



TETRA TECH EBA

GROUNDWATER AND SOIL VAPOUR MONITORING PROGRAM 202 MAIN STREET, BARONS, ALBERTA ALBERTA MUNICIPAL AFFAIRS SITE #9557



PRESENTED TO
VILLAGE OF BARONS

OCTOBER 2014
ISSUED FOR USE
FILE: 704-ENVIND03354-01

This page intentionally left blank.

EXECUTIVE SUMMARY

Foreword

The Village of Barons, Alberta (Barons), retained Tetra Tech EBA Inc. (Tetra Tech EBA), to conduct a groundwater monitoring program (GWMP) and a subsurface soil vapour monitoring program (SVMP) for a property located at 202 Main Street in Barons, Alberta. The site is included within the Alberta Municipal Affairs Tank Site Remediation Program (AMA Program), Site Number: 9557.

The scope of work is based on previous environmental site assessments (ESAs) conducted at the site by Tetra Tech EBA which identified concentrations of petroleum hydrocarbons (PHCs) in the soil and groundwater greater than the applicable Alberta Environment and Sustainable Resource Development (ESRD) 2014 Alberta Tier 1 and 2 Soil and Groundwater Remediation Guidelines (Tier 1 Guidelines), and more specifically, in excess of the Tier 1 vapour inhalation (VI) guidelines.

Details of the previous ESAs are presented in the following documents:

- Phase II and Phase III Environmental Site Assessment. 202 Main Street. Lot 1 and Lot 2, Block 7, Plan 2605X. Barons, Alberta. Tetra Tech EBA File No. L22101182.001, Dated October 2009.
- Additional Phase III Environmental Site Assessment. 202 Main Street. Lot 1 and Lot 2, Block 7, Plan 2605X. Barons, Alberta. Tetra Tech EBA File No. L22101182.002, Dated December 2011.
- Underground Storage Tank Removal and Monitoring. 202 Main Street. Barons, Alberta. Alberta Municipal Affairs Site #9557. Tetra Tech EBA File No. L22003112-01, Dated October 2013.

The objective of the SVMP was to identify potential risks to occupants working at the site and residing at the adjacent residential dwelling to the east from exposure to soil vapours, specifically benzene, ethylbenzene, toluene, and xylenes (BTEX) and PHC fractions F1 and F2.

Additionally, the SVMP will support the risk management plan (RMP) developed for the site by Tetra Tech EBA in May 2012. It will also ensure that Barons is providing adequate due diligence with respect to any potential health risks to occupants at the site and the adjacent property from potential exposure to soil vapours. Note that the RMP has not yet been approved by ESRD.

The objective of the GWMP was to document current concentrations, allowing the evaluation of natural attenuation of PHC compounds in the soil and groundwater beneath the site.

Discussion and Conclusions

Soil

Concentrations of BTEX, and PHC fractions F1 to F4, were less than the laboratory detection limits, and/or Tier 1 Guidelines at the locations tested in 2014. Historically, concentrations of BTEX and PHC fractions F1 to F3 have been identified at concentrations greater than the Tier 1 Guidelines at several locations (08BH01 through 08BH06, 09BH12, 09BH13, 09BH17, 09BH19, 09BH20, 11MW01, and 11MW03) at depths ranging from 1.2 – 4.8 mbg.

Groundwater

Concentrations of benzene, ethylbenzene and PHC fraction F1 were detected greater than the Tier 1 Guideline in the groundwater at one or more of the following locations tested (08MW02, 09MW10, and 09MW13). All remaining BTEX and PHC fraction F1 to F2 concentrations were less than the applicable guidelines. Concentrations of PHC compounds have generally shown a decrease at most locations since Tetra Tech EBA's 2008/2009 groundwater assessment. Historically concentrations of benzene, ethylbenzene, xylenes, and PHC fraction F1 and/or F2 were detected greater than the applicable guidelines at all locations sampled.

Routine groundwater parameters were analyzed for the first time in 2014 for future reference to assist in determining the potential for the natural attenuation of PHCs in the groundwater at the site. Concentrations of total dissolved solids (TDS), sodium, sulphate, chloride, nitrite, manganese and iron greater than the Tier 1 Guidelines were measured in one or more monitoring wells in 2014. The concentrations of these parameters, excluding chloride, may reflect natural groundwater composition attributed to the dissolution of soluble salts within the till beneath the site.

Concentrations of dissolved manganese and iron greater than the Tier 1 Guidelines are often detected in groundwater under anaerobic conditions and are likely not the result of historic site activities.

Soil Vapour

Concentrations of benzene exceeded the risk specific concentration in each of the four vapour wells (14VW01 to 14VW04). The $>C_8-C_{10}$ aromatic sub-fraction exceeded the tolerable concentration in the three vapour wells closest to the adjacent residence (14VW01 to 14VW03) and the $>C_{10}-C_{12}$ aromatic sub-fractions exceeded the tolerable concentration in two of the vapour wells (14VW01 and 14VW03). Following application of the British Columbia Ministry of Environment (MoE) attenuation coefficient, the benzene concentration in each of the four vapour wells still exceeded the calculated soil vapour screening level concentration. The results indicate that there is a risk of exposure to PHCs via inhalation of indoor air at the nearby residence with an earthen basement. No risk of exposure via inhalation of indoor air was identified to receptors in surrounding commercial buildings which have concrete floors or basements.

Recommendations

- Annual groundwater monitoring and sampling of the current monitoring well network and analytical parameters should be maintained to determine if PHC concentrations are stable or decreasing.
- The RMP should be updated to address the risk of exposure to PHC-impacted vapours at the proximal residence with an earthen basement. In the interim, it should be determined if potentially explosive vapour concentrations exist within the crawlspace beneath the residence. This could be accomplished with a combustible vapour analyzer.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
1.0 INTRODUCTION	1
1.1 General	1
1.2 Authorization	1
1.3 Scope of Work	1
1.3.1 Drilling Program, Soil Sampling, and Soil Vapour Well Installation.....	2
1.3.2 Groundwater Monitoring and Sampling	2
1.3.3 Soil Vapour Leak Testing and Sampling	2
1.3.4 Data evaluation and reporting	3
1.4 Qualifications of Assessors.....	3
2.0 METHODS	3
2.1 Utility Locates.....	3
2.2 Project Safety.....	3
2.3 Borehole Drilling and Soil Vapour Well Installation Program	4
2.4 Groundwater Monitoring, Sampling, and Analytical Testing.....	4
2.5 Leak Detection Testing and Soil Vapour Sampling	5
2.6 Regulatory Framework	5
2.6.1 Soil and Groundwater Regulatory Guidelines	5
2.6.2 Soil Vapour Regulatory Guidelines.....	5
2.6.2.1 Comparative Guidelines Following ESRD 2014 Guidance	5
2.6.2.2 Comparative Guidelines Following BC MoE 2010 Guidance	6
3.0 RESULTS.....	7
3.1 Soil Stratigraphy.....	7
3.2 Soil Chemical Quality.....	7
3.3 Groundwater Results	8
3.3.1 Groundwater Levels.....	8
3.3.2 Groundwater Chemical Quality.....	8
3.4 Soil Vapour Results	8
4.0 DISCUSSION AND CONCLUSIONS	9
4.1 Soil	9
4.2 Groundwater	9
4.3 Soil Vapour	9
5.0 RECORD OF SITE CONDITION	10
6.0 RECOMMENDATIONS	10
7.0 CLOSURE.....	11
REFERENCES	12

LIST OF TABLES IN TEXT

Table A: Soil Vapour Screening Levels.....	7
--	---

APPENDIX SECTIONS

TABLES

Table 1	Monitoring Well Completion Details and 2014 Field Monitoring Results
Table 2	Soil Analytical Results
Table 3	Groundwater Analytical Results
Table 4	Soil Vapour Analytical Results
Table 5	Historical Soil Analytical Results
Table 6	Historical Groundwater Analytical Results

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 (July 19, 2014)

APPENDICES

Appendix A	Tetra Tech's General Conditions
Appendix B	Borehole Logs
Appendix C	Laboratory Certificates
Appendix D	Record Of Site Condition

LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Village Of Barons and their agents. Tetra Tech EBA Inc. (Tetra Tech EBA) 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 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 EBA's Services Agreement. Tetra Tech EBA's General Conditions are provided in Appendix A of this report.

1.0 INTRODUCTION

1.1 General

Tetra Tech EBA Inc. (Tetra Tech EBA), was retained by the village of Barons (Barons) to conduct a groundwater monitoring program (GWMP) and a subsurface soil vapour monitoring program (SVMP) for a property located at 202 Main Street in Barons, Alberta (Figure 1). The site is included within the Alberta Municipal Affairs Tank Site Remediation Program (AMA Program), Site Number: 9557.

The scope of work is based on previous environmental site assessments (ESAs) conducted at the site by Tetra Tech EBA which identified concentrations of petroleum hydrocarbons (PHCs) in the soil and groundwater greater than the applicable Alberta Environment and Sustainable Resource Development (ESRD) 2014 Alberta Tier 1 and 2 Soil and Groundwater Remediation Guidelines (Tier 1 Guidelines), and more specifically, in excess of the Tier 1 vapour inhalation (VI) guidelines.

Details of the previous ESAs are presented in the following documents:

- Phase II and Phase III Environmental Site Assessment. 202 Main Street. Lot 1 and Lot 2, Block 7, Plan 2605X. Barons, Alberta. Tetra Tech EBA File No. L22101182.001, Dated October 2009.
- Additional Phase III Environmental Site Assessment. 202 Main Street. Lot 1 and Lot 2, Block 7, Plan 2605X Barons, Alberta. Tetra Tech EBA File No. L22101182.002, Dated December 2011.
- Underground Storage Tank Removal and Monitoring. 202 Main Street. Barons, Alberta. Alberta Municipal Affairs Site #9557. Tetra Tech EBA File No. L22003112-01, Dated October 2013.

