

**2016 Groundwater Monitoring Program
124 Main Street, Barons, Alberta
Alberta Municipal Affairs Site #9558**



PRESENTED TO
Village of Barons

JANUARY 2017
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EXECUTIVE SUMMARY

The Village of Barons (Barons) retained Tetra Tech Canada Inc. (Tetra Tech) to conduct the 2016 bi-annual groundwater monitoring and sampling program (GWMP) and to prepare the 2016 annual groundwater monitoring report for a property located at 124 Main Street in Barons, Alberta (the site). An abandoned underground storage tank (UST) was discovered at the site in 2009, and in 2010, the UST was removed. The site is included within the Alberta Municipal Affairs Tank Site Remediation Program (AMA Program), Site Number 9558. A site location plan is presented on Figure 1. A site plan showing the location of the groundwater monitoring wells is presented on Figure 2.

The objective of the 2016 GWMP was to document current petroleum hydrocarbon (PHC) concentrations, which were historically detected in the groundwater at the site, and to evaluate the potential for the natural attenuation of PHC compounds beneath the site.

Monitoring activities for 2016 included bi-annual (spring and fall) groundwater monitoring, sampling, and analytical testing of four monitoring wells. Groundwater analytical results at the locations sampled do not currently indicate an adverse impact on the groundwater quality at the site as a result of historical fuel storage and/or handling.

Key results of the 2016 GWMP include the following:

- Routine groundwater parameters were included in the analytical suite for the first time in 2014, to assist in determining the potential for the natural attenuation of PHCs in the groundwater at the site. Concentrations of TDS, sodium, sulphate, chloride, nitrate, nitrite, dissolved iron and/or dissolved manganese were measured greater than the Tier 1 Guidelines in 2016, as well as historically. Concentrations of these parameters measured in the up-gradient wells have been similar to/or less than the concentrations measured down-gradient of the site and have remained generally stable since first measured in 2014. Based on these results, concentrations of these parameters measured in the groundwater likely reflect the natural groundwater composition at the site.
- In 2016, oxic groundwater conditions noted at all wells in the spring changed to anoxic in the fall suggesting that conditions in the groundwater is less favourable for the attenuation of residual biodegradable hydrocarbons.
- Concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX) and PHC fractions F1 and F2 were less than the laboratory analytical detection limits at all wells in 2016. The November 2016 GWMP is the second consecutive event where BTEX and PHC fractions F1 and F2 have been less than the detection limits at all wells at the site.

Based upon the results of groundwater monitoring and sampling conducted at the site to date, Tetra Tech presents the following recommendation:

- Drill three additional boreholes, to be completed as shallow groundwater monitoring wells immediately adjacent to, and within the former tank nest (historical source area). The new wells will aid in characterizing any residual hydrocarbon impacts that may be still be present at the site.
- Continue the semi-annual groundwater monitoring program and analytical suite in 2017 including the three newly installed wells, and excluding 08MW01 and 08MW03 where PHC concentrations have consistently been less than the laboratory detection limits.

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LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of the Village of Barons and their agents. Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than the Village of Barons, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in Tetra Tech Canada Inc.'s Services Agreement. Tetra Tech's General Conditions are provided in Appendix A of this report.

1.0 INTRODUCTION

1.1 General

The Village of Barons (Barons) retained Tetra Tech Canada Inc. (Tetra Tech) to conduct the 2016 bi-annual groundwater monitoring and sampling program (GWMP) and to prepare the 2016 annual groundwater monitoring report for a property located at 124 Main Street in Barons, Alberta (the site). An abandoned underground storage tank (UST) was discovered at the site in 2009, and in 2010, the UST was removed. The site is included within the Alberta Municipal Affairs Tank Site Remediation Program (AMA Program), Site Number 9558. A site location plan is presented on Figure 1. A site plan showing the borehole, groundwater monitoring wells, and soil vapour well locations is presented on Figure 2.

The 2016 GWMP is based on recommendations made in Tetra Tech's 2015 Groundwater Monitoring Program Report (Tetra Tech EBA File: ENVIND03335-03, dated December 2015). The objective of the 2016 GWMP was to document current petroleum hydrocarbon (PHC) concentrations, which were historically detected in the groundwater at the site, and to evaluate the potential for the natural attenuation of PHC compounds beneath the site.

1.2 Previous Environmental Assessments

A Revised Risk Management Plan (RMP) was completed for the site (Tetra Tech File: ENVIND03335-01, dated May 2014) which recommended the implementation of a GWMP and a soil vapour monitoring program (SVMP). The RMP was based on previous environmental site assessments (ESAs) conducted at the site by Tetra Tech which identified concentrations of PHCs in the soil and groundwater greater than the then referenced Alberta Environment and Sustainable Resource Development¹ (ESRD) 2014 Alberta Tier 1 Soil and Groundwater Remediation Guidelines. The Revised RMP has not yet been approved by Alberta Environment and Parks (AEP).

Details of the previous ESAs completed at the site by Tetra Tech are presented in the following documents:

- Phase II and Phase III Environmental Site Assessment. 124 Main Street. Lot 17, Block 2, Plan 2605X. AMA Site 9558. Barons, Alberta. Tetra Tech File: L22101183.001, dated October 2009.
- Underground Storage Tank Removal and Monitoring. AMA Site 9558. Barons, Alberta. Tetra Tech File: L22101183.004, dated December 2011.

Tetra Tech's 2014 Groundwater and Soil Vapour Monitoring Program Report (Tetra Tech File: ENVIND03335-02, dated December 2014) included the documentation of PHC concentrations in the existing groundwater monitoring wells and the implementation of a SVMP. The objective was to identify potential risks to occupants using the site and the adjacent commercial business to the east from exposure to soil vapours, specifically from PHCs. The results of the SVMP indicated that soil vapour concentrations did not exceed the calculated indoor and outdoor soil vapour screening levels, and that further soil vapour monitoring was not required.

1.3 Authorization

Ms. Laurie Beck, of the Village of Barons, provided written authorization to Tetra Tech to proceed with the 2016 GWMP via a signed Services Agreement dated April 11, 2016.

¹ Currently Alberta Environment and Parks.

1.4 Scope of Work

The scope of work for the 2016 GWMP (April and November) included the following:

- Measuring monitoring well headspace vapour concentrations (VCs) and groundwater levels within four groundwater monitoring wells (08MW01, 08MW03, 08MW07, and 09MW11), and observing the integrity of the monitoring well network;
- Purging each well of approximately three standing well volumes or until the well was practically dry; and allowing the water level in the well to recover prior to collecting groundwater samples from each well;
- Submitting four groundwater samples to Maxxam Analytics Inc. (Maxxam), located in Calgary, Alberta, for chemical analyses of the following parameters: benzene, toluene, ethylbenzene, and xylenes (BTEX), PHC fractions F1 and F2, routine groundwater chemistry, and dissolved iron and manganese;
- Preparing an annual report, including a summary of the field activities undertaken in 2016 and providing an interpretation of the measured groundwater levels and groundwater analytical results; and
- Preparing an updated record of site condition (ROSC) to accompany the groundwater assessment report.

The project was completed under Tetra Tech's Geoenvironmental Report – General Conditions for conducting environmental work. A copy of these conditions is provided in Appendix A.

1.5 Qualifications of Assessors

Mr. Jamie LaMontagne, EP., conducted the groundwater monitoring and sampling and wrote this report. Mr. LaMontagne is an Environmental Technologist with Tetra Tech's Environment and Water Practice and has over 16 years of experience in the environmental industry.

Mr. Jaymes Going, B.Sc., EP, acted as the Project Manager, assisted with the interpretation of the data, and conducted the intermediate review of this report. Mr. Going is an Environmental Consultant with Tetra Tech's Environment and Water Practice and has over nine years of experience in the environmental industry.

Mr. Henri Carriere, P.Eng., M.N.R.M., conducted the final review of the report. Mr. Carriere is a Senior Project Engineer with Tetra Tech's Environment and Water Practice in Calgary, Alberta. Mr. Carriere has over 20 years of experience in the environmental industry.

2.0 METHODS

This section describes the methods applied by Tetra Tech during the 2016 GWMP.

2.1 Field Program

2.1.1 Project Safety

A pre-job hazard assessment and safe work form were completed prior to the initiation of the fieldwork and applicable safe work procedures were reviewed. The safe work form was reviewed on site by the Tetra Tech representative.

2.1.2 Groundwater Monitoring and Sampling Program

Tetra Tech personnel conducted the GWMP on April 27, 2016 and November 8, 2016. Monitoring wells were screened for headspace VCs using a MiniRae 3000 Photoionization Detector (PID) immediately upon opening the well cap and prior to measuring liquid levels using a Heron™ electronic interface probe. Each monitoring well was then purged of approximately three standing well volumes, or until practically dry, using polyethylene bailers dedicated to each well. Water levels were given sufficient time to recover and groundwater samples were collected on the same day purging took place. Strict procedures were followed for purging, sampling, sample preservation, and transportation to avoid cross-contamination and to ensure sample quality was maintained. Chain-of-custody (COC) forms were completed and the samples were transported to an independent laboratory, Maxxam in Calgary, Alberta, for chemical analysis.

2.1.3 Analytical Testing Program

All chemical analyses was conducted by Maxxam. The chemical analysis report including analytical methods used by Maxxam in 2016 is included in Appendix B. The 2016 analytical suite is described in the following table.

Table A: Analytical Program

Wells	Analysis
08MW01, 08MW03, 08MW07, and 09MW11	BTEX, PHC fractions F1 and F2, routine water chemistry*; dissolved iron and manganese**

Notes:

* Routine water chemistry includes pH, electrical conductivity (EC), total dissolved solids (TDS), and major ions.

** 2016 is the fifth consecutive event that routine parameters and dissolved iron and manganese have been analyzed at the site.

2.2 Data Evaluation

2.2.1 Regulatory Framework

The groundwater analytical results are compared to the AEP 2016 Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Tier 1 Guidelines). The Tier 1 approach is based on the assumption that all exposure pathways and receptors relevant to a particular land use are present and operative. The site is currently a landscaped park area with a gazebo present. As well, there are commercial/residential buildings adjacent to the site. Therefore, the Tier 1 Guidelines for residential/parkland land use with fine-grained soils under the most stringent pathway are deemed appropriate for the site. Pertinent to the data evaluation is that the current 2016 Tier 1 Guidelines have lower guideline values than in the 2014 Tier 1 Guidelines for ethylbenzene (was 0.0024 mg/L, currently 0.0016 mg/L) and xylenes (was 0.3 mg/L, currently 0.02 mg/L).

Analytical results from 2016 have also been compared between hydraulically up-gradient and down-gradient monitoring wells installed at the site.

2.2.2 Redox Conditions and Natural Attenuation Potential

Analytical results for redox sensitive routine water chemistry parameters in 2016, including nitrate, nitrite, sulphate, and dissolved iron and manganese, were used to assess the inferred redox conditions at the groundwater monitoring wells. Assessing redox conditions is relevant to determine if monitored natural attenuation (MNA), an approach that relies on natural processes (biodegradation, dispersion, dilution, sorption, volatilization, and chemical stabilization of chemicals of concern), can be used to remediate groundwater within a reasonable time frame, or to assess if a dissolved hydrocarbon plume is stable.

Empirical redox measurements in groundwater are difficult and often yield unreliable results. Stuyfzand (1993) proposed a semi-empirical redox indexing based on measured concentrations of redox sensitive elements.

To demonstrate the relative redox conditions on site and off site, a system of three redox levels was used, based on the analytical results of the redox sensitive elements including nitrate, sulphate, dissolved iron, and dissolved manganese. The three simplified redox levels in groundwater are as follows:

- Oxidic Zone: Nitrate concentrations are typically stable, but dissolved iron and manganese are not present in appreciable concentrations.
- Suboxic Zone: Nitrate concentrations are less than 1 mg-N/L; dissolved manganese is present in concentrations greater than 0.1 mg/L without an accompanying increase in dissolved iron.
- Anoxic Zone: Nitrate has been reduced; dissolved iron and dissolved manganese occur in concentrations typically greater than 0.1 mg/L; sulphate reduction is occurring, based on observations made during sampling and/or sulphate concentrations considerably less than background values.

Using this system of simplified redox levels, the spatial distribution of inferred redox conditions at the monitoring wells was summarized for the data collected in 2016. Inferred redox conditions for the April 2016 and November 2016 are further discussed in Section 4.0.

3.0 RESULTS

The results of the 2016 groundwater monitoring event are presented in Section 3.1 and Section 3.2.

3.1 Groundwater Levels and Field Monitoring Results

The average depth to shallow groundwater on April 27, 2016 was 1.84 mbg, and on average 0.33 m deeper than the April 2015 measurement. The average depth to shallow groundwater on November 8, 2016 was 2.79 mbg, and on average 0.43 m deeper than the October 2015 measurement. Based on the calculated groundwater elevations, the inferred groundwater flow direction near the former UST location was to the northwest under an average horizontal hydraulic gradient of 0.004 m/m during both events.

Monitoring well headspace VCs measured in April 2016 and November 2016 were less than the instrument detection limit at all monitoring wells. All monitoring wells sampled in 2016 were reported to be in good condition.

The 2016 groundwater level measurements and field monitoring results are presented on Table 1. Figure 3 and Figure 4 present the groundwater elevations on April 27, 2016 and on November 8, 2016, respectively.

3.2 Groundwater Analytical Results

Concentrations of BTEX and PHC fractions F1 and F2 were less than the laboratory detection limits in the groundwater at the sampled wells in 2016.

In 2016, TDS, sulphate, and sodium concentrations were greater than the Tier 1 Guidelines at the sampled monitoring wells.

Chloride concentrations were greater than the Tier 1 Guideline (120 mg/L) at most sampled monitoring wells in 2016, excluding 09MW11. The chloride concentration at monitoring well 08MW03 was equal to the guideline in November 2016.

Dissolved iron concentrations were less than the analytical detection limit at the sampled wells in April 2016, and subsequently increased to greater than the Tier 1 Guidelines (0.3 mg/L) at the sampled wells during the November 2016 event.

Nitrate and nitrite concentrations were greater than the Tier 1 Guidelines (3 mg/L and 0.6 mg/L, respectively) at most sampled monitoring wells, with the exception of the nitrite concentration at 08MW01 (November) and 08MW07 (April and October).

Laboratory analytical results, including methods of analyses, are presented in Appendix B. A summary of the 2016 groundwater analytical results is provided in Table 2. Historical groundwater analytical results are summarized in Table 3.

4.0 DISCUSSION

Concentrations of BTEX and PHC fractions F1 and F2 were less than the laboratory detection limits in the groundwater at the sampled wells in 2016. A concentration of benzene (0.027 mg/L) greater than the Tier 1 Guideline at 08MW07; and trace concentrations of xylenes (0.0025 mg/L) and PHC fraction F2 (0.21 mg/L) measured in October 2015, were not observed in 2016. Historically, benzene and PHC fraction F1 have also been measured at 09MW11, however, all parameters have been less than the detection limit at this well for four consecutive monitoring events. BTEX and PHC fractions F1 and F2 have consistently been less than the detection limit at 08MW01 and 08MW03 throughout the monitoring program.

In 2016, TDS, sulphate, and sodium concentrations were greater than the Tier 1 Guidelines at the sampled monitoring wells; however, concentrations were within the historical range noted for each well. The highest concentrations of these parameters in 2016, as well as historically, are typically measured at 08MW01, which is interpreted to be hydraulically up-gradient of the site. As concentrations of these parameters are greater up-gradient than down-gradient of the site they are interpreted to reflect background conditions. As well, sulphate and sodium concentrations are often greater than the Tier 1 Guidelines in shallow groundwater found in glacial till as a result of the dissolution of naturally occurring salts. Therefore, the elevated concentrations of sulphate, sodium, and consequently, TDS, are not interpreted to be a result of historical fuel storage and/or handling at the site.

Chloride concentrations were greater than the Tier 1 Guideline (120 mg/L) at most monitoring wells in 2016, excluding 09MW11, which is consistent with historical data. The chloride concentration at monitoring well 08MW03 was equal to the guideline in November 2016. The highest chloride concentration in 2016, as well as historically, is typically measured at 08MW01, which is interpreted to be hydraulically up-gradient of the site. Chloride concentrations have been generally stable since 2014 and values up-gradient of the site are similar to those measured down-gradient. The chloride concentrations measured at the site are interpreted to reflect background conditions and no trends have been established.

Dissolved iron concentrations were less than the analytical detection limit at the sampled wells in April 2016, and subsequently increased to greater than the Tier 1 Guidelines (0.3 mg/L) at the sampled wells during the November 2016 event. The November 2016 event is the first time dissolved iron has been measured in the groundwater at the site, and concentrations ranged between 0.39 mg/L at 08MW07 (hydraulically down-gradient of the site) to 0.47 mg/L at 08MW01 (hydraulically up-gradient of the site). Dissolved manganese concentrations were greater than the Tier 1 Guideline at the sampled wells in 2016, as well as historically. The 2016 concentrations were typically within the historical range at the sampled wells, however, 09MW11 has exhibited a marginal increasing trend since 2014 and was measured at the highest value to date in November 2016.

Nitrate and nitrite concentrations were greater than the Tier 1 Guidelines (3 mg/L and 0.6 mg/L, respectively) at most monitoring wells, with the exception of the nitrite concentration at 08MW01 (November) and 08MW07 (April and October). This result is generally consistent with historical data and concentrations have remained stable since first analyzed in July 2014. Nitrate and nitrite concentrations measured in the up-gradient wells have been similar to/or less than the concentrations measured down-gradient of the site.

Degradation occurs both under aerobic and anaerobic conditions, although aerobic breakdown of many potential contaminants of concern is often more rapid (Howard et al. 1991). The significance of the redox condition is, therefore, that under aerobic (oxic) conditions, many hydrocarbons, including BTEX compounds, are expected to attenuate much faster than under anoxic conditions. Therefore, if inferred oxic conditions prevail at the edge of the former plume, the migration of hydrocarbons may stabilize or decrease. The inferred redox conditions of groundwater at the site have been oxic and generally stable since first monitored in 2014 with the exception of 08MW07 which was anoxic in October 2015. In 2016, oxic groundwater conditions noted at all wells in the spring changed to anoxic in the fall suggesting that conditions in the groundwater were better in the spring than the fall for the attenuation of residual biodegradable hydrocarbons.

An updated copy of the ROSC form is included in Appendix C.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Monitoring activities for 2016 included bi-annual (spring and fall) groundwater monitoring, sampling, and analytical testing of four monitoring wells. Groundwater analytical results at the locations sampled do not currently indicate an adverse impact on the groundwater quality at the site as a result of historical fuel storage and/or handling.

Key results of the 2016 GWMP include the following:

- Routine groundwater parameters were included in the analytical suite for the first time in 2014, to assist in determining the potential for the natural attenuation of PHCs in the groundwater at the site. Concentrations of TDS, sodium, sulphate, chloride, nitrate, nitrite, dissolved iron and/or dissolved manganese were measured greater than the Tier 1 Guidelines in 2016, as well as historically. Concentrations of these parameters measured in the up-gradient wells have been similar to/or less than the concentrations measured down-gradient of the site and have remained generally stable since first measured in 2014. Based on these results, concentrations of these parameters measured in the groundwater likely reflect the natural groundwater composition at the site.
- In 2016, oxic groundwater conditions noted at all wells in the spring changed to anoxic in the fall suggesting that conditions in the groundwater is less favourable for the attenuation of residual biodegradable hydrocarbons.
- Concentrations of BTEX and PHC fractions F1 and F2 were less than the laboratory analytical detection limits at all wells in 2016. The November 2016 GWMP is the second consecutive event where BTEX and PHC fractions F1 and F2 have been less than the detection limits at all wells at the site.

Based upon the results of groundwater monitoring and sampling conducted at the site to date, Tetra Tech presents the following recommendation:

- Drill three additional boreholes, to be completed as shallow groundwater monitoring wells immediately adjacent to, and within the former tank nest (historical source area). The new wells will aid in characterizing any residual hydrocarbon impacts that may be still be present at the site.
- Continue the semi-annual groundwater monitoring program and analytical suite in 2017 including the three newly installed wells, and excluding 08MW01 and 08MW03 where PHC concentrations have consistently been less than the laboratory detection limits.

