO#UGS@BRINEPITSITE 3	Monitoring	Chemistry	Unknown	Chemistry Exists
0261489	SW	14	055	22	4	6.1							4.6	6.1					DOME PETRO#UGS@BRINEPITSITE 4	Monitoring	Chemistry	Unknown	Chemistry Exists
0263387	01	05	056	21	4	42.1	39.3	42.1									27/04/1982		CAN BADGER CO LTD #7	Monitoring	New Well	Rotary	No Chemistry
0263397	01	05	056	21	4	45.7	38.1	39.6									30/03/1982	30/03/1982	CAN BADGER CO LTD	Monitoring	New Well-Abandoned	Rotary	No Chemistry
0263410	01	05	056	21	4	47.2	38.1	41.1									06/04/1982		CAN BADGER CO LTD #2	Monitoring	New Well	Rotary	No Chemistry
0263417	01	05	056	21	4	61.0	45.7	61.0									08/04/1982		CAN BADGER CO LTD #3	Monitoring	New Well	Rotary	No Chemistry
0263423	01	05	056	21	4	61.0	45.7	61.0									13/04/1982		CAN BADGER CO LTD #4	Monitoring	New Well	Rotary	No Chemistry
0263439	01	05	056	21	4	91.4	76.5	82.3									16/04/1982	16/04/1982	CAN BADGER CO LTD	Monitoring	New Well-Abandoned	Rotary	No Chemistry
0263447	01	05	056	21	4	76.2	64.0	73.2									22/04/1982	22/04/1982	CAN BADGER CO LTD	Monitoring	New Well-Abandoned	Rotary	No Chemistry
0263459	01	05	056	21	4	42.7							39.0	40.5			03/05/1982		CAN BADGER CO LTD #8	Monitoring	New Well	Rotary	No Chemistry
0263465	01	05	056	21	4	42.7											05/05/1982		CAN BADGER CO LTD #9	Monitoring	New Well	Rotary	No Chemistry
0264021	SE	20	056	21	4	5.2													IMPERIAL OIL #6A	Monitoring	Chemistry	Unknown	Chemistry Exists
0264030	SE	20	056	21	4	7.9													IMPERIAL OIL #6D	Monitoring	Chemistry	Unknown	Chemistry Exists
0264036	SE	20	056	21	4	21.9													IMPERIAL OIL #5B	Monitoring	Chemistry	Unknown	Chemistry Exists
0264045	SE	20	056	21	4	33.5													IMPERIAL OIL #6B	Monitoring	Chemistry	Unknown	Chemistry Exists
0264050	SE	20	056	21	4	43.0													IMPERIAL OIL #3B	Monitoring	Chemistry	Unknown	Chemistry Exists
0264054	SE	20	056	21	4	2.1													IMPERIAL OIL #5F	Monitoring	Chemistry	Unknown	Chemistry Exists
0264056	SE	20	056	21	4	43.3													IMPERIAL OIL #5A	Monitoring	Chemistry	Unknown	Chemistry Exists
0264061	SE	20	056	21	4	15.2													IMPERIAL OIL #6C	Monitoring	Chemistry	Unknown	Chemistry Exists
0264075	SE	20	056	21	4	7.3													IMPERIAL OIL #5D	Monitoring	Chemistry	Unknown	Chemistry Exists
0264078	SE	20	056	21	4	5.5													IMPERIAL OIL #7	Monitoring	Chemistry	Unknown	Chemistry Exists
0264081	SE	20	056	21	4	5.5													IMPERIAL OIL #10	Monitoring	Chemistry	Unknown	Chemistry Exists
0264086	SE	20	056	21	4	4.3													IMPERIAL OIL #8	Monitoring	Chemistry	Unknown	Chemistry Exists
0264089	SE	20	056	21	4	4.3													IMPERIAL OIL #5H	Monitoring	Chemistry	Unknown	Chemistry Exists
0264094	SE	20	056	21	4	4.3													IMPERIAL OIL #5E	Monitoring	Chemistry	Unknown	Chemistry Exists
0264096	SE	20	056	21	4	4.0													IMPERIAL OIL #4A	Monitoring	Chemistry	Unknown	Chemistry Exists
0264098	SE	20	056	21	4	4.0													IMPERIAL OIL #5G	Monitoring	Chemistry	Unknown	Chemistry Exists
0264103	SE	20	056	21	4	3.0													IMPERIAL OIL #9	Monitoring	Chemistry	Unknown	Chemistry Exists
1270257	5	14	55	22	4	37.6							35.2	36.7			20/12/2013		KEYERA ENERGY LTD.	Monitoring	New Well	Rotary - Mud	No Chemistry
1270258	6	14	55	22	4	36.4							34.9	36.4			18/12/2013		KEYERA ENERGY LTD.	Monitoring	New Well	Rotary - Mud	No Chemistry
1270271	1	14	55	22	4	41.8	39.0	40.5					39.0	40.5			30/09/2014		KEYERA ENERGY LTD.	Monitoring	Piezometer	Rotary - Mud	No Chemistry
1270272	2	14	55	22	4	39.2	36.6	38.1					36.6	38.1			02/10/2014		KEYERA ENERGY LTD.	Monitoring	Piezometer	Rotary - Mud	No Chemistry
1270273	2	14	55	22	4	38.7	36.0	37.7					36.0	37.6			03/10/2014		KEYERA ENERGY LTD.	Monitoring	Piezometer	Rotary - Mud	No Chemistry
1420288	NW	14	056	21	4	42.7							35.1	38.1			02/02/2005		NCIA	Monitoring	New Well	Rotary	No Chemistry
1420299	SW	31	054	22	4	32.0							25.0	29.6			25/01/2005		NCIA	Monitoring	New Well	Rotary	No Chemistry
1420305	NW	31	055	21	4	42.7							31.1	37.2			28/01/2005		NCIA	Monitoring	Test Hole	Rotary	No Chemistry
1420309	NE	33	055	21	4	44.8							35.7	41.8			27/01/2005		NCIA	Monitoring	New Well	Rotary	No Chemistry
1420313	SE	04	055	22	4	36.6							26.5	31.1			03/02/2005		NCIA	Monitoring	New Well	Rotary	No Chemistry
1420564	NW	19	054	22	4	38.1							27.7	34.4			24/01/2005		N C I A	Monitoring	New Well	Rotary	No Chemistry
2093187	1	35	56	21	4	8.4							4.6	7.6			10/11/2008		AMEC EARTH & ENVIRONMENT	Monitoring	New Well	Auger	No Chemistry
2093188	1	35	56	21	4	13.0							9.8	12.8			10/11/2008		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093213	1	35	56	21	4	8.4							4.8	7.8			11/11/2008		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093222	1	35	56	21	4	10.0							7.0	10.0			18/09/2008		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry

Appendix A1-1

Water Well Records Within the Study Area

WELL ID	LOCATION					WELL DEPTH (m)	PERFORATIONS 1 (m)		PERFORATIONS 2 (m)		PERFORATIONS 3 (m)		SCREENINGS 1 (m)		SCREENINGS 2 (m)		DATE		WELL OWNER	PROPOSED USE	TYPE OF WORK	DRILL METHOD	CHEMISTRY
	LSD	SECTION	TOWNSHIP	RANGE	MERIDIAN		FROM	TO	FROM	TO	FROM	TO	FROM	TO	FROM	TO	COMPLETED	ABANDONED					
2093223	1	35	56	21	4	9.8							6.8	9.8			19/09/2008		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093224	1	35	56	21	4	12.0							9.0	12.0			19/09/2008		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093225	1	35	56	21	4	12.0							7.0	10.0			19/09/2008		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093226	1	35	56	21	4	13.1							7.7	10.7			22/09/2008		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093227	1	35	56	21	4	9.9							5.2	8.2			13/12/2007		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093228	1	35	56	21	4	13.1							8.5	11.5			22/09/2008		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093229	1	35	56	21	4	13.0							7.1	10.1			10/11/2008		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093230	1	35	56	21	4	12.0							7.0	10.0			19/09/2008		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093232	1	35	56	21	4	8.4							5.0	8.0			18/09/2008		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093233	1	35	56	21	4	8.4							5.2	8.2			13/12/2007		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093235	1	35	56	21	4	12.5							9.0	12.0			18/09/2008		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093241	1	35	56	21	4	8.4							4.6	7.6			11/11/2008		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093243	1	35	56	21	4	11.5							7.1	10.1			13/12/2007		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093244	1	35	56	21	4	9.9							6.8	9.9			13/12/2007		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093249	1	35	56	21	4	8.4							5.2	8.2			14/12/2007		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
2093250	1	35	56	21	4	8.4							5.2	8.2			14/12/2007		AMEC EARTH & ENVIRONMENTAL	Monitoring	New Well	Auger	No Chemistry
0101384	NW	32	054	22	4	0.0													FT SASK, TOWN OF #WELL 1	Municipal	Unknown	Unknown	No Chemistry
0156873	NW	09	055	22	4	0.0													U.M.O.L.-C.R.N.E.W.S.	Municipal	Chemistry	Not Applicable	No Chemistry
0260180	04	17	54	22	4	29.0											22/04/1972		ALTA ENV/WATER RES	Municipal	Unknown	Drilled	No Chemistry
0260416	NH	32	054	22	4	18.6														Municipal	New Well	Drilled	No Chemistry
0263723	16	12	056	21	4	42.7							29.3	30.8			06/11/1975		BRUDERHEIM, TOWN OF#11-75	Municipal	New Well	Unknown	Chemistry Exists
0263728	16	12	056	21	4	42.7							35.7	37.2			03/10/1975		BRUDERHEIM, TOWN OF #9-75	Municipal	New Well	Unknown	Chemistry Exists
0263729	16	12	056	21	4	42.7							33.8	37.2			04/11/1975		BRUDERHEIM, TOWN OF#10-75	Municipal	New Well	Unknown	Chemistry Exists
0263738	01	13	56	21	4	43.6	30.8	38.4									16/07/1975		BRUDERHEIM, TOWN OF#6-75 PUMP	Municipal	New Well	Unknown	Chemistry Exists
0263821	05	13	056	21	4	48.8							41.8	43.0			11/11/1975		BRUDERHEIM, TOWN OF#14-75	Municipal	New Well	Unknown	Chemistry Exists
0263828	16	13	056	21	4	36.6							31.1	32.3			10/11/1975		BRUDERHEIM, TOWN OF#13-75	Municipal	New Well-Abandoned	Unknown	Chemistry Exists
0263912	09	14	056	21	4	49.4											16/07/1975		BRUDERHEIM, TOWN OF	Municipal	New Well	Unknown	No Chemistry
0264233	15	21	056	21	4	42.7							34.1	35.4			07/11/1975		BRUDERHEIM, TOWN OF#12-75	Municipal	New Well	Unknown	Chemistry Exists
1495323	NE	12	56	21	4	38.1							33.2	36.3			22/08/2007		STRATHCONA COUNTY / UMA	Municipal	New Well	Rotary	No Chemistry
0263789	01	13	56	21	4	35.7	34.4	35.7									16/07/1975		BRUDERHEIM, TOWN OF	Municipal & Observation	New Well	Unknown	No Chemistry
0042022	4	14	56	21	4	6.1							3.1	4.6			25/09/1991		ALTA ENV/CHMILIAR, W.	Observation	New Well	Rotary	No Chemistry
0083369	NE	06	055	21	4	15.2											08/04/1988		ALTA ENV	Observation	Test Hole	Auger	No Chemistry
0083370	SW	07	055	21	4	42.7											06/08/1976		ALTA ENV #1619BE	Observation	Test Hole	Rotary	No Chemistry
0083472	12	22	055	21	4	30.8											24/06/1969		ALTA AGRICULTURE	Observation	Test Hole	Rotary	No Chemistry
0215410	08	30	054	22	4	42.7	29.0	34.1									06/08/1976		ALTA ENV #1619E	Observation	Test Hole	Unknown	No Chemistry
0224185	SE	18	056	20	4	73.2											08/10/1993	08/10/1993	MCLELLAN, ART	Observation	Test Hole-Abandoned	Rotary	No Chemistry
0234510	NW	30	056	20	4	51.8											12/05/1969		ALTA ENV #0298E	Observation	Test Hole	Unknown	No Chemistry
0234526	SE	30	056	20	4	37.5											13/05/1969		ALTA ENV #0299E	Observation	Test Hole	Unknown	No Chemistry
0234530	13	30	56	20	4	10.1													ALBERTA ENVIRONMENT	Observation	Old Well - Test	Unknown	Chemistry Exists
0234530	13	30	56	20	4	10.1							8.5	10.1			27/03/1985		ALTA ENV #2342E	Observation	Test Hole	Rotary	Chemistry Exists
0234532	13	30	56	20	4	36.9							35.4	36.9			26/03/1985		ALTA ENV #2341E	Observation	Test Hole	Rotary	No Chemistry
0234538	13	30	56	20	4	10.1							8.5	10.1			27/03/1985		ALTA ENV #2343E	Observation	Test Hole	Rotary	Chemistry Exists
0234538	13	30	56	20	4	10.1													ALBERTA ENVIRONMENT	Observation	Old Well - Test	Unknown	Chemistry Exists
0234545	13	30	56	20	4	48.2							46.3	47.9			22/03/1985		ALTA ENV	Observation	Test Hole	Rotary	No Chemistry
0234548	13	30	56	20	4	78.9													ALBERTA ENVIRONMENT	Observation	Old Well - Test	Unknown	Chemistry Exists
0234548	13	30	56	20	4	78.9											19/03/1985		ALTA ENV #2339E	Observation	Test Hole	Rotary	Chemistry Exists
0234549	13	30	056	20	4	72.5											11/03/1985	11/03/1985	ALTA ENV #2334E	Observation	Test Hole-Abandoned	Rotary	No Chemistry
0260051	NE	08	054	22	4	38.1							6.4	12.8			14/04/1977		KENNEDY	Observation	New Well	Rotary	No Chemistry
0260458	SW	36	054	22	4	13.7											07/04/1988			Observation	Test Hole	Bored	No Chemistry
0262034	09	33	054	23	4	56.4											06/10/1972		ALTA ENV #0886E	Observation	Test Hole	Unknown	No Chemistry
0263831	SW	01	056	22	4	19.8													ALTA ENV/WATER RES #0293E	Observation	Test Hole	Rotary	No Chemistry
0286110	01	28	055	21	4	21.3											24/06/1969		#HOLE 670-H	Observation	Test Hole	Auger	No Chemistry
0286112	13	22	055	21	4	30.8											24/06/1969		#HOLE 671-H	Observation	Test Hole	Auger	No Chemistry
0286117	13	28	055	21	4	29.3											25/06/1969		#HOLE 669-H	Observation	Test Hole	Auger	No Chemistry
1270377	1	27	55	21	4	61.0							36.0	42.1			10/06/2016		INTERCHEM CANADA	Observation	New Well	Combination	No Chemistry
1300177	12	5	56	21	4	43.0							30.5	39.9			16/04/2007		SHELL CANADA/THURBER ENG.	Observation	Piezometer	Rotary	No Chemistry
1420001	NE	10	055	22	4	19.2							16.2	19.2			10/02/2005		AGRIUM PLANT-FORT SASKATCHEWA	Observation	New Well	Rotary	No Chemistry
1420003	NW	05	056	21	4	44.2							38.1	44.2			24/09/2004		SHELL CANADA	Observation	New Well	Rotary	No Chemistry
1420007	SW	24	055	22	4	43.9							37.8	43.9			15/05/2005		NCIA	Observation	New Well	Rotary	No Chemistry
1420016	NE	10	055	22	4	17.4							14.3	17.4			10/02/2005		AGRIUM PLANT-FORT SASKATCHEWA	Observation	New Well	Rotary	No Chemistry
1420018	NE	03	056	21	4	48.8											20/01/2005	20/01/2005	NCIA	Observation	Test Hole-Abandoned	Rotary	No Chemistry
1420020	SE	29	055	21	4	33.5							30.5	33.5			03/02/2005		NICA	Observation	New Well	Rotary	No Chemistry
1420023	NE	18	055	21	4	38.7							34.1	38.7			31/01/2005		NCIA	Observation	New Well	Rotary	No Chemistry
1420030	NE	32	054	22	4	30.5							21.6	26.2			26/01/2005		NCIA	Observation	New Well	Rotary	No Chemistry
1420050	NW	24	054	23	4	19.8							15.5	19.8			24/01/2005		NCIA	Observation	New Well	Rotary	No Chemistry
1420097	09	10	056	21	4	36.6											24/03/2004	24/03/2004	STANTEC CONSULTING LTD	Observation	Test Hole-Abandoned	Unknown	No Chemistry
1420104	SW	10	055	22	4	15.8							12.8	15.8			10/11/2005		AGRIUM	Observation	New Well	Rotary	No Chemistry
1420115	NE	10	55	22	4	24.7							18.6	24.7			09/02/2005		AGRIUM PLANT -FT SASKATCHEWAN	Observation	New Well	Rotary	No Chemistry
1420135	NE	10	055	22	4	18.3							15.2	18.3			10/02/2005		AGRIUM PLANT	Observation	New Well	Rotary	No Chemistry
1420143	NE	10	055	22	4	19.2							15.2	18.3			11/02/2005		AGRIUM PLANT-FT SASKATCHEWAN	Observation	New Well	Rotary	No Chemistry
1420152	SW	25	055	22	4	48.8											21/01/2005	21/02/2005	NCIA	Observation	Test Hole-Abandoned	Rotary	No Chemistry
1420161	SW	15	055	22	4	36.6											18/01/2005	18/01/2005	NCIA	Observation	Dry Hole-Abandoned	Rotary	No Chemistry
1420165	NW	04	055	22	4	12.2											18/01/2005	18/01/2005	NCIA	Observation	Dry Hole-Abandoned	Rotary	No Chemistry
1420173	SW	26	055	22	4	30.5											18/01/2005	18/01/2005	NCIA	Observation	Dry Hole-Abandoned	Rotary	No Chemistry
1420174	SE	30	055	21	4	47.2											19/01/2005	19/01/2005	NCIA	Observation	Dry Hole-Abandoned	Rotary	No Chemistry
1420181	SE	36	055	22	4	12.2											19/01/2005	19/01/2005	NCIA	Observation	Dry Hole-Abandoned	Rotary	No Chemistry
1420197	SW	34	055	21	4	54.9											20/01/2005	20/01/2005	NCIA	Observation	Test Hole-Abandoned	Rotary	No Chemistry
1420210	15	09	056	21	4	48.8							32.0	53.3			22/03/2004		STANTEC CONSULTING LTD	Observation	New Well	Rotary	No Chemistry
1420217	13	10	056	21	4	48.8							38.7	44.8			23/03/2004		STANTEC CONSULTING LTD	Observation	New Well	Rotary	No Chemistry
1420224	16	10	056	21	4	48.8							40.2	43.3			24/03/2004		STANTEC CONSULTING LTD	Observation	New Well	Rotary	No Chemistry
1420228	04	10	056	21	4	36.6							33.5	36.6			23/03/2004		STANTEC CONSULTING LTD	Observation	New Well	Rotary	No Chemistry
1420242	NW	15	056	21	4	42.7							36.0	40.5			02/02/2005		NCIA	Observation	New Well	Rotary	No Chemistry
1420259	SE	29	054	22	4	36.6											17/01/2005	17/01/2005	NCIA	Observation	Test Hole-Abandoned	Rotary	No Chemistry
1420418	NE	10	055	22	4	25.0							21.9	25.0			09/02/2005		AGRIUM PLANT, FT SASKATCHEWAN	Observation	New Well	Rotary	No Chemistry
1420419	NE	10	055	22	4	30.5							21.9	25.0			09/02/2005		AGRIUM PLANT, FT SASKATCHEWAN	Observation	New Well	Rotary	No Chemistry
1420432	SW	32	055	21	4	17.1							14.0	17.1			08/09/2006		SHELL SCOTTFORD REFINERY	Observation	Piezometer	Rotary	No Chemistry
1420433	SW	32	055	21	4	45.7							38.7	41.8			08/09/2006		SHELL SCOTTFORD REFINERY	Observation	Piezometer	Rotary	No Chemistry
1420565	SW	34	055	21	4	42.7											21/01/2005	21/01/2005	N C I A	Observation	New Well-Abandoned	Rotary	No Chemistry
1420578	SE	16	056	21	4	48.8							39.6	45.7			23/06/2006		SHELL SCOTFORD	Observation	New Well	Rotary	No Chemistry
1420579	NE	04	056	21	4	44.2							36.9	39.9			21/06/2006		SHELL SCOTFORD	Observation	New Well	Rotary	No Chemistry
1421030	SW	36	54	22	4	24.4							14.3	15.8	15.8	18.9	03/07/2010		REPERIO RESOURCES	Observation	New Well	Rotary - Mud	No Chemistry
1421033	NE	26	54	22	4	10.7							6.4	9.4			24/06/2010		REPERIO RESOURCES	Observation	New Well	Rotary - Mud	No Chemistry
1421034	NE	26	54	22	4	12.2							7.6	10.7			25/06/2010		REPERIO RESOURCES	Observation	New Well	Rotary - Mud	No Chemistry
1421035	SW	26	54	22	4	11.3							8.2	9.8			01/07/2010		REPERIO RESOURCES	Observation	New Well	Rotary - Mud	No Chemistry
1421038	SW	26	54	22	4	16.5							9.1	15.2			01/07/2010		REPERIO RESOURCES	Observation	New Well	Rotary - Mud	No Chemistry
1421039	NE	26	54	22	4	10.7							6.1	9.1			29/06/2010		REPERIO RESOURCES	Observation	New Well	Rotary - Mud	No Chemistry
1421785	3	14	55	22	4	41.1							35.2	39.9			03/11/2015		KERYERA CORP	Observation	New Well	Rotary - Mud	No Chemistry
1421793	SE	14	55	22	4	42.7							37.1	41.8			27/10/2015		KEYERA CORP	Observation	New Well	Rotary - Mud	No Chemistry
1421794	SE	14	55	22	4	43.2							37.4	42.1			30/10/2015		KEYERA CORP	Observation	New Well	Rotary - Mud	No Chemistry
1495324	NE	12	056	21	4	34.4							31.1	34.1			22/08/2007		STRATHCONA COUNTY / UMA	Observation	New Well	Rotary	No Chemistry
2058433	04	17	54	22	4	29.0											22/04/1972		ALTA ENV - #791E	Observation	Other	Unknown	No Chemistry
0196962	08	22	054	22	4	150.9											29/05/1975		ARC# TH 3-75	Other	Coal Test Hole	Unknown	No Chemistry
0261523	12	17	055	22	4	10.7											01/01/1935		NORMANDEAU, J	Other	Federal Well Survey	Hand Dug	No Chemistry
1421047	SW	36	54	22	4	10.1							7.6	9.1			25/06/2010		REPERIO RESOURCES	Other	New Well	Rotary - Mud	No Chemistry
1421611	SW	14	55	22	4	45.7							33.8	38.4	38.4	44.5	24/07/2014		KEYERA ENERGY	Other	New Well	Rotary - Mud	No Chemistry
1421680	SW	14	55	22	4	46.6							33.9	39.3			04/12/2014		KEYERA ENERGY	Other	New Well	Rotary - Mud	No Chemistry
1476845	6	34	55	21	4	119.8											04/11/2015		SKYSTONE ENGINEERING	Other	Other	Unknown	No Chemistry
1476846	6	34	55	21	4	119.8											07/11/2015		SKYSTONE ENGINEERING	Other	Other	Rotary - Mud	No Chemistry
1476847	5	34	55	21	4	94.5											08/11/2015		SKYSTONE ENGINEERING	Other	Other	Rotary - Mud	No Chemistry
1795266	SE	32	56	21	4	3.6												29/09/2010	TOTAL E & P CANADA LTD.	Other	Old Well - Abandoned	Other	No Chemistry
1795267	SE	32	56	21	4	12.5												28/09/2010	TOTAL E & P CANADA	Other	Old Well - Abandoned	Unknown	No Chemistry
1795268	SE	32	56	21	4	23.7												30/09/2010	TOTAL E & P CANADA LTD	Other	Old Well - Abandoned	Bored	No Chemistry
1795269	SE	32	56	21	4	14.5												30/09/2010	TOTAL E & P CANADA LTD	Other	Old Well - Abandoned	Unknown	No Chemistry
1795270	NW	33	56	21	4	13.7												01/10/2010	TOTAL E & P CANADA LTD.	Other	Old Well - Abandoned	Unknown	No Chemistry
1795271	NW	33	56	21	4	14.3												01/10/2010	TOTAL E & P CANADA LTD	Other	Old Well - Abandoned	Unknown	No Chemistry
1795277	NW	33	56	21	4	14.3												04/10/2010	TOTAL E & P CANADA LTD	Other	Old Well - Abandoned	Unknown	No Chemistry
1795278	SW	33	56	21	4	8.8												05/10/2010	TOTAL E & P CANADA LTD.	Other	Old Well - Abandoned	Bored	No Chemistry
1795279	SE	33	56	21	4	33.5							32.0	33.5				07/10/2010	TOTAL E & P CANADA LTD.	Other	Old Well - Abandoned	Unknown	No Chemistry
1795280	NE	33	56	21	4	28.0												12/10/2010	TOTAL E & P CANADA LTD.	Other	Old Well - Abandoned	Unknown	No Chemistry
1795281	NE	34	56	21	4	30.7												06/10/2010	TOTAL E & P CANADA LTD	Other	Old Well - Abandoned	Unknown	No Chemistry
1795282	SE	4	57	21	4	27.7												06/10/2010	TOTAL E & P CANADA LTD	Other	Old Well - Abandoned	Unknown	No Chemistry
1795283	NE	33	56	21	4	16.8												05/10/2010	TOTAL E& P CANADA LTD	Other	Old Well - Abandoned	Unknown	No Chemistry
1795285	SE	28	56	21	4	10.3												04/10/2010	TOTAL E & P CANADA LTD	Other	Old Well - Abandoned	Unknown	No Chemistry
1795286	15	34	56	21	4	13.3												07/10/2010	TOTAL E & P CANADA LTD.	Other	Old Well - Abandoned	Unknown	No Chemistry
1888893	4	18	56	21	4	48.8							30.5	33.5	33.5	36.6	29/06/2009		ACCESS PIPELINES	Other	New Well	Rotary	No Chemistry
0083371	03	07	055	21	4	50.3	39.6	50.3									11/09/1981		MOYSEY, FRANK	Stock	New Well	Rotary	No Chemistry
0083421	16	16	055	21	4	14.0											01/01/1934		MANZ, A.	Stock	Federal Well Survey	Bored	No Chemistry
0083422	NW	17	055	21	4	39.6											01/11/1973		SCOTFORD COLONY	Stock	New Well	Cable Tool	No Chemistry
0083424	NE	17	055	21	4	85.3	73.2	85.3									07/12/1983		SCOTFORD COLONY	Stock	New Well	Rotary	Chemistry Exists
0083427	16	17	055	21	4	82.3											02/07/1974		SCOTFORD COLONY	Stock	New Well	Cable Tool	No Chemistry
0083429	09	17	055	21	4	45.7											01/08/1973		SCOTFORD COLONY	Stock	New Well	Cable Tool	No Chemistry
0083430	16	17	055	21	4	73.2	71.6	73.2									23/06/1978		SCOTFORD COLONY	Stock	New Well	Rotary	No Chemistry
0083431	16	17	055	21	4	85.3													MANN, A.A.	Stock	Federal Well Survey	Drilled	No Chemistry
0083432	16	17	055	21	4	134.1											02/12/1983		SCOTFORD COLONY	Stock	New Well	Rotary	No Chemistry
0083434	NE	17	055	21	4	21.3							17.7	19.2			27/08/1986		SCOTFORD COLONY	Stock	New Well	Rotary	No Chemistry
0083441	16	18	055	21	4	12.2											01/01/1928		BARCLEY, E.H.	Stock	Federal Well Survey	Bored	No Chemistry
0083442	SW	19	55	21	4	2.4													WING, H.S.	Stock	Chemistry	Hand Dug	Chemistry Exists
0083443	SW	19	055	21	4	3.0													WING, GERRY	Stock	Chemistry	Hand Dug	Chemistry Exists
0083444	SW	19	055	21	4	4.3													BLACKLOCK, BRIAN	Stock	Chemistry	Hand Dug	Chemistry Exists
0083454	15	19	055	21	4	7.3											10/05/1968	01/01/2001	NEBEL, ROBERT	Stock	New Well	Bored	Chemistry Exists
0083456	15	19	055	21	4	8.5	1.8	7.9									07/01/1980		HENDERSON, GARTH	Stock	New Well	Bored	No Chemistry
0083457	15	19	055	21	4	12.2	5.5	7.6									02/01/1980	01/01/2001	HENDERSON, GARTH	Stock	New Well	Bored	No Chemistry
0083464	01	21	055	21	4	38.1	31.7	36.6									03/04/1980		KRIBS, ROBERT	Stock	New Well	Rotary	Chemistry Exists
0083466	04	21	055	21	4	18.3											14/09/1983		WAKARYK, ANDREW	Stock	New Well	Bored	No Chemistry
0083475	05	23	055	21	4	54.9											01/01/1926		PENELTON, J.	Stock	Federal Well Survey	Drilled	No Chemistry
0083478	14	23	055	21	4	13.4											01/01/1926		ARNDT, G.	Stock	Federal Well Survey	Bored	No Chemistry
0083498	SE	27	055	21	4	56.4	40.2	51.2									30/11/1962		CHOLOWSKI, ALBERT	Stock	New Well	Rotary	No Chemistry
0083504	16	27	55	21	4	26.8											05/07/1974		HEINRICHS, ED	Stock	New Well	Cable Tool	Chemistry Exists
0083515	SE	30	055	21	4	9.8	3.7	9.8									20/08/1975	01/01/2001	GODBOUT, STAN	Stock	New Well	Bored	No Chemistry
0083530	13	30	055	21	4	42.7											01/05/1974		LIVING, DALE	Stock	New Well	Cable Tool	Chemistry Exists
0083547	04	34	55	21	4	32.0											13/04/1982		RADKE, BEN	Stock	New Well	Cable Tool	No Chemistry
0083547	04	34	55	21	4	32.0											18/04/1982		RADKE, JAMES & RANDY	Stock	Well Inventory	Unknown	No Chemistry
0083550	SW	34	55	21	4	94.5	85.3	94.5									28/09/1977		RADKE, BEN	Stock	New Well	Rotary	Chemistry Exists
0083553	04	34	055	21	4	14.6											06/11/1981		RADKE, BEN	Stock	New Well	Bored	No Chemistry
0083557	13	34	055	21	4	36.6											09/09/1981		HALL'S AUTO	Stock	New Well	Cable Tool	No Chemistry
0083558	13	34	055	21	4	40.5											19/10/1978		DAOUST, CHARLES	Stock	New Well	Cable Tool	No Chemistry
0083559	13	34	055	21	4	42.7							36.6	42.7			14/07/1987		DAOUST, C.	Stock	New Well	Rotary	No Chemistry
0083562	16	34	055	21	4	53.3											01/05/1982		BERG, RON	Stock	New Well	Cable Tool	No Chemistry
0083574	12	36	55	21	4	12.2											01/01/1936		PROKOPCZAK, J.	Stock	Federal Well Survey	Bored	No Chemistry
0091556	04	17	056	20	4	42.7	27.4	42.7									16/08/1982		SCHRAM, BARRY	Stock	New Well	Cable Tool	No Chemistry
0091557	12	17	056	20	4	48.8							39.6	41.5			04/06/1984		HODGSON, L.	Stock	New Well	Rotary	No Chemistry
0091567	13	18	056	20	4	6.7											01/01/1918		SERANT, M.	Stock	Federal Well Survey	Unknown	No Chemistry
0091568	NW	18	056	20	4	47.2											24/08/1987		SERINK, WILLIAM	Stock	New Well	Rotary	No Chemistry
0091569	01	19	056	20	4	50.3											31/07/1975		RADKE, SIEGFRIED	Stock	New Well	Cable Tool	No Chemistry
0091571	04	19	056	20	4	45.7											08/07/1977		SERINK, WILLIAM	Stock	New Well	Rotary	Chemistry Exists
0154375	NE	03	056	22	4	59.4	45.7	57.9									17/04/1985		KUGLER, IRWIN	Stock	New Well	Rotary	No Chemistry
0159190	NE	17	055	21	4	82.3											28/05/1976		SCOTFORD COLONY#PUMP HOUSE	Stock	New Well	Rotary	Chemistry Exists
0159197	NE	34	055	21	4	54.9	46.6	52.7									29/09/1991		BERG, RON	Stock	New Well	Rotary	No Chemistry
0159288	SE	05	055	22	4	13.4	8.2	12.2									10/07/1991		GODBOUT, ROMEO	Stock	Reconstructed	Bored	No Chemistry
0167849	NE	17	055	21	4	14.9											10/07/1992		SCOTFORD COLONY	Stock	New Well-Abandoned	Bored	No Chemistry
0167850	NE	17	055	21	4	20.4	12.2	13.1	19.5	20.4							12/07/1992		SCOTFORD COLONY	Stock	New Well	Bored	No Chemistry
0185985	SW	17	056	20	4	67.1	48.8	61.0									28/10/1992		SCHRAM, BARRY	Stock	New Well	Rotary	No Chemistry
0260183	NW	18	054	22	4	36.6											01/02/1974		SMITH, HARRY	Stock	New Well	Cable Tool	No Chemistry
0260184	SE	19	054	22	4	28.3							26.5	28.0			27/04/1968		GALLOWAY, R.	Stock	New Well	Drilled	No Chemistry
0260190	SE	19	054	22	4	28.7											01/01/1925		LOREN, J.	Stock	New Well	Combination	No Chemistry
0260222	SW	26	054	22	4	54.9											08/06/1978		GALLOWAY, ED	Stock	New Well	Rotary	No Chemistry
0261227	09	07	055	22	4	7.9											01/01/1930		VILLENEUVE, E.	Stock	Federal Well Survey	Hand Dug	No Chemistry
0261236	03	08	055	22	4	105.5											01/01/1924		HOULE, O.	Stock	Federal Well Survey	Drilled	No Chemistry
0261456	16	13	55	22	4	103.6											01/01/1924		KREPS, J.	Stock	Federal Well Survey	Drilled	No Chemistry
0261550	04	18	055	22	4	118.9											01/01/1930		VILLENEUVE, M	Stock	Federal Well Survey	Drilled	No Chemistry
0261611	08	19	055	22	4	5.5											01/01/1931		ROCK, L.C.	Stock	Federal Well Survey	Hand Dug	No Chemistry
0261753	08	29	055	22	4	22.9											01/01/1933		LANGLOIS, L	Stock	Federal Well Survey	Bored	No Chemistry
0261833	NE	14	056	21	4	11.3											19/04/1989		HODGSON, GEORGE	Stock	Deepened	Bored	No Chemistry
0262001	02	33	054	23	4	152.4											01/01/1931		DORLAND	Stock	Federal Well Survey	Drilled	No Chemistry
0262022	16	33	054	23	4	15.2											01/01/1916		WILSON	Stock	Federal Well Survey	Bored	No Chemistry
0262123	SE	35	054	23	4	36.6	24.4	25.0	27.4	30.5	32.0	32.6					01/06/1975		DEVEREUX, JOHN	Stock	New Well	Drilled	No Chemistry
0262361	EH	35	054	23	4	35.1	26.5	31.1									01/09/1973		DEVEREUX, J	Stock	New Well	Rotary	No Chemistry
0262430	SE	01	055	23	4	12.2											14/07/1922		VAN ACKER, L.	Stock	Federal Well Survey	Hand Dug	No Chemistry
0262520	SE	13	055	23	4	120.1											13/07/1925		VILLENEUVE, O.	Stock	Federal Well Survey	Drilled	No Chemistry
0263351	SE	03	056	21	4	10.7	6.1	10.7									17/09/1974		PROKOPCZAK, J.	Stock	New Well	Backhoe	No Chemistry
0263599	NE	11	056	21	4	36.6													TAYLOR, G J	Stock	New Well	Cable Tool	Chemistry Exists
0263607	NE	11	056	21	4	37.2											01/08/1973		FAIRWEATHER, B.	Stock	New Well	Cable Tool	Chemistry Exists
0263699	SW	12	056	21	4	31.1													OLSON, R	Stock	New Well	Cable Tool	No Chemistry
0263703	SW	12	056	21	4	13.7											03/09/1977		OLSEN, R	Stock	New Well	Rotary	No Chemistry
0263710	NW	12	056	21	4	44.2											12/08/1983		GABERT, M.	Stock	New Well	Rotary	No Chemistry
0263818	03	13	056	21	4	4.9													PROCNAIM, R.	Stock	Federal Well Survey	Hand Dug	No Chemistry
0263941	04	16	056	21	4	42.7													KROPP, L.	Stock	New Well	Cable Tool	Chemistry Exists
0264180	SE	21	056	21	4	54.9							47.5	48.2			03/07/1978		DEBAAN, J	Stock	New Well	Rotary	No Chemistry
0264218	SW	21	056	21	4	53.6											01/03/1974		SMITH, E.	Stock	New Well	Cable Tool	Chemistry Exists
0264254	08	25	056	21	4	14.9											17/06/1978		SERINK, W	Stock	New Well	Bored	No Chemistry
0264272	SW	26	056	21	4	39.6	31.7	37.8									12/04/1988		SAWATZKI, W	Stock	New Well	Rotary	No Chemistry
0264282	09	27	056	21	4	67.1							30.5	36.6	42.7	48.8	20/05/1986		MEDAK, W	Stock	New Well	Rotary	No Chemistry
0264315	SE	29	056	21	4	7.3													PUCHALUK, P.	Stock	Chemistry	Unknown	Chemistry Exists
0264931	NE	17	54	22	4	67.1											18/04/1955		ARMSTRONG	Stock	New Well	Drilled	Chemistry Exists
0264947	NE	35	054	22	4	51.8											01/09/1973		SIMMONS, HECTOR	Stock	New Well	Cable Tool	Chemistry Exists
0267241	SE	03	056	21	4	10.7	4.6	10.7									10/10/1974		PROKOPCZAK, L.J.	Stock	New Well	Bored	No Chemistry
0270766	04	21	056	20	4	68.6													GRONER, LARRY	Stock	New Well	Cable Tool	No Chemistry
0290971	SW	34	056	21	4	16.8	12.8	15.8									18/10/1998		WOHNSKY, WALT	Stock	New Well	Bored	No Chemistry
0297412	5	36	56	21	4	48.8	36.6	48.8									23/05/2000		DRABBLE, R.	Stock	New Well	Rotary	No Chemistry

Appendix A1-1

Water Well Records Within the Study Area

WELL ID	LOCATION					WELL DEPTH	PERFORATIONS 1 (m)		PERFORATIONS 2 (m)		PERFORATIONS 3 (m)		SCREENINGS 1 (m)		SCREENINGS 2 (m)		DATE		WELL OWNER	PROPOSED USE	TYPE OF WORK	DRILL METHOD	CHEMISTRY
	LSD	SECTION	TOWNSHIP	RANGE	MERIDIAN	(m)	FROM	TO	FROM	TO	FROM	TO	FROM	TO	FROM	TO	COMPLETED	ABANDONED					
1325000	NE	35	054	22	4	51.8											01/09/1973		SIMMONS, HECTOR	Stock	New Well	Cable Tool	No Chemistry
1690056	NW	9	56	21	4	11.6	3.0	9.1									09/07/2002		GAUMONT, CONARD	Stock	New Well	Bored	No Chemistry
1912209	SW	8	56	20	4	85.3											09/10/2013	09/10/2013	SHRAM, BARRY	Stock	Dry Hole - Abandoned	Rotary - Mud	No Chemistry
1912211	SW	8	56	20	4	97.5	91.4	97.5									13/10/2013		SHRAM, BARRY	Stock	New Well	Rotary - Mud	No Chemistry
1912296	SW	17	56	20	4	91.4	79.2	85.3									05/11/2014		SCHRAM, BARRY	Stock	New Well	Rotary - Mud	No Chemistry
0042021	13	24	56	21	4	4.6											04/03/1994		ALBERTA ENVIRONMENT	Unknown	Old Well - Test	Unknown	No Chemistry
0042022	4	14	56	21	4	5.5													ALBERTA ENVIRONMENT	Unknown	Other	Unknown	No Chemistry
0083442	SW	19	55	21	4	5.2												03/11/2008	WING, H.S.	Unknown	Old Well-Abandoned	Unknown	Chemistry Exists
0083445	SW	19	055	21	4	0.0													BLACKLOCK, OLGA	Unknown	Chemistry	Unknown	No Chemistry
0083446	SW	19	055	21	4	3.7												20/12/2002	DZURNY, E.	Unknown	Chemistry	Unknown	No Chemistry
0083468	05	22	55	21	4													30/10/2012	ROCQUE, SHANE	Unknown	Old Well - Abandoned	Unknown	No Chemistry
0083504	16	27	55	21	4	27.4												02/07/2009	HEINRICHS, E & D	Unknown	Old Well-Abandoned	Unknown	Chemistry Exists
0083507	01	28	055	21	4	21.3											24/06/1969		ALTA AGRICULTURE #670H	Unknown	Test Hole	Rotary	No Chemistry
0083508	13	28	055	21	4	29.3											25/06/1969		ALTA AGRICULTURE #669H	Unknown	Test Hole	Rotary	No Chemistry
0083529	NW	30	055	21	4													02/11/2007	SHELL CANADA LIMITED	Unknown	Old Well-Abandoned	Unknown	No Chemistry
0083564	NE	35	55	21	4	11.0												10/07/2009	CHICHAK, L.	Unknown	Old Well-Abandoned	Unknown	Chemistry Exists
0083574	12	36	55	21	4	12.2												01/07/2009	PROKOPCZAK, B.	Unknown	Old Well-Abandoned	Unknown	No Chemistry
0091497	04	06	056	20	4	7.0											17/07/1975		HYDROGEOLOGICAL CONSULT LTD	Unknown	Test Hole	Auger	No Chemistry
0091501	01	7	56	20	4	27.4											17/07/1975		HYDROGEOLOGICAL CONSULT LTD	Unknown	Test Hole	Auger	No Chemistry
0152372	WH	08	056	21	4	30.5											26/06/1990		MASCHMEYER, RAY	Unknown	Dry Hole	Rotary	No Chemistry
0160230	NE	08	054	22	4	17.7	6.1	13.7									24/10/1991		KROENING, GREG	Unknown	New Well	Bored	No Chemistry
0164457	NE	11	056	22	4													08/12/2008	PETRO CANADA	Unknown	Old Well-Abandoned	Unknown	No Chemistry
0169121	SE	16	056	21	4	34.7											23/09/1992	23/09/1992	HENKELMAN, P.R.	Unknown	New Well-Abandoned	Rotary	No Chemistry
0208911	SE	16	056	21	4													01/11/2007	SHELL CANADA LIMITED	Unknown	Old Well-Abandoned	Unknown	No Chemistry
0240750	NE	30	055	21	4	42.7											11/05/1969		ALTA ENV/WATER RES #0295E	Unknown	Test Hole	Rotary	No Chemistry
0240751	EH	20	055	21	4	45.1											12/05/1969		ALTA ENV/WATER RES #0296E	Unknown	Test Hole	Rotary	No Chemistry
0240752	NE	15	055	21	4	24.4											12/05/1969		ALTA ENV #0297E	Unknown	Test Hole	Rotary	No Chemistry
0240761	02	33	54	23	4	42.7											20/09/1973		ALTA ENV #1072E	Unknown	Test Hole	Rotary	Chemistry Exists
0240767	NE	36	054	22	4	12.2											08/08/1976		ALTA ENV #1621E	Unknown	Test Hole	Rotary	No Chemistry
0240768	NE	35	054	22	4	30.5											05/08/1976		ALTA ENV #1618E	Unknown	Test Hole	Auger	No Chemistry
0240769	NE	34	054	22	4	36.6											07/08/1976		ALTA ENV #1620E	Unknown	Test Hole	Rotary	No Chemistry
0240770	NW	29	054	22	4	42.7											08/08/1976		ALTA ENV #1622E	Unknown	Test Hole	Rotary	No Chemistry
0260032	NW	07	054	22	4	45.7													HOPKIN, JIM	Unknown	Chemistry	Drilled	Chemistry Exists
0260036	NE	08	054	22	4	21.3													TUCKER, CHARLES	Unknown	Chemistry	Bored	Chemistry Exists
0260040	NE	08	054	22	4	20.7											28/10/1974		KREBS, CLIFF	Unknown	Chemistry	Drilled	Chemistry Exists
0260041	NE	08	054	22	4	23.8													WILKINSON, J.P.	Unknown	Chemistry	Bored	Chemistry Exists
0260042	NE	08	054	22	4	0.0													GIDYCH, R.T.	Unknown	Chemistry	Unknown	Chemistry Exists
0260043	NE	08	054	22	4	8.2													STEVENSON, R.C.	Unknown	Chemistry	Hand Dug	Chemistry Exists
0260044	NE	08	054	22	4	7.9													LIVINGSTON, BRIAN	Unknown	Chemistry	Bored	Chemistry Exists
0260047	NE	08	054	22	4	67.1													MCKINLAY, R.L.	Unknown	Chemistry	Drilled	Chemistry Exists
0260049	NE	08	054	22	4	12.2													KENSON HLDG	Unknown	Chemistry	Bored	Chemistry Exists
0260050	NE	08	054	22	4	12.2													KENSON HLDG	Unknown	Chemistry	Bored	Chemistry Exists
0260053	NE	08	054	22	4	0.0													SUPINA, NICK	Unknown	Chemistry	Unknown	Chemistry Exists
0260055	NE	08	054	22	4	7.9													BECKER, MARK	Unknown	Chemistry	Unknown	Chemistry Exists
0260056	NE	08	054	22	4	24.4													HENDRICKSON, CONNIE	Unknown	Chemistry	Unknown	Chemistry Exists
0260057	NE	08	054	22	4	3.0													SPALLIN, LYNNE	Unknown	Chemistry	Unknown	Chemistry Exists
0260059	NE	08	054	22	4	16.8													KENNEDY, KENNETH	Unknown	Chemistry	Unknown	Chemistry Exists
0260060	NE	08	054	22	4	9.1													GROTEN, HELEN	Unknown	Chemistry	Unknown	Chemistry Exists
0260061	00	08	054	22	4	10.7													DIRKS, G.A.	Unknown	Chemistry	Unknown	Chemistry Exists
0260067	NW	09	054	22	4	61.0													VAN CAMP, ERIC	Unknown	Chemistry	Drilled	Chemistry Exists
0260173	NW	16	054	22	4	27.4													THOMAS, ALFRED	Unknown	Chemistry	Unknown	Chemistry Exists
0260175	NW	16	054	22	4	29.6													MCKAY, A.A.	Unknown	Chemistry	Unknown	Chemistry Exists
0260176	NE	16	054	22	4	24.1													GUY, F.E.	Unknown	Chemistry	Unknown	Chemistry Exists
0260177	SE	17	054	22	4	6.1													TWIGGE, E.R.	Unknown	Chemistry	Drilled	Chemistry Exists
0260178	SW	17	054	22	4	80.8													GALLOWAY, LLOYD	Unknown	Chemistry	Unknown	Chemistry Exists
0260185	SE	19	054	22	4	54.9													RIVER BRAE FARM	Unknown	Chemistry	Unknown	Chemistry Exists
0260186	SE	19	054	22	4	56.4													GALLOWAY, ROY	Unknown	Chemistry	Unknown	Chemistry Exists
0260187	NW	19	054	22	4	57.9													LAMPRECHT, HENRY	Unknown	Chemistry	Unknown	Chemistry Exists
0260188	NW	19	054	22	4	70.1													GABERT, DOUG	Unknown	Chemistry	Drilled	Chemistry Exists
0260189	10	19	054	22	4	32.9														Unknown	Chemistry	Unknown	Chemistry Exists
0260191	04	20	054	22	4	28.3											01/01/1915		PETERS, R.J.	Unknown	New Well	Drilled	No Chemistry
0260192	NW	20	54	22	4													05/12/2014	SUREWAY CONSTRUCTION	Unknown	Old Well - Abandoned	Unknown	Chemistry Exists
0260197	SW	22	054	22	4	9.1													SHACKLETON, STV	Unknown	Chemistry	Unknown	Chemistry Exists
0260218	02	26	54	22	4	22.9							12.2	13.4			18/09/1964		MID WESTERN INDUSTRIAL GAS LTD	Unknown	New Well	Unknown	No Chemistry
0260220	SW	26	054	22	4	61.0													IRELAND, KEN	Unknown	Chemistry	Bored	Chemistry Exists
0260221	SW	26	054	22	4	51.8													GALLOWAY, EDWARD	Unknown	Chemistry	Drilled	Chemistry Exists
0260231	NW	28	054	22	4	61.0													RUDOLPH, MARJORIE	Unknown	Chemistry	Drilled	Chemistry Exists
0260359	NW	28	054	22	4	32.0													KOVAC, JOE	Unknown	Chemistry	Unknown	Chemistry Exists
0260361	NW	28	054	22	4	30.5													MCNIRNE, ROBERT	Unknown	Chemistry	Unknown	Chemistry Exists
0260363	NW	28	054	22	4	29.9													HAMER, LYLE	Unknown	Chemistry	Unknown	Chemistry Exists
0260364	NW	28	054	22	4	25.9													LEONHARDT, C.J.	Unknown	Chemistry	Drilled	Chemistry Exists
0260371	00	28	054	22	4	24.4													FINDLAY, W.	Unknown	Chemistry	Unknown	No Chemistry
0260372	NW	29	054	22	4	10.4													VAN DEN BERG	Unknown	Chemistry	Unknown	Chemistry Exists
0260374	NW	29	054	22	4	35.1													VAN DEN BERG	Unknown	Chemistry	Unknown	Chemistry Exists
0260381	00	29	054	22	4	15.5											01/05/1965		HANFORD, R.M.	Unknown	New Well	Bored	No Chemistry
0260385	SE	30	054	22	4	67.1													LAINPRECHT, H.	Unknown	Chemistry	Unknown	Chemistry Exists
0260389	NW	31	054	22	4	18.9													#TH 1	Unknown	Test Hole	Unknown	No Chemistry
0260391	NW	31	054	22	4	16.2													#TH 2	Unknown	Test Hole	Unknown	No Chemistry
0260392	NW	31	054	22	4	16.8													#TH 3	Unknown	Test Hole	Unknown	No Chemistry
0260394	NW	31	054	22	4	15.8													#TH 4	Unknown	Test Hole	Unknown	No Chemistry
0260395	NW	31	054	22	4	23.2													#TH 5	Unknown	Test Hole	Unknown	No Chemistry
0260398	SW	32	054	22	4	71.6													SEWCHUK, S.	Unknown	Chemistry	Unknown	Chemistry Exists
0260399	SW	32	054	22	4	0.0													SCOTFORD COLONY	Unknown	Chemistry	Unknown	No Chemistry
0260400	SW	32	054	22	4	9.1													KOHUT, WM	Unknown	Chemistry	Drilled	Chemistry Exists
0260401	SW	32	054	22	4	12.8													DONALDSON, ARTHUR	Unknown	Chemistry	Unknown	Chemistry Exists
0260405	NW	32	054	22	4	15.8											01/01/1927		HOPPER#N SASK RIVER	Unknown	New Well	Drilled	No Chemistry
0260413	NW	32	054	22	4	0.0													WALKER, L.	Unknown	Chemistry	Unknown	No Chemistry
0260415	NW	32	054	22	4	0.0													SHERRITT GORDON MINES	Unknown	Chemistry	Unknown	No Chemistry
0260431	SW	34	054	22	4	49.4											02/05/1955			Unknown	New Well	Drilled	No Chemistry
0260436	SW	34	054	22	4	0.0													EMONTS, GERALD	Unknown	Chemistry	Unknown	No Chemistry
0260462	EH	36	054	22	4	12.2													LAMOUREUX, JIM	Unknown	Chemistry	Unknown	No Chemistry
0260942	NW	13	54	23	4	69.5											02/09/1930		ARMSTRONG, E.	Unknown	Other	Drilled	No Chemistry
0261035	SE	01	055	22	4	69.5											01/09/1930		ATKINSON, H	Unknown	Well Inventory	Unknown	No Chemistry
0261038	SE	01	055	22	4	54.9											19/07/1959		HANSEN, P E	Unknown	New Well	Unknown	No Chemistry
0261055	NW	28	054	22	4	36.0														Unknown	New Well	Drilled	No Chemistry
0261166	NW	06	055	22	4	57.9													JESKE, O	Unknown	Test Hole	Rotary	No Chemistry
0261432	SE	13	055	22	4	56.4											01/09/1930		TATHAM, J	Unknown	New Well	Unknown	No Chemistry
0261583	SW	25	054	23	4	39.6											12/10/1963		HANES, A	Unknown	New Well	Rotary	No Chemistry
0261596	16	18	055	22	4	12.5											23/10/1964		LAMOUREUX, J A	Unknown	New Well	Bored	No Chemistry
0261749	SE	01	055	23	4	4.6														Unknown	Unknown	Unknown	No Chemistry
0261751	SE	01	055	23	4	29.6											28/08/1984	28/08/1984	SERNA, VICTOR	Unknown	New Well-Abandoned	Bored	No Chemistry
0262042	SE	34	054	23	4	91.4	24.4	42.7									28/10/1974		BELYEA, A.F.	Unknown	New Well	Unknown	Chemistry Exists
0262078	NW	34	054	23	4	67.1											01/07/1954		SPEER, A.	Unknown	New Well	Drilled	No Chemistry
0262257	SW	35	054	23	4	21.0											12/11/1977	12/11/1977	YUSKIW, N	Unknown	Old Well-Abandoned	Bored	No Chemistry
0262433	01	03	055	23	4	15.2													WILSON	Unknown	Federal Well Survey	Bored	No Chemistry
0263525	NE	05	056	21	4													19/10/2007	SHELL CANAD LIMITED	Unknown	Old Well-Abandoned	Unknown	Chemistry Exists
0263554	NW	07	056	21	4	56.7													VISSCHER, P.	Unknown	Unknown	Unknown	No Chemistry
0263560	SW	08	056	21	4													01/11/2007	SHELL CANADA - OIL SANDS	Unknown	Old Well-Abandoned	Unknown	Chemistry Exists
0263661	09	11	056	21	4	66.4	32.9	36.0	36.9	37.8							31/08/1973		ANURATIL, J.	Unknown	Unknown	Unknown	No Chemistry
0263852	SW	2	56	22	4													07/12/2010	NOEL, MAURICE	Unknown	Old Well - Abandoned	Unknown	Chemistry Exists
0263867	SW	3	56	22	4	54.9												24/07/2008	MELENKA, ALEX	Unknown	Old Well-Abandoned	Unknown	Chemistry Exists
0263992	SW	19	56	21	4	18.1												08/06/2016	NORTH WEST REDWATER PTR	Unknown	Old Well - Abandoned	Not Applicable	No Chemistry
0264091	SE	11	056	22	4	64.0	51.8	64.0									10/10/1973		SERINK, MIKE	Unknown	New Well	Rotary	Chemistry Exists
0264141	SE	12	056	22	4	61.0													SERINK, MIKE	Unknown	Chemistry	Unknown	Chemistry Exists
0264168	SE	13	056	22	4	61.0													BLOOM, B.	Unknown	Chemistry	Unknown	Chemistry Exists
0264193	NE	13	056	22	4	50.3													OOSTERHUIS, H.T.	Unknown	Chemistry	Unknown	Chemistry Exists
0264390	SW	29	056	21	4	0.0													ESSO RES	Unknown	Chemistry	Unknown	Chemistry Exists
0268135	SE	01	055	23	4	4.6														Unknown	Unknown	Unknown	No Chemistry
0268141	SE	01	055	23	4	4.6														Unknown	Unknown	Unknown	No Chemistry
0297410	SW	30	56	20	4													28/07/2015	SHILOH YOUTH RANCH	Unknown	Old Well - Abandoned	Unknown	No Chemistry
0297411	SW	30	56	20	4													28/07/2015	SHILOH YOUTH RANCH	Unknown	Old Well - Abandoned	Unknown	No Chemistry
0298285	NE	19	055	21	4	0.0														Unknown	Old Well-Abandoned	Not Applicable	No Chemistry
1125042	9	1	56	22	4	15.2												26/09/2011	OVIDENT ENERGY / WILLIAMS ENER	Unknown	Old Well - Abandoned	Unknown	No Chemistry
1165818	SW	34	55	21	4	33.2											13/05/2014	13/05/2014	RADKE, BEN	Unknown	Old Well - Abandoned	Unknown	No Chemistry
1165819	SW	34	55	21	4	7.6											13/05/2014	13/05/2014	RADKE, BEN	Unknown	Old Well - Abandoned	Unknown	No Chemistry
1165820	SW	34	55	21	4												13/05/2014	13/05/2014	RADKE, BEN	Unknown	Old Well - Abandoned	Unknown	No Chemistry
1165821	SW	34	55	21	4												13/05/2014	13/05/2014	RADKE, BEN	Unknown	Old Well - Abandoned	Unknown	No Chemistry
1165822	SW	35	55	21	4	89.0											13/05/2014	13/05/2014	RADKE, BEN	Unknown	Old Well - Abandoned	Unknown	No Chemistry
1270253	15	8	56	21	4	12.2	2.4	11.6									18/10/2013		CITY OF EDMONTON	Unknown	Other	Rotary - Mud	No Chemistry
1270254	15	8	56	21	4	12.2	2.4	11.6									19/10/2013		CITY OF EDMONTON	Unknown	Other	Rotary - Mud	No Chemistry
1270255	15	8	56	21	4	21.3	8.5	20.7									19/10/2013		CITY OF EDMONTON	Unknown	Other	Rotary - Mud	No Chemistry
1270256	15	8	56	21	4	21.3	8.5	20.7									21/10/2013		CITY OF EDMONTON	Unknown	Other	Rotary - Mud	No Chemistry
1370431	1	36	55	22	4														YOUNG, CARL	Unknown	Old Well - Test	Not Applicable	No Chemistry
1420003	NW	05	056	21	4													01/11/2007	SHELL CANADA LIMITED	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1420578	SE	16	056	21	4													01/11/2007	SHELL CANADA LIMITED	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575400	SE	18	56	21	4													08/07/2009	ACCESS PIPELINES	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575427	SW	09	056	21	4													19/10/2007	SHELL CANADA LIMITED OIL SANDS	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575428	SW	09	056	21	4													19/10/2007	SHELL CANADA LIMITED OIL SANDS	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575581	NW	09	056	21	4													20/10/2007	SHELL CANADA LIMITED	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575582	SW	16	056	21	4													20/10/2007	SHELL CANADA LIMITED	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575583	SW	16	056	21	4													20/10/2007	SHELL CANADA LIMITED	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575584	SE	16	056	21	4													01/11/2007	SHELL CANADA LIMITED	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575585	SE	30	055	21	4													02/11/2007	SHELL CANADA LIMITED	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575586	SE	30	055	21	4													02/11/2007	SHELL CANADA LIMITED	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575587	SE	30	055	21	4													02/11/2007	SHELL CANADA LIMITED	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575588	SE	30	055	21	4													02/11/2007	SHELL CANADA LIMITED	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575589	NW	30	055	21	4													02/11/2007	SHELL CANADA LIMITED	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575666	SW	12	056	22	4													08/12/2008	PETRO CANADA	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575667	SW	13	056	22	4													09/12/2008	PETRO CANADA	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575668	SW	13	056	22	4													09/12/2008	PETRO CANADA	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575669	SW	16	056	21	4													11/06/2008	SHELL CANADA LTD.	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575670	SW	16	056	21	4													11/06/2008	SHELL CANADA LTD.	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575671	SE	16	056	21	4													11/06/2008	SHELL CANADA LTD.	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575697	NE	35	55	21	4	18.3												02/07/2009	CHICHAK, L.	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575698	NE	35	55	21	4	4.9												01/07/2009	CHICHAK, L.	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575699	NW	26	55	21	4	30.5												02/07/2009	PROKOPCZAK, L.	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575700	NW	26	55	21	4	18.3												10/07/2009	PROKOPCZAK, L.	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575701	NW	26	55	21	4	27.4												10/07/2009	PROKOPCZAK, L.	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575702	SW	35	55	21	4	42.7												02/07/2009	HALLABEY, S.	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575703	NW	30	55	21	4	5.5												01/07/2009	PROKOPCZAK, B.	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1575880	SE	11	56	22	4													09/12/2008	PETRO CANADA	Unknown	Old Well - Abandoned	Unknown	No Chemistry
1575882	NW	12	56	22	4													09/12/2008	PETRO CANADA	Unknown	Old Well - Abandoned	Unknown	No Chemistry
1575883	SW	12	56	22	4													09/12/2008	PETRO CANADA	Unknown	Old Well - Abandoned	Unknown	No Chemistry
1690056	NW	9	56	21	4													01/11/2007	SHELL CANADA LIMITED	Unknown	Old Well-Abandoned	Unknown	No Chemistry
1716348	2	27	55	21	4													05/07/2016	LEDCOR	Unknown	Old Well - Abandoned	Not Applicable	No Chemistry
1716351	2	27	55	21	4													05/07/2016	LEDCOR	Unknown	Old Well - Abandoned	Not Applicable	No Chemistry
1795275	15	34	56	21	4	3.7											14/06/2011	14/06/2011	TOTAL E & P CANADA LTD.	Unknown	Old Well - Abandoned	Unknown	No Chemistry