The objective of the SVMP was to identify potential risks to occupants working at the site and residing at the adjacent residential dwelling to the east from exposure to soil vapours, specifically benzene, ethylbenzene, toluene, and xylenes (BTEX) and PHC fractions F1 and F2.

Additionally, the SVMP will support the risk management plan (RMP) developed for the site by Tetra Tech EBA in May 2012 (File No. L22101490). It will also ensure that Barons is providing adequate due diligence with respect to any potential health risks to occupants at the site and the adjacent property from potential exposure to soil vapours. Note that the RMP has not yet been approved by ESRD.

The objective of the GWMP was to document current concentrations, allowing the evaluation of natural attenuation of PHC compounds in the soil and groundwater beneath the site.

1.2 Authorization

Ms. Laurie Beck, of the Village of Barons, provided written authorization to Tetra Tech EBA to proceed with the present study via a signed services agreement dated June 25, 2014.

1.3 Scope of Work

To meet the objectives stated in Section 1.1, the scope of work for the GWMP and SVMP included the following tasks:

- Task 1 - Drilling program, soil sampling, and soil vapour well installation.
- Task 2 - Groundwater monitoring and sampling.

- Task 3 – Soil vapour leak testing and sampling.
- Task 4 - Data evaluation and reporting including a Record of Site Condition (RSC).

1.3.1 Drilling Program, Soil Sampling, and Soil Vapour Well Installation

- Requested that Alberta One-Call and a private utility locate company conduct a buried utility locate prior to commencing work.
- Prepared a health and safety plan using Tetra Tech EBA's in-house Safe Work Form (SWF). A safety meeting, including a field level risk assessment, was conducted on site prior to the start of work.
- Obtained water levels from existing monitoring wells on-site to determine the installation depth of the soil vapour wells.
- Drilled four (4) boreholes at the site to a maximum depth of 1.6 m below grade (mbg).
- Obtained representative soil samples during drilling at regular intervals, at a minimum of every 0.4 m, but with greater frequency where there were changes in stratigraphy, moisture, or field screening results. Soils were described according to the Unified Soil Classification System (USCS).
- Conducted combustible vapour concentration (CVC) measurements on soil samples using a photoionization detector (PID).
- Constructed four (4) drilled boreholes into soil vapour monitoring wells using 25 mm solid polyvinyl chloride (PVC) pipe connected to a 50 mm PVC slotted section at the bottom 300 mm of the borehole.
- From the four (4) boreholes, submitted soil samples to Maxxam Laboratory (Maxxam) for laboratory analysis for the following parameters: BTEX, PHC fractions F1 to F4, fraction organic carbon (FOC) and particle size analysis (PSA).

1.3.2 Groundwater Monitoring and Sampling

- Measured groundwater levels in all accessible groundwater monitoring wells previously installed at the site and observed monitoring well integrity.
- Measured CVCs in the headspace of each monitoring well.
- Purged each well of approximately three standing well volumes of water or until the well was practically dry, and allowing the water level in the well to recover; collected groundwater samples from each well.
- Submitted four (4) groundwater samples for laboratory analysis of the following parameters: BTEX, PHC fractions F1 and F2, dissolved iron and manganese, and routine parameters.

1.3.3 Soil Vapour Leak Testing and Sampling

- Performed well leak tests with a helium shroud, collected soil vapour samples from the soil vapour wells installed at the site and submitted soil vapour samples to Maxxam for laboratory analysis for the following parameters: BTEX and aliphatic and aromatic hydrocarbon sub-fractions.

1.3.4 Data evaluation and reporting

- Prepared this report discussing the field observations and analytical results, comparing the results to the ESRD 2014 Soil and Groundwater Tier 1 Guidelines, Health Canada Preliminary Quantitative Risk Assessment (PQRA) Guidance, and ESRD 2014 human toxicity reference values for inhalation exposure thresholds.

1.4 Qualifications of Assessors

Mr. Jamie LaMontagne, EP, conducted the soil vapour well drilling, leak testing, sampling, and prepared this report. Mr. LaMontagne is an environmental technologist for Tetra Tech EBA's Geoenvironmental Discipline and has over thirteen 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 a Team Lead with Tetra Tech EBA's Geoenvironmental Discipline and has over six years of experience in the environment industry.

Mr. Brian Gray, P.Geol., provided technical guidance throughout the project, and conducted the final review of the report. Mr. Gray is a senior environmental geologist with Tetra Tech EBA in the Geoenvironmental Discipline in Calgary, Alberta. Mr. Gray has 30 years of earth sciences experience, the last 20 of which have involved management and remediation of contaminated sites in Alberta, British Columbia, and Ontario.

2.0 METHODS

This section describes the methods applied by Tetra Tech EBA during the GWMP and the SVMP.

2.1 Utility Locates

Utility locates were coordinated with Alberta One-Call (Ticket # 4148568) and a private locator (Alberta Line Find) to identify underground and above-ground utilities. These included, but were not limited to, telecommunication lines, pipelines, power lines, and potential buried objects. A 30 m work zone was cleared around each proposed borehole location.

Due to ground disturbance procedure policy, drilling was not to be conducted within five metres of a buried marked utility and the mast of the drill rig was not to be erected within seven metres from any overhead utility.

2.2 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 EBA representatives. At that time, emergency shut-offs were identified, site conditions were discussed and a safe meeting location was chosen.

2.3 Borehole Drilling and Soil Vapour Well Installation Program

On June 6, 2014, Tetra Tech EBA retained Chilako Drilling Services Ltd. of Coaldale, Alberta to conduct the borehole drilling and soil vapour well installation at four locations (14VW01, 14VW02, 14VW03, and 14VW04). Prior to drilling activities commencing, groundwater levels were obtained from the existing monitoring well network to determine installation depths. Drilling activities were conducted using a track-mounted drill rig equipped with a 100 mm solid stem auger. Tetra Tech EBA described soils according to the modified USCS with additional comments on unusual stains and/or debris. Soil samples were collected directly from the auger of the drill rig at 0.4 m intervals and/or changes in lithology, or where soil staining was observed. Bagged soil samples were screened for CVCs using a MiniRAE 3000 portable PID. CVC measurements from all the soil samples were less than the instruments detection limits (various locations) to 45 ppm at 14VW03 (1.4 to 1.6 m).

Soil vapour wells were constructed and installed approximately 0.5 m above the perceived water table using a sampling port and valve attached to a 25 mm solid PVC pipe and a 50 mm slotted PVC vapour intake screen with a length of 300 mm at the base of the well. 14VW01 to 14VW03 were completed to 1.6 mbg and 14VW04 was completed to 1.1 mbg. Silica sand was placed from the base of the borehole to approximately 0.2 m above the slotted interval of the standpipe within the borehole annulus. The annulus of each monitoring well, above the screened section, was sealed with bentonite clay to ground level and a flush mount casing was seated in concrete to protect the well.

One (1) soil sample from the base of each borehole was selected for laboratory analyses of BTEX and PHC fraction F1 to F4. An additional two (2) samples from 14VW03 were submitted for FOC and PSA. Soil samples were placed in laboratory-supplied 250 mL glass jars with Teflon™-lined lids, kept cool in ice-filled coolers, and transported to Maxxam, under chain-of-custody (COC) documentation.

Soil vapour well locations are presented on Figure 2, and borehole logs are included in Appendix B.

2.4 Groundwater Monitoring, Sampling, and Analytical Testing

Tetra Tech EBA personnel conducted the GWMP on July 18 and 19, 2014. Liquid levels were measured using a Heron™ electronic interface probe at all accessible groundwater monitoring wells (08MW02, 08MW07, 09MW10, and 09MW13). Monitoring wells were screened for headspace CVCs using a PID and measurements ranged from 0.6 ppm (08MW07) to 275 ppm (09MW13). Prior to sampling, groundwater wells were purged of approximately three standing well volumes of water, or until the well was practically dry, and allowed to recover to near static levels prior to collecting the samples. Groundwater samples were collected using dedicated disposable bailers, stored in laboratory-supplied bottles, appropriately preserved/filtered, and stored on ice in a cooler. The samples were transported to Maxxam under COC for analysis of BTEX, PHC fraction F1 and F2, dissolved iron and manganese, and routine groundwater parameters. Dissolved iron and manganese, and routine groundwater parameters were analyzed for the first time in 2014 for future reference to assist in determining the potential for the natural attenuation of PHCs at the site.

Tetra Tech EBA's standard procedures for purging, sampling, preserving, and transporting groundwater samples were followed to avoid cross-contamination and to ensure sample quality was maintained. Groundwater monitoring and sampling was conducted in accordance with EBA work methods (WM4203).

Table 1 summarizes groundwater monitoring well completion details and the 2014 monitoring results. Groundwater monitoring well locations are presented on Figure 2.

2.5 Leak Detection Testing and Soil Vapour Sampling

Tetra Tech EBA personnel conducted helium leak detection tests and purged all four (4) soil vapour wells of approximately 1.0 L of air on July 18, 2014. A shroud constructed from a 20 L plastic container was placed over the soil vapour well and sealed to the ground surface using a hydrated bentonite mixture. Industrial grade helium gas (99.99 % helium) was then introduced into the shroud until a minimum of 25 % helium gas was present and stable within the shroud. A PID was attached to the brass sampling valve of the well within the shroud and 1.0 L of air was drawn from the well into a Tedlar bag. A helium / hydrogen multi-gas detector was then attached to the Tedlar bag to draw a sample and determine if ambient air was entering the soil vapour well via the subsurface bentonite seal. The helium concentration from all four (4) soil vapour wells were less than the instrument detection limits, concluding that the well integrity was sufficient.

Tetra Tech EBA returned to the site on July 19, 2014 to conduct the soil vapour sampling. Soil vapour samples were collected using 1.4 L Summa™ canisters equipped with non-linear flow regulators set to collect the sample over a period of 60 minutes. The Summa™ canisters were submitted to Maxxam for analysis of BTEX and aliphatic and aromatic hydrocarbon sub-fractions.