6.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
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PERMIT TO PRACTICE	
TETRA TECH CANADA INC.	
Signature	
Date	Jan 27, 2017
PERMIT NUMBER: P13774	
The Association of Professional Engineers and Geoscientists of Alberta	

REFERENCES

- Alberta Environment and Parks (AEP). 2016. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Environmental Policy Branch. Edmonton, Alberta.
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TABLES

Table 1	Monitoring Well Completion Details and 2016 Field Monitoring Results
Table 2	2016 Groundwater Analytical Results
Table 3	Historical Groundwater Analytical Results

Table 1: Monitoring Well Completion Details and 2016 Field Monitoring Results

Monitoring Well I.D.	Date of Installation	TOP Elevation ¹ (m)	Monitoring Well Depth (mbg) ²	Monitoring Well Screen Interval (mbg)	Monitoring Well Screened In	Depth to Groundwater (mBTOC) ³	Depth to Groundwater (mbg)	Groundwater Elevation (m)	Vapour Concentrations ⁴	Depth to Groundwater (mBTOC) ⁴	Depth to Groundwater (mbg)	Groundwater Elevation (m)	Vapour Concentrations
						April 27, 2016				November 8, 2016			
08MW01	18-Nov-08	98.64	6.1	1.6 to 6.1	Clay and bedrock	1.72	1.86	96.92	0.0	2.67	2.81	95.97	0.0
08MW03	18-Nov-08	98.71	6.1	1.6 to 6.1	Clay and bedrock	1.77	1.84	96.94	0.0	2.73	2.80	95.98	0.0
08MW07	18-Nov-08	98.47	6.1	1.6 to 6.1	Clay and bedrock	1.63	1.72	96.84	0.0	2.57	2.66	95.90	0.0
09MW11	9-Mar-09	98.82	6.1	3.1 to 6.1	Clay and bedrock	1.89	1.92	96.93	0.0	2.85	2.88	95.97	0.0

Notes:

Benchmark: Top bolt of fire hydrant located on the northwest corner of Main Street and Alberta Avenue.

¹ Elevation of top of pipe casing.² Meters below grade.³ Meters below top of pipe casing.⁴ Vapour concentrations measured in parts per million using a MiniRae 3000 Photoionization Detector.

Table 2: 2016 Groundwater Analytical Results

Parameter	Unit	Detection Limit	Tier 1 Guideline ¹	08MW01		08MW03		08MW07		09MW11	
				4/27/2016	11/8/2016	4/27/2016	11/8/2016	4/27/2016	11/8/2016	4/27/2016	11/8/2016
Hydrocarbons											
Benzene	mg/L	0.0004	0.005	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
Toluene	mg/L	0.0004	0.024	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
Ethylbenzene	mg/L	0.0004	0.0016	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
Xylene Total	mg/L	0.0008	0.02	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
F1 (C6-C10) - BTEX	mg/L	0.1	2.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
F2 (C10-C16 Hydrocarbons)	mg/L	0.1	1.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nutrients											
Nitrate (as N)	mg-N/L	0.01	3	75	72	51	43	41	44	14	15
Nitrite (as N)	mg-N/L	0.01	0.6 ²	0.70	0.49	1.2	0.94	0.011	0.03	1.6	1.6
Total Nitrogen	mg-N/L	0.01	NG	75.7	72.5	52.2	43.9	41.0	44.0	15.6	16.6
Routine											
pH (Lab)	pH Units	--	6.5-8.5	7.63	7.58	7.68	7.57	7.78	7.73	7.55	7.50
Hardness as CaCO3	mg/L	0.5	NG	3,100	3,400	2,900	3,100	2,400	2,600	2,700	2,900
Electrical Conductivity (EC)	uS/cm	1	NG	10,000	9,700	8,600	8,400	9,400	9,200	7,600	7,700
Total Dissolved Solids (TDS)	mg/L	10	500	9,300	9,600	7,800	7,500	8,100	8,300	6,800	7,000
Chloride (Cl) (Filtered)	mg/L	1	120	160	160	130	120	140	130	110	110
Alkalinity (total as CaCO3)	mg/L	0.5	NG	690	660	760	800	720	670	690	730
Bicarbonate	mg/L	0.5	NG	840	800	930	980	880	810	840	890
Calcium (Filtered)	mg/L	0.3	NG	470	490	440	460	390	400	410	440
Carbonate	mg/L	0.5	NG	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Hydroxide	mg/L	0.5	NG	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium (Filtered)	mg/L	0.2	NG	470	520	440	470	360	380	410	450
Alkalinity (pp as CaCO3)	mg/L	0.5	NG	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Potassium (Filtered)	mg/L	0.3	NG	11	12	10	11	11	12	10	11
Sodium (Filtered)	mg/L	0.5	200	1,700	1,500	1,200	1,200	1,600	1,500	1,000	1,100
Sulphate (SO4) (Filtered)	mg/L	1	429 ³	5,800	6,200	4,900	4,500	5,100	5,200	4,400	4,500
Metals											
Iron (Filtered)	mg/L	0.06	0.3	<0.060	0.47	<0.060	0.44	<0.060	0.39	<0.060	0.43
Manganese (Filtered)	mg/L	0.004	0.05	0.55	0.51	0.46	0.51	0.13	0.18	1.6	1.7
Inorganics											
Anion Sum	meq/L	--	NG	140	150	120	120	130	130	110	110
Cation Sum	meq/L	0.01	NG	130	130	110	120	120	120	98	100
Ionic Balance	N/A	--	NG	0.93	0.89	0.89	0.99	0.92	0.92	0.89	0.94
Lab Identification Number				ON3884	PZ5783	ON3885	PZ5784	ON3886	PZ5786	ON3887	PZ5785
Lab Report Number				B631854	B6A0360	B631854	B6A0360	B631854	B6A0360	B631854	B6A0360

Notes:

¹ Alberta Environment and Parks (AEP). 2016. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land and Forestry Policy Branch, Policy Division. 197 pp. References guidelines are for fine-grained soils under residential/parkland land use for the most stringent pathway.

² Guideline is chloride dependent. Site chloride ranged from 110 mg/L to 160 mg/L.

³ Guideline is hardness dependent. Site hardness values ranged from 2,400 mg/L to 3,400 mg/L.

NG - No guideline.

< = less than laboratory reportable detection limit.

BOLD AND SHADED - Exceeds Guideline.

Table 3: Historical Groundwater Analytical Results

Parameter	Unit	Tier 1 Guideline ¹	08MW01				08MW03				08MW06*	08MW07				08MW08*	09MW09*	09MW11					09MW13*
			11/28/2008	7/18/2014	4/23/2015	10/7/2015	11/28/2008	7/18/2014	4/23/2015	10/7/2015	11/28/2008	11/28/2008	7/18/2014	4/23/2015	10/7/2015	11/28/2008	3/26/2009	3/26/2009	7/18/2014	4/23/2015	10/7/2015	3/26/2009	
Hydrocarbons																							
Benzene	mg/L	0.005	<0.0009	<0.0004	<0.0004	<0.0004	<0.0009	<0.0004	<0.0004	<0.0004	0.068	<0.0009	<0.0004	<0.0004	0.027	<0.0009	0.0017	0.0057	0.0022	<0.0004	<0.0004	<0.0009	
Toluene	mg/L	0.024	<0.0009	<0.0004	<0.0004	<0.0004	<0.0009	<0.0004	<0.0004	<0.0004	<0.0004	<0.0009	<0.0004	<0.0004	<0.0004	<0.0009	<0.0009	<0.0009	<0.0004	<0.0004	<0.0004	<0.0009	
Ethylbenzene	mg/L	0.0016	<0.0009	<0.0004	<0.0004	<0.0004	<0.0009	<0.0004	<0.0004	<0.0004	0.036	<0.0009	<0.0004	<0.0004	<0.0004	<0.0009	<0.0009	<0.0009	<0.0004	<0.0004	<0.0004	<0.0009	
Xylene Total	mg/L	0.02	<0.002	<0.0008	<0.0008	<0.0008	<0.002	<0.0008	<0.0008	<0.0008	0.072	<0.002	<0.0008	<0.0008	0.0025	<0.002	<0.002	<0.002	<0.0008	<0.0008	<0.0008	<0.002	
F1 (C6-C10) - BTEX	mg/L	2.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	
F2 (C10-C16 Hydrocarbons)	mg/L	1.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.8	<0.1	<0.1	<0.1	0.21	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Nutrients																							
Nitrate (as N) (Filtered)	mg-N/L	3	--	74	68	78	--	38	40	54	--	--	41	44	1.8	--	--	--	21	21	20	--	
Nitrite (as N) (Filtered)	mg-N/L	0.6 ²	--	0.72	0.72	0.58	--	1.3	1.1	1.6	--	--	0.063	0.018	0.54	--	--	--	1.5	1.2	1.4	--	
Routine																							
pH (Lab)	pH_Units	6.5-8.5	--	7.52	7.86	7.46	--	7.62	7.88	7.57	--	--	7.63	7.94	7.55	--	--	--	7.41	7.79	7.48	--	
Hardness as CaCO3	mg/L	NG	--	3,000	3,100	3,500	--	2,900	2,900	3,000	--	--	2,300	2,400	2,000	--	--	--	2,600	2,800	2,900	--	
Electrical Conductivity (EC)	uS/cm	NG	--	9,900	9,900	10,000	--	8,300	8,300	8,600	--	--	9,100	9,300	5,600	--	--	--	7,800	7,800	8,000	--	
Total Dissolved Solids (TDS)	mg/L	500	--	8,800	9,300	9,700	--	6,900	7,700	7,800	--	--	7,600	8,300	4,800	--	--	--	6,500	7,100	7,600	--	
Chloride (Cl) (Filtered)	mg/L	120	--	160	160	170	--	120	120	140	--	--	120	120	69	--	--	--	110	110	110	--	
Alkalinity (total as CaCO3)	mg/L	NG	--	670	700	710	--	740	750	750	--	--	600	650	880	--	--	--	680	680	690	--	
Bicarbonate	mg/L	NG	--	820	860	860	--	900	920	910	--	--	730	790	1100	--	--	--	830	830	840	--	
Calcium (Filtered)	mg/L	NG	--	450	460	500	--	440	440	450	--	--	360	370	340	--	--	--	380	410	430	--	
Carbonate	mg/L	NG	--	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	--	--	<0.5	<0.5	<0.5	--	--	--	<0.5	<0.5	<0.5	--	
Hydroxide	mg/L	NG	--	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	--	--	<0.5	<0.5	<0.5	--	--	--	<0.5	<0.5	<0.5	--	
Magnesium (Filtered)	mg/L	NG	--	460	470	540	--	440	430	450	--	--	330	350	270	--	--	--	390	430	440	--	
Alkalinity (pp as CaCO3)	mg/L	NG	--	<0.5	<0.5	-	--	<0.5	<0.5	-	--	--	<0.5	<0.5	-	--	--	--	<0.5	<0.5	-	--	
Potassium (Filtered)	mg/L	NG	--	9.7	10	12	--	9.6	9.4	11	--	--	9.1	9.7	7.8	--	--	--	8.2	9.1	11	--	
Sodium (Filtered)	mg/L	200	--	1,700	1,500	1,600	--	1,200	1,200	1,200	--	--	1,600	1,600	760	--	--	--	1,100	1,100	1,100	--	
Sulphate (SO4) (Filtered)	mg/L	429 ³	--	5,200	5,900	6,000	--	4,100	4,900	4,900	--	--	4,600	5,200	2,800	--	--	--	4,000	4,600	4,900	--	
Metals																							
Iron (Filtered)	mg/L	0.3	--	<0.06	<0.06	<0.06	--	<0.06	<0.06	<0.06	--	--	<0.06	<0.06	<0.06	--	--	--	<0.06	<0.06	<0.06	--	
Manganese (Filtered)	mg/L	0.05	--	0.54	0.56	0.64	--	0.37	0.41	0.52	--	--	0.15	0.1	1.8	--	--	--	1.5	1.5	1.6	--	
Lead (Filtered)	mg/L	0.01	<0.001	--	--	--	<0.001	--	--	--	0.0031	0.0003	--	--	--	<0.001	<0.001	<0.001	--	--	--	<0.001	
Inorganics																							
Anion Sum	meq/L	NG	--	130	150	150	--	110	120	120	--	--	110	130	79	--	--	--	100	110	120	--	
Cation Sum	meq/L	NG	--	140	130	140	--	110	110	110	--	--	120	120	73	--	--	--	100	100	110	--	
Ionic Balance	N/A	NG	--	1	0.88	0.94	--	1	0.9	0.89	--	--	1	0.91	0.92	--	--	--	1	0.91	0.9	--	
Lab Identification Number			M95064	KD2520	MC8643	NJ1453	M95065	KD2521	MC8644	NJ1454	M95066	M95067	KD2519	MC8642	NJ1456	M95068	O23768	O23766	KD2518	MC8641	NJ1455	O23767	
Lab Report Number			A865936	B461485	B533570	B589879	A865936	B461485	B533570	B589879	A865936	A865936	B461485	B533570	B589879	A865936	A913848	A913848	B461485	B533570	B589879	A913848	

Notes:

¹ Alberta Environment and Parks (AEP). 2016. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land and Forestry Policy Branch, Policy Division. 197 pp. References guidelines are for fine-grained soils under residential/parkland land use for the most stringent pathway.

² Guideline is chloride dependent. Site chloride ranged from 69 mg/L to 170 mg/L.

³ Guideline is hardness dependent. Site hardness values ranged from 2,000 mg/L to 3,500 mg/L.

NG - No guideline.

< = less than laboratory reportable detection limit.

BOLD AND SHADED

- Exceeds Guideline.

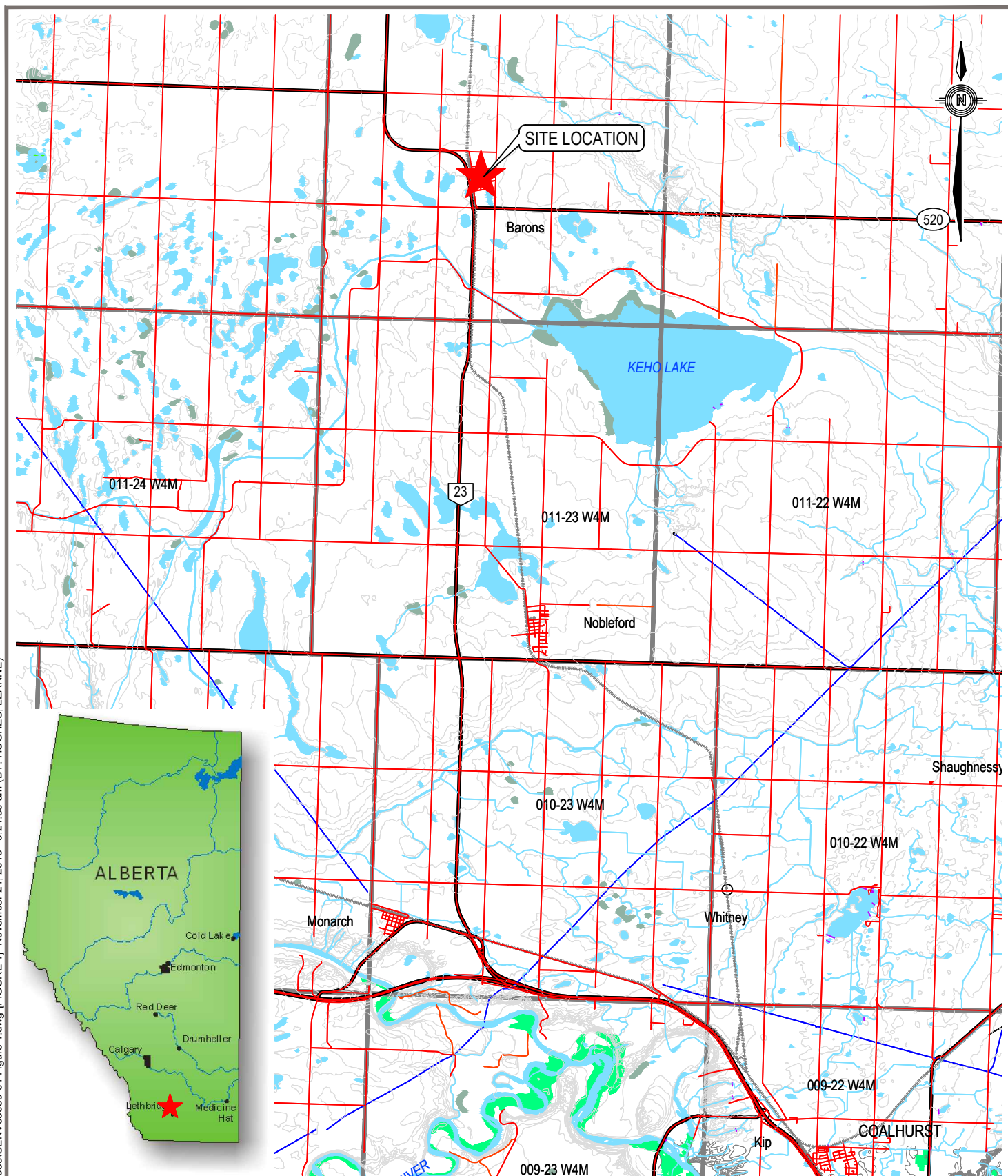
-- - No Data

*Monitoring well destroyed or not located.