* Data Source: Alberta Environment and Parks, Alberta Water Well Information Database. Retrieved October 4, 2016, via Alberta Environment and Parks FTP site.
* Date of Search: October 20, 2016

Appendix 2 Borehole Logs

Advisian
WorleyParsons Group

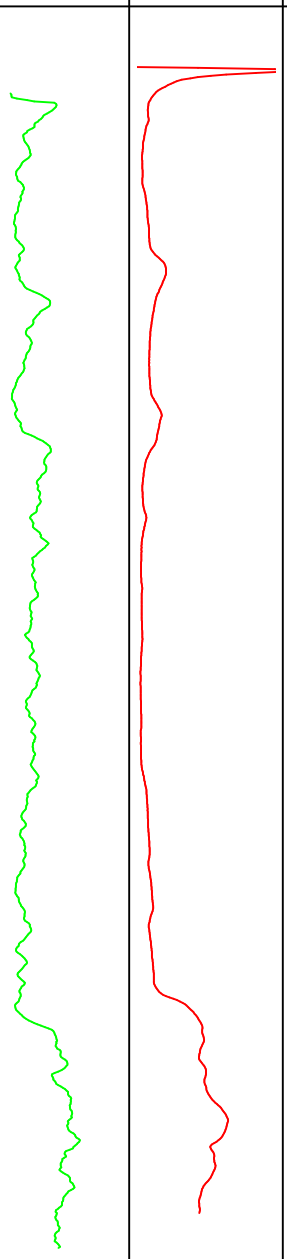
Borehole # MW-02B

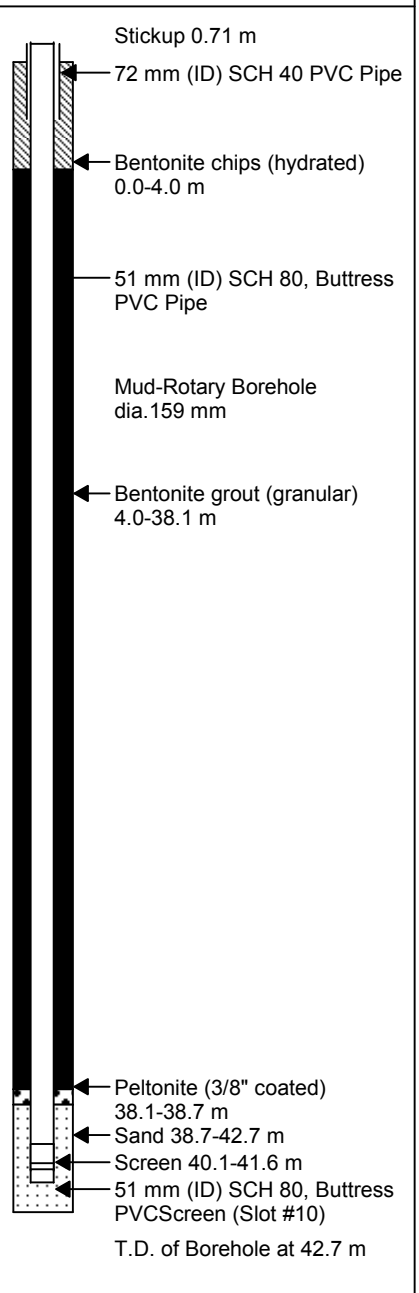
PROJECT # 307075-01608-200

Project Name: 2016 Beverly Channel Groundwater Monitoring
Client: Northwest Capital Industry Association
Drilled by: Lakeland Drilling
Drilling Method: Mud-Rotary
Drill Date: 02-Sep-2016
Logged by: Josh Malkin

Location: 14-19-054-22 W4M
Northing: 5950323.21 m
Easting: 50604.05 m
Elevation: 630.67 masl

Depth (m)	Description
0	Ground Surface
0–2	***CLAY (0.0-1.8 m)*** Silt; grey; moderately firm; medium plasticity; cohesive.
2–8	***SAND (1.8-7.6 m)*** Medium grained; well sorted; rounded; brownish grey; coal inclusions.
8–13	***SILTY CLAY (7.6-12.2 m)*** Some sand; trace clay; brown; moderately soft; trace coal fragements.
13–14	***SITY CLAY TILL (12.2-13.4 m)*** Greyish black; moderately soft; low plasticity; trace coal fragments; trace sand stringer.
14–32	***SAND (13.4-31.4 m)*** Well sorted; rounded; brown; loose; trace potassium feldspar.
32–34	***SAND AND GRAVEL (31.4-34.0 m)*** Poorly sorted; sub-rounded to sub-angular; brown; loose; some coal fragments.
34–42.7	***SHALE (34.0-42.7 m)*** Bluish grey; consistant sorting; firm.
42.7 m	End of Borehole

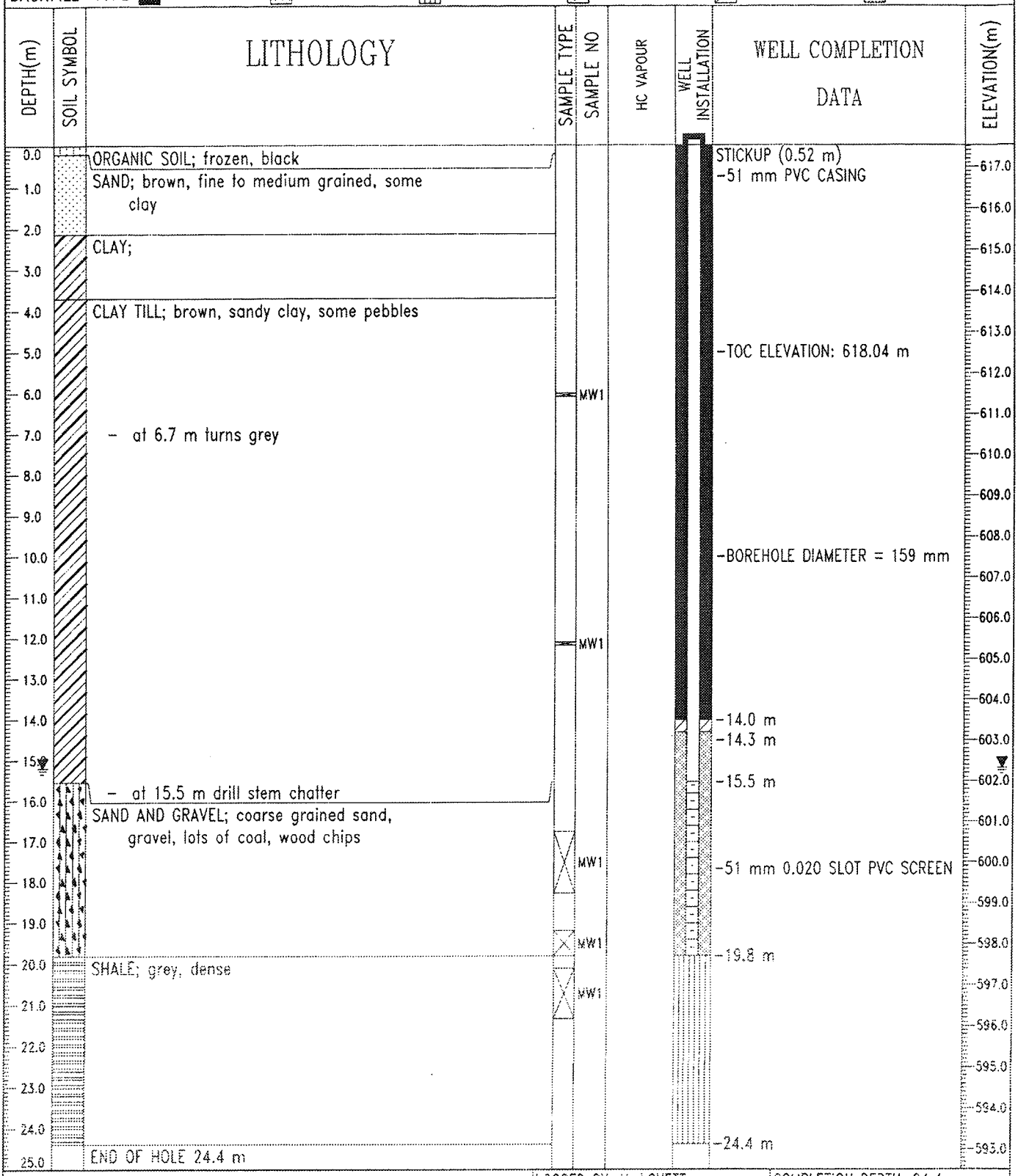




CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-01
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:350335.04 N:5951040.45	ELEVATION: 617.52 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND



Stantec Consulting Ltd.	LOGGED BY: H. LOVETT	COMPLETION DEPTH: 24.4 m
Edmonton, Alberta	REVIEWED BY: D. YOSHISAKA	COMPLETE: 01/24/05
	Fig. No: 17094	Page 1 of 1

05/11/04 07:28PM (PETION-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-02
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:352457.80 N:5950583.37	ELEVATION: 630.71 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	SOIL SYMBOL	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	WELL INSTALLATION	WELL COMPLETION DATA	ELEVATION(m)
0.0		ORGANIC SOIL; frozen, black					STICKUP (0.60 m)	630.0
1.0		SAND; brown, medium grained					-51 mm PVC CASING	
2.0							-TOC ELEVATION: 631.31 m	629.0
3.0							-BOREHOLE DIAMETER = 159 mm	628.0
4.0								627.0
5.0								626.0
6.0								625.0
7.0		CLAY TILL; brown, sandy clay, silty, some pebbles, coal chips						624.0
8.0								623.0
9.0								622.0
10.0								621.0
11.0								620.0
12.0								619.0
13.0								618.0
14.0		SAND; brown, grey, speckled medium grained sand						617.0
15.0								616.0
16.0								615.0
17.0		CLAY; brown, sandy						614.0
18.0		SAND; grey, medium speckled sand		MW2				613.0
19.0								612.0
20.0								611.0
21.0								610.0
22.0								609.0
23.0								608.0
24.0				MW2				607.0
25.0								606.0

Stantec Consulting Ltd.
Edmonton, Alberta

LOGGED BY: H. LOVETT	COMPLETION DEPTH: 38.1 m
REVIEWED BY: D. YOSHISAKA	COMPLETE: 01/24/05
Fig. No: 17094	Page 1 of 2

05/11/04 02:28PM (PELTON-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-02
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:352457.80 N:5950583.37	ELEVATION: 630.71 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	SOIL SYMBOL	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	WELL INSTALLATION	WELL COMPLETION DATA	ELEVATION(m)
25.0								605.0
26.0							-25.9 m	
27.0		SAND AND GRAVEL; coarse grained sand and gravel, coal chips, wood					-26.2 m	604.0
28.0								603.0
29.0		- at 29.0 m lots of chatter on drill stem						602.0
30.0				MW2			-51 mm 0.020 SLOT PVC SCREEN	601.0
31.0								600.0
32.0								599.0
33.0								598.0
34.0		SHALE; grey, dense					-33.8 m	597.0
35.0								596.0
36.0				MW2				595.0
37.0								594.0
38.0		END OF HOLE 38.1 m					-38.1 m	593.0
39.0								592.0
40.0								591.0
41.0								590.0
42.0								589.0
43.0								588.0
44.0								587.0
45.0								586.0
46.0								585.0
47.0								584.0
48.0								583.0
49.0								582.0
50.0								581.0

Stantec Consulting Ltd.
Edmonton, Alberta

LOGGED BY: H. LOVETT	COMPLETION DEPTH: 38.1 m
REVIEWED BY: D. YOSHISAKA	COMPLETE: 01/24/05
Fig. No: 17094	Page 2 of 2

05/11/04 02:28PM (PELTON-1)

Advisian
WorleyParsons Group

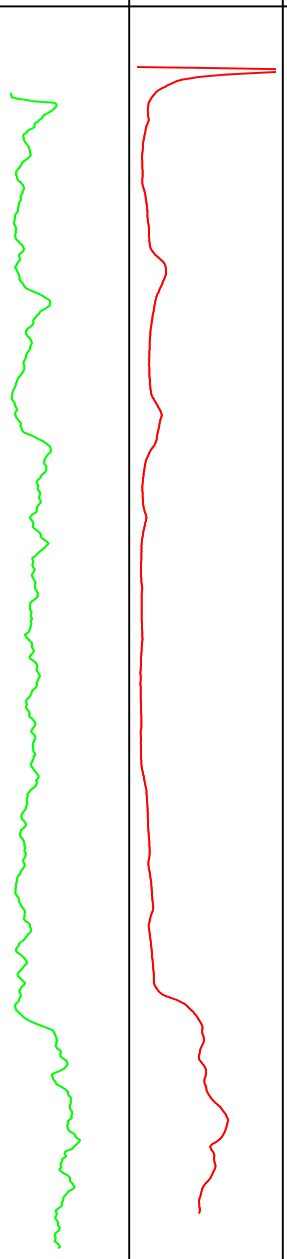
Borehole # MW-02B

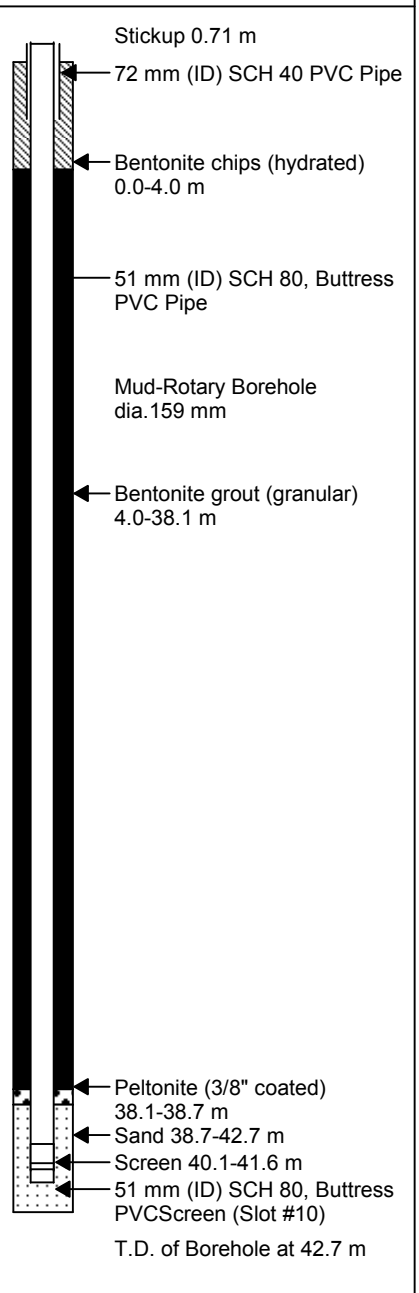
PROJECT # 307075-01608-200

Project Name: 2016 Beverly Channel Groundwater Monitoring
Client: Northwest Capital Industry Association
Drilled by: Lakeland Drilling
Drilling Method: Mud-Rotary
Drill Date: 02-Sep-2016
Logged by: Josh Malkin

Location: 14-19-054-22 W4M
Northing: 5950323.21 m
Easting: 50604.05 m
Elevation: 630.67 masl

Depth (m)	Description
0	Ground Surface
0–2	***CLAY (0.0-1.8 m)*** Silt; grey; moderately firm; medium plasticity; cohesive.
2–8	***SAND (1.8-7.6 m)*** Medium grained; well sorted; rounded; brownish grey; coal inclusions.
8–13	***SILTY CLAY (7.6-12.2 m)*** Some sand; trace clay; brown; moderately soft; trace coal fragements.
13–14	***SITY CLAY TILL (12.2-13.4 m)*** Greyish black; moderately soft; low plasticity; trace coal fragments; trace sand stringer.
14–32	***SAND (13.4-31.4 m)*** Well sorted; rounded; brown; loose; trace potassium feldspar.
32–34	***SAND AND GRAVEL (31.4-34.0 m)*** Poorly sorted; sub-rounded to sub-angular; brown; loose; some coal fragments.
34–42.7	***SHALE (34.0-42.7 m)*** Bluish grey; consistant sorting; firm.
42.7 m	End of Borehole

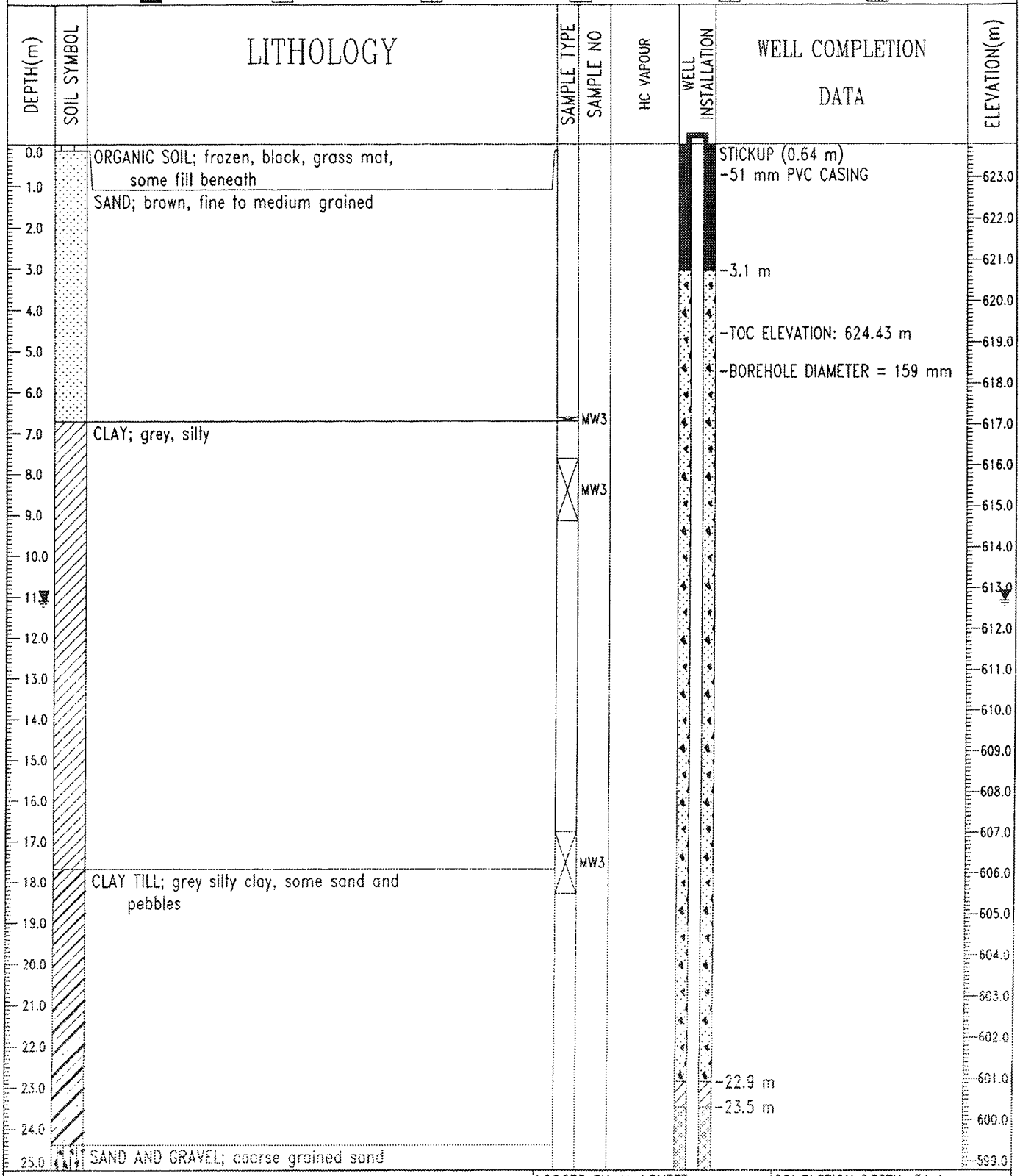




CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-03
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:353030.21 N:5952940.90	ELEVATION: 623.79 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND



Stantec Consulting Ltd.	LOGGED BY: H. LOVETT	COMPLETION DEPTH: 31.4 m
Edmonton, Alberta	REVIEWED BY: D. YOSHISAKA	COMPLETE: 01/25/05
	Fig. No: 17094	Page 1 of 2

05/11/04 02:28PM (PETCH-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-03
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:353030.21 N:5952940.90	ELEVATION: 623.79 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	WELL INSTALLATION	WELL COMPLETION DATA	ELEVATION(m)
25.0	with coal and gravel					-25.0 m	598.0
26.0			MW3				
27.0			MW3			-51 mm 0.020 SLOT PVC SCREEN	597.0
28.0							596.0
29.0							595.0
30.0	SHALE; grey, dense		MW3			-29.6 m	594.0
31.0						-31.4 m	593.0
32.0	END OF HOLE 31.4 m						592.0
33.0							591.0
34.0							590.0
35.0							589.0
36.0							588.0
37.0							587.0
38.0							586.0
39.0							585.0
40.0							584.0
41.0							583.0
42.0							582.0
43.0							581.0
44.0							580.0
45.0							579.0
46.0							578.0
47.0							577.0
48.0							576.0
49.0							575.0
50.0							574.0

Stantec Consulting Ltd.
Edmonton, Alberta

LOGGED BY: H. LOVETT	COMPLETION DEPTH: 31.4 m
REVIEWED BY: D. YOSHISAKA	COMPLETE: 01/25/05
Fig. No: 17094	Page 2 of 2

05/11/04 02:26PM (PETION-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-04
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:354823.41 N:5953959.76	ELEVATION: 620.25 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	LITHOLOGY	SAMPLE TYPE / SAMPLE NO	HC VAPOUR	WELL INSTALLATION	WELL COMPLETION DATA	ELEVATION(m)
0.0	ORGANIC SOIL; black, frozen				STICKUP (0.54 m)	620.0
1.0	CLAY; grey, sandy				-152 mm PVC CASING	619.0
2.0					-1.5 m	618.0
3.0					-TOC ELEVATION: 620.79 m	617.0
4.0					-BOREHOLE DIAMETER = 222 mm	616.0
5.0						615.0
6.0						614.0
7.0	SAND; brown, fine to coarse grained, pebbles, black speckles	MW4				613.0
8.0						612.0
9.0						611.0
10.0						610.0
11.0						609.0
12.0						608.0
13.0						607.0
14.0						606.0
15.0						605.0
16.0						604.0
17.0	- at 16.8 m finer grained brown sand					603.0
18.0 ▼					-18.3 m	602.0 ▼
19.0	- at 18.3 m back to medium to coarse grained grey/brown sand				-19.5 m	601.0
20.0	SHALE; grey, clay					600.0
21.0		MW4				599.0
22.0	SAND; grey, medium to coarse grained	MW4			-21.6 m	598.0
23.0	SAND AND GRAVEL; grey, coarse grained sand and gravel, wood fibers	MW4				597.0
24.0						596.0
25.0					-155 mm 0.020 SLOT PVC SCREEN	

Stantec Consulting Ltd.
Edmonton, Alberta

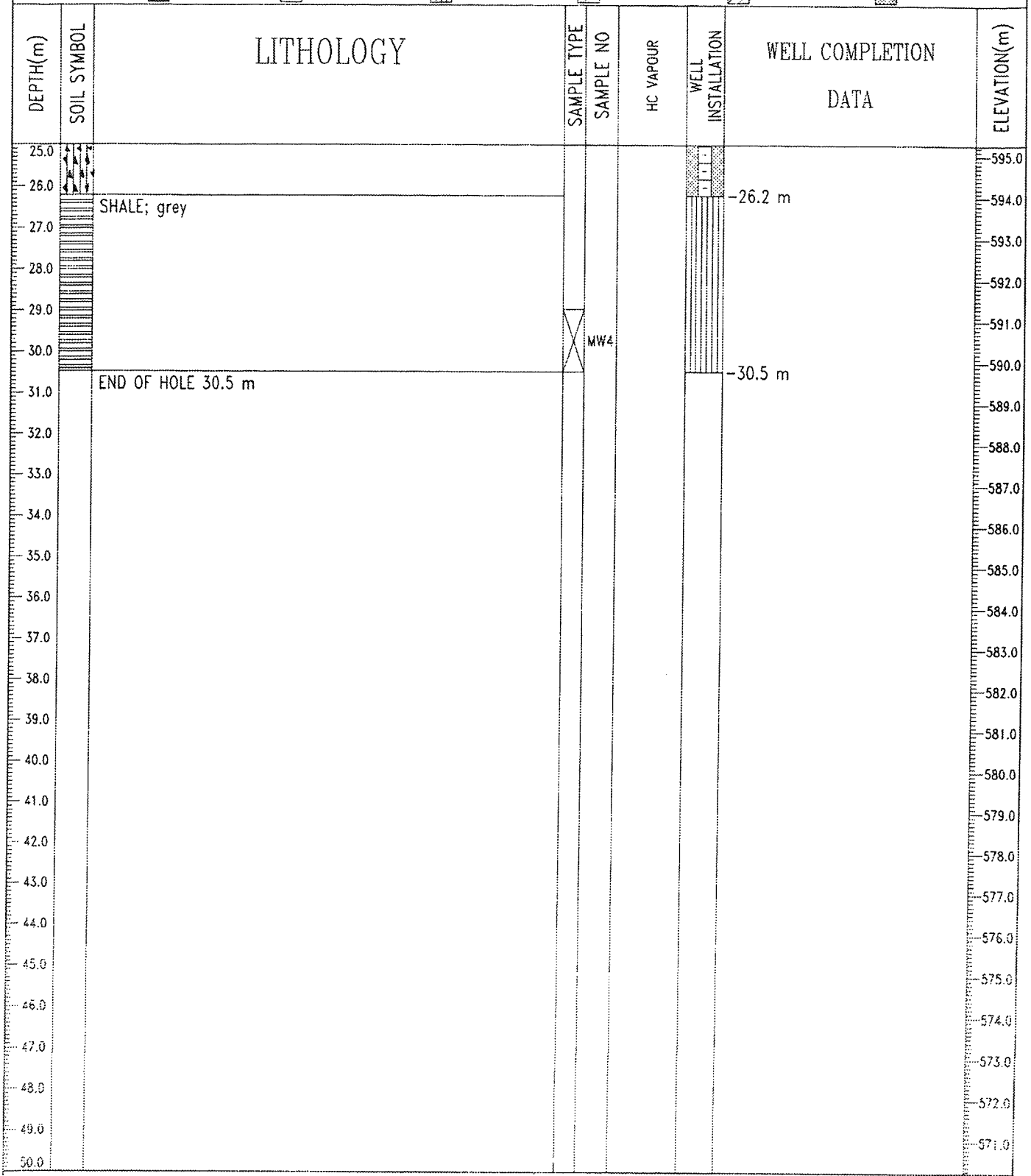
LOGGED BY: H. LOVETT	COMPLETION DEPTH: 30.5 m
REVIEWED BY: D. YOSHISAKA	COMPLETE: 01/25/05
Fig. No: 17094	Page 1 of 2

05/11/04 02:32PM (PETIOR-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-04
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:354823.41 N:5953959.76	ELEVATION: 620.25 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND



Stantec Consulting Ltd.	LOGGED BY: H. LOVETT	COMPLETION DEPTH: 30.5 m
Edmonton, Alberta	REVIEWED BY: D. YOSHISAKA	COMPLETE: 01/25/05
	Fig. No: 17094	Page 2 of 2

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-05
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:354293.74 N:5954889.46	ELEVATION: 624.28 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	SOIL SYMBOL	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	WELL INSTALLATION	WELL COMPLETION DATA	ELEVATION(m)
0.0		TOPSOIL; frozen, black, some organics					STICKUP (0.61 m)	624.0
1.0		SAND; brown, fine to medium grained					-51 mm PVC CASING	623.0
2.0								622.0
3.0							-3.1 m	621.0
4.0		CLAY; brown, soft, silty					-TOC ELEVATION: 624.89 m	620.0
5.0							-BOREHOLE DIAMTER = 159 mm	619.0
6.0								618.0
7.0		- from 7.3 to 10.7 m blue, silty clay						617.0
8.0								616.0
9.0								615.0
10.0								614.0
11.0		TILL; blue, silty clay, small gravel, multi colored						613.0
12.0								612.0
13.0								611.0
14.0								610.0
15.0								609.0
16.0		GRAVEL; large gravel, multi colored, tower shakes						608.0
17.0		TILL; sandy, sandy clay, fine grained, small gravel, grey						607.0
18.0		SAND AND GRAVEL; grey, medium to coarse grained sand, small gravel						606.0
19.0		CLAY TILL; sandy, grey, fine grained sandy clay till		MW5				605.0
20.0								604.0
21.0								603.0
22.0							-22.6 m	602.0
23.0		- well cemented from 23.2 to 25.0 m					-23.2 m	601.0
24.0								600.0
25.0				MW5				

Stantec Consulting Ltd.
Edmonton, Alberta

LOGGED BY: H. LOVETT	COMPLETION DEPTH: 37.5 m
REVIEWED BY: D. YOSHISAKA	COMPLETE: 02/03/05
Fig. No: 17094	Page 1 of 2

05/11/04 01:29PM (PELTON-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-05
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:354293.74 N:5954889.46	ELEVATION: 624.28 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	LITHOLOGY	SAMPLE NO	WELL COMPLETION DATA	ELEVATION(m)
25.0		MW5		599.0
26.0	SAND; grey, salt and pepper color, fine to medium grained sand			598.0
27.0			-26.8 m	597.0
28.0	GRAVEL; small to large gravel, multi colored, sand and gravel mixed alot	MW	-28.4 m	596.0
29.0				595.0
30.0			-51 mm 0.020 SLOT PVC SCREEN	594.0
31.0			-31.4 m	593.0
32.0	SHALE; grey, dense			592.0
33.0				591.0
34.0				590.0
35.0				589.0
36.0				588.0
37.0			-37.5 m	587.0
38.0	END OF HOLE 37.5 m			586.0
39.0				585.0
40.0				584.0
41.0				583.0
42.0				582.0
43.0				581.0
44.0				580.0
45.0				579.0
46.0				578.0
47.0				577.0
48.0				576.0
49.0				575.0
50.0				

Stantec Consulting Ltd.
Edmonton, Alberta

LOGGED BY: H. LOVETT	COMPLETION DEPTH: 37.5 m
REVIEWED BY: D. YOSHISAKA	COMPLETE: 02/03/05
Fig. No: 17094	Page 2 of 2

05/11/04 02:29PM (PELTON-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-06
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:361559.34 N:5958812.22	ELEVATION: 629.61 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	SOIL SYMBOL	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	WELL INSTALLATION	WELL COMPLETION DATA	ELEVATION(m)
0.0		TOPSOIL; black/brown, frozen, organics					STICKUP (0.67 m)	629.0
1.0		CLAY; sandy, light brown, fine grained					-51 mm PVC CASING	
2.0								628.0
3.0		- at 3.1 m turns grey, silty					-3.1 m	627.0
4.0				MW6			-TOC ELEVATION: 630.28 m	626.0
5.0							-BOREHOLE DIAMETER = 159 mm	
6.0								625.0
7.0				MW6				624.0
8.0		CLAY TILL; grey, silty, clay, some rocks and pebbles						623.0
9.0								622.0
10.0								621.0
11.0								620.0
12.0								619.0
13.0								618.0
14.0		- at 13.7 m becomes more sandy, firm						617.0
15.0								616.0
16.0								615.0
17.0								614.0
18.0								613.0
19.0								612.0
20.0								611.0
21.0								610.0
22.0								609.0
23.0		SAND; grey, black speckled, medium grained, some silt		MW6				608.0
24.0		CLAY; grey, sandy, silty						607.0
25.0		SAND;						606.0
								605.0

Stantec Consulting Ltd.
Edmonton, Alberta

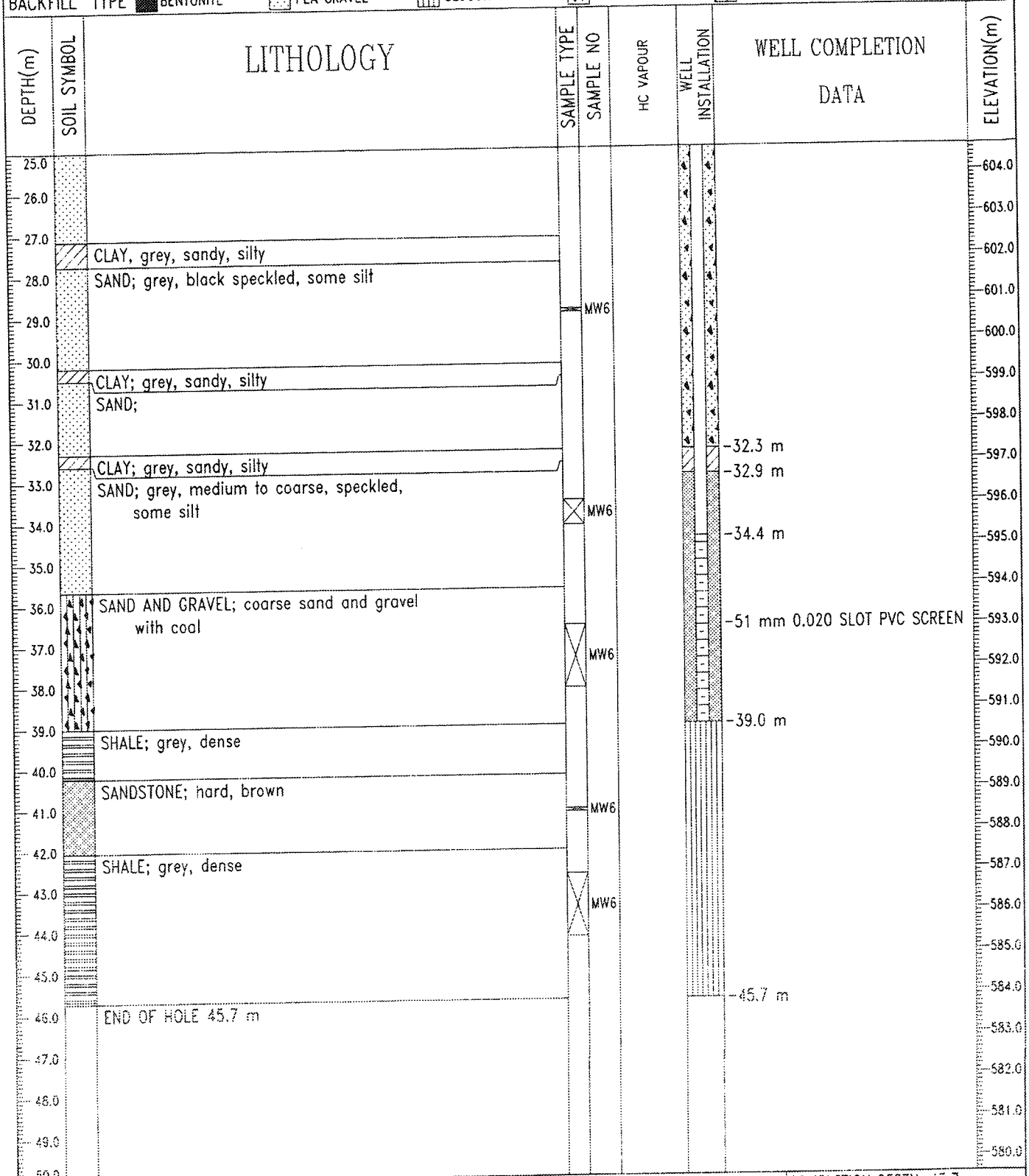
LOGGED BY: H. LOVETT | COMPLETION DEPTH: 45.7 m
REVIEWED BY: D. YOSHISAKA | COMPLETE: 01/31/05
Fig. No: 17094 |

05/11/04 02:42PM (PELTON-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-06
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:361559.34 N:5958812.22	ELEVATION: 629.61 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND



Stantec Consulting Ltd.
Edmonton, Alberta

LOGGED BY: H. LOVETT	COMPLETION DEPTH: 45.7 m
REVIEWED BY: D. YOSHISAKA	COMPLETE: 01/31/05
Fig. No: 17094	Page 2 of 2

05/11/04 02:42PM (PELTON-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-07
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:359089.70 N:5959604.24	ELEVATION: 630.41 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	SOIL SYMBOL	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	WELL INSTALLATION	WELL COMPLETION DATA	ELEVATION(m)
0.0		SAND; brown, medium to coarse grained sand and gravel					STICKUP (0.60 m)	630.0
1.0							-152 mm PVC CASING	629.0
2.0								628.0
3.0		CLAY; grey, sandy					-TOC ELEVATION: 631.01 m	627.0
4.0		SAND; grey, fine grained					-BOREHOLE DIAMETER = 222 mm	626.0
5.0								625.0
6.0								624.0
7.0								623.0
8.0								622.0
9.0								621.0
10.0		CLAY; grey, sandy						620.0
11.0								619.0
12.0								618.0
13.0		SAND; grey, fine grained						617.0
14.0								616.0
15.0								615.0
16.0								614.0
17.0		CLAY TILL; grey, sandy clay with pebbles						613.0
18.0								612.0
19.0								611.0
20.0								610.0
21.0								609.0
22.0								608.0
23.0								607.0
24.0								606.0
25.0								

Stantec Consulting Ltd.
Edmonton, Alberta

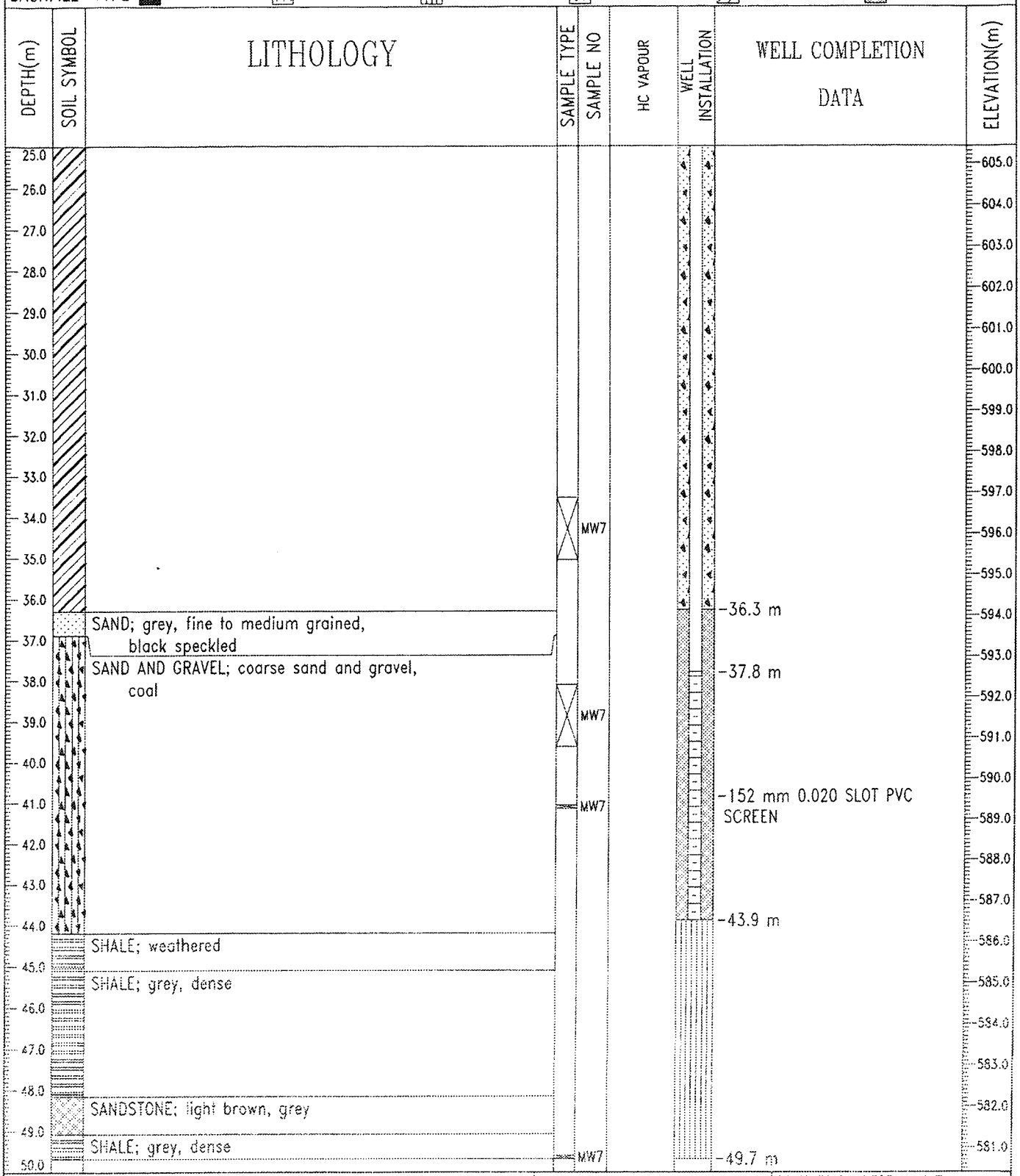
LOGGED BY: H. LOVETT | COMPLETION DEPTH: 49.7 m
REVIEWED BY: D. YOSHISAKA | COMPLETE: 02/14/05
Fig. No: 17094 |

05/11/04 02:47PM (PELTON-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-07
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:359089.70 N:5959604.24	ELEVATION: 630.41 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND



Stantec Consulting Ltd. Edmonton, Alberta	LOGGED BY: H. LOVETT	COMPLETION DEPTH: 49.7 m
	REVIEWED BY: D. YOSHISAKA	COMPLETE: 02/14/05
	Fig. No: 17094	Page 2 of 2

05/11/04 02:47PM (PETION-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-08
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:363133.77 N:5961204.95	ELEVATION: 625.87 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	WELL INSTALLATION	WELL COMPLETION DATA	ELEVATION(m)
0.0	TOPSOIL; black, roots, grasses					STICKUP (0.57 m)	625.0
1.0	SAND; brown/black grains, fine to medium grained					-51 mm PVC CASING	
2.0	CLAY; brown/grey, silty						624.0
3.0							623.0
4.0						-3.1 m -TOC ELEVATION: 626.44 m -BOREHOLE DIAMETER = 159 mm	622.0
5.0	SAND; silty, brown, very fine grained						621.0
6.0							620.0
7.0							619.0
8.0							618.0
9.0							617.0
10.0	CLAY; blue/grey, silty						616.0
11.0							615.0
12.0							614.0
13.0							613.0
14.0	CLAY TILL; blue clay, sandy						612.0
15.0							611.0
16.0							610.0
17.0							609.0
18.0							608.0
19.0	SAND; coarse grained, grey/brown						607.0
20.0	CLAY TILL; blue clay, small gravel, sandy						606.0
21.0							605.0
22.0			MW8				604.0
23.0							603.0
24.0	SHALE; rafted						602.0
25.0							601.0

Stantec Consulting Ltd.
Edmonton, Alberta

LOGGED BY: H. LOVETT	COMPLETION DEPTH: 37.8 m
REVIEWED BY: D. YOSHISAKA	COMPLETE: 02/03/05
Fig. No: 17094	Page 1 of 2

05/11/04 02:28PM (PELTON-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-08
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:363133.77 N:5961204.95	ELEVATION: 625.87 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	SOIL SYMBOL	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	WELL INSTALLATION	WELL COMPLETION DATA	ELEVATION(m)
25.0								600.0
26.0		SAND; fine to medium grained, grey, black specks						599.0
27.0								598.0
28.0				MW8			-28.0 m	597.0
29.0							-28.7 m	596.0
30.0				MW8			-30.5 m	595.0
31.0		GRAVEL; brown/black, small gravel, coal chunks					-51 mm 0.020 SLOT PVC SCREEN	594.0
32.0								593.0
33.0				MW8			-33.5 m	592.0
34.0		SHALE; grey, dense						591.0
35.0								590.0
36.0				MW8				589.0
37.0								588.0
38.0		END OF HOLE 37.8 m					-37.8 m	587.0
39.0								586.0
40.0								585.0
41.0								584.0
42.0								583.0
43.0								582.0
44.0								581.0
45.0								580.0
46.0								579.0
47.0								578.0
48.0								577.0
49.0								576.0
50.0								

Stantec Consulting Ltd.
Edmonton, Alberta

LOGGED BY: H. LOVETT	COMPLETION DEPTH: 37.8 m
REVIEWED BY: D. YOSHISAKA	COMPLETE: 02/03/05
Fig. No: 17094	Page 2 of 2

05/11/24 02:29PM (PELTON-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-09
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:361003.46 N:5962032.28	ELEVATION: 624.06 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	SOIL SYMBOL	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	WELL INSTALLATION	WELL COMPLETION DATA	ELEVATION(m)
0.0		ORGANIC SOIL; frozen, black					STICKUP (0.67 m)	624.0
1.0		CLAY; silty, light brown, some sand, some pebbles					-51 mm PVC CASING	623.0
2.0								622.0
3.0		- at 3.1 m turns darker brown					-TOC ELEVATION: 624.73 m	621.0
4.0							-BOREHOLE DIAMETER = 159 mm	620.0
5.0								619.0
6.0								618.0
7.0								617.0
8.0								616.0
9.0								615.0
10.0								614.0
11.0		CLAY TILL; grey, silty, some pebbles						613.0
12.0								612.0
13.0								611.0
14.0								610.0
15.0		- at 14.6 m becomes sandy						609.0
16.0								608.0
17.0								607.0
18.0		SAND; grey, fine to medium grained, some clay and coal						606.0
19.0		CLAY TILL; grey, fine to medium grained sand and pebbles						605.0
20.0								604.0
21.0								603.0
22.0								602.0
23.0								601.0
24.0								600.0
25.0								

Stantec Consulting Ltd.
Edmonton, Alberta

LOGGED BY: H. LOVETT	COMPLETION DEPTH: 43.6 m
REVIEWED BY: D. YOSHISAKA	COMPLETE: 01/28/05
Fig. No: 17094	Page 1 of 2

05/11/04 02:30PM (PETION-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-09
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:361003.46 N:5962032.28	ELEVATION: 624.06 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	WELL INSTALLATION	WELL COMPLETION DATA	ELEVATION(m)
25.0							599.0
26.0	SAND; grey, medium grained, some clay, black coal speckles						598.0
27.0							597.0
28.0							596.0
29.0	CLAY; grey, sandy						595.0
30.0	GRAVEL; gravel with coarse sand and gravel					-29.9 m -30.5 m	594.0
31.0			MW9				593.0
32.0	SAND AND GRAVEL; coarse sand and coal with gravel					-32.0 m	592.0
33.0						-51 mm 0.020 SLOT PVC SCREEN	591.0
34.0	GRAVEL; gravel with coarse sand and coal						590.0
35.0							589.0
36.0			MW9			-36.6 m	588.0
37.0							587.0
38.0							586.0
39.0	SHALE; grey, dense						585.0
40.0			MW9				584.0
41.0							583.0
42.0							582.0
43.0						-43.6 m	581.0
44.0	END OF HOLE 43.6 m						580.0
45.0							579.0
46.0							578.0
47.0							577.0
48.0							576.0
49.0							575.0
50.0							

Stantec Consulting Ltd Edmonton, Alberta	LOGGED BY: H. LOVETT	COMPLETION DEPTH: 43.6 m
	REVIEWED BY: D. YOSHISAKA	COMPLETE: 01/28/05
	Fig. No: 17094	Page 2 of 2

05/11/04 02:50PM (PEL GN-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-10
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:364,954.62 N:5,963,505.11	ELEVATION: 624.06 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	SOIL SYMBOL	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	WELL INSTALLATION	WELL COMPLETION DATA	ELEVATION(m)
0.0		TOPSOIL; brown, frozen, sandy					STICKUP (0.61 m)	624.0
1.0		SAND; brown, fine to medium grained					-152 mm PVC CASING	623.0
2.0								622.0
3.0		- at 3.1 m turns grey, some silt					-3.0 m	621.0
4.0							-TOC ELEVATION: 624.67 m	620.0
5.0							-BOREHOLE DIAMETER = 200 mm	619.0
6.0								618.0
7.0								617.0
8.0		CLAY; grey, silty						616.0
9.0								615.0
10.0								614.0
11.0								613.0
12.0		SAND; grey, fine grained						612.0
13.0								611.0
14.0								610.0
15.0								609.0
16.0		CLAY TILL; grey, silty						608.0
17.0		SILT; sandy, grey, fine grained sand and silt						607.0
18.0		CLAY TILL; grey, silty						606.0
19.0								605.0
20.0								604.0
21.0								603.0
22.0								602.0
23.0		SAND; grey, fine grained, some silt						601.0
24.0								600.0
25.0		CLAY; grey, silty, harder						

Stantec Consulting Ltd.
Edmonton, Alberta

LOGGED BY: H. LOVETT | COMPLETION DEPTH: 44.8 m
REVIEWED BY: D. YOSHISAKA | COMPLETE: 01/26/05
Fig. No: 17094

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-10
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:364,954.62 N:5,963,505.11	ELEVATION: 624.06 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	SOIL SYMBOL	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	WELL INSTALLATION	WELL COMPLETION DATA	ELEVATION(m)
25.0								599.0
26.0		SAND; cemented, grey, black speckled						598.0
27.0								597.0
28.0				MW10				596.0
29.0								595.0
30.0							-30.2 m	594.0
31.0							-31.4 m	593.0
32.0								592.0
33.0								591.0
34.0		SAND AND GRAVEL; coarse grained sand and gravel, coal		MW10			-SHALE BASKET	590.0
35.0								589.0
36.0							-35.7 m	588.0
37.0				MW10			-152 mm 0.020 SLOT PVC SCREEN	587.0
38.0								586.0
39.0		GRAVEL; mostly gravel, lots of drill stem chatter, some sand						585.0
40.0								584.0
41.0								583.0
42.0		SHALE; grey, dense					-41.8 m	582.0
43.0				MW10				581.0
44.0								580.0
45.0		END OF HOLE 44.8 m					-44.8 m	579.0
46.0								578.0
47.0								577.0
48.0								576.0
49.0								575.0
50.0								

Stantec Consulting Ltd.
Edmonton, Alberta

LOGGED BY: H. LOVETT | COMPLETION DEPTH: 44.8 m
REVIEWED BY: D. YOSHISAKA | COMPLETE: 01/26/05
Fig. No: 17094 |

CLIENT: NCIA	DRILLING COMPANY: SPT DRILLING LTD.	BOREHOLE NO: MW-11
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: N:5,965,300.71 E:362,564.36	ELEVATION: 624.491 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	SOIL SYMBOL	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	SLOTTED PIEZOMETER	WELL COMPLETION DATA	ELEVATION(m)
0.0		TOPSOIL; soft, black, organic silty soil					-STICKUP (0.67 m)	624.0
		SAND; loose, brown, fine to medium grained					-51 mm PVC CASING	
1.0		CLAY; firm, brown, orange, grey, silty, no pebbles						623.0
2.0		CLAY TILL; firm, brown, sandy clay, grey, silt strands, some orange oxidation, some coal, pebbles						622.0
3.0							-3.0 m	621.0
4.0								
5.0							-BOREHOLE DIAMETER 160 mm	620.0
		- at 5.5 m turns grey						619.0
6.0		- at 6.4 m damp to moist						618.0
7.0								617.0
8.0								616.0
9.0								615.0
10.0								614.0
11.0								613.0
12.0								612.0
13.0								611.0
14.0								610.0
15.0		- from 15.2 to 17.7 m lots of sand, coarse grained, speckled, larger rocks mixed with clay, wet						609.0
16.0								608.0
17.0								607.0
18.0		- at 17.7 m returns to firm, grey clay till						606.0
19.0		- at 18.9 m small band of coarse grained sand then returns to grey						605.0
20.0								

Stantec Consulting Ltd.
Edmonton, Alberta

LOGGED BY: H. LOVETT	COMPLETION DEPTH: 44.2 m
REVIEWED BY: H. LOVETT	COMPLETE: 09/24/04
Fig. No: 17094	Page 1 of 3

CLIENT: NCIA	DRILLING COMPANY: SPT DRILLING LTD.	BOREHOLE NO: MW-11
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: N:5,965,300.71 E:362,564.36	ELEVATION: 624.491 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	SOIL SYMBOL	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	SLOTTED PIEZOMETER	WELL COMPLETION DATA	ELEVATION(m)
20.0		clay till						604.0
21.0								603.0
22.0								602.0
23.0								601.0
24.0								600.0
25.0								599.0
26.0								598.0
27.0		SAND; loose, fine to medium grained, wet						597.0
28.0								596.0
29.0								595.0
30.0								594.0
31.0								593.0
32.0								592.0
33.0								591.0
34.0								590.0
35.0							-35.1 m	589.0
36.0								588.0
37.0		SAND AND GRAVEL; loose, grey, wet, large gravel						587.0
38.0							-38.1 m	586.0
39.0								585.0
40.0								

Stantec Consulting Ltd. Edmonton, Alberta	LOGGED BY: H. LOVETT	COMPLETION DEPTH: 44.2 m
	REVIEWED BY: H. LOVETT	COMPLETE: 09/24/04
	Fig. No: 17094	Page 2 of 3

CLIENT: NCIA	DRILLING COMPANY: SPT DRILLING LTD.	BOREHOLE NO: MW-11
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: N:5,965,300.71 E:362,564.36	ELEVATION: 624.491 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	SOIL SYMBOL	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	SLOTTED PIEZOMETER	WELL COMPLETION DATA	ELEVATION(m)
40.0								584.0
41.0							-51 mm 0.010 SLOT PVC SCREEN	583.0
42.0								582.0
43.0								581.0
44.0							-44.2 m	580.0
45.0		SHALE; dark grey, dry						579.0
46.0								578.0
47.0							-47.2 m	577.0
48.0		END OF HOLE 47.2 m NOTE: ON COMPLETION -backfill borehole with 10/20 grade sand to 44.2 mBGL MONITOR WELL INSTALLED -blue steel casing protector with lock added -above ground PVC stickup (0.67 mAGL) ON SEPTEMBER 24, 2004 -water level at 29.84 mBGL ON SEPTEMBER 28, 2004 -water level at 29.83 mBGL LOCAL COORDINATES: N:5242.77 E:2786.27 NOTE: -Originally installed for Shell Scotford Upgrader 04-10-44						576.0
49.0								575.0
50.0								574.0
51.0								573.0
52.0								572.0
53.0								571.0
54.0								570.0
55.0								569.0
56.0								568.0
57.0								567.0
58.0								566.0
59.0								565.0
60.0								

Stantec Consulting Ltd.
Edmonton, Alberta

LOGGED BY: H. LOVETT | COMPLETION DEPTH: 44.2 m
REVIEWED BY: H. LOVETT | COMPLETE: 09/24/04
Fig. No: 17094 |

08/08/29 11:10AM (PETTOH-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-12
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:366805.93 N:5968379.85	ELEVATION: 625.46 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	SOIL SYMBOL	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	WELL INSTALLATION	WELL COMPLETION DATA	ELEVATION(m)
0.0		MOSS; frozen, green, some organics					STICKUP (0.61 m)	625.0
1.0		SAND; brown, fine to medium grained					-51 mm PVC CASING	624.0
2.0								623.0
3.0							-3.1 m	622.0
4.0							-TOC ELEVATION: 626.07 m	621.0
5.0							-BOREHOLE DIAMETER = 159 mm	620.0
6.0								619.0
7.0								618.0
8.0		CLAY; grey, silty SILT; grey						617.0
9.0								616.0
10.0								615.0
11.0		CLAY; grey, silty						614.0
12.0								613.0
13.0		SILT; grey						612.0
14.0								611.0
15.0		CLAY; grey, silty						610.0
16.0								609.0
17.0								608.0
18.0								607.0
19.0		CLAY TILL; grey, sandy, clay, some silt,						606.0
20.0		some pebbles						605.0
21.0								604.0
22.0								603.0
23.0								602.0
24.0								601.0
25.0								

Stantec Consulting Ltd.
Edmonton, Alberta

LOGGED BY: H. LOVETT	COMPLETION DEPTH: 42.7 m
REVIEWED BY: D. YOSHISAKA	COMPLETE: 01/02/05
Fig. No: 17094	Page 1 of 2

05/11/04 02:30PM (PELTON-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-12
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:366805.93 N:5968379.85	ELEVATION: 625.46 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	SOIL SYMBOL	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	WELL INSTALLATION	WELL COMPLETION DATA	ELEVATION(m)
25.0								600.0
26.0								599.0
27.0				MW12				598.0
28.0		SAND; grey, medium grained, black speckled		MW12				597.0
29.0								596.0
30.0								595.0
31.0								594.0
32.0								593.0
33.0							-32.9 m	592.0
34.0							-33.5 m	591.0
35.0								590.0
36.0								589.0
37.0		SAND AND GRAVEL; coarse sand and gravel, coal					-51 mm 0.020 SLOT PVC SCREEN	588.0
38.0				MW12			-38.1 m	587.0
39.0		SHALE; grey, dense						586.0
40.0								585.0
41.0		- brown, soft shale						584.0
42.0		- grey, dense		MW12			-42.7 m	583.0
43.0		END OF HOLE 42.7 m						582.0
44.0								581.0
45.0								580.0
46.0								579.0
47.0								578.0
48.0								577.0
49.0								576.0
50.0								

Stantec Consulting Ltd.
Edmonton, Alberta

LOGGED BY: H. LOVETT	COMPLETION DEPTH: 42.7 m
REVIEWED BY: D. YOSHISAKA	COMPLETE: 01/02/05
Fig. No: 17094	Page 2 of 2

05/11/04 02:30PM (PETTEN-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-13
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:365292.72 N:5968147.12	ELEVATION: 625.65 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

DEPTH(m)	SOIL SYMBOL	LITHOLOGY	SAMPLE TYPE	SAMPLE NO	HC VAPOUR	WELL INSTALLATION	WELL COMPLETION DATA	ELEVATION(m)
0.0		PEAT MOSS;					STICKUP (0.63 m)	625.0
1.0		SAND; brown, fine to medium grained					-51 mm PVC CASING	624.0
2.0								623.0
3.0							-3.1 m	622.0
4.0							-TOC ELEVATION: 626.28 m	621.0
5.0							-BOREHOLE DIAMETER = 159 mm	620.0
6.0								619.0
7.0								618.0
8.0		CLAY; brown grey, silty						617.0
9.0		SAND; brown, grey, fine to medium grained, some clay						616.0
10.0		CLAY; grey, silty						615.0
11.0								614.0
12.0								613.0
13.0								612.0
14.0								611.0
15.0								610.0
16.0								609.0
17.0								608.0
18.0								607.0
19.0								606.0
20.0		CLAY TILL; grey, sandy (fine to medium grained), clay with pebbles - at 19.8 m rock						605.0
21.0								604.0
22.0								603.0
23.0				MW13				602.0
24.0								601.0
25.0								