2.6 Regulatory Framework

2.6.1 Soil and Groundwater Regulatory Guidelines

Based on the surrounding land use and the desired end land use for the site, soil and groundwater analytical results were compared to Tier 1 Guidelines for residential land use, fine-grained soils. 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. Such receptors include the DUA, freshwater aquatic life (FAL), direct soil contact (ecological and human), off-site migration, and vapour inhalation.

2.6.2 Soil Vapour Regulatory Guidelines

2.6.2.1 Comparative Guidelines Following ESRD 2014 Guidance

As presented in the ESRD Alberta 2014 Tier 2 Soil and Groundwater Remediation Guidelines (Tier 2 Guidelines), the concentration of potential contaminants of concern (PCOC) in soil vapour samples may be used to evaluate the risk to indoor and outdoor receptors via inhalation of vapours originating in the subsurface.

The Tier 2 Guidelines include human toxicity reference values (TRVs) for inhalation. For non-carcinogens, the inhalation TRV represents the concentration of the chemical of concern considered unlikely to cause adverse human health effects after a lifetime of continuous exposure, referred to as the tolerable concentration (TC). For carcinogens, the inhalation TRV is referred to as the inhalation unit risk (IUR), and can be used to determine a risk-specific concentration (RSC). To ensure that the incremental lifetime cancer risk of an individual does not exceed 1 in 100,000 (1×10^{-5}) after a lifetime of continuous exposure, the RSC is calculated as follows:

$$\text{RSC} = 10^{-5} / \text{IUR}$$

The assumption of continuous exposure, expressed as an exposure term (ET) of 1, is considered appropriate for residential exposure. The ET is used to determine appropriate indoor screening levels for ambient air in buildings as indicated below:

$$\text{Indoor Screening Level} = (\text{TC or RSC}) / \text{ET}$$

As permitted under the Tier 2 Guidelines, subsurface soil vapour concentrations may be used to assess the potential for health risks via inhalation by applying an attenuation coefficient [dilution factor(DF)] to account for the dilution of vapours as they migrate from the subsurface into the building and mixing with indoor air. However, the DF used in the models to assess the transport of hydrocarbon vapours into a building assumes that the structure has a solid foundation, such as a concrete floor slab or basement. In the cases where the physical structures are more sensitive than assumed under the Tier 1 and Tier 2 Guideline development, such as the presence of an earthen floor basement, ESRD does not offer an attenuation coefficient and calculation of site specific DFs is required.

At this site, where the proximal residence has an earthen basement, the calculation of site-specific DFs would require extensive field and laboratory testing of numerous geotechnical soil properties, which was beyond the scope of this project. Alternatively, the use of "typical" default soil properties could be employed in the calculations however; it is considered that the number of default parameters required would be too extensive to assume that the calculated DF would be representative of true conditions.

In consideration of the above coupled with the presence of soil having PHC concentrations in excess of the Tier 1 Guidelines within 3 m of the residence (and soil with benzene concentrations in excess of the Tier 1 vapour inhalation guideline within 5 m), Tetra Tech EBA suggests that the soil vapour concentrations measured in the vapour wells may provide a reasonable approximation of the vapours actually entering the building envelope. As such Tetra Tech EBA compared the soil vapour data to the TC or RSC in the case of carcinogenic compounds.

2.6.2.2 Comparative Guidelines Following BC MoE 2010 Guidance

As stated above, the ESRD models do not offer an attenuation coefficient to account for the dilution of vapours as they migrate from the subsurface into a building with an earthen basement and mixing with indoor air. However, BC Guidance (CSR Technical Guidance 4) permits the conservative application of an attenuation coefficient of 0.1 (dilution factor of 10) to soil vapour data collected within 5 m of an unlined crawl space, earthen basement or wooden basement. In order to support the assumption that the TC or RSC adequately represents the risk to receptors, the BC CSR dilution factor was also applied. The TC, IUR, and ET are the same in models from both provinces.

For non-carcinogens, ESRD 2014 and BC 2010 apply a soil allocation factor (SAF) in the development of the soil remediation guidelines. The SAF represents the relative proportion of the TRV that may be apportioned to impacts in soil and allows for the remaining incremental exposure to be reserved for other media (e.g. food, air, water and consumer products). ESRD also use the SAF in deriving the groundwater guidelines, again reserving some incremental exposure to be allocated to other media. To maintain an equivalent level of protection, the SAF was also applied in the development of the soil vapour screening levels. Tetra Tech EBA advises that the SAF was not applied to the carcinogenic indoor screening levels since the air within the building reflects the contributions of all other media to the inhalation pathway.

Based on the above, the soil vapour screening levels were determined as follows:

$$\text{Soil Vapour Screening Level (non-carcinogen)} = \text{TC} \times \text{SAF} \times \text{DF} / \text{ET}$$

$$\text{Soil Vapour Screening Level (carcinogen)} = \text{RSC} \times \text{DF} / \text{ET}$$

The following table (Table A) presents the calculated soil vapour screening levels.

Table A: Soil Vapour Screening Levels

Compound	TC (mg/m3)	IUR (mg/m3)	RSC (mg/m3)	ET (residential)	Indoor Screening Level (mg/m3)	SAF	DF	Soil Vapour Screening Levels (mg/m3)
Benzene	-	0.0033	0.0030	1	0.0033	-	10	0.03
Toluene	3.8	-	-	1	3.8	0.5	10	19.0
Ethylbenzene	1.0	-	-	1	1.0	0.5	10	5.0
Xylenes (total)	0.18	-	-	1	0.18	0.5	10	0.9
F1								
>C6-C10 Aliphatic	18.4	-	-	1	18.4	0.5	10	92.0
>C8-C10 Aliphatic	1.0	-	-	1	1.0	0.5	10	5.0
>C8-C10 Aromatic	0.2	-	-	1	0.2	0.5	10	1.0
F2								
>C10-C12 Aliphatic	1.0	-	-	1	1.0	0.5	10	5.0
>C12-C16 Aliphatic	1.0	-	-	1	1.0	0.5	10	5.0
>C10-C12 Aromatic	0.2	-	-	1	0.2	0.5	10	1.0
>C12-C16 Aromatic	0.2	-	-	1	0.2	0.5	10	1.0

- = no value or not applicable

TC = tolerable concentration (Table A7 ESRD 2014)

IUR – inhalation unit risk (Table A7 ESRD 2014)

RSC = risk specific concentration

ET = exposure term (Table A1 ESRD 2014)

SAF = soil allocation factor (Table A9 ESRD 2014)

DF = dilution factor (British Columbia Ministry of Environment, Technical Guidance on Contaminated Sites 4; Vapour Investigation and Remediation, Version 1, September 2010)

3.0 RESULTS

3.1 Soil Stratigraphy

The surficial soils at all soil vapour well locations are generally comprised of a layer of clay fill to an approximate depth ranging between 0.8 mbg (14VW01, 14VW03 and 14VW04) and 1.2 mbg (14VW02). Underlying the clay fill is a medium plasticity clay to the completion depth at 1.6 mbg (14VW01, 14VW02, and 14VW03), and 1.1 mbg (14VW04).

Free water was not encountered in any of the boreholes.

3.2 Soil Chemical Quality

Concentrations of BTEX and PHC fractions F1 to F4 in the soil samples collected from the soil vapour wells were less than the laboratory detection limits at all locations sampled, excluding 14VW03. Concentrations of BTEX and PHC fractions F2 to F4 at 14VW03 were detected, however, were at concentrations less than the applicable Tier 1 Guidelines.

Soil samples analyzed for PSA at 14VW03 from depths of 0.2 m to 0.4 m and 0.6 m to 0.8 m characterized the soil as fine-grained.

Laboratory analytical results, including methods of analyses, are attached in Appendix C. A summary of soil analytical results is provided in Table 2. Historical soil analytical results are summarized in Table 5 and historic borehole locations are identified on Figure 2.

3.3 Groundwater Results

3.3.1 Groundwater Levels

Groundwater levels on July 19, 2014 ranged from 1.41 mbg at 09MW13 to 1.80 mbg at 08MW02. Based on the calculated groundwater elevations, the inferred groundwater flow direction is south-easterly.

Monitoring well completion details and field monitoring results are summarized in Table 1 and Figure 3 presents the groundwater elevations.

3.3.2 Groundwater Chemical Quality

Concentrations of benzene were greater than the Tier 1 Guideline (0.005 mg/L) in the groundwater at 08MW02 (0.042 mg/L), 09MW10 (0.11 mg/L) and 09MW13 (0.15 mg/L). Concentrations of ethylbenzene were greater than the Tier 1 Guideline (0.0024 mg/L) at 09MW13 (0.020 mg/L). Concentrations of PHC fraction F2 were greater than the Tier 1 Guideline (1.1 mg/L) at 08MW02 (1.4 mg/L) and 09MW13 (14 mg/L). All remaining BTEX and PHC fractions F1 to F2 concentrations were less than the applicable guidelines.

Nitrite concentrations were greater than the Tier 1 Guidelines (0.06 mg/L) at 08MW7 (0.2 mg/L), 09MW10 (3.3 mg/L) and 09MW13 (2.3 mg/L).

Total dissolved solids (TDS) concentrations were greater than the Tier 1 Guideline (500 mg/L) at all locations sampled, ranging from 1,600 mg/L at 08MW02 to 7,000 mg/L at 09MW13.

Chloride concentrations were less than the Tier 1 Guideline (120 mg/L) at all locations sampled, excluding 09MW13 (130 mg/L).

Sodium concentrations were greater than the Tier 1 Guideline (200 mg/L) at all locations sampled, excluding 08MW02, and ranged from 600 mg/L at 08MW07 to 1,300 mg/L at 09MW13.

Sulphate concentrations were greater than the Tier 1 Guideline (500 mg/L) at all locations sampled, ranging from 680 mg/L at 08MW02 to 4,100 mg/L at 09MW13.