FIGURES

- | | |
|----------|--|
| Figure 1 | Site Location Plan |
| Figure 2 | Site Plan Showing Borehole, Monitoring Well and Soil Vapour Well Locations |
| Figure 3 | Site Plan Showing Groundwater Elevations (April 27, 2016) |
| Figure 4 | Site Plan Showing Groundwater Elevations (November 8, 2016) |

C:\Riverbend\Drafting\ENV\ENV\ENV\03059\CENV\03059-01 Figure 1.dwg [FIGURE 1] November 21, 2016 - 9:24:50 am (BY: HUGHES, LEANNE)



NOTES
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CLIENT

Village of Barons

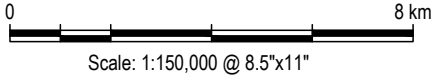


2016 GROUNDWATER MONITORING PROGRAM
124 MAIN STREET, BARONS, ALBERTA
AMA SITE 9558

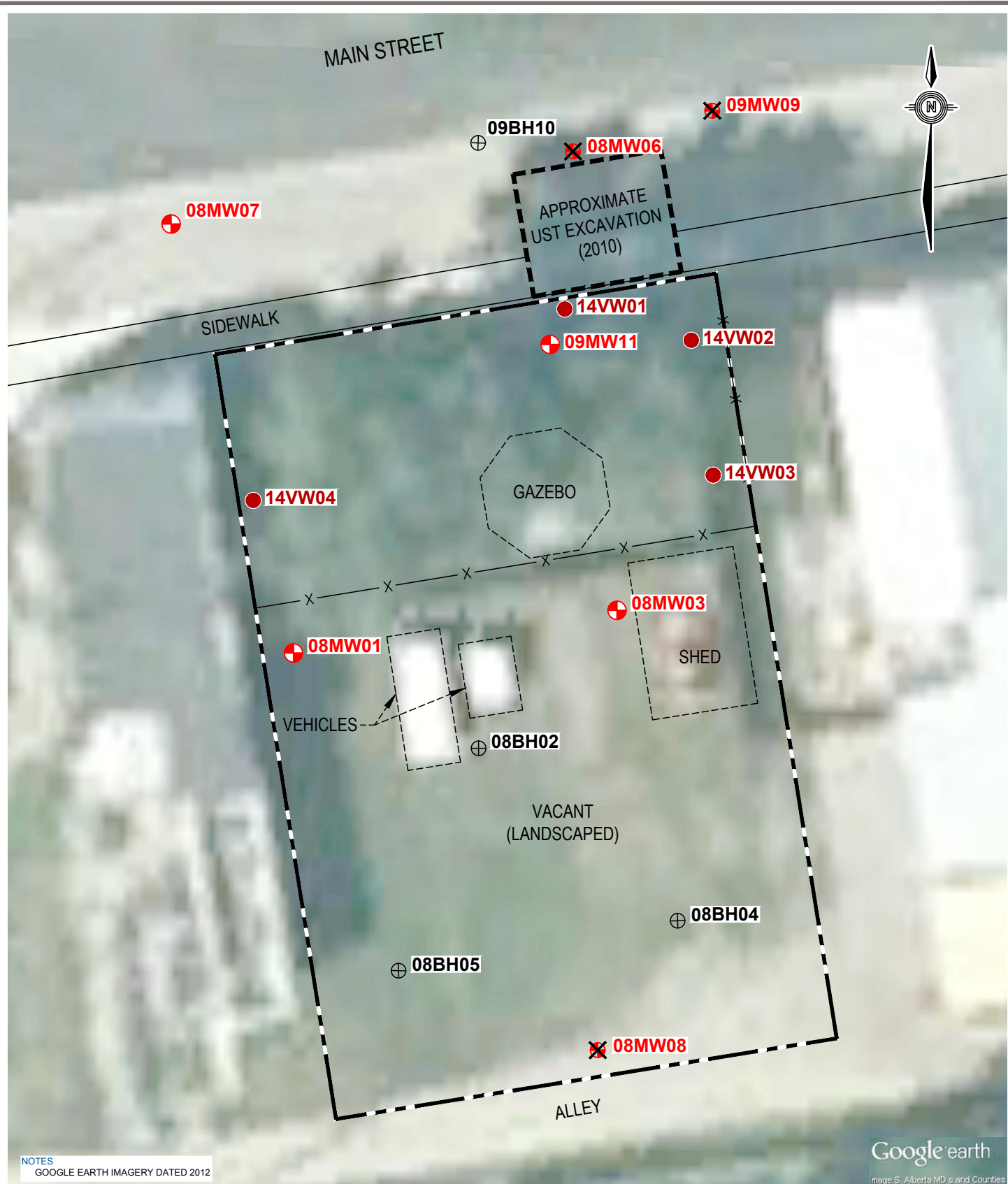
SITE LOCATION PLAN

PROJECT NO. CENV03059-01	DWN LCH	CKD JL	REV 0
OFFICE CALGARY	DATE November 2016		

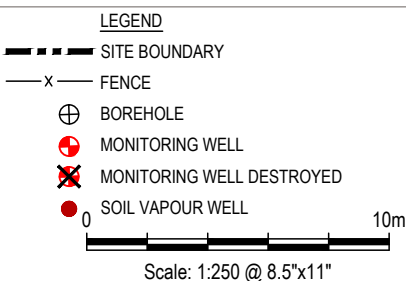
Figure 1



C:\Riverbend\Drafting\ENV\CENV\03059\CENV\03059-01 Figures 2.3.4.dwg [FIGURE 2] January 20, 2017 - 2:59:07 pm (BY: HUGHES, LEANNE)



Google earth
Image S. Alberta MD's and Counties



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Village of Barons



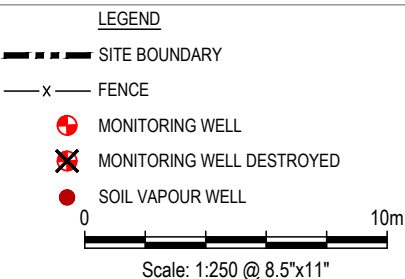
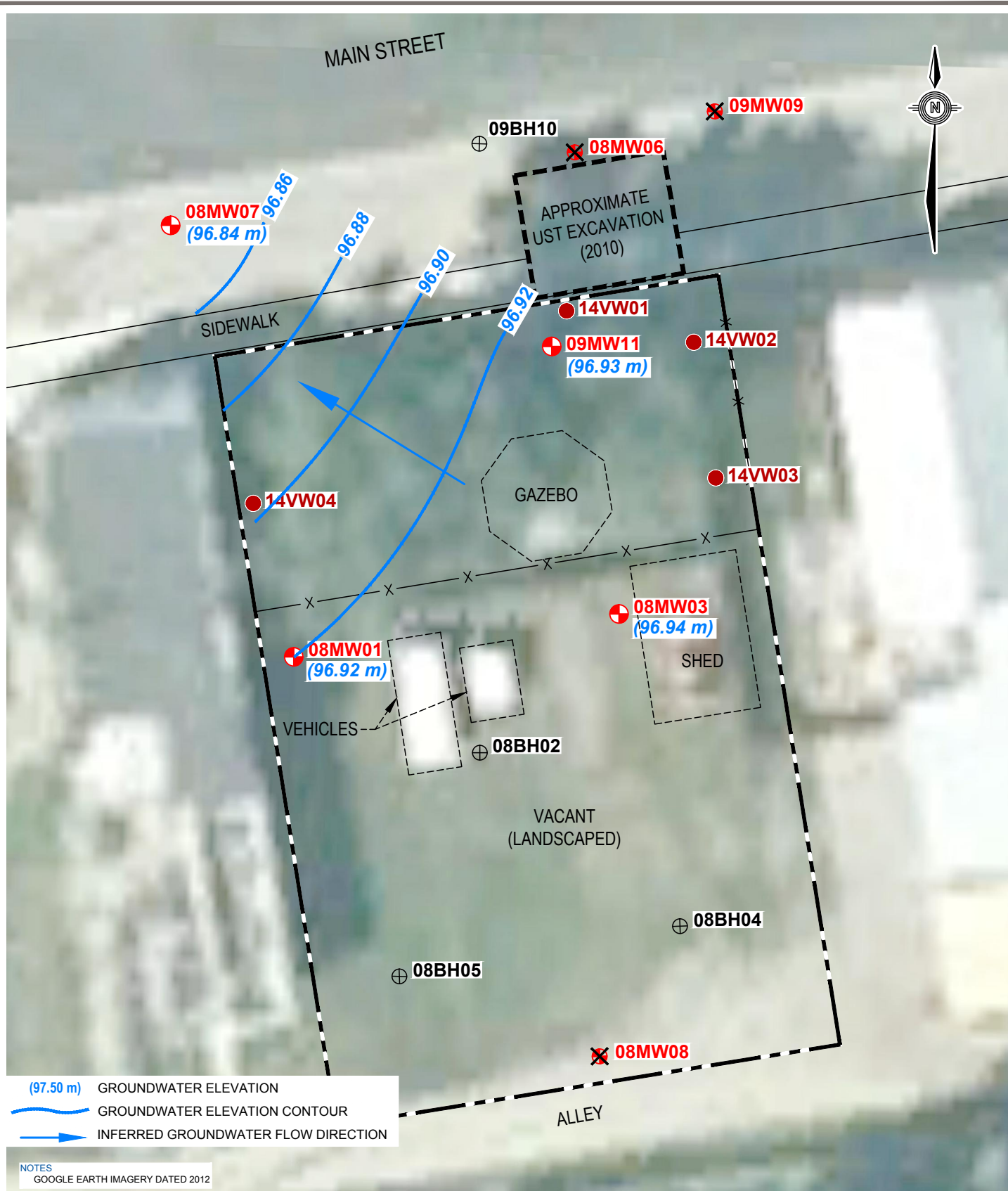
2016 GROUNDWATER MONITORING PROGRAM
124 MAIN STREET, BARONS, ALBERTA
AMA SITE 9558

**SITE PLAN SHOWING BOREHOLE,
MONITORING WELL AND
SOIL VAPOUR WELL LOCATIONS**

PROJECT NO. CENV03059-01	DWN LCH	CKD JL	REV 0
OFFICE CALGARY	DATE January 2017		

Figure 2

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CLIENT

Village of Barons



2016 GROUNDWATER MONITORING PROGRAM
124 MAIN STREET, BARONS, ALBERTA
AMA SITE 9558

SITE PLAN SHOWING GROUNDWATER
ELEVATIONS (April 27, 2016)

PROJECT NO. CENV03059-01	DWN LCH	CKD JL	REV 0
OFFICE CALGARY	DATE January 2017		

Figure 3

C:\Riverbend\Drafting\ENV\CENV\03059\CENV\03059-01 Figures 2,3,4.dwg [FIGURE 4] January 20, 2017 - 2:58:05 pm (BY: HUGHES, LEANNE)



LEGEND

- SITE BOUNDARY
- x--- FENCE
- ⊕ MONITORING WELL
- ⊗ MONITORING WELL DESTROYED
- SOIL VAPOUR WELL

0 10m

Scale: 1:250 @ 8.5"x11"

CLIENT

Village of Barons



2016 GROUNDWATER MONITORING PROGRAM
124 MAIN STREET, BARONS, ALBERTA
AMA SITE 9558

SITE PLAN SHOWING GROUNDWATER ELEVATIONS (November 8, 2016)

PROJECT NO. CENV03059-01	DWN LCH	CKD JL	REV 0
OFFICE CALGARY	DATE January 2017		

Figure 4

APPENDIX A

TETRA TECH'S GENERAL CONDITIONS

GENERAL CONDITIONS

GEOENVIRONMENTAL REPORT

This report incorporates and is subject to these "General Conditions".

1.1 USE OF REPORT AND OWNERSHIP

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

This report and the assessments and recommendations contained in it are intended for the sole use of TETRA TECH's client. TETRA TECH does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than TETRA TECH's Client unless otherwise authorized in writing by TETRA TECH. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of TETRA TECH. Additional copies of the report, if required, may be obtained upon request.

1.2 ALTERNATE REPORT FORMAT

Where TETRA TECH submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed TETRA TECH's instruments of professional service); only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by TETRA TECH shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of TETRA TECH's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except TETRA TECH. The Client warrants that TETRA TECH's instruments of professional service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

1.1 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by TETRA TECH in its reasonably exercised discretion.

1.2 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of the report, TETRA TECH may rely on information provided by persons other than the Client. While TETRA TECH endeavours to verify the accuracy of such information when instructed to do so by the Client, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

APPENDIX B

2016 LABORATORY CERTIFICATES

Your Project #: ENV.CENV03059-01
Site Location: 124 MAIN ST. BARONS, AB AMA 9558
Your C.O.C. #: 1 OF 1

Attention: JAYMES GOING

TETRA TECH EBA INC.
442-10 STREET NORTH
LETHBRIDGE, AB
CANADA T1H 2C7

Report Date: 2016/05/03

Report #: R2171465

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B631854

Received: 2016/04/28, 08:30

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH	2	N/A	2016/04/29	AB SOP-00005	SM 22 2320 B m
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH	2	N/A	2016/04/30	AB SOP-00005	SM 22 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	4	N/A	2016/05/02	AB SOP-00039	CCME CWS/EPA 8260c m
Chloride by Automated Colourimetry	4	N/A	2016/04/30	AB SOP-00020	SM 22-4500-Cl G m
Conductivity @25C	2	N/A	2016/04/29	AB SOP-00005	SM 22 2510 B m
Conductivity @25C	2	N/A	2016/04/30	AB SOP-00005	SM 22 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16)	4	2016/04/29	2016/04/30	AB SOP-00040 AB SOP-00037	CCME PHC-CWS m
Hardness	4	N/A	2016/04/30	AB WI-00065	Auto Calc
Elements by ICP - Dissolved	4	N/A	2016/04/29	AB SOP-00042	EPA 200.7 CFR 2012 m
Ion Balance	4	N/A	2016/04/30	AB WI-00065	Auto Calc
Sum of cations, anions	4	N/A	2016/04/30	AB WI-00065	Auto Calc
Nitrate and Nitrite	4	N/A	2016/05/03	AB WI-00065	Auto Calc
Nitrate + Nitrite-N (calculated)	4	N/A	2016/05/03	AB WI-00065	Auto Calc
Nitrogen, (Nitrite, Nitrate) by IC	1	N/A	2016/04/29	AB SOP-00023	SM 22 4110 B m
Nitrogen, (Nitrite, Nitrate) by IC	3	N/A	2016/04/30	AB SOP-00023	SM 22 4110 B m
pH @25°C	2	N/A	2016/04/29	AB SOP-00005	SM 22 4500-H+B m
pH @25°C	2	N/A	2016/04/30	AB SOP-00005	SM 22 4500-H+B m
Sulphate by Automated Colourimetry	4	N/A	2016/04/30	AB SOP-00018	SM 22 4500-SO4 E m
Total Dissolved Solids (Calculated)	4	N/A	2016/04/30	AB WI-00065	Auto Calc

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

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

Your Project #: ENV.CENV03059-01
Site Location: 124 MAIN ST. BARONS, AB AMA 9558
Your C.O.C. #: 1 OF 1

Attention: JAYMES GOING

TETRA TECH EBA INC.
442-10 STREET NORTH
LETHBRIDGE, AB
CANADA T1H 2C7

Report Date: 2016/05/03

Report #: R2171465

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B631854

Received: 2016/04/28, 08:30

Encryption Key

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

Sherlyne Sim, B.Eng, Project Manager

Email: SSim@maxxam.ca

Phone# (780)577-7113

=====

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

Maxxam Job #: B631854
Report Date: 2016/05/03

TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Location: 124 MAIN ST. BARONS, AB AMA 9558
Sampler Initials: JL

AT1 BTEX AND F1-F2 (WATER)

Maxxam ID		ON3884	ON3884	ON3885	ON3886	ON3887		
Sampling Date		2016/04/27 10:00	2016/04/27 10:00	2016/04/27 10:30	2016/04/27 11:00	2016/04/27 11:30		
COC Number		1 OF 1	1 OF 1	1 OF 1	1 OF 1	1 OF 1		
	UNITS	08MW01	08MW01 Lab-Dup	08MW03	08MW07	09MW11	RDL	QC Batch
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	N/A	<0.10	<0.10	<0.10	0.10	8255156
Volatiles								
Benzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8256201
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8256201
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8256201
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	8256201
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	8256201
Xylenes (Total)	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.00080	8256201
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8256201
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8256201
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	114	115	113	116	117	N/A	8256201
4-Bromofluorobenzene (sur.)	%	108	107	108	106	106	N/A	8256201
D4-1,2-Dichloroethane (sur.)	%	97	98	102	96	95	N/A	8256201
O-TERPHENYL (sur.)	%	92	N/A	89	90	87	N/A	8255156
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable								

Maxxam Job #: B631854
Report Date: 2016/05/03

TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Location: 124 MAIN ST. BARONS, AB AMA 9558
Sampler Initials: JL

ROUTINE WATER (WATER)

Maxxam ID		ON3884	ON3884	ON3885		ON3886		ON3887	ON3887		
Sampling Date		2016/04/27 10:00	2016/04/27 10:00	2016/04/27 10:30		2016/04/27 11:00		2016/04/27 11:30	2016/04/27 11:30		
COC Number		1 OF 1	1 OF 1	1 OF 1		1 OF 1		1 OF 1	1 OF 1		
	UNITS	08MW01	08MW01 Lab-Dup	08MW03	RDL	08MW07	RDL	09MW11	09MW11 Lab-Dup	RDL	QC Batch

Calculated Parameters											
Anion Sum	meq/L	140	N/A	120	N/A	130	N/A	110	N/A	N/A	8254217
Cation Sum	meq/L	130	N/A	110	N/A	120	N/A	98	N/A	N/A	8254217
Hardness (CaCO ₃)	mg/L	3100	N/A	2900	0.50	2400	0.50	2700	N/A	0.50	8254214
Ion Balance	N/A	0.93	N/A	0.89	0.010	0.92	0.010	0.89	N/A	0.010	8254216
Dissolved Nitrate (NO ₃)	mg/L	330	N/A	230	0.44	180	0.22	62	N/A	0.089	8254218
Nitrate plus Nitrite (N)	mg/L	76	N/A	53	0.020	41	0.020	16	N/A	0.020	8254219
Dissolved Nitrite (NO ₂)	mg/L	2.3	N/A	4.0	0.033	0.036	0.033	5.3	N/A	0.033	8254218
Total Dissolved Solids	mg/L	9300	N/A	7800	10	8100	10	6800	N/A	10	8254220

Misc. Inorganics											
Conductivity	uS/cm	10000	10000	8600	1.0	9400	1.0	7600	N/A	1.0	8256089
pH	pH	7.63	7.59	7.68	N/A	7.78	N/A	7.55	N/A	N/A	8256081

Anions											
Alkalinity (PP as CaCO ₃)	mg/L	<0.50	<0.50	<0.50	0.50	<0.50	0.50	<0.50	N/A	0.50	8256076
Alkalinity (Total as CaCO ₃)	mg/L	690	700	760	0.50	720	0.50	690	N/A	0.50	8256076
Bicarbonate (HCO ₃)	mg/L	840	850	930	0.50	880	0.50	840	N/A	0.50	8256076
Carbonate (CO ₃)	mg/L	<0.50	<0.50	<0.50	0.50	<0.50	0.50	<0.50	N/A	0.50	8256076
Hydroxide (OH)	mg/L	<0.50	<0.50	<0.50	0.50	<0.50	0.50	<0.50	N/A	0.50	8256076
Dissolved Sulphate (SO ₄)	mg/L	5800 (1)	N/A	4900 (1)	50	5100 (1)	50	4400 (1)	4400	50	8256521
Dissolved Chloride (Cl)	mg/L	160	N/A	130	1.0	140	1.0	110	100	1.0	8256520

Nutrients											
Dissolved Nitrite (N)	mg/L	0.70	0.70	1.2	0.010	0.011	0.010	1.6	N/A	0.010	8256137
Dissolved Nitrate (N)	mg/L	75 (1)	75	51 (1)	0.10	41 (1)	0.050	14 (1)	N/A	0.020	8256137

Elements											
Dissolved Calcium (Ca)	mg/L	470	N/A	440	0.30	390	0.30	410	N/A	0.30	8256234
Dissolved Iron (Fe)	mg/L	<0.060	N/A	<0.060	0.060	<0.060	0.060	<0.060	N/A	0.060	8256234
Dissolved Magnesium (Mg)	mg/L	470	N/A	440	0.20	360	0.20	410	N/A	0.20	8256234
Dissolved Manganese (Mn)	mg/L	0.55	N/A	0.46	0.0040	0.13	0.0040	1.6	N/A	0.0040	8256234
Dissolved Potassium (K)	mg/L	11	N/A	10	0.30	11	0.30	10	N/A	0.30	8256234
Dissolved Sodium (Na)	mg/L	1700 (1)	N/A	1200 (1)	5.0	1600 (1)	5.0	1000 (1)	N/A	5.0	8256234

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

Maxxam Job #: B631854
Report Date: 2016/05/03

TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Location: 124 MAIN ST. BARONS, AB AMA 9558
Sampler Initials: JL

GENERAL COMMENTS

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

Package 1	9.0°C
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Sample ON3885-01 : Cation anion balance investigated data quality confirmed.

Sample ON3887-01 : Cation anion balance investigated data quality confirmed.

Results relate only to the items tested.