Stantec Consulting Ltd.
Edmonton, Alberta

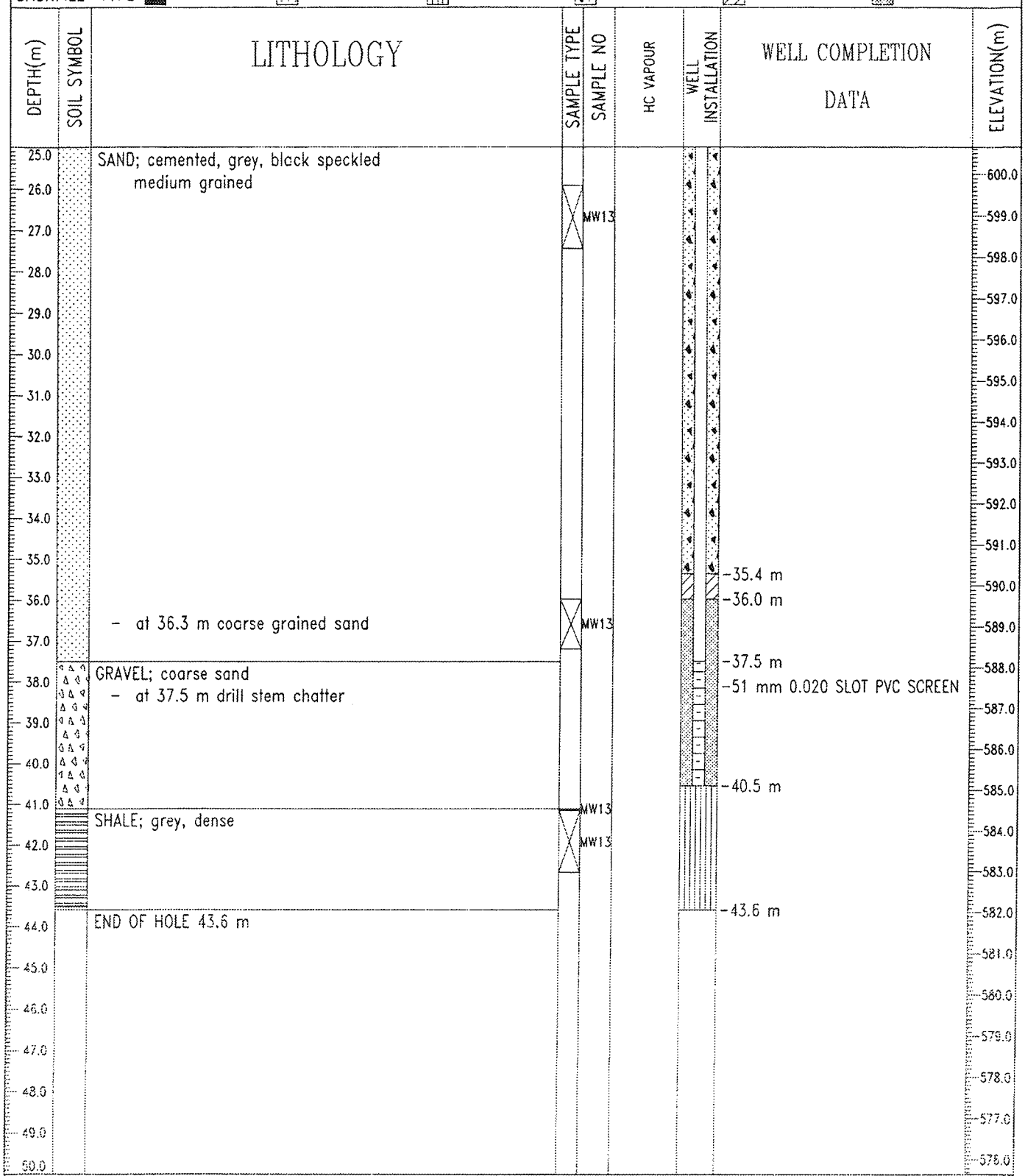
LOGGED BY: H. LOVETT | COMPLETION DEPTH: 43.6 m
REVIEWED BY: D. YOSHISAKA | COMPLETE: 01/02/05
Fig. No: 17094 | Page 1 of 2

05/11/04 02:48PM (FELTON-1)

CLIENT: NCIA	FIELD PERSONNEL: H. LOVETT	BOREHOLE NO: MW-13
PROJECT: BEVERLY CHANNEL INVESTIGATION	DRILLING METHOD: MUD ROTARY	PROJECT NO: 1102-17094/400
LOCATION: FORT SASKATCHEWAN, AB	COORDINATES: E:365292.72 N:5968147.12	ELEVATION: 625.65 (m)

SAMPLE TYPE: SHELBY TUBE | NO RECOVERY | GRAB | SPT | A-CASING | CORE

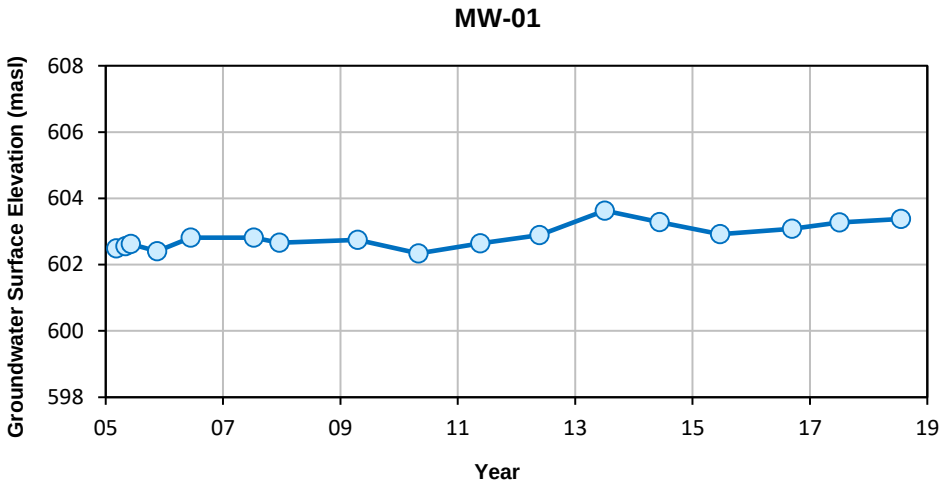
BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | PELTONITE | SAND

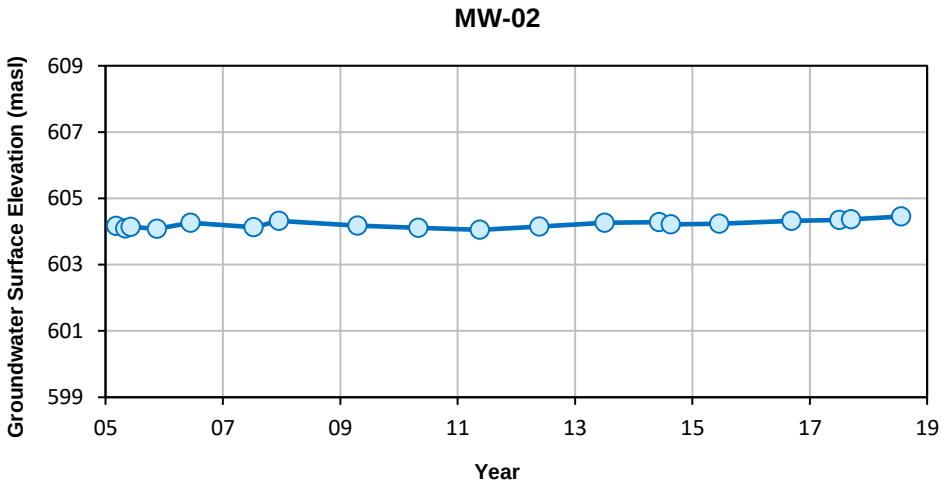


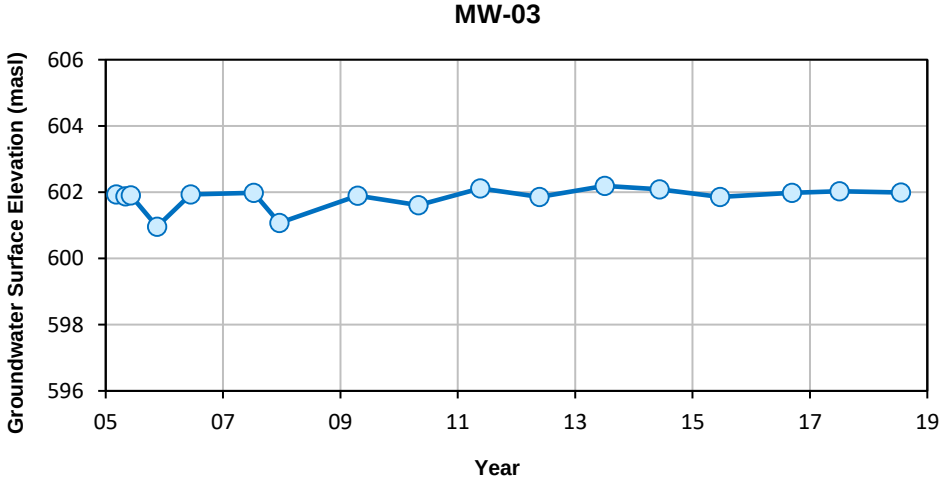
Stantec Consulting Ltd.	LOGGED BY: H. LOVETT	COMPLETION DEPTH: 43.6 m
Edmonton, Alberta	REVIEWED BY: D. YOSHISAKA	COMPLETE: 01/02/05
	Fig. No: 17094	Page 2 of 2

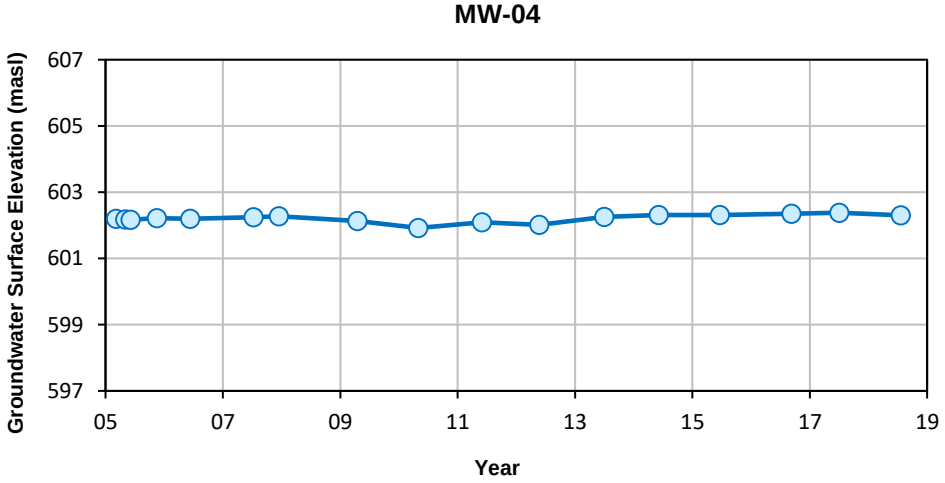
05/11/04 02:48PM (PELTON-1)

Appendix 3 Groundwater Hydrographs









Notes:

- Filled symbols denote measurable values; unfilled symbols denote dry wells
- Dashed line between data points indicates data gap of more than two years

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

GROUNDWATER HYDROGRAPHS
MW-01, MW-02, MW-03, AND MW-04

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS	DS	

WorleyParsons Project No.: 307075-01608-400

FIG No.: A3-1

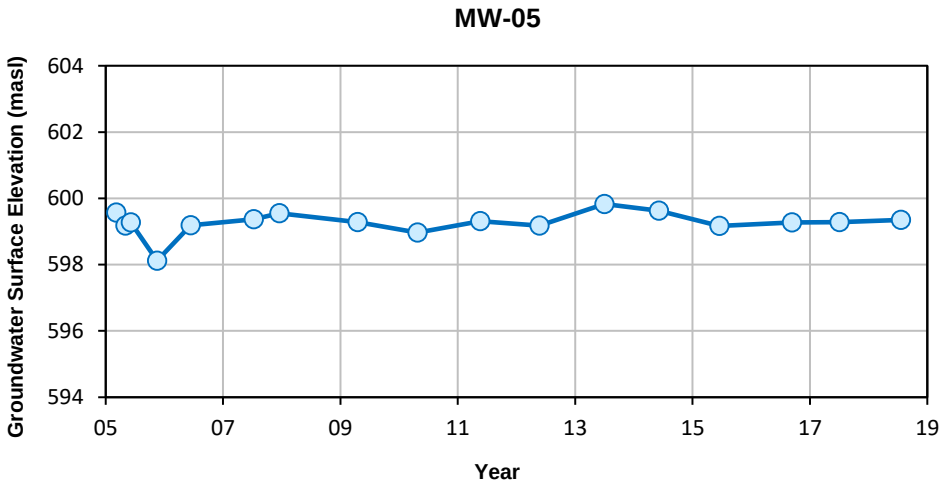
REV: A

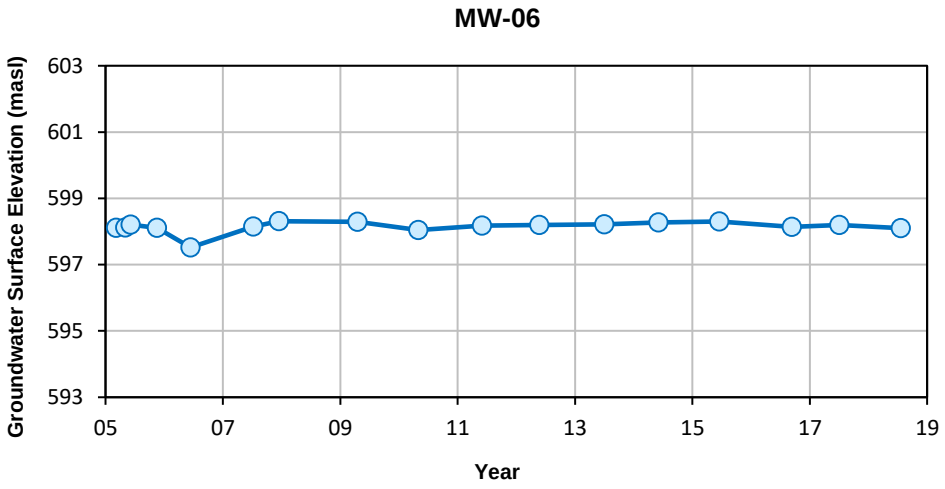
OneWay to zero harm

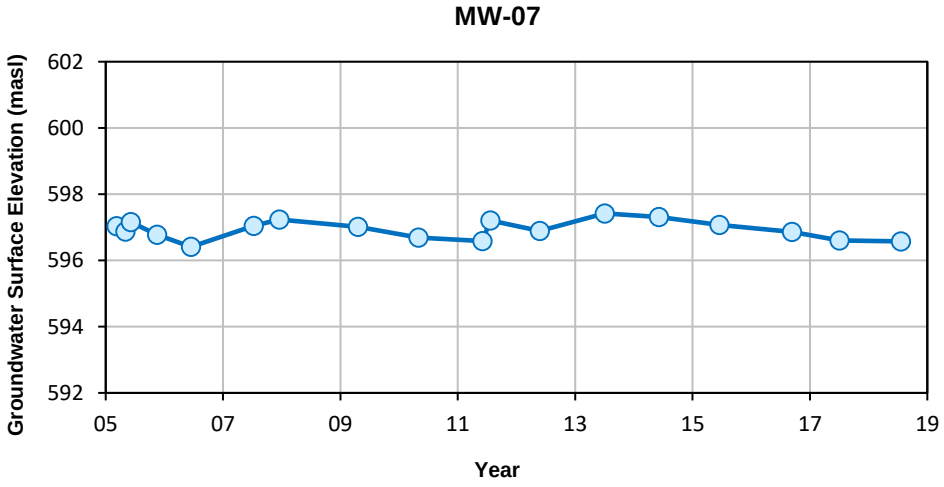
Advisian
WorleyParsons Group

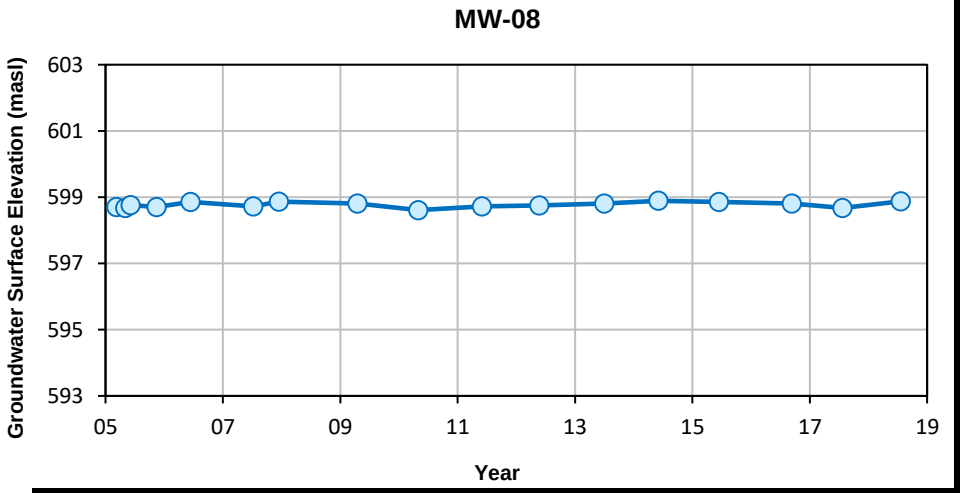
FILE LOCATION: EDMONTON

FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 3 HYDROGRAPHS\WORKING FILES\









Notes:

- Filled symbols denote measurable values; unfilled symbols denote dry wells
- Dashed line between data points indicates data gap of more than two years

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

GROUNDWATER HYDROGRAPHS
MW-05, MW-06, MW-07, AND MW-08

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS	DS	

OneWay to zero harm

Advisian
WorleyParsons Group

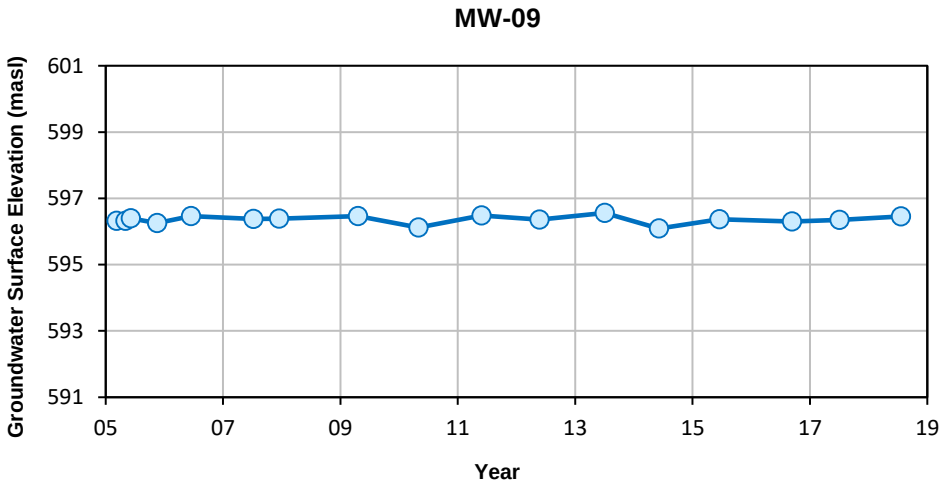
WorleyParsons Project No.: 307075-01608-400

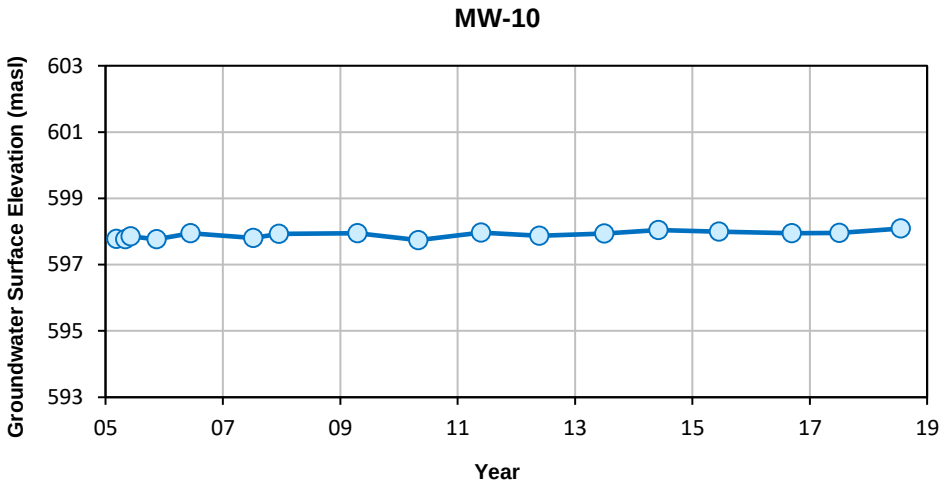
FIG No.: A3-2

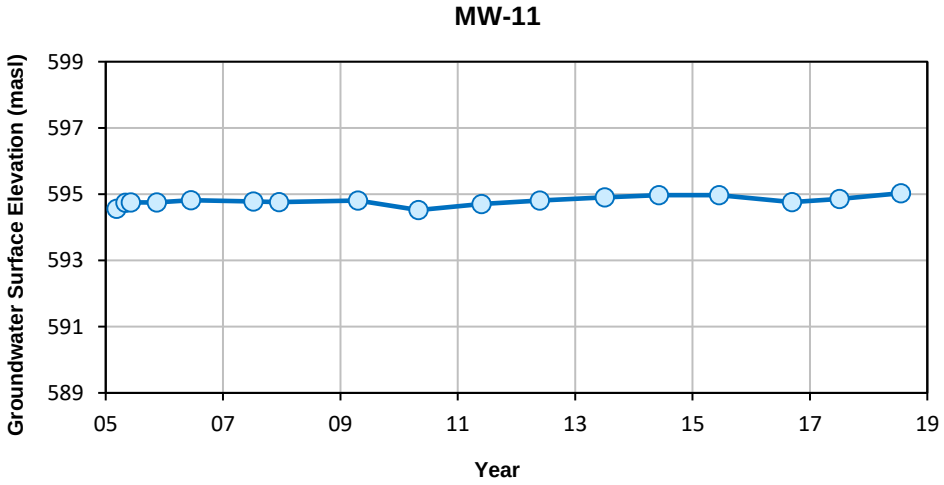
REV: A

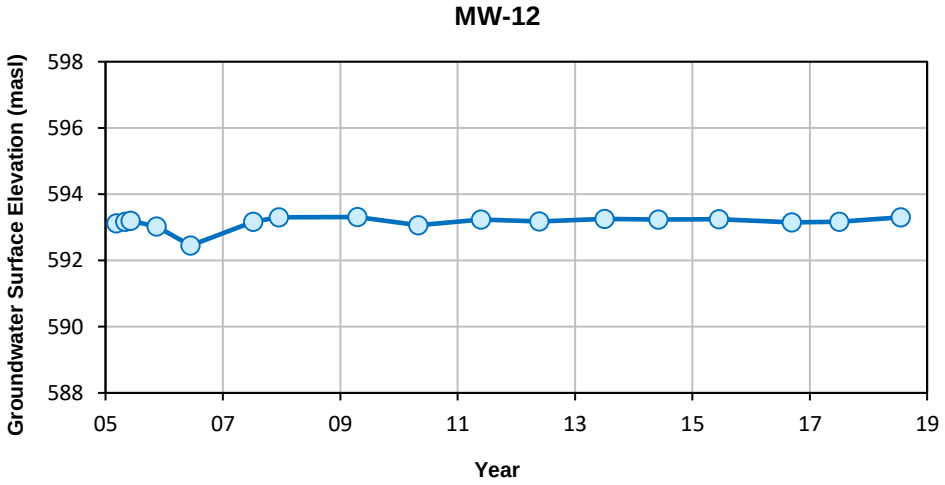
FILE LOCATION: EDMONTON

FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 3 HYDROGRAPHS\WORKING FILES\









Notes:

- Filled symbols denote measurable values; unfilled symbols denote dry wells
- Dashed line between data points indicates data gap of more than two years

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

GROUNDWATER HYDROGRAPHS
MW-09, MW-10, MW-11, AND MW-12

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS	DS	

OneWay to zero harm

Advisian
WorleyParsons Group

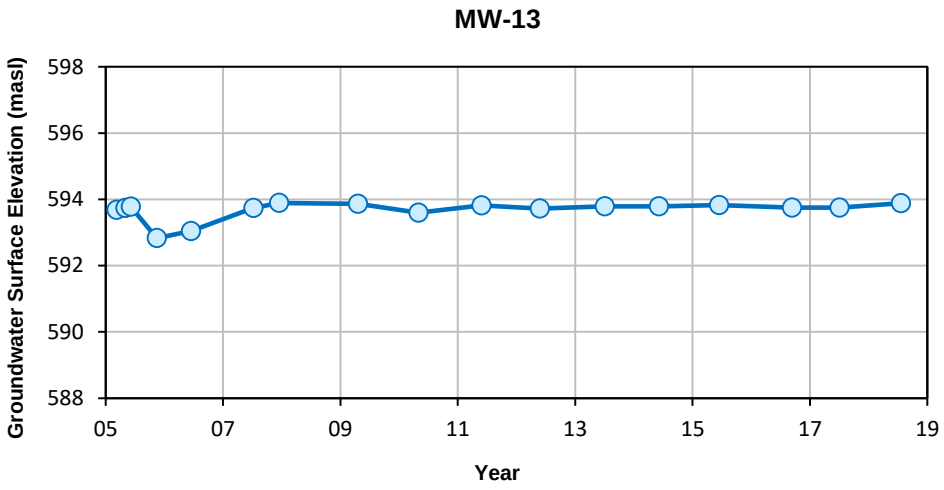
WorleyParsons Project No.
307075-01608-400

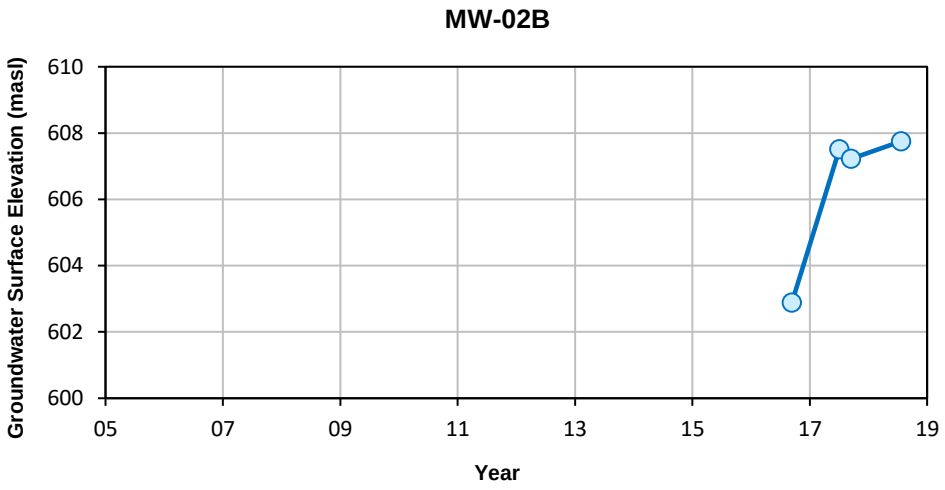
FIG No. A3-3

REV A

FILE LOCATION: EDMONTON

FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 3 HYDROGRAPHS\WORKING FILES\





Notes:

- Filled symbols denote measurable values; unfilled symbols denote dry wells
- Dashed line between data points indicates data gap of more than two years

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

GROUNDWATER HYDROGRAPHS
MW13, AND MW-02B

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS	DS	

OneWay to zero harm

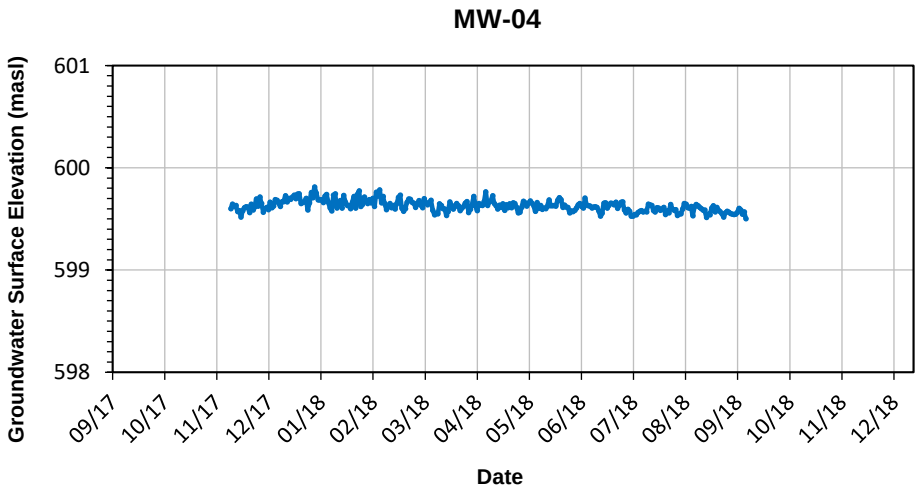
Advisian
WorleyParsons Group

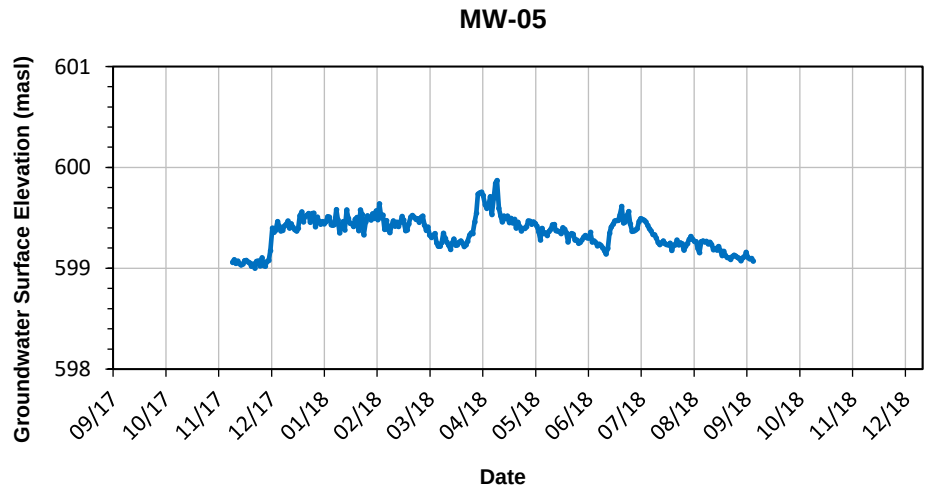
WorleyParsons Project No.
307075-01608-400

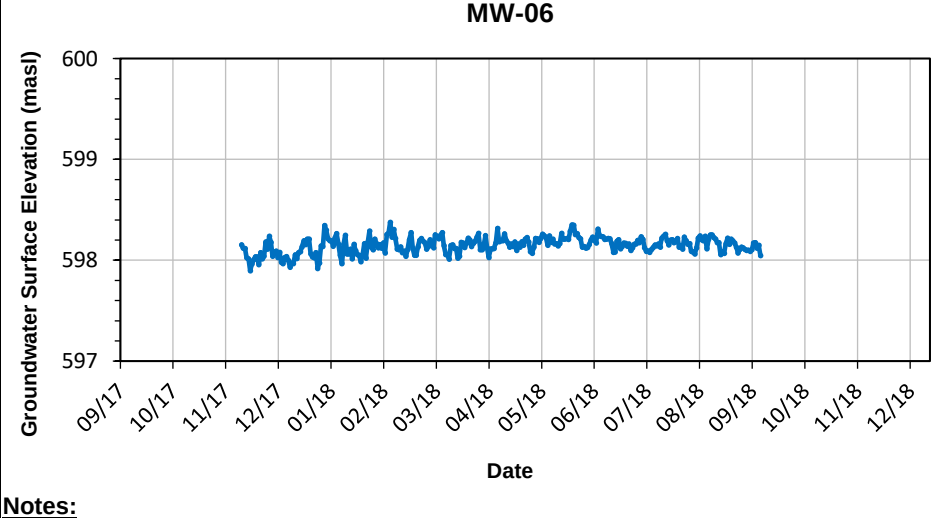
FIG No. A3-4

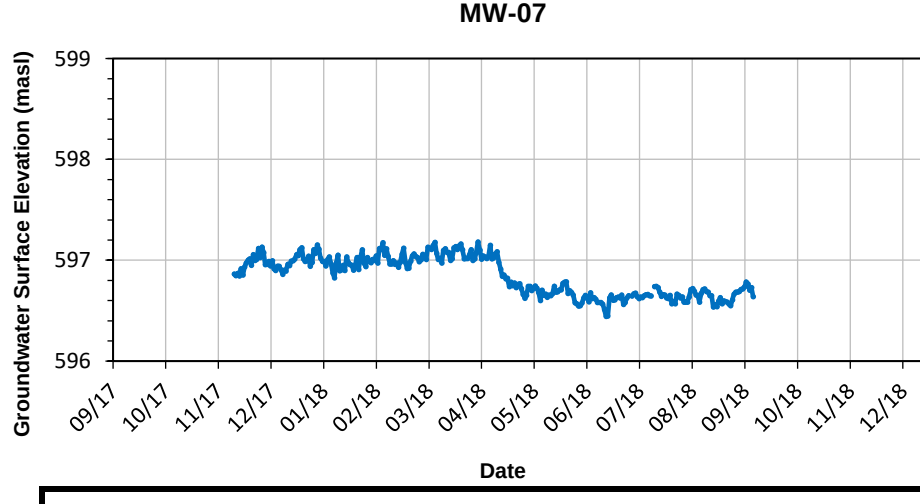
REV A

FILE LOCATION: EDMONTON
FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 3 HYDROGRAPHS\WORKING FILES\









Notes:

- Filled symbols denote measurable values; unfilled symbols denote dry wells
- Dashed line between data points indicates data gap of more than two years

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING

DETAILED HYDROGRAPHS
MW-04, MW-05, MW-06, AND MW-07

Date:	Drawn by:	Edited by:	App'd by:
20-Nov-18	DS	DS	

OneWay to zero harm

Advisian
WorleyParsons Group

WorleyParsons Project No.: 307075-01608-400

FIG No.: A3-5

REV: C

FILE LOCATION: EDMONTON

FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 3 HYDROGRAPHS\DETAILED-HYDROGF

Appendix 4 Laboratory Analytical Data

WorleyParsons Canada
ATTN: Trevor Butterfield
8615 51 Avenue
Edmonton AB T6E 6A8

Date Received: 01-AUG-18
Report Date: 06-SEP-18 14:49 (MT)
Version: FINAL

Client Phone: 780-496-9055

Certificate of Analysis

Lab Work Order #: L2139927

Project P.O. #: NOT SUBMITTED
Job Reference: 307075-01608-400
C of C Numbers: 17-657887, 17-657888
Legal Site Desc:

Dana Brown, Chem. Tech. DIPL
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-1 MW-04							
Sampled By: RM on 31-JUL-18 @ 11:00							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Toluene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
EthylBenzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
m+p-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
o-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Styrene	<0.0010		0.0010	mg/L	02-AUG-18	03-AUG-18	R4151477
F1(C6-C10)	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
F1-BTEX	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
Xylenes	<0.00071		0.00071	mg/L	02-AUG-18	03-AUG-18	R4151477
Surrogate: 1,4-Difluorobenzene (SS)	99.7		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 4-Bromofluorobenzene (SS)	92.3		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 3,4-Dichlorotoluene (SS)	111.8		70-130	%	02-AUG-18	03-AUG-18	R4151477
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-AUG-18	02-AUG-18	R4158207
Surrogate: 2-Bromobenzotrifluoride	103.7		60-140	%	02-AUG-18	02-AUG-18	R4158207
Miscellaneous Parameters							
Ammonia, Total Dissolved (as N)	<0.050		0.050	mg/L		02-AUG-18	R4161301
Dissolved Organic Carbon	3.40		0.50	mg/L		14-AUG-18	R4170716
Phenols (4AAP)	0.0012		0.0010	mg/L		07-AUG-18	R4161179
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					20-AUG-18	R4178482
Aluminum (Al)-Dissolved	<0.0050	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Antimony (Sb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Arsenic (As)-Dissolved	0.00079	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Barium (Ba)-Dissolved	0.108	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Boron (B)-Dissolved	0.093	DLDS	0.050	mg/L		20-AUG-18	R4178507
Cadmium (Cd)-Dissolved	<0.000025	DLDS	0.000025	mg/L		20-AUG-18	R4178507
Calcium (Ca)-Dissolved	156	DLDS	0.25	mg/L		20-AUG-18	R4178507
Chromium (Cr)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Copper (Cu)-Dissolved	<0.0010	DLDS	0.0010	mg/L		20-AUG-18	R4178507
Iron (Fe)-Dissolved	2.19	DLDS	0.050	mg/L		20-AUG-18	R4178507
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Magnesium (Mg)-Dissolved	45.9	DLDS	0.025	mg/L		20-AUG-18	R4178507
Manganese (Mn)-Dissolved	0.548	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Nickel (Ni)-Dissolved	0.0026	DLDS	0.0025	mg/L		20-AUG-18	R4178507
Potassium (K)-Dissolved	9.49	DLDS	0.25	mg/L		20-AUG-18	R4178507
Selenium (Se)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Silver (Ag)-Dissolved	<0.000050	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Sodium (Na)-Dissolved	65.5	DLDS	0.25	mg/L		20-AUG-18	R4178507
Uranium (U)-Dissolved	0.00330	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Zinc (Zn)-Dissolved	<0.0050	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	169		0.50	mg/L		02-AUG-18	R4158668
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					16-AUG-18	R4171933
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		16-AUG-18	R4173229
Fluoride in Water by IC							
Fluoride (F)	0.113		0.020	mg/L		02-AUG-18	R4158668
Ion Balance Calculation							
Ion Balance	103			%		21-AUG-18	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-1 MW-04							
Sampled By: RM on 31-JUL-18 @ 11:00							
Matrix: WATER							
Ion Balance Calculation							
TDS (Calculated)	779			mg/L		21-AUG-18	
Hardness (as CaCO3)	579			mg/L		21-AUG-18	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		02-AUG-18	R4158668
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		03-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		02-AUG-18	R4158668
Sulfate in Water by IC							
Sulfate (SO4)	133		0.30	mg/L		02-AUG-18	R4158668
pH, Conductivity and Total Alkalinity							
pH	8.25		0.10	pH		09-AUG-18	R4162144
Conductivity (EC)	1280		2.0	uS/cm		09-AUG-18	R4162144
Bicarbonate (HCO3)	407		5.0	mg/L		09-AUG-18	R4162144
Carbonate (CO3)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Hydroxide (OH)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Alkalinity, Total (as CaCO3)	334		2.0	mg/L		09-AUG-18	R4162144
L2139927-2 MW-07							
Sampled By: RM on 31-JUL-18 @ 13:00							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Toluene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
EthylBenzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
m+p-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
o-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Styrene	<0.0010		0.0010	mg/L	02-AUG-18	03-AUG-18	R4151477
F1(C6-C10)	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
F1-BTEX	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
Xylenes	<0.00071		0.00071	mg/L	02-AUG-18	03-AUG-18	R4151477
Surrogate: 1,4-Difluorobenzene (SS)	100.3		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 4-Bromofluorobenzene (SS)	93.0		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 3,4-Dichlorotoluene (SS)	117.2		70-130	%	02-AUG-18	03-AUG-18	R4151477
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-AUG-18	02-AUG-18	R4158207
Surrogate: 2-Bromobenzotrifluoride	107.3		60-140	%	02-AUG-18	02-AUG-18	R4158207
Miscellaneous Parameters							
Ammonia, Total Dissolved (as N)	1.88		0.050	mg/L		02-AUG-18	R4161301
Dissolved Organic Carbon	6.27		0.50	mg/L		14-AUG-18	R4170716
Phenols (4AAP)	0.0013		0.0010	mg/L		07-AUG-18	R4161179
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					20-AUG-18	R4178482
Aluminum (Al)-Dissolved	<0.0050	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Antimony (Sb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Arsenic (As)-Dissolved	0.00505	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Barium (Ba)-Dissolved	0.0518	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Boron (B)-Dissolved	0.282	DLDS	0.050	mg/L		20-AUG-18	R4178507
Cadmium (Cd)-Dissolved	<0.000025	DLDS	0.000025	mg/L		20-AUG-18	R4178507
Calcium (Ca)-Dissolved	254	DLDS	0.25	mg/L		20-AUG-18	R4178507
Chromium (Cr)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-2 MW-07							
Sampled By: RM on 31-JUL-18 @ 13:00							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Copper (Cu)-Dissolved	<0.0010	DLDS	0.0010	mg/L		20-AUG-18	R4178507
Iron (Fe)-Dissolved	12.3	DLDS	0.050	mg/L		20-AUG-18	R4178507
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Magnesium (Mg)-Dissolved	94.2	DLDS	0.025	mg/L		20-AUG-18	R4178507
Manganese (Mn)-Dissolved	1.88	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Nickel (Ni)-Dissolved	<0.0025	DLDS	0.0025	mg/L		20-AUG-18	R4178507
Potassium (K)-Dissolved	5.97	DLDS	0.25	mg/L		20-AUG-18	R4178507
Selenium (Se)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Silver (Ag)-Dissolved	<0.000050	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Sodium (Na)-Dissolved	264	DLDS	0.25	mg/L		20-AUG-18	R4178507
Uranium (U)-Dissolved	0.00138	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Zinc (Zn)-Dissolved	<0.0050	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	11.9	DLDS	1.0	mg/L		02-AUG-18	R4158668
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					16-AUG-18	R4171933
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		16-AUG-18	R4173229
Fluoride in Water by IC							
Fluoride (F)	0.061	DLDS	0.040	mg/L		02-AUG-18	R4158668
Ion Balance Calculation							
Ion Balance	106			%		21-AUG-18	
TDS (Calculated)	1890			mg/L		21-AUG-18	
Hardness (as CaCO3)	1020			mg/L		21-AUG-18	
Nitrate in Water by IC							
Nitrate (as N)	<0.040	DLDS	0.040	mg/L		02-AUG-18	R4158668
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.045		0.045	mg/L		03-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.020	DLDS	0.020	mg/L		02-AUG-18	R4158668
Sulfate in Water by IC							
Sulfate (SO4)	964	DLDS	0.60	mg/L		02-AUG-18	R4158668
pH, Conductivity and Total Alkalinity							
pH	8.00		0.10	pH		09-AUG-18	R4162144
Conductivity (EC)	2310		2.0	uS/cm		09-AUG-18	R4162144
Bicarbonate (HCO3)	608		5.0	mg/L		09-AUG-18	R4162144
Carbonate (CO3)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Hydroxide (OH)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Alkalinity, Total (as CaCO3)	498		2.0	mg/L		09-AUG-18	R4162144
L2139927-3 MW-06							
Sampled By: RM on 31-JUL-18 @ 14:40							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Toluene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
EthylBenzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
m+p-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
o-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Styrene	<0.0010		0.0010	mg/L	02-AUG-18	03-AUG-18	R4151477
F1(C6-C10)	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-3 MW-06							
Sampled By: RM on 31-JUL-18 @ 14:40							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
F1-BTEX	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
Xylenes	<0.00071		0.00071	mg/L	02-AUG-18	03-AUG-18	R4151477
Surrogate: 1,4-Difluorobenzene (SS)	100.7		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 4-Bromofluorobenzene (SS)	92.8		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 3,4-Dichlorotoluene (SS)	117.7		70-130	%	02-AUG-18	03-AUG-18	R4151477
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-AUG-18	02-AUG-18	R4158207
Surrogate: 2-Bromobenzotrifluoride	102.0		60-140	%	02-AUG-18	02-AUG-18	R4158207
Miscellaneous Parameters							
Ammonia, Total Dissolved (as N)	1.52		0.050	mg/L		02-AUG-18	R4161301
Dissolved Organic Carbon	6.90		0.50	mg/L		14-AUG-18	R4170716
Phenols (4AAP)	0.0012		0.0010	mg/L		07-AUG-18	R4161179
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					20-AUG-18	R4178482
Aluminum (Al)-Dissolved	0.131	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Antimony (Sb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Arsenic (As)-Dissolved	0.00607	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Barium (Ba)-Dissolved	0.0322	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Boron (B)-Dissolved	0.148	DLDS	0.050	mg/L		20-AUG-18	R4178507
Cadmium (Cd)-Dissolved	<0.000025	DLDS	0.000025	mg/L		20-AUG-18	R4178507
Calcium (Ca)-Dissolved	172	DLDS	0.25	mg/L		20-AUG-18	R4178507
Chromium (Cr)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Copper (Cu)-Dissolved	<0.0010	DLDS	0.0010	mg/L		20-AUG-18	R4178507
Iron (Fe)-Dissolved	6.76	DLDS	0.050	mg/L		20-AUG-18	R4178507
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Magnesium (Mg)-Dissolved	67.2	DLDS	0.025	mg/L		20-AUG-18	R4178507
Manganese (Mn)-Dissolved	1.74	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Nickel (Ni)-Dissolved	<0.0025	DLDS	0.0025	mg/L		20-AUG-18	R4178507
Potassium (K)-Dissolved	5.62	DLDS	0.25	mg/L		20-AUG-18	R4178507
Selenium (Se)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Silver (Ag)-Dissolved	<0.000050	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Sodium (Na)-Dissolved	153	DLDS	0.25	mg/L		20-AUG-18	R4178507
Uranium (U)-Dissolved	0.00166	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Zinc (Zn)-Dissolved	<0.0050	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	4.41		0.50	mg/L		02-AUG-18	R4158668
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					16-AUG-18	R4171933
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		16-AUG-18	R4173229
Fluoride in Water by IC							
Fluoride (F)	0.170		0.020	mg/L		02-AUG-18	R4158668
Ion Balance Calculation							
Ion Balance	103			%		21-AUG-18	
TDS (Calculated)	1210			mg/L		21-AUG-18	
Hardness (as CaCO3)	706			mg/L		21-AUG-18	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		02-AUG-18	R4158668
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		03-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		02-AUG-18	R4158668

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-3 MW-06							
Sampled By: RM on 31-JUL-18 @ 14:40							
Matrix: WATER							
Sulfate in Water by IC							
Sulfate (SO4)	528		0.30	mg/L		02-AUG-18	R4158668
pH, Conductivity and Total Alkalinity							
pH	8.09		0.10	pH		09-AUG-18	R4162144
Conductivity (EC)	1590		2.0	uS/cm		09-AUG-18	R4162144
Bicarbonate (HCO3)	564		5.0	mg/L		09-AUG-18	R4162144
Carbonate (CO3)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Hydroxide (OH)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Alkalinity, Total (as CaCO3)	462		2.0	mg/L		09-AUG-18	R4162144
L2139927-4 MW-03							
Sampled By: RM on 31-JUL-18 @ 16:10							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Toluene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
EthylBenzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
m+p-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
o-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Styrene	<0.0010		0.0010	mg/L	02-AUG-18	03-AUG-18	R4151477
F1(C6-C10)	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
F1-BTEX	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
Xylenes	<0.00071		0.00071	mg/L	02-AUG-18	03-AUG-18	R4151477
Surrogate: 1,4-Difluorobenzene (SS)	101.4		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 4-Bromofluorobenzene (SS)	92.5		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 3,4-Dichlorotoluene (SS)	114.2		70-130	%	02-AUG-18	03-AUG-18	R4151477
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-AUG-18	02-AUG-18	R4158207
Surrogate: 2-Bromobenzotrifluoride	105.1		60-140	%	02-AUG-18	02-AUG-18	R4158207
Miscellaneous Parameters							
Ammonia, Total Dissolved (as N)	0.338		0.050	mg/L		02-AUG-18	R4161301
Dissolved Organic Carbon	3.27		0.50	mg/L		14-AUG-18	R4170716
Phenols (4AAP)	<0.0010		0.0010	mg/L		07-AUG-18	R4161179
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					20-AUG-18	R4178482
Aluminum (Al)-Dissolved	0.327		0.0010	mg/L		20-AUG-18	R4178507
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L		20-AUG-18	R4178507
Arsenic (As)-Dissolved	0.00197		0.00010	mg/L		20-AUG-18	R4178507
Barium (Ba)-Dissolved	0.0523		0.00010	mg/L		20-AUG-18	R4178507
Boron (B)-Dissolved	0.098		0.010	mg/L		20-AUG-18	R4178507
Cadmium (Cd)-Dissolved	0.0000156		0.0000050	mg/L		20-AUG-18	R4178507
Calcium (Ca)-Dissolved	97.0		0.050	mg/L		20-AUG-18	R4178507
Chromium (Cr)-Dissolved	0.00088		0.00010	mg/L		20-AUG-18	R4178507
Copper (Cu)-Dissolved	0.00126		0.00020	mg/L		20-AUG-18	R4178507
Iron (Fe)-Dissolved	6.22		0.010	mg/L		20-AUG-18	R4178507
Lead (Pb)-Dissolved	0.000295		0.000050	mg/L		20-AUG-18	R4178507
Magnesium (Mg)-Dissolved	41.9		0.0050	mg/L		20-AUG-18	R4178507
Manganese (Mn)-Dissolved	0.297		0.00010	mg/L		20-AUG-18	R4178507
Nickel (Ni)-Dissolved	0.00232		0.00050	mg/L		20-AUG-18	R4178507
Potassium (K)-Dissolved	3.41		0.050	mg/L		20-AUG-18	R4178507
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L		20-AUG-18	R4178507
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		20-AUG-18	R4178507

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-4 MW-03							
Sampled By: RM on 31-JUL-18 @ 16:10							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Sodium (Na)-Dissolved	56.1		0.050	mg/L		20-AUG-18	R4178507
Uranium (U)-Dissolved	0.000478		0.000010	mg/L		20-AUG-18	R4178507
Zinc (Zn)-Dissolved	0.0029		0.0010	mg/L		20-AUG-18	R4178507
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	60.8		0.50	mg/L		02-AUG-18	R4158668
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					16-AUG-18	R4171933
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		16-AUG-18	R4173229
Fluoride in Water by IC							
Fluoride (F)	0.102		0.020	mg/L		02-AUG-18	R4158668
Ion Balance Calculation							
Ion Balance	98.1			%		21-AUG-18	
TDS (Calculated)	587			mg/L		21-AUG-18	
Hardness (as CaCO3)	415			mg/L		21-AUG-18	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		02-AUG-18	R4158668
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		03-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		02-AUG-18	R4158668
Sulfate in Water by IC							
Sulfate (SO4)	128		0.30	mg/L		02-AUG-18	R4158668
pH, Conductivity and Total Alkalinity							
pH	8.07		0.10	pH		09-AUG-18	R4162144
Conductivity (EC)	941		2.0	uS/cm		09-AUG-18	R4162144
Bicarbonate (HCO3)	405		5.0	mg/L		09-AUG-18	R4162144
Carbonate (CO3)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Hydroxide (OH)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Alkalinity, Total (as CaCO3)	332		2.0	mg/L		09-AUG-18	R4162144
L2139927-5 MW-05							
Sampled By: RM on 31-JUL-18 @ 17:00							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Toluene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
EthylBenzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
m+p-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
o-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Styrene	<0.0010		0.0010	mg/L	02-AUG-18	03-AUG-18	R4151477
F1(C6-C10)	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
F1-BTEX	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
Xylenes	<0.00071		0.00071	mg/L	02-AUG-18	03-AUG-18	R4151477
Surrogate: 1,4-Difluorobenzene (SS)	102.1		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 4-Bromofluorobenzene (SS)	92.8		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 3,4-Dichlorotoluene (SS)	122.0		70-130	%	02-AUG-18	03-AUG-18	R4151477
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-AUG-18	02-AUG-18	R4158207
Surrogate: 2-Bromobenzotrifluoride	107.8		60-140	%	02-AUG-18	02-AUG-18	R4158207
Miscellaneous Parameters							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-5 MW-05							
Sampled By: RM on 31-JUL-18 @ 17:00							
Matrix: WATER							
Ammonia, Total Dissolved (as N)	0.224		0.050	mg/L		02-AUG-18	R4161301
Dissolved Organic Carbon	3.72		0.50	mg/L		14-AUG-18	R4170716
Phenols (4AAP)	0.0013		0.0010	mg/L		07-AUG-18	R4161179
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					20-AUG-18	R4178482
Aluminum (Al)-Dissolved	0.0015		0.0010	mg/L		20-AUG-18	R4178507
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L		20-AUG-18	R4178507
Arsenic (As)-Dissolved	0.00251		0.00010	mg/L		20-AUG-18	R4178507
Barium (Ba)-Dissolved	0.0520		0.00010	mg/L		20-AUG-18	R4178507
Boron (B)-Dissolved	0.045		0.010	mg/L		20-AUG-18	R4178507
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		20-AUG-18	R4178507
Calcium (Ca)-Dissolved	93.2		0.050	mg/L		20-AUG-18	R4178507
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		20-AUG-18	R4178507
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L		20-AUG-18	R4178507
Iron (Fe)-Dissolved	4.93		0.010	mg/L		20-AUG-18	R4178507
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		20-AUG-18	R4178507
Magnesium (Mg)-Dissolved	39.4		0.0050	mg/L		20-AUG-18	R4178507
Manganese (Mn)-Dissolved	0.785		0.00010	mg/L		20-AUG-18	R4178507
Nickel (Ni)-Dissolved	0.00125		0.00050	mg/L		20-AUG-18	R4178507
Potassium (K)-Dissolved	9.13		0.050	mg/L		20-AUG-18	R4178507
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L		20-AUG-18	R4178507
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		20-AUG-18	R4178507
Sodium (Na)-Dissolved	46.5		0.050	mg/L		20-AUG-18	R4178507
Uranium (U)-Dissolved	0.000532		0.000010	mg/L		20-AUG-18	R4178507
Zinc (Zn)-Dissolved	0.0013		0.0010	mg/L		20-AUG-18	R4178507
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	40.0		0.50	mg/L		02-AUG-18	R4158668
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					16-AUG-18	R4171933
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		16-AUG-18	R4173229
Fluoride in Water by IC							
Fluoride (F)	0.099		0.020	mg/L		02-AUG-18	R4158668
Ion Balance Calculation							
Ion Balance	96.0			%		21-AUG-18	
TDS (Calculated)	563			mg/L		21-AUG-18	
Hardness (as CaCO3)	395			mg/L		21-AUG-18	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		02-AUG-18	R4158668
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		03-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		02-AUG-18	R4158668
Sulfate in Water by IC							
Sulfate (SO4)	136		0.30	mg/L		02-AUG-18	R4158668
pH, Conductivity and Total Alkalinity							
pH	8.08		0.10	pH		09-AUG-18	R4162144
Conductivity (EC)	905		2.0	uS/cm		09-AUG-18	R4162144
Bicarbonate (HCO3)	403		5.0	mg/L		09-AUG-18	R4162144
Carbonate (CO3)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Hydroxide (OH)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Alkalinity, Total (as CaCO3)	331		2.0	mg/L		09-AUG-18	R4162144

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-6 MW-08							
Sampled By: RM on 01-AUG-18 @ 09:00							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Toluene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
EthylBenzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
m+p-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
o-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Styrene	<0.0010		0.0010	mg/L	02-AUG-18	03-AUG-18	R4151477
F1(C6-C10)	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
F1-BTEX	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
Xylenes	<0.00071		0.00071	mg/L	02-AUG-18	03-AUG-18	R4151477
Surrogate: 1,4-Difluorobenzene (SS)	100.3		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 4-Bromofluorobenzene (SS)	90.3		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 3,4-Dichlorotoluene (SS)	120.2		70-130	%	02-AUG-18	03-AUG-18	R4151477
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-AUG-18	02-AUG-18	R4158207
Surrogate: 2-Bromobenzotrifluoride	100.9		60-140	%	02-AUG-18	02-AUG-18	R4158207
Miscellaneous Parameters							
Ammonia, Total Dissolved (as N)	1.73		0.050	mg/L		02-AUG-18	R4161301
Dissolved Organic Carbon	6.15		0.50	mg/L		14-AUG-18	R4170716
Phenols (4AAP)	0.0010		0.0010	mg/L		07-AUG-18	R4161179
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					20-AUG-18	R4178482
Aluminum (Al)-Dissolved	<0.0050	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Antimony (Sb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Arsenic (As)-Dissolved	0.00513	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Barium (Ba)-Dissolved	0.0274	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Boron (B)-Dissolved	0.201	DLDS	0.050	mg/L		20-AUG-18	R4178507
Cadmium (Cd)-Dissolved	<0.000025	DLDS	0.000025	mg/L		20-AUG-18	R4178507
Calcium (Ca)-Dissolved	151	DLDS	0.25	mg/L		20-AUG-18	R4178507
Chromium (Cr)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Copper (Cu)-Dissolved	<0.0010	DLDS	0.0010	mg/L		20-AUG-18	R4178507
Iron (Fe)-Dissolved	8.45	DLDS	0.050	mg/L		20-AUG-18	R4178507
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Magnesium (Mg)-Dissolved	45.9	DLDS	0.025	mg/L		20-AUG-18	R4178507
Manganese (Mn)-Dissolved	0.495	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Nickel (Ni)-Dissolved	<0.0025	DLDS	0.0025	mg/L		20-AUG-18	R4178507
Potassium (K)-Dissolved	6.14	DLDS	0.25	mg/L		20-AUG-18	R4178507
Selenium (Se)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Silver (Ag)-Dissolved	<0.000050	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Sodium (Na)-Dissolved	135	DLDS	0.25	mg/L		20-AUG-18	R4178507
Uranium (U)-Dissolved	0.000728	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Zinc (Zn)-Dissolved	<0.0050	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	1.59		0.50	mg/L		02-AUG-18	R4158668
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					16-AUG-18	R4171933
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		16-AUG-18	R4173229
Fluoride in Water by IC							
Fluoride (F)	0.130		0.020	mg/L		02-AUG-18	R4158668
Ion Balance Calculation							
Ion Balance	103			%		21-AUG-18	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-6 MW-08							
Sampled By: RM on 01-AUG-18 @ 09:00							
Matrix: WATER							
Ion Balance Calculation							
TDS (Calculated)	987			mg/L		21-AUG-18	
Hardness (as CaCO3)	566			mg/L		21-AUG-18	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		02-AUG-18	R4158668
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		03-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		02-AUG-18	R4158668
Sulfate in Water by IC							
Sulfate (SO4)	387		0.30	mg/L		02-AUG-18	R4158668
pH, Conductivity and Total Alkalinity							
pH	8.18		0.10	pH		09-AUG-18	R4162144
Conductivity (EC)	1360		2.0	uS/cm		09-AUG-18	R4162144
Bicarbonate (HCO3)	529		5.0	mg/L		09-AUG-18	R4162144
Carbonate (CO3)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Hydroxide (OH)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Alkalinity, Total (as CaCO3)	433		2.0	mg/L		09-AUG-18	R4162144
L2139927-7 MW-09							
Sampled By: RM on 01-AUG-18 @ 10:00							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Toluene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
EthylBenzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
m+p-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
o-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Styrene	<0.0010		0.0010	mg/L	02-AUG-18	03-AUG-18	R4151477
F1(C6-C10)	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
F1-BTEX	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
Xylenes	<0.00071		0.00071	mg/L	02-AUG-18	03-AUG-18	R4151477
Surrogate: 1,4-Difluorobenzene (SS)	100.6		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 4-Bromofluorobenzene (SS)	88.9		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 3,4-Dichlorotoluene (SS)	120.6		70-130	%	02-AUG-18	03-AUG-18	R4151477
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-AUG-18	02-AUG-18	R4158207
Surrogate: 2-Bromobenzotrifluoride	103.8		60-140	%	02-AUG-18	02-AUG-18	R4158207
Miscellaneous Parameters							
Ammonia, Total Dissolved (as N)	1.97		0.050	mg/L		02-AUG-18	R4161301
Dissolved Organic Carbon	6.57		0.50	mg/L		14-AUG-18	R4170716
Phenols (4AAP)	0.0015		0.0010	mg/L		07-AUG-18	R4161179
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					20-AUG-18	R4178482
Aluminum (Al)-Dissolved	<0.0050	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Antimony (Sb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Arsenic (As)-Dissolved	0.00243	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Barium (Ba)-Dissolved	0.0199	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Boron (B)-Dissolved	0.268	DLDS	0.050	mg/L		20-AUG-18	R4178507
Cadmium (Cd)-Dissolved	<0.000025	DLDS	0.000025	mg/L		20-AUG-18	R4178507
Calcium (Ca)-Dissolved	93.1	DLDS	0.25	mg/L		20-AUG-18	R4178507
Chromium (Cr)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-7 MW-09							
Sampled By: RM on 01-AUG-18 @ 10:00							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Copper (Cu)-Dissolved	<0.0010	DLDS	0.0010	mg/L		20-AUG-18	R4178507
Iron (Fe)-Dissolved	2.01	DLDS	0.050	mg/L		20-AUG-18	R4178507
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Magnesium (Mg)-Dissolved	28.2	DLDS	0.025	mg/L		20-AUG-18	R4178507
Manganese (Mn)-Dissolved	0.813	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Nickel (Ni)-Dissolved	<0.0025	DLDS	0.0025	mg/L		20-AUG-18	R4178507
Potassium (K)-Dissolved	4.04	DLDS	0.25	mg/L		20-AUG-18	R4178507
Selenium (Se)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Silver (Ag)-Dissolved	<0.000050	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Sodium (Na)-Dissolved	242	DLDS	0.25	mg/L		20-AUG-18	R4178507
Uranium (U)-Dissolved	0.00117	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Zinc (Zn)-Dissolved	<0.0050	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	5.20		0.50	mg/L		02-AUG-18	R4158668
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					16-AUG-18	R4171933
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		16-AUG-18	R4173229
Fluoride in Water by IC							
Fluoride (F)	0.250		0.020	mg/L		02-AUG-18	R4158668
Ion Balance Calculation							
Ion Balance	107			%		21-AUG-18	
TDS (Calculated)	993			mg/L		21-AUG-18	
Hardness (as CaCO3)	349			mg/L		21-AUG-18	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		02-AUG-18	R4158668
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		03-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		02-AUG-18	R4158668
Sulfate in Water by IC							
Sulfate (SO4)	347		0.30	mg/L		02-AUG-18	R4158668
pH, Conductivity and Total Alkalinity							
pH	8.28		0.10	pH		09-AUG-18	R4162144
Conductivity (EC)	1420		2.0	uS/cm		09-AUG-18	R4162144
Bicarbonate (HCO3)	556		5.0	mg/L		09-AUG-18	R4162144
Carbonate (CO3)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Hydroxide (OH)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Alkalinity, Total (as CaCO3)	456		2.0	mg/L		09-AUG-18	R4162144
L2139927-8 MW-11							
Sampled By: RM on 01-AUG-18 @ 11:05							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Toluene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
EthylBenzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
m+p-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
o-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Styrene	<0.0010		0.0010	mg/L	02-AUG-18	03-AUG-18	R4151477
F1(C6-C10)	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-8 MW-11							
Sampled By: RM on 01-AUG-18 @ 11:05							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
F1-BTEX	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
Xylenes	<0.00071		0.00071	mg/L	02-AUG-18	03-AUG-18	R4151477
Surrogate: 1,4-Difluorobenzene (SS)	100.5		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 4-Bromofluorobenzene (SS)	89.5		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 3,4-Dichlorotoluene (SS)	119.9		70-130	%	02-AUG-18	03-AUG-18	R4151477
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-AUG-18	02-AUG-18	R4158207
Surrogate: 2-Bromobenzotrifluoride	101.6		60-140	%	02-AUG-18	02-AUG-18	R4158207
Miscellaneous Parameters							
Ammonia, Total Dissolved (as N)	1.41		0.050	mg/L		02-AUG-18	R4161301
Dissolved Organic Carbon	6.77		0.50	mg/L		14-AUG-18	R4170716
Phenols (4AAP)	0.0011		0.0010	mg/L		07-AUG-18	R4161179
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					20-AUG-18	R4178482
Aluminum (Al)-Dissolved	0.0082	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Antimony (Sb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Arsenic (As)-Dissolved	0.00257	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Barium (Ba)-Dissolved	0.0388	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Boron (B)-Dissolved	0.198	DLDS	0.050	mg/L		20-AUG-18	R4178507
Cadmium (Cd)-Dissolved	<0.000025	DLDS	0.000025	mg/L		20-AUG-18	R4178507
Calcium (Ca)-Dissolved	148	DLDS	0.25	mg/L		20-AUG-18	R4178507
Chromium (Cr)-Dissolved	0.00325	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Copper (Cu)-Dissolved	<0.0010	DLDS	0.0010	mg/L		20-AUG-18	R4178507
Iron (Fe)-Dissolved	7.33	DLDS	0.050	mg/L		20-AUG-18	R4178507
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Magnesium (Mg)-Dissolved	45.1	DLDS	0.025	mg/L		20-AUG-18	R4178507
Manganese (Mn)-Dissolved	0.626	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Nickel (Ni)-Dissolved	<0.0025	DLDS	0.0025	mg/L		20-AUG-18	R4178507
Potassium (K)-Dissolved	4.77	DLDS	0.25	mg/L		20-AUG-18	R4178507
Selenium (Se)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Silver (Ag)-Dissolved	<0.000050	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Sodium (Na)-Dissolved	96.4	DLDS	0.25	mg/L		20-AUG-18	R4178507
Uranium (U)-Dissolved	0.000950	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Zinc (Zn)-Dissolved	<0.0050	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	9.38		0.50	mg/L		02-AUG-18	R4158668
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					16-AUG-18	R4171933
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		16-AUG-18	R4173229
Fluoride in Water by IC							
Fluoride (F)	0.126		0.020	mg/L		02-AUG-18	R4158668
Ion Balance Calculation							
Ion Balance	105			%		21-AUG-18	
TDS (Calculated)	823			mg/L		21-AUG-18	
Hardness (as CaCO3)	555			mg/L		21-AUG-18	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		02-AUG-18	R4158668
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		03-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		02-AUG-18	R4158668