Dissolved manganese concentrations were greater than the Tier 1 Guideline (0.05 mg/L) in the groundwater at all locations sampled, ranging from 0.81 mg/L at 09MW10 to 1.7 mg/L at 08MW02. Concentrations of dissolved iron were greater than the Tier 1 Guideline (0.3 mg/L) at 08MW02 (1.3 mg/L) and 09MW13 (1.1 mg/L).

Laboratory analytical results, including methods of analyses, are attached in Appendix C. A summary of groundwater analytical results is provided in Table 3. Historical groundwater analytical results are summarized in Table 6 and historic groundwater wells are identified on Figure 2.

3.4 Soil Vapour Results

Soil vapour samples were collected in Summa™ canisters, from the soil vapour probes that were installed on the site and submitted for laboratory analysis to assess potential impacts from regulated vapours. Concentrations of BTEX and PHC aliphatic and aromatic sub-fractions were within the applicable standards with the exception of benzene and the >C₈-C₁₀ and >C₁₀-C₁₂ aromatic sub-fractions.

Concentrations of benzene exceeded the RSC in each of the four vapour wells (14VW01 to 14VW04). The $>C_8$ - C_{10} aromatic sub-fraction exceeded the TC in the three vapour wells closest to the adjacent residence (14VW01 to 14VW03) and the $>C_{10}$ - C_{12} aromatic sub-fractions exceeded the TC in two of the vapour wells (14VW01 and 14VW03). Following application of the British Columbia Ministry of Environment (MoE) attenuation coefficient, the benzene concentration in each of the four vapour wells still exceeded the calculated soil vapour screening level concentration.

Laboratory analytical results, including methods of analyses, are attached in Appendix C. Table 4 presents the soil vapour analytical data in comparison to the TC (or RSC) derived from ESRD guidance and the soil vapour screening levels calculated using the BC MoE DF.

4.0 DISCUSSION AND CONCLUSIONS

4.1 Soil

Concentrations of BTEX, and PHC fractions F1 to F4, were less than the laboratory detection limits, and/or Tier 1 Guidelines at the locations tested in 2014. Historically, concentrations of BTEX and PHC fractions F1 to F3 have been identified at concentrations greater than the Tier 1 Guidelines at several locations (08BH01 through 08BH06, 09BH12, 09BH13, 09BH17, 09BH19, 09BH20, 11MW01, and 11MW03) at depths ranging from 1.2 – 4.8 mbg. Tetra Tech EBA notes that the soil samples collected during this investigation were from a maximum depth of 1.6 mbg.

4.2 Groundwater

Concentrations of benzene, ethylbenzene and PHC fraction F2 were detected greater than the Tier 1 Guideline in the groundwater at one or more of the following locations tested (08MW02, 09MW10, and 09MW13). All remaining BTEX and PHC fraction F1 to F2 concentrations were less than the applicable guidelines. Concentrations of PHC compounds have generally shown a decrease at most locations since Tetra Tech EBA's 2008/2009 groundwater assessment (EBA 2009). Historically concentrations of benzene, ethylbenzene, xylenes, and PHC fraction F1 and/or F2 were detected greater than the applicable guidelines at all locations sampled.

Routine groundwater parameters were analyzed for the first time in 2014 for future reference to assist in determining the potential for the natural attenuation of PHCs at the site. Concentrations of TDS, sodium, sulphate, chloride, nitrite, manganese and iron greater than the Tier 1 Guidelines were measured in one or more monitoring wells in 2014. The concentrations of these parameters, excluding chloride, may reflect natural groundwater composition attributed to the dissolution of soluble salts within the till beneath the site.

Concentrations of dissolved manganese and iron greater than the Tier 1 Guidelines are often detected in groundwater under anaerobic conditions and are likely not the result of historical site activities.

4.3 Soil Vapour

The concentrations of one or more of benzene and the $>C_8$ - C_{10} and $>C_{10}$ - C_{12} aromatic sub-fraction exceeded the applied guidelines from each of the four vapour wells (14VW01, 14VW02, 14VW03 and 14VW04). Following application of the British Columbia MoE attenuation coefficient, the benzene concentration in each of the four vapour wells still exceeded the calculated soil vapour screening level concentration. The results indicate that there is a risk of exposure to PHCs via inhalation of indoor air at the nearby residence with an earthen basement. No risk of exposure via inhalation of indoor air was identified to receptors in surrounding commercial buildings which have concrete floors or basements.

5.0 RECORD OF SITE CONDITION

In March 2008, ESRD adopted the RSC form. A completed RSC form is required to be submitted with environmental assessment reports. A copy of the RSC form is included in Appendix D.

6.0 RECOMMENDATIONS

- Annual groundwater monitoring and sampling of the current monitoring well network and analytical parameters should be maintained to determine if PHC concentrations are stable or decreasing.
- The RMP should be updated to address the risk of exposure to PHC-impacted vapours at the proximal residence with an earthen basement. In the interim, it should be determined if potentially explosive vapour concentrations exist within the crawlspace beneath the residence. This could be accomplished with a combustible vapour analyzer.

7.0 CLOSURE

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

Respectfully submitted,
Tetra Tech EBA Inc.

Prepared by:
Jamie LaMontagne, EP
Environmental Technologist - Geoenvironmental
Environment Practice
Direct Line: 403.329.9009 x227
Jamie.LaMontagne@tetrattech.com

Reviewed by:
Jaymes Going, B.Sc., EP
Environmental Scientist - Geoenvironmental
Environment Practice
Direct Line: 403.329.9009 x236
Jaymes.Going@tetrattech.com



Reviewed by:
Brian H. Gray
Senior Environmental Geologist – Geoenvironmental
Environment Practice
Direct Line: 403.723.6856 x808
Brian.Gray@tetrattech.com

/cee

PERMIT TO PRACTICE TETRA TECH EBA INC.	
Signature	
Date	<u>October 15, 2014</u>
PERMIT NUMBER: P245 The Association of Professional Engineers and Geoscientists of Alberta	

REFERENCES

- Alberta Environment and Sustainable Resource Development. 2014. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Environmental Policy Branch. Edmonton, Alberta.
- Alberta Environment and Sustainable Resource Development. 2014. Alberta Tier 2 Soil and Groundwater Remediation Guidelines. Environmental Policy Branch. Edmonton, Alberta.
- Phase II and Phase III Environmental Site Assessment. 202 Main Street. Lot 1 and Lot 2, Block 7, Plan 2605X. Barons, Alberta. Tetra Tech EBA File No. L22101182.001, Dated October 2009.
- Additional Phase III Environmental Site Assessment. 202 Main Street. Lot 1 and Lot 2, Block 7, Plan 2605X. Barons, Alberta. Tetra Tech EBA File No. L22101182.002, Dated December 2011.
- Underground Storage Tank Removal and Monitoring. 202 Main Street. Barons, Alberta. Alberta Municipal Affairs Site #9557. Tetra Tech EBA File No. L22003112-01, Dated October 2013.
- British Columbia Ministry of Environment. 2010. Technical Guidance 4: Vapour Investigation and Remediation. Victoria, BC.

TABLES

Table 1	Monitoring Well Completion Details and 2014 Field Monitoring Results
Table 2	Soil Analytical Results
Table 3	Groundwater Analytical Results
Table 4	Soil Vapour Analytical Results
Table 5	Historical Soil Analytical Results
Table 6	Historical Groundwater Analytical Results

Table 1: Monitoring Well Completion Details and 2014 Field Monitoring Results

Monitoring Well I.D.	Date of Installation	Elevation ¹ (m)	Monitoring Well Depth (mbg) ²	Screen Interval (mbg)	Screened In	Depth to Groundwater (mBTOC) ³	Depth to Groundwater (mbg)	Groundwater Elevation (m)	Combustible Vapour Concentrations ⁴
July 18, 2014									
08MW02	17-Nov-08	99.33	5.2	2.2 to 5.2	Clay and bedrock	1.835	1.80	97.50	46.5 ppm
08MW07	17-Nov-08	99.13	6.1	1.6 to 6.1	Clay and bedrock	1.62	1.67	97.51	0.6 ppm
09MW10	12-Mar-09	99.29	6.1	3.1 to 6.1	Clay and bedrock	1.78	1.78	97.51	2.6 ppm
09MW13	12-Mar-09	98.86	6.1	3.1 to 6.1	Clay and bedrock	1.38	1.41	97.48	275 ppm

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 Combustible vapour concentrations measured in parts per million using a MiniRae 3000 PID.

Table 2: Soil Analytical Results

Parameter	Unit	Tier 1 Guideline ¹		14VW01	14VW02	14VW03	14VW03	14VW03	14VW04
				1.6 m	1.6 m	0.2-0.4 m	0.6-0.8 m	1.6 m	1.0 m
		Surface Soil	Subsoil	6/6/2014	6/6/2014	6/6/2014	6/6/2014	6/6/2014	6/6/2014
Hydrocarbons									
Benzene	mg/kg	0.046	0.046	<0.005	<0.005	--	--	0.018	<0.005
Toluene	mg/kg	0.52	0.52	<0.02	<0.02	--	--	0.14	<0.02
Ethylbenzene	mg/kg	0.11	0.11	<0.01	<0.01	--	--	0.037	<0.01
Xylene Total	mg/kg	15	15	<0.04	<0.04	--	--	0.49	<0.04
Xylene (m & p)	mg/kg	NG	NG	<0.04	<0.04	--	--	0.33	<0.04
Xylene (o)	mg/kg	NG	NG	<0.02	<0.02	--	--	0.16	<0.02
F1 (C6-C10 Hydrocarbons)	mg/kg	210	420	<12	<12	--	--	<12	<12
F1 (C6-C10) - BTEX	mg/kg	210	420	<12	<12	--	--	<12	<12
F2 (C10-C16 Hydrocarbons)	mg/kg	150	300	<10	<10	--	--	24	<10
F3 (C16-C34 Hydrocarbons)	mg/kg	1,300	2,600	<50	<50	--	--	310	<50
F4 (C34-C50 Hydrocarbons)	mg/kg	5,600	10,000	<50	<50	--	--	540	<50
F4G (C50+)	mg/kg	NG	NG	--	--	--	--	3,800	--
Physical Properties									
Dry Bulk Density	g/cm3	NG	NG	--	--	1.6	1.7	--	--
Moisture	%	NG	NG	21	21	14	13	16	18
Organics									
Total Organic Carbon (TOC)	%	NG	NG	--	--	1.1	0.67	--	--
Fraction of Organic Carbon	g/g	NG	NG	--	--	0.011	0.0067	--	--
Particle Size									
Sieve-Pan	%	NG	NG	--	--	81	64	--	--
Sieve-Pan - # 200 (>0.075 mm)	N/A	NG	NG	--	--	19	36	--	--
Grain Size	N/A	NG	NG	--	--	Fine	Fine	--	--

Notes:

¹ Alberta Environment and Sustainable Resource Development (ESRD). 2014. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land and Forestry Policy Branch, Policy Division. 195 pp. References guidelines are for fine-grained surface and subsoil under residential/parkland land use.