Maxxam Job #: B631854
Report Date: 2016/05/03

TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Location: 124 MAIN ST. BARONS, AB AMA 9558
Sampler Initials: JL

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8255156	LSH	Matrix Spike	O-TERPHENYL (sur.)	2016/04/30		90	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/04/30		93	%	50 - 130
8255156	LSH	Spiked Blank	O-TERPHENYL (sur.)	2016/04/30		89	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/04/30		95	%	70 - 130
8255156	LSH	Method Blank	O-TERPHENYL (sur.)	2016/04/30		90	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/04/30	<0.10		mg/L	
8255156	LSH	RPD	F2 (C10-C16 Hydrocarbons)	2016/04/30	NC		%	40
8256076	IKO	Spiked Blank	Alkalinity (Total as CaCO3)	2016/04/29		98	%	80 - 120
8256076	IKO	Method Blank	Alkalinity (PP as CaCO3)	2016/04/29	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2016/04/29	<0.50		mg/L	
			Bicarbonate (HCO3)	2016/04/29	<0.50		mg/L	
			Carbonate (CO3)	2016/04/29	<0.50		mg/L	
			Hydroxide (OH)	2016/04/29	<0.50		mg/L	
8256076	IKO	RPD [ON3884-01]	Alkalinity (PP as CaCO3)	2016/04/29	NC		%	20
			Alkalinity (Total as CaCO3)	2016/04/29	1.7		%	20
			Bicarbonate (HCO3)	2016/04/29	1.7		%	20
			Carbonate (CO3)	2016/04/29	NC		%	20
			Hydroxide (OH)	2016/04/29	NC		%	20
8256081	IKO	Spiked Blank	pH	2016/04/29		100	%	97 - 103
8256081	IKO	RPD [ON3884-01]	pH	2016/04/29	0.50		%	N/A
8256089	IKO	Spiked Blank	Conductivity	2016/04/29		101	%	90 - 110
8256089	IKO	Method Blank	Conductivity	2016/04/29	<1.0		uS/cm	
8256089	IKO	RPD [ON3884-01]	Conductivity	2016/04/29	0.80		%	20
8256137	LQ1	Matrix Spike [ON3884-01]	Dissolved Nitrite (N)	2016/04/30		101	%	80 - 120
			Dissolved Nitrate (N)	2016/04/30		NC	%	80 - 120
8256137	LQ1	Spiked Blank	Dissolved Nitrite (N)	2016/04/29		101	%	80 - 120
			Dissolved Nitrate (N)	2016/04/29		102	%	80 - 120
8256137	LQ1	Method Blank	Dissolved Nitrite (N)	2016/04/29	<0.010		mg/L	
			Dissolved Nitrate (N)	2016/04/29	<0.010		mg/L	
8256137	LQ1	RPD [ON3884-01]	Dissolved Nitrite (N)	2016/04/30	0.080		%	20
			Dissolved Nitrate (N)	2016/04/30	0.43		%	20
8256201	MZ	Matrix Spike [ON3885-04]	1,4-Difluorobenzene (sur.)	2016/05/02		111	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/05/02		109	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/05/02		104	%	70 - 130
			Benzene	2016/05/02		95	%	70 - 130
			Toluene	2016/05/02		90	%	70 - 130
			Ethylbenzene	2016/05/02		93	%	70 - 130
			m & p-Xylene	2016/05/02		94	%	70 - 130
			o-Xylene	2016/05/02		92	%	70 - 130
			F1 (C6-C10)	2016/05/02		78	%	70 - 130
8256201	MZ	Spiked Blank	1,4-Difluorobenzene (sur.)	2016/05/02		114	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/05/02		108	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/05/02		108	%	70 - 130
			Benzene	2016/05/02		97	%	70 - 130
			Toluene	2016/05/02		93	%	70 - 130
			Ethylbenzene	2016/05/02		98	%	70 - 130
			m & p-Xylene	2016/05/02		98	%	70 - 130
			o-Xylene	2016/05/02		95	%	70 - 130
			F1 (C6-C10)	2016/05/02		109	%	70 - 130
8256201	MZ	Method Blank	1,4-Difluorobenzene (sur.)	2016/05/02		115	%	70 - 130

Maxxam Job #: B631854
Report Date: 2016/05/03

TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Location: 124 MAIN ST. BARONS, AB AMA 9558
Sampler Initials: JL

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8256201	MZ	RPD [ON3884-04]	4-Bromofluorobenzene (sur.)	2016/05/02		108	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/05/02		92	%	70 - 130
			Benzene	2016/05/02	<0.00040		mg/L	
			Toluene	2016/05/02	<0.00040		mg/L	
			Ethylbenzene	2016/05/02	<0.00040		mg/L	
			m & p-Xylene	2016/05/02	<0.00080		mg/L	
			o-Xylene	2016/05/02	<0.00040		mg/L	
			Xylenes (Total)	2016/05/02	<0.00080		mg/L	
			F1 (C6-C10) - BTEX	2016/05/02	<0.10		mg/L	
			F1 (C6-C10)	2016/05/02	<0.10		mg/L	
			Benzene	2016/05/02	NC		%	40
			Toluene	2016/05/02	NC		%	40
			Ethylbenzene	2016/05/02	NC		%	40
			m & p-Xylene	2016/05/02	NC		%	40
			o-Xylene	2016/05/02	NC		%	40
8256234	JBX	Matrix Spike	Xylenes (Total)	2016/05/02	NC		%	40
			F1 (C6-C10) - BTEX	2016/05/02	NC		%	40
			F1 (C6-C10)	2016/05/02	NC		%	40
			Dissolved Calcium (Ca)	2016/04/29		NC	%	80 - 120
			Dissolved Iron (Fe)	2016/04/29		88	%	80 - 120
8256234	JBX	Spiked Blank	Dissolved Magnesium (Mg)	2016/04/29		NC	%	80 - 120
			Dissolved Manganese (Mn)	2016/04/29		NC	%	80 - 120
			Dissolved Potassium (K)	2016/04/29		100	%	80 - 120
			Dissolved Sodium (Na)	2016/04/29		NC	%	80 - 120
			Dissolved Calcium (Ca)	2016/04/29		98	%	80 - 120
8256234	JBX	Method Blank	Dissolved Iron (Fe)	2016/04/29		92	%	80 - 120
			Dissolved Magnesium (Mg)	2016/04/29		103	%	80 - 120
			Dissolved Manganese (Mn)	2016/04/29		98	%	80 - 120
			Dissolved Potassium (K)	2016/04/29		101	%	80 - 120
			Dissolved Sodium (Na)	2016/04/29		102	%	80 - 120
8256234	JBX	RPD	Dissolved Calcium (Ca)	2016/04/30	<0.30		mg/L	
			Dissolved Iron (Fe)	2016/04/30	<0.060		mg/L	
			Dissolved Magnesium (Mg)	2016/04/30	<0.20		mg/L	
			Dissolved Manganese (Mn)	2016/04/30	<0.0040		mg/L	
			Dissolved Potassium (K)	2016/04/30	<0.30		mg/L	
8256234	JBX	RPD	Dissolved Sodium (Na)	2016/04/30	<0.50		mg/L	
			Dissolved Calcium (Ca)	2016/04/29	0.24		%	20
			Dissolved Iron (Fe)	2016/04/29	NC		%	20
			Dissolved Magnesium (Mg)	2016/04/29	1.3		%	20
			Dissolved Manganese (Mn)	2016/04/29	0.30		%	20
8256520	KP9	Matrix Spike [ON3887-01]	Dissolved Potassium (K)	2016/04/29	1.3		%	20
			Dissolved Sodium (Na)	2016/04/29	1.9		%	20
			Dissolved Chloride (Cl)	2016/04/30		NC	%	80 - 120
			Dissolved Chloride (Cl)	2016/04/30		104	%	80 - 120
			Dissolved Chloride (Cl)	2016/04/30	<1.0		mg/L	
8256520	KP9	Method Blank	Dissolved Chloride (Cl)	2016/04/30	1.8		%	20
8256521	KP9	Matrix Spike [ON3887-01]	Dissolved Sulphate (SO4)	2016/04/30		NC	%	80 - 120
8256521	KP9	Spiked Blank	Dissolved Sulphate (SO4)	2016/04/30		102	%	80 - 120
8256521	KP9	Method Blank	Dissolved Sulphate (SO4)	2016/04/30	<1.0		mg/L	

Maxxam Job #: B631854
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TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Location: 124 MAIN ST. BARONS, AB AMA 9558
Sampler Initials: JL

QUALITY ASSURANCE REPORT(CONT'D)

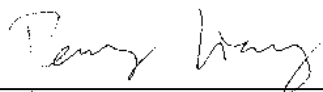
QA/QC			Date		Value	Recovery	UNITS	QC Limits
Batch	Init	QC Type	Parameter	Analyzed				
8256521	KP9	RPD [ON3887-01]	Dissolved Sulphate (SO4)	2016/04/30	0.34		%	20
N/A = Not Applicable								
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.								
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.								
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.								
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.								
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.								
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).								
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).								

Maxxam Job #: B631854
Report Date: 2016/05/03

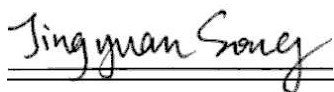
TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Location: 124 MAIN ST. BARONS, AB AMA 9558
Sampler Initials: JL

VALIDATION SIGNATURE PAGE

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



Harry (Peng) Liang, Senior Analyst



Jingyuan Song, Organics – Senior Analyst



Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics

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

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CHAIN OF CUSTODY RECORD 2016042701

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Invoice Information		Report Information (if differs from invoice)		Project Information		Turnaround Time (TAT) Required																																																																																			
Company: <u>TETRA TECH EBA INC.</u>	Company:	Quotation #:	☒ 5 - 7 Days Regular (Most analyses)		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS																																																																																				
Contact Name: <u>JAMES GOING</u>	Contact Name:	P.O. #/ AFE#:	Rush TAT (Surcharges will be applied)																																																																																						
Address: <u>442-10th ST. N.</u>	Address:	Project #: <u>ENV.CEN03059-01</u>	☐ Same Day	☐ 2 Days																																																																																					
Phone: <u>403.634.3566</u>	Phone: <u>SIA.</u>	Site Location: <u>124 Main St. Barons, AB A9A 9S58</u>	☐ 1 Day	☐ 3-4 Days																																																																																					
Email: <u>jgoing@eba.ca</u>	Email:	Site #:	Date Required:																																																																																						
Copies: <u>jmontagne@eba.ca</u>	Copies:	Sampled By: <u>Jamie LaMontagne</u>	Rush Confirmation #:																																																																																						
Laboratory Use Only				Analysis Requested				Regulatory Criteria																																																																																	
<table border="1"> <tr> <td>Seal Present</td> <td>YES</td> <td>NO</td> <td>Cooler ID</td> </tr> <tr> <td>Seal Intact</td> <td>☒</td> <td>☒</td> <td>Temp 8 9 10</td> </tr> <tr> <td>Cooling Media</td> <td>☒</td> <td>☒</td> <td></td> </tr> <tr> <td>Seal Present</td> <td>YES</td> <td>NO</td> <td>Cooler ID</td> </tr> <tr> <td>Seal Intact</td> <td></td> <td></td> <td>Temp</td> </tr> <tr> <td>Cooling Media</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Seal Present</td> <td>YES</td> <td>NO</td> <td>Cooler ID</td> </tr> <tr> <td>Seal Intact</td> <td></td> <td></td> <td>Temp</td> </tr> <tr> <td>Cooling Media</td> <td></td> <td></td> <td></td> </tr> </table>				Seal Present	YES	NO	Cooler ID	Seal Intact	☒	☒	Temp 8 9 10	Cooling Media	☒	☒		Seal Present	YES	NO	Cooler ID	Seal Intact			Temp	Cooling Media				Seal Present	YES	NO	Cooler ID	Seal Intact			Temp	Cooling Media				<table border="1"> <tr> <td colspan="4">Depot Reception</td> </tr> <tr> <td colspan="4"></td> </tr> </table>				Depot Reception								<table border="1"> <tr> <td># of containers</td> <td>BTEX F1</td> <td>VOC</td> <td>BTEX F1 F2</td> <td>BTEX F1 F4</td> <td>Routine Water</td> <td>Regulated Metals</td> <td>Total</td> <td>Diss</td> <td>Dissolved</td> <td>Mercury</td> <td>Salinity 4</td> <td>Sieve (75 micron)</td> <td>Texture (% Sand, Silt, Clay)</td> <td>Basic Class II Landfill</td> <td>Diss. Fe & Mn</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>				# of containers	BTEX F1	VOC	BTEX F1 F2	BTEX F1 F4	Routine Water	Regulated Metals	Total	Diss	Dissolved	Mercury	Salinity 4	Sieve (75 micron)	Texture (% Sand, Silt, Clay)	Basic Class II Landfill	Diss. Fe & Mn																	☒ AT1/CCME ☐ Drinking Water ☐ Saskatchewan ☐ D50 (Drilling Waste) ☐ Other:	
Seal Present	YES	NO	Cooler ID																																																																																						
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Sample Identification				Depth (Unit)	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	HOLD - DO NOT ANALYZE								Special Instructions																																																																									
1	08MW01			Monitoring well	2016/04/27	10:00	G.W	6	X	X					X	* Diss. Manganese (Mn) & Iron (Fe) field filtered & preserved.																																																																									
2	08MW03			↓	↓	10:30	↓	6	X	X				X																																																																											
3	08MW07			↓	↓	11:00	↓	6	X	X				X																																																																											
4	09MW11			↓	↓	11:30	↓	6	X	X				X																																																																											
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Please indicate Filtered, Preserved or Both (F, P, F/P):																																																																																									
Relinquished by: (Signature/ Print)				DATE (YYYY/MM/DD)	Time (HH:MM)	Received by: (Signature/ Print)				DATE (YYYY/MM/DD)	Time (HH:MM)	28-Apr-16 08:30																																																																													
<u>JAMIE LAMONTAGNE</u>				2016/04/27	14:30	<u>GARY WING CHUN</u>				2016/04/28	08:30	Sherlyne Sim																																																																													
												B631854																																																																													

AB FCD-00331/6

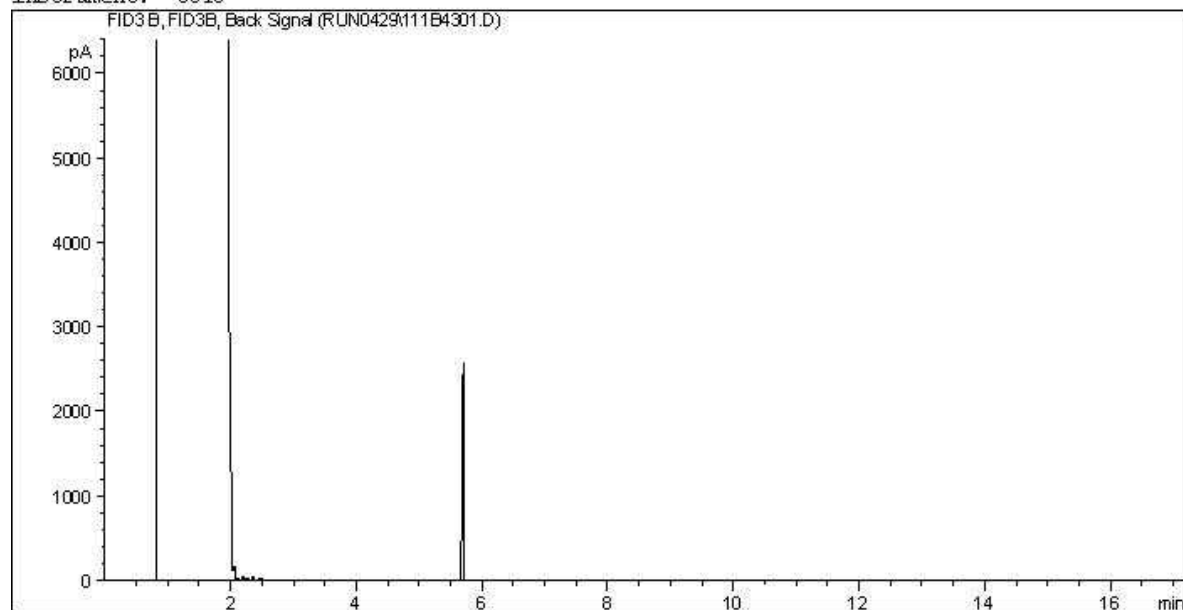
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Maxxam Job #: B631854
Report Date: 2016/05/03
Maxxam Sample: ON3884

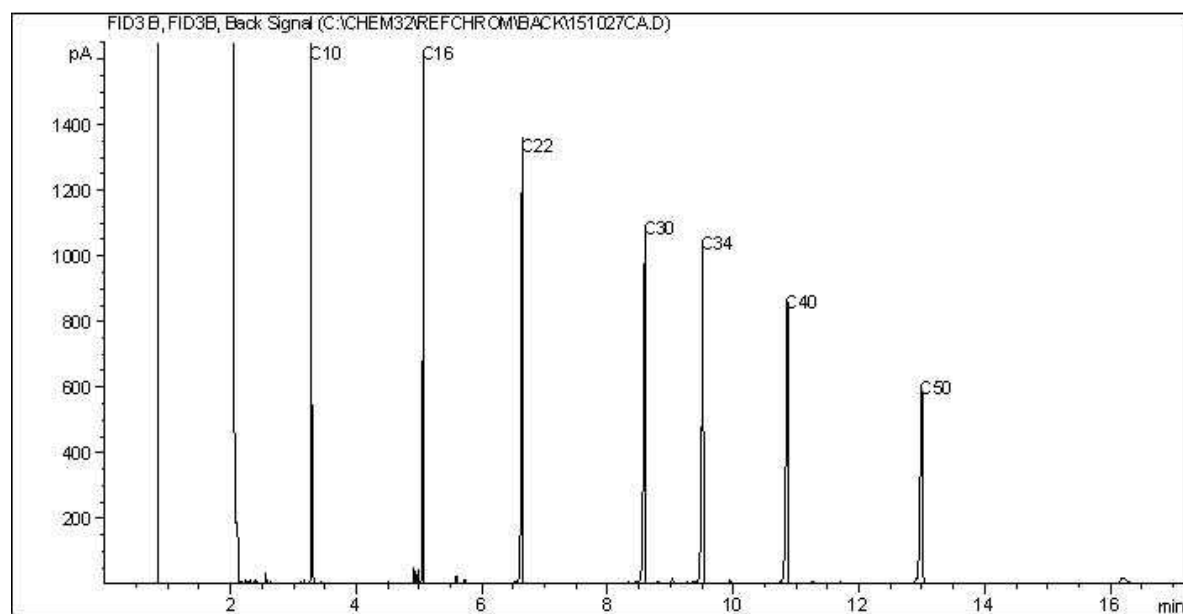
TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Reference: 124 MAIN ST. BARONS, AB AMA 9558
Client ID: 08MW01