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-8 MW-11							
Sampled By: RM on 01-AUG-18 @ 11:05							
Matrix: WATER							
Sulfate in Water by IC							
Sulfate (SO4)	228		0.30	mg/L		02-AUG-18	R4158668
pH, Conductivity and Total Alkalinity							
pH	8.25		0.10	pH		09-AUG-18	R4162144
Conductivity (EC)	1210		2.0	uS/cm		09-AUG-18	R4162144
Bicarbonate (HCO3)	593		5.0	mg/L		09-AUG-18	R4162144
Carbonate (CO3)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Hydroxide (OH)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Alkalinity, Total (as CaCO3)	486		2.0	mg/L		09-AUG-18	R4162144
L2139927-9 MW-10							
Sampled By: RM on 01-AUG-18 @ 12:55							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Toluene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
EthylBenzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
m+p-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
o-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Styrene	<0.0010		0.0010	mg/L	02-AUG-18	03-AUG-18	R4151477
F1(C6-C10)	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
F1-BTEX	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
Xylenes	<0.00071		0.00071	mg/L	02-AUG-18	03-AUG-18	R4151477
Surrogate: 1,4-Difluorobenzene (SS)	101.0		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 4-Bromofluorobenzene (SS)	87.8		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 3,4-Dichlorotoluene (SS)	119.0		70-130	%	02-AUG-18	03-AUG-18	R4151477
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-AUG-18	02-AUG-18	R4158207
Surrogate: 2-Bromobenzotrifluoride	103.4		60-140	%	02-AUG-18	02-AUG-18	R4158207
Miscellaneous Parameters							
Ammonia, Total Dissolved (as N)	1.63		0.050	mg/L		02-AUG-18	R4161301
Dissolved Organic Carbon	6.12		0.50	mg/L		14-AUG-18	R4170716
Phenols (4AAP)	0.0011		0.0010	mg/L		07-AUG-18	R4161179
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					20-AUG-18	R4178482
Aluminum (Al)-Dissolved	0.0192	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Antimony (Sb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Arsenic (As)-Dissolved	0.00453	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Barium (Ba)-Dissolved	0.0295	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Boron (B)-Dissolved	0.176	DLDS	0.050	mg/L		20-AUG-18	R4178507
Cadmium (Cd)-Dissolved	<0.000025	DLDS	0.000025	mg/L		20-AUG-18	R4178507
Calcium (Ca)-Dissolved	130	DLDS	0.25	mg/L		20-AUG-18	R4178507
Chromium (Cr)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Copper (Cu)-Dissolved	<0.0010	DLDS	0.0010	mg/L		20-AUG-18	R4178507
Iron (Fe)-Dissolved	6.51	DLDS	0.050	mg/L		20-AUG-18	R4178507
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Magnesium (Mg)-Dissolved	38.8	DLDS	0.025	mg/L		20-AUG-18	R4178507
Manganese (Mn)-Dissolved	0.692	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Nickel (Ni)-Dissolved	<0.0025	DLDS	0.0025	mg/L		20-AUG-18	R4178507
Potassium (K)-Dissolved	5.58	DLDS	0.25	mg/L		20-AUG-18	R4178507
Selenium (Se)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Silver (Ag)-Dissolved	<0.000050	DLDS	0.000050	mg/L		20-AUG-18	R4178507

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-9 MW-10							
Sampled By: RM on 01-AUG-18 @ 12:55							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Sodium (Na)-Dissolved	119	DLDS	0.25	mg/L		20-AUG-18	R4178507
Uranium (U)-Dissolved	0.00111	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Zinc (Zn)-Dissolved	0.0168	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	0.75		0.50	mg/L		02-AUG-18	R4158668
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					16-AUG-18	R4171933
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		16-AUG-18	R4173229
Fluoride in Water by IC							
Fluoride (F)	0.187		0.020	mg/L		02-AUG-18	R4158668
Ion Balance Calculation							
Ion Balance	104			%		21-AUG-18	
TDS (Calculated)	811			mg/L		21-AUG-18	
Hardness (as CaCO3)	484			mg/L		21-AUG-18	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		02-AUG-18	R4158668
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		03-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		02-AUG-18	R4158668
Sulfate in Water by IC							
Sulfate (SO4)	229		0.30	mg/L		02-AUG-18	R4158668
pH, Conductivity and Total Alkalinity							
pH	8.27		0.10	pH		09-AUG-18	R4162144
Conductivity (EC)	1200		2.0	uS/cm		09-AUG-18	R4162144
Bicarbonate (HCO3)	585		5.0	mg/L		09-AUG-18	R4162144
Carbonate (CO3)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Hydroxide (OH)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Alkalinity, Total (as CaCO3)	480		2.0	mg/L		09-AUG-18	R4162144
L2139927-10 MW-12							
Sampled By: RM on 01-AUG-18 @ 14:10							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Toluene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
EthylBenzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
m+p-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
o-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Styrene	<0.0010		0.0010	mg/L	02-AUG-18	03-AUG-18	R4151477
F1(C6-C10)	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
F1-BTEX	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
Xylenes	<0.00071		0.00071	mg/L	02-AUG-18	03-AUG-18	R4151477
Surrogate: 1,4-Difluorobenzene (SS)	101.3		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 4-Bromofluorobenzene (SS)	90.6		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 3,4-Dichlorotoluene (SS)	122.7		70-130	%	02-AUG-18	03-AUG-18	R4151477
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-AUG-18	02-AUG-18	R4158207
Surrogate: 2-Bromobenzotrifluoride	105.7		60-140	%	02-AUG-18	02-AUG-18	R4158207
Miscellaneous Parameters							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-10 MW-12							
Sampled By: RM on 01-AUG-18 @ 14:10							
Matrix: WATER							
Ammonia, Total Dissolved (as N)	1.36		0.050	mg/L		02-AUG-18	R4161301
Dissolved Organic Carbon	7.24		0.50	mg/L		14-AUG-18	R4170716
Phenols (4AAP)	0.0017		0.0010	mg/L		07-AUG-18	R4161179
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					20-AUG-18	R4178482
Aluminum (Al)-Dissolved	0.0446		0.0010	mg/L		20-AUG-18	R4178507
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L		20-AUG-18	R4178507
Arsenic (As)-Dissolved	0.00315		0.00010	mg/L		20-AUG-18	R4178507
Barium (Ba)-Dissolved	0.124		0.00010	mg/L		20-AUG-18	R4178507
Boron (B)-Dissolved	0.191		0.010	mg/L		20-AUG-18	R4178507
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		20-AUG-18	R4178507
Calcium (Ca)-Dissolved	81.2		0.050	mg/L		20-AUG-18	R4178507
Chromium (Cr)-Dissolved	0.00013		0.00010	mg/L		20-AUG-18	R4178507
Copper (Cu)-Dissolved	0.00024		0.00020	mg/L		20-AUG-18	R4178507
Iron (Fe)-Dissolved	4.17		0.010	mg/L		20-AUG-18	R4178507
Lead (Pb)-Dissolved	0.000063		0.000050	mg/L		20-AUG-18	R4178507
Magnesium (Mg)-Dissolved	31.3		0.0050	mg/L		20-AUG-18	R4178507
Manganese (Mn)-Dissolved	0.493		0.00010	mg/L		20-AUG-18	R4178507
Nickel (Ni)-Dissolved	0.00076		0.00050	mg/L		20-AUG-18	R4178507
Potassium (K)-Dissolved	5.66		0.050	mg/L		20-AUG-18	R4178507
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L		20-AUG-18	R4178507
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		20-AUG-18	R4178507
Sodium (Na)-Dissolved	111		0.050	mg/L		20-AUG-18	R4178507
Uranium (U)-Dissolved	0.000667		0.000010	mg/L		20-AUG-18	R4178507
Zinc (Zn)-Dissolved	0.0015		0.0010	mg/L		20-AUG-18	R4178507
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	5.75		0.50	mg/L		02-AUG-18	R4158668
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					16-AUG-18	R4171933
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		16-AUG-18	R4173229
Fluoride in Water by IC							
Fluoride (F)	0.103		0.020	mg/L		02-AUG-18	R4158668
Ion Balance Calculation							
Ion Balance	100			%		21-AUG-18	
TDS (Calculated)	593			mg/L		21-AUG-18	
Hardness (as CaCO3)	332			mg/L		21-AUG-18	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		02-AUG-18	R4158668
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		03-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		02-AUG-18	R4158668
Sulfate in Water by IC							
Sulfate (SO4)	38.9		0.30	mg/L		02-AUG-18	R4158668
pH, Conductivity and Total Alkalinity							
pH	8.06		0.10	pH		09-AUG-18	R4162144
Conductivity (EC)	969		2.0	uS/cm		09-AUG-18	R4162144
Bicarbonate (HCO3)	648		5.0	mg/L		09-AUG-18	R4162144
Carbonate (CO3)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Hydroxide (OH)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Alkalinity, Total (as CaCO3)	531		2.0	mg/L		09-AUG-18	R4162144

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-11 MW-13							
Sampled By: RM on 01-AUG-18 @ 14:45							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Toluene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
EthylBenzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
m+p-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
o-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Styrene	<0.0010		0.0010	mg/L	02-AUG-18	03-AUG-18	R4151477
F1(C6-C10)	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
F1-BTEX	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
Xylenes	<0.00071		0.00071	mg/L	02-AUG-18	03-AUG-18	R4151477
Surrogate: 1,4-Difluorobenzene (SS)	100.2		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 4-Bromofluorobenzene (SS)	97.3		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 3,4-Dichlorotoluene (SS)	122.6		70-130	%	02-AUG-18	03-AUG-18	R4151477
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-AUG-18	02-AUG-18	R4158207
Surrogate: 2-Bromobenzotrifluoride	103.0		60-140	%	02-AUG-18	02-AUG-18	R4158207
Miscellaneous Parameters							
Ammonia, Total Dissolved (as N)	1.26		0.050	mg/L		02-AUG-18	R4161301
Dissolved Organic Carbon	4.92		0.50	mg/L		14-AUG-18	R4170716
Phenols (4AAP)	0.0013		0.0010	mg/L		07-AUG-18	R4161179
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					20-AUG-18	R4178482
Aluminum (Al)-Dissolved	<0.0010		0.0010	mg/L		20-AUG-18	R4178507
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L		20-AUG-18	R4178507
Arsenic (As)-Dissolved	0.00193		0.00010	mg/L		20-AUG-18	R4178507
Barium (Ba)-Dissolved	0.473		0.00010	mg/L		20-AUG-18	R4178507
Boron (B)-Dissolved	0.222		0.010	mg/L		20-AUG-18	R4178507
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		20-AUG-18	R4178507
Calcium (Ca)-Dissolved	44.2		0.050	mg/L		20-AUG-18	R4178507
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		20-AUG-18	R4178507
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L		20-AUG-18	R4178507
Iron (Fe)-Dissolved	1.38		0.010	mg/L		20-AUG-18	R4178507
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		20-AUG-18	R4178507
Magnesium (Mg)-Dissolved	16.9		0.0050	mg/L		20-AUG-18	R4178507
Manganese (Mn)-Dissolved	0.237		0.00010	mg/L		20-AUG-18	R4178507
Nickel (Ni)-Dissolved	0.00083		0.00050	mg/L		20-AUG-18	R4178507
Potassium (K)-Dissolved	4.39		0.050	mg/L		20-AUG-18	R4178507
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L		20-AUG-18	R4178507
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		20-AUG-18	R4178507
Sodium (Na)-Dissolved	119		0.050	mg/L		20-AUG-18	R4178507
Uranium (U)-Dissolved	0.000547		0.000010	mg/L		20-AUG-18	R4178507
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		20-AUG-18	R4178507
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2.00		0.50	mg/L		02-AUG-18	R4158668
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					16-AUG-18	R4171933
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		16-AUG-18	R4173229
Fluoride in Water by IC							
Fluoride (F)	0.161		0.020	mg/L		02-AUG-18	R4158668
Ion Balance Calculation							
Ion Balance	102			%		21-AUG-18	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-11 MW-13							
Sampled By: RM on 01-AUG-18 @ 14:45							
Matrix: WATER							
Ion Balance Calculation							
TDS (Calculated)	449			mg/L		21-AUG-18	
Hardness (as CaCO3)	180			mg/L		21-AUG-18	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		02-AUG-18	R4158668
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		03-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		02-AUG-18	R4158668
Sulfate in Water by IC							
Sulfate (SO4)	10.4		0.30	mg/L		02-AUG-18	R4158668
pH, Conductivity and Total Alkalinity							
pH	8.14		0.10	pH		09-AUG-18	R4162144
Conductivity (EC)	734		2.0	uS/cm		09-AUG-18	R4162144
Bicarbonate (HCO3)	512		5.0	mg/L		09-AUG-18	R4162144
Carbonate (CO3)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Hydroxide (OH)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Alkalinity, Total (as CaCO3)	420		2.0	mg/L		09-AUG-18	R4162144
L2139927-12 MW-01							
Sampled By: RM on 01-AUG-18 @ 16:00							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Toluene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
EthylBenzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
m+p-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
o-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Styrene	<0.0010		0.0010	mg/L	02-AUG-18	03-AUG-18	R4151477
F1(C6-C10)	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
F1-BTEX	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
Xylenes	<0.00071		0.00071	mg/L	02-AUG-18	03-AUG-18	R4151477
Surrogate: 1,4-Difluorobenzene (SS)	100.1		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 4-Bromofluorobenzene (SS)	89.8		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 3,4-Dichlorotoluene (SS)	118.9		70-130	%	02-AUG-18	03-AUG-18	R4151477
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-AUG-18	02-AUG-18	R4158207
Surrogate: 2-Bromobenzotrifluoride	103.4		60-140	%	02-AUG-18	02-AUG-18	R4158207
Miscellaneous Parameters							
Ammonia, Total Dissolved (as N)	0.233		0.050	mg/L		02-AUG-18	R4161301
Dissolved Organic Carbon	2.63		0.50	mg/L		14-AUG-18	R4170716
Phenols (4AAP)	0.0016		0.0010	mg/L		07-AUG-18	R4161179
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					20-AUG-18	R4178482
Aluminum (Al)-Dissolved	<0.0050	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Antimony (Sb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Arsenic (As)-Dissolved	0.00094	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Barium (Ba)-Dissolved	0.127	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Boron (B)-Dissolved	0.088	DLDS	0.050	mg/L		20-AUG-18	R4178507
Cadmium (Cd)-Dissolved	<0.000025	DLDS	0.000025	mg/L		20-AUG-18	R4178507
Calcium (Ca)-Dissolved	89.8	DLDS	0.25	mg/L		20-AUG-18	R4178507
Chromium (Cr)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-12 MW-01							
Sampled By: RM on 01-AUG-18 @ 16:00							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Copper (Cu)-Dissolved	<0.0010	DLDS	0.0010	mg/L		20-AUG-18	R4178507
Iron (Fe)-Dissolved	1.94	DLDS	0.050	mg/L		20-AUG-18	R4178507
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Magnesium (Mg)-Dissolved	27.4	DLDS	0.025	mg/L		20-AUG-18	R4178507
Manganese (Mn)-Dissolved	0.690	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Nickel (Ni)-Dissolved	<0.0025	DLDS	0.0025	mg/L		20-AUG-18	R4178507
Potassium (K)-Dissolved	2.61	DLDS	0.25	mg/L		20-AUG-18	R4178507
Selenium (Se)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Silver (Ag)-Dissolved	<0.000050	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Sodium (Na)-Dissolved	35.3	DLDS	0.25	mg/L		20-AUG-18	R4178507
Uranium (U)-Dissolved	0.00176	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Zinc (Zn)-Dissolved	<0.0050	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	9.64		0.50	mg/L		02-AUG-18	R4158668
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					16-AUG-18	R4171933
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		16-AUG-18	R4173229
Fluoride in Water by IC							
Fluoride (F)	0.133		0.020	mg/L		02-AUG-18	R4158668
Ion Balance Calculation							
Ion Balance	98.7			%		21-AUG-18	
TDS (Calculated)	431			mg/L		21-AUG-18	
Hardness (as CaCO3)	337			mg/L		21-AUG-18	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		02-AUG-18	R4158668
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		03-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		02-AUG-18	R4158668
Sulfate in Water by IC							
Sulfate (SO4)	54.0		0.30	mg/L		02-AUG-18	R4158668
pH, Conductivity and Total Alkalinity							
pH	8.05		0.10	pH		09-AUG-18	R4162144
Conductivity (EC)	727		2.0	uS/cm		09-AUG-18	R4162144
Bicarbonate (HCO3)	430		5.0	mg/L		09-AUG-18	R4162144
Carbonate (CO3)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Hydroxide (OH)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Alkalinity, Total (as CaCO3)	353		2.0	mg/L		09-AUG-18	R4162144
L2139927-13 DUP18-01							
Sampled By: RM on 01-AUG-18 @ 11:10							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Toluene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
EthylBenzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
m+p-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
o-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Styrene	<0.0010		0.0010	mg/L	02-AUG-18	03-AUG-18	R4151477
F1(C6-C10)	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-13 DUP18-01							
Sampled By: RM on 01-AUG-18 @ 11:10							
Matrix: WATER							
BTEX, Styrene and F1 (C6-C10)							
F1-BTEX	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
Xylenes	<0.00071		0.00071	mg/L	02-AUG-18	03-AUG-18	R4151477
Surrogate: 1,4-Difluorobenzene (SS)	101.9		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 4-Bromofluorobenzene (SS)	91.3		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 3,4-Dichlorotoluene (SS)	123.0		70-130	%	02-AUG-18	03-AUG-18	R4151477
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	02-AUG-18	02-AUG-18	R4158207
Surrogate: 2-Bromobenzotrifluoride	101.4		60-140	%	02-AUG-18	02-AUG-18	R4158207
Miscellaneous Parameters							
Ammonia, Total Dissolved (as N)	1.38		0.050	mg/L		02-AUG-18	R4161301
Dissolved Organic Carbon	6.54		0.50	mg/L		14-AUG-18	R4170716
Phenols (4AAP)	<0.0010		0.0010	mg/L		07-AUG-18	R4161179
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					20-AUG-18	R4178482
Aluminum (Al)-Dissolved	0.0063	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Antimony (Sb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Arsenic (As)-Dissolved	0.00247	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Barium (Ba)-Dissolved	0.0393	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Boron (B)-Dissolved	0.194	DLDS	0.050	mg/L		20-AUG-18	R4178507
Cadmium (Cd)-Dissolved	<0.000025	DLDS	0.000025	mg/L		20-AUG-18	R4178507
Calcium (Ca)-Dissolved	132	DLDS	0.25	mg/L		20-AUG-18	R4178507
Chromium (Cr)-Dissolved	<0.00050	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Copper (Cu)-Dissolved	<0.0010	DLDS	0.0010	mg/L		20-AUG-18	R4178507
Iron (Fe)-Dissolved	7.23	DLDS	0.050	mg/L		20-AUG-18	R4178507
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Magnesium (Mg)-Dissolved	44.8	DLDS	0.025	mg/L		20-AUG-18	R4178507
Manganese (Mn)-Dissolved	0.627	DLDS	0.00050	mg/L		20-AUG-18	R4178507
Nickel (Ni)-Dissolved	<0.0025	DLDS	0.0025	mg/L		20-AUG-18	R4178507
Potassium (K)-Dissolved	4.82	DLDS	0.25	mg/L		20-AUG-18	R4178507
Selenium (Se)-Dissolved	<0.00025	DLDS	0.00025	mg/L		20-AUG-18	R4178507
Silver (Ag)-Dissolved	<0.000050	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Sodium (Na)-Dissolved	96.0	DLDS	0.25	mg/L		20-AUG-18	R4178507
Uranium (U)-Dissolved	0.000839	DLDS	0.000050	mg/L		20-AUG-18	R4178507
Zinc (Zn)-Dissolved	<0.0050	DLDS	0.0050	mg/L		20-AUG-18	R4178507
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	9.67		0.50	mg/L		02-AUG-18	R4158668
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					16-AUG-18	R4171933
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		16-AUG-18	R4173229
Fluoride in Water by IC							
Fluoride (F)	0.126		0.020	mg/L		02-AUG-18	R4158668
Ion Balance Calculation							
Ion Balance	96.3			%		21-AUG-18	
TDS (Calculated)	819			mg/L		21-AUG-18	
Hardness (as CaCO3)	514			mg/L		21-AUG-18	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		02-AUG-18	R4158668
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		03-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		02-AUG-18	R4158668

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139927-13 DUP18-01							
Sampled By: RM on 01-AUG-18 @ 11:10							
Matrix: WATER							
Sulfate in Water by IC							
Sulfate (SO4)	229		0.30	mg/L		02-AUG-18	R4158668
pH, Conductivity and Total Alkalinity							
pH	7.98		0.10	pH		09-AUG-18	R4162144
Conductivity (EC)	1230		2.0	uS/cm		09-AUG-18	R4162144
Bicarbonate (HCO3)	615		5.0	mg/L		09-AUG-18	R4162144
Carbonate (CO3)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Hydroxide (OH)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Alkalinity, Total (as CaCO3)	504		2.0	mg/L		09-AUG-18	R4162144

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)	EPA 5021/8015&8260 GC-MS & FID
C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310B

Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-N-ED	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

F-IC-N-ED	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

F2-ED	Water	F2 (>C10-C16)	EPA 3510/CCME PHC CWS-GC-FID
HG-D-CVAA-ED	Water	Dissolved Mercury in Water by CVAAS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

HYDG2-ISOTOPE-H2O-IS	Water	Hydrogen-2 water	Picarro Cavity Ring-Down Spectroscopy

A water sample is treated and filtered to remove particulates and some dissolved organics, then vaporised under vacuum. The water vapor travels into a cavity containing 3 mirrors in triangular arrangement. A laser beam enters the cavity and bounces between mirrors, expanding the effective path length. Vapor in the cavity will absorb a matched wavelength of light. A small gap in one mirror just in front of a photodetector allows the laser light to escape and be detected. Once the light intensity in the cavity reaches it's maximum, the laser is turned off and detection begins. Quantitation is achieved by measuring the amount of time it takes for the light to deplete to non-detectable levels (ring down time). A vapor high in Hydrogen-2 will deplete the laser quicker, because of the absorption occurring, than an empty cavity will. Rather than removing the vapor from the cavity, the wavelength is alternated to one that is not absorbed. This is Cavity Ring Down Spectroscopy.

IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-D-COL-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.

NO2+NO3-CALC-ED	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-ED	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-N-ED	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

OXY18-ISOTOPE-H2O-IS	Water	Oxygen-18 water	Picarro Cavity Ring-Down Spectroscopy

A water sample is treated and filtered to remove particulates and some dissolved organics, then vaporised under vacuum. The water vapor travels into a cavity containing 3 mirrors in triangular arrangement. A laser beam enters the cavity and bounces between mirrors, expanding the effective path length. Vapor in the cavity will absorb a matched wavelength of light. A small gap in one mirror just in front of a photodetector allows the laser light to escape and be detected. Once the light intensity in the cavity reaches it's maximum, the laser is turned off and detection begins. Quantitation is achieved by measuring the amount of time it takes for the light to deplete to non-detectable levels (ring down time). A vapor high in Oxygen-18 will deplete the laser quicker, because of the absorption occurring, than an empty cavity will. Rather than removing the vapor from the cavity, the wavelength is alternated to one that is not absorbed. This is Cavity Ring Down Spectroscopy.

PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320

All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed).
pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode.
Alkalinity measurement is based on the sample's capacity to neutralize acid. Auto-titration to pH 4.5 using 0.02N H_2SO_4 is performed.
Conductivity measurement is based on the sample's capacity to convey an electric current, and is measured with a conductivity meter.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.			
SO4-IC-N-ED	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
IS	ISOBRINE SOLUTIONS INC
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

17-657887 17-657888

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2139927 Report Date: 06-SEP-18

Client: WorleyParsons Canada
8615 51 Avenue
Edmonton AB T6E 6A8
Contact: Trevor Butterfield

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED	**Water**							
Batch R4151477								
WG2839798-4 DUP		**L2139927-1**						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	03-AUG-18
Toluene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	03-AUG-18
EthylBenzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	03-AUG-18
m+p-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	03-AUG-18
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	03-AUG-18
Styrene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	50	03-AUG-18
F1(C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	03-AUG-18
WG2839798-2 LCS								
Benzene			129.1		%		70-130	03-AUG-18
Toluene			126.3		%		70-130	03-AUG-18
EthylBenzene			120.2		%		70-130	03-AUG-18
m+p-Xylene			119.7		%		70-130	03-AUG-18
o-Xylene			124.3		%		70-130	03-AUG-18
Styrene			124.4		%		70-130	03-AUG-18
WG2839798-3 LCS								
F1(C6-C10)			113.9		%		70-130	03-AUG-18
WG2839798-1 MB								
Benzene			<0.00050		mg/L		0.0005	03-AUG-18
Toluene			<0.00050		mg/L		0.0005	03-AUG-18
EthylBenzene			<0.00050		mg/L		0.0005	03-AUG-18
m+p-Xylene			<0.00050		mg/L		0.0005	03-AUG-18
o-Xylene			<0.00050		mg/L		0.0005	03-AUG-18
Styrene			<0.0010		mg/L		0.001	03-AUG-18
F1(C6-C10)			<0.10		mg/L		0.1	03-AUG-18
Surrogate: 1,4-Difluorobenzene (SS)			100.5		%		70-130	03-AUG-18
Surrogate: 4-Bromofluorobenzene (SS)			92.1		%		70-130	03-AUG-18
Surrogate: 3,4-Dichlorotoluene (SS)			112.7		%		70-130	03-AUG-18
C-DIS-ORG-WT	**Water**							
Batch R4170716								
WG2849666-3 DUP		**L2139927-2**						
Dissolved Organic Carbon		6.27	6.29		mg/L	0.3	20	14-AUG-18
WG2849666-2 LCS								
Dissolved Organic Carbon			101.9		%		80-120	14-AUG-18
WG2849666-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	14-AUG-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-WT	**Water**							
Batch R4170716								
WG2849666-4 MS		**L2139927-1**						
Dissolved Organic Carbon			96.4		%		70-130	14-AUG-18
CL-IC-N-ED	**Water**							
Batch R4158668								
WG2839785-3 DUP		**L2139927-5**						
Chloride (Cl)		40.0	39.7		mg/L	0.8	20	02-AUG-18
WG2839785-13 LCS								
Chloride (Cl)			103.8		%		90-110	02-AUG-18
WG2839785-15 LCS								
Chloride (Cl)			104.3		%		90-110	02-AUG-18
WG2839785-17 LCS								
Chloride (Cl)			103.7		%		90-110	02-AUG-18
WG2839785-2 LCS								
Chloride (Cl)			104.2		%		90-110	02-AUG-18
WG2839785-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	02-AUG-18
WG2839785-14 MB								
Chloride (Cl)			<0.50		mg/L		0.5	02-AUG-18
WG2839785-16 MB								
Chloride (Cl)			<0.50		mg/L		0.5	02-AUG-18
WG2839785-18 MB								
Chloride (Cl)			<0.50		mg/L		0.5	02-AUG-18
WG2839785-4 MS		**L2139927-5**						
Chloride (Cl)			98.4		%		75-125	02-AUG-18
F-IC-N-ED	**Water**							
Batch R4158668								
WG2839785-3 DUP		**L2139927-5**						
Fluoride (F)		0.099	0.097		mg/L	2.4	20	02-AUG-18
WG2839785-13 LCS								
Fluoride (F)			104.7		%		90-110	02-AUG-18
WG2839785-15 LCS								
Fluoride (F)			105.5		%		90-110	02-AUG-18
WG2839785-17 LCS								
Fluoride (F)			102.3		%		90-110	02-AUG-18
WG2839785-2 LCS								
Fluoride (F)			104.1		%		90-110	02-AUG-18
WG2839785-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-ED	**Water**							
Batch R4158668								
WG2839785-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	02-AUG-18
WG2839785-14 MB								
Fluoride (F)			<0.020		mg/L		0.02	02-AUG-18
WG2839785-16 MB								
Fluoride (F)			<0.020		mg/L		0.02	02-AUG-18
WG2839785-18 MB								
Fluoride (F)			<0.020		mg/L		0.02	02-AUG-18
WG2839785-4 MS		**L2139927-5**						
Fluoride (F)			107.7		%		75-125	02-AUG-18
F2-ED	**Water**							
Batch R4158207								
WG2839617-2 LCS		**DIESEL/MOTOR OIL**						
F2 (C10-C16)			108.1		%		70-130	02-AUG-18
WG2839617-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	02-AUG-18
Surrogate: 2-Bromobenzotrifluoride			104.5		%		60-140	02-AUG-18
HG-D-CVAA-ED	**Water**							
Batch R4173229								
WG2851317-2 LCS								
Mercury (Hg)-Dissolved			94.0		%		80-120	16-AUG-18
WG2851317-1 MB								
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	16-AUG-18
MET-D-CCMS-CL	**Water**							
Batch R4178507								
WG2854564-7 DUP		**L2139927-13**						
Aluminum (Al)-Dissolved		0.0063	0.0059		mg/L	6.2	20	20-AUG-18
Antimony (Sb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	20-AUG-18
Arsenic (As)-Dissolved		0.00247	0.00249		mg/L	1.1	20	20-AUG-18
Barium (Ba)-Dissolved		0.0393	0.0395		mg/L	0.5	20	20-AUG-18
Boron (B)-Dissolved		0.194	0.195		mg/L	0.8	20	20-AUG-18
Cadmium (Cd)-Dissolved		<0.000025	<0.000025	RPD-NA	mg/L	N/A	20	20-AUG-18
Calcium (Ca)-Dissolved		132	136		mg/L	2.4	20	20-AUG-18
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	20-AUG-18
Copper (Cu)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-AUG-18
Iron (Fe)-Dissolved		7.23	7.41		mg/L	2.5	20	20-AUG-18
Lead (Pb)-Dissolved		<0.00025	<0.00025	RPD-NA	mg/L	N/A	20	20-AUG-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R4178507								
WG2854564-7 DUP		**L2139927-13**						
Magnesium (Mg)-Dissolved		44.8	46.4		mg/L	3.5	20	20-AUG-18
Manganese (Mn)-Dissolved		0.627	0.636		mg/L	1.4	20	20-AUG-18
Nickel (Ni)-Dissolved		<0.0025	<0.0025	RPD-NA	mg/L	N/A	20	20-AUG-18
Potassium (K)-Dissolved		4.82	4.87		mg/L	1.1	20	20-AUG-18
Selenium (Se)-Dissolved		<0.00025	<0.00025	RPD-NA	mg/L	N/A	20	20-AUG-18
Silver (Ag)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	20-AUG-18
Sodium (Na)-Dissolved		96.0	97.1		mg/L	1.1	20	20-AUG-18
Uranium (U)-Dissolved		0.000839	0.000882		mg/L	5.0	20	20-AUG-18
Zinc (Zn)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	20-AUG-18
WG2854564-10 LCS		**TMRM**						
Aluminum (Al)-Dissolved			98.0		%		80-120	20-AUG-18
Antimony (Sb)-Dissolved			110.7		%		80-120	20-AUG-18
Arsenic (As)-Dissolved			96.2		%		80-120	20-AUG-18
Barium (Ba)-Dissolved			95.1		%		80-120	20-AUG-18
Boron (B)-Dissolved			92.5		%		80-120	20-AUG-18
Cadmium (Cd)-Dissolved			95.6		%		80-120	20-AUG-18
Calcium (Ca)-Dissolved			98.7		%		80-120	20-AUG-18
Chromium (Cr)-Dissolved			98.8		%		80-120	20-AUG-18
Copper (Cu)-Dissolved			95.4		%		80-120	20-AUG-18
Iron (Fe)-Dissolved			102.1		%		80-120	20-AUG-18
Lead (Pb)-Dissolved			96.4		%		80-120	20-AUG-18
Magnesium (Mg)-Dissolved			104.1		%		80-120	20-AUG-18
Manganese (Mn)-Dissolved			99.3		%		80-120	20-AUG-18
Nickel (Ni)-Dissolved			96.6		%		80-120	20-AUG-18
Potassium (K)-Dissolved			100.1		%		80-120	20-AUG-18
Selenium (Se)-Dissolved			95.9		%		80-120	20-AUG-18
Silver (Ag)-Dissolved			90.7		%		80-120	20-AUG-18
Sodium (Na)-Dissolved			98.5		%		80-120	20-AUG-18
Uranium (U)-Dissolved			90.2		%		80-120	20-AUG-18
Zinc (Zn)-Dissolved			90.6		%		80-120	20-AUG-18
WG2854564-2 LCS		**TMRM**						
Aluminum (Al)-Dissolved			99.0		%		80-120	20-AUG-18
Antimony (Sb)-Dissolved			105.9		%		80-120	20-AUG-18
Arsenic (As)-Dissolved			98.6		%		80-120	20-AUG-18
Barium (Ba)-Dissolved			94.3		%		80-120	20-AUG-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R4178507								
WG2854564-2 LCS		**TMRM**						
Boron (B)-Dissolved			94.4		%		80-120	20-AUG-18
Cadmium (Cd)-Dissolved			96.9		%		80-120	20-AUG-18
Calcium (Ca)-Dissolved			95.7		%		80-120	20-AUG-18
Chromium (Cr)-Dissolved			97.2		%		80-120	20-AUG-18
Copper (Cu)-Dissolved			96.1		%		80-120	20-AUG-18
Iron (Fe)-Dissolved			102.1		%		80-120	20-AUG-18
Lead (Pb)-Dissolved			94.0		%		80-120	20-AUG-18
Magnesium (Mg)-Dissolved			100.7		%		80-120	20-AUG-18
Manganese (Mn)-Dissolved			98.6		%		80-120	20-AUG-18
Nickel (Ni)-Dissolved			94.7		%		80-120	20-AUG-18
Potassium (K)-Dissolved			98.6		%		80-120	20-AUG-18
Selenium (Se)-Dissolved			97.8		%		80-120	20-AUG-18
Silver (Ag)-Dissolved			90.1		%		80-120	20-AUG-18
Sodium (Na)-Dissolved			93.0		%		80-120	20-AUG-18
Uranium (U)-Dissolved			88.3		%		80-120	20-AUG-18
Zinc (Zn)-Dissolved			98.3		%		80-120	20-AUG-18
WG2854564-6 LCS		**TMRM**						
Aluminum (Al)-Dissolved			99.0		%		80-120	20-AUG-18
Antimony (Sb)-Dissolved			116.7		%		80-120	20-AUG-18
Arsenic (As)-Dissolved			99.3		%		80-120	20-AUG-18
Barium (Ba)-Dissolved			94.1		%		80-120	20-AUG-18
Boron (B)-Dissolved			99.1		%		80-120	20-AUG-18
Cadmium (Cd)-Dissolved			97.3		%		80-120	20-AUG-18
Calcium (Ca)-Dissolved			103.1		%		80-120	20-AUG-18
Chromium (Cr)-Dissolved			96.3		%		80-120	20-AUG-18
Copper (Cu)-Dissolved			93.8		%		80-120	20-AUG-18
Iron (Fe)-Dissolved			98.9		%		80-120	20-AUG-18
Lead (Pb)-Dissolved			99.8		%		80-120	20-AUG-18
Magnesium (Mg)-Dissolved			101.2		%		80-120	20-AUG-18
Manganese (Mn)-Dissolved			97.5		%		80-120	20-AUG-18
Nickel (Ni)-Dissolved			94.6		%		80-120	20-AUG-18
Potassium (K)-Dissolved			99.5		%		80-120	20-AUG-18
Selenium (Se)-Dissolved			100.0		%		80-120	20-AUG-18
Silver (Ag)-Dissolved			98.6		%		80-120	20-AUG-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R4178507								
WG2854564-6 LCS		**TMRM**						
Sodium (Na)-Dissolved			94.5		%		80-120	20-AUG-18
Uranium (U)-Dissolved			92.3		%		80-120	20-AUG-18
Zinc (Zn)-Dissolved			95.8		%		80-120	20-AUG-18
WG2854564-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	20-AUG-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	20-AUG-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	20-AUG-18
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	20-AUG-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	20-AUG-18
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	20-AUG-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	20-AUG-18
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	20-AUG-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	20-AUG-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	20-AUG-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	20-AUG-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	20-AUG-18
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	20-AUG-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	20-AUG-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	20-AUG-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	20-AUG-18
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	20-AUG-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	20-AUG-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	20-AUG-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	20-AUG-18
WG2854564-5 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	20-AUG-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	20-AUG-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	20-AUG-18
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	20-AUG-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	20-AUG-18
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	20-AUG-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	20-AUG-18
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	20-AUG-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	20-AUG-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	20-AUG-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R4178507								
WG2854564-5 MB								
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	20-AUG-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	20-AUG-18
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	20-AUG-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	20-AUG-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	20-AUG-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	20-AUG-18
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	20-AUG-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	20-AUG-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	20-AUG-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	20-AUG-18
WG2854564-9 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	20-AUG-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	20-AUG-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	20-AUG-18
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	20-AUG-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	20-AUG-18
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	20-AUG-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	20-AUG-18
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	20-AUG-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	20-AUG-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	20-AUG-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	20-AUG-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	20-AUG-18
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	20-AUG-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	20-AUG-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	20-AUG-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	20-AUG-18
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	20-AUG-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	20-AUG-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	20-AUG-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	20-AUG-18
NH3-D-COL-ED	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-D-COL-ED	**Water**							
Batch R4161301								
WG2839683-12 LCS								
Ammonia, Total Dissolved (as N)			105.9		%		85-115	02-AUG-18
WG2839683-14 LCS								
Ammonia, Total Dissolved (as N)			98.9		%		85-115	02-AUG-18
WG2839683-16 LCS								
Ammonia, Total Dissolved (as N)			100.2		%		85-115	02-AUG-18
WG2839683-2 LCS								
Ammonia, Total Dissolved (as N)			100.9		%		85-115	02-AUG-18
WG2839683-1 MB								
Ammonia, Total Dissolved (as N)			<0.050		mg/L		0.05	02-AUG-18
WG2839683-11 MB								
Ammonia, Total Dissolved (as N)			<0.050		mg/L		0.05	02-AUG-18
WG2839683-13 MB								
Ammonia, Total Dissolved (as N)			<0.050		mg/L		0.05	02-AUG-18
WG2839683-15 MB								
Ammonia, Total Dissolved (as N)			<0.050		mg/L		0.05	02-AUG-18
NO2-IC-N-ED	**Water**							
Batch R4158668								
WG2839785-3 DUP		**L2139927-5**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	02-AUG-18
WG2839785-13 LCS								
Nitrite (as N)			97.9		%		90-110	02-AUG-18
WG2839785-15 LCS								
Nitrite (as N)			92.0		%		90-110	02-AUG-18
WG2839785-17 LCS								
Nitrite (as N)			103.0		%		90-110	02-AUG-18
WG2839785-2 LCS								
Nitrite (as N)			103.8		%		90-110	02-AUG-18
WG2839785-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	02-AUG-18
WG2839785-14 MB								
Nitrite (as N)			<0.010		mg/L		0.01	02-AUG-18
WG2839785-16 MB								
Nitrite (as N)			<0.010		mg/L		0.01	02-AUG-18
WG2839785-18 MB								
Nitrite (as N)			<0.010		mg/L		0.01	02-AUG-18
WG2839785-4 MS		**L2139927-5**						
Nitrite (as N)			95.8		%		75-125	02-AUG-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-N-ED	**Water**							
Batch R4158668								
WG2839785-3 DUP		**L2139927-5**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	02-AUG-18
WG2839785-13 LCS								
Nitrate (as N)			99.7		%		90-110	02-AUG-18
WG2839785-15 LCS								
Nitrate (as N)			98.6		%		90-110	02-AUG-18
WG2839785-17 LCS								
Nitrate (as N)			96.4		%		90-110	02-AUG-18
WG2839785-2 LCS								
Nitrate (as N)			102.2		%		90-110	02-AUG-18
WG2839785-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	02-AUG-18
WG2839785-14 MB								
Nitrate (as N)			<0.020		mg/L		0.02	02-AUG-18
WG2839785-16 MB								
Nitrate (as N)			<0.020		mg/L		0.02	02-AUG-18
WG2839785-18 MB								
Nitrate (as N)			<0.020		mg/L		0.02	02-AUG-18
WG2839785-4 MS		**L2139927-5**						
Nitrate (as N)			101.4		%		75-125	02-AUG-18
PH/EC/ALK-ED	**Water**							
Batch R4162144								
WG2844945-7 DUP		**L2139927-5**						
pH		8.08	8.12	J	pH	0.04	0.3	09-AUG-18
Conductivity (EC)		905	907		uS/cm	0.2	10	09-AUG-18
Bicarbonate (HCO3)		403	401		mg/L	0.5	25	09-AUG-18
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	09-AUG-18
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	09-AUG-18
Alkalinity, Total (as CaCO3)		331	329		mg/L	0.5	20	09-AUG-18
WG2844945-15 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			95.3		%		85-115	09-AUG-18
WG2844945-20 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			97.2		%		85-115	09-AUG-18
WG2844945-25 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			98.6		%		85-115	09-AUG-18
WG2844945-30 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			95.7		%		85-115	09-AUG-18
WG2844945-35 LCS		**PCTITRATE_LCS**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED	**Water**							
Batch R4162144								
WG2844945-35 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			96.7		%		85-115	09-AUG-18
WG2844945-4 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			94.8		%		85-115	09-AUG-18
WG2844945-40 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			95.4		%		85-115	09-AUG-18
WG2844945-1 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-AUG-18
Bicarbonate (HCO3)			<5.0		mg/L		5	09-AUG-18
Carbonate (CO3)			<5.0		mg/L		5	09-AUG-18
Hydroxide (OH)			<5.0		mg/L		5	09-AUG-18
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-AUG-18
WG2844945-12 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-AUG-18
Bicarbonate (HCO3)			<5.0		mg/L		5	09-AUG-18
Carbonate (CO3)			<5.0		mg/L		5	09-AUG-18
Hydroxide (OH)			<5.0		mg/L		5	09-AUG-18
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-AUG-18
WG2844945-17 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-AUG-18
Bicarbonate (HCO3)			<5.0		mg/L		5	09-AUG-18
Carbonate (CO3)			<5.0		mg/L		5	09-AUG-18
Hydroxide (OH)			<5.0		mg/L		5	09-AUG-18
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-AUG-18
WG2844945-22 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-AUG-18
Bicarbonate (HCO3)			<5.0		mg/L		5	09-AUG-18
Carbonate (CO3)			<5.0		mg/L		5	09-AUG-18
Hydroxide (OH)			<5.0		mg/L		5	09-AUG-18
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-AUG-18
WG2844945-27 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-AUG-18
Bicarbonate (HCO3)			<5.0		mg/L		5	09-AUG-18
Carbonate (CO3)			<5.0		mg/L		5	09-AUG-18
Hydroxide (OH)			<5.0		mg/L		5	09-AUG-18
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-AUG-18
WG2844945-32 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED	**Water**							
Batch R4162144								
WG2844945-32 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-AUG-18
Bicarbonate (HCO3)			<5.0		mg/L		5	09-AUG-18
Carbonate (CO3)			<5.0		mg/L		5	09-AUG-18
Hydroxide (OH)			<5.0		mg/L		5	09-AUG-18
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-AUG-18
WG2844945-37 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-AUG-18
Bicarbonate (HCO3)			<5.0		mg/L		5	09-AUG-18
Carbonate (CO3)			<5.0		mg/L		5	09-AUG-18
Hydroxide (OH)			<5.0		mg/L		5	09-AUG-18
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-AUG-18
PHENOLS-4AAP-WT	**Water**							
Batch R4161179								
WG2842755-2 LCS								
Phenols (4AAP)			96.5		%		85-115	07-AUG-18
WG2842755-6 LCS								
Phenols (4AAP)			95.0		%		85-115	07-AUG-18
WG2842755-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	07-AUG-18
WG2842755-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	07-AUG-18
SO4-IC-N-ED	**Water**							
Batch R4158668								
WG2839785-3 DUP		**L2139927-5**						
Sulfate (SO4)		136	135		mg/L	0.5	20	02-AUG-18
WG2839785-13 LCS								
Sulfate (SO4)			99.5		%		90-110	02-AUG-18
WG2839785-15 LCS								
Sulfate (SO4)			99.99		%		90-110	02-AUG-18
WG2839785-17 LCS								
Sulfate (SO4)			99.4		%		90-110	02-AUG-18
WG2839785-2 LCS								
Sulfate (SO4)			99.9		%		90-110	02-AUG-18
WG2839785-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	02-AUG-18
WG2839785-14 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-ED	**Water**							
Batch R4158668								
WG2839785-14 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	02-AUG-18
WG2839785-16 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	02-AUG-18
WG2839785-18 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	02-AUG-18
WG2839785-4 MS		**L2139927-5**						
Sulfate (SO4)			N/A	MS-B	%		-	02-AUG-18

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Client: ALS Environmental
Report date: 27-Aug-18

WATER ANALYSIS RESULTS

Isobrine ID	Client sample IDs		Client project ID	Collected	Received	$\delta^{18}O$
						‰ VSMOW
IB-19-001	L2139927-1	MW-04	L2139927	31-Jul-18	2018-Aug-18	-16.37
IB-19-002	L2139927-2	MW-07	L2139927	31-Jul-18	2018-Aug-18	-17.84
IB-19-003	L2139927-3	MW-06	L2139927	31-Jul-18	2018-Aug-18	-17.52
IB-19-004	L2139927-4	MW-03	L2139927	31-Jul-18	2018-Aug-18	-18.62
IB-19-005	L2139927-5	MW-05	L2139927	31-Jul-18	2018-Aug-18	-16.03
IB-19-006	L2139927-6	MW-08	L2139927	1-Aug-18	2018-Aug-18	-17.49
IB-19-007	L2139927-7	MW-09	L2139927	1-Aug-18	2018-Aug-18	-18.11
IB-19-008	L2139927-8	MW-11	L2139927	1-Aug-18	2018-Aug-18	-16.69
IB-19-009	L2139927-9	MW-10	L2139927	1-Aug-18	2018-Aug-18	-18.17
IB-19-010	L2139927-10	MW-12	L2139927	1-Aug-18	2018-Aug-18	-16.95
IB-19-011	L2139927-11	MW-13	L2139927	1-Aug-18	2018-Aug-18	-18.23
IB-19-012	L2139927-12	MW-01	L2139927	1-Aug-18	2018-Aug-18	-17.83
IB-19-013	L2139927-13	DUP18-01	L2139927	1-Aug-18	2018-Aug-18	-16.71

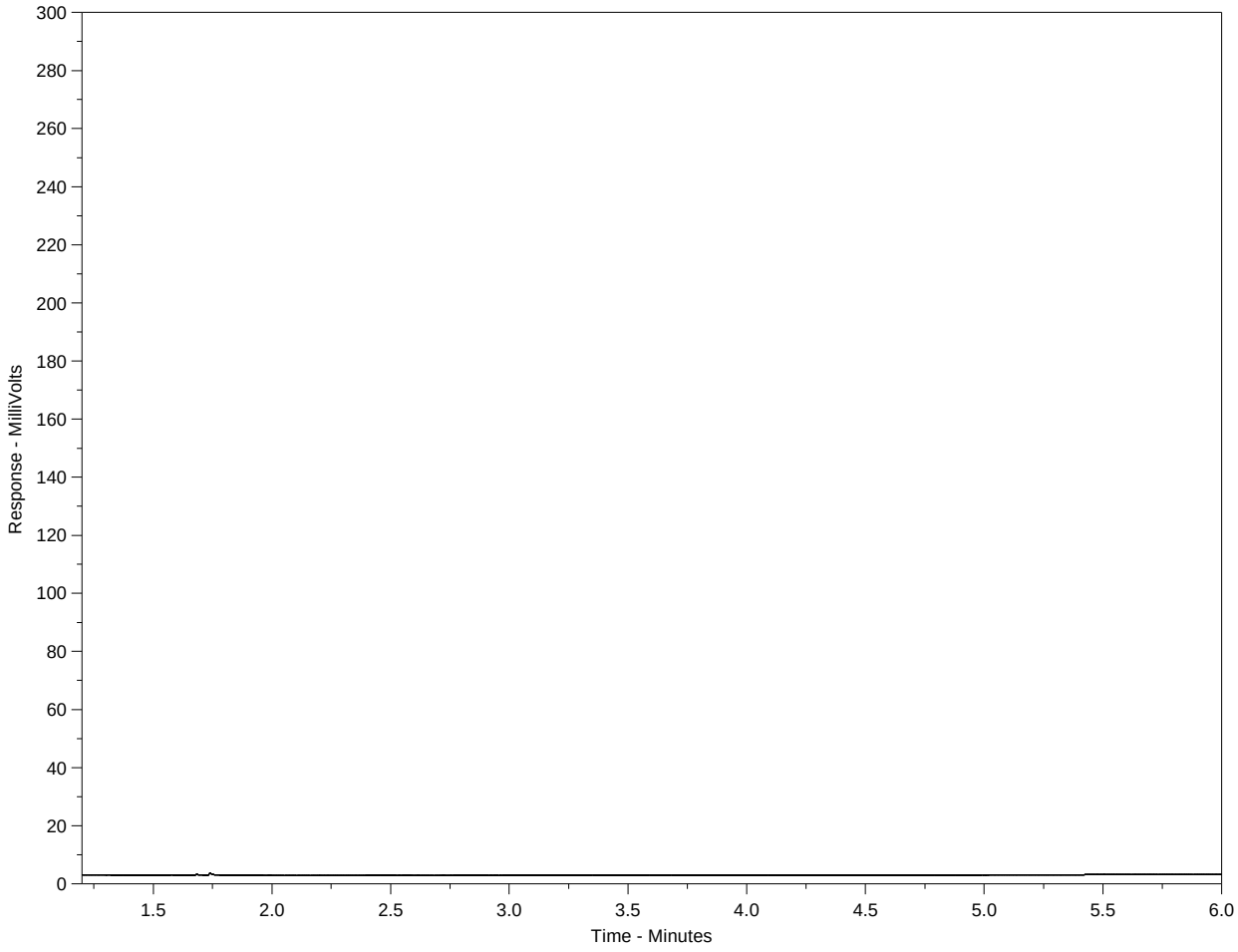
Oxygen and hydrogen stable isotope compositions determined on mechanically and chemically cleaned samples using a CRDS (Cavity Ring-down Mass Spectrometer).
Standard deviations for $\delta^{18}O$ and $\delta^{2}H$ are equal to or better than 0.2 ‰ and 2.0 ‰, respectively ($\pm 1\sigma$).