NG - No guideline.

-- = Not analyzed.

< = less than laboratory reportable detection limit.

BOLD AND SHADED - Exceeds Guideline.

Table 3: Groundwater Analytical Results

Parameter	Unit	Tier 1 Guideline ¹	08MW02	08MW07	09MW10	09MW13
			7/18/2014	7/18/2014	7/18/2014	7/18/2014
Hydrocarbons						
Benzene	mg/L	0.005	0.042	0.0038	0.11	0.15
Toluene	mg/L	0.024	<0.0004	<0.0004	<0.0004	<0.0004
Ethylbenzene	mg/L	0.0024	0.002	<0.0004	<0.0004	0.02
Xylene Total	mg/L	0.3	0.0014	<0.0008	0.0032	0.017
Xylene (m & p)	mg/L	NG	0.0014	<0.0008	0.001	0.015
Xylene (o)	mg/L	NG	<0.0004	<0.0004	0.0021	0.0024
F1 (C6-C10 Hydrocarbons)	mg/L	2.2	0.14	<0.1	0.27	0.78
F1 (C6-C10) - BTEX	mg/L	2.2	<0.1	<0.1	0.16	0.59
F2 (C10-C16 Hydrocarbons)	mg/L	1.1	1.4	0.33	<0.1	14
Nutrients						
Nitrate (as NO3-) (Filtered)	mg/L	NG	0.92	12	3.5	7.2
Nitrite (as NO2-) (Filtered)	mg/L	NG	0.11	0.66	11	7.5
Nitrogen (Total Oxidised)	mg/L	NG	0.24	2.8	4.1	3.9
Nitrate (as N) (Filtered)	mg/L	3	0.21	2.6	0.78	1.6
Nitrite (as N) (Filtered)	mg/L	0.06	0.034	0.2	3.3	2.3
Routine						
Alkalinity (Carbonate as CaCO3)	mg/L	NG	<0.5	<0.5	<0.5	<0.5
pH (Lab)	pH Units	6.5-8.5	7.59	7.71	7.63	7.56
Hardness as CaCO3	mg/L	NG	1,000	1,700	2,100	2,400
Electrical Conductivity (EC)	uS/cm	NG	2,200	4,700	6,600	7,700
Total Dissolved Solids (TDS)	mg/L	500	1,600	4,000	5,700	7,000
Chloride (Cl) (Filtered)	mg/L	120	24	51	86	130
Alkalinity (total as CaCO3)	mg/L	NG	680	770	990	1,200
Bicarbonate	mg/L	NG	820	940	1,200	1,400
Calcium (Filtered)	mg/L	NG	180	300	340	380
Carbonate	mg/L	NG	<0.5	<0.5	<0.5	<0.5
Hydroxide	mg/L	NG	<0.5	<0.5	<0.5	<0.5
Magnesium (Filtered)	mg/L	NG	130	230	290	360
Alkalinity (pp as CaCO3)	mg/L	NG	<0.5	<0.5	<0.5	<0.5
Potassium (Filtered)	mg/L	NG	3.9	6.8	8.2	9.1
Sodium (Filtered)	mg/L	200	190	600	1,000	1,300
Sulphate (SO4) (Filtered)	mg/L	500	680	2,300	3,400	4,100
Metals						
Iron (Filtered)	mg/L	0.3	1.3	<0.06	<0.06	1.1
Manganese (Filtered)	mg/L	0.05	1.7	1.6	0.81	1.3
Inorganics						
Anion Sum	meq/L	NG	28	66	93	110
Cation Sum	meq/L	NG	29	60	86	100
Ionic Balance	N/A	NG	1	0.92	0.93	0.91

Notes:

¹ Alberta Environment and Sustainable Resource Development (ESRD). 2014. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land and Forestry Policy Branch, Policy Division. 195 pp. References guidelines are for fine-grained soils under residential/parkland land use.

NG - No guideline.

< = less than laboratory reportable detection limit.

BOLD AND SHADED - Exceeds Guideline.

Table 4: Soil Vapour Analytical Results

Parameters	Sample Location	14VW01	14VW02	14VW03	14VW04	TC ¹ (ug/m ³)	RSC (ug/m ³)	Soil Vapour Screening Level Concentration ² (ug/m ³)
	Lab ID	WT9268	WT9269	WT9270	WT9271			
	Date	7/18/2014	7/18/2014	7/18/2014	7/18/2014			
	Sample Duration (min)	60	60	60	60			
	Sample Flow Rate (mL/min)	23	23	23	23			
	Sample Volume (litres)	1.4	1.4	1.4	1.4			
Volatile Organics								
Benzene		535	238	639	205	NG	3.3	30
Toluene		3.5	2.3	6.6	<1.6	3,800	NG	19,000
Ethylbenzene		<1.6	<1.6	<1.6	<1.6	1,000	NG	5,000
Xylenes (total)		5.2	<2.2	<2.2	<2.2	180	NG	900
F1 Petroleum Hydrocarbons								
>C6-C8 Aliphatic		27.4	11.5	31.0	9.0	18,400	NG	92,000
>C8-C10 Aliphatic		81.4	10.8	12.0	<5.0	1,000	NG	5,000
>C8-C10 Aromatic		442	387	732	145	200	NG	1,000
F2 Petroleum Hydrocarbons								
>C10-C12 Aliphatic		98.8	34.4	45.9	5.4	1,000	NG	5,000
>C12-C16 Aliphatic		9.8	13.3	35.5	<5.0	1,000	NG	5,000
>C10-C12 Aromatic		264	149	268	18.2	200	NG	1,000
>C12-C16 Aromatic		10.2	10.2	7	<5.0	200	NG	1,000

Notes:

¹ = Alberta Tier 2 Soil and Groundwater Remediation Guidelines - tolerable concentration from Table C-7 Human Toxicity Reference Values.

² = Alberta Tier 2 Soil and Groundwater Remediation Guidelines - Calculated screening levels for indoor air inhalation employing BC MoE attenuation coefficient.

mL/min = millilitres per minute.

< = less than laboratory reportable detection limit.

NG = no guideline.

All results in ug/m³.

TC = tolerable concentration.

RSC = risk specific concentration.

442 Measured concentration exceeds TC or RSC.

535 Measured concentration exceeds soil vapour screening level.

Table 5: Historical Soil Analytical Results

Parameters	Detection Limits	Units	Tier 1 Guidelines ¹		17-Nov-08																					
					08MW01			08MW02			08BH03			08BH04			08BH05			08MW06			08MW07			
			Surface Soil	Subsoil	1.5 m	4.2 m	4.8 m	1.6 m	2.2 m	4.2 m	1.2 m	1.8 m	4.8 m	1.9 m	3.0 m	5.4 m	1.8 m	2.4 m	4.8 m	1.6 m	2.4 m	5.4 m	3.0 m	4.2 m	6.0 m	
Petroleum Hydrocarbons																										
Benzene	0.02	mg/kg	0.046	0.046	<0.02	6.3	<0.02	<0.02	<0.02	3.2	<0.02	0.15	54	<0.02	<0.02	19	<0.02	<0.02	1.1	<0.02	<0.02	2	<0.02	<0.02	<0.02	<0.02
Toluene	0.01	mg/kg	0.52	0.52	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.11	6.4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Ethylbenzene	0.04	mg/kg	0.11	0.11	<0.04	13	0.092	<0.04	41	<0.04	0.21	310	<0.04	<0.04	36	<0.04	<0.04	6.3	<0.04	<0.04	21	<0.04	<0.04	<0.04	<0.04	
Xylenes	0.04	mg/kg	15	15	<0.04	16	0.16	<0.04	50	<0.04	1	1,500	<0.04	0.24	50	<0.04	<0.04	8	<0.04	<0.04	31	<0.04	<0.04	<0.04	<0.04	
F1 (C ₁₀ to C ₁₀)	12	mg/kg	210	420	<12	710	<12	<12	1,000	<12	<12	5,300	<12	<12	1,300	<12	<12	140	<12	<12	280	<12	<12	<12	<12	
F2 (C ₁₀ to C ₁₀)	10	mg/kg	150	300	<10	4,700	250	<10	310	23	<10	3,500	<10	<10	4,200	<10	<10	2,000	<10	<10	1,300	<10	<10	<10	<10	
F3 (C ₁₀ to C ₁₀)	10	mg/kg	1,300	2,600	<10	2,100	140	<10	<10	21	360	9,400	<10	<10	1,700	<10	<10	1,000	<10	<10	510	<10	<10	<10	<10	
F4 (C ₁₀ to C ₁₀)	10	mg/kg	5,600	10,000	<10	23	<10	<10	<10	<10	100	1,500	<10	<10	<10	<10	<10	nd	<10	<10	<10	<10	<10	<10	<10	
Metals																										
Lead (Pb)	1	mg/kg	140	NG	9	8	6	8	13	5	46	67	7	21	17	7	6	16	9	9	14	8	9	9	8	
Physical Properties																										
Soil Moisture Content	0.3	%	NG	NG	22	14	5.3	20	26	6.1	16	24	14	20	20	19	17	23	12	24	23	11	24	14	10	
<75 um Sieve	0.2	%	NG	NG	94	--	49	--	--	--	--	--	--	--	73	--	--	--	--	--	--	--	--	--	--	
>75 um Sieve	0.2	%	NG	NG	6	--	51	--	--	--	--	--	--	--	27	--	--	--	--	--	--	--	--	--	--	
Grain Size	0.2		NG	NG	FINE	--	COARSE	--	--	--	--	--	--	--	FINE	--	--	--	--	--	--	--	--	--	--	