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram

Instrument: GC13



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

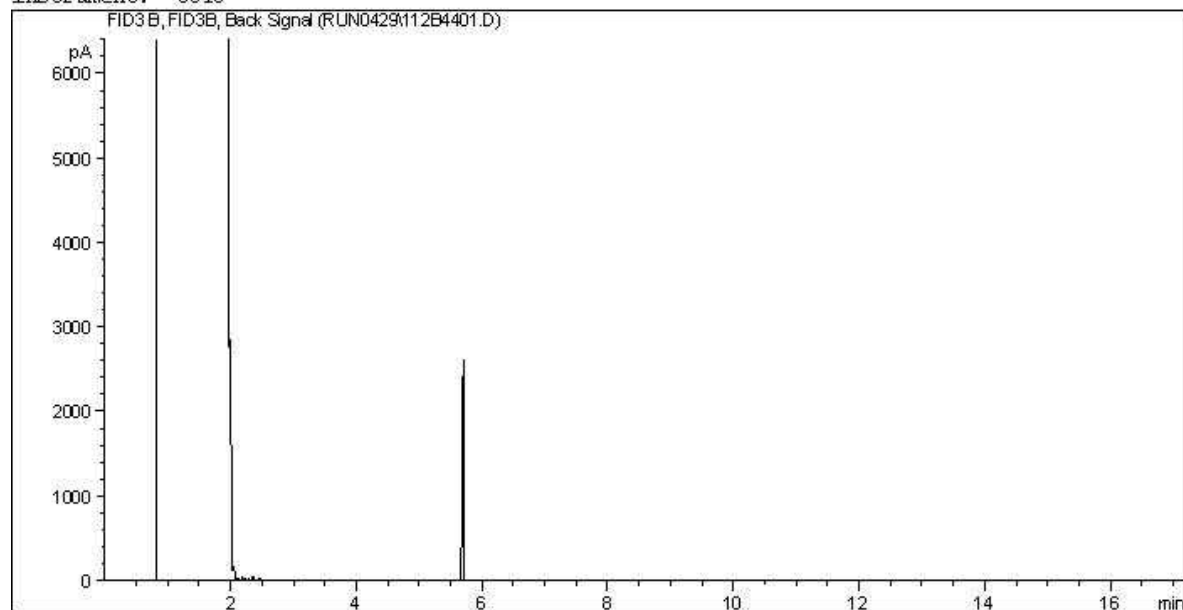
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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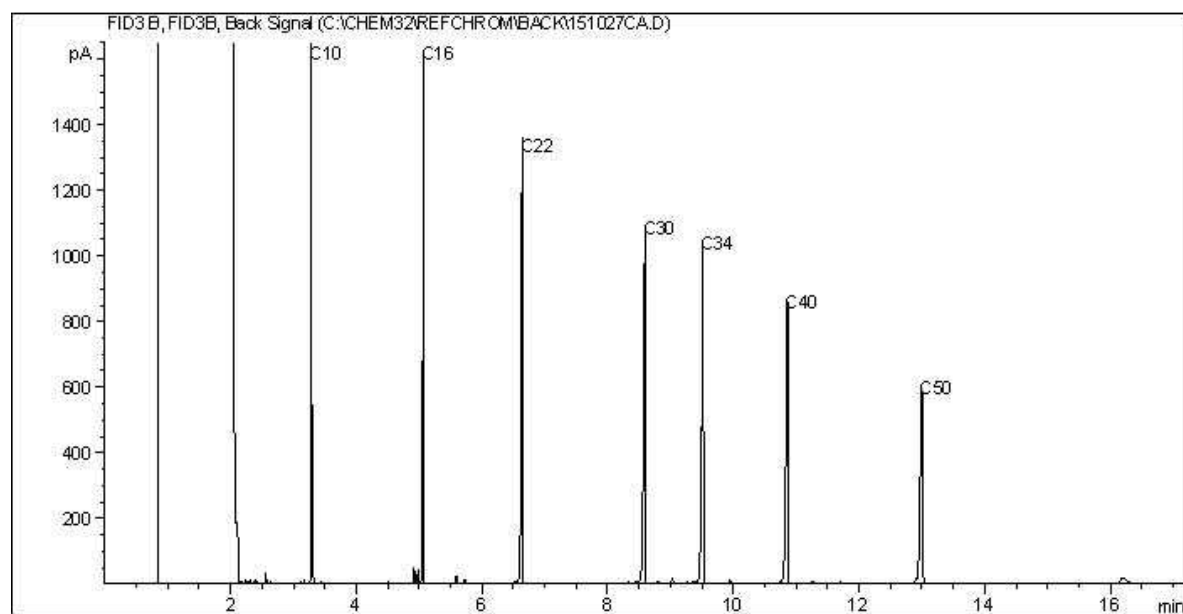
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram

Instrument: GC13



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

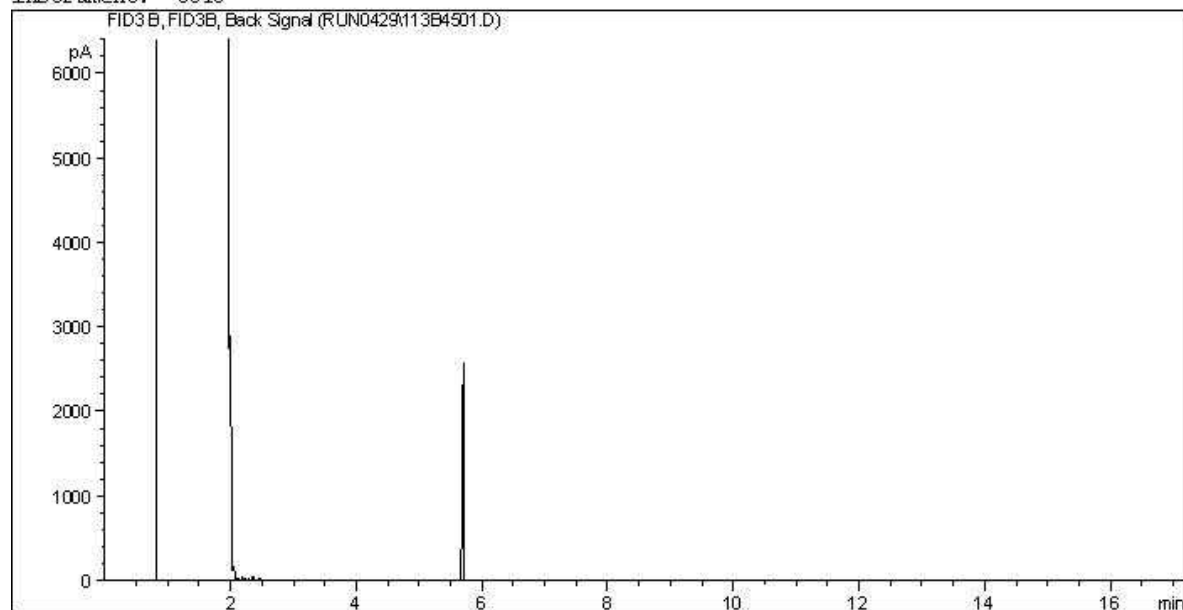
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

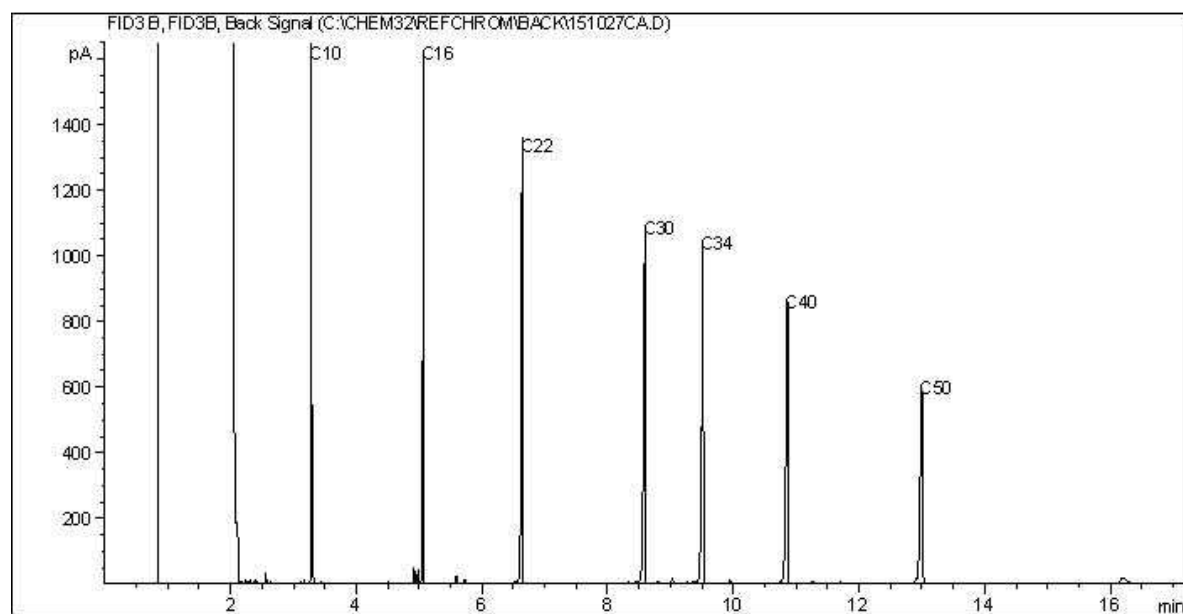
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram

Instrument: GC13



Carbon Range Distribution - Reference Chromatogram



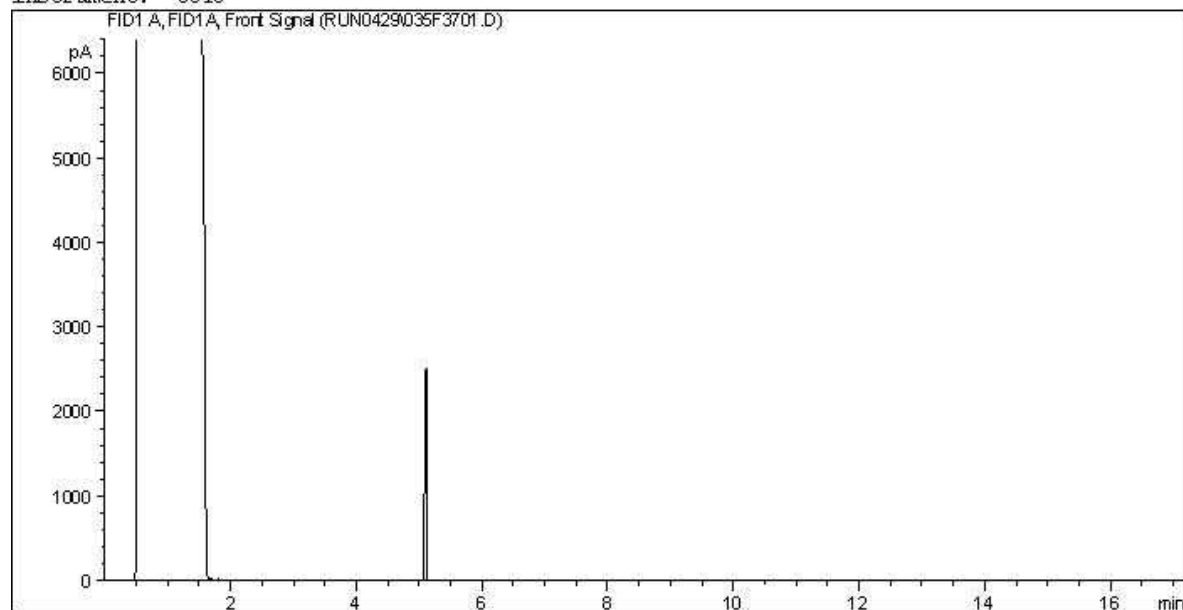
TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

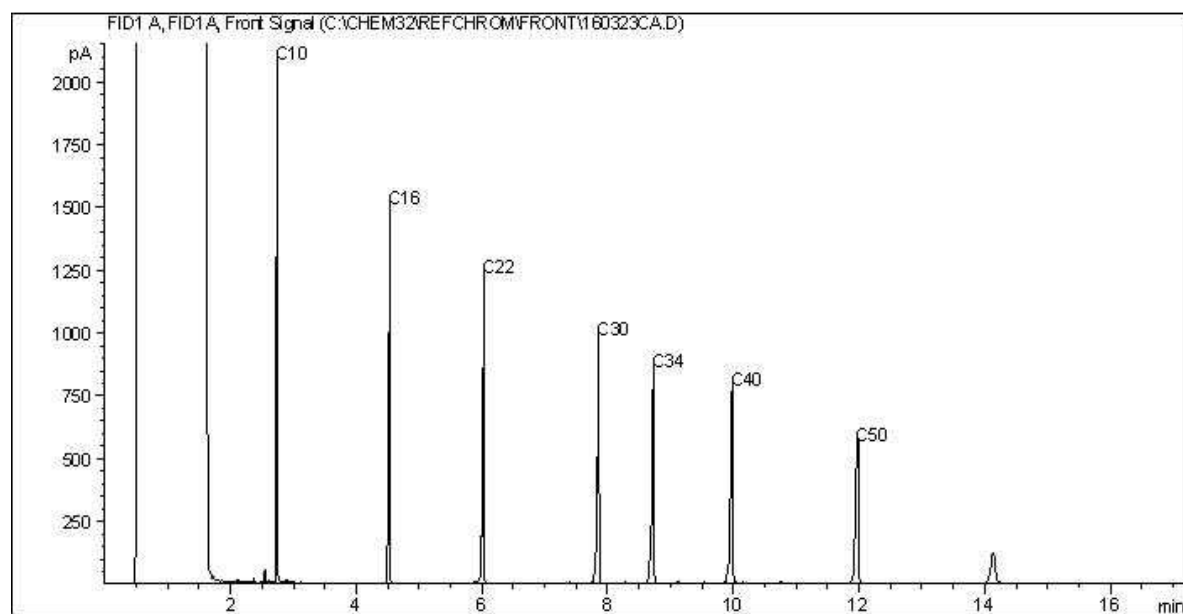
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram

Instrument: GC13



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Page 1 of 1

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Your Project #: ENV.CENV03059-01
Site#: AMA SITE # 9558
Site Location: 124 MAIN STREET BARONS, AB
Your C.O.C. #: 1 OF 1

Attention: JAYMES GOING

TETRA TECH EBA INC.
442-10 STREET NORTH
LETHBRIDGE, AB
CANADA T1H 2C7

Report Date: 2016/11/17
Report #: R2301947
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6A0360

Received: 2016/11/09, 08:51

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO ₃ ,HCO ₃ ,OH	4	N/A	2016/11/12	AB SOP-00005	SM 22 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	4	N/A	2016/11/15	AB SOP-00039	CCME CWS/EPA 8260c m
Chloride by Automated Colourimetry	3	N/A	2016/11/13	AB SOP-00020	SM 22-4500-Cl G m
Chloride by Automated Colourimetry	1	N/A	2016/11/14	AB SOP-00020	SM 22-4500-Cl G m
Conductivity @25C	4	N/A	2016/11/12	AB SOP-00005	SM 22 2510 B m
CCME Hydrocarbons in Water (F2; C10-C16)	4	2016/11/10	2016/11/11	AB SOP-00040 AB SOP-00037	CCME PHC-CWS m
Hardness	4	N/A	2016/11/16	AB WI-00065	Auto Calc
Elements by ICP - Dissolved	4	N/A	2016/11/14	AB SOP-00042	EPA 200.7 CFR 2012 m
Ion Balance	4	N/A	2016/11/13	AB WI-00065	Auto Calc
Sum of cations, anions	4	N/A	2016/11/16	AB WI-00065	Auto Calc
Nitrate and Nitrite	4	N/A	2016/11/13	AB WI-00065	Auto Calc
Nitrate + Nitrite-N (calculated)	4	N/A	2016/11/13	AB WI-00065	Auto Calc
Nitrogen, (Nitrite, Nitrate) by IC	4	N/A	2016/11/10	AB SOP-00023	SM 22 4110 B m
pH @25°C	4	N/A	2016/11/12	AB SOP-00005	SM 22 4500-H+B m
Sulphate by Automated Colourimetry	3	N/A	2016/11/13	AB SOP-00018	SM 22 4500-SO4 E m
Sulphate by Automated Colourimetry	1	N/A	2016/11/14	AB SOP-00018	SM 22 4500-SO4 E m
Total Dissolved Solids (Calculated)	4	N/A	2016/11/16	AB WI-00065	Auto Calc

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Attention: JAYMES GOING

TETRA TECH EBA INC.
442-10 STREET NORTH
LETHBRIDGE, AB
CANADA T1H 2C7

Your Project #: ENV.CENV03059-01
Site#: AMA SITE # 9558
Site Location: 124 MAIN STREET BARONS, AB
Your C.O.C. #: 1 OF 1

Report Date: 2016/11/17
Report #: R2301947
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6A0360

Received: 2016/11/09, 08:51

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods. Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

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

Encryption Key

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

Sherlyne Sim, B.Eng, Project Manager

Email: SSim@maxxam.ca

Phone# (780)577-7113

=====

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

Maxxam Job #: B6A0360
Report Date: 2016/11/17

TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Location: 124 MAIN STREET BARONS, AB
Sampler Initials: JL

AT1 BTEX AND F1-F2 IN WATER (WATER)

Maxxam ID		PZ5783	PZ5783	PZ5784	PZ5785	PZ5786	PZ5786		
Sampling Date		2016/11/08 09:30	2016/11/08 09:30	2016/11/08 10:30	2016/11/08 11:00	2016/11/08 12:00	2016/11/08 12:00		
COC Number		1 OF 1	1 OF 1	1 OF 1	1 OF 1	1 OF 1	1 OF 1		
	UNITS	08MW01	08MW01 Lab-Dup	08MW03	08MW11	08MW07	08MW07 Lab-Dup	RDL	QC Batch

Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	N/A	<0.10	<0.10	<0.10	<0.10	0.10	8466081
Volatiles									
Benzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	N/A	0.00040	8469332
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	N/A	0.00040	8469332
Ethylbenzene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	N/A	0.00040	8469332
m & p-Xylene	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	N/A	0.00080	8469332
o-Xylene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	N/A	0.00040	8469332
Xylenes (Total)	mg/L	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	N/A	0.00080	8469332
F1 (C6-C10) - BTEX	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	N/A	0.10	8469332
F1 (C6-C10)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	N/A	0.10	8469332
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	109	156 (1)	115	115	110	N/A	N/A	8469332
4-Bromofluorobenzene (sur.)	%	74	76	104	103	80	N/A	N/A	8469332
D4-1,2-Dichloroethane (sur.)	%	99	139 (1)	109	105	101	N/A	N/A	8469332
O-TERPHENYL (sur.)	%	85	N/A	81	83	85	90	N/A	8466081

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

Maxxam Job #: B6A0360
Report Date: 2016/11/17

TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Location: 124 MAIN STREET BARONS, AB
Sampler Initials: JL

ROUTINE WATER (WATER)

Maxxam ID		PZ5783	PZ5783			PZ5784			PZ5785		
Sampling Date		2016/11/08 09:30	2016/11/08 09:30			2016/11/08 10:30			2016/11/08 11:00		
COC Number		1 OF 1	1 OF 1			1 OF 1			1 OF 1		
	UNITS	08MW01	08MW01 Lab-Dup	RDL	QC Batch	08MW03	RDL	QC Batch	08MW11	RDL	QC Batch

Calculated Parameters											
Anion Sum	meq/L	150	N/A	N/A	8465053	120	N/A	8465053	110	N/A	8465053
Cation Sum	meq/L	130	N/A	N/A	8465053	120	N/A	8465053	100	N/A	8465053
Hardness (CaCO ₃)	mg/L	3400	N/A	0.50	8465115	3100	0.50	8465115	2900	0.50	8465115
Ion Balance	N/A	0.89	N/A	0.010	8465052	0.99	0.010	8465052	0.94	0.010	8465052
Dissolved Nitrate (NO ₃)	mg/L	320	N/A	0.44	8465054	190	0.44	8465054	67	0.22	8465054
Nitrate plus Nitrite (N)	mg/L	72	N/A	0.020	8465055	44	0.020	8465055	17	0.020	8465055
Dissolved Nitrite (NO ₂)	mg/L	1.6	N/A	0.033	8465054	3.1	0.033	8465054	5.2	0.033	8465054
Calculated Total Dissolved Solids	mg/L	9600	N/A	10	8465056	7500	10	8465056	7000	10	8465056

Misc. Inorganics											
Conductivity	uS/cm	9700	9800	1.0	8467000	8400	1.0	8467000	7700	1.0	8467000
pH	pH	7.58	7.60	N/A	8466999	7.57	N/A	8466999	7.50	N/A	8466999

Anions											
Alkalinity (PP as CaCO ₃)	mg/L	<0.50	<0.50	0.50	8466996	<0.50	0.50	8466996	<0.50	0.50	8466996
Alkalinity (Total as CaCO ₃)	mg/L	660	670	0.50	8466996	800	0.50	8466996	730	0.50	8466996
Bicarbonate (HCO ₃)	mg/L	800	820	0.50	8466996	980	0.50	8466996	890	0.50	8466996
Carbonate (CO ₃)	mg/L	<0.50	<0.50	0.50	8466996	<0.50	0.50	8466996	<0.50	0.50	8466996
Hydroxide (OH)	mg/L	<0.50	<0.50	0.50	8466996	<0.50	0.50	8466996	<0.50	0.50	8466996
Dissolved Sulphate (SO ₄)	mg/L	6200 (1)	N/A	50	8468821	4500 (1)	50	8470208	4500 (1)	50	8468821
Dissolved Chloride (Cl)	mg/L	160	N/A	1.0	8468819	120	1.0	8470206	110	1.0	8468819

Nutrients											
Dissolved Nitrite (N)	mg/L	0.49	N/A	0.010	8467116	0.94	0.010	8467116	1.6	0.010	8467116
Dissolved Nitrate (N)	mg/L	72 (1)	N/A	0.10	8467116	43 (2)	0.10	8467116	15 (1)	0.050	8467116

Elements											
Dissolved Calcium (Ca)	mg/L	490	N/A	0.30	8470207	460	0.30	8470207	440	0.30	8470207
Dissolved Iron (Fe)	mg/L	0.47	N/A	0.060	8470207	0.44	0.060	8470207	0.43	0.060	8470207
Dissolved Magnesium (Mg)	mg/L	520 (1)	N/A	1.0	8470207	470	0.20	8470207	450	0.20	8470207
Dissolved Manganese (Mn)	mg/L	0.51	N/A	0.0040	8470207	0.51	0.0040	8470207	1.7	0.0040	8470207
Dissolved Potassium (K)	mg/L	12	N/A	0.30	8470207	11	0.30	8470207	11	0.30	8470207

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

(2) Detection limits raised due to matrix interference.