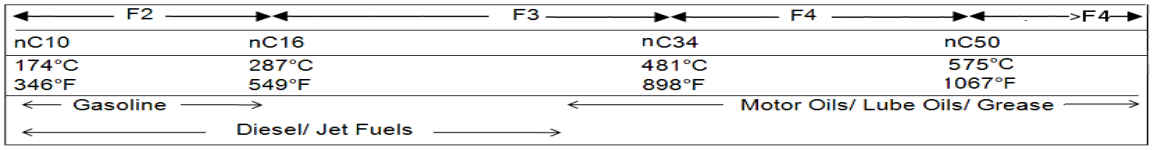
Isobrine Solutions Inc.
4-341 Enterprise Square
10230 Jasper Ave
Edmonton, AB, T5J 4P6

O	δ^2H	
±1σ	‰ VSMOW	±1σ
0.02	-134.7	0.22
0.04	-144.6	0.16
0.04	-143.2	0.17
0.05	-148.5	0.31
0.05	-132.6	0.65
0.06	-142.7	0.54
0.03	-146.5	0.12
0.06	-136.9	0.51
0.02	-144.8	0.17
0.07	-138.7	0.31
0.32	-146.4	0.84
0.07	-142.8	0.21
0.22	-139.4	0.68

Hydrocarbon Distribution Report

ALS Sample ID: L2139927-1
Client ID: MW-04





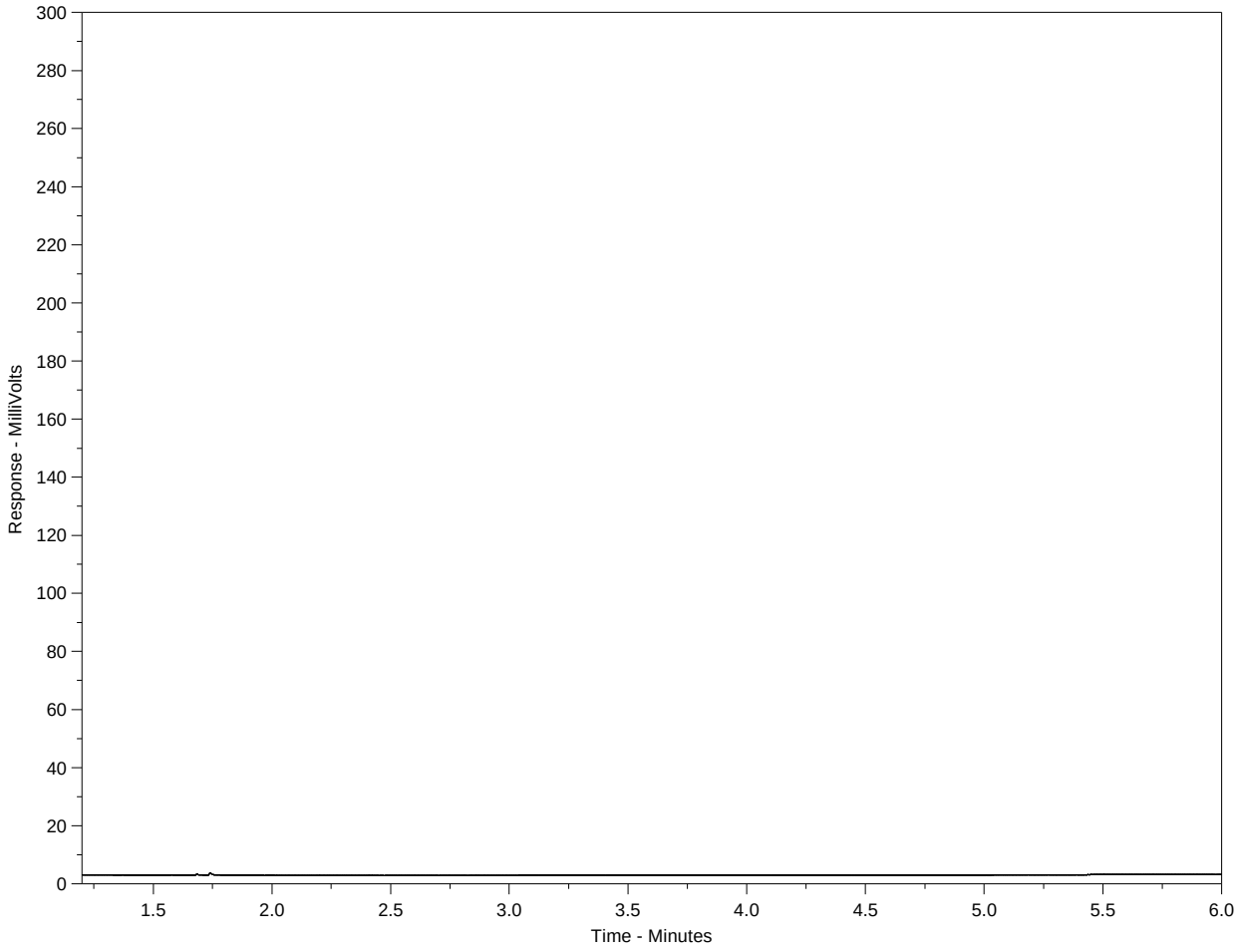
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

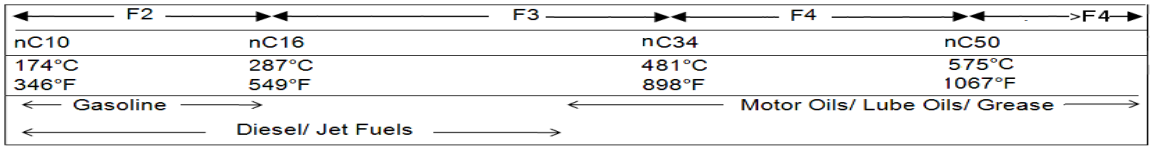
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L2139927-2
Client ID: MW-07





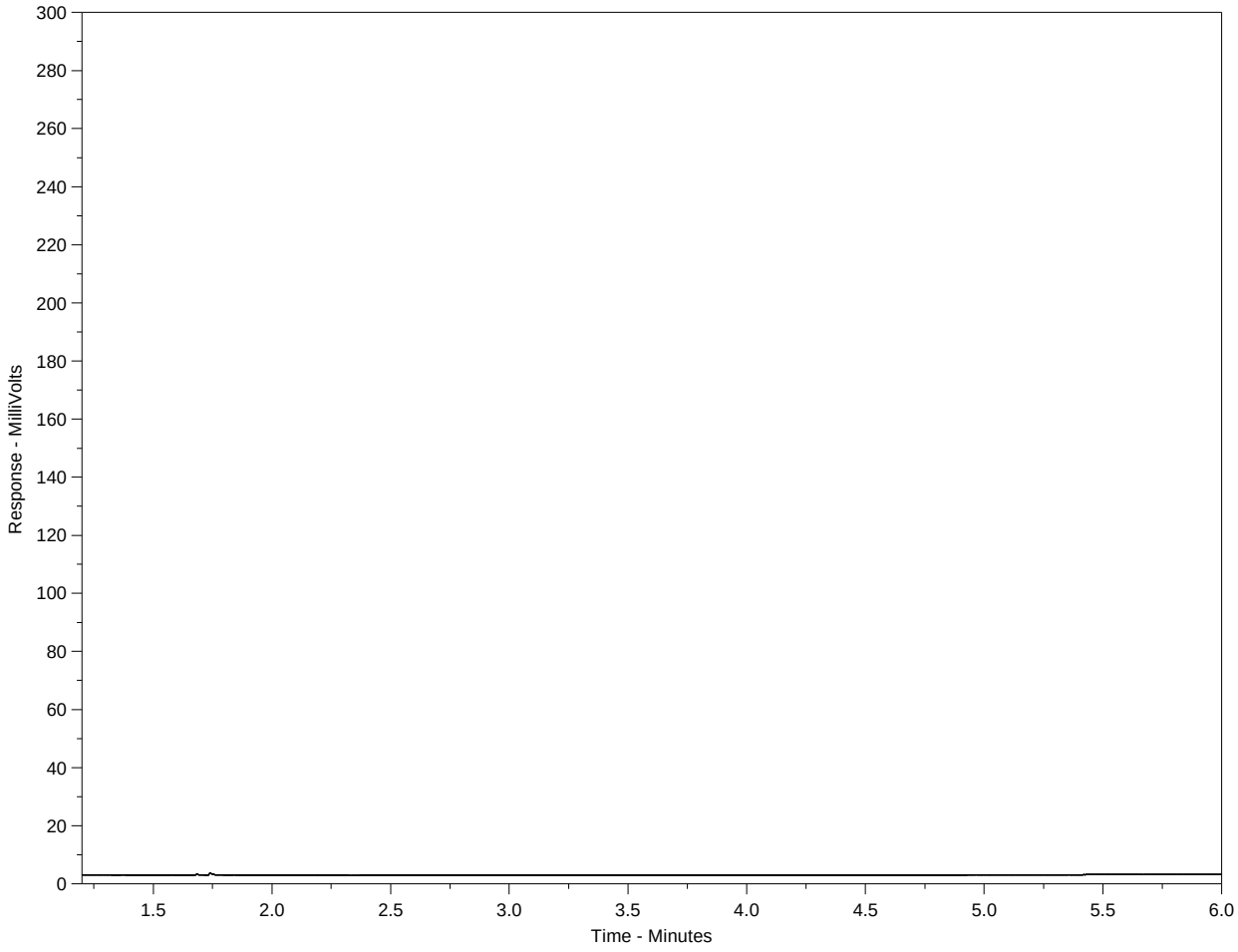
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

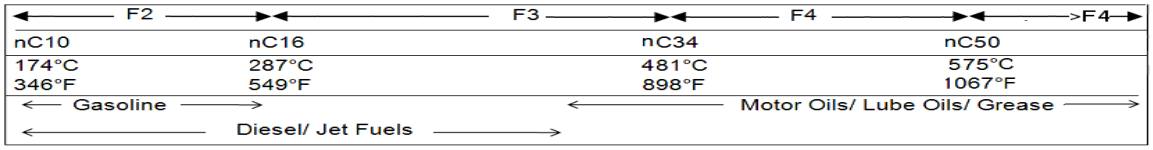
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L2139927-3
Client ID: MW-06





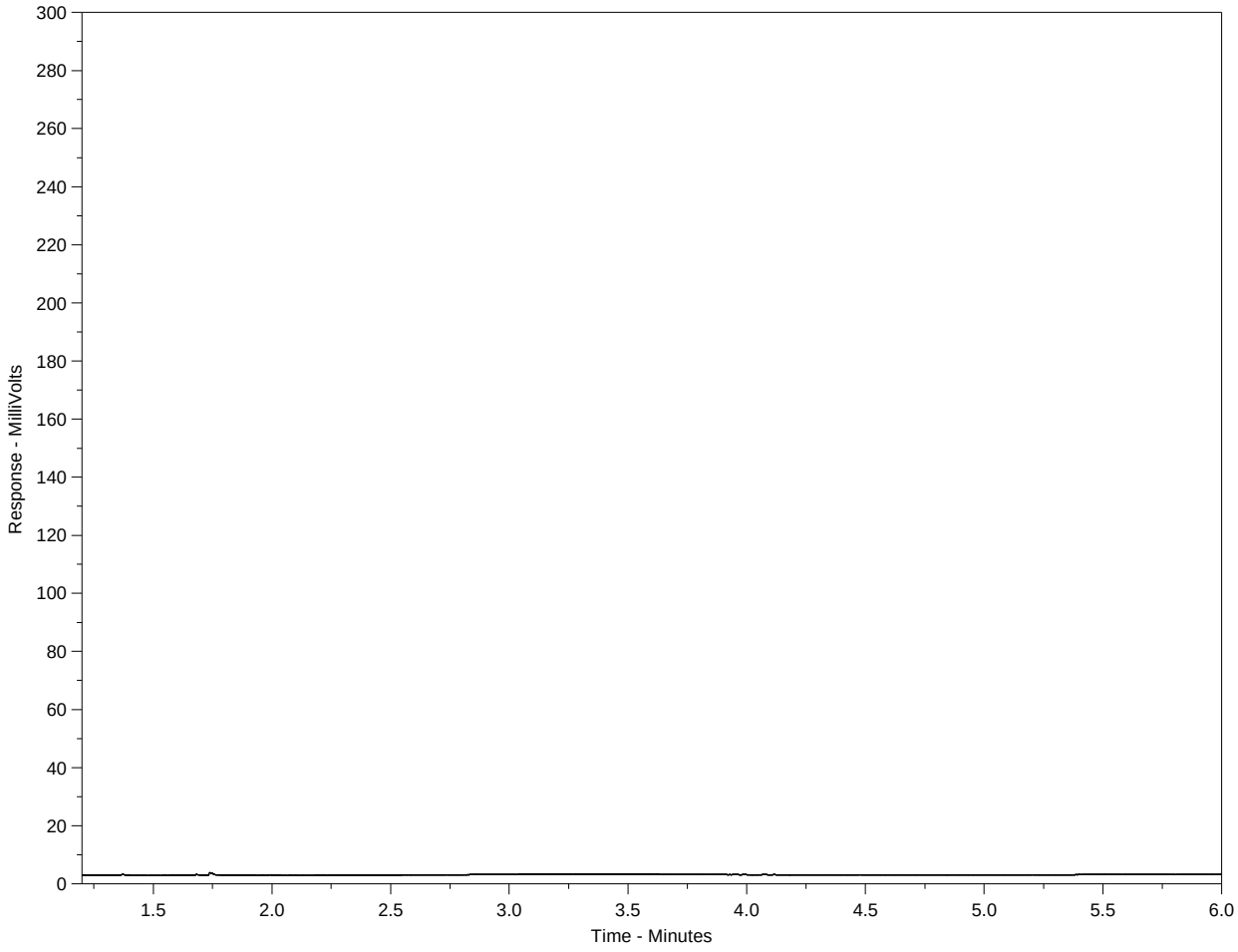
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

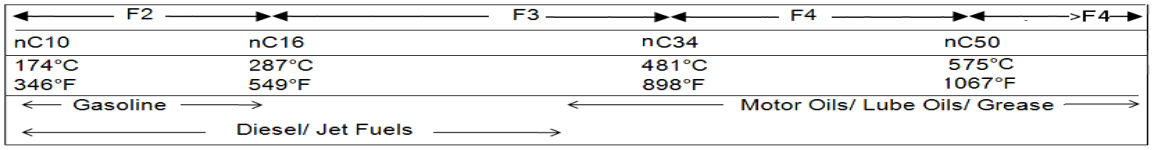
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L2139927-4
Client ID: MW-03





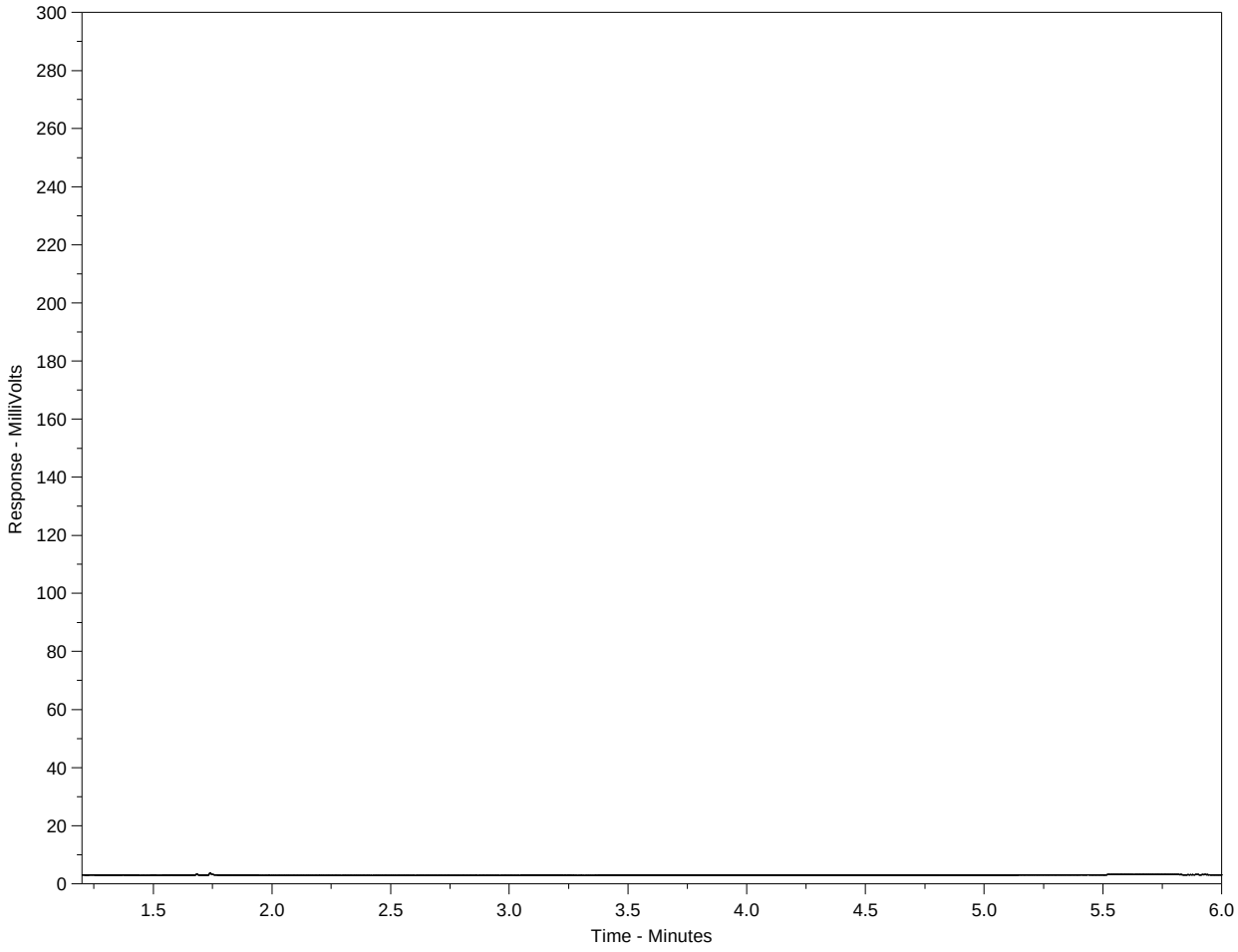
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

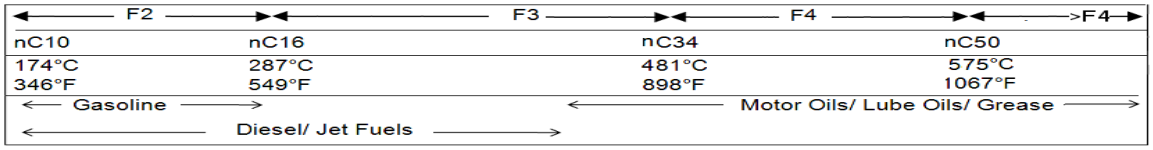
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L2139927-5
Client ID: MW-05





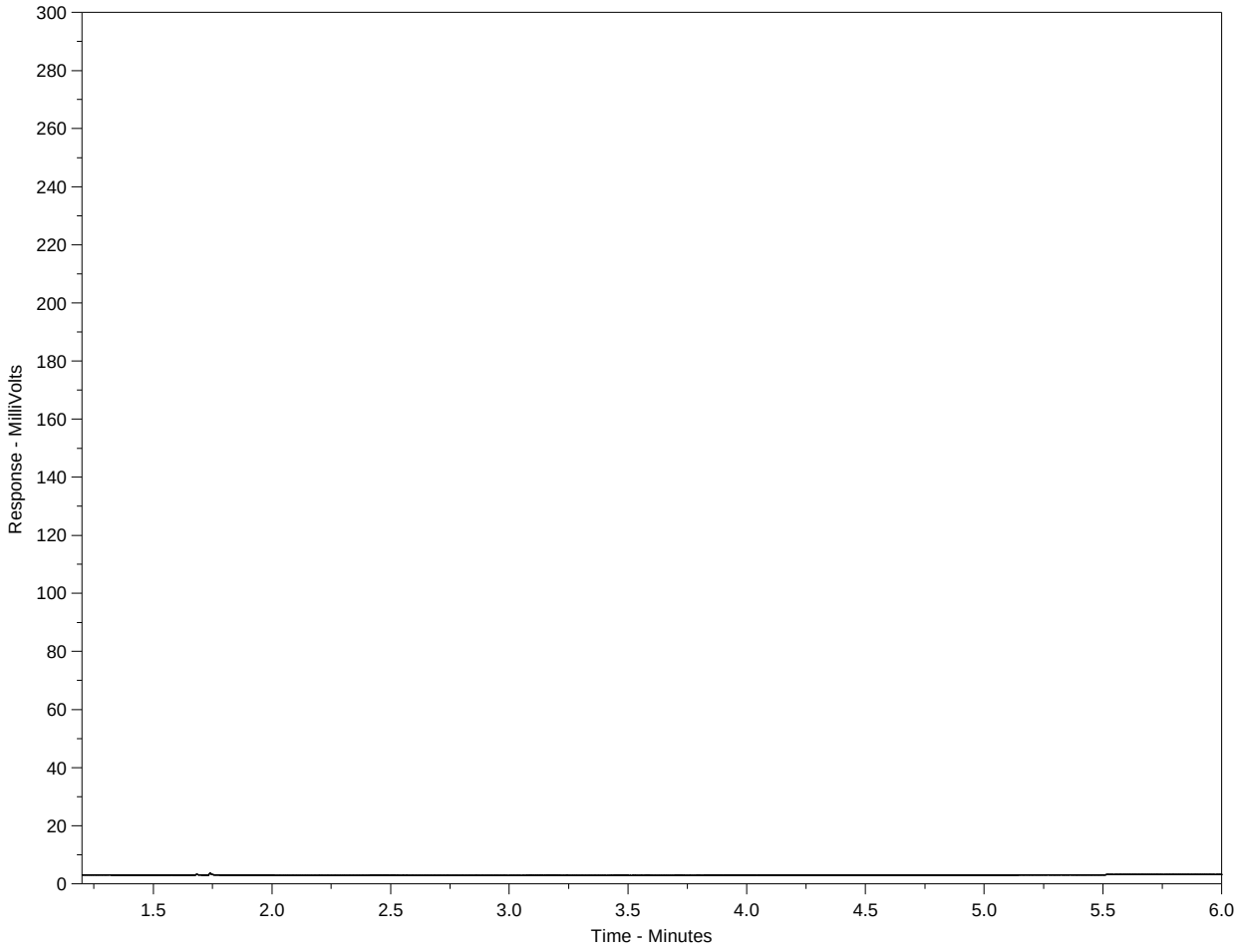
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

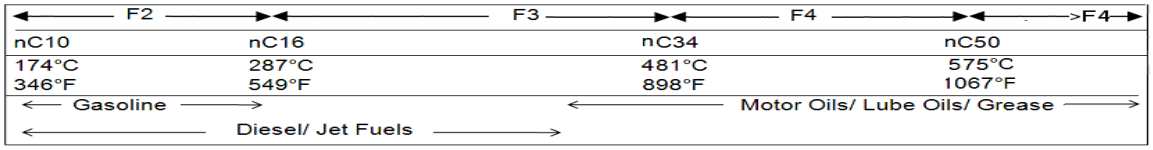
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L2139927-6
Client ID: MW-08





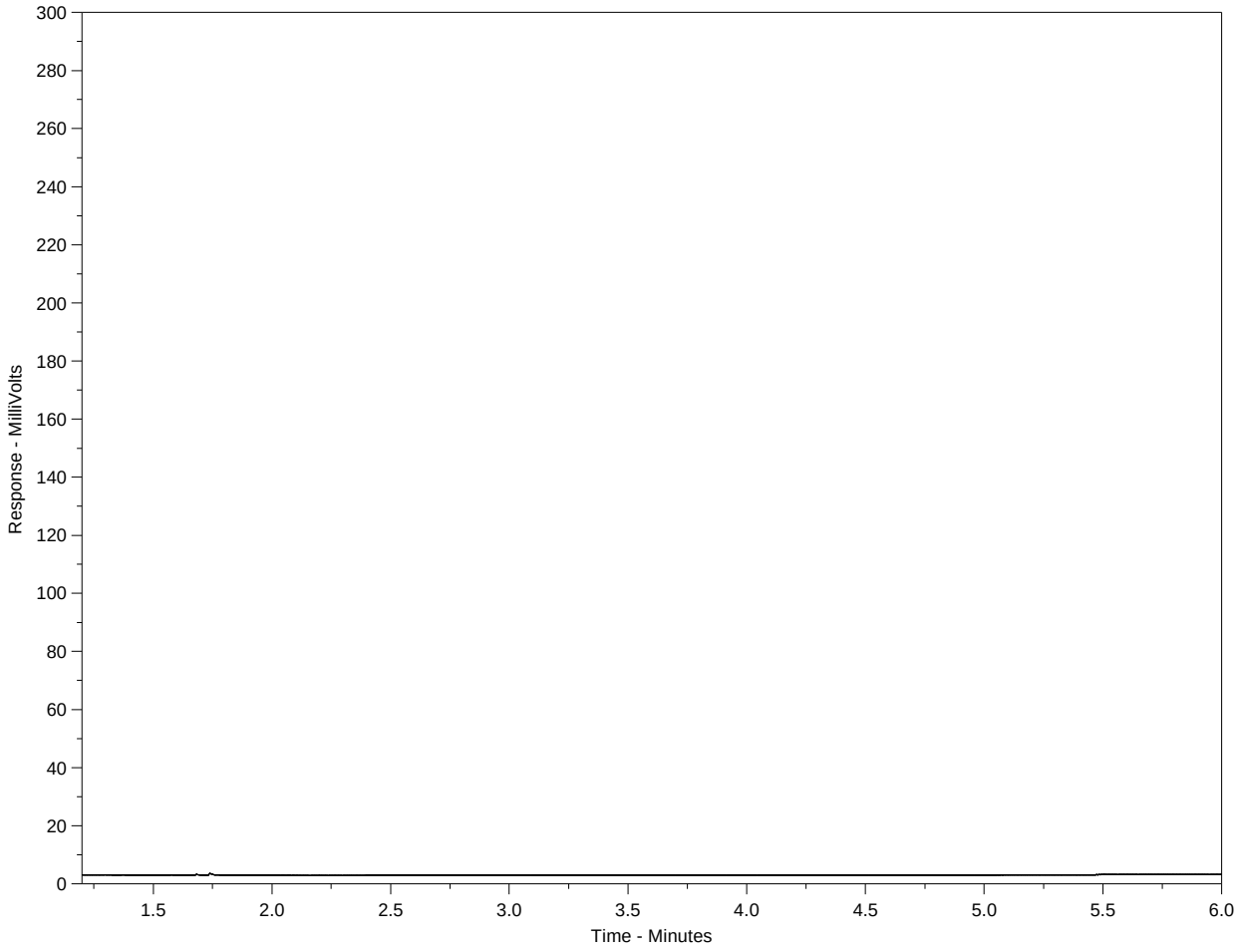
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

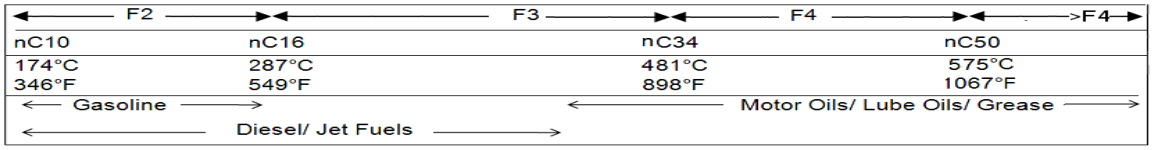
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L2139927-7
Client ID: MW-09





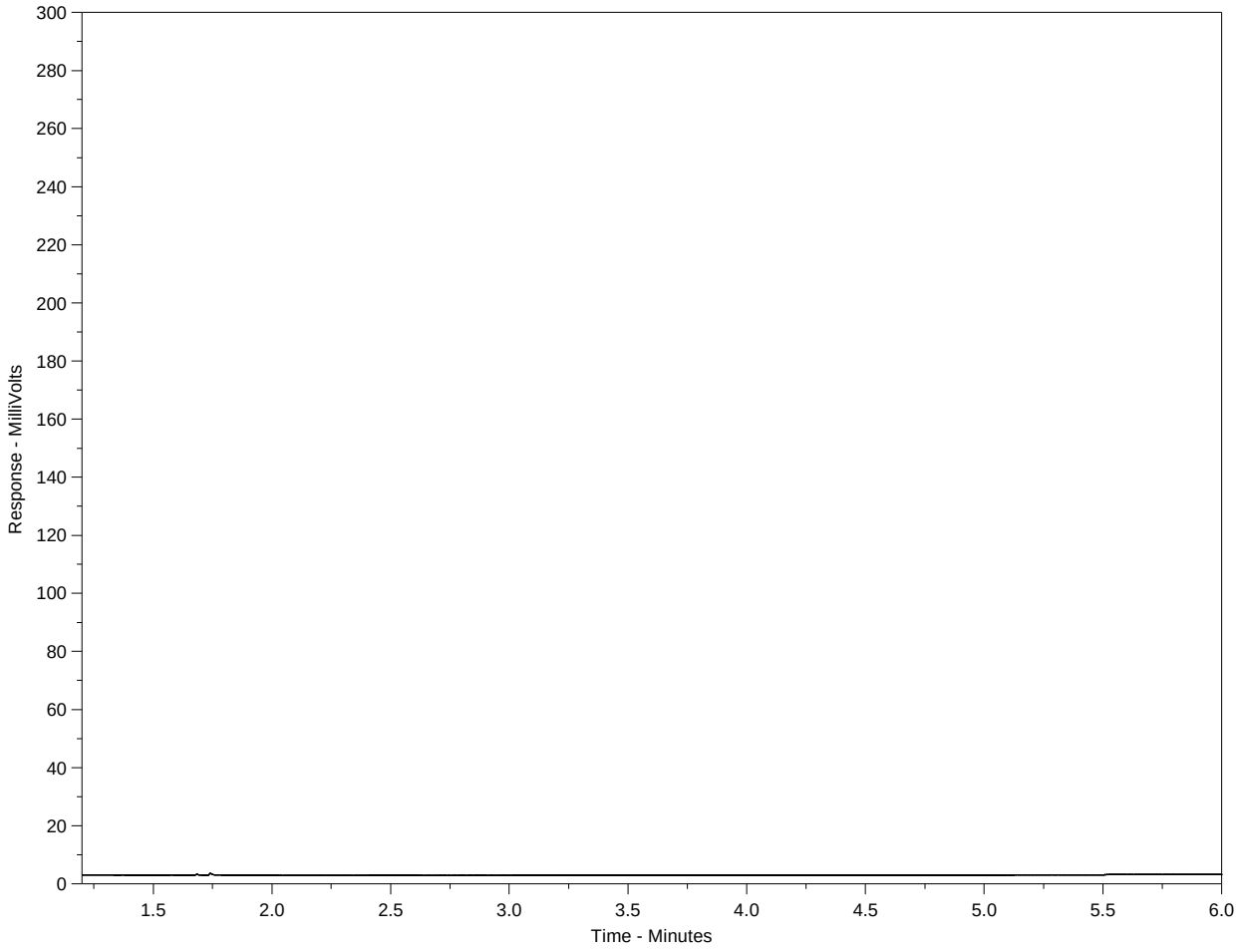
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

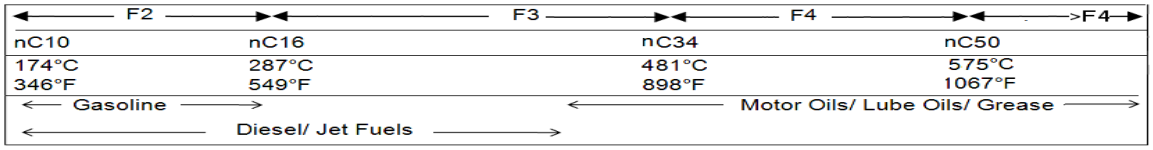
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L2139927-8
Client ID: MW-11





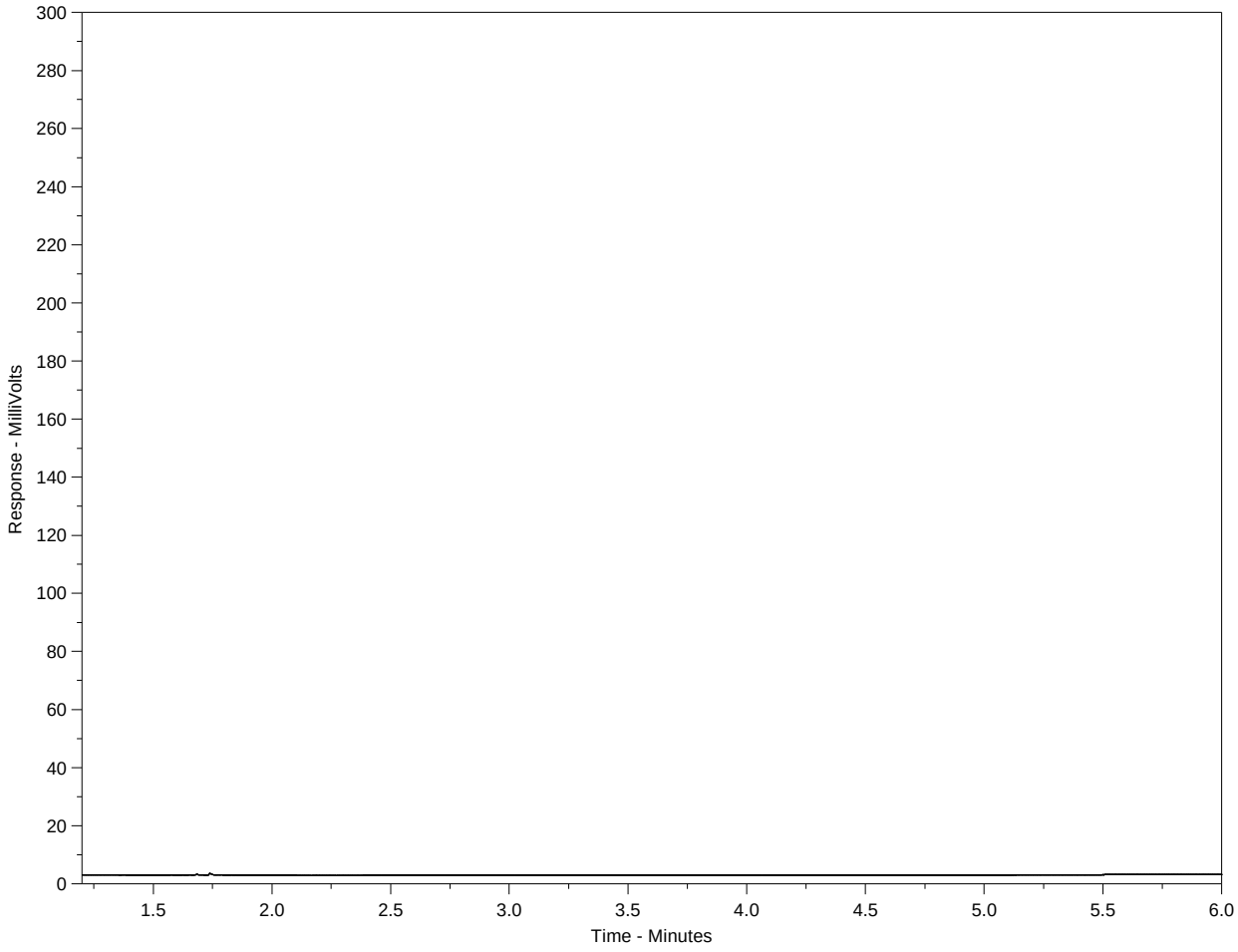
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

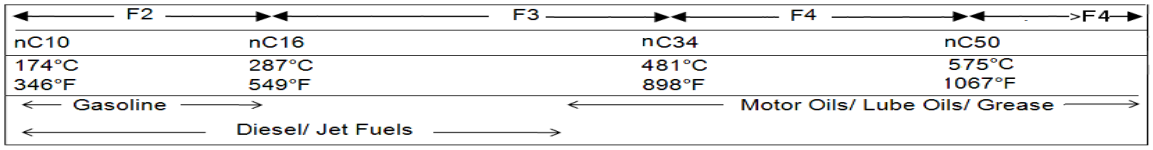
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L2139927-9
Client ID: MW-10





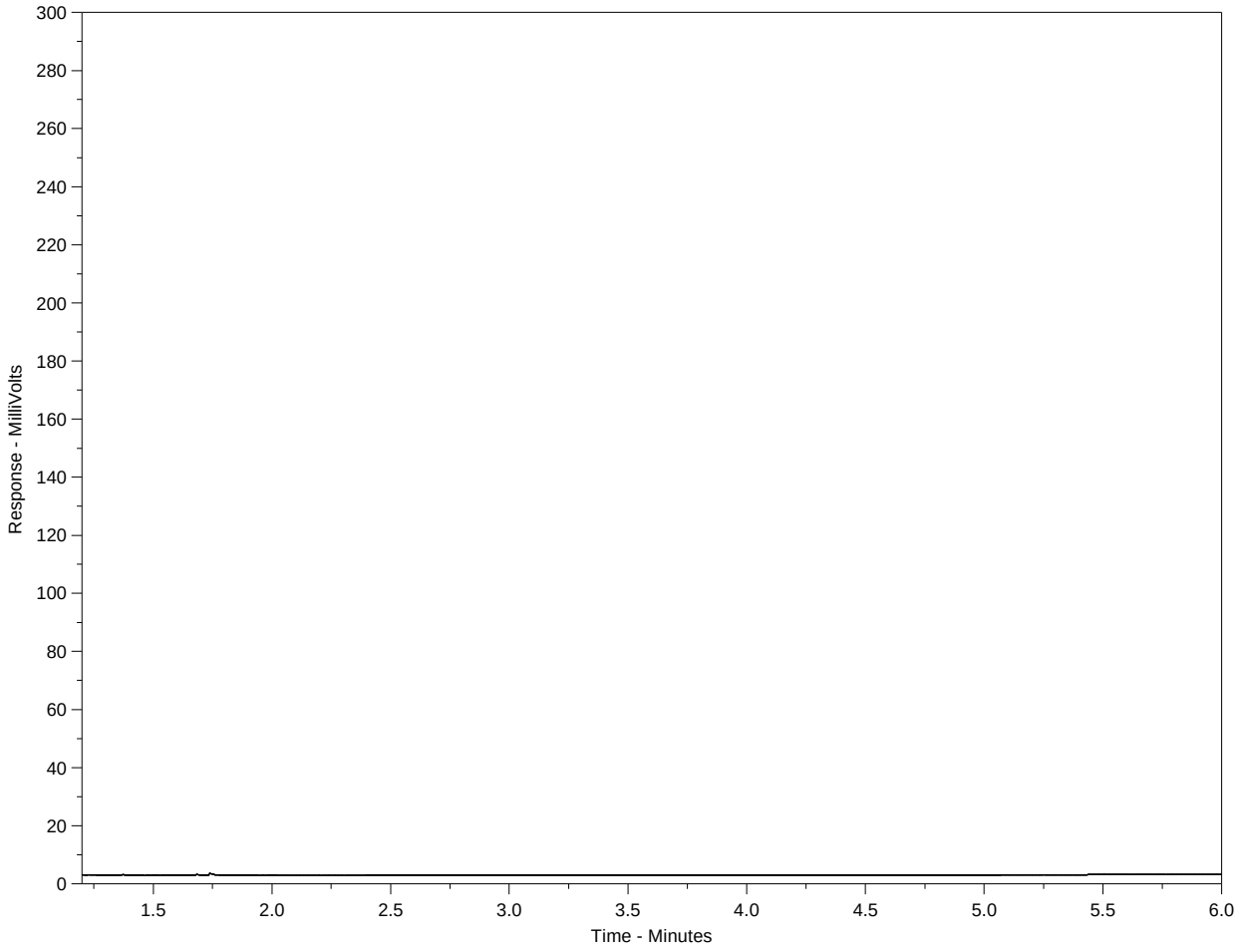
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

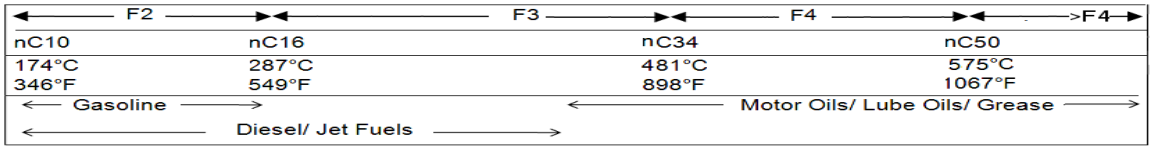
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L2139927-10
Client ID: MW-12





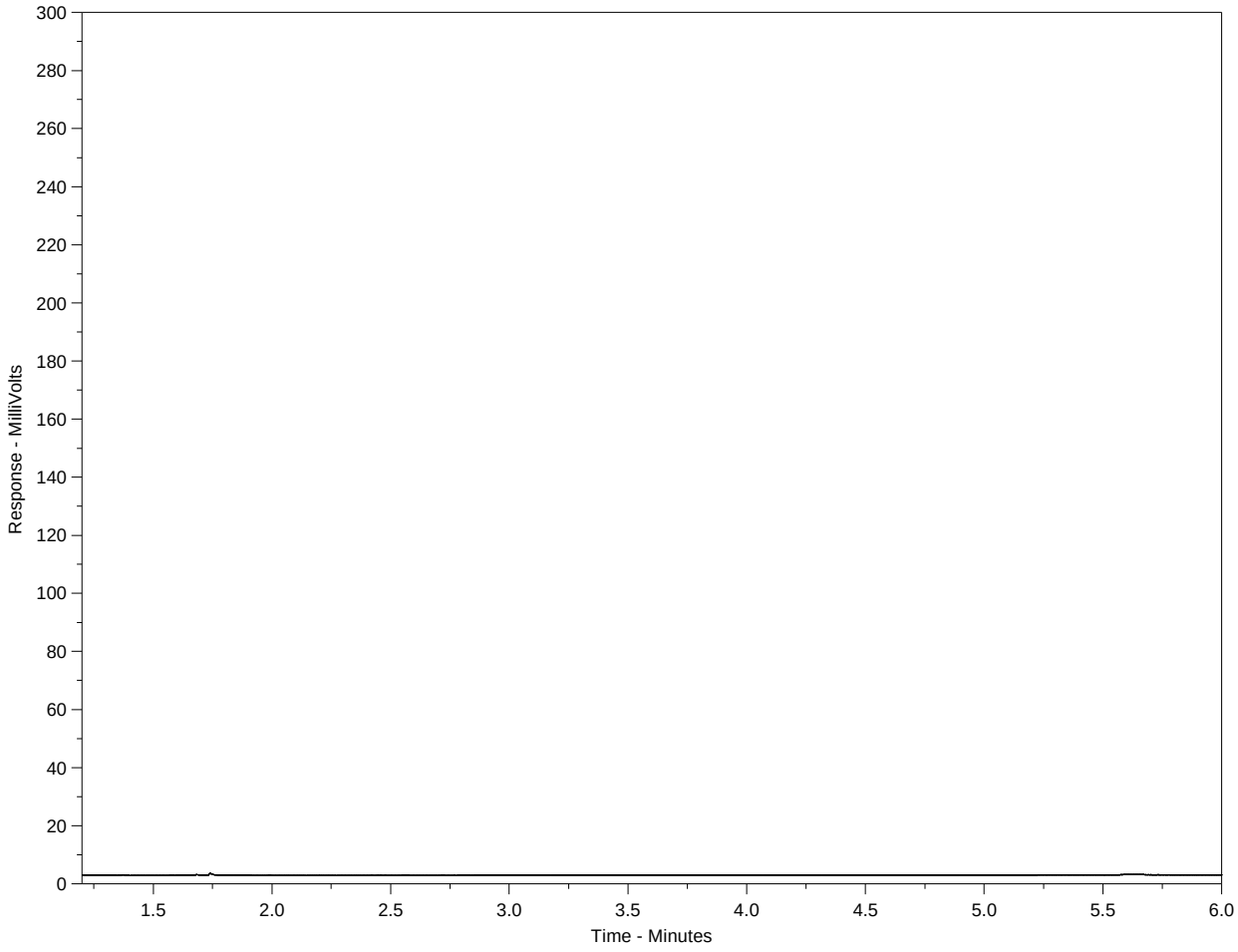
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

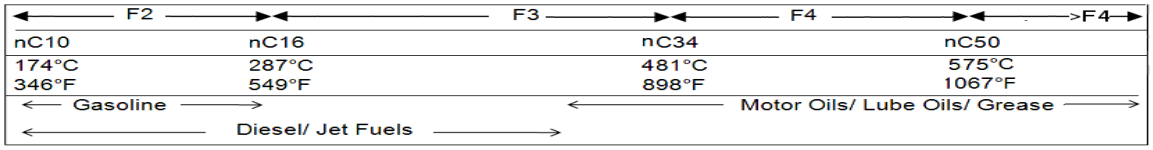
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L2139927-11
Client ID: MW-13





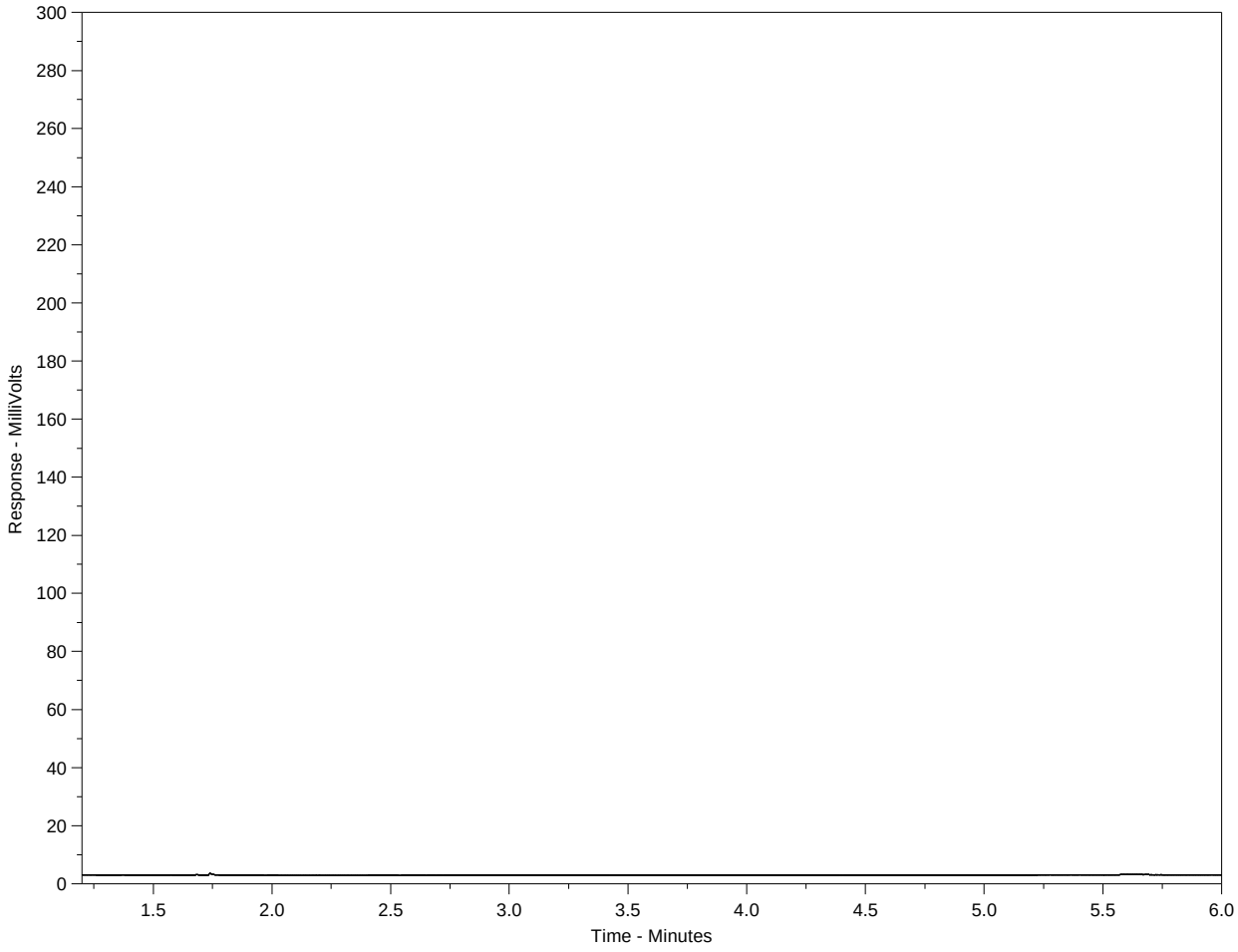
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

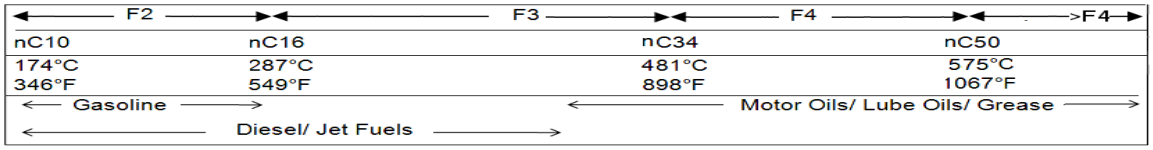
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L2139927-12
Client ID: MW-01





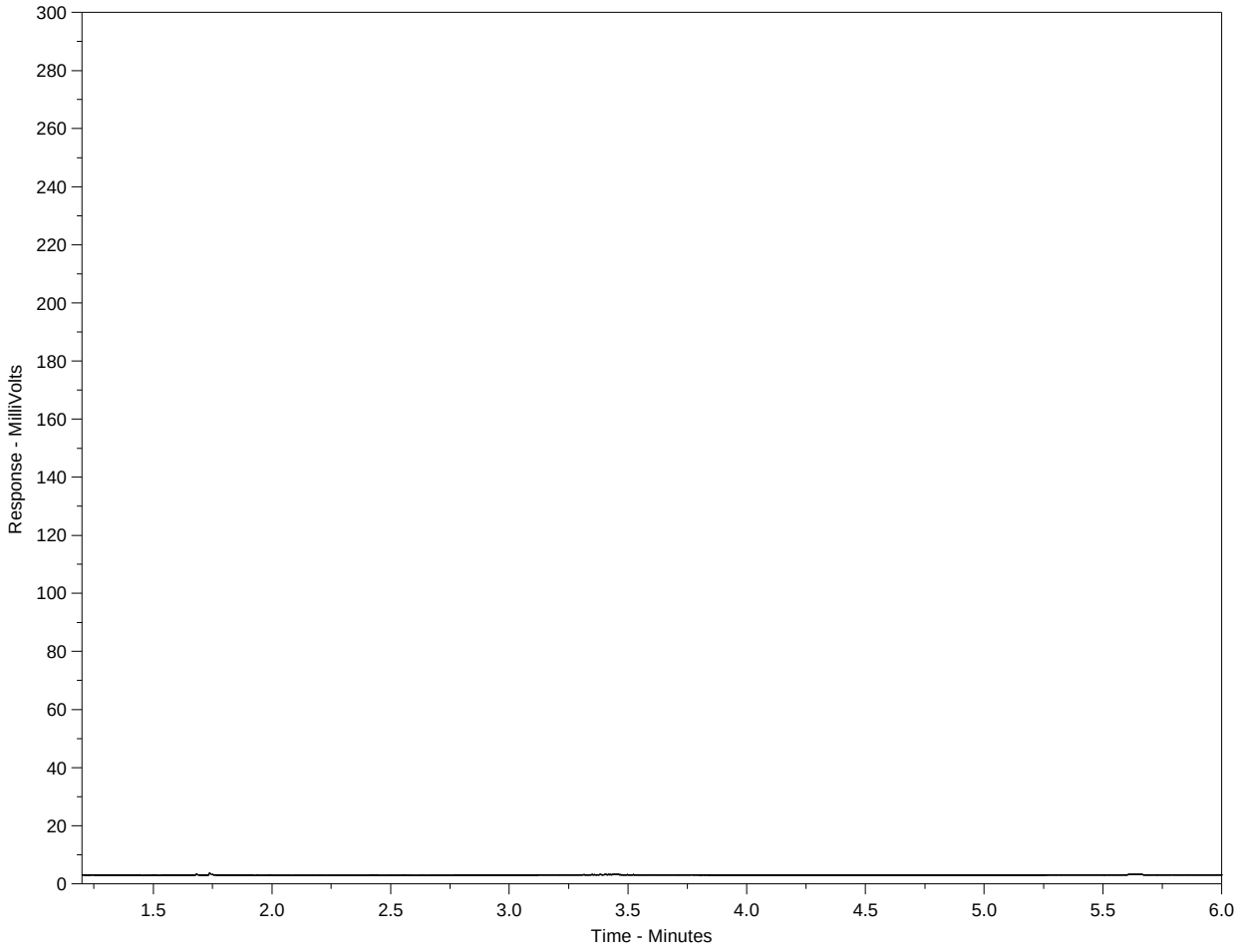
The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

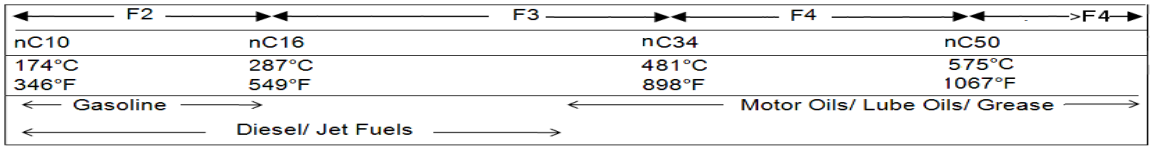
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Hydrocarbon Distribution Report

ALS Sample ID: L2139927-13
Client ID: DUP18-01





The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

P/A Ice/Ice packs
P/A free water

Chain of Custody (COC) / Analytical Request Form

L2139927-COFC

COC Number: 17 - 657888

Page 1 of 2

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)
Company:	Advision - WorleyParsons	Select Report Format: [X] PDF [ ] EXCEL [ ] EDD (DIGITAL)	Regular [R] [X] Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:		Quality Control (QC) Report with Report [ ] YES [ ] NO	PRIORITY (Business Days): 4 day [P4-20%] [ ]; 3 day [P3-25%] [ ]; 2 day [P2-50%] [ ]
Phone:		[ ] Compare Results to Criteria on Report - provide details below if box checked	EMERGENCY: 1 Business day [E-100%] [ ]; Same Day, Weekend or Statutory holiday [E2-200% (Laboratory opening fees may apply)] [ ]
	Company address below will appear on the final report	Select Distribution: [X] EMAIL [ ] MAIL [ ] FAX	
Street:	Suite 300, 2115 51 Ave	Email 1 or Fax stuart.gray@advision.com	Date and Time Required for all E&P TATs:
City/Province:	Edmonton, AB	Email 2 canada.chemistry@worleyparsons.com	For tests that can not be performed according to the service level selected, you will be contacted.
Postal Code:	T6E 6A5	Email 3	
Invoice To	Same as Report To [X] YES [ ] NO	Invoice Distribution	Analysis Request
	Copy of Invoice with Report [ ] YES [ ] NO	Select Invoice Distribution: [X] EMAIL [ ] MAIL [ ] FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:		Email 1 or Fax	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	307075-01608-400	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only):	L2139927	ALS Contact: Dana	Sampler: Rylee Mackulak

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Routine-Major Ions	BTEX, PHC F1	PHC F2	Phenols (P)	Diss Metals (F/P)	Diss Ammonia (F/P)	DOC (F/P)	Isotopes - deuterium H2 - oxygen O18	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
	MW-04	31-Jul-18	1100	GW	X	X	X	X	X	X	X	X			9
	MW-07		1300	GW	X	X	X	X	X	X	X	X			9
	MW-06		1410	GW	X	X	X	X	X	X	X	X			9
	MW-03		1610	GW	X	X	X	X	X	X	X	X			9
	MW-05		1700	GW	X	X	X	X	X	X	X	X			9
	MW-08	01-Aug-18	900	GW	X	X	X	X	X	X	X	X			9
	MW-09		1000	GW	X	X	X	X	X	X	X	X			9
	MW-11		~~1105~~ 1105	GW	X	X	X	X	X	X	X	X			9
	MW-10		1255	GW	X	X	X	X	X	X	X	X			9
	MW-12		1410	GW	X	X	X	X	X	X	X	X			9
	MW-13		1415	GW	X	X	X	X	X	X	X	X			9
	MW-01		1600	GW	X	X	X	X	X	X	X	X			9

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? [ ] YES [X] NO	Please take routine analysis from isotopes bottles.
Are samples for human consumption/ use? [ ] YES [X] NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	[ ]	SIF Observations	Yes [ ]	No	[ ]
Ice Packs [ ]	Ice Cubes [ ]	Custody seal intact	Yes [ ]	No	[ ]
Cooling Initiated [ ]					

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Rylee Mackulak	Date: 01-Aug-2018	Time: 1700	Received by:	Date: Aug 1, 2018	Time: 5:15PM	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy

1 If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form

5.8/10.2°C

P/A Ice / Ice packs
P / A free water

Chain of Custody (COC) / Analytical Request Form

L2139927-COFC

COC Number: 17 - 657887

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)
Company:		Select Report Format: | | PDF ☐ EXCEL | EDD (DIGITAL)	Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:		Quality Control (QC) Report with Report | | YES | NO	PRIORITY (Business Days): 4 day [P4-20%] ☐ / 3 day [P3-25%] ☐ / 2 day [P2-50%] ☐
Phone:		☐ Compare Results to Criteria on Report - provide details below if box checked	EMERGENCY: 1 Business day [E-100%] ☐ / Same Day, Weekend or Statutory holiday [E2-200% (Laboratory opening fees may apply)] ☐
	Company address below will appear on the final report	Select Distribution: | | EMAIL | | MAIL | | FAX	Date and Time Required for all E&P TATs:
Street:		Email 1 or Fax	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:		Email 2	
Postal Code:		Email 3	

Invoice To	Same as Report To | | YES | NO	Invoice Distribution
	Copy of Invoice with Report | | YES | NO	Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX
Company:		Email 1 or Fax
Contact:		Email 2

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#:
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only):		ALS Contact:	Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Routine - Major Ions	BTEX, PHC F1	PHC F2	Phenols (P)	Diss. Metals (F/P)	Diss. Ammonia (F/P)	DOC (F/P)	Extra's - dissolved Fe & Mn	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
	DUP18-01	01-Aug-18	1110	GW	X	X	X	X	X	X	X	X			9

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? | | YES [X] NO	Please take routine analysis from isotopes bottle
Are samples for human consumption/ use? | | YES [X] NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐		SIF Observations	Yes ☐	No ☐	
Ice Packs ☐	Ice Cubes ☐	Custody seal intact	Yes ☐	No ☐	
Cooling Initiated ☐					

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
[illegible]	01-Aug-2018	1700						

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy

1 If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

5.8°C / 10.2°C

WorleyParsons Canada
ATTN: Trevor Butterfield
8615 51 Avenue
Edmonton AB T6E 6A8

Date Received: 02-AUG-18
Report Date: 06-SEP-18 14:48 (MT)
Version: FINAL

Client Phone: 780-496-9055

Certificate of Analysis

Lab Work Order #: L2140259

Project P.O. #: NOT SUBMITTED
Job Reference: 307075-01608-400
C of C Numbers: 17-657883
Legal Site Desc:

Dana Brown, Chem. Tech. DIPL
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2140259-1 MW-02							
Sampled By: RM on 02-AUG-18 @ 09:20							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Toluene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
EthylBenzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
m+p-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
o-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Styrene	<0.0010		0.0010	mg/L	02-AUG-18	03-AUG-18	R4151477
F1(C6-C10)	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
F1-BTEX	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
Xylenes	<0.00071		0.00071	mg/L	02-AUG-18	03-AUG-18	R4151477
Surrogate: 1,4-Difluorobenzene (SS)	101.4		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 4-Bromofluorobenzene (SS)	91.6		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 3,4-Dichlorotoluene (SS)	116.0		70-130	%	02-AUG-18	03-AUG-18	R4151477
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	05-AUG-18	05-AUG-18	R4159642
Surrogate: 2-Bromobenzotrifluoride	95.3		60-140	%	05-AUG-18	05-AUG-18	R4159642
Miscellaneous Parameters							
Ammonia, Total Dissolved (as N)	0.556		0.050	mg/L		03-AUG-18	R4158822
Dissolved Organic Carbon	7.01		0.50	mg/L		21-AUG-18	R4179903
Phenols (4AAP)	0.0013		0.0010	mg/L		08-AUG-18	R4161642
Total Dissolved Solids	909		10	mg/L		10-AUG-18	R4168161
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					21-AUG-18	R4179990
Aluminum (Al)-Dissolved	<0.0050	DLDS	0.0050	mg/L		28-AUG-18	R4180309
Antimony (Sb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		28-AUG-18	R4180309
Arsenic (As)-Dissolved	0.00329	DLDS	0.00050	mg/L		28-AUG-18	R4180309
Barium (Ba)-Dissolved	0.129	DLDS	0.00050	mg/L		28-AUG-18	R4180309
Boron (B)-Dissolved	0.194	DLDS	0.050	mg/L		28-AUG-18	R4180309
Cadmium (Cd)-Dissolved	<0.000025	DLDS	0.000025	mg/L		28-AUG-18	R4180309
Calcium (Ca)-Dissolved	140	DLDS	0.25	mg/L		28-AUG-18	R4180309
Chromium (Cr)-Dissolved	<0.00050	DLDS	0.00050	mg/L		28-AUG-18	R4180309
Copper (Cu)-Dissolved	<0.0010	DLDS	0.0010	mg/L		28-AUG-18	R4180309
Iron (Fe)-Dissolved	7.79	DLDS	0.050	mg/L		28-AUG-18	R4180309
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		28-AUG-18	R4180309
Magnesium (Mg)-Dissolved	51.0	DLDS	0.025	mg/L		28-AUG-18	R4180309
Manganese (Mn)-Dissolved	0.387	DLDS	0.00050	mg/L		28-AUG-18	R4180309
Nickel (Ni)-Dissolved	<0.0025	DLDS	0.0025	mg/L		28-AUG-18	R4180309
Potassium (K)-Dissolved	4.67	DLDS	0.25	mg/L		28-AUG-18	R4180309
Selenium (Se)-Dissolved	<0.00025	DLDS	0.00025	mg/L		28-AUG-18	R4180309
Silver (Ag)-Dissolved	<0.000050	DLDS	0.000050	mg/L		28-AUG-18	R4180309
Sodium (Na)-Dissolved	104	DLDS	0.25	mg/L		28-AUG-18	R4180309
Uranium (U)-Dissolved	0.00119	DLDS	0.000050	mg/L		28-AUG-18	R4180309
Zinc (Zn)-Dissolved	<0.0050	DLDS	0.0050	mg/L		28-AUG-18	R4180309
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	61.6		0.50	mg/L		02-AUG-18	R4158668
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					09-AUG-18	R4161694
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		13-AUG-18	R4166767
Fluoride in Water by IC							
Fluoride (F)	0.102		0.020	mg/L		02-AUG-18	R4158668

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2140259-1 MW-02							
Sampled By: RM on 02-AUG-18 @ 09:20							
Matrix: WATER							
Ion Balance Calculation							
Ion Balance	97.7			%		29-AUG-18	
TDS (Calculated)	883			mg/L		29-AUG-18	
Hardness (as CaCO3)	560			mg/L		29-AUG-18	
Nitrate in Water by IC							
Nitrate (as N)	<0.020		0.020	mg/L		02-AUG-18	R4158668
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		03-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		02-AUG-18	R4158668
Sulfate in Water by IC							
Sulfate (SO4)	234		0.30	mg/L		02-AUG-18	R4158668
pH, Conductivity and Total Alkalinity							
pH	8.20		0.10	pH		09-AUG-18	R4162144
Conductivity (EC)	1360		2.0	uS/cm		09-AUG-18	R4162144
Bicarbonate (HCO3)	585		5.0	mg/L		09-AUG-18	R4162144
Carbonate (CO3)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Hydroxide (OH)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Alkalinity, Total (as CaCO3)	479		2.0	mg/L		09-AUG-18	R4162144
L2140259-2 MW-02B							
Sampled By: RM on 02-AUG-18 @ 09:05							
Matrix: WATER							
BTEX, Styrene & F1-F2							
BTEX, Styrene and F1 (C6-C10)							
Benzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Toluene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
EthylBenzene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
m+p-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
o-Xylene	<0.00050		0.00050	mg/L	02-AUG-18	03-AUG-18	R4151477
Styrene	<0.0010		0.0010	mg/L	02-AUG-18	03-AUG-18	R4151477
F1(C6-C10)	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
F1-BTEX	<0.10		0.10	mg/L	02-AUG-18	03-AUG-18	R4151477
Xylenes	<0.00071		0.00071	mg/L	02-AUG-18	03-AUG-18	R4151477
Surrogate: 1,4-Difluorobenzene (SS)	100.7		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 4-Bromofluorobenzene (SS)	91.1		70-130	%	02-AUG-18	03-AUG-18	R4151477
Surrogate: 3,4-Dichlorotoluene (SS)	119.0		70-130	%	02-AUG-18	03-AUG-18	R4151477
F2 (>C10-C16)							
F2 (C10-C16)	<0.10		0.10	mg/L	03-AUG-18	03-AUG-18	R4159642
Surrogate: 2-Bromobenzotrifluoride	101.9		60-140	%	03-AUG-18	03-AUG-18	R4159642
Miscellaneous Parameters							
Ammonia, Total Dissolved (as N)	1.53		0.050	mg/L		03-AUG-18	R4158822
Dissolved Organic Carbon	8.66		0.50	mg/L		21-AUG-18	R4179903
Phenols (4AAP)	0.0010		0.0010	mg/L		08-AUG-18	R4161642
Total Dissolved Solids	1860		10	mg/L		10-AUG-18	R4168161
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					21-AUG-18	R4179990
Aluminum (Al)-Dissolved	0.0294	DLDS	0.0050	mg/L		28-AUG-18	R4180309
Antimony (Sb)-Dissolved	<0.00050	DLDS	0.00050	mg/L		28-AUG-18	R4180309
Arsenic (As)-Dissolved	0.00432	DLDS	0.00050	mg/L		28-AUG-18	R4180309
Barium (Ba)-Dissolved	0.851	DLDS	0.00050	mg/L		28-AUG-18	R4180309
Boron (B)-Dissolved	0.723	DLDS	0.050	mg/L		28-AUG-18	R4180309
Cadmium (Cd)-Dissolved	<0.000025	DLDS	0.000025	mg/L		28-AUG-18	R4180309

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2140259-2 MW-02B							
Sampled By: RM on 02-AUG-18 @ 09:05							
Matrix: WATER							
Dissolved Metals in Water by CRC ICPMS							
Calcium (Ca)-Dissolved	35.8	DLDS	0.25	mg/L		28-AUG-18	R4180309
Chromium (Cr)-Dissolved	<0.00050	DLDS	0.00050	mg/L		28-AUG-18	R4180309
Copper (Cu)-Dissolved	<0.0010	DLDS	0.0010	mg/L		28-AUG-18	R4180309
Iron (Fe)-Dissolved	0.127	DLDS	0.050	mg/L		28-AUG-18	R4180309
Lead (Pb)-Dissolved	<0.00025	DLDS	0.00025	mg/L		28-AUG-18	R4180309
Magnesium (Mg)-Dissolved	6.95	DLDS	0.025	mg/L		28-AUG-18	R4180309
Manganese (Mn)-Dissolved	0.102	DLDS	0.00050	mg/L		28-AUG-18	R4180309
Nickel (Ni)-Dissolved	<0.0025	DLDS	0.0025	mg/L		28-AUG-18	R4180309
Potassium (K)-Dissolved	4.00	DLDS	0.25	mg/L		28-AUG-18	R4180309
Selenium (Se)-Dissolved	<0.00025	DLDS	0.00025	mg/L		28-AUG-18	R4180309
Silver (Ag)-Dissolved	<0.000050	DLDS	0.000050	mg/L		28-AUG-18	R4180309
Sodium (Na)-Dissolved	691	DLDS	0.25	mg/L		28-AUG-18	R4180309
Uranium (U)-Dissolved	0.00132	DLDS	0.000050	mg/L		28-AUG-18	R4180309
Zinc (Zn)-Dissolved	<0.0050	DLDS	0.0050	mg/L		28-AUG-18	R4180309
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	930	DLDS	2.5	mg/L		02-AUG-18	R4158668
Dissolved Mercury in Water by CVAAS							
Dissolved Mercury Filtration Location	FIELD					17-AUG-18	R4175169
Mercury (Hg)-Dissolved	0.000221		0.0000050	mg/L		17-AUG-18	R4175613
Fluoride in Water by IC							
Fluoride (F)	0.73	DLDS	0.10	mg/L		02-AUG-18	R4158668
Ion Balance Calculation							
Ion Balance	98.5			%		29-AUG-18	
TDS (Calculated)	1870			mg/L		29-AUG-18	
Hardness (as CaCO3)	118			mg/L		29-AUG-18	
Nitrate in Water by IC							
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		02-AUG-18	R4158668
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.11		0.11	mg/L		03-AUG-18	
Nitrite in Water by IC							
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		02-AUG-18	R4158668
Sulfate in Water by IC							
Sulfate (SO4)	<1.5	DLDS	1.5	mg/L		02-AUG-18	R4158668
pH, Conductivity and Total Alkalinity							
pH	8.49		0.10	pH		09-AUG-18	R4162144
Conductivity (EC)	3460		2.0	uS/cm		09-AUG-18	R4162144
Bicarbonate (HCO3)	389		5.0	mg/L		09-AUG-18	R4162144
Carbonate (CO3)	11.3		5.0	mg/L		09-AUG-18	R4162144
Hydroxide (OH)	<5.0		5.0	mg/L		09-AUG-18	R4162144
Alkalinity, Total (as CaCO3)	338		2.0	mg/L		09-AUG-18	R4162144

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS,F1-ED	Water	BTEX, Styrene and F1 (C6-C10)	EPA 5021/8015&8260 GC-MS & FID
C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310B

Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-N-ED	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

F-IC-N-ED	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

F2-ED	Water	F2 (>C10-C16)	EPA 3510/CCME PHC CWS-GC-FID
HG-D-CVAA-ED	Water	Dissolved Mercury in Water by CVAAS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

HYDG2-ISOTOPE-H2O-IS	Water	Hydrogen-2 water	Picarro Cavity Ring-Down Spectroscopy

A water sample is treated and filtered to remove particulates and some dissolved organics, then vaporised under vacuum. The water vapor travels into a cavity containing 3 mirrors in triangular arrangement. A laser beam enters the cavity and bounces between mirrors, expanding the effective path length. Vapor in the cavity will absorb a matched wavelength of light. A small gap in one mirror just in front of a photodetector allows the laser light to escape and be detected. Once the light intensity in the cavity reaches it's maximum, the laser is turned off and detection begins. Quantitation is achieved by measuring the amount of time it takes for the light to deplete to non-detectable levels (ring down time). A vapor high in Hydrogen-2 will deplete the laser quicker, because of the absorption occurring, than an empty cavity will. Rather than removing the vapor from the cavity, the wavelength is alternated to one that is not absorbed. This is Cavity Ring Down Spectroscopy.