Parameters	Detection Limits	Units	Tier 1 Guidelines ⁴		12-Mar-09											
					09BH09		09BH11	09BH12		09MW13	09BH17		09MW19		09BH20	
			Surface Soil	Subsoil	5.4 m	6.0 m	4.2 m	2.4 m	3.0 m	4.8 m	3.0 m	4.2 m	4.8 m	5.4 m	3.0 m	3.6 m
Petroleum Hydrocarbons																
Benzene	0.02	mg/kg	0.046	0.046	<0.02	<0.02	0.023	0.016	1.5	0.054	0.97	0.036	0.02	0.018	9.7	0.53
Toluene	0.01	mg/kg	0.52	0.52	<0.01	<0.01	<0.01	<0.04	<0.01	<0.01	<0.01	<0.04	<0.04	<0.04	0.06	0.1
Ethylbenzene	0.04	mg/kg	0.11	0.11	<0.04	<0.04	0.028	<0.04	12	0.057	19	0.051	<0.04	<0.04	21	0.2
Xylenes	0.04	mg/kg	15	15	<0.04	<0.04	0.11	<12	18	0.069	29	0.066	<12	<12	36	0.7
F1 (C ₁₀ to C ₁₀)	12	mg/kg	210	420	<12	<12	<12	<12	410	<12	590	<12	<12	<12	430	<12
F2 (C ₁₀ to C ₁₀)	10	mg/kg	150	300	13	11	<10	<10	180	69	1,400	<10	<10	<10	660	<10
F3 (C ₁₀ to C ₁₀)	10	mg/kg	1,300	2,600	<10	<10	<10	<10	24	<10	520	<10	<10	<10	230	<10
F4 (C ₁₀ to C ₁₀)	10	mg/kg	5,600	10,000	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Metals																
Lead (Pb)	1	mg/kg	140	NG	10	8	7	9	13	4	13	7	8	8	12	7
Physical Properties																
Soil Moisture Content	0.3	%	NG	NG	18	19	14	18	23	17	21	15	18	17	19	13
<75 um Sieve	0.2	%	NG	NG	--	51	--	89	--	71	90	--	--	52	--	--
>75 um Sieve	0.2	%	NG	NG	--	49	--	11	--	29	10	--	--	48	--	--
Grain Size	0.2		NG	NG	--	FINE	--	FINE	--	FINE	FINE	--	--	FINE	--	--

Parameters	Detection Limits	Units	Tier 1 Guidelines ¹		15-Mar-11								
					11MW01			11MW02			11MW03		
			Surface Soil	Subsoil	1.8 m	2.4 m	4.2 m	1.6 m	2.2 m	6.0 m	3.6 m	4.8 m	5.4 m
Petroleum Hydrocarbons													
Benzene	0.02	mg/kg	0.046	0.046	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Toluene	0.01	mg/kg	0.52	0.52	<0.01	<0.01	<0.01	<0.01	<0.01	<0.04	<0.01	<0.04	<0.01
Ethylbenzene	0.04	mg/kg	0.11	0.11	0.059	5.5	0.062	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Xylenes	0.04	mg/kg	15	15	0.14	16	<0.04	<0.04	<0.04	<0.04	<0.04	<12	<0.04
F1 (C ₁₀ to C ₁₀)	12	mg/kg	210	420	<12	12	<12	<12	<12	<12	<12	260	<12
F2 (C ₁₀ to C ₁₀)	10	mg/kg	150	300	<10	21	<10	<10	<10	230	<10	1,700	<10
F3 (C ₁₀ to C ₁₀)	10	mg/kg	1,300	2,600	<10	<10	<10	<10	<10	110	<10	800	<10
F4 (C ₁₀ to C ₁₀)	10	mg/kg	5,600	10,000	<10	<10	<10	<10	<10	<10	<10	<10	<10
Physical Properties													
Soil Moisture Content	0.3	%	NG	NG	22	13	15	15	16	10	13	15	12
<75 um Sieve	0.2	%	NG	NG	--	--	48	--	--	60	--	--	41
>75 um Sieve	0.2	%	NG	NG	--	--	52	--	--	40	--	--	59
Grain Size	0.2		NG	NG	--	--	Coarse	--	--	Fine	--	--	Coarse

Notes:

¹ Alberta Environment and Sustainable Resource Development (ESRD), 2014. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land and Forestry Policy Branch, Policy Division. 195 pp. References guidelines are for fine-grained surface and subsoil under residential/parkland land use.

NG - No guideline.

-- = Not analyzed.

<= less than laboratory reportable detection limit.

BOLD AND SHADED - Exceeds Guideline.

Table 6: Historical Groundwater Analytical Results

Parameter	Detection Limits	Units	Tier 1 Guidelines ¹	28-Nov-08					26-Mar-09			31-Mar-11			
				08MW01	08MW02	08MW06	08MW07	08MW08	09MW10	09MW13	09MW19	11MW01	11MW02	11MW03	11MW03 Duplicate
Petroleum Hydrocarbons															
Benzene	0.0009	mg/L	0.005	5.5	1.6	1.2	0.056	<0.0009	0.13	0.7	0.23	<0.0009	<0.0009	<0.0009	<0.0009
Toluene	0.0009	mg/L	0.024	0.0005	0.0017	0.0022	<0.0009	<0.0009	0.0007	0.0013	0.0007	<0.0009	<0.0009	<0.0009	<0.0009
Ethylbenzene	0.0009	mg/L	0.0024	0.47	0.4	0.35	<0.0009	<0.0009	0.0004	0.28	<0.0009	<0.0009	<0.0009	<0.0009	<0.0009
Xylenes	0.002	mg/L	0.3	0.5	0.5	0.52	0.014	<0.002	0.027	0.37	0.0017	<0.002	<0.002	<0.002	<0.002
F1 (C ₆ to C ₁₀)	0.2	mg/L	2.2	<0.2	1	2	0.5	<0.2	0.3	3.9	<0.2	<0.2	<0.2	<0.2	<0.2
F2 (C ₁₀ to C ₁₆)	0.1	mg/L	1.1	6.4	8.2	31.9	0.7	<0.1	0.2	28.4	<0.1	<0.1	<0.1	<0.1	<0.1
Metals															
Lead (Pb)	0.001	mg/L	0.01	0.0059	<0.001	<0.001	0.0002	<0.001	<0.001	<0.001	<0.001	--	--	--	--

Notes:

¹ Alberta Environment and Sustainable Resource Development (ESRD). 2014. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land and Forestry Policy Branch, Policy Division. 195 pp. References guidelines are for fine-grained surface and subsoil under residential/parkland land use.

< = less than laboratory reportable detection limit.

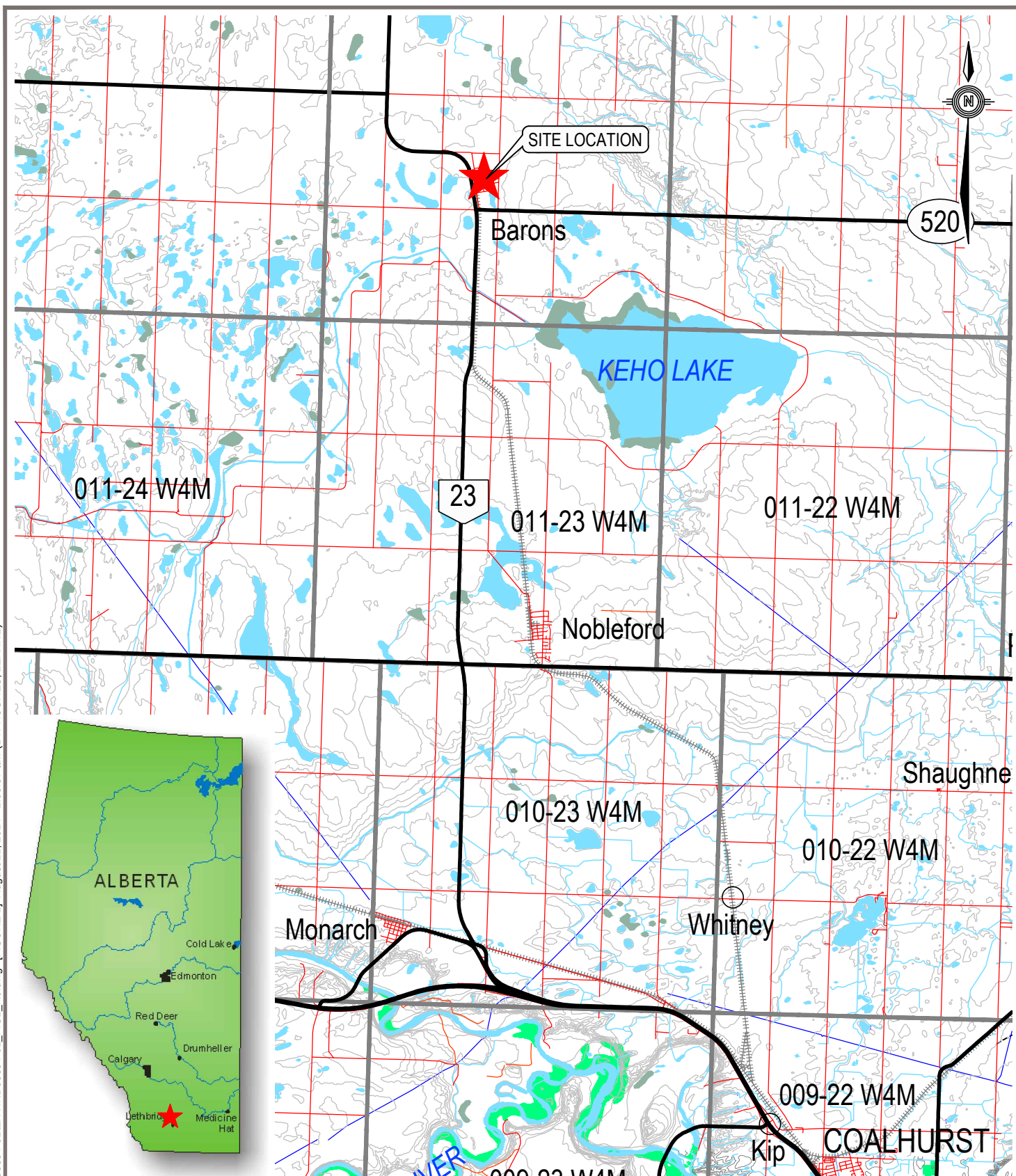
-- = Not analyzed.