Maxxam Job #: B6A0360
Report Date: 2016/11/17

TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Location: 124 MAIN STREET BARONS, AB
Sampler Initials: JL

ROUTINE WATER (WATER)

Maxxam ID		PZ5783	PZ5783			PZ5784			PZ5785		
Sampling Date		2016/11/08 09:30	2016/11/08 09:30			2016/11/08 10:30			2016/11/08 11:00		
COC Number		1 OF 1	1 OF 1			1 OF 1			1 OF 1		
	UNITS	08MW01	08MW01 Lab-Dup	RDL	QC Batch	08MW03	RDL	QC Batch	08MW11	RDL	QC Batch
Dissolved Sodium (Na)	mg/L	1500 (1)	N/A	2.5	8470207	1200 (1)	2.5	8470207	1100 (1)	2.5	8470207

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

Maxxam Job #: B6A0360
Report Date: 2016/11/17

TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Location: 124 MAIN STREET BARONS, AB
Sampler Initials: JL

ROUTINE WATER (WATER)

Maxxam ID		PZ5786		
Sampling Date		2016/11/08 12:00		
COC Number		1 OF 1		
	UNITS	08MW07	RDL	QC Batch
Calculated Parameters				
Anion Sum	meq/L	130	N/A	8465053
Cation Sum	meq/L	120	N/A	8465053
Hardness (CaCO ₃)	mg/L	2600	0.50	8465115
Ion Balance	N/A	0.92	0.010	8465052
Dissolved Nitrate (NO ₃)	mg/L	200	0.44	8465054
Nitrate plus Nitrite (N)	mg/L	44	0.020	8465055
Dissolved Nitrite (NO ₂)	mg/L	0.098	0.033	8465054
Calculated Total Dissolved Solids	mg/L	8300	10	8465056
Misc. Inorganics				
Conductivity	uS/cm	9200	1.0	8467000
pH	pH	7.73	N/A	8466999
Anions				
Alkalinity (PP as CaCO ₃)	mg/L	<0.50	0.50	8466996
Alkalinity (Total as CaCO ₃)	mg/L	670	0.50	8466996
Bicarbonate (HCO ₃)	mg/L	810	0.50	8466996
Carbonate (CO ₃)	mg/L	<0.50	0.50	8466996
Hydroxide (OH)	mg/L	<0.50	0.50	8466996
Dissolved Sulphate (SO ₄)	mg/L	5200 (1)	50	8468821
Dissolved Chloride (Cl)	mg/L	130	1.0	8468819
Nutrients				
Dissolved Nitrite (N)	mg/L	0.030	0.010	8467116
Dissolved Nitrate (N)	mg/L	44 (1)	0.10	8467116
Elements				
Dissolved Calcium (Ca)	mg/L	400	0.30	8470207
Dissolved Iron (Fe)	mg/L	0.39	0.060	8470207
Dissolved Magnesium (Mg)	mg/L	380	0.20	8470207
Dissolved Manganese (Mn)	mg/L	0.18	0.0040	8470207
Dissolved Potassium (K)	mg/L	12	0.30	8470207
Dissolved Sodium (Na)	mg/L	1500 (1)	2.5	8470207
RDL = Reportable Detection Limit N/A = Not Applicable (1) Detection limits raised due to dilution to bring analyte within the calibrated range.				

Maxxam Job #: B6A0360
Report Date: 2016/11/17

TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Location: 124 MAIN STREET BARONS, AB
Sampler Initials: JL

GENERAL COMMENTS

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

Package 1	11.7°C
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Sample PZ5783 [08MW01] : Cation anion balance investigated data quality confirmed.

Results relate only to the items tested.

Maxxam Job #: B6A0360
Report Date: 2016/11/17

TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Location: 124 MAIN STREET BARONS, AB
Sampler Initials: JL

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8466081	VP4	Matrix Spike [PZ5783-03]	O-TERPHENYL (sur.)	2016/11/11		84	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2016/11/11		92	%	60 - 130
8466081	VP4	Spiked Blank	O-TERPHENYL (sur.)	2016/11/11		88	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2016/11/11		90	%	70 - 130
8466081	VP4	Method Blank	O-TERPHENYL (sur.)	2016/11/11		87	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2016/11/11	<0.10		mg/L	
8466081	VP4	RPD [PZ5786-03]	F2 (C10-C16 Hydrocarbons)	2016/11/11	NC		%	30
8466996	SSO	Spiked Blank	Alkalinity (Total as CaCO3)	2016/11/12		100	%	80 - 120
8466996	SSO	Method Blank	Alkalinity (PP as CaCO3)	2016/11/12	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2016/11/12	<0.50		mg/L	
			Bicarbonate (HCO3)	2016/11/12	<0.50		mg/L	
			Carbonate (CO3)	2016/11/12	<0.50		mg/L	
			Hydroxide (OH)	2016/11/12	<0.50		mg/L	
8466996	SSO	RPD [PZ5783-01]	Alkalinity (PP as CaCO3)	2016/11/12	NC		%	20
			Alkalinity (Total as CaCO3)	2016/11/12	1.3		%	20
			Bicarbonate (HCO3)	2016/11/12	1.3		%	20
			Carbonate (CO3)	2016/11/12	NC		%	20
			Hydroxide (OH)	2016/11/12	NC		%	20
8466999	SSO	Spiked Blank	pH	2016/11/12		100	%	97 - 103
8466999	SSO	RPD [PZ5783-01]	pH	2016/11/12	0.22		%	N/A
8467000	SSO	Spiked Blank	Conductivity	2016/11/12		98	%	90 - 110
8467000	SSO	Method Blank	Conductivity	2016/11/12	<1.0		uS/cm	
8467000	SSO	RPD [PZ5783-01]	Conductivity	2016/11/12	0.42		%	20
8467116	NW4	Matrix Spike	Dissolved Nitrite (N)	2016/11/10		100	%	80 - 120
			Dissolved Nitrate (N)	2016/11/10		100	%	80 - 120
8467116	NW4	Spiked Blank	Dissolved Nitrite (N)	2016/11/10		101	%	80 - 120
			Dissolved Nitrate (N)	2016/11/10		101	%	80 - 120
8467116	NW4	Method Blank	Dissolved Nitrite (N)	2016/11/10	<0.010		mg/L	
			Dissolved Nitrate (N)	2016/11/10	<0.010		mg/L	
8467116	NW4	RPD	Dissolved Nitrite (N)	2016/11/10	NC		%	20
			Dissolved Nitrate (N)	2016/11/10	NC		%	20
8468819	JH0	Matrix Spike	Dissolved Chloride (Cl)	2016/11/13		107	%	80 - 120
8468819	JH0	Spiked Blank	Dissolved Chloride (Cl)	2016/11/13		102	%	80 - 120
8468819	JH0	Method Blank	Dissolved Chloride (Cl)	2016/11/13	<1.0		mg/L	
8468819	JH0	RPD	Dissolved Chloride (Cl)	2016/11/13	NC		%	20
8468821	JH0	Matrix Spike	Dissolved Sulphate (SO4)	2016/11/13		NC	%	80 - 120
8468821	JH0	Spiked Blank	Dissolved Sulphate (SO4)	2016/11/13		106	%	80 - 120
8468821	JH0	Method Blank	Dissolved Sulphate (SO4)	2016/11/13	<1.0		mg/L	
8468821	JH0	RPD	Dissolved Sulphate (SO4)	2016/11/13	1.6		%	20
8469332	MZ	Matrix Spike [PZ5784-04]	1,4-Difluorobenzene (sur.)	2016/11/16		97	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/11/16		105	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/11/16		106	%	70 - 130
			Benzene	2016/11/16		78	%	70 - 130
			Toluene	2016/11/16		79	%	70 - 130
			Ethylbenzene	2016/11/16		96	%	70 - 130
			m & p-Xylene	2016/11/16		94	%	70 - 130
			o-Xylene	2016/11/16		90	%	70 - 130
			F1 (C6-C10)	2016/11/16		74	%	70 - 130
8469332	MZ	Spiked Blank	1,4-Difluorobenzene (sur.)	2016/11/15		105	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/11/15		77	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/11/15		103	%	70 - 130
			Benzene	2016/11/15		77	%	70 - 130

Maxxam Job #: B6A0360
Report Date: 2016/11/17

TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Location: 124 MAIN STREET BARONS, AB
Sampler Initials: JL

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8469332	MZ	Method Blank	Toluene	2016/11/15		78	%	70 - 130
			Ethylbenzene	2016/11/15		88	%	70 - 130
			m & p-Xylene	2016/11/15		87	%	70 - 130
			o-Xylene	2016/11/15		86	%	70 - 130
			F1 (C6-C10)	2016/11/15		92	%	70 - 130
			1,4-Difluorobenzene (sur.)	2016/11/15		116	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/11/15		104	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/11/15		102	%	70 - 130
			Benzene	2016/11/15	<0.00040		mg/L	
			Toluene	2016/11/15	<0.00040		mg/L	
			Ethylbenzene	2016/11/15	<0.00040		mg/L	
			m & p-Xylene	2016/11/15	<0.00080		mg/L	
			o-Xylene	2016/11/15	<0.00040		mg/L	
			Xylenes (Total)	2016/11/15	<0.00080		mg/L	
8469332	MZ	RPD [PZ5783-04]	F1 (C6-C10) - BTEX	2016/11/15	<0.10		mg/L	
			F1 (C6-C10)	2016/11/15	<0.10		mg/L	
			Benzene	2016/11/15	NC		%	30
			Toluene	2016/11/15	NC		%	30
			Ethylbenzene	2016/11/15	NC		%	30
			m & p-Xylene	2016/11/15	NC		%	30
			o-Xylene	2016/11/15	NC		%	30
			Xylenes (Total)	2016/11/15	NC		%	30
			F1 (C6-C10) - BTEX	2016/11/15	NC		%	30
			F1 (C6-C10)	2016/11/15	NC		%	30
8470206	JH0	Matrix Spike	Dissolved Chloride (Cl)	2016/11/14		104	%	80 - 120
8470206	JH0	Spiked Blank	Dissolved Chloride (Cl)	2016/11/14		102	%	80 - 120
8470206	JH0	Method Blank	Dissolved Chloride (Cl)	2016/11/14	<1.0		mg/L	
8470206	JH0	RPD	Dissolved Chloride (Cl)	2016/11/14	6.7		%	20
8470207	MAP	Matrix Spike	Dissolved Calcium (Ca)	2016/11/14		101	%	80 - 120
			Dissolved Iron (Fe)	2016/11/14		99	%	80 - 120
			Dissolved Magnesium (Mg)	2016/11/14		97	%	80 - 120
			Dissolved Manganese (Mn)	2016/11/14		97	%	80 - 120
			Dissolved Potassium (K)	2016/11/14		101	%	80 - 120
			Dissolved Sodium (Na)	2016/11/14		NC	%	80 - 120
			Dissolved Calcium (Ca)	2016/11/14		104	%	80 - 120
			Dissolved Iron (Fe)	2016/11/14		102	%	80 - 120
			Dissolved Magnesium (Mg)	2016/11/14		100	%	80 - 120
			Dissolved Manganese (Mn)	2016/11/14		100	%	80 - 120
8470207	MAP	Spiked Blank	Dissolved Potassium (K)	2016/11/14		100	%	80 - 120
			Dissolved Sodium (Na)	2016/11/14		100	%	80 - 120
			Dissolved Calcium (Ca)	2016/11/14	<0.30		mg/L	
			Dissolved Iron (Fe)	2016/11/14	<0.060		mg/L	
			Dissolved Magnesium (Mg)	2016/11/14	<0.20		mg/L	
			Dissolved Manganese (Mn)	2016/11/14	<0.0040		mg/L	
			Dissolved Potassium (K)	2016/11/14	<0.30		mg/L	
			Dissolved Sodium (Na)	2016/11/14	<0.50		mg/L	
			Dissolved Calcium (Ca)	2016/11/14	NC		%	20
			Dissolved Iron (Fe)	2016/11/14	NC		%	20
8470207	MAP	RPD	Dissolved Magnesium (Mg)	2016/11/14	NC		%	20
			Dissolved Manganese (Mn)	2016/11/14	1.1		%	20
			Dissolved Potassium (K)	2016/11/14	NC		%	20
			Dissolved Sodium (Na)	2016/11/14	0.90		%	20

Maxxam Job #: B6A0360
Report Date: 2016/11/17

TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Location: 124 MAIN STREET BARONS, AB
Sampler Initials: JL

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8470208	JH0	Matrix Spike	Dissolved Sulphate (SO4)	2016/11/14		NC	%	80 - 120
8470208	JH0	Spiked Blank	Dissolved Sulphate (SO4)	2016/11/14		100	%	80 - 120
8470208	JH0	Method Blank	Dissolved Sulphate (SO4)	2016/11/14	<1.0		mg/L	
8470208	JH0	RPD	Dissolved Sulphate (SO4)	2016/11/14	5.2		%	20

N/A = Not Applicable

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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

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

Maxxam Job #: B6A0360
Report Date: 2016/11/17

TETRA TECH EBA INC.
Client Project #: ENV.CENV03059-01
Site Location: 124 MAIN STREET BARONS, AB
Sampler Initials: JL

VALIDATION SIGNATURE PAGE

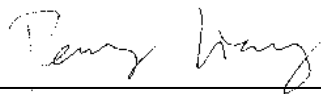
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Dennis Ngundu, B.Sc., P.Chem., QP, Supervisor, Organics



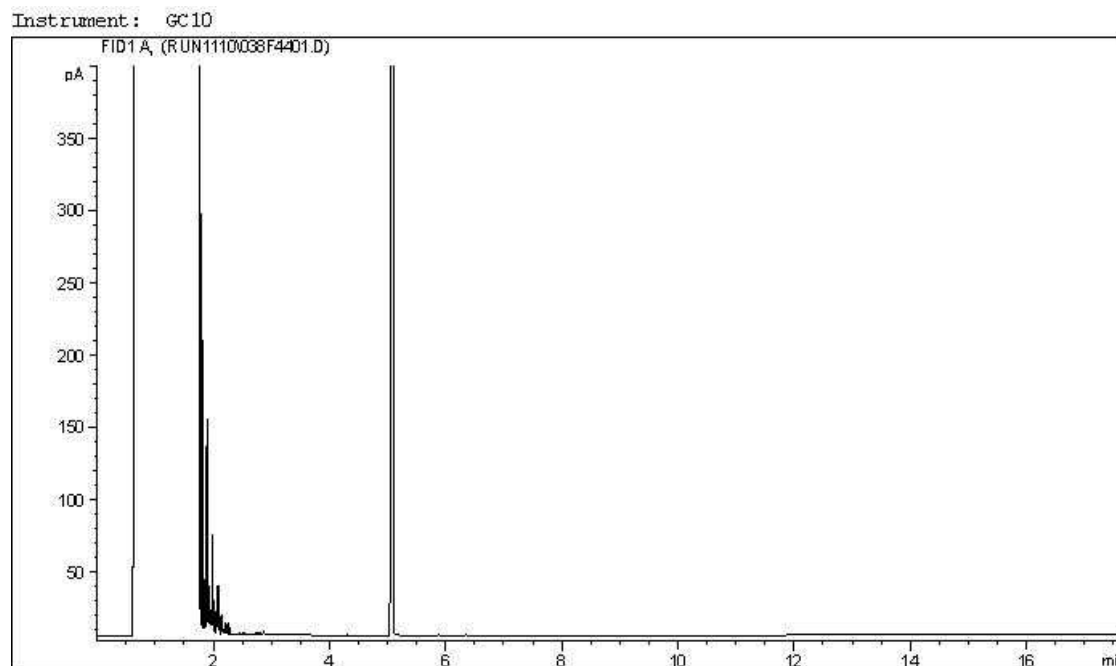
Janet Gao, B.Sc., QP, Supervisor, Organics