IONBALANCE-ED	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-D-COL-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.

NO2+NO3-CALC-ED	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-ED	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-N-ED	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

OXY18-ISOTOPE-H2O-IS	Water	Oxygen-18 water	Picarro Cavity Ring-Down Spectroscopy

A water sample is treated and filtered to remove particulates and some dissolved organics, then vaporised under vacuum. The water vapor travels into a cavity containing 3 mirrors in triangular arrangement. A laser beam enters the cavity and bounces between mirrors, expanding the effective path length. Vapor in the cavity will absorb a matched wavelength of light. A small gap in one mirror just in front of a photodetector allows the laser light to escape and be detected. Once the light intensity in the cavity reaches it's maximum, the laser is turned off and detection begins. Quantitation is achieved by measuring the amount of time it takes for the light to deplete to non-detectable levels (ring down time). A vapor high in Oxygen-18 will deplete the laser quicker, because of the absorption occurring, than an empty cavity will. Rather than removing the vapor from the cavity, the wavelength is alternated to one that is not absorbed. This is Cavity Ring Down Spectroscopy.

PH/EC/ALK-ED	Water	pH, Conductivity and Total Alkalinity	APHA 4500-H, 2510, 2320

All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed).
pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode.
Alkalinity measurement is based on the sample's capacity to neutralize acid. Auto-titration to pH 4.5 using 0.02N H_2SO_4 is performed.
Conductivity measurement is based on the sample's capacity to convey an electric current, and is measured with a conductivity meter.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.			
SO4-IC-N-ED	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TDS-ED	Water	Total Dissolved Solids	APHA 2540 C
Gravimetric determination of solids in waters by filtration and evaporating filtrate to dryness at 180 degrees Celsius.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
IS	ISOBRINE SOLUTIONS INC
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

17-657883

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2140259 Report Date: 06-SEP-18

Client: WorleyParsons Canada
8615 51 Avenue
Edmonton AB T6E 6A8
Contact: Trevor Butterfield

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-ED	**Water**							
Batch R4151477								
WG2839798-2 LCS								
Benzene			129.1		%		70-130	03-AUG-18
Toluene			126.3		%		70-130	03-AUG-18
EthylBenzene			120.2		%		70-130	03-AUG-18
m+p-Xylene			119.7		%		70-130	03-AUG-18
o-Xylene			124.3		%		70-130	03-AUG-18
Styrene			124.4		%		70-130	03-AUG-18
WG2839798-3 LCS								
F1(C6-C10)			113.9		%		70-130	03-AUG-18
WG2839798-1 MB								
Benzene			<0.00050		mg/L		0.0005	03-AUG-18
Toluene			<0.00050		mg/L		0.0005	03-AUG-18
EthylBenzene			<0.00050		mg/L		0.0005	03-AUG-18
m+p-Xylene			<0.00050		mg/L		0.0005	03-AUG-18
o-Xylene			<0.00050		mg/L		0.0005	03-AUG-18
Styrene			<0.0010		mg/L		0.001	03-AUG-18
F1(C6-C10)			<0.10		mg/L		0.1	03-AUG-18
Surrogate: 1,4-Difluorobenzene (SS)			100.5		%		70-130	03-AUG-18
Surrogate: 4-Bromofluorobenzene (SS)			92.1		%		70-130	03-AUG-18
Surrogate: 3,4-Dichlorotoluene (SS)			112.7		%		70-130	03-AUG-18
C-DIS-ORG-WT	**Water**							
Batch R4179903								
WG2854877-2 LCS								
Dissolved Organic Carbon			106.1		%		80-120	21-AUG-18
WG2854877-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	21-AUG-18
CL-IC-N-ED	**Water**							
Batch R4158668								
WG2839785-9 DUP		**L2140259-1**						
Chloride (Cl)		61.6	61.2		mg/L	0.6	20	02-AUG-18
WG2839785-13 LCS								
Chloride (Cl)			103.8		%		90-110	02-AUG-18
WG2839785-15 LCS								
Chloride (Cl)			104.3		%		90-110	02-AUG-18
WG2839785-17 LCS								
Chloride (Cl)			103.7		%		90-110	02-AUG-18
WG2839785-2 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-N-ED	**Water**							
Batch R4158668								
WG2839785-2 LCS								
Chloride (Cl)			104.2		%		90-110	02-AUG-18
WG2839785-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	02-AUG-18
WG2839785-14 MB								
Chloride (Cl)			<0.50		mg/L		0.5	02-AUG-18
WG2839785-16 MB								
Chloride (Cl)			<0.50		mg/L		0.5	02-AUG-18
WG2839785-18 MB								
Chloride (Cl)			<0.50		mg/L		0.5	02-AUG-18
WG2839785-10 MS		**L2140259-1**						
Chloride (Cl)			97.1		%		75-125	02-AUG-18
F-IC-N-ED	**Water**							
Batch R4158668								
WG2839785-9 DUP		**L2140259-1**						
Fluoride (F)		0.102	0.093		mg/L	9.2	20	02-AUG-18
WG2839785-13 LCS								
Fluoride (F)			104.7		%		90-110	02-AUG-18
WG2839785-15 LCS								
Fluoride (F)			105.5		%		90-110	02-AUG-18
WG2839785-17 LCS								
Fluoride (F)			102.3		%		90-110	02-AUG-18
WG2839785-2 LCS								
Fluoride (F)			104.1		%		90-110	02-AUG-18
WG2839785-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	02-AUG-18
WG2839785-14 MB								
Fluoride (F)			<0.020		mg/L		0.02	02-AUG-18
WG2839785-16 MB								
Fluoride (F)			<0.020		mg/L		0.02	02-AUG-18
WG2839785-18 MB								
Fluoride (F)			<0.020		mg/L		0.02	02-AUG-18
WG2839785-10 MS		**L2140259-1**						
Fluoride (F)			100.8		%		75-125	02-AUG-18
F2-ED	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-ED	**Water**							
Batch R4159642								
WG2840768-2 LCS		**DIESEL/MOTOR OIL**						
F2 (C10-C16)			103.3		%		70-130	03-AUG-18
WG2840768-1 MB								
F2 (C10-C16)			<0.10		mg/L		0.1	03-AUG-18
Surrogate: 2-Bromobenzotrifluoride			96.5		%		60-140	03-AUG-18
HG-D-CVAA-ED	**Water**							
Batch R4166767								
WG2844683-6 LCS								
Mercury (Hg)-Dissolved			86.2		%		80-120	13-AUG-18
WG2844683-5 MB								
Mercury (Hg)-Dissolved			<0.000005		mg/L		0.000005	13-AUG-18
Batch R4175613								
WG2852592-6 LCS								
Mercury (Hg)-Dissolved			85.4		%		80-120	17-AUG-18
WG2852592-5 MB								
Mercury (Hg)-Dissolved			<0.000005		mg/L		0.000005	17-AUG-18
MET-D-CCMS-CL	**Water**							
Batch R4180309								
WG2856368-12 LCS		**TMRM**						
Aluminum (Al)-Dissolved			93.0		%		80-120	22-AUG-18
Antimony (Sb)-Dissolved			102.5		%		80-120	22-AUG-18
Arsenic (As)-Dissolved			91.1		%		80-120	22-AUG-18
Barium (Ba)-Dissolved			90.0		%		80-120	22-AUG-18
Boron (B)-Dissolved			86.1		%		80-120	22-AUG-18
Cadmium (Cd)-Dissolved			91.5		%		80-120	22-AUG-18
Calcium (Ca)-Dissolved			92.9		%		80-120	22-AUG-18
Chromium (Cr)-Dissolved			88.2		%		80-120	22-AUG-18
Copper (Cu)-Dissolved			89.4		%		80-120	22-AUG-18
Iron (Fe)-Dissolved			99.4		%		80-120	22-AUG-18
Lead (Pb)-Dissolved			91.9		%		80-120	22-AUG-18
Magnesium (Mg)-Dissolved			97.1		%		80-120	22-AUG-18
Manganese (Mn)-Dissolved			93.5		%		80-120	22-AUG-18
Nickel (Ni)-Dissolved			91.8		%		80-120	22-AUG-18
Potassium (K)-Dissolved			94.6		%		80-120	22-AUG-18
Selenium (Se)-Dissolved			88.2		%		80-120	22-AUG-18
Silver (Ag)-Dissolved			82.7		%		80-120	22-AUG-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R4180309								
WG2856368-12 LCS		**TMRM**						
Sodium (Na)-Dissolved			92.1		%		80-120	22-AUG-18
Uranium (U)-Dissolved			92.4		%		80-120	22-AUG-18
Zinc (Zn)-Dissolved			87.6		%		80-120	22-AUG-18
WG2856368-15 LCS		**TMRM**						
Aluminum (Al)-Dissolved			93.3		%		80-120	22-AUG-18
Antimony (Sb)-Dissolved			107.1		%		80-120	22-AUG-18
Arsenic (As)-Dissolved			91.6		%		80-120	22-AUG-18
Barium (Ba)-Dissolved			94.0		%		80-120	22-AUG-18
Boron (B)-Dissolved			80.8		%		80-120	22-AUG-18
Cadmium (Cd)-Dissolved			92.0		%		80-120	22-AUG-18
Calcium (Ca)-Dissolved			94.2		%		80-120	22-AUG-18
Chromium (Cr)-Dissolved			89.5		%		80-120	22-AUG-18
Copper (Cu)-Dissolved			90.7		%		80-120	22-AUG-18
Iron (Fe)-Dissolved			101.8		%		80-120	22-AUG-18
Lead (Pb)-Dissolved			95.6		%		80-120	22-AUG-18
Magnesium (Mg)-Dissolved			97.9		%		80-120	22-AUG-18
Manganese (Mn)-Dissolved			91.8		%		80-120	22-AUG-18
Nickel (Ni)-Dissolved			92.5		%		80-120	22-AUG-18
Potassium (K)-Dissolved			96.3		%		80-120	22-AUG-18
Selenium (Se)-Dissolved			90.0		%		80-120	22-AUG-18
Silver (Ag)-Dissolved			82.9		%		80-120	22-AUG-18
Sodium (Na)-Dissolved			91.8		%		80-120	22-AUG-18
Uranium (U)-Dissolved			98.2		%		80-120	22-AUG-18
Zinc (Zn)-Dissolved			86.8		%		80-120	22-AUG-18
WG2856368-2 LCS		**TMRM**						
Aluminum (Al)-Dissolved			100.2		%		80-120	22-AUG-18
Antimony (Sb)-Dissolved			110.3		%		80-120	22-AUG-18
Arsenic (As)-Dissolved			97.0		%		80-120	22-AUG-18
Barium (Ba)-Dissolved			95.7		%		80-120	22-AUG-18
Boron (B)-Dissolved			98.1		%		80-120	22-AUG-18
Cadmium (Cd)-Dissolved			97.8		%		80-120	22-AUG-18
Calcium (Ca)-Dissolved			103.4		%		80-120	22-AUG-18
Chromium (Cr)-Dissolved			95.0		%		80-120	22-AUG-18
Copper (Cu)-Dissolved			94.8		%		80-120	22-AUG-18
Iron (Fe)-Dissolved			106.3		%		80-120	22-AUG-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R4180309								
WG2856368-2 LCS		**TMRM**						
Lead (Pb)-Dissolved			95.7		%		80-120	22-AUG-18
Magnesium (Mg)-Dissolved			105.0		%		80-120	22-AUG-18
Manganese (Mn)-Dissolved			99.2		%		80-120	22-AUG-18
Nickel (Ni)-Dissolved			96.4		%		80-120	22-AUG-18
Potassium (K)-Dissolved			101.2		%		80-120	22-AUG-18
Selenium (Se)-Dissolved			94.2		%		80-120	22-AUG-18
Silver (Ag)-Dissolved			84.4		%		80-120	22-AUG-18
Sodium (Na)-Dissolved			99.8		%		80-120	22-AUG-18
Uranium (U)-Dissolved			97.5		%		80-120	22-AUG-18
Zinc (Zn)-Dissolved			98.9		%		80-120	22-AUG-18
WG2856368-9 LCS		**TMRM**						
Aluminum (Al)-Dissolved			93.5		%		80-120	23-AUG-18
Antimony (Sb)-Dissolved			94.7		%		80-120	23-AUG-18
Arsenic (As)-Dissolved			96.0		%		80-120	23-AUG-18
Barium (Ba)-Dissolved			89.6		%		80-120	23-AUG-18
Boron (B)-Dissolved			81.3		%		80-120	23-AUG-18
Cadmium (Cd)-Dissolved			90.9		%		80-120	23-AUG-18
Calcium (Ca)-Dissolved			92.5		%		80-120	23-AUG-18
Chromium (Cr)-Dissolved			92.7		%		80-120	23-AUG-18
Copper (Cu)-Dissolved			91.8		%		80-120	23-AUG-18
Iron (Fe)-Dissolved			97.1		%		80-120	23-AUG-18
Lead (Pb)-Dissolved			96.0		%		80-120	23-AUG-18
Magnesium (Mg)-Dissolved			100.9		%		80-120	23-AUG-18
Manganese (Mn)-Dissolved			96.6		%		80-120	23-AUG-18
Nickel (Ni)-Dissolved			92.8		%		80-120	23-AUG-18
Potassium (K)-Dissolved			94.2		%		80-120	23-AUG-18
Selenium (Se)-Dissolved			91.8		%		80-120	23-AUG-18
Silver (Ag)-Dissolved			94.4		%		80-120	23-AUG-18
Sodium (Na)-Dissolved			95.6		%		80-120	23-AUG-18
Uranium (U)-Dissolved			96.8		%		80-120	23-AUG-18
Zinc (Zn)-Dissolved			93.2		%		80-120	23-AUG-18
WG2856368-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	22-AUG-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R4180309								
WG2856368-1 MB								
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	22-AUG-18
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	22-AUG-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	22-AUG-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	22-AUG-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	22-AUG-18
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	22-AUG-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-18
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	22-AUG-18
WG2856368-11 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	22-AUG-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	22-AUG-18
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	22-AUG-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	22-AUG-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	22-AUG-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	22-AUG-18
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	22-AUG-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R4180309								
WG2856368-11 MB								
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	22-AUG-18
WG2856368-14 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	22-AUG-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	22-AUG-18
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	22-AUG-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	22-AUG-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	22-AUG-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	22-AUG-18
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	22-AUG-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-18
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	22-AUG-18
WG2856368-5 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	22-AUG-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	22-AUG-18
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	22-AUG-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	22-AUG-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R4180309								
WG2856368-5 MB								
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	22-AUG-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	22-AUG-18
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	22-AUG-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-18
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	22-AUG-18
WG2856368-8 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	22-AUG-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	22-AUG-18
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	22-AUG-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	22-AUG-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	22-AUG-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	22-AUG-18
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	22-AUG-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-18
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	22-AUG-18
NH3-D-COL-ED	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-D-COL-ED	**Water**							
Batch R4158822								
WG2841194-13 DUP		**L2140259-2**						
Ammonia, Total Dissolved (as N)		1.53	1.50		mg/L	1.9	20	03-AUG-18
WG2841194-2 LCS								
Ammonia, Total Dissolved (as N)			101.3		%		85-115	03-AUG-18
WG2841194-1 MB								
Ammonia, Total Dissolved (as N)			<0.050		mg/L		0.05	03-AUG-18
WG2841194-14 MS		**L2140259-2**						
Ammonia, Total Dissolved (as N)			N/A	MS-B	%		-	03-AUG-18
NO2-IC-N-ED	**Water**							
Batch R4158668								
WG2839785-9 DUP		**L2140259-1**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	02-AUG-18
WG2839785-13 LCS								
Nitrite (as N)			97.9		%		90-110	02-AUG-18
WG2839785-15 LCS								
Nitrite (as N)			92.0		%		90-110	02-AUG-18
WG2839785-17 LCS								
Nitrite (as N)			103.0		%		90-110	02-AUG-18
WG2839785-2 LCS								
Nitrite (as N)			103.8		%		90-110	02-AUG-18
WG2839785-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	02-AUG-18
WG2839785-14 MB								
Nitrite (as N)			<0.010		mg/L		0.01	02-AUG-18
WG2839785-16 MB								
Nitrite (as N)			<0.010		mg/L		0.01	02-AUG-18
WG2839785-18 MB								
Nitrite (as N)			<0.010		mg/L		0.01	02-AUG-18
WG2839785-10 MS		**L2140259-1**						
Nitrite (as N)			106.9		%		75-125	02-AUG-18
NO3-IC-N-ED	**Water**							
Batch R4158668								
WG2839785-9 DUP		**L2140259-1**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	02-AUG-18
WG2839785-13 LCS								
Nitrate (as N)			99.7		%		90-110	02-AUG-18
WG2839785-15 LCS								
Nitrate (as N)			98.6		%		90-110	02-AUG-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-N-ED	**Water**							
Batch R4158668								
WG2839785-17 LCS								
Nitrate (as N)			96.4		%		90-110	02-AUG-18
WG2839785-2 LCS								
Nitrate (as N)			102.2		%		90-110	02-AUG-18
WG2839785-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	02-AUG-18
WG2839785-14 MB								
Nitrate (as N)			<0.020		mg/L		0.02	02-AUG-18
WG2839785-16 MB								
Nitrate (as N)			<0.020		mg/L		0.02	02-AUG-18
WG2839785-18 MB								
Nitrate (as N)			<0.020		mg/L		0.02	02-AUG-18
WG2839785-10 MS		**L2140259-1**						
Nitrate (as N)			98.2		%		75-125	02-AUG-18
PH/EC/ALK-ED	**Water**							
Batch R4162144								
WG2844945-10 DUP		**L2140259-1**						
pH		8.20	8.15	J	pH	0.05	0.3	09-AUG-18
Conductivity (EC)		1360	1360		uS/cm	0.4	10	09-AUG-18
Bicarbonate (HCO3)		585	586		mg/L	0.3	25	09-AUG-18
Carbonate (CO3)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	09-AUG-18
Hydroxide (OH)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	09-AUG-18
Alkalinity, Total (as CaCO3)		479	481		mg/L	0.3	20	09-AUG-18
WG2844945-15 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			95.3		%		85-115	09-AUG-18
WG2844945-20 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			97.2		%		85-115	09-AUG-18
WG2844945-25 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			98.6		%		85-115	09-AUG-18
WG2844945-30 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			95.7		%		85-115	09-AUG-18
WG2844945-35 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			96.7		%		85-115	09-AUG-18
WG2844945-4 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			94.8		%		85-115	09-AUG-18
WG2844945-40 LCS		**PCTITRATE_LCS**						
Alkalinity, Total (as CaCO3)			95.4		%		85-115	09-AUG-18
WG2844945-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED	**Water**							
Batch R4162144								
WG2844945-1 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-AUG-18
Bicarbonate (HCO3)			<5.0		mg/L		5	09-AUG-18
Carbonate (CO3)			<5.0		mg/L		5	09-AUG-18
Hydroxide (OH)			<5.0		mg/L		5	09-AUG-18
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-AUG-18
WG2844945-12 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-AUG-18
Bicarbonate (HCO3)			<5.0		mg/L		5	09-AUG-18
Carbonate (CO3)			<5.0		mg/L		5	09-AUG-18
Hydroxide (OH)			<5.0		mg/L		5	09-AUG-18
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-AUG-18
WG2844945-17 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-AUG-18
Bicarbonate (HCO3)			<5.0		mg/L		5	09-AUG-18
Carbonate (CO3)			<5.0		mg/L		5	09-AUG-18
Hydroxide (OH)			<5.0		mg/L		5	09-AUG-18
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-AUG-18
WG2844945-22 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-AUG-18
Bicarbonate (HCO3)			<5.0		mg/L		5	09-AUG-18
Carbonate (CO3)			<5.0		mg/L		5	09-AUG-18
Hydroxide (OH)			<5.0		mg/L		5	09-AUG-18
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-AUG-18
WG2844945-27 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-AUG-18
Bicarbonate (HCO3)			<5.0		mg/L		5	09-AUG-18
Carbonate (CO3)			<5.0		mg/L		5	09-AUG-18
Hydroxide (OH)			<5.0		mg/L		5	09-AUG-18
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-AUG-18
WG2844945-32 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-AUG-18
Bicarbonate (HCO3)			<5.0		mg/L		5	09-AUG-18
Carbonate (CO3)			<5.0		mg/L		5	09-AUG-18
Hydroxide (OH)			<5.0		mg/L		5	09-AUG-18
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-AUG-18

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-ED	**Water**							
Batch R4162144								
WG2844945-37 MB								
Conductivity (EC)			<2.0		uS/cm		2	09-AUG-18
Bicarbonate (HCO3)			<5.0		mg/L		5	09-AUG-18
Carbonate (CO3)			<5.0		mg/L		5	09-AUG-18
Hydroxide (OH)			<5.0		mg/L		5	09-AUG-18
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	09-AUG-18
PHENOLS-4AAP-WT	**Water**							
Batch R4161642								
WG2844053-2 LCS								
Phenols (4AAP)			99.99		%		85-115	09-AUG-18
WG2844053-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	08-AUG-18
SO4-IC-N-ED	**Water**							
Batch R4158668								
WG2839785-9 DUP		**L2140259-1**						
Sulfate (SO4)		234	232		mg/L	0.8	20	02-AUG-18
WG2839785-13 LCS								
Sulfate (SO4)			99.5		%		90-110	02-AUG-18
WG2839785-15 LCS								
Sulfate (SO4)			99.99		%		90-110	02-AUG-18
WG2839785-17 LCS								
Sulfate (SO4)			99.4		%		90-110	02-AUG-18
WG2839785-2 LCS								
Sulfate (SO4)			99.9		%		90-110	02-AUG-18
WG2839785-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	02-AUG-18
WG2839785-14 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	02-AUG-18
WG2839785-16 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	02-AUG-18
WG2839785-18 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	02-AUG-18
WG2839785-10 MS		**L2140259-1**						
Sulfate (SO4)			N/A	MS-B	%		-	02-AUG-18
SOLIDS-TDS-ED	**Water**							

Quality Control Report

Workorder: L2140259 Report Date: 06-SEP-18

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-ED	**Water**							
Batch R4168161								
WG2846222-2 LCS								
Total Dissolved Solids			96.5		%		85-115	10-AUG-18
WG2846222-1 MB								
Total Dissolved Solids			<10		mg/L		10	10-AUG-18

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Total Dissolved Solids							
	1	02-AUG-18 09:20	10-AUG-18 00:00	7	8	days	EHT
	2	02-AUG-18 09:05	10-AUG-18 00:00	7	8	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2140259 were received on 02-AUG-18 10:33.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Client:	**ALS Environmental**
Report date:	**27-Aug-18**

WATER ANALYSIS RESULTS

Isobrine ID	Client sample IDs		Client project ID	Collected	Received	$\delta^{18}O$
						‰ VSMOW
IB-19-014	L2140259-1	MW-02	L2140259	2-Aug-18	8-Aug-18	-18.16
IB-19-015	L2140259-2	MW-02B	L2140259	2-Aug-18	8-Aug-18	-16.51

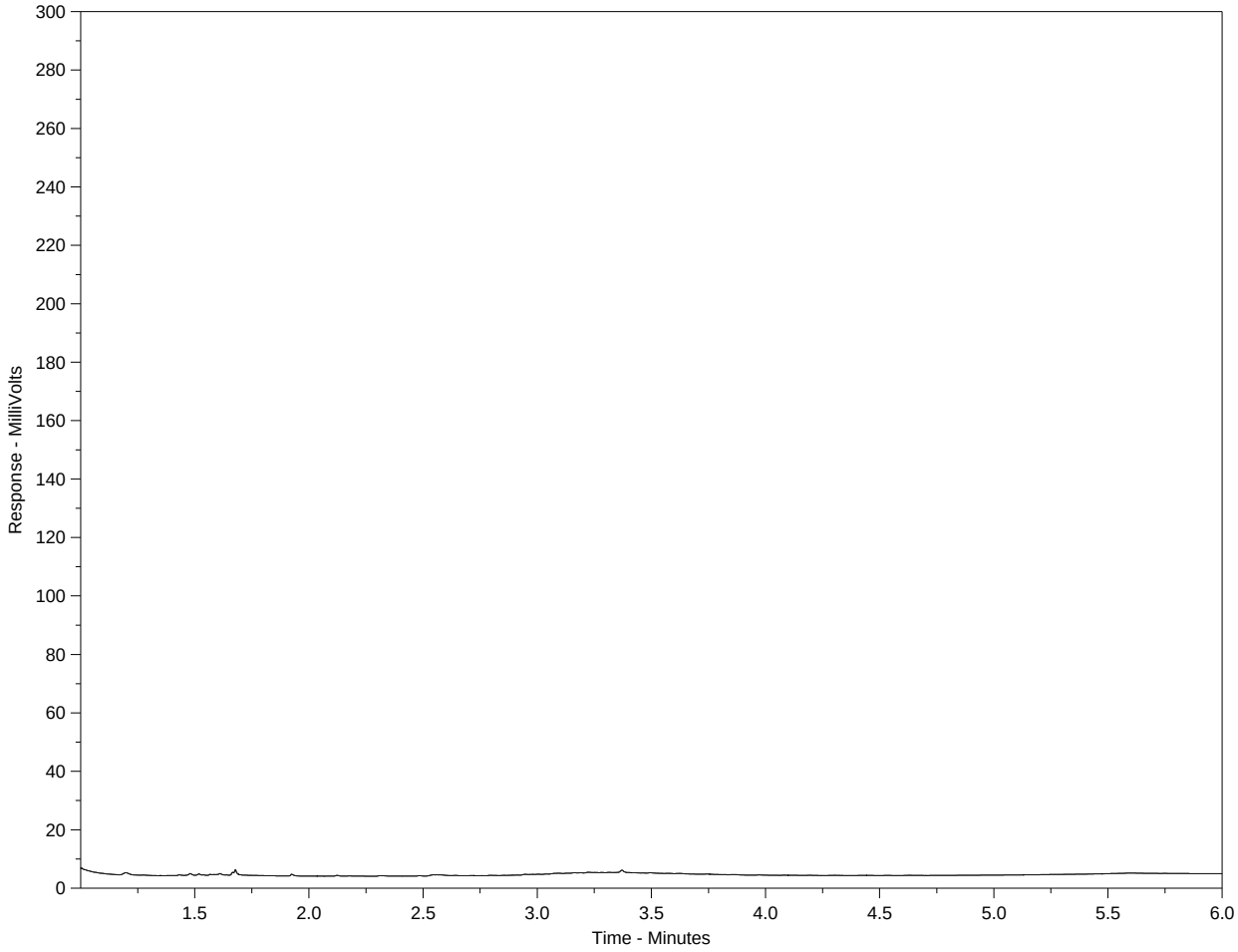
Oxygen and hydrogen stable isotope compositions determined on mechanically and chemically cleaned samples using a CRDS (Cavity Ring-down Mass Spectrometer).
Standard deviations for $\delta^{18}O$ and $\delta^{2}H$ are equal to or better than 0.2 ‰ and 2.0 ‰, respectively ($\pm 1\sigma$).

Isobrine Solutions Inc.
4-341 Enterprise Square
10230 Jasper Ave
Edmonton, AB, T5J 4P6

	δ^2H	
±1σ	‰ VSMOW	±1σ
0.12	-145.0	0.45
0.09	-135.0	0.40

Hydrocarbon Distribution Report

ALS Sample ID: L2140259-1
Client ID: MW-02



F2		F3	F4	>F4
nC10	nC16	nC34	nC50	
174°C	287°C	481°C	575°C	
346°F	549°F	898°F	1067°F	
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →		
← Diesel/ Jet Fuels →				

The Canada Wide Standard Hydrocarbon Distribution Report is intended to assist you in characterizing hydrocarbon products that may be present in your sample. The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products as well as a number of specified n-alkane hydrocarbon marker compounds. Comparison of this report with those of reference standards may also assist in characterizing hydrocarbons present in the sample.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note:
This chromatogram was produced with a high temperature GC method that is specific to the Canada-Wide Standard method. Note that retention times and distribution profiles from reports produced using different GC programs will differ.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2140259-COFC

COC Number: 17 - 657883

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)
Company:	Advisian - WorleyParsons	Select Report Format: [X] PDF [ ] EXCEL [X] EDD (DIGITAL)	Regular [R]: [X] Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Stuart Gray	Quality Control (QC) Report with Report: [X] YES [ ] NO	PRIORITY (Business Days): 4 day [P4-20%] [ ]; 3 day [P3-25%] [ ]; 2 day [P2-50%] [ ]
Phone:		[ ] Compare Results to Criteria on Report - provide details below if box checked	EMERGENCY: 1 Business day [E-100%] [ ]; Same Day, Weekend or Statutory holiday [E2-200% (Laboratory opening fees may apply)] [ ]
	Company address below will appear on the final report	Select Distribution: [X] EMAIL [ ] MAIL [ ] FAX	Date and Time Required for all E&P TATs:
Street:	Suite 300, 8615 51 Ave	Email 1 or Fax: Stuart.Gray@advisian.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	Edmonton, AB	Email 2: canada.chemistry@worleyparsons.com	
Postal Code:	T6E 6A8	Email 3	
Invoice To	Same as Report To [X] YES [ ] NO	Invoice Distribution	
	Copy of Invoice with Report [ ] YES [ ] NO	Select Invoice Distribution: [X] EMAIL [ ] MAIL [ ] FAX	
Company:		Email 1 or Fax	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	3070775-016088-400	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): L2140259

ALS Contact: Dana

Sampler: Rylee Machula

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Routine - Major Ions	BTEX, PHC F1	PHC F2 (P)	Phenols (F/P)	Diss. Metals (F/P)	Diss. Ammonia (F/P)	DOC (F/P)	Isotopes - deuterium H2 and oxygen O18	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
	MW-02	02-Aug-18	0920	GW	X	X	X	X	X	X	X	X			9
	MW-02B	02-Aug-18	0905	GW	X	X	X	X	X	X	X	X			9

Drinking Water (DW) Samples' (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? [ ] YES [X] NO	Please take routine analysis from isotopes bottles.
Are samples for human consumption/ use? [ ] YES [X] NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen [ ] SIF Observations Yes [ ] No [ ]

Ice Packs [ ] Ice Cubes [ ] Custody seal intact Yes [ ] No [ ]

Cooling Initiated [ ]

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
13							

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Rylee Machula	02-Aug-2018	1000	Natasha McWilliams	2AUG18	10:33			

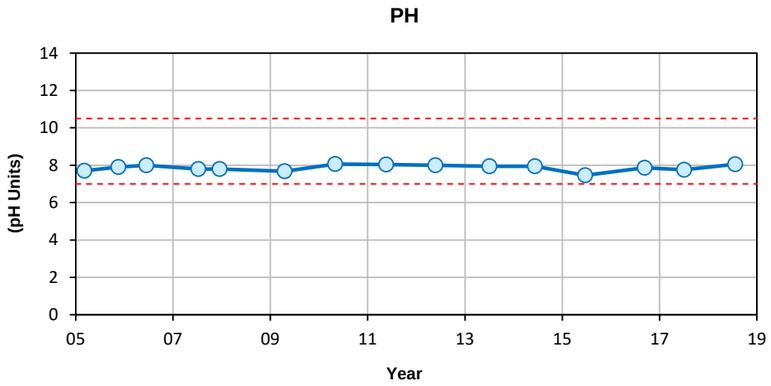
REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

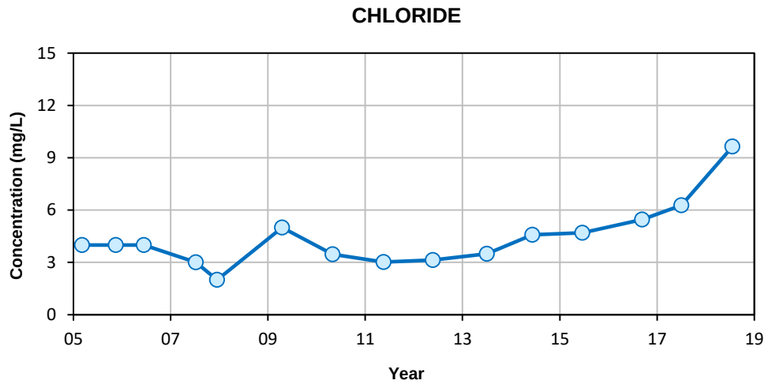
WHITE - LABORATORY COPY YELLOW - CLIENT COPY

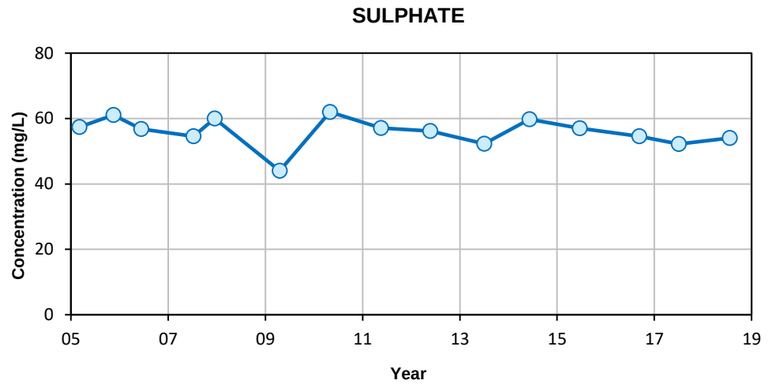
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

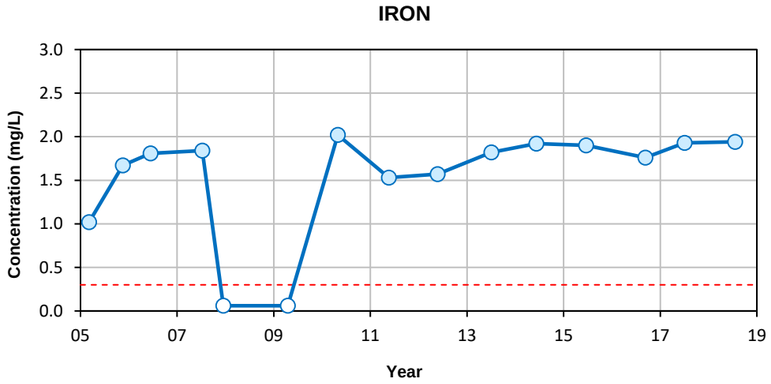
1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

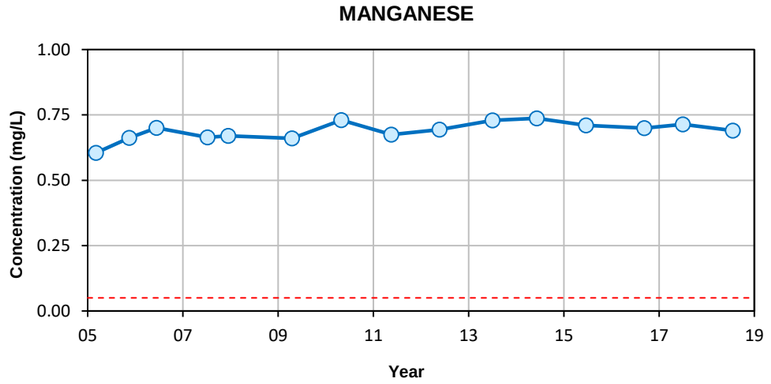
Appendix 5 Hydrochemical Control Charts

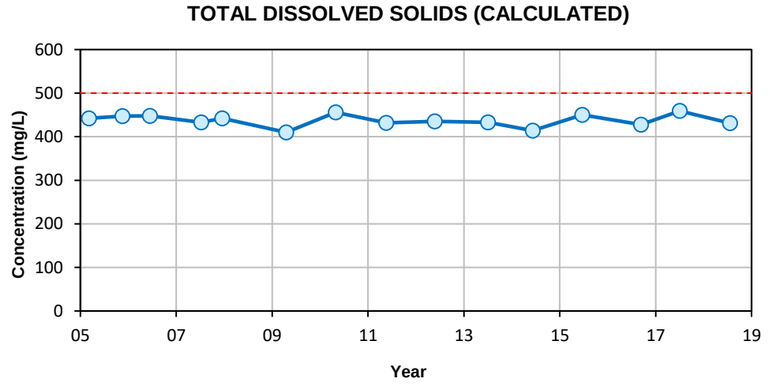


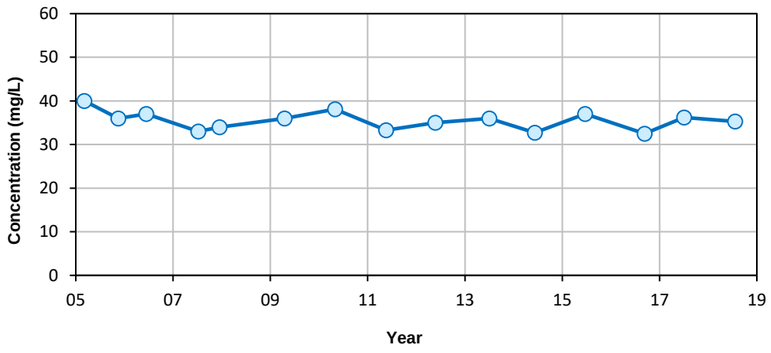


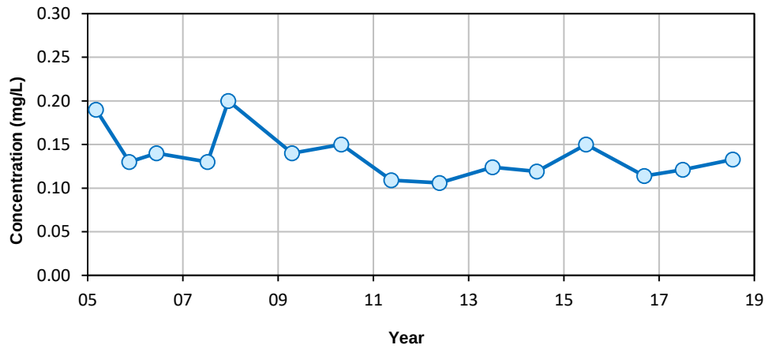


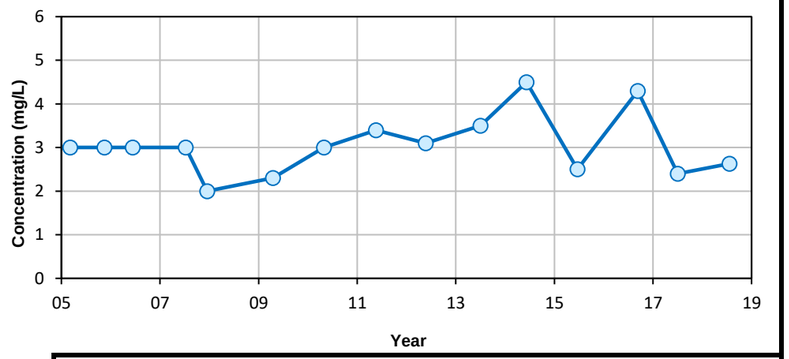












Notes:

- Filled symbols denote sample values; unfilled symbols denote values less than detection limit(s)
- Dashed line between data points indicates data gap of more than two years
- Canadian Drinking Water AO Guidelines 2017:
  - pH: 7-10.5 pH Units
  - Iron: 0.3 mg/L
  - Sodium: 200 mg/L
  - Chloride: 250 mg/L
  - Manganese: 0.05 mg/L
  - Fluoride: 1.5 mg/L
  - Sulphate: 500 mg/L
  - Total Dissolved Solids (Calculated): 500 mg/L
  - Dissolved Organic Carbon: N/A
- Canadian Drinking Water MAC Guidelines 2017:

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

HYDROCHEMICAL CONTROL CHARTS
MW-01

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS		

WorleyParsons Project No.: 307075-01608-400

FIG No.: A5-1 | REV: B

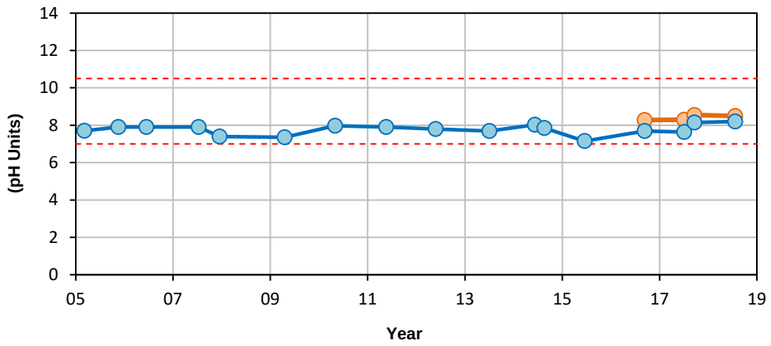
OneWay to zero harm

Advisian WorleyParsons Group

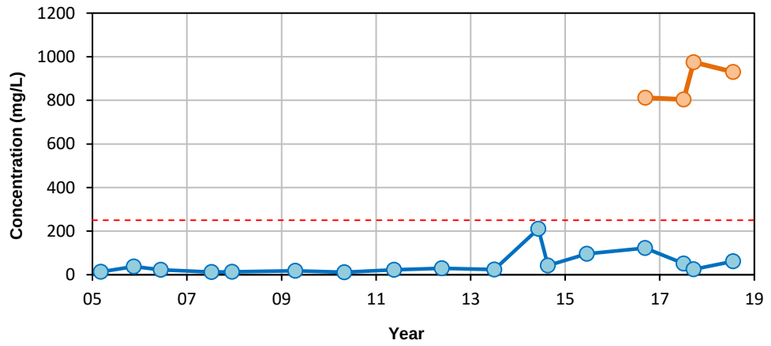
FILE LOCATION: EDMONTON

FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 5 HYDROCHEMICAL CONTROL CHARTS\REVB\WORKING FILES\

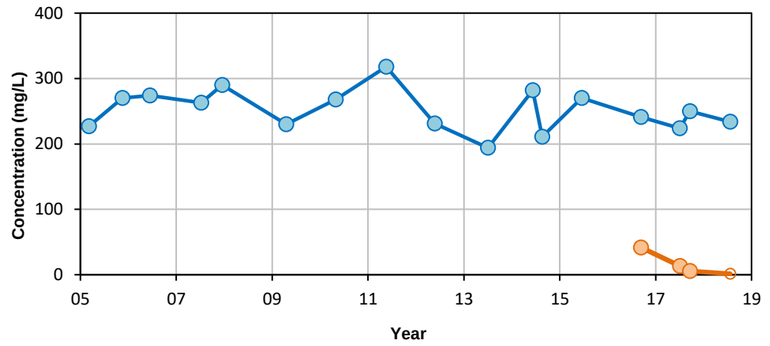
PH



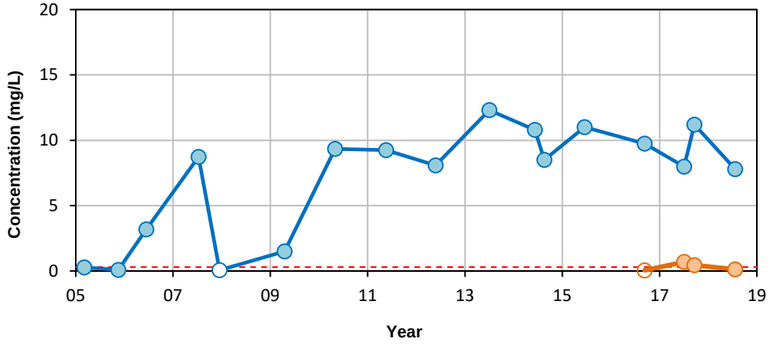
CHLORIDE



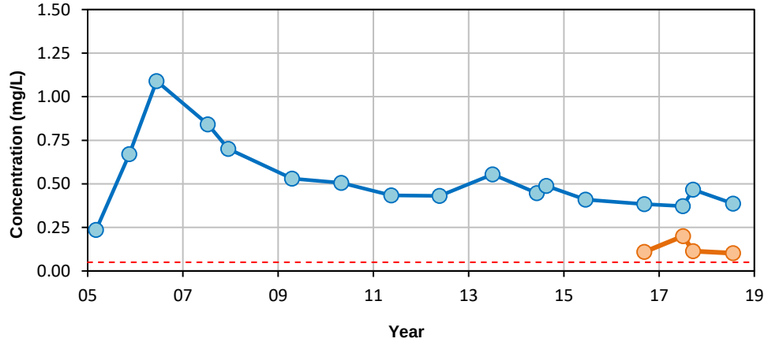
SULPHATE



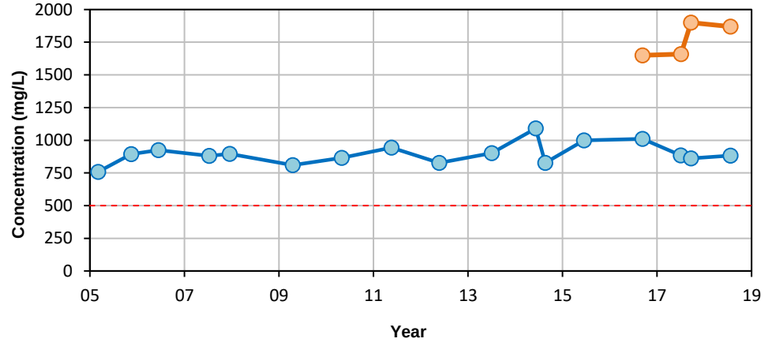
IRON



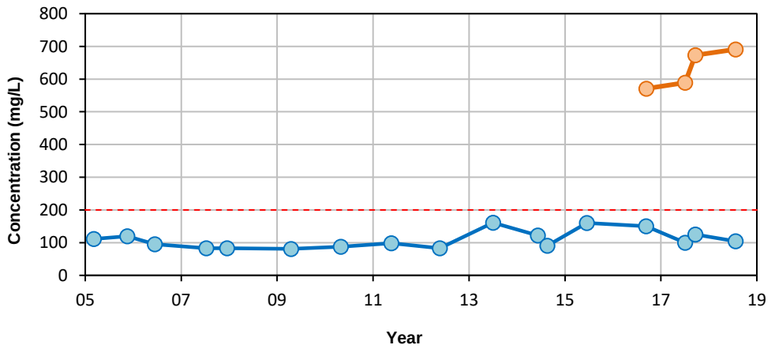
MANGANESE



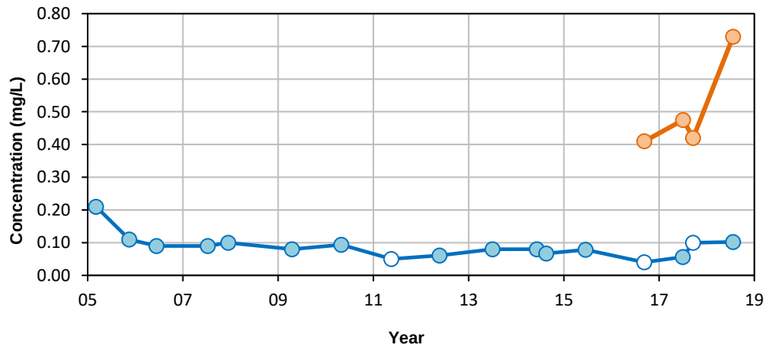
TOTAL DISSOLVED SOLIDS (CALCULATED)



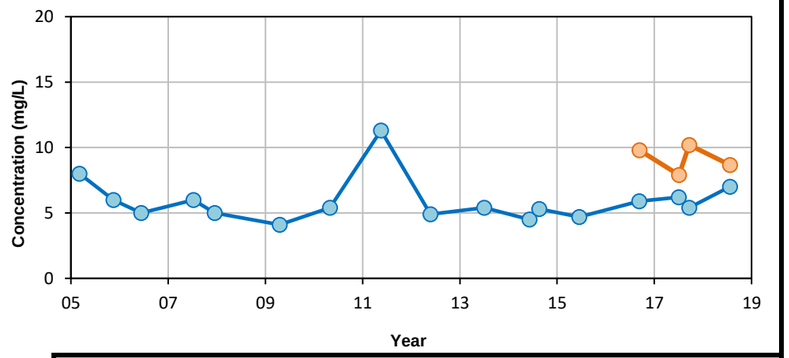
SODIUM



FLUORIDE



DISSOLVED ORGANIC CARBON



Notes:

- Filled symbols denote sample values; unfilled symbols denote values less than detection limit(s)
- Dashed line between data points indicates data gap of more than two years
- Canadian Drinking Water AO Guidelines 2017:
  - pH: 7-10.5 pH Units
  - Iron: 0.3 mg/L
  - Sodium: 200 mg/L
  - Chloride: 250 mg/L
  - Manganese: 0.05 mg/L
  - Fluoride: 1.5 mg/L
  - Sulphate: 500 mg/L
  - Total Dissolved Solids (Calculated): 500 mg/L
  - Dissolved Organic Carbon: N/A
- Canadian Drinking Water MAC Guidelines 2017:

Bedrock Monitoring Well (MW-02B) data point.