BOLD AND SHADED - Exceeds Guideline.

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 (July 19, 2014) |

C:\Users\leanne.hughes\Documents\ENVIND03354-01\ENVIND03354-01_FIG1_R0.dwg [FIGURE 1] August 11, 2014 - 1:08:37 am (BY: HUGHES, LEANNE)



NOTES
DRAWING PROVIDED BY "© Department of Natural
Resources Canada. All rights reserved."

CLIENT

Village of Barons

Groundwater and Soil Vapour Monitoring Program
202 Main Street, Barons, Alberta
AMA Site 9557

SITE LOCATION PLAN

0 8 km

Scale: 1:150,000 @ 8.5"x11"



TETRA TECH EBA

PROJECT NO.
ENVIND03354-01

DWN
LCH

CKD
JL

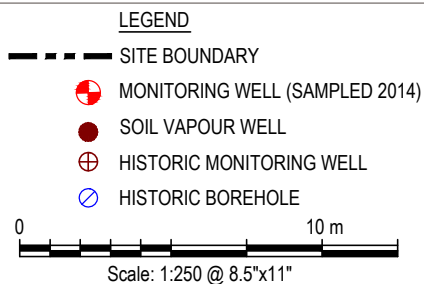
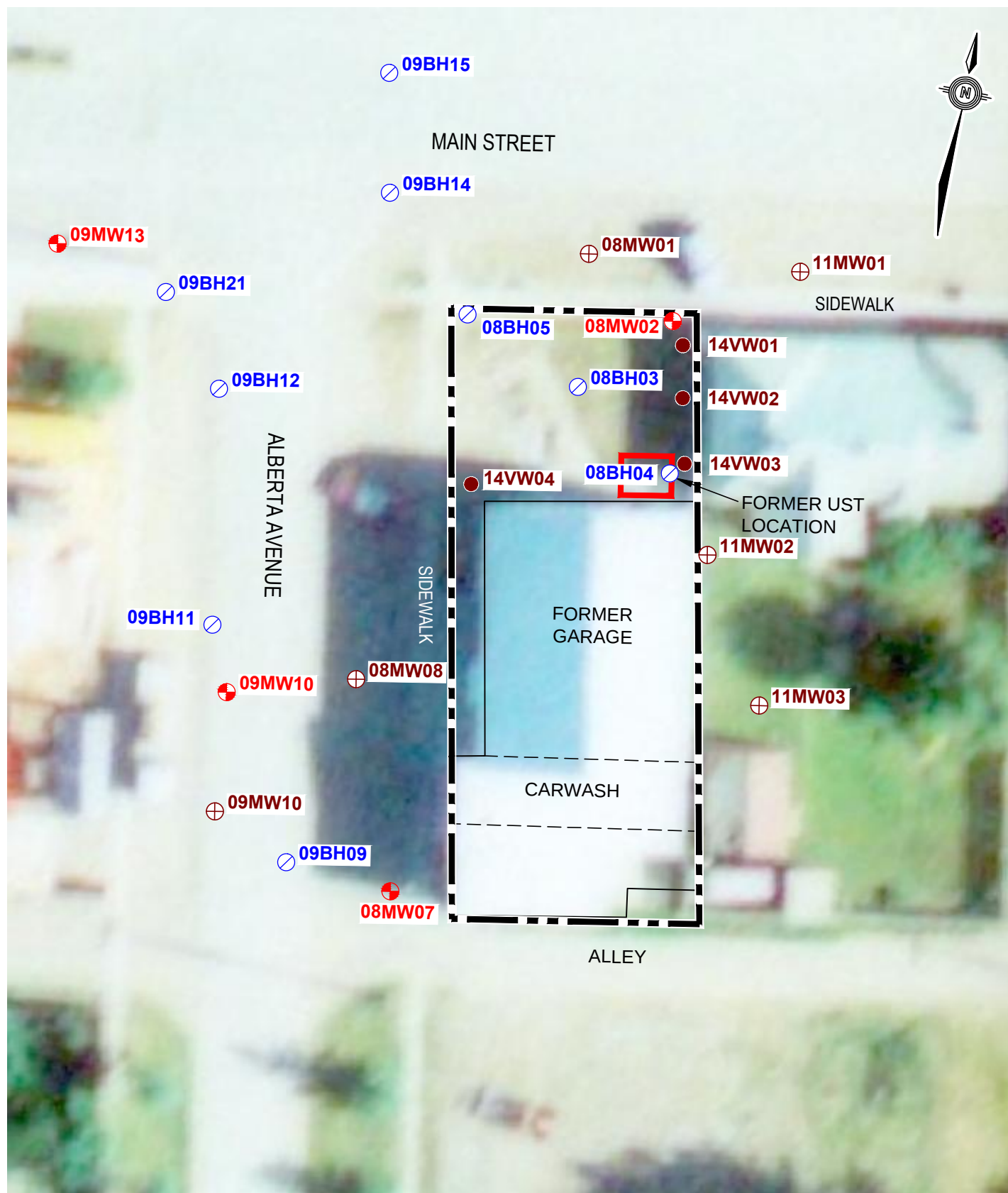
REV
0

OFFICE
EBA-Lethbridge

DATE
August 2014

Figure 1

C:\Users\leanne.hughes\Documents\ENVIND03354\ENVIND03354-01_FIGS_R0.dwg [FIGURE 2] September 26, 2014 - 10:15:34 am (BY: HUGHES, LEANNE)



CLIENT

Village of Barons



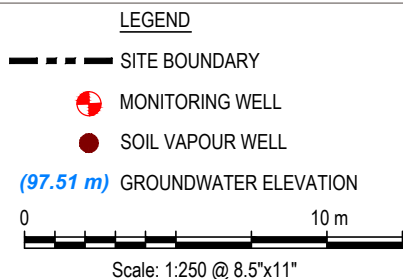
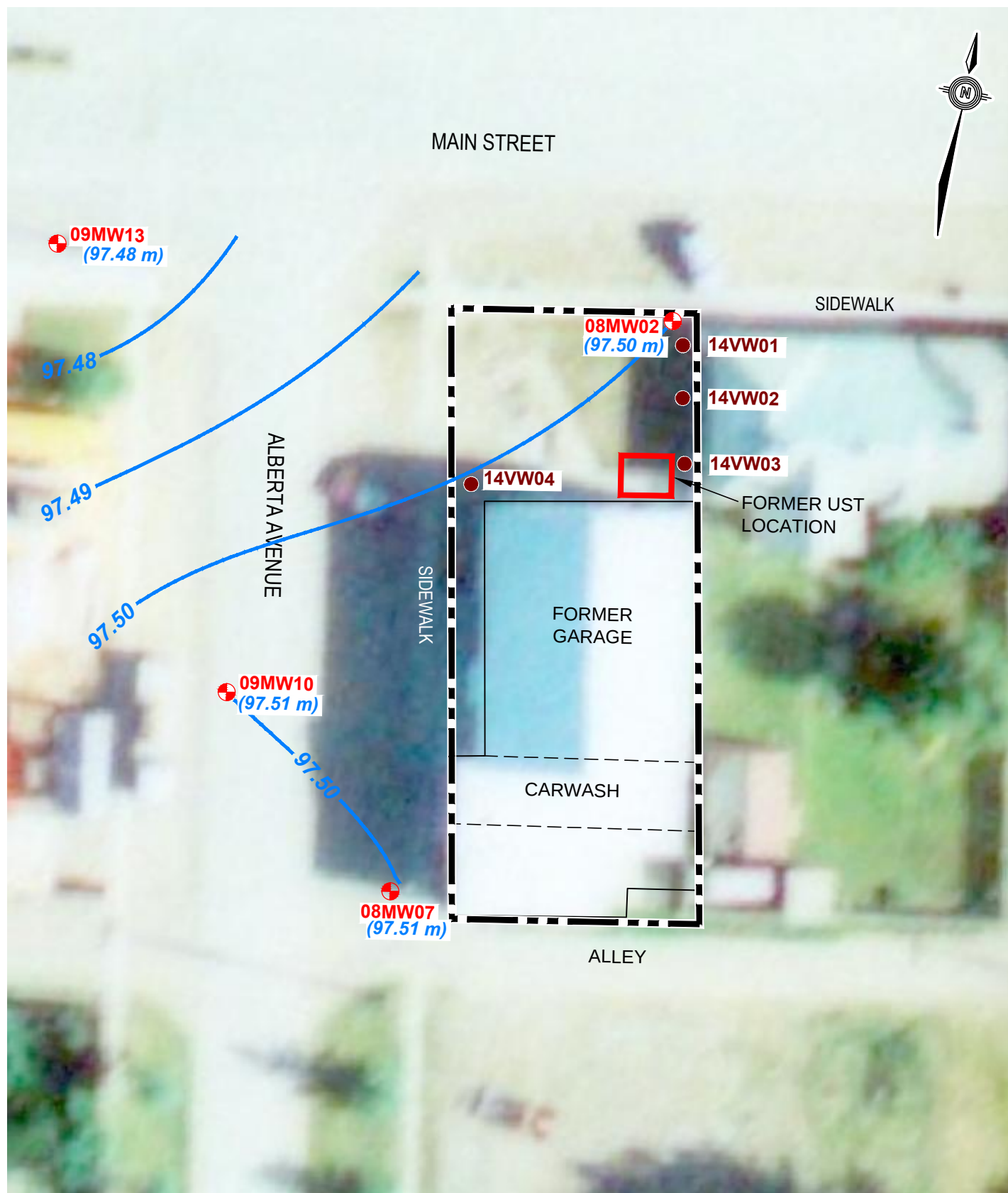
TETRA TECH EBA