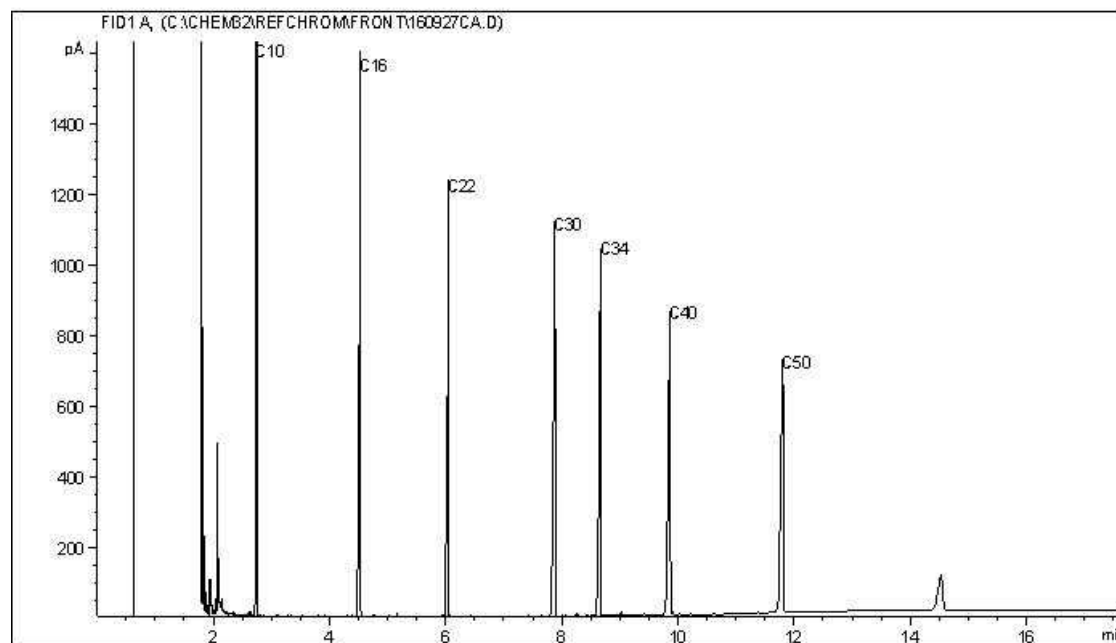
Harry (Peng) Liang, Senior Analyst

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

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram



Carbon Range Distribution - Reference Chromatogram

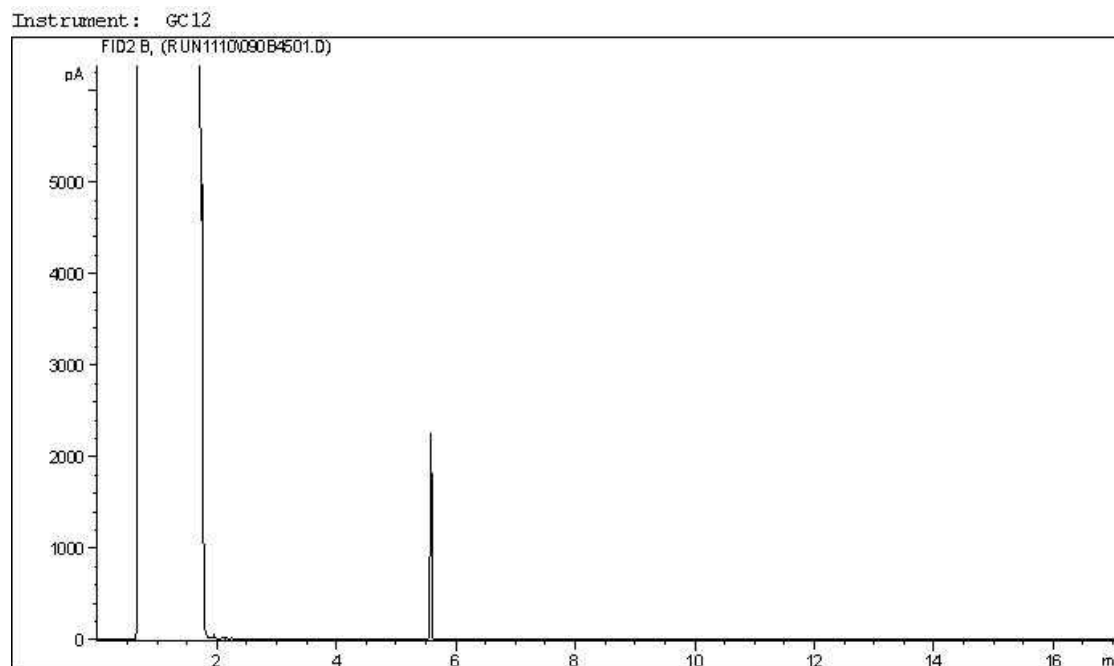


TYPICAL PRODUCT CARBON NUMBER RANGES

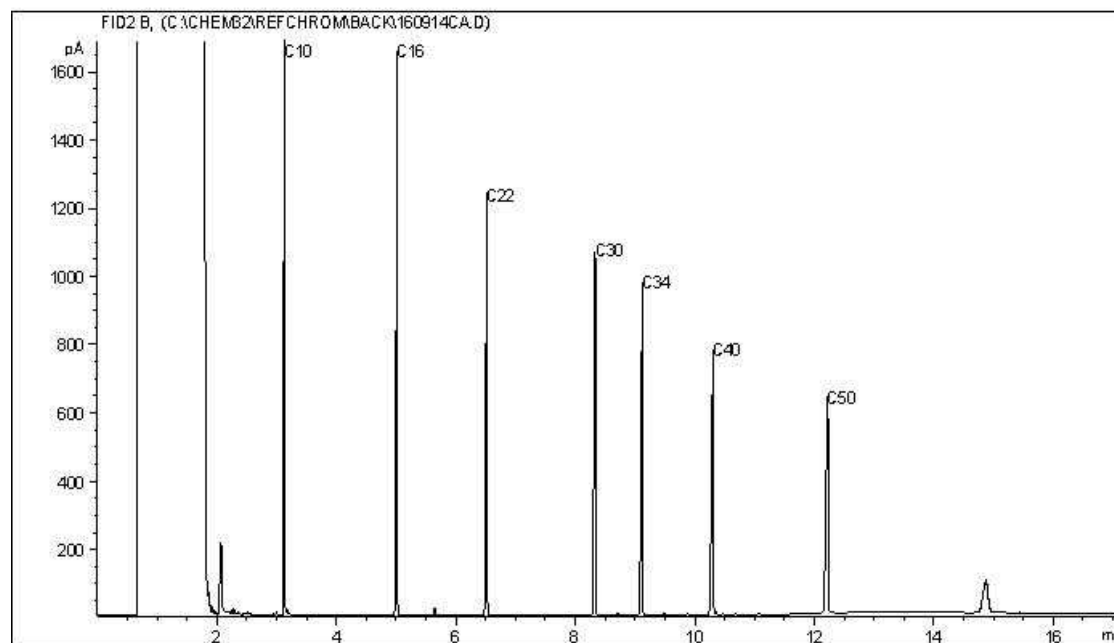
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram



Carbon Range Distribution - Reference Chromatogram

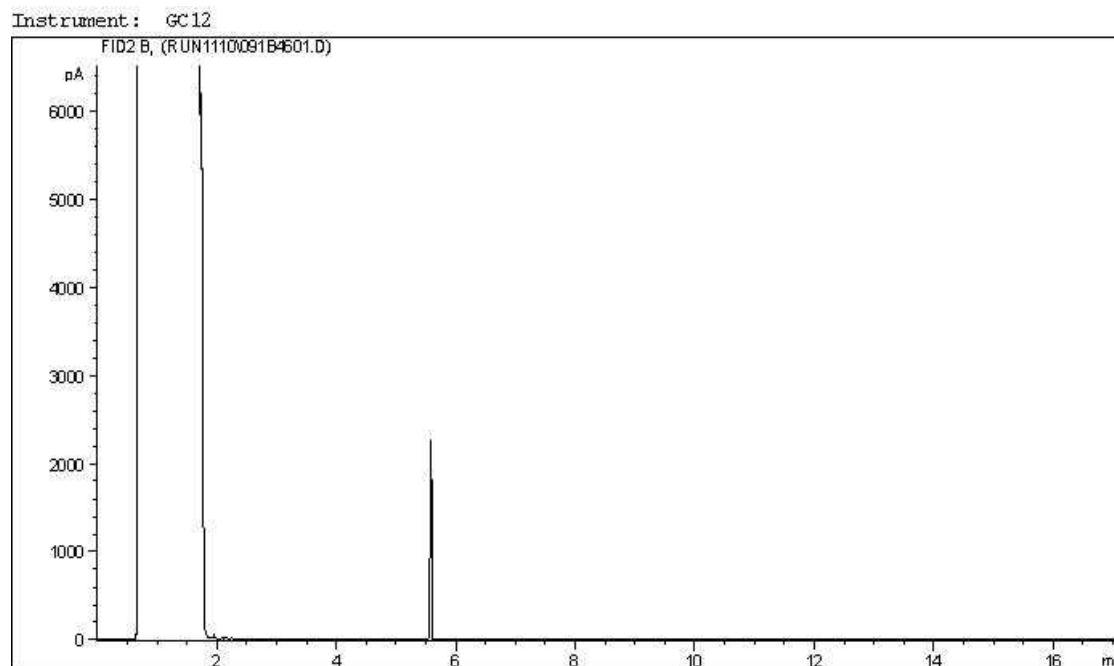


TYPICAL PRODUCT CARBON NUMBER RANGES

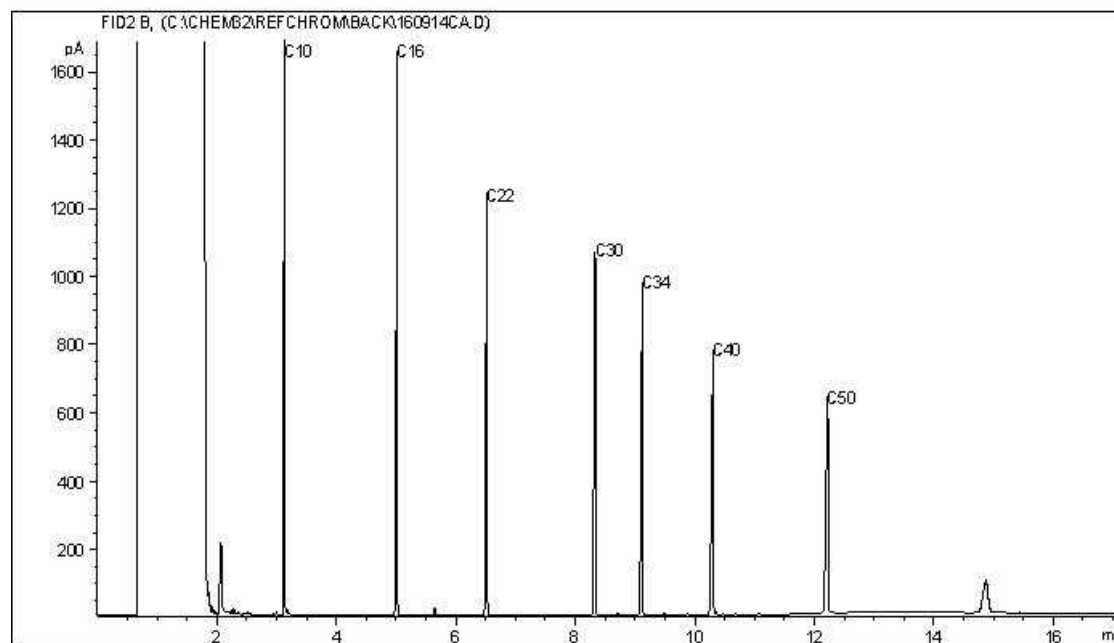
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram



Carbon Range Distribution - Reference Chromatogram

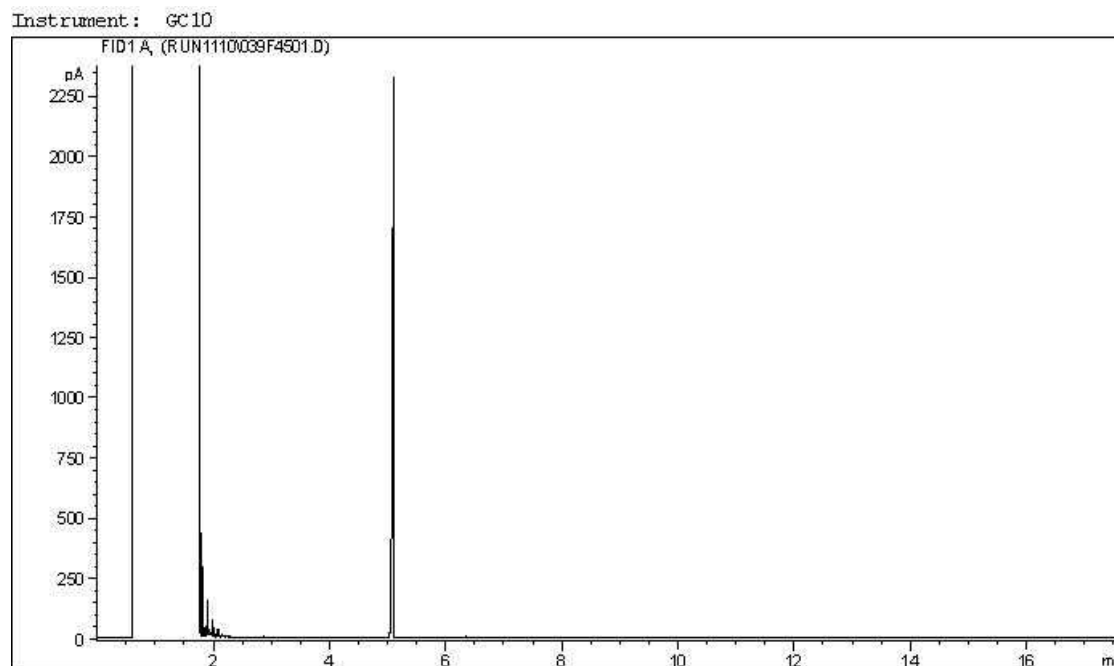


TYPICAL PRODUCT CARBON NUMBER RANGES

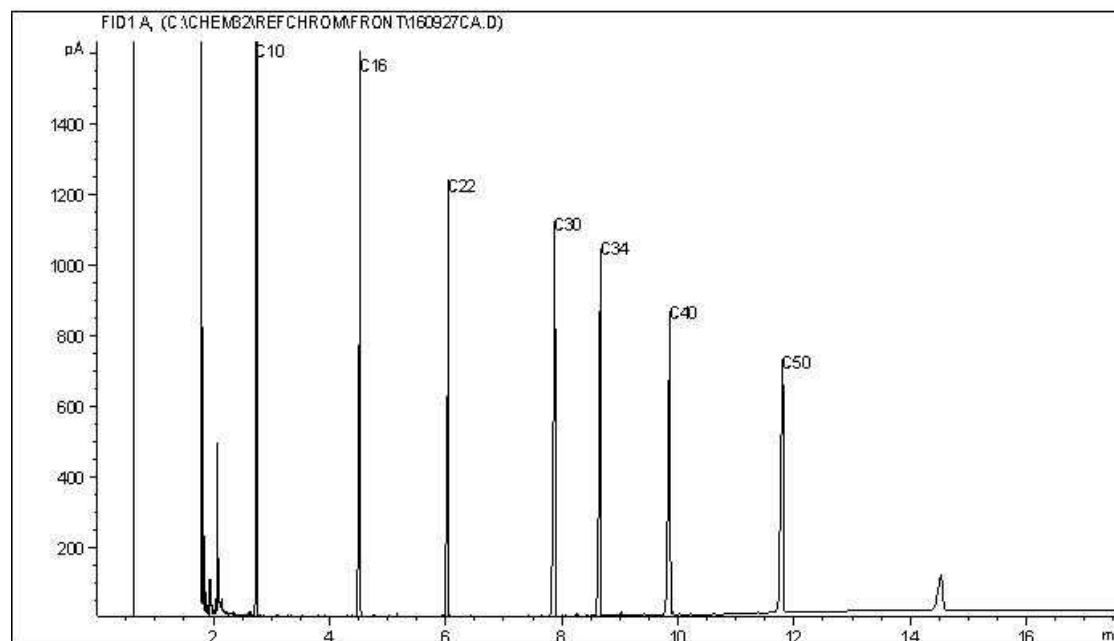
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram



Carbon Range Distribution - Reference Chromatogram

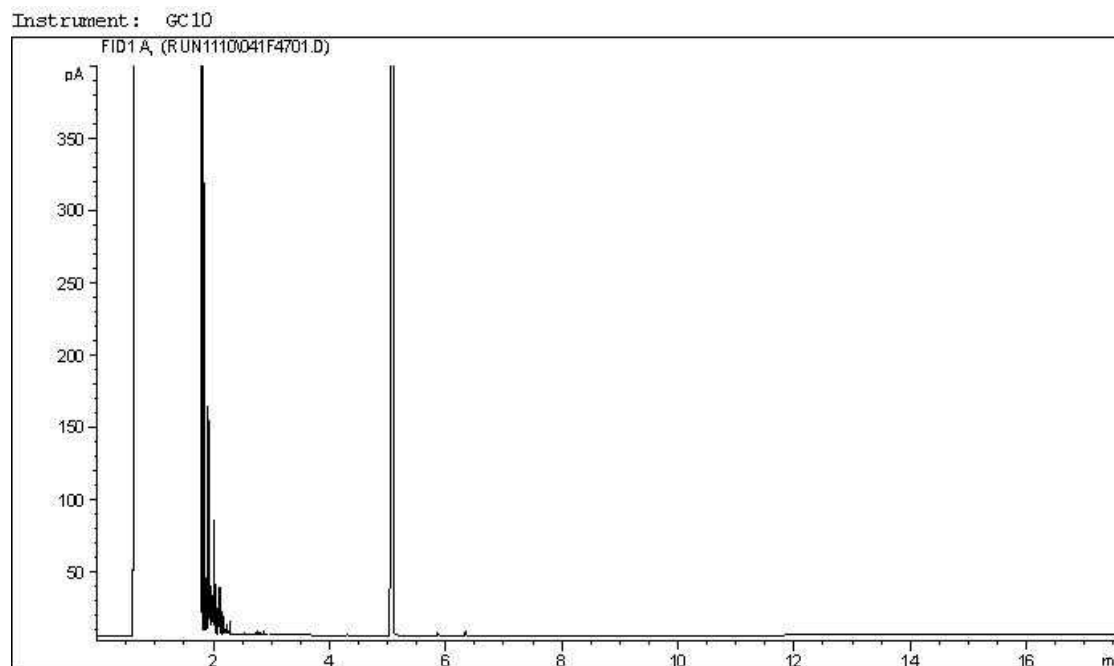


TYPICAL PRODUCT CARBON NUMBER RANGES

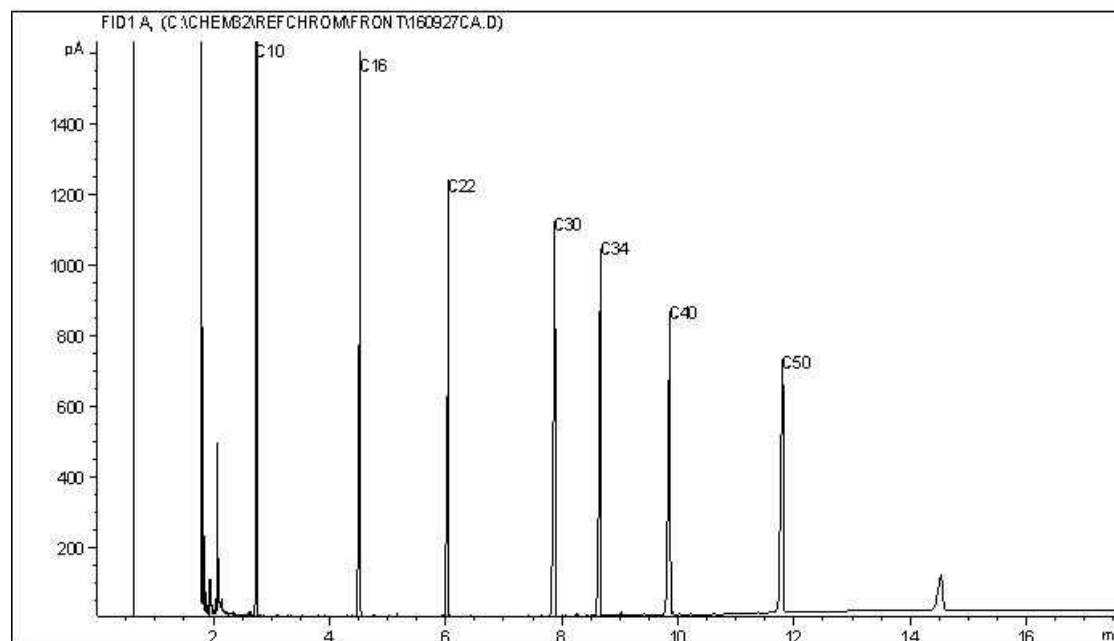
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

CCME Hydrocarbons in Water (F2; C10-C16) Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

APPENDIX C

RECORD OF SITE CONDITION

Record of Site Condition



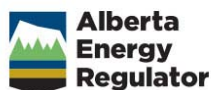
1 REPORT AND FORM INFORMATION			
Title of report	2016 Groundwater Monitoring Program. 124 Main Street Barons, AB. Alberta Municipal Affairs Site #9558		
Report date (dd-mon-yyyy)	January 2017	Record of Site Condition (RSC) ID No. ^ψ	

2 SITE IDENTIFICATION AND PHYSICAL LOCATION								
2.1 Site name		AMA Site #9558						
2.2 Address of site		124 Main Street						
		Municipality	Barons					Alberta
2.3 Legal land description of site (if multiple, list all.)								
Plan, Block, Lot (PBL)			Alberta Township System (ATS)					
Plan	Block	Lot	LSD	Quarter	Section	Township	Range	Meridian
2605X	2	14						

3 STAKEHOLDERS			
3.1 Operator			
Company	Village of Barons	Contact person	Laurie Beck
Mailing address	PO Box 129 Barons AB T0L 0G0	Position held	Administrator
		Business phone No.	403.757.3633
		Business fax No.	403.757.2599
		Business e-mail	Barons@figment.ca
3.2 Consultant ☐ Not applicable			
Company	Tetra Tech Canada Inc.	Contact person	Jaymes Going
Mailing address	442 - 10 Street North Lethbridge, AB T1H 2C7	Position held	Environmental Scientist
		Business phone No.	403.359.6512
		Business fax No.	403.328.8817
		Business e-mail	Jaymes.Going@tetrattech.com
3.3 Landowner(s)			
Land type	☐ Private ☐ Special Areas ☐ Parks and protected area ☒ Public (if not private, provide Disposition No.: _____)		
Landowner(s)	☒ Same as operator ☐ Other		

^ψ: Do not fill in. Reserved for internal administrative purposes only.