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

HYDROCHEMICAL CONTROL CHARTS
MW-02 MW-02B

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS		

OneWay to zero harm

Advisian
WorleyParsons Group

WorleyParsons Project No.: 307075-01608-400

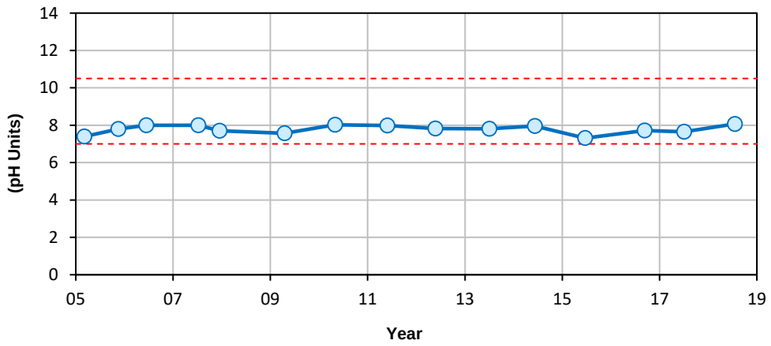
FIG No.: A5-2

REV: B

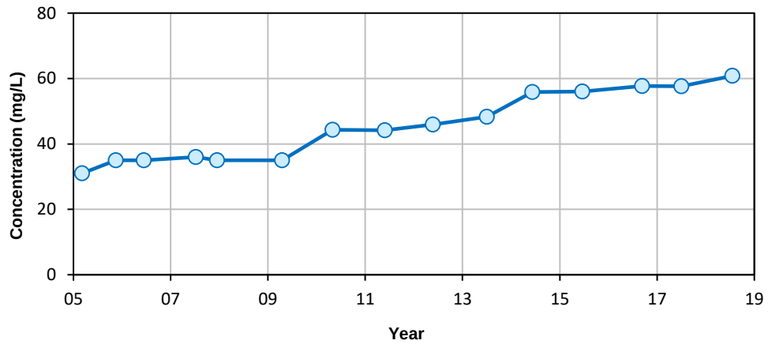
FILE LOCATION: EDMONTON

FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 5 HYDROCHEMICAL CONTROL CHARTS\REVB\WORKING FILES\

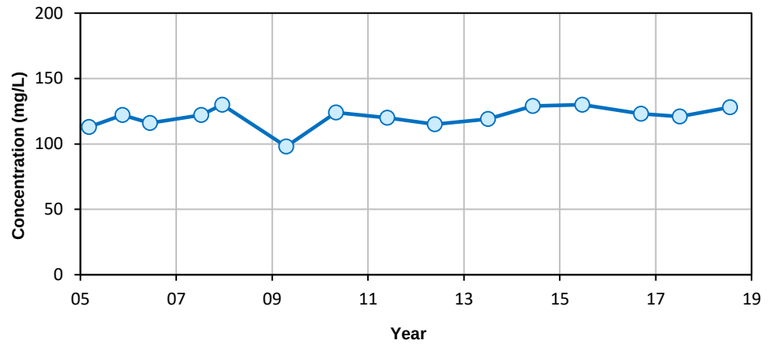
PH



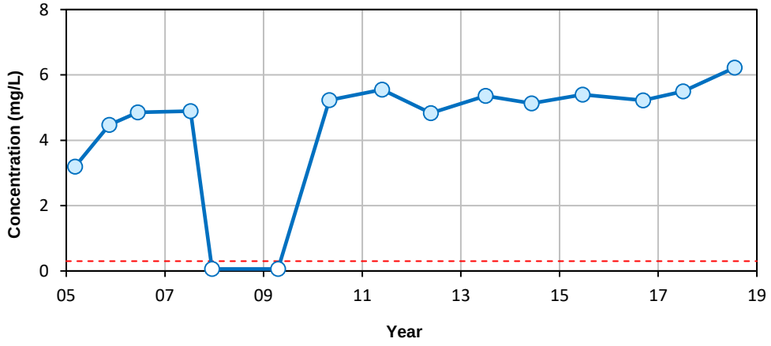
CHLORIDE



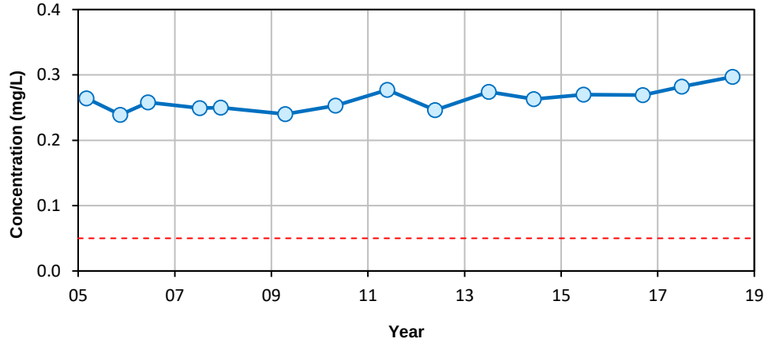
SULPHATE



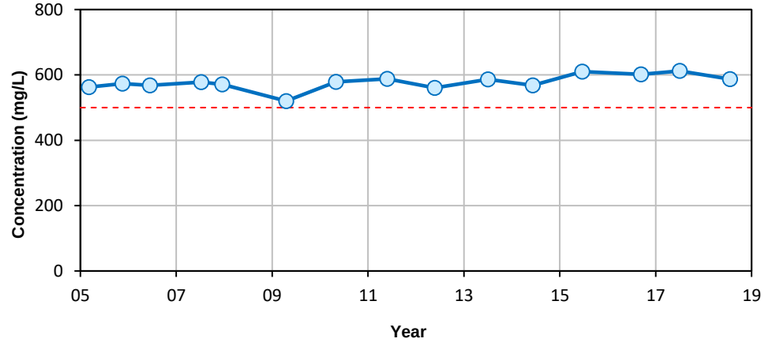
IRON



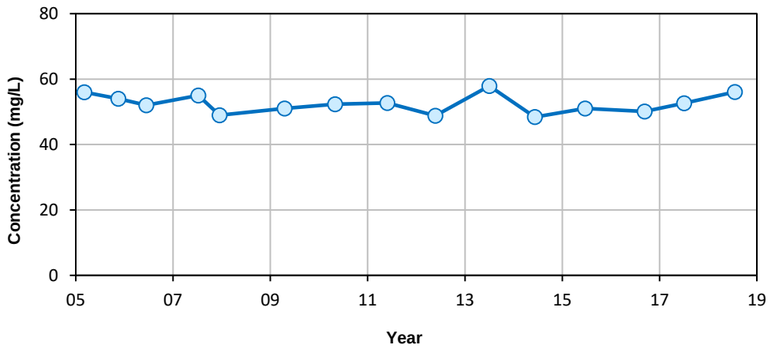
MANGANESE



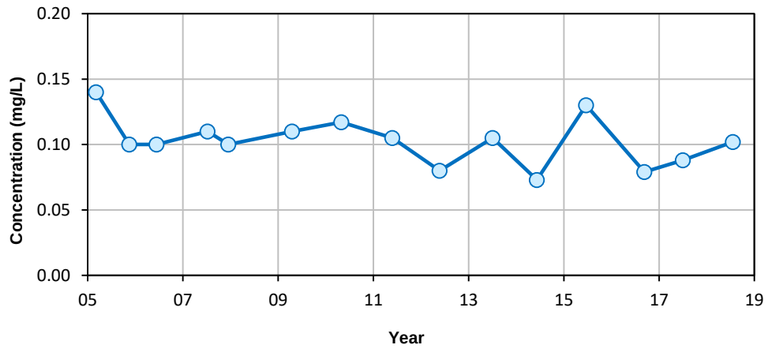
TOTAL DISSOLVED SOLIDS (CALCULATED)



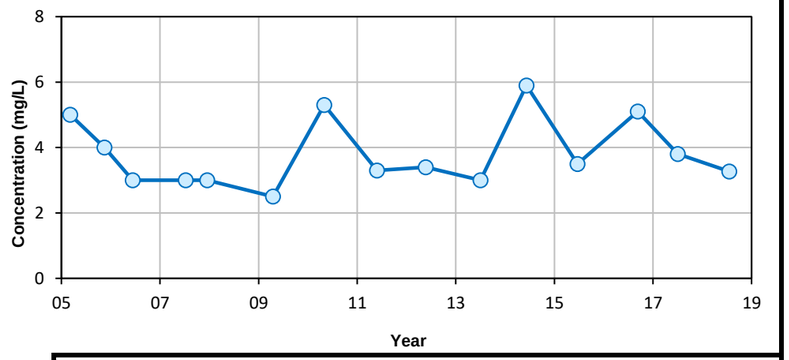
SODIUM



FLUORIDE



DISSOLVED ORGANIC CARBON



Notes:

- Filled symbols denote sample values; unfilled symbols denote values less than detection limit(s)
- Dashed line between data points indicates data gap of more than two years
- Canadian Drinking Water AO Guidelines 2017:
  - pH: 7-10.5 pH Units
  - Iron: 0.3 mg/L
  - Sodium: 200 mg/L
  - Chloride: 250 mg/L
  - Manganese: 0.05 mg/L
  - Fluoride: 1.5 mg/L
  - Sulphate: 500 mg/L
  - Total Dissolved Solids (Calculated): 500 mg/L
  - Dissolved Organic Carbon: N/A
- Canadian Drinking Water MAC Guidelines 2017:

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

HYDROCHEMICAL CONTROL CHARTS
MW-03

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS		

WorleyParsons Project No.: 307075-01608-400

FIG No.: A5-3

REV: B

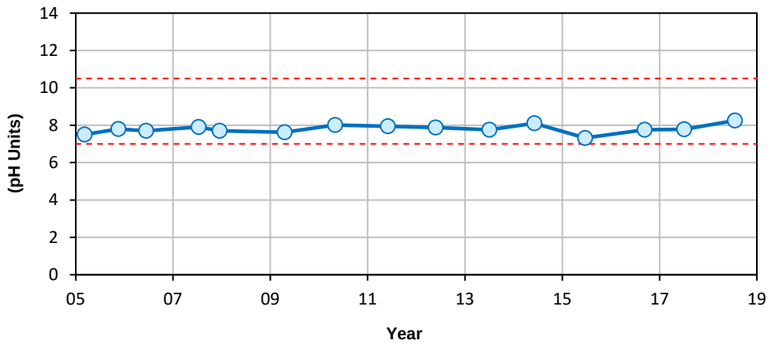
OneWay to zero harm

Advisian
WorleyParsons Group

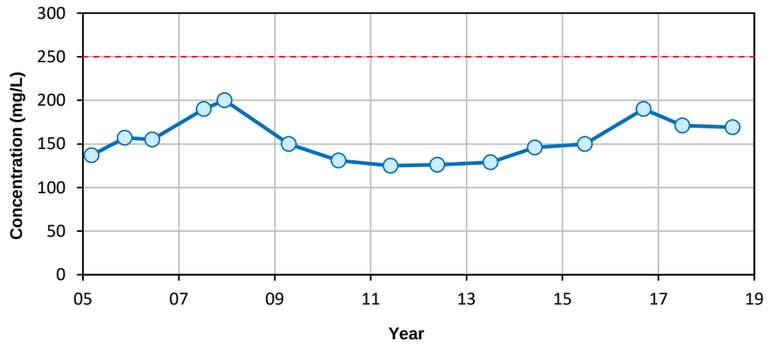
FILE LOCATION: EDMONTON

FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 5 HYDROCHEMICAL CONTROL CHARTS\REVB\WORKING FILES\

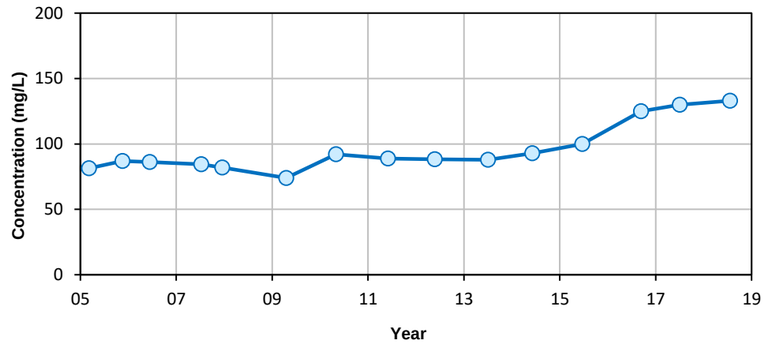
PH



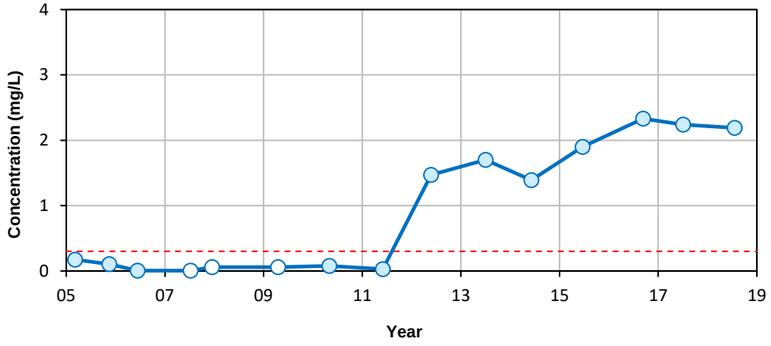
CHLORIDE



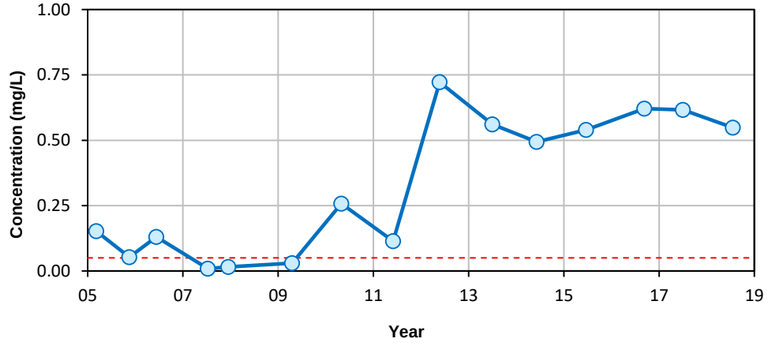
SULPHATE



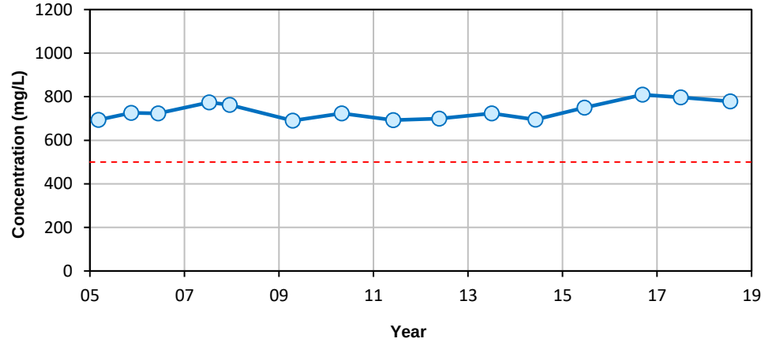
IRON



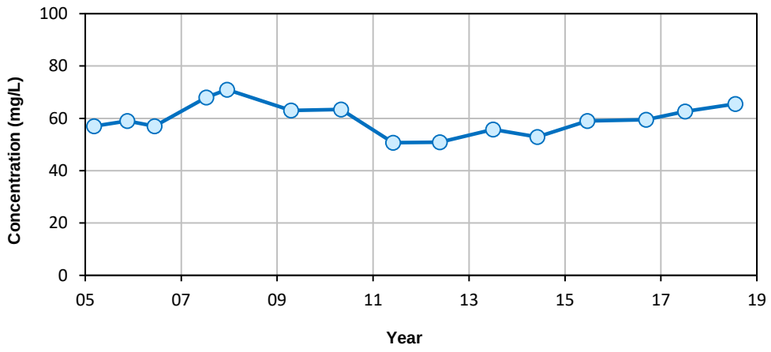
MANGANESE



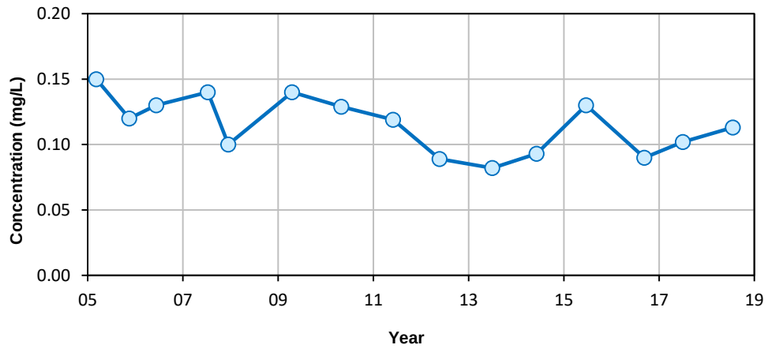
TOTAL DISSOLVED SOLIDS (CALCULATED)



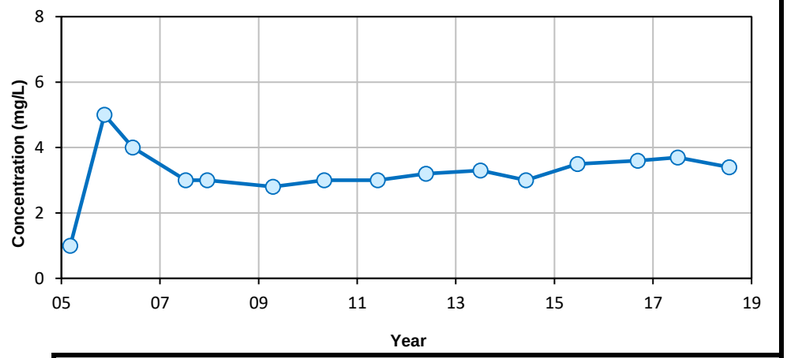
SODIUM



FLUORIDE



DISSOLVED ORGANIC CARBON



Notes:

- Filled symbols denote sample values; unfilled symbols denote values less than detection limit(s)
- Dashed line between data points indicates data gap of more than two years
- Canadian Drinking Water AO Guidelines 2017:
  - pH: 7-10.5 pH Units
  - Iron: 0.3 mg/L
  - Sodium: 200 mg/L
  - Chloride: 250 mg/L
  - Manganese: 0.05 mg/L
  - Fluoride: 1.5 mg/L
  - Sulphate: 500 mg/L
  - Total Dissolved Solids (Calculated): 500 mg/L
  - Dissolved Organic Carbon: N/A
- Canadian Drinking Water MAC Guidelines 2017:

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

HYDROCHEMICAL CONTROL CHARTS
MW-04

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS		

OneWay to zero harm

Advisian
WorleyParsons Group

WorleyParsons Project No.: 307075-01608-400

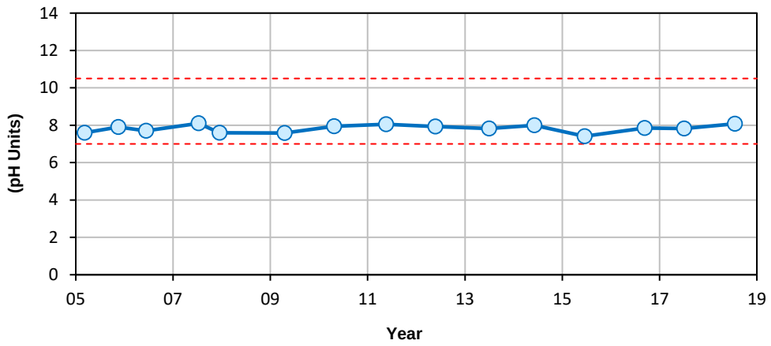
FIG No.: A5-4

REV: B

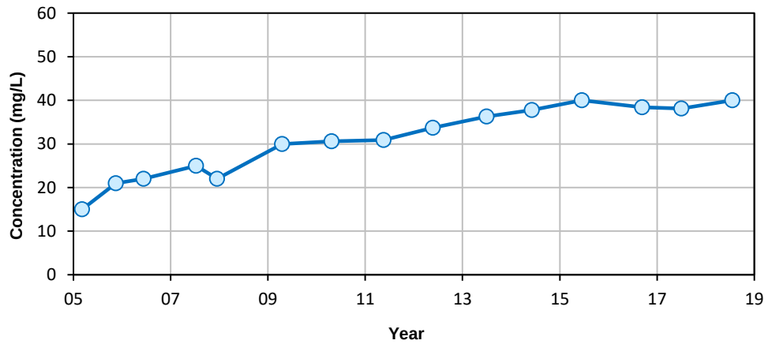
FILE LOCATION: EDMONTON

FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 5 HYDROCHEMICAL CONTROL CHARTS\REVB\WORKING FILES\

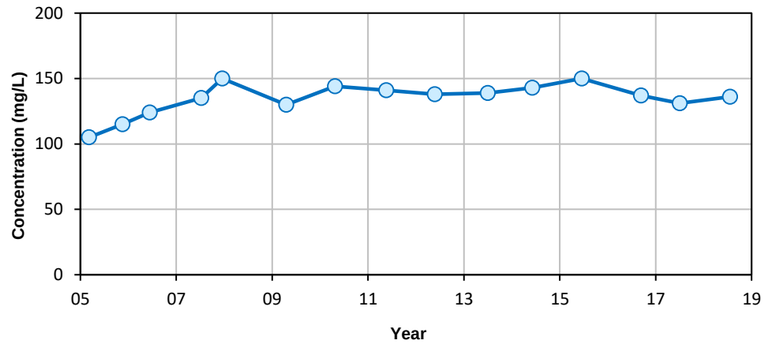
PH



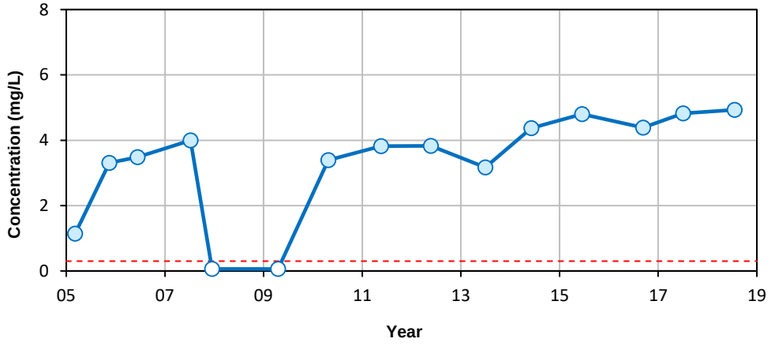
CHLORIDE



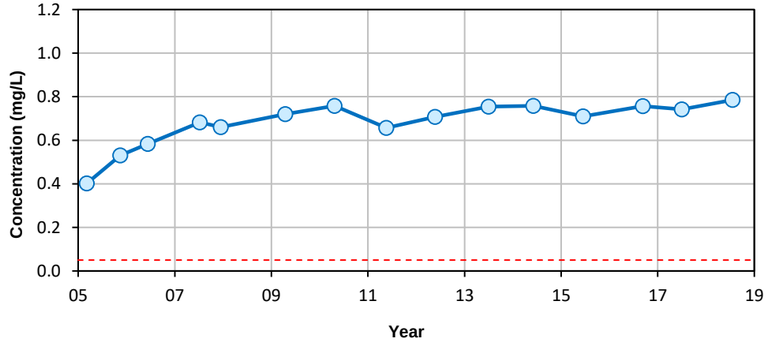
SULPHATE



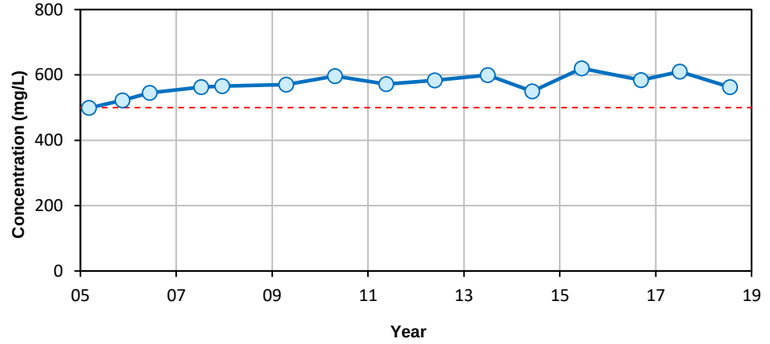
IRON



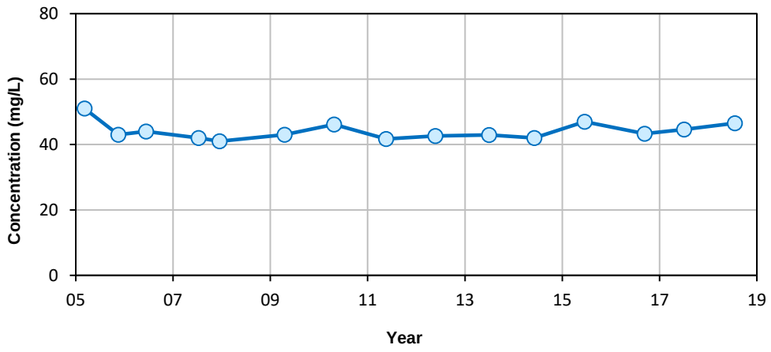
MANGANESE



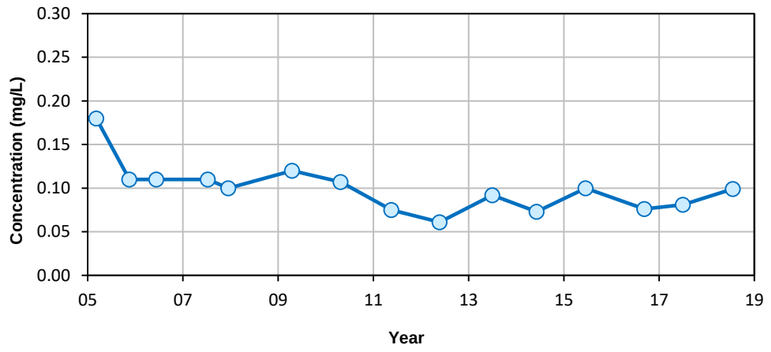
TOTAL DISSOLVED SOLIDS (CALCULATED)



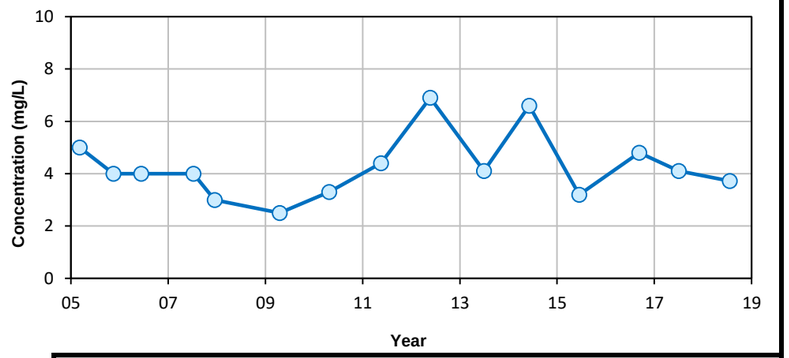
SODIUM



FLUORIDE



DISSOLVED ORGANIC CARBON



Notes:

- Filled symbols denote sample values; unfilled symbols denote values less than detection limit(s)
- Dashed line between data points indicates data gap of more than two years
- Canadian Drinking Water AO Guidelines 2017:
  - pH: 7-10.5 pH Units
  - Iron: 0.3 mg/L
  - Sodium: 200 mg/L
  - Chloride: 250 mg/L
  - Manganese: 0.05 mg/L
  - Fluoride: 1.5 mg/L
  - Sulphate: 500 mg/L
  - Total Dissolved Solids (Calculated): 500 mg/L
  - Dissolved Organic Carbon: N/A
- Canadian Drinking Water MAC Guidelines 2017:

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

HYDROCHEMICAL CONTROL CHARTS
MW-05

OneWay to zero harm

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS		

Advisian
WorleyParsons Group

WorleyParsons Project No.: 307075-01608-400

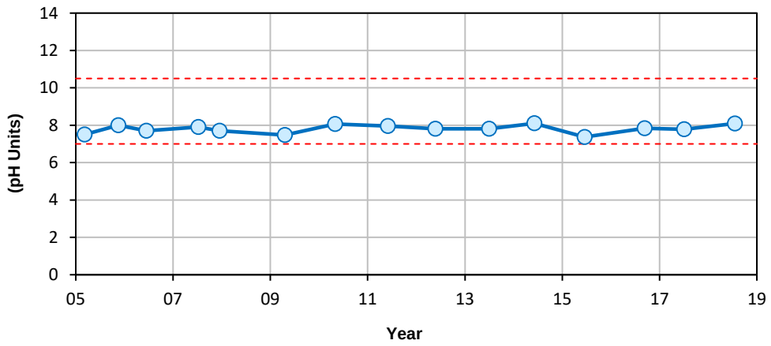
FIG No.: A5-5

REV: B

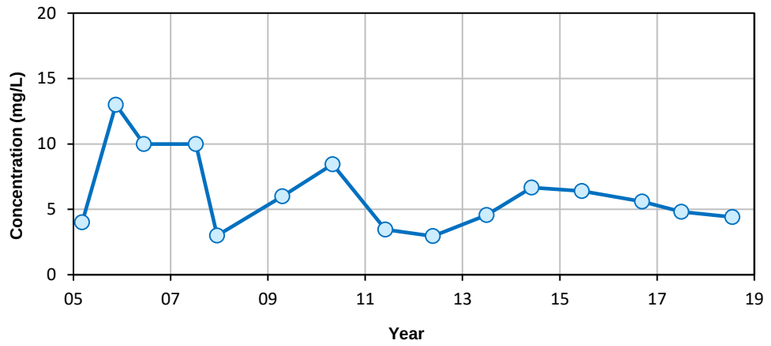
FILE LOCATION: EDMONTON

FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 5 HYDROCHEMICAL CONTROL CHARTS\REVB\WORKING FILES\

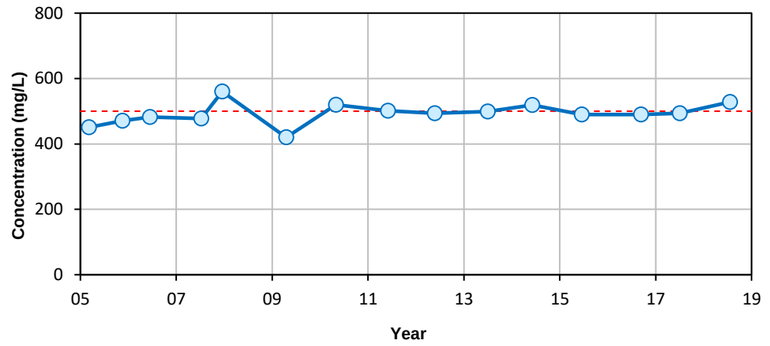
PH



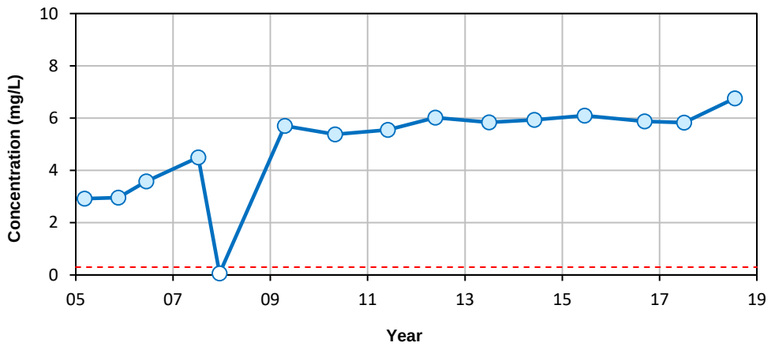
CHLORIDE



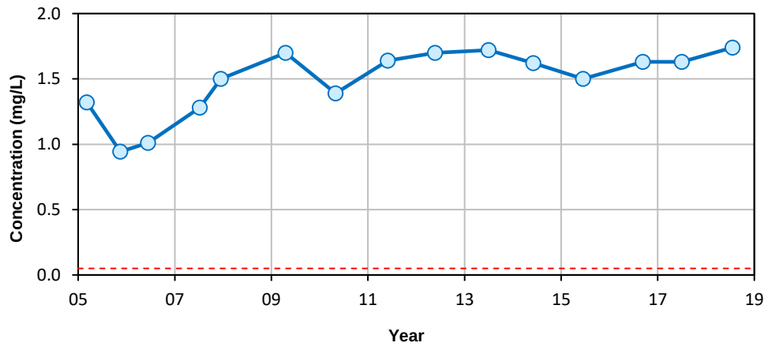
SULPHATE



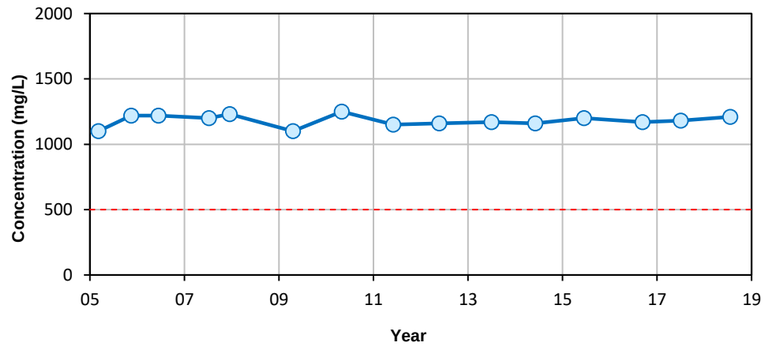
IRON



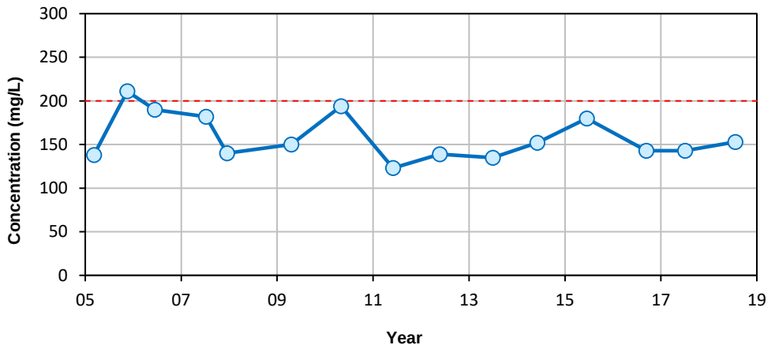
MANGANESE



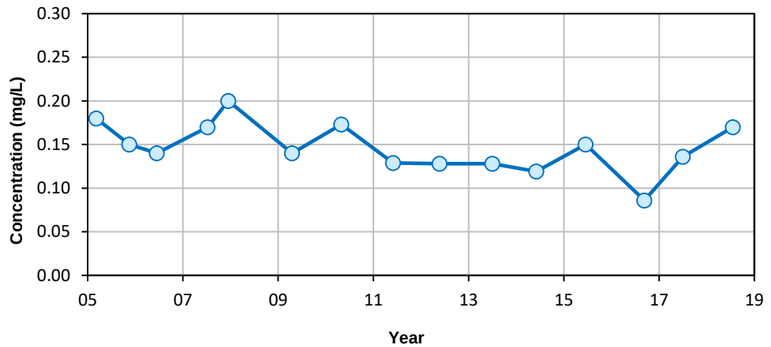
TOTAL DISSOLVED SOLIDS (CALCULATED)



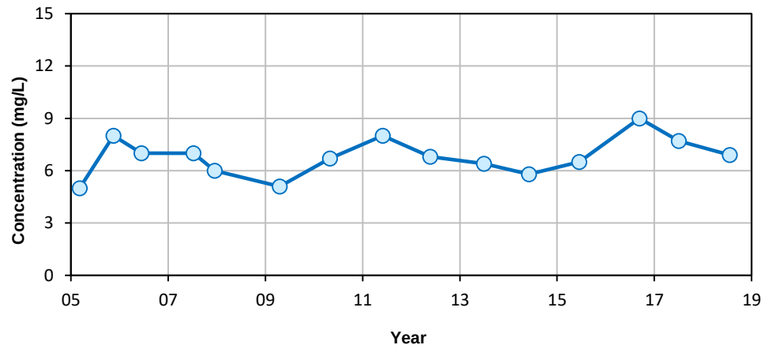
SODIUM



FLUORIDE



DISSOLVED ORGANIC CARBON



Notes:

- Filled symbols denote sample values; unfilled symbols denote values less than detection limit(s)
- Dashed line between data points indicates data gap of more than two years
- Canadian Drinking Water AO Guidelines 2017:
  - pH: 7-10.5 pH Units
  - Iron: 0.3 mg/L
  - Sodium: 200 mg/L
  - Chloride: 250 mg/L
  - Manganese: 0.05 mg/L
  - Fluoride: 1.5 mg/L
  - Sulphate: 500 mg/L
  - Total Dissolved Solids (Calculated): 500 mg/L
  - Dissolved Organic Carbon: N/A
- Canadian Drinking Water MAC Guidelines 2017:

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

HYDROCHEMICAL CONTROL CHARTS
MW-06

OneWay to zero harm

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS		

Advisian
WorleyParsons Group

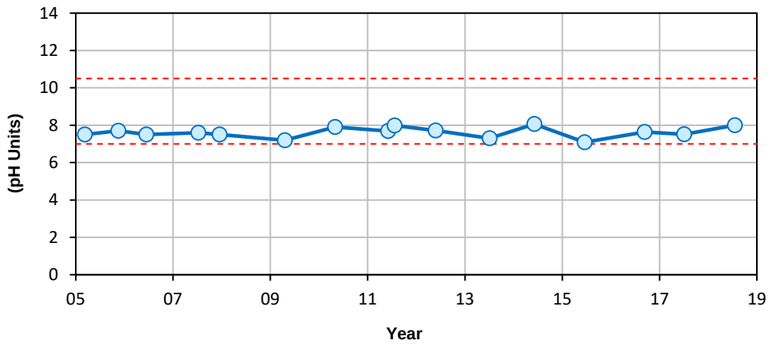
WorleyParsons Project No.: 307075-01608-400

FIG No.: A5-6 | REV: B

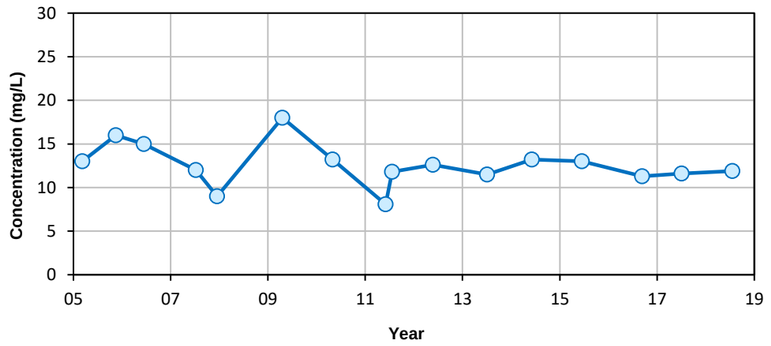
FILE LOCATION: EDMONTON

FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 5 HYDROCHEMICAL CONTROL CHARTS\REVB\WORKING FILES\

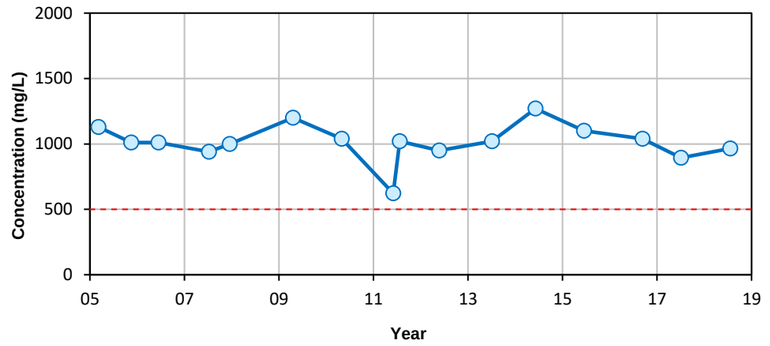
PH



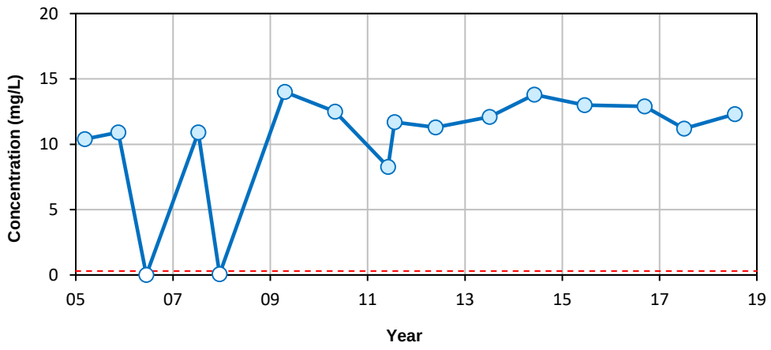
CHLORIDE



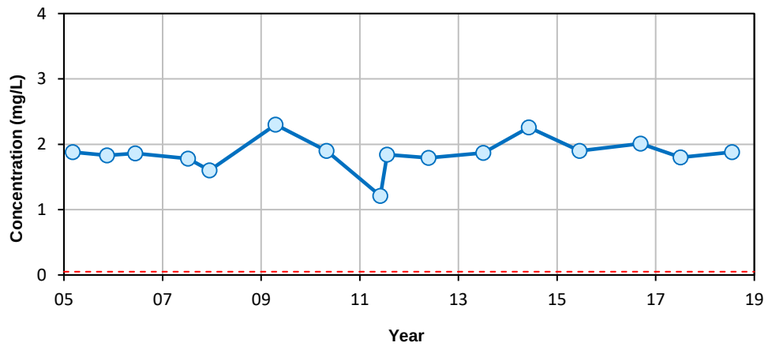
SULPHATE



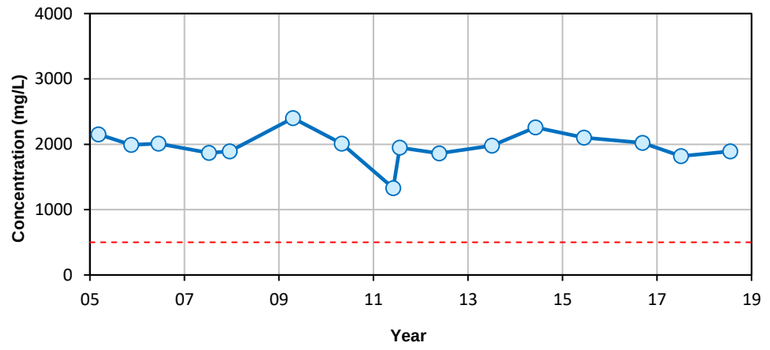
IRON



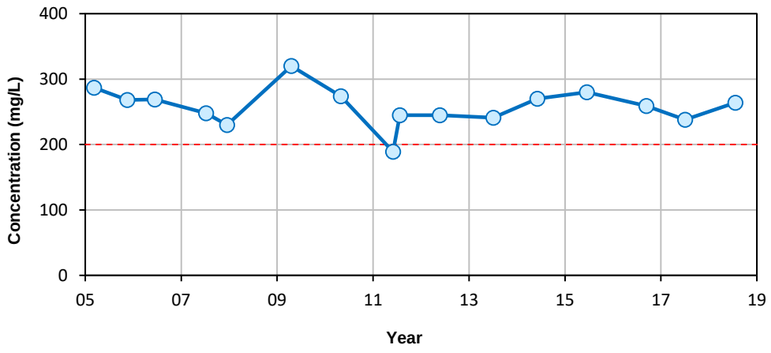
MANGANESE



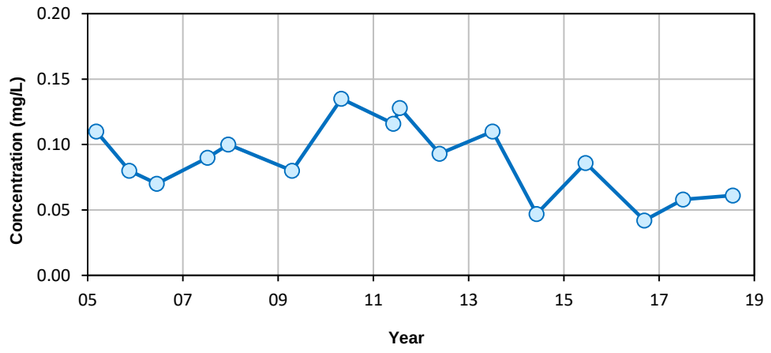
TOTAL DISSOLVED SOLIDS (CALCULATED)



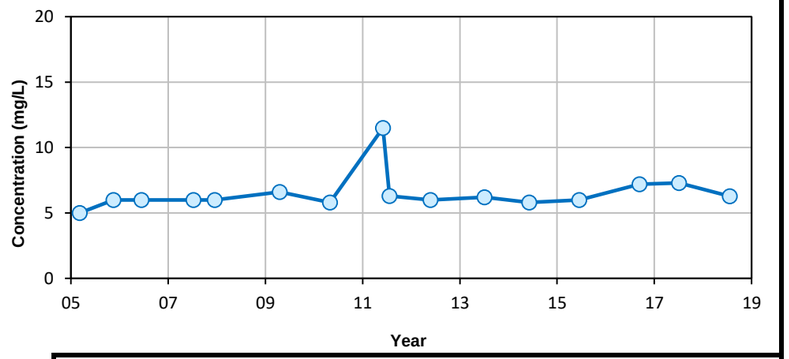
SODIUM



FLUORIDE



DISSOLVED ORGANIC CARBON



Notes:

- Filled symbols denote sample values; unfilled symbols denote values less than detection limit(s)
- Dashed line between data points indicates data gap of more than two years
- Canadian Drinking Water AO Guidelines 2017:
  - pH: 7-10.5 pH Units
  - Iron: 0.3 mg/L
  - Sodium: 200 mg/L
  - Chloride: 250 mg/L
  - Manganese: 0.05 mg/L
  - Fluoride: 1.5 mg/L
  - Sulphate: 500 mg/L
  - Total Dissolved Solids (Calculated): 500 mg/L
  - Dissolved Organic Carbon: N/A
- Canadian Drinking Water MAC Guidelines 2017:

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

HYDROCHEMICAL CONTROL CHARTS
MW-07

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS		

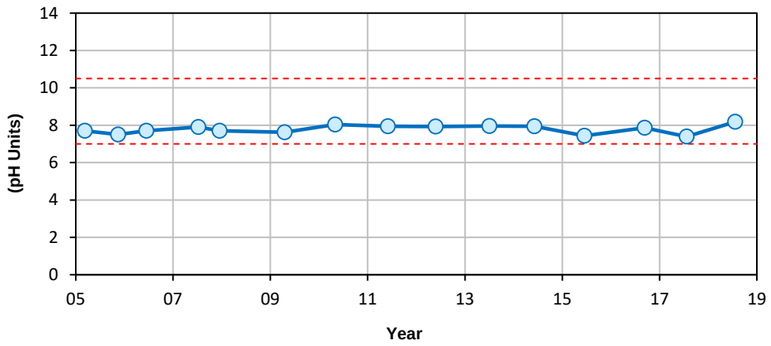
WorleyParsons Project No.: 307075-01608-400

FIG No.: A5-7 | REV: B

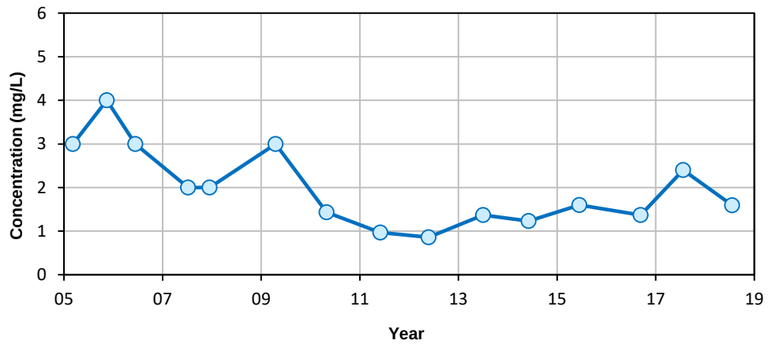
FILE LOCATION: EDMONTON

FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 5 HYDROCHEMICAL CONTROL CHARTS\REVB\WORKING FILES\

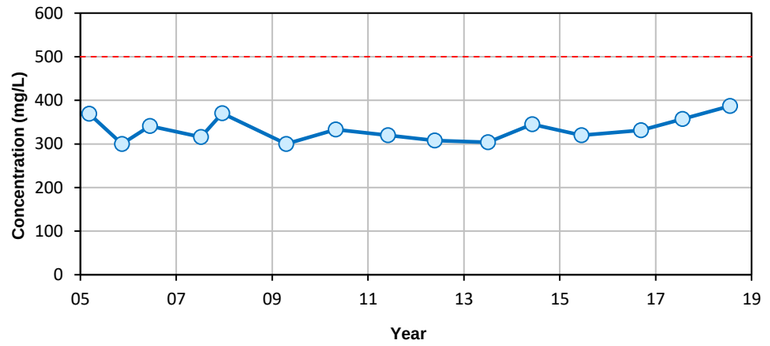
PH



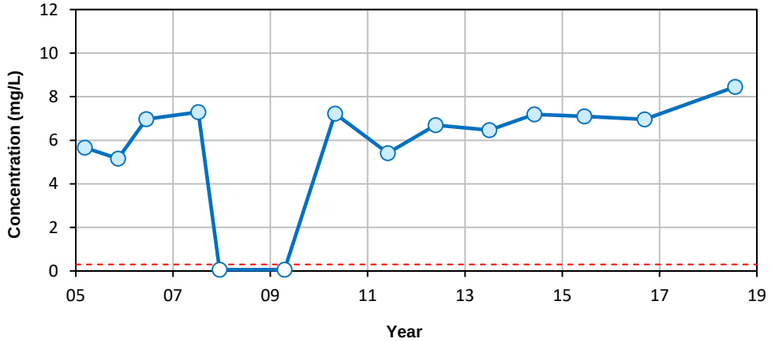
CHLORIDE



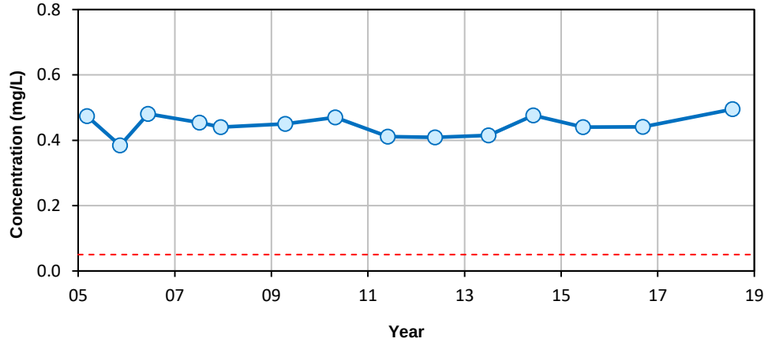
SULPHATE



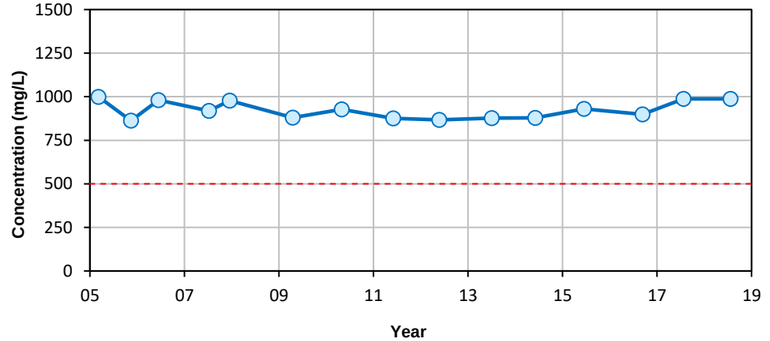
IRON



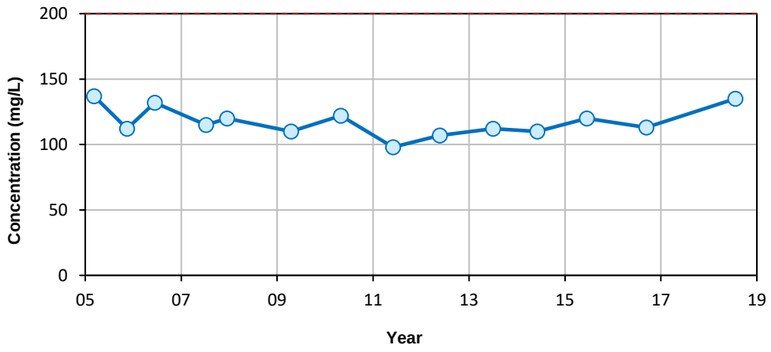
MANGANESE



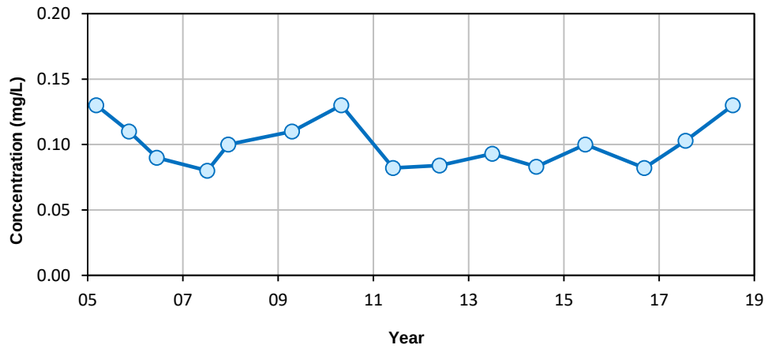
TOTAL DISSOLVED SOLIDS (CALCULATED)



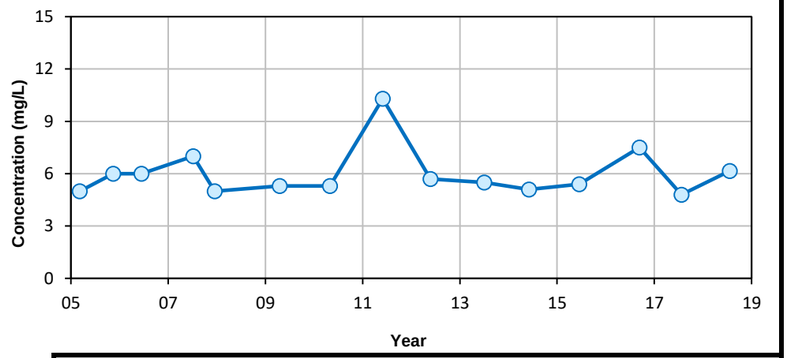
SODIUM



FLUORIDE



DISSOLVED ORGANIC CARBON



Notes:

- Filled symbols denote sample values; unfilled symbols denote values less than detection limit(s)
- Dashed line between data points indicates data gap of more than two years
- Canadian Drinking Water AO Guidelines 2017:
- Canadian Drinking Water MAC Guidelines 2017:
  - pH: 7-10.5 pH Units
  - Iron: 0.3 mg/L
  - Sodium: 200 mg/L
  - Chloride: 250 mg/L
  - Manganese: 0.05 mg/L
  - Fluoride: 1.5 mg/L
  - Sulphate: 500 mg/L
  - Total Dissolved Solids (Calculated): 500 mg/L
  - Dissolved Organic Carbon: N/A

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

HYDROCHEMICAL CONTROL CHARTS
MW-08

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS		

OneWay to zero harm

Advisian
WorleyParsons Group

WorleyParsons Project No.: 307075-01608-400

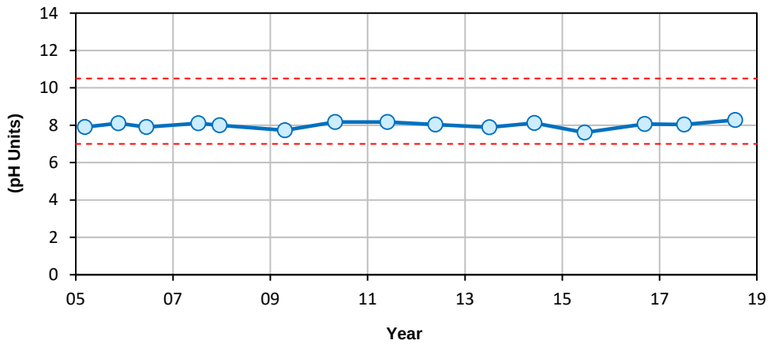
FIG No.: A5-8

REV: B

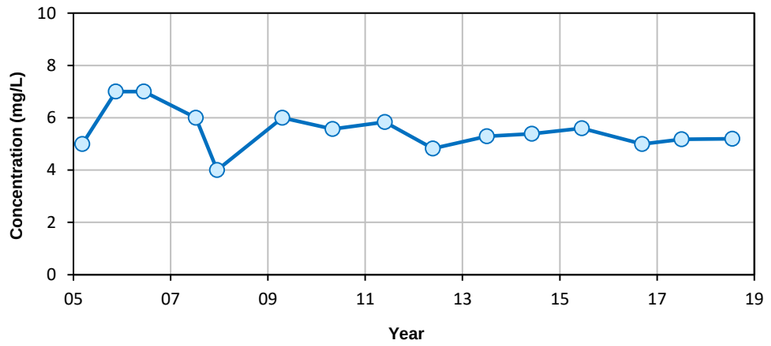
FILE LOCATION: EDMONTON

FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 5 HYDROCHEMICAL CONTROL CHARTS\REVB\WORKING FILES\

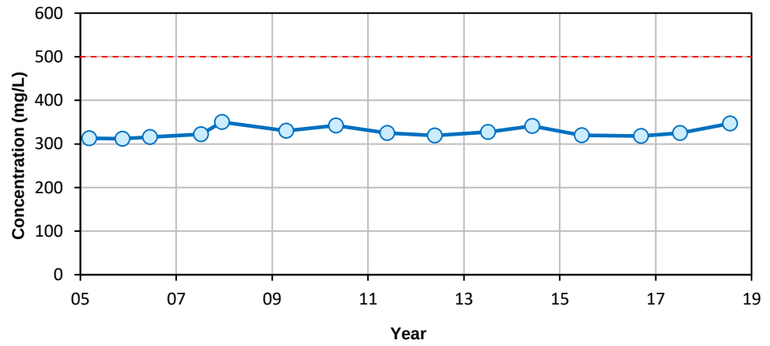
PH



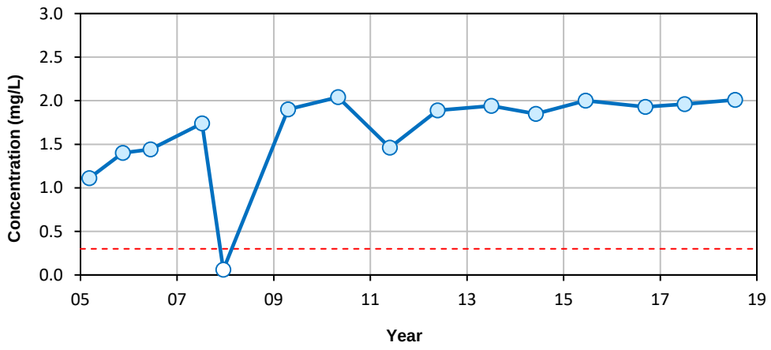
CHLORIDE



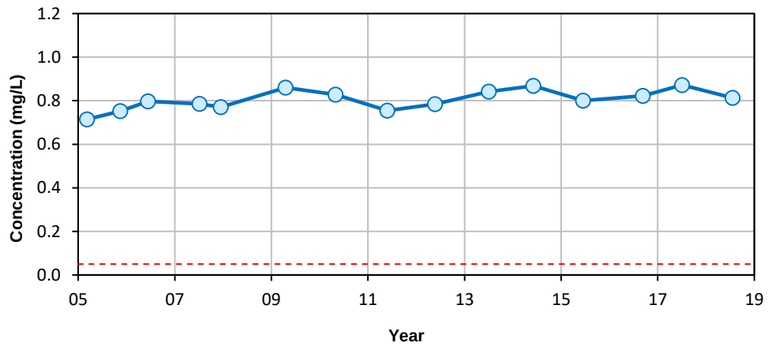
SULPHATE



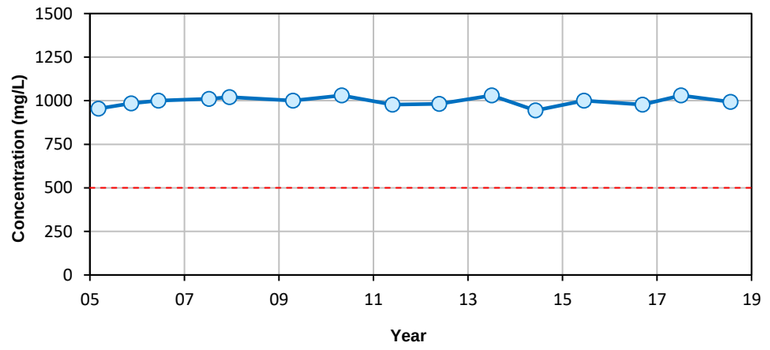
IRON



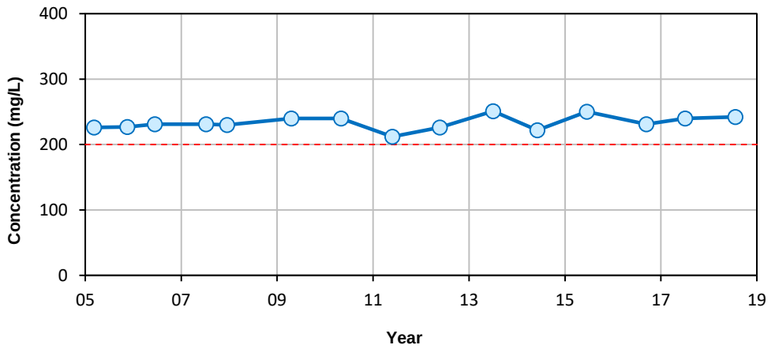
MANGANESE



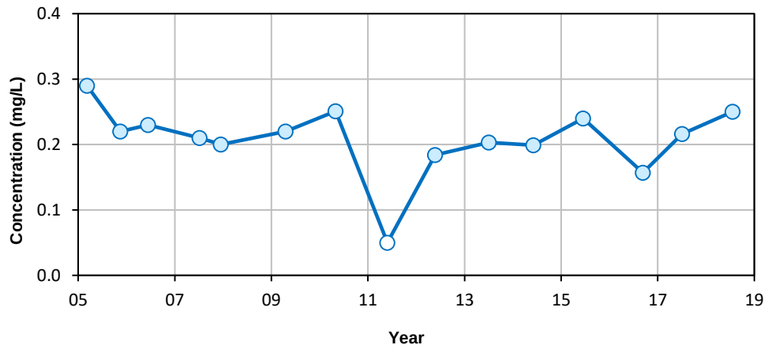
TOTAL DISSOLVED SOLIDS (CALCULATED)



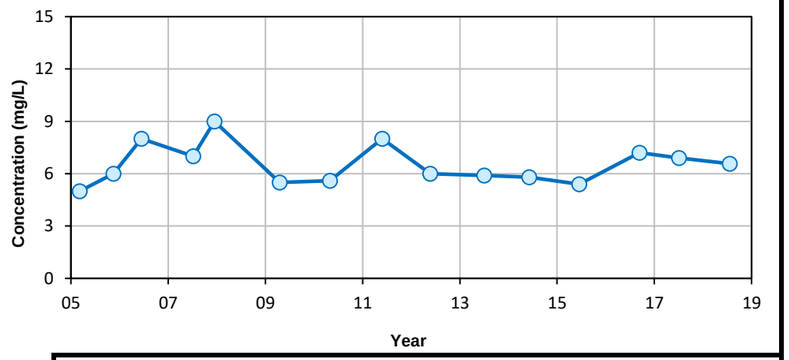
SODIUM



FLUORIDE



DISSOLVED ORGANIC CARBON



Notes:

- Filled symbols denote sample values; unfilled symbols denote values less than detection limit(s)
- Dashed line between data points indicates data gap of more than two years
- Canadian Drinking Water AO Guidelines 2017:
  - pH: 7-10.5 pH Units
  - Iron: 0.3 mg/L
  - Sodium: 200 mg/L
  - Chloride: 250 mg/L
  - Manganese: 0.05 mg/L
  - Fluoride: 1.5 mg/L
  - Sulphate: 500 mg/L
  - Total Dissolved Solids (Calculated): 500 mg/L
  - Dissolved Organic Carbon: N/A
- Canadian Drinking Water MAC Guidelines 2017:

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

HYDROCHEMICAL CONTROL CHARTS
MW-09

OneWay to zero harm

Advisian
WorleyParsons Group

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS		

WorleyParsons Project No.: 307075-01608-400

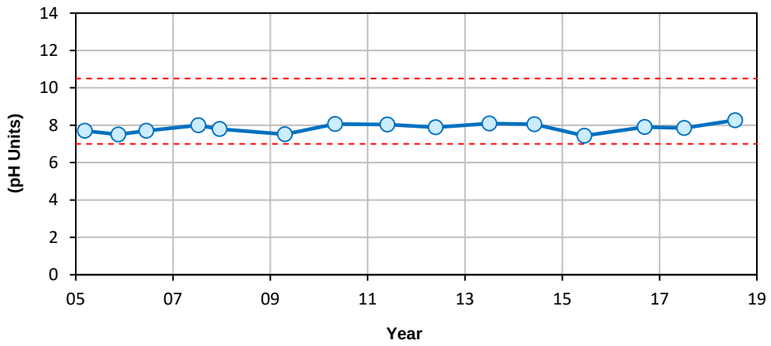
FIG No.: A5-9

REV: B

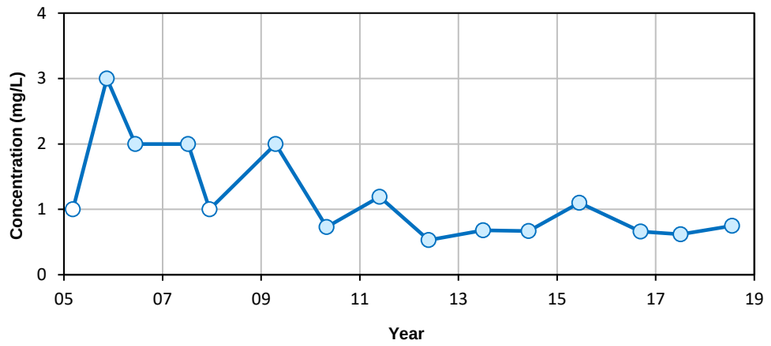
FILE LOCATION: EDMONTON

FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 5 HYDROCHEMICAL CONTROL CHARTS\REVB\WORKING FILES\

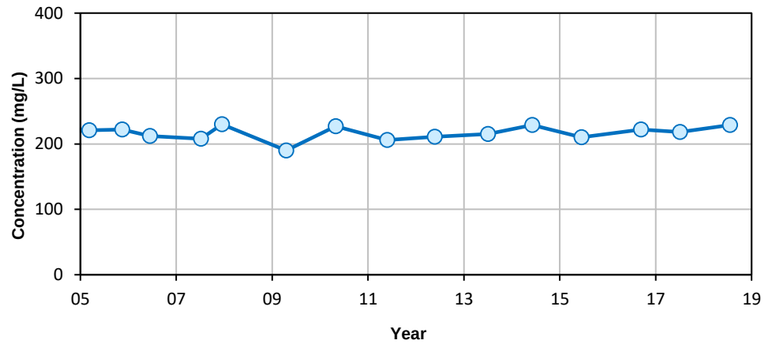
PH



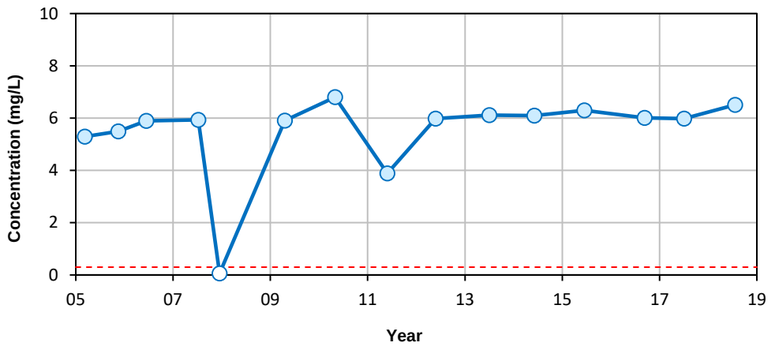
CHLORIDE



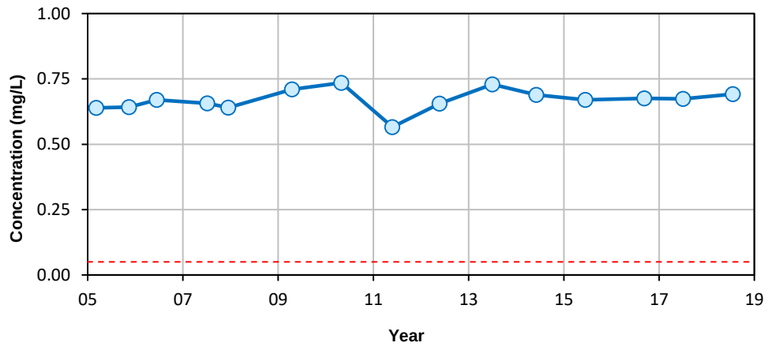
SULPHATE



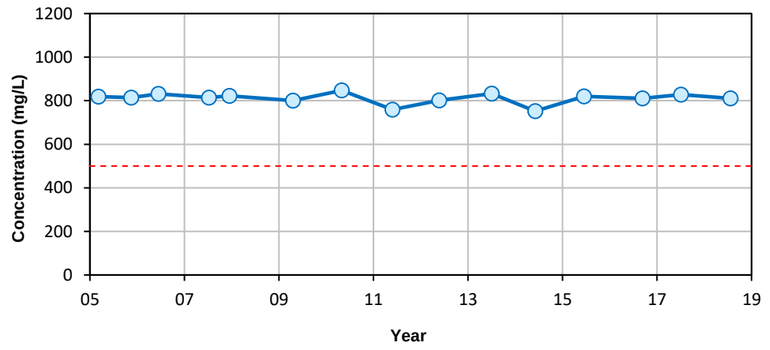
IRON



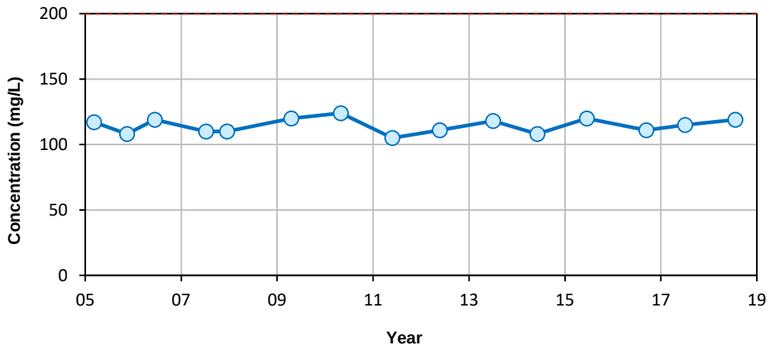
MANGANESE



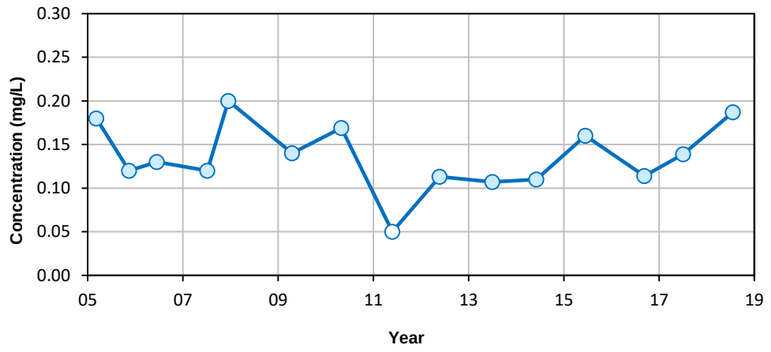
TOTAL DISSOLVED SOLIDS (CALCULATED)



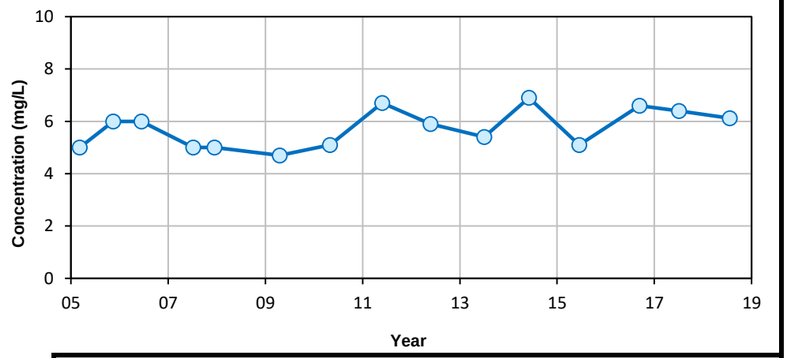
SODIUM



FLUORIDE



DISSOLVED ORGANIC CARBON



Notes:

- Filled symbols denote sample values; unfilled symbols denote values less than detection limit(s)
- Dashed line between data points indicates data gap of more than two years
- Canadian Drinking Water AO Guidelines 2017:
  - pH: 7-10.5 pH Units
  - Iron: 0.3 mg/L
  - Sodium: 200 mg/L
  - Chloride: 250 mg/L
  - Manganese: 0.05 mg/L
  - Fluoride: 1.5 mg/L
  - Sulphate: 500 mg/L
  - Total Dissolved Solids (Calculated): 500 mg/L
  - Dissolved Organic Carbon: N/A
- Canadian Drinking Water MAC Guidelines 2017:

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

HYDROCHEMICAL CONTROL CHARTS
MW-10

OneWay to zero harm

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS		

Advisian
WorleyParsons Group

WorleyParsons Project No.: 307075-01608-400

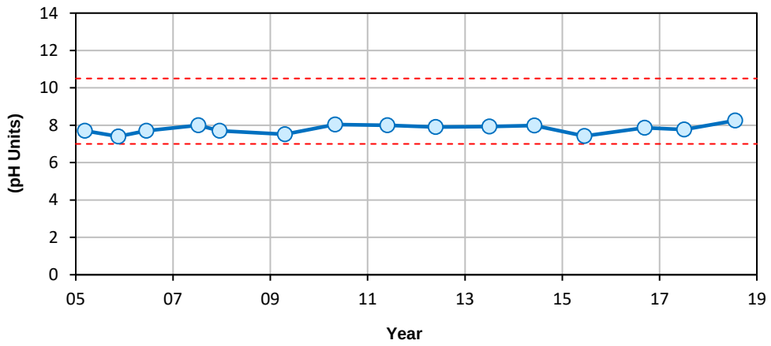
FIG No.: A5-10

REV: B

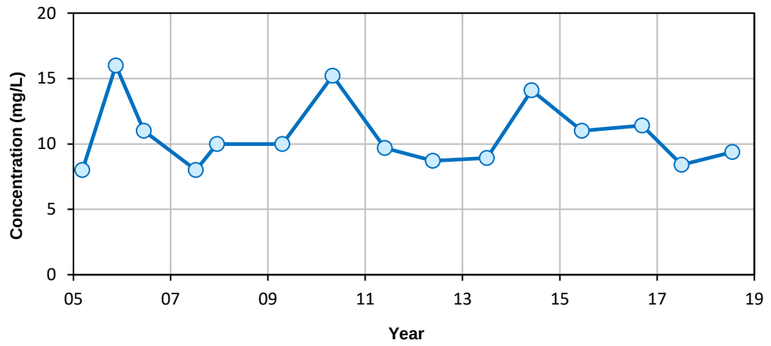
FILE LOCATION: EDMONTON

FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 5 HYDROCHEMICAL CONTROL CHARTS\REVB\WORKING FILES\

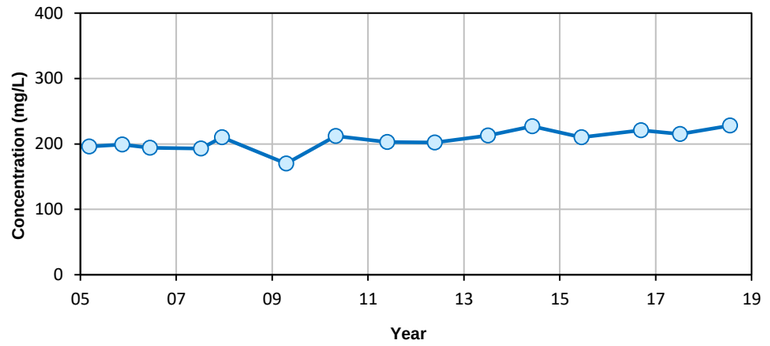
PH



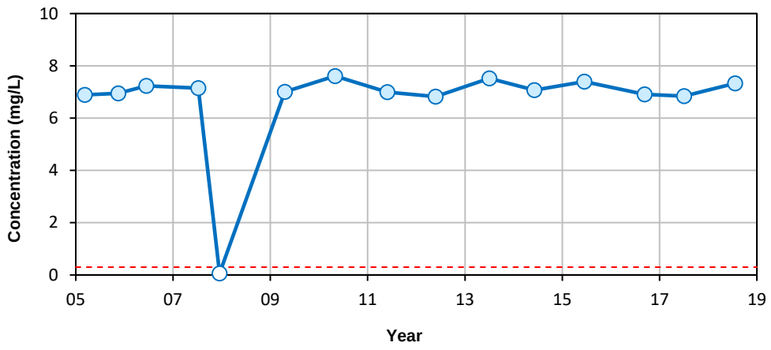
CHLORIDE



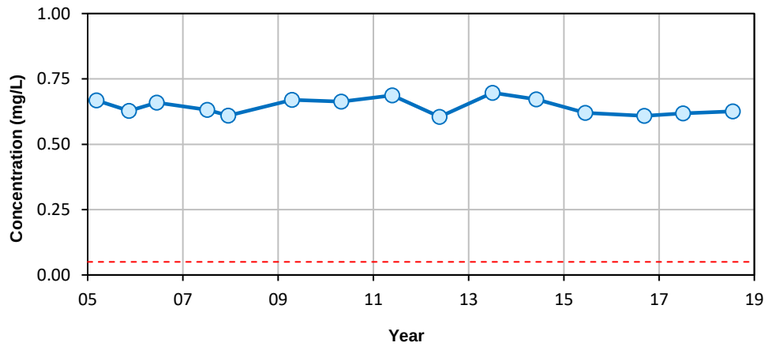
SULPHATE



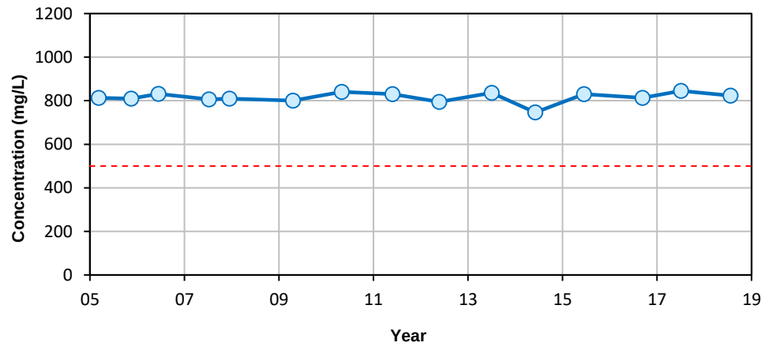
IRON



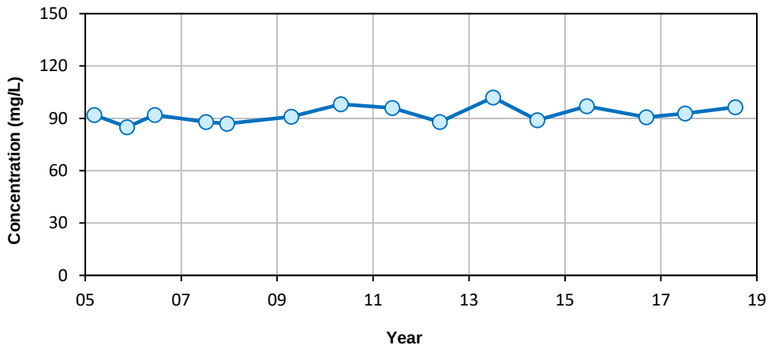
MANGANESE



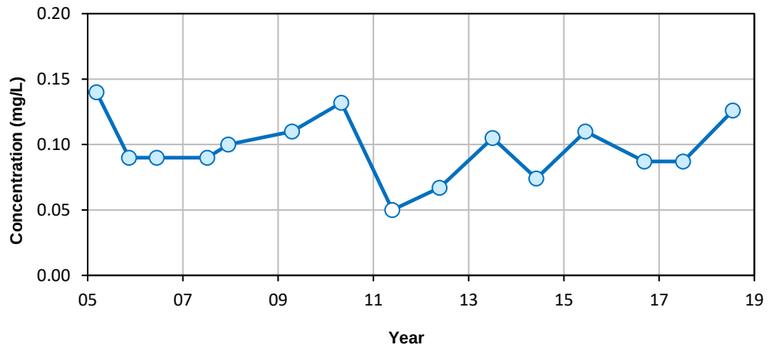
TOTAL DISSOLVED SOLIDS (CALCULATED)



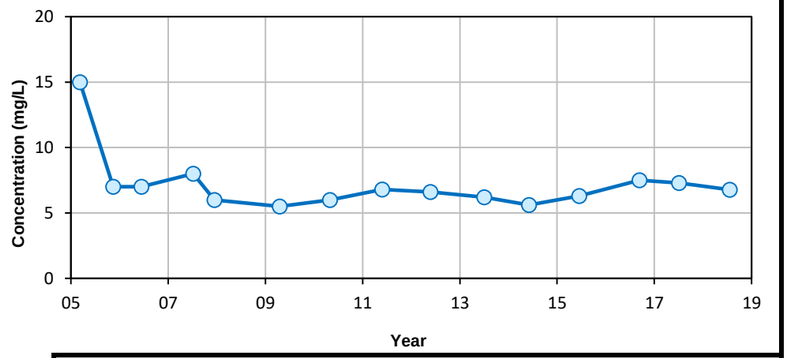
SODIUM



FLUORIDE



DISSOLVED ORGANIC CARBON



Notes:

- Filled symbols denote sample values; unfilled symbols denote values less than detection limit(s)
- Dashed line between data points indicates data gap of more than two years
- Canadian Drinking Water AO Guidelines 2017:
  - pH: 7-10.5 pH Units
  - Iron: 0.3 mg/L
  - Sodium: 200 mg/L
  - Chloride: 250 mg/L
  - Manganese: 0.05 mg/L
  - Fluoride: 1.5 mg/L
  - Sulphate: 500 mg/L
  - Total Dissolved Solids (Calculated): 500 mg/L
  - Dissolved Organic Carbon: N/A
- Canadian Drinking Water MAC Guidelines 2017:

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

HYDROCHEMICAL CONTROL CHARTS
MW-11

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS		

OneWay to zero harm

Advisian
WorleyParsons Group

WorleyParsons Project No.: 307075-01608-400

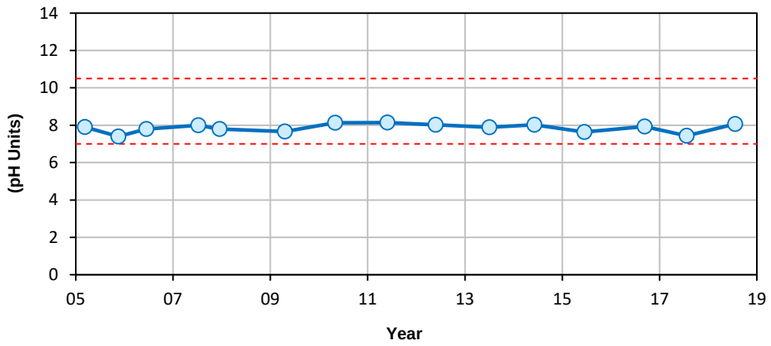
FIG No.: A5-11

REV: B

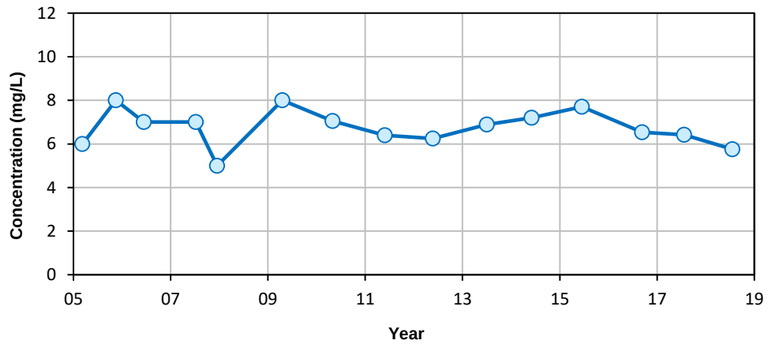
FILE LOCATION: EDMONTON

FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 5 HYDROCHEMICAL CONTROL CHARTS\REVB\WORKING FILES\

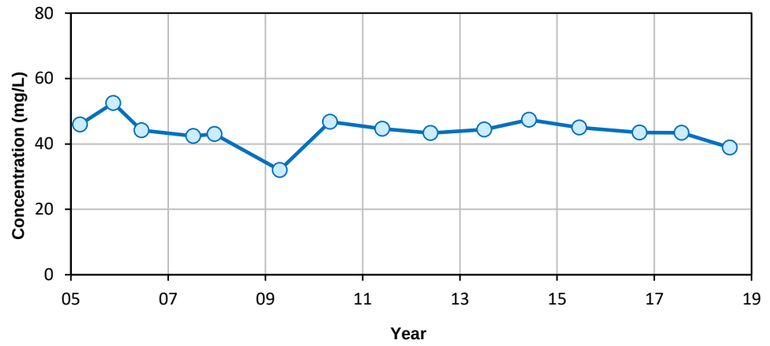
PH



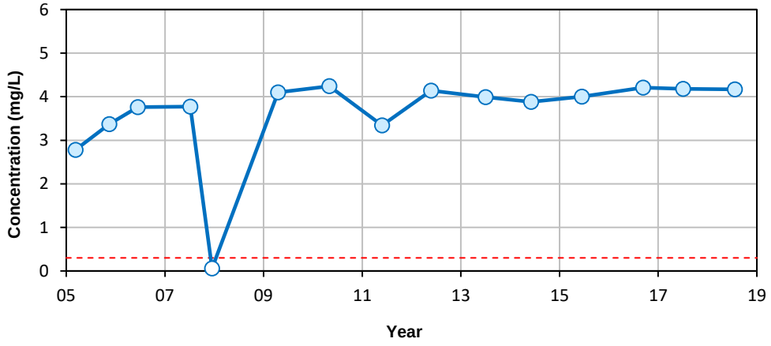
CHLORIDE



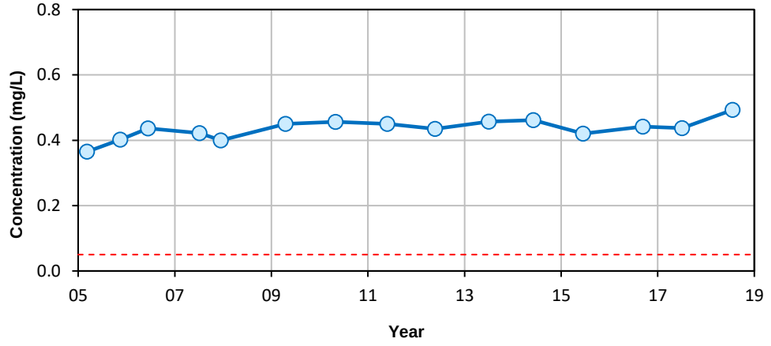
SULPHATE



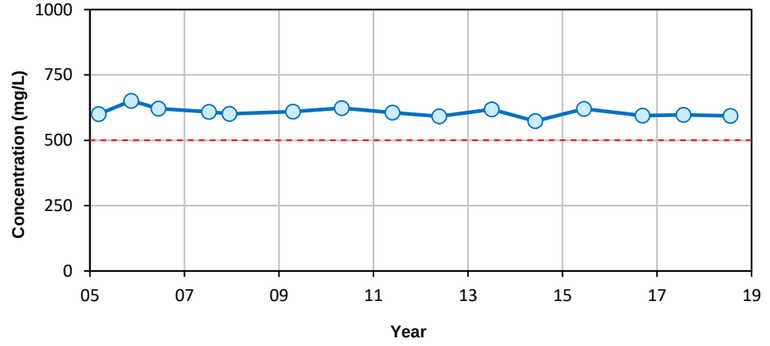
IRON



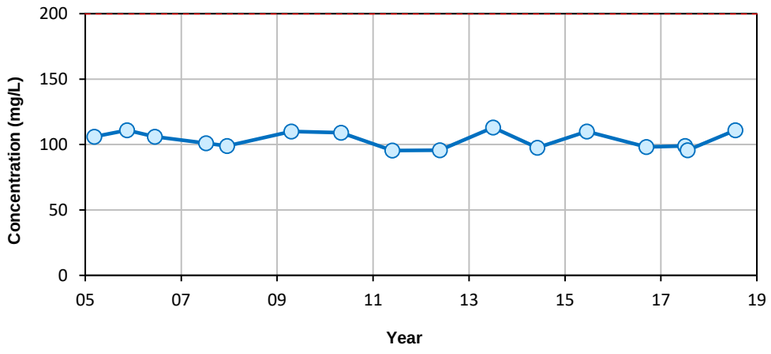
MANGANESE



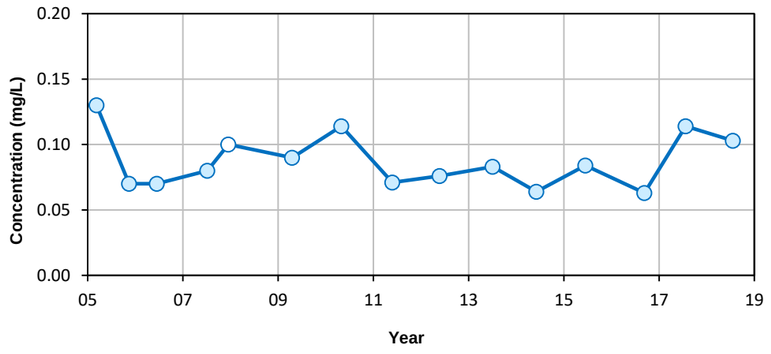
TOTAL DISSOLVED SOLIDS (CALCULATED)



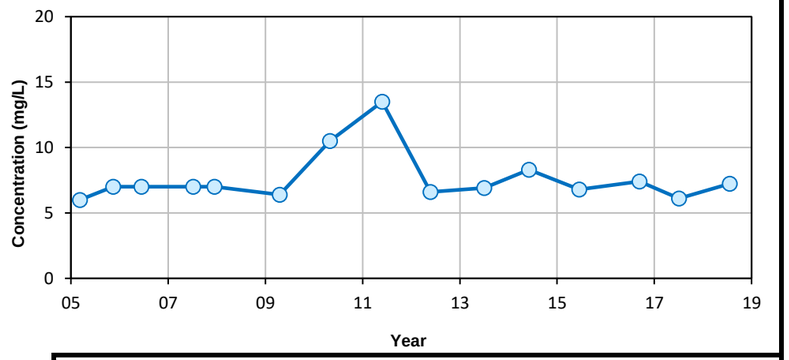
SODIUM



FLUORIDE



DISSOLVED ORGANIC CARBON



Notes:

- Filled symbols denote sample values; unfilled symbols denote values less than detection limit(s)
- Dashed line between data points indicates data gap of more than two years
- Canadian Drinking Water AO Guidelines 2017:
  - pH: 7-10.5 pH Units
  - Iron: 0.3 mg/L
  - Sodium: 200 mg/L
  - Chloride: 250 mg/L
  - Manganese: 0.05 mg/L
  - Fluoride: 1.5 mg/L
  - Sulphate: 500 mg/L
  - Total Dissolved Solids (Calculated): 500 mg/L
  - Dissolved Organic Carbon: N/A
- Canadian Drinking Water MAC Guidelines 2017:

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

HYDROCHEMICAL CONTROL CHARTS
MW-12

OneWay to zero harm

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS		

Advisian
WorleyParsons Group

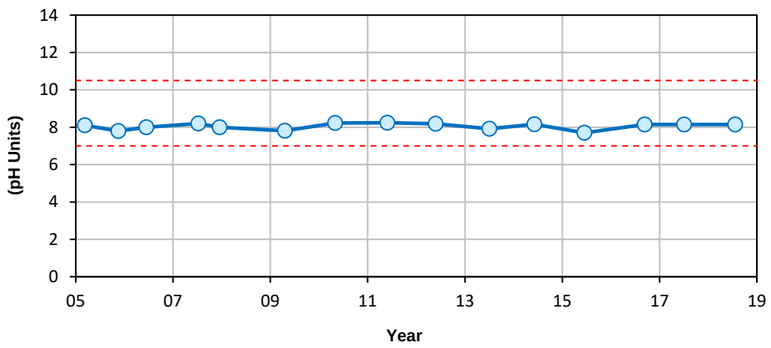
WorleyParsons Project No.: 307075-01608-400

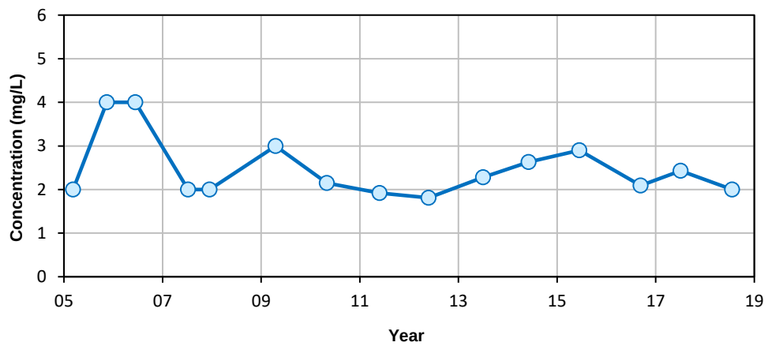
FIG No.: A5-12

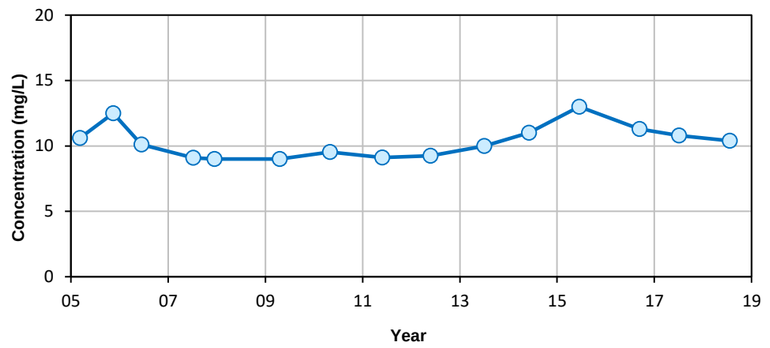
REV: B

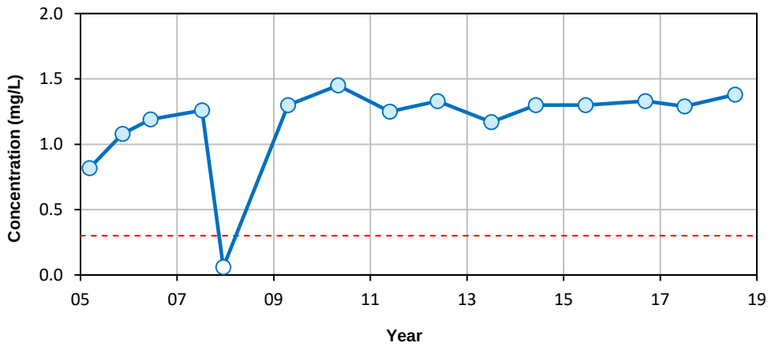
FILE LOCATION: EDMONTON

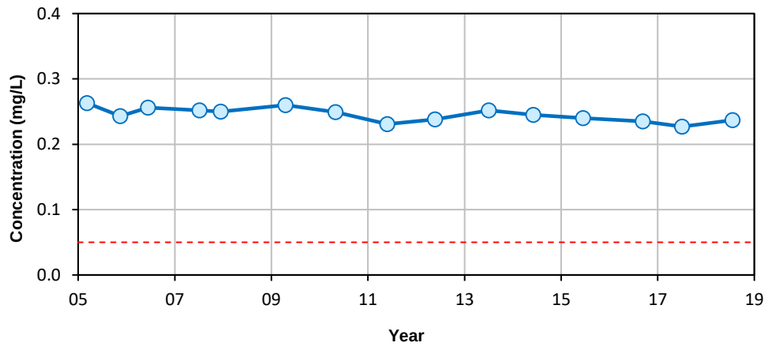
FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 5 HYDROCHEMICAL CONTROL CHARTS\REVB\WORKING FILES\

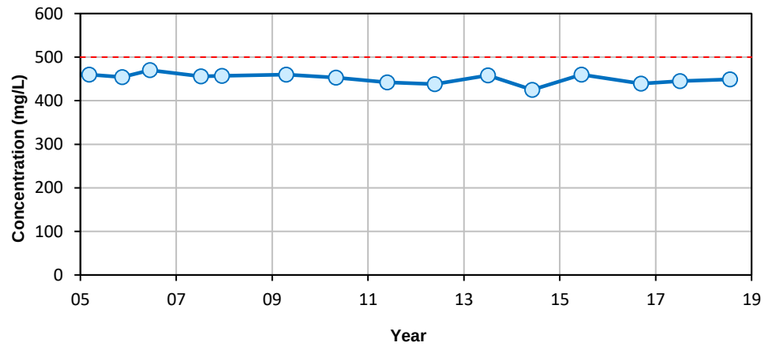


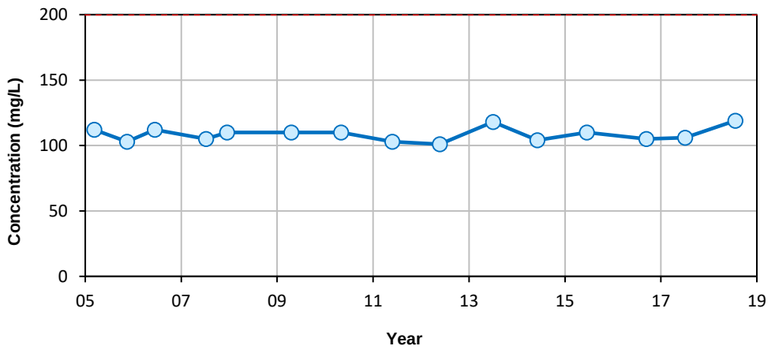


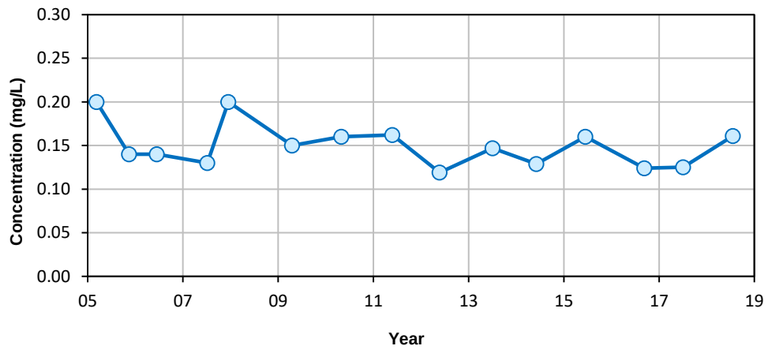


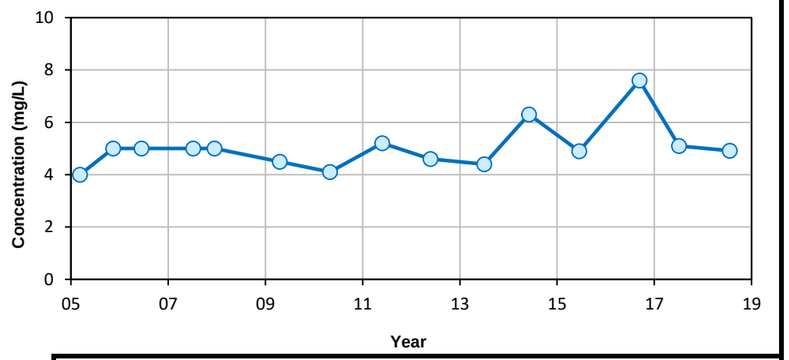












Notes:

- Filled symbols denote sample values; unfilled symbols denote values less than detection limit(s)
- Dashed line between data points indicates data gap of more than two years
- Canadian Drinking Water AO Guidelines 2017:
  - pH: 7-10.5 pH Units
  - Iron: 0.3 mg/L
  - Sodium: 200 mg/L
  - Chloride: 250 mg/L
  - Manganese: 0.05 mg/L
  - Fluoride: 1.5 mg/L
  - Sulphate: 500 mg/L
  - Total Dissolved Solids (Calculated): 500 mg/L
  - Dissolved Organic Carbon: N/A
- Canadian Drinking Water MAC Guidelines 2017:

NORTHEAST CAPITAL INDUSTRIAL ASSOCIATION
2018 GROUNDWATER QUALITY MONITORING
BEVERLY CHANNEL MONITORING WELLS

HYDROCHEMICAL CONTROL CHARTS
MW-13

Date:	Drawn by:	Edited by:	App'd by:
02-Nov-18	DS		

OneWay to zero harm

Advisian
WorleyParsons Group

WorleyParsons Project No.: 307075-01608-400

FIG No.: A5-13

REV: B

FILE LOCATION: EDMONTON

FILE DIRECTORY: U:\EDM\GBS\307075-01608\400-2018_GW_MON\12.0_REPORTS\12.3_BACKEND\APDX 5 HYDROCHEMICAL CONTROL CHARTS\REVB\WORKING FILES\

Appendix 6 Mann-Kendall/Sen's Slope Analysis and Statistical Table

Advisian
WorleyParsons Group

Table 6-1

Statistical Analysis

Project No.: 307075-01608-400		Mann-Kendall Trend Analysis								Visual Trend	Guideline Analysis		Basic Analysis							
Monitoring Station	Parameter	S-Stat (-)	Z-Stat (-)	P Value of Two Tailed Test (-)	Inferred Confidence Level (of Trend Present in Data Set) (%)	Slope (mg/L/yr)	Normalized Slope (%/yr)	Meets Trend Assumptions? [6]	Statistically Significant Mann-Kendall Trend [5]	Visual Trend Classification	Guideline Value [8] (mg/L)	2018 Guideline Exceedances	Count	Min (mg/L)	Median (mg/L)	Max (mg/L)	Range (mg/L)	Variability [4]	Average (mg/L)	Standard Deviation (mg/L)
Groundwater Monitoring																				
MW-01	Chloride	48	2.34	0.02	98.1%	0.22	5.52	Y	---	U	N/A	---	15	2	4	9.64	7.64	1.91	4.38	1.81
	Sulphate	-36	1.73	0.08	91.7%	-0.38	-0.68	Y	---		N/A	---	15	44	56.8	62	18	0.32	55.94	4.45
	Iron	46	2.23	0.03	97.4%	0.03	1.61	Y	---		N/A	---	15	0.03	1.81	2.02	1.99	1.10	1.52	0.65
	Manganese	45	2.18	0.03	97.1%	4.6E-03	0.66	Y	---		N/A	---	15	0.605	0.694	0.737	0.132	0.19	0.69	0.03
	Sodium	-21	1.00	0.32	68.0%	-0.14	-0.39	Y	---		N/A	---	15	32.5	36	40	7.5	0.21	35.47	2.12
	Fluoride	-28	1.34	0.18	82.0%	-2.1E-03	-1.59	Y	---		1.5	0	15	0.106	0.13	0.2	0.094	0.72	0.14	0.03
	Total Dissolved Solids (Calculated)	-13	0.60	0.55	44.8%	-0.65	-0.15	Y	---		N/A	---	15	410	435	459	49	0.11	437.33	13.94
	Dissolved Organic Carbon	15	0.71	0.48	52.1%	0.02	0.51	Y	---		N/A	---	15	2	3	4.5	2.5	0.83	3.04	0.69
MW-02	Chloride	65	2.64	0.01	99.2%	3.51	14.03	N (Non-Monotonic)	---		N/A	---	17	11.6	25	211	199.4	7.98	47.94	52.16
	Sulphate	-21	0.82	0.41	59.0%	-1.91	-0.76	Y	---		N/A	---	17	194	250	318	124	0.50	251.59	31.66
	Iron	52	2.10	0.04	96.4%	0.60	7.09	Y	---		N/A	---	17	0.03	8.49	12.3	12.27	1.45	7.05	4.25
	Manganese	-64	2.60	0.01	99.1%	-0.02	-4.48	Y	---		N/A	---	17	0.236	0.467	1.09	0.854	1.83	0.53	0.20
	Sodium	33	1.32	0.19	81.3%	1.69	1.70	Y	---		N/A	---	17	81	99.6	161	80	0.80	109.02	26.92
	Fluoride	-66	2.69	0.01	99.3%	-3.7E-03	-4.64	Y	---		1.5	0	17	0.02	0.08	0.21	0.19	2.38	0.08	0.04
	Total Dissolved Solids (Calculated)	21	0.82	0.41	59.0%	4.50	0.51	Y	---		N/A	---	17	759	884	1090	331	0.37	897.41	80.31
	Dissolved Organic Carbon	1	0.00	1.00	0.0%	0.00	0.00	Y	---		N/A	---	17	4.1	5.4	11.3	7.2	1.33	5.89	1.68
MW-03	Chloride	91	4.50	0.00	100.0%	2.19	4.95	Y	---	U	N/A	---	15	31	44.3	60.8	29.8	0.67	45.18	10.35
	Sulphate	29	1.39	0.16	83.5%	0.68	0.56	Y	---		N/A	---	15	98	122	130	32	0.26	120.67	8.23
	Iron	60	2.92	0.00	99.7%	0.12	2.35	Y	---		N/A	---	15	0.03	5.13	6.22	6.19	1.21	4.39	1.89
	Manganese	51	2.47	0.01	98.7%	2.6E-03	1.00	Y	---		N/A	---	15	0.239	0.263	0.297	0.058	0.22	0.26	0.02
	Sodium	-12	0.55	0.59	41.4%	-0.12	-0.23	Y	---		N/A	---	15	48.4	52.3	57.9	9.5	0.18	52.46	2.88
	Fluoride	-24	1.15	0.25	74.8%	-1.2E-03	-1.16	Y	---		1.5	0	15	0.073	0.102	0.14	0.067	0.66	0.10	0.02
	Total Dissolved Solids (Calculated)	50	2.43	0.02	98.5%	2.87	0.50	Y	---		N/A	---	15	520	578	612	92	0.16	577.67	22.66
	Dissolved Organic Carbon	13	0.60	0.55	45.2%	0.03	0.75	Y	---		N/A	---	15	2.5	3.4	5.9	3.4	1.00	3.80	1.03
MW-04	Chloride	5	0.20	0.84	15.7%	0.97	0.65	Y	---		N/A	---	15	125	150	200	75	0.50	155.07	24.46
	Sulphate	71	3.46	0.00	99.9%	2.73	3.10	Y	---	U	N/A	---	15	74	88.2	133	59	0.67	95.53	18.49
	Iron	60	2.92	0.00	99.7%	0.19	108.00	Y	U	U	N/A	---	15	0.0025	0.173	2.33	2.3275	13.45	0.91	0.98
	Manganese	53	2.57	0.01	99.0%	0.05	17.64	Y	---		N/A	---	15	0.009	0.258	0.722	0.713	2.76	0.32	0.27
	Sodium	7	0.30	0.77	23.4%	0.20	0.35	Y	---		N/A	---	15	50.7	59	71	20.3	0.34	59.69	5.97
	Fluoride	-41	1.98	0.05	95.3%	-2.8E-03	-2.33	Y	---		1.5	0	15	0.082	0.119	0.15	0.068	0.57	0.12	0.02
	Total Dissolved Solids (Calculated)	30	1.44	0.15	85.1%	3.81	0.53	Y	---		N/A	---	15	690	724	809	119	0.16	736.07	40.16
	Dissolved Organic Carbon	31	1.52	0.13	87.0%	0.06	1.75	Y	---		N/A	---	15	1	3.2	5	4	1.25	3.23	0.83
MW-05	Chloride	95	4.66	0.00	100.0%	1.80	5.83	Y	---	U	N/A	---	15	15	30.9	40	25	0.81	30.72	8.03
	Sulphate	30	1.44	0.15	84.9%	1.37	1.00	Y	---		N/A	---	15	105	137	150	45	0.33	134.53	12.30
	Iron	66	3.22	0.00	99.9%	0.18	4.67	Y	---		N/A	---	15	0.03	3.82	4.93	4.9	1.28	3.30	1.62
	Manganese	68	3.32	0.00	99.9%	0.02	2.20	Y	---		N/A	---	15	0.402	0.71	0.785	0.383	0.54	0.68	0.10
	Sodium	13	0.60	0.55	44.8%	0.12	0.29	Y	---		N/A	---	15	41	43	51	10	0.23	44.05	2.63
	Fluoride	-51	2.49	0.01	98.7%	-2.9E-03	-2.90	Y	---		1.5	0	15	0.061	0.1	0.18	0.119	1.19	0.10	0.03
	Total Dissolved Solids (Calculated)	60	2.92	0.00	99.7%	5.50	0.97	Y	---		N/A	---	15	499	570	620	121	0.21	569.47	32.14
	Dissolved Organic Carbon	5	0.20	0.84	15.8%	0.01	0.21	Y	---		N/A	---	15	2.5	4	6.9	4.4	1.10	4.24	1.21

Advisian
WorleyParsons Group

Table 6-1

Statistical Analysis

Project No.: 307075-01608-400		Mann-Kendall Trend Analysis								Visual Trend	Guideline Analysis		Basic Analysis							
Monitoring Station	Parameter	S-Stat (-)	Z-Stat (-)	P Value of Two Tailed Test (-)	Inferred Confidence Level (of Trend Present in Data Set) (%)	Slope (mg/L/yr)	Normalized Slope (%/yr)	Meets Trend Assumptions? [6]	Statistically Significant Mann-Kendall Trend [5]	Visual Trend Classification	Guideline Value [8] (mg/L)	2018 Guideline Exceedances	Count	Min (mg/L)	Median (mg/L)	Max (mg/L)	Range (mg/L)	Variability [4]	Average (mg/L)	Standard Deviation (mg/L)
MW-06	Chloride	-26	1.24	0.22	78.5%	-0.40	-7.12	Y	---		N/A	---	15	2.95	5.6	13	10.05	1.79	6.22	2.95
	Sulphate	33	1.59	0.11	88.8%	3.38	0.68	Y	---		N/A	---	15	420	494	560	140	0.28	493.13	32.91
	Iron	73	3.56	0.00	100.0%	0.22	3.92	Y	---		N/A	---	15	0.03	5.7	6.76	6.73	1.18	4.87	1.78
	Manganese	56	2.73	0.01	99.4%	0.04	2.41	Y	---		N/A	---	15	0.943	1.62	1.74	0.797	0.49	1.49	0.25
	Sodium	-12	0.55	0.59	41.4%	-0.94	-0.63	Y	---		N/A	---	15	123	150	211	88	0.59	158.20	26.19
	Fluoride	-39	1.89	0.06	94.1%	-2.9E-03	-2.08	Y	---		1.5	0	15	0.086	0.14	0.2	0.114	0.81	0.15	0.03
	Total Dissolved Solids (Calculated)	6	0.25	0.80	19.7%	0.90	0.08	Y	---		N/A	---	15	1100	1180	1250	150	0.13	1181.33	43.89
	Dissolved Organic Carbon	13	0.60	0.55	44.8%	0.06	0.93	Y	---		N/A	---	15	5	6.8	9	4	0.59	6.79	1.09
MW-07	Chloride	-32	1.40	0.16	83.8%	-0.16	-1.27	Y	---		N/A	---	16	8.07	12.3	18	9.93	0.81	12.57	2.40
	Sulphate	-5	0.18	0.86	14.3%	-3.15	-0.31	Y	---		N/A	---	16	622	1015	1270	648	0.64	1013.13	142.04
	Iron	45	1.98	0.05	95.3%	0.20	1.78	Y	---		N/A	---	16	0.0025	11.5	14	13.9975	1.22	10.33	4.26
	Manganese	18	0.77	0.44	55.7%	3.0E-03	0.16	Y	---		N/A	---	16	1.21	1.865	2.3	1.09	0.58	1.86	0.24
	Sodium	-19	0.81	0.42	58.3%	-0.99	-0.38	Y	---		N/A	---	16	189	261.5	320	131	0.50	257.94	28.87
	Fluoride	-30	1.31	0.19	80.9%	-2.7E-03	-3.07	Y	---		1.5	0	16	0.042	0.088	0.135	0.093	1.06	0.09	0.03
	Total Dissolved Solids (Calculated)	-14	0.59	0.56	44.2%	-6.89	-0.35	Y	---		N/A	---	16	1330	1985	2400	1070	0.54	1970.63	229.77
	Dissolved Organic Carbon	38	1.72	0.09	91.4%	0.05	0.80	Y	---		N/A	---	16	5	6	11.5	6.5	1.08	6.50	1.44
MW-08	Chloride	-40	1.94	0.05	94.8%	-0.11	-7.09	Y	---		N/A	---	15	0.86	1.6	4	3.14	1.96	1.99	0.91
	Sulphate	19	0.89	0.37	62.8%	1.44	0.43	Y	---		N/A	---	15	300	331	387	87	0.26	333.40	27.56
	Iron	28	1.48	0.14	86.1%	0.15	2.24	Y	---		N/A	---	14	0.03	6.825	8.45	8.42	1.23	5.76	2.57
	Manganese	4	0.16	0.87	13.1%	2.2E-04	0.05	Y	---		N/A	---	14	0.384	0.4455	0.495	0.111	0.25	0.45	0.03
	Sodium	-10	0.49	0.62	37.9%	-0.39	-0.34	Y	---		N/A	---	14	98	114	137	39	0.34	117.36	11.16
	Fluoride	-5	0.20	0.84	15.8%	0.00	0.00	Y	---		1.5	0	15	0.08	0.1	0.13	0.05	0.50	0.10	0.02
	Total Dissolved Solids (Calculated)	6	0.25	0.80	19.6%	0.58	0.06	Y	---		N/A	---	15	862	918	999	137	0.15	922.87	50.64
	Dissolved Organic Carbon	4	0.15	0.88	11.8%	0.01	0.20	Y	---		N/A	---	15	4.8	5.5	10.3	5.5	1.00	6.00	1.41
MW-09	Chloride	-32	1.54	0.12	87.6%	-0.08	-1.52	Y	---		N/A	---	15	4	5.39	7	3	0.56	5.53	0.78
	Sulphate	28	1.34	0.18	81.9%	0.83	0.26	Y	---		N/A	---	15	312	325	350	38	0.12	327.13	12.33
	Iron	63	3.07	0.00	99.8%	0.05	2.53	Y	---		N/A	---	15	0.03	1.89	2.04	2.01	1.06	1.65	0.53
	Manganese	49	2.38	0.02	98.2%	0.01	0.81	Y	---		N/A	---	15	0.714	0.8	0.872	0.158	0.20	0.80	0.05
	Sodium	32	1.55	0.12	87.9%	1.13	0.49	Y	---		N/A	---	15	212	231	251	39	0.17	233.27	10.55
	Fluoride	-18	0.84	0.40	60.0%	-2.2E-03	-1.03	Y	---		1.5	0	15	0.025	0.216	0.29	0.265	1.23	0.21	0.06
	Total Dissolved Solids (Calculated)	7	0.30	0.76	23.6%	0.71	0.07	Y	---		N/A	---	15	944	1000	1030	86	0.09	995.47	26.44
	Dissolved Organic Carbon	1	0.00	1.00	0.0%	0.00	0.00	Y	---		N/A	---	15	5	6	9	4	0.67	6.52	1.14
MW-10	Chloride	-25	1.19	0.23	76.8%	-0.05	-6.74	Y	---		N/A	---	15	0.5	0.73	3	2.5	3.42	1.13	0.76
	Sulphate	13	0.60	0.55	44.8%	0.54	0.25	Y	---		N/A	---	15	190	218	230	40	0.18	216.67	10.91
	Iron	52	2.53	0.01	98.8%	0.06	0.99	Y	---		N/A	---	15	0.03	5.98	6.8	6.77	1.13	5.48	1.64
	Manganese	34	1.64	0.10	89.8%	3.1E-03	0.47	Y	---		N/A	---	15	0.566	0.67	0.735	0.169	0.25	0.67	0.04
	Sodium	14	0.65	0.52	48.3%	0.15	0.13	Y	---		N/A	---	15	105	115	124	19	0.17	114.33	5.67
	Fluoride	-6	0.25	0.80	19.6%	-6.5E-04	-0.50	Y	---		1.5	0	15	0.025	0.13	0.2	0.175	1.35	0.13	0.04
	Total Dissolved Solids (Calculated)	-11	0.50	0.62	38.0%	-0.28	-0.03	Y	---		N/A	---	15	752	814	847	95	0.12	810.73	25.52
	Dissolved Organic Carbon	34	1.64	0.10	90.0%	0.06	1.10	Y	---		N/A	---	15	4.7	5.9	6.9	2.2	0.37	5.73	0.73

Advisian
WorleyParsons Group

Table 6-1

Statistical Analysis

Project No.: 307075-01608-400		Mann-Kendall Trend Analysis								Visual Trend	Guideline Analysis		Basic Analysis							
Monitoring Station	Parameter	S-Stat (-)	Z-Stat (-)	P Value of Two Tailed Test (-)	Inferred Confidence Level (of Trend Present in Data Set) (%)	Slope (mg/L/yr)	Normalized Slope (%/yr)	Meets Trend Assumptions? [6]	Statistically Significant Mann-Kendall Trend [5]	Visual Trend Classification	Guideline Value [8] (mg/L)	2018 Guideline Exceedances	Count	Min (mg/L)	Median (mg/L)	Max (mg/L)	Range (mg/L)	Variability [4]	Average (mg/L)	Standard Deviation (mg/L)
MW-11	Chloride	-4	0.15	0.88	11.8%	-0.04	-0.43	Y	---		N/A	---	15	8	10	16	8	0.80	10.65	2.55
	Sulphate	62	3.02	0.00	99.7%	2.17	1.03	Y	---		N/A	---	15	170	210	228	58	0.28	206.20	14.95
	Iron	9	0.40	0.69	30.8%	0.01	0.19	Y	---		N/A	---	15	0.03	7	7.61	7.58	1.08	6.65	1.85
	Manganese	-13	0.59	0.55	44.7%	-9.7E-04	-0.15	Y	---		N/A	---	15	0.605	0.632	0.697	0.092	0.15	0.64	0.03
	Sodium	30	1.44	0.15	84.9%	0.48	0.52	Y	---		N/A	---	15	85	92	102	17	0.18	92.33	4.74
	Fluoride	-6	0.25	0.80	19.7%	-2.6E-04	-0.29	Y	---		1.5	0	15	0.025	0.09	0.14	0.115	1.28	0.10	0.03
	Total Dissolved Solids (Calculated)	11	0.50	0.62	38.0%	0.71	0.09	Y	---		N/A	---	15	746	813	845	99	0.12	815.13	24.31
	Dissolved Organic Carbon	-13	0.60	0.55	44.8%	-0.05	-0.80	Y	---		N/A	---	15	5.5	6.77	15	9.5	1.40	7.17	2.28
MW-12	Chloride	-13	0.60	0.55	44.8%	-0.05	-0.71	Y	---		N/A	---	15	5	6.89	8	3	0.44	6.75	0.83
	Sulphate	-17	0.79	0.43	57.2%	-0.20	-0.46	Y	---		N/A	---	15	32	44.2	52.5	20.5	0.46	43.82	4.40
	Iron	53	2.57	0.01	99.0%	0.06	1.60	Y	---		N/A	---	15	0.03	3.99	4.24	4.21	1.06	3.60	1.07
	Manganese	48	2.33	0.02	98.0%	4.7E-03	1.08	Y	---		N/A	---	15	0.365	0.437	0.493	0.128	0.29	0.44	0.03
	Sodium	-16	0.68	0.50	50.2%	-0.30	-0.29	Y	---		N/A	---	16	95.4	103.5	113	17.6	0.17	103.59	6.47
	Fluoride	9	0.40	0.69	30.9%	5.0E-04	0.63	Y	---		1.5	0	15	0.05	0.08	0.13	0.08	1.00	0.08	0.02
	Total Dissolved Solids (Calculated)	-35	1.68	0.09	90.8%	-1.63	-0.27	Y	---		N/A	---	15	573	606	651	78	0.13	607.13	18.23
	Dissolved Organic Carbon	9	0.40	0.69	31.1%	0.02	0.27	Y	---		N/A	---	15	6	7	13.5	7.5	1.07	7.58	1.96
MW-13	Chloride	-10	0.45	0.65	34.8%	-0.01	-0.60	Y	---		N/A	---	15	1.81	2.15	4	2.19	1.02	2.48	0.71
	Sulphate	24	1.14	0.25	74.6%	0.08	0.77	Y	---		N/A	---	15	9	10.1	13	4	0.40	10.31	1.25
	Iron	49	2.39	0.02	98.3%	0.02	1.40	Y	---		N/A	---	15	0.03	1.29	1.45	1.42	1.10	1.17	0.35
	Manganese	-58	2.82	0.00	99.5%	-1.8E-03	-0.75	Y	---		N/A	---	15	0.227	0.245	0.263	0.036	0.15	0.25	0.01
	Sodium	2	0.05	0.96	4.0%	0.00	0.00	Y	---		N/A	---	15	101	110	119	18	0.16	108.53	5.36
	Fluoride	-20	0.94	0.35	65.5%	-1.3E-03	-0.88	Y	---		1.5	0	15	0.119	0.147	0.2	0.081	0.55	0.15	0.03
	Total Dissolved Solids (Calculated)	-36	1.74	0.08	91.8%	-1.22	-0.27	Y	---		N/A	---	15	425	454	470	45	0.10	451.07	11.45
	Dissolved Organic Carbon	23	1.10	0.27	72.9%	0.04	0.81	Y	---		N/A	---	15	4	5	7.6	3.6	0.72	5.04	0.89
MW-02B	Chloride	---	---	---	---	---	---	N (Ins. trend data)	---		N/A	---	4	804	871	975	171	0.20	880.25	85.49
	Sulphate	---	---	---	---	---	---	N (Ins. trend data)	---		N/A	---	4	0.75	9.55	41.7	40.95	4.29	15.39	18.28
	Iron	---	---	---	---	---	---	N (Ins. trend data)	---		N/A	---	4	0.025	0.2835	0.687	0.662	2.34	0.32	0.30
	Manganese	---	---	---	---	---	---	N (Ins. trend data)	---		N/A	---	4	0.102	0.1115	0.2	0.098	0.88	0.13	0.05
	Sodium	---	---	---	---	---	---	N (Ins. trend data)	---		N/A	---	4	571	631	691	120	0.19	631.00	59.80
	Fluoride	---	---	---	---	---	---	N (Ins. trend data)	---		1.5	0	4	0.41	0.4475	0.73	0.32	0.72	0.51	0.15
	Total Dissolved Solids (Calculated)	---	---	---	---	---	---	N (Ins. trend data)	---		N/A	---	4	1650	1765	1900	250	0.14	1770.00	133.42
	Dissolved Organic Carbon	---	---	---	---	---	---	N (Ins. trend data)	---		N/A	---	4	7.9	9.23	10.2	2.3	0.25	9.14	1.05

1. *Bold formatting indicates a value is above the applied guideline*
   - *The following results have been checked against the guideline: minimum, median, maximum, average, LCL, UCL*
2. *Shading in the parameter column indicates one or more analyses returned notable results (analysis-specific shading is further specified below)*
3. *Basic analysis performed with the following conditions:*
   - *Analyses performed on all sample data before 31-Dec-2018 (inclusive)*
   - *Non-detect multiplier of .5 applied to <DL sample data*
4. *Variability calculated as range / median*

Advisian
WorleyParsons Group

Table 6-1

Statistical Analysis

Project No.: 307075-01608-400		Mann-Kendall Trend Analysis								Visual Trend	Guideline Analysis		Basic Analysis								
Monitoring Station	Parameter	S-Stat (-)	Z-Stat (-)	P Value of Two Tailed Test (-)	Inferred Confidence Level (of Trend Present in Data Set) (%)	Slope (mg/L/yr)	Normalized Slope (%/yr)	Meets Trend Assumptions? [6]	Statistically Significant Mann-Kendall Trend [5]	Visual Trend Classification	Guideline Value [8] (mg/L)	2018 Guideline Exceedances	Count	Min (mg/L)	Median (mg/L)	Max (mg/L)	Range (mg/L)	Variability [4]	Average (mg/L)	Standard Deviation (mg/L)

5. Trend Analysis:
- Analyses performed on all sample data before 31-Dec-2018 (inclusive)
- Non-detect multiplier of .5 applied to <DL sample data
- Statistically signficant trend defined as:
-- Inferred confidence level greater than 95%
(in other words, P-value of two-tailed test is less than or equal to 0.05)
-- Absolute value of Sen's normalized slope is greater than 10%
-- Absolute slope criteria met for individual parameters (see criteria below)
- U: Denotes statistically significant upward trend
- D: Denotes statistically significant downward trend
- "---": Denotes no trend
- Shading of trend analysis cells indicates a Mann-Kendall trend has been detected
6. Legend for trend assumptions:
- Y: All conditions are met
- N: Not all conditions are met, specified as follows:
-- No new data: No sample data present for years reported
-- Ins. trend data: Found fewer than 6 data points in the date range specified from which to calculate Mann-Kendall information
-- Ins. >DL data: Less than 50% of trend data was above detection limit
-- U Trend: An upward Mann-Kendall trend is present
-- D Trend: A downward Mann-Kendall trend is present
-- Non-Monotonic: Trend is non-monotonic (ie. trend reversal or termination is present)
-- Damaged: The well is damaged
7. Absolute slope criteria (used to determine validity of Mann-Kendall trends):
- Chloride - 2.0 mg/L/yr
- Sulphate - 2.0 mg/L/yr
- Iron - 0.1 mg/L/yr
- Manganese - 0.1 mg/L/yr
- Sodium - 2.0 mg/L/yr
- Fluoride - 0.1 mg/L/yr
- Total Dissolved Solids (Calculated) - 2.0 mg/L/yr
- Dissolved Organic Carbon - 0.5 mg/L/yr
8. Guideline: Canadian Drinking Water MAC Guidelines 2017
- Guideline exceedances reported on sample data between 01-Jan-2018 and 31-Dec-2018 (inclusive)