Groundwater and Soil Vapour Monitoring Program
202 Main Street, Barons, Alberta
AMA Site 9557

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

PROJECT NO. ENVIND03354-01	DWN LCH	CKD JL	REV 0
OFFICE EBA-Lethbridge	DATE September 2014		

Figure 2



CLIENT

Village of Barons

Groundwater and Soil Vapour Monitoring Program 202 Main Street, Barons, Alberta AMA Site 9557			
SITE PLAN SHOWING GROUNDWATER ELEVATIONS (July 19, 2014)			
PROJECT NO. ENVIND03354-01	DWN LCH	CKD JL	REV 0
OFFICE EBA-Lethbridge	DATE September 2014		Figure 3

APPENDIX A

TETRA TECH'S GENERAL CONDITIONS

GENERAL CONDITIONS

GEOENVIRONMENTAL REPORT

This report incorporates and is subject to these “General Conditions”.

1.0 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 EBA's client. Tetra Tech EBA 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 EBA's Client unless otherwise authorized in writing by Tetra Tech EBA. 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 EBA. Additional copies of the report, if required, may be obtained upon request.

2.0 ALTERNATE REPORT FORMAT

Where Tetra Tech EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed Tetra Tech EBA'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 EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of Tetra Tech EBA'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 EBA. The Client warrants that Tetra Tech EBA's instruments of professional service will be used only and exactly as submitted by Tetra Tech EBA.

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

3.0 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 EBA in its reasonably exercised discretion.

4.0 INFORMATION PROVIDED TO TETRA TECH EBA BY OTHERS

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

APPENDIX B

BOREHOLE LOGS

Project: Soil Vapour Assessment (AMA Site 9557)		Client: Village of Barons		PROJECT NO. - BOREHOLE NO.	
Address: 202 Main Street		Drill Type: 150 mm Solid Stem Auger		ENVIND03354-01 - 14VW01	
City: Barons, Alberta		Project Scientist: Brian Gray			
SAMPLE TYPE ☒ DISTURBED ☐ NO RECOVERY ☐ SPT ☐ A-CASING ☐ SHELBY TUBE ☐ CORE					
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☐ DRILL CUTTINGS ☐ SAND					
Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	NOTES & COMMENTS	
				☒ HYDROCARBONS (ppm) ☐ 200 400 600 800	
0	CLAY (Fill) - silty, some sand and gravel, stiff, medium plastic, moist, very dark brown, trace organics.				
		B1			
		B2			
1	CLAY - silty, trace sand, firm, medium plastic, moist, greyish brown, trace white precipitates.				
	... some sand to sandy, light greyish brown.	B3			
		B4			
	End of Borehole at 1.6 m 0 m to 1.3 m - 1 inch solid PVC 1.3 to 1.6 m - 2 inch screened PVC				
2					



TETRA TECH EBA

LOGGED BY: JL

REVIEWED BY: JG

DRAWING NO: D1

COMPLETION DEPTH: 1.6 m

COMPLETE: 6/6/2014

Page 1 of 1

Project: Soil Vapour Assessment (AMA Site 9557)		Client: Village of Barons		PROJECT NO. - BOREHOLE NO.	
Address: 202 Main Street		Drill Type: 150 mm Solid Stem Auger		ENVIND03354-01 - 14VW02	
City: Barons, Alberta		Project Scientist: Brian Gray			
SAMPLE TYPE ☒ DISTURBED ☐ NO RECOVERY ☐ SPT ☐ A-CASING ☐ SHELBY TUBE ☐ CORE					
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☐ DRILL CUTTINGS ☐ SAND					

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	HYDROCARBONS (ppm)				NOTES & COMMENTS	14VW02	Depth (ft)
				200	400	600	800			
0	CLAY (Fill) - silty, some sand and gravel, stiff, medium plastic, moist, very dark brown, trace organics.									0
			B1							
			B2							
			B3							
1	CLAY - silty, trace sand, firm, medium plastic, moist, greyish brown, trace white precipitates.									
			B4							
	End of Borehole at 1.6 m 0 m to 1.3 m - 1 inch solid PVC 1.3 to 1.6 m - 2 inch screened PVC									
2										7

 TETRA TECH EBA	LOGGED BY: JL	COMPLETION DEPTH: 1.6 m
	REVIEWED BY: JG	COMPLETE: 6/6/2014
	DRAWING NO: D2	Page 1 of 1

Project: Soil Vapour Assessment (AMA Site 9557)		Client: Village of Barons		PROJECT NO. - BOREHOLE NO.	
Address: 202 Main Street		Drill Type: 150 mm Solid Stem Auger		ENVIND03354-01 - 14VW03	
City: Barons, Alberta		Project Scientist: Brian Gray			
SAMPLE TYPE ☒ DISTURBED ☐ NO RECOVERY ☐ SPT ☐ A-CASING ☐ SHELBY TUBE ☐ CORE					
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☐ DRILL CUTTINGS ☐ SAND					

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	HYDROCARBONS (ppm)				NOTES & COMMENTS	14VW03	Depth (ft)
				200	400	600	800			
0	CLAY (Fill) - silty, some sand and gravel, stiff, medium plastic, moist, very dark brown, trace organics.									0
			B1							
			B2							
	CLAY - silty, trace sand, firm, medium plastic, moist, greyish brown, trace white precipitates.									
1			B3							
			B4							
	End of Borehole at 1.6 m 0 m to 1.3 m - 1 inch solid PVC 1.3 to 1.6 m - 2 inch screened PVC									
2										7

 TETRA TECH EBA	LOGGED BY: JL	COMPLETION DEPTH: 1.6 m
	REVIEWED BY: JG	COMPLETE: 6/6/2014
	DRAWING NO: D3	Page 1 of 1

Project: Soil Vapour Assessment (AMA Site 9557)		Client: Village of Barons		PROJECT NO. - BOREHOLE NO.			
Address: 202 Main Street		Drill Type: 150 mm Solid Stem Auger		ENVIND03354-01 - 14VW04			
City: Barons, Alberta		Project Scientist: Brian Gray					
SAMPLE TYPE ☒ DISTURBED ☐ NO RECOVERY ☐ SPT ☐ A-CASING ☐ SHELBY TUBE ☐ CORE							
BACKFILL TYPE ☒ BENTONITE ☐ PEA GRAVEL ☐ SLOUGH ☐ GROUT ☐ DRILL CUTTINGS ☐ SAND							
Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	☒ HYDROCARBONS (ppm) ☒ 200 400 600 800	NOTES & COMMENTS	14VW04	Depth (ft)
0	CLAY (Fill) - silty, some sand and gravel, stiff, medium plastic, moist, very dark brown, trace organics.	☒	B1				0
		☐					
		☒	B2				
		☐					
1	CLAY - silty, trace sand, firm, medium plastic, moist, greyish brown, trace white precipitates.	☒	B3				
	End of Borehole at 1.1 m 0 m to 0.8 m - 1 inch solid PVC 0.8 to 1.1 m - 2 inch screened PVC	☐					
2							7



TETRA TECH EBA

LOGGED BY: JL

REVIEWED BY: JG

DRAWING NO: D4

COMPLETION DEPTH: 1.1 m

COMPLETE: 6/6/2014

Page 1 of 1

APPENDIX C

LABORATORY CERTIFICATES

Attention: JAYMES GOING

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

Your P.O. #: ENVINDO3354-01
Your Project #: AMA 9557
Site Location: 202 MAIN ST BARONS
Your C.O.C. #: A114131

Report Date: 2014/07/28

Report #: R1611014

Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B461484
Received: 2014/07/19, 10:40

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	2014/07/21	AB SOP-00005	SM 2320-B
BTEX/F1 in Water by HS GC/MS	3	N/A	2014/07/24	AB SOP-00039	CCME, EPA 8260C
BTEX/F1 in Water by HS GC/MS	1	N/A	2014/07/25	AB SOP-00039	CCME, EPA 8260C
Chloride by Automated Colourimetry	4	N/A	2014/07/25	AB SOP-00020	SM 4500 Cl-G
Conductivity @25C	4	N/A	2014/07/21	AB SOP-00005	SM 2510-B
CCME Hydrocarbons in Water (F2; C10-C16)	1	2014/07/22	2014/07/25	AB SOP-00040 AB SOP-00037	EPA3510C/CCME PHCCWS
CCME Hydrocarbons in Water (F2; C10-C16)	3	2014/07/22	2014/07/26	AB SOP-00040 AB SOP-00037	EPA3510C/CCME PHCCWS
Hardness	4	N/A	2014/07/24	AB WI-00065	SM 2340B
Elements by ICP - Dissolved	4	N/A	2014/07/23	AB SOP-00042	EPA 200.7
Ion Balance	4	N/A	2014/07/21	AB WI-00065	SM 1030E
Sum of cations, anions	4	N/A	2014/07/24	AB WI-00065	SM 1030E
Nitrate and Nitrite	2	N/A	2014/07/23	AB SOP-00023	SM4110B
Nitrate and Nitrite	2	N/A	2014/07/24	AB SOP-00023	SM4110B
Nitrate + Nitrite-N (calculated)