Record of Site Condition

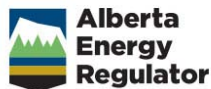


3.4 Occupant(s)			
Are there occupants at the site?	☐ Yes	☒ No	☐ To be determined (TBD)
Occupant(s)	☐ Same as operator	☐ Same as landowner	☐ Other
What is the type of occupancy?	☐ Apartment building	☐ Town house	☐ Single detached house
	☐ Agricultural	☐ Industrial	☐ Commercial
	☒ Other (specify) <u>Public park/Roadway</u>		

4 OPERATING STATUS	
☐ Operating ☐ Suspended ☒ Abandoned ☐ Decommissioning in progress ☐ Closed	☐ Reclaimed (provide Reclamation Certificate No.(s): _____) ☐ Not applicable

5 TYPE OF ACTIVITY AND SITE					
5.1 Petroleum Storage Tank Site					☒ Yes
5.1.1 ESRD file No.(s)				PTMAA site No.	
5.1.2 Types of activity					
☒	Retail gas station	☐	Aviation fuelling station	☐	Bulk fuel
		☐ Other (specify): _____			
5.2 Upstream Oil and Gas Facility					☐ Yes
5.2.1 ESRD file No.(s)				AER approval No.(s)	
5.2.2 AER authorization type		☐ Approval ☐ License ☐ Permit ☐ Order ☐ Other (specify) _____			
5.2.3 Types of activity					
☐	Wellsite and associated facility	☐	Satellite	☐	Battery
☐	Compressor and pumping station	☐ Other (specify): _____			
5.3 Approved Facility Under Environmental Protection and Enhancement Act (EPEA)					☐ Yes
5.3.1 ESRD approval No.(s)				AER approval No.(s)	
5.3.2 Types of approved activity					
☐	Chemical manufacturing plant	☐	Enhanced recovery in-situ oil sands or heavy oil processing plant	☐	Fertilizer manufacturing plant
☐	Metal manufacturing plant	☐	Oil refinery	☐	Oilsands processing plant
☐	Pesticide manufacturing plant	☐	Petrochemical manufacturing plant	☐	Pipeline
☐	Pulp and paper processing plant	☐	Sour gas processing plant	☐	Sulphur manufacturing or processing plant
☐	Wood treatment plant	☐ Other (specify): _____			
☐		☐		☐	Landfill
☐		☐		☐	Oil production site
☐		☐		☐	Power plant
☐		☐		☐	Waste management facility

Record of Site Condition



5.4 Facility Under EPEA Code of Practice				☐ Yes	
5.4.1 ESRD registration No.(s)				AER registration No.(s)	
5.4.2 Type of Code of Practice					
☐	Asphalt paving plant	☐	Compressor and pumping station	☐	Concrete producing plant
☐	Pesticides	☐	Pipeline	☐	Land treatment of soils containing hydrocarbons
☐	Small incinerator	☐	Sweet gas processing plant	☐	Other (specify): _____
5.5 Other Activity					
☐ Yes					
5.5.1 ESRD file No.(s)				Other site ID No.(s)	
				Authorized by	
5.5.2 Types of activity					
☐	Dry cleaning operation	☐	Highway maintenance yard	☐	Transportation
☐	Other (specify): _____				

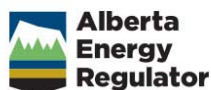
6 SITE CHARACTERIZATION					
6.1 What Environmental Site Assessments (ESA) Have Been Conducted and Completed to Date?					
☒ Phase I ESA ☒ Phase II ESA (check all that apply.) ☒ Initial intrusive sampling ☐ delineation completed ☒ post-remediation monitoring ☐ final confirmatory sampling					
6.2 Contaminants of Potential Concern (COPC)					
6.2.1 Does the site have any of the conditions that require the mandatory use of Alberta Tier 2 Soil and Groundwater Remediation Guidelines (ESRD, 2007 and updates)? (check all that apply in Section 6.2.1.1.)					
☒ Yes ☐ No (→ proceed to Section 6.2.2.)					
6.2.1.1 Identify any conditions that require the approaches of the Alberta Tier 2 guidelines. (see Alberta Tier 1 Soil and Groundwater Remediation Guidelines (ESRD, 2007 and updates), for details.)					
☐	Contamination within 30 cm of building foundation	☐	Unusual building feature (eg. earthen floor)	☐	Contamination within 10 m distance of surface water body
☒	Fractured bedrock	☐	Potentially high hydraulic conductivity ($> 10^{-5}$ m/sec.)	☐	Other (see Alberta Tier 1 guidelines and specify): _____
6.2.1.2 Did the Alberta Tier 2 approach lead to a soil or groundwater guideline that was lower than the corresponding Tier 1 guideline for the same contaminant(s)?					
☐ Yes ☐ TBD ☒ No (→ proceed to Section 6.2.2.)					
6.2.1.3 If you answered 'yes' or 'TBD' to Section 6.2.1.2, identify the group of contaminants for each COPC with a mandatory Tier 2 guideline that is lower than the corresponding Tier 1 guideline (check all that apply, see Alberta Tier 1 guidelines, Tables 1-4 for detailed listing).					
☐	General and inorganic parameters	☐	Metals		
☐	Hydrocarbons	☐	Halogenated aliphatics		
☐	Chlorinated aromatics	☐	Pesticides		
☐	Other organics	☐	Radionuclides		
☐	Salt	☐	Other (specify): _____		

Record of Site Condition



6.2.1.4 Did any past or current ESA relevant to this investigation identify an exceedance of the mandatory Tier 2 guidelines referred to in Section 6.2.1.3 (e.g. Tier 2 guidelines that are lower than the corresponding Tier 1 guidelines)? ☐ Yes ☐ No ☐ TBD	
6.2.1.5 If you answered 'yes' in Section 6.2.1.4, have all relevant COPC been remediated to meet the mandatory Tier 2 guidelines? ☐ Yes ☐ No	
6.2.2. Did any past or current ESA relevant to this investigation identify a drilling waste disposal area? ☐ Yes ☒ No (→ proceed to Section 6.2.3.)	
6.2.2.1 If a drilling waste disposal area was identified, did any past or current ESA identify non-compliance with the compliance options outlined in <i>Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification</i> (AER, 2014), as amended? ☐ Yes ☐ No	
6.2.2.2 If you answered 'yes' in Section 6.2.2.1, have all COPC been remediated to meet the compliance options outlined in <i>Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification</i> (AER, 2014), as amended? ☐ Yes ☐ No	
6.2.2.3 For any COPC that did not meet the compliance options in <i>Assessing Drilling Waste Disposal Areas</i>, identify the group of contaminants (check of all that apply, see the Alberta Tier 1 guidelines, Tables 1-4 for detailed listing).	
☐ General and inorganic parameters	☐ Metals
☐ Hydrocarbons	☐ Halogenated aliphatics
☐ Chlorinated aromatics	☐ Pesticides
☐ Other organics	☐ Radionuclides
☐ Salt	☐ Other (specify): _____
6.2.3 For all areas and COPCs not assessed under Sections 6.2.1 or 6.2.2, did any ESA relevant to this investigation identify an exceedance over the Alberta Tier 1 guidelines? ☒ Yes ☐ No (→ proceed to Section 6.3.)	
6.2.3.1 If you answered 'yes' in Section 6.2.3, have all COPC been remediated to meet the Alberta Tier 1 guidelines? ☐ Yes ☒ No ☐ TBD	
6.2.3.2 For any COPC that exceeded Alberta Tier 1 guidelines in Section 6.2.3.1, identify the group of contaminants. (check all that apply, see the Alberta Tier 1 guidelines, Tables 1-4 for detailed listing.)	
☐ General and inorganic parameters	☐ Metals
☒ Hydrocarbons	☐ Halogenated aliphatics
☐ Chlorinated aromatics	☐ Pesticides
☐ Other organics	☐ Radionuclides
☐ Salt	☐ Other (specify): _____

Record of Site Condition



6.3 Status of Investigation

6.3.1 Identify soil and groundwater guidelines used to assess the COPCs that are the subject of this investigation (check all that apply).

- ☒ Alberta Tier 1 Soil and Groundwater Remediation Guidelines – 2007 and updates,
☐ Coarse grained ☒ Fine grained
☐ Alberta Tier 2 Soil and Groundwater Remediation Guidelines – 2007 and updates,
☐ Pathway exclusion ☐ Guideline adjustment ☐ Site specific remediation objectives
☐ Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification (AER, 2014), as amended
☐ Other (specify): _____

6.3.2 What land use classification(s) is used?

- ☐ Natural ☐ Agricultural ☒ Residential ☐ Commercial ☐ Industrial ☒ Other (specify: Parkland)

6.3.3 What is the outcome of the investigation? (check one only.)

- ☐ For all COPCs on-site and off-site, no exceedance has been found above any applicable soil and groundwater guidelines in any prior and current assessments.
☐ All contamination on-site and off-site has been completely remediated and meets the applicable soil and groundwater guidelines.
☒ One or more COPC still exceeds the applicable soil or groundwater guidelines.

6.3.4 How many contaminated areas are there currently at the site?

☒ One ☐ None ☐ TBD

6.3.5 Are all contaminated areas and potential contaminated areas assessed during this investigation?

☒ Yes ☐ No

6.3.6 For all areas of potential environmental concern, list the dates when the contamination was discovered (specify dd-mon-yyyy): Nov 2008; _____

6.3.7 For all areas that have been identified in Section 6.3.4, have all substance releases been reported to ESRD?

☒ Yes ☐ No ☐ Not applicable

6.3.8 If the answer to Section 6.3.7 is 'yes', list all Incident No.(s) (attach separate sheet if necessary): _____; _____

☒ Not assigned

6.3.9 What is the approximate, cumulative amount of land area remaining exceeding applicable remediation guidelines? _____ (m²) ☐ None ☒ TBD

6.3.10 Is there non-aqueous phase liquid (NAPL) product remaining on site? ☐ Yes ☒ No ☐ TBD

6.3.11 Is there non-aqueous phase liquid (NAPL) product remaining off site? ☐ Yes ☐ No ☒ TBD

6.3.12 What is the remediation status of the contaminated areas at site?

☐	No remediation required	☐	Site has exceedance but no remediation plan
☒	Remediation plan developed	☐	Active remediation
☐	Remediation completed	☐	Post remediation assessment completed
☒	Ongoing risk management plan – on-site	☒	Ongoing risk management plan – off-site
☐	Remediation Certificate issued for some area(s) (provide Remediation Certificate No.(s): _____)		
☐	Remediation Certificate cancelled for some area(s) (provide Remediation Certificate No.(s): _____)		

Direction for Completing the Remainder of the Form

Attach the analytical summary tables of the COPCs that are the subject of this investigation and still present at this site. A detailed listing of COPCs can be found with Tables 1-4 in *Alberta Tier 1 Soil and Groundwater Remediation Guidelines* (ESRD, 2007 and updates), as amended. Refer to the *RSC User's Guide* for detailed information on format and other requirements regarding the summary table.

For the remainder of the form, follow the directions below:

- If the COPCs on-site and off-site have never exceeded any applicable soil and groundwater guidelines in any prior and current assessments, → proceed to Section 8, or
- If the COPCs on-site and off-site have been completely remediated and meet the applicable soil and groundwater guidelines, → proceed to Section 8, or
- For all other circumstances, continue with Section 6.4.

6.4 Key Transport Factors for Existing COPCs

6.4.1 What is the horizontal distance to the nearest water well from the edge of the nearest contaminated area?

☐ 0-50 m ☐ 50-100 m ☒ 100-300 m ☐ 300-1000 m ☐ > 1000 m

6.4.2 What is the horizontal distance to the nearest surface water body from the edge of the contaminated area?

☐ ≤10 m ☐ 10-50 m ☐ 50-100 m ☐ 100-300 m ☒ 300-1000 m ☐ > 1000 m

6.4.3 Does delineation achieve closure above the groundwater water table that is nearest to the ground surface?

☐ Yes (→ go to Section 6.5.) ☒ No ☐ TBD

6.4.4 Is the groundwater that is nearest the ground surface a domestic use aquifer (DUA) as defined in Alberta Tier 2 guidelines?

☒ Yes ☐ No ☐ TBD ☐ Not required (NR)

6.4.5 Is there a hydraulic barrier, as defined in Alberta Tier 2 guidelines, between the base of the contaminated area and the DUA?

☐ Yes ☐ No ☒ TBD ☐ NR

6.4.6 If you answered 'yes' to Section 6.4.5, provide the measured largest value of the hydraulic conductivity (as value $\times 10^{-7}$ m/sec.) for the 5.0 m vertical layer from the bottom of the contaminated zone.

_____ ($\times 10^{-7}$ m/sec.) ☐ TBD ☐ NR

6.5 On-site Characterization

6.5.1 What is the dominant soil texture that governs substance transport at the site?

☐ Coarse grained ☒ Fine grained ☐ TBD ☐ Not applicable (must identify reason in Section 6.2.1.1.)

6.5.2 What are the shallowest and deepest measured depths (meters below ground surface) of the water table at site?

Shallowest: 1.63 (m) Deepest: 2.85 (m) ☐ TBD ☐ NR (specify max. depth assessed: _____ (m))

6.5.3 What is the dominant horizontal direction of groundwater flow for the near surface water table?

(N, NW, etc.: NW) ☐ TBD ☐ NR

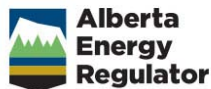
6.5.4 What is the existing land use classification?

☐ Natural ☐ Agricultural ☒ Residential ☐ Commercial ☐ Industrial ☒ Other (specify) Parkland

6.5.5 What is the end land use classification?

☐ Natural ☐ Agricultural ☒ Residential ☐ Commercial ☐ Industrial ☒ Other (specify) Parkland

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6.5.6 Identify exposure pathways for which the applicable guidelines are exceeded on-site (check all that apply).			
☐	Vapour inhalation	☐	Soil ingestion
☐	Ingestion of potable water	☐	Soil dermal (skin) contact
☐	Fresh water aquatic life	☐	Soil contact for plants and invertebrates
☒	TBD	☐	Other (specify): _____

6.6 Off-site Characterization			
6.6.1 Are there COPCs off-site exceeding applicable soil or groundwater guidelines?			
☐ No (→ if on-site contamination was reported, proceed to Section 7, otherwise, proceed to Section 8.) ☐ Yes ☒ TBD			
6.6.2 What is the current land use classification for any off-site area(s) identified in Section 6.6.1?			
☐ Natural ☐ Agricultural ☐ Residential ☐ Commercial ☐ Industrial ☒ Other (specify) <u>Road</u>			
6.6.3 What is the end land use classification for any off-site area(s) identified in Section 6.6.1?			
☐ Natural ☐ Agricultural ☐ Residential ☐ Commercial ☐ Industrial ☒ Other (specify) <u>Road</u>			
6.6.4 Is there any substance concentration under a road allowance exceeding the applicable soil or groundwater guidelines?			
☐ Yes ☐ No (→ proceed to Section 6.6.6.) ☒ TBD			
6.6.5 What is the most sensitive land use classification adjacent to the road allowance?			
☐ Natural ☐ Agricultural ☒ Residential ☐ Commercial ☐ Industrial ☒ Other (specify) <u>Parkland</u>			
6.6.6 Identify exposure pathways for which the applicable guidelines are exceeded off-site (check all that apply).			
☐	Vapour inhalation	☐	Soil ingestion
☐	Ingestion of potable water	☐	Soil dermal (skin) contact
☐	Fresh water aquatic life	☐	Soil contact for plants and invertebrates
☒	TBD	☐	Other (specify): _____

7 RISK MANAGEMENT PLAN (RMP)

7.1 What is the Plan for Contaminated Areas Still Remaining on and off the Site? (check one only.)

- ☐ Complete remediation (→ proceed to Section 8).
- ☒ Partial remediation with risk management for some residual contamination.
- ☐ Risk management for all remaining contamination.

7.2 Key Progress of RMP

7.2.1 If the site needs an on-going RMP, answer all the following questions that apply to the RMP.

☐ Yes	☒ No	Are contaminated areas completely delineated horizontally and vertically in soil?
☐ Yes	☒ No	Are contaminated areas completely delineated horizontally and vertically in groundwater?
☒ Yes	☐ No	Is source identified and completely delineated?
☐ Yes	☐ No	Is source migrating or has migrated off-site?
☐ Yes	☒ No	Is source left as is?
☒ Yes	☐ No	Is source partially removed and residual source being managed?
☐ Yes	☒ No	Is source controlled with physical or administrative methods?
☒ Yes	☐ No	Are all pathways of concern identified?
☒ Yes	☐ No	Have all relevant receptors been identified and protected?
☒ Yes	☐ No	Is there a monitoring program in place to verify RMP success?
☐ Yes	☒ No	Are there third parties related to this RMP? (if the answer is 'no', skip the next question.)
☐ Yes	☐ No	If there are third parties, have all of them accepted the RMP?
☐ Yes	☒ No	Is there a commitment from person(s) responsible to implement and monitor the RMP until final remediation guidelines are achieved?
☒ Yes	☐ No	Is there a contingency plan in place should the RMP fail?
☒ Yes	☐ No	Is the RMP implemented for the site?

Public Disclosure and Privacy Notification

The *Record of Site Condition* form is a public record that is disclosed in accordance with section 35 of the *Environmental Protection and Enhancement Act*, *Disclosure of Information Regulation*, and *Ministerial Order 23/2004*. Reasonable efforts have been made to minimize collection of personal information where possible. Personal information on the form is collected under the authority of section 12(c) and other provisions of the *Environmental Protection and Enhancement Act* and is in compliance with section 33(a) and 33(c) of the *Freedom of Information and Protection of Privacy Act* (FOIP). Personal information collected on this form will be used by Alberta Environment and Sustainable Resource Development (ESRD) or the Alberta Energy Regulator (AER), as the case may be, for the purposes of administering its programs.

Accuracy of Information

The information in this document has been submitted by persons other than ESRD or the AER. The Department, the Government of Alberta, and the AER cannot and do not warrant that the information in this document is current, accurate, complete, or free of errors. Persons accessing the information provided should not rely on it, and any reliance on the information provided is taken at the sole risk of the user. Users of this information are advised to conduct their own due diligence to satisfy themselves of the environmental condition of the property of interest.

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8 DECLARATION

This *Record of Site Condition* form was prepared for the purpose of reporting on the state of environmental site conditions and, where applicable, for the purpose of remediation or reclamation, for:

AMA Site #9558 (site name) (the "Site").

I, as the licensed operator or authorized representative, have reviewed all information that was used in preparation of this form and I am satisfied that it was prepared in a manner consistent with the Applicable Standard¹ together with any relevant additional guidance that is available from Alberta Environment and Sustainable Resource Development as of this date for conducting environmental site assessments.

Having conducted reasonable inquiries to obtain all relevant information, to my knowledge, the statements made in this form are true as of this date. I have disclosed all pertinent information of which I am aware concerning the historical and current environmental condition of the Site to the Director.

Any use which a third party, other than the Crown in right of Alberta or the AER, makes of this form, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. The undersigned accepts no responsibility for damages, if any, suffered by any third party, other than the Crown in right of Alberta and the AER, as a result of decisions made or actions based on this form. Any exclusions or disclaimers to the contrary contained in any attachment to this form are of no force or effect as against the Crown in right of Alberta and the AER.

Footnote 1:

"Applicable Standard" means

- a) for the purposes of upstream oil and gas sites,
 - i) *2010 Reclamation Criteria for Wellsites and Associated Facilities Application Guidelines* (ESRD 2011),
 - ii) *CSA Standard Z769, Phase II Environmental Site Assessment*, as amended, for any Phase II site assessment information used in preparation of this form on all upstream oil and gas sites not included in a) i);
- b) for the purposes of all other sites, *CSA Standard Z768, Phase I Environmental Site Assessment*, as amended, for any Phase I site assessment information and with *CSA Standard Z769, Phase II Environmental Site Assessment*, as amended, for any Phase II site assessment information used in preparation of this form.

By signing below, I as the licensed operator or authorized representative, confirm the information provided herein is correct and complete, to the best of my knowledge and belief.

Village of Barons				
Name of operator	Name of authorized representative <i>Henri Corriveau</i>	Title of authorized representative (e.g. officer, director)	Signature <i>AC</i>	Date (dd-mon-yyyy) <i>January 26, 2017</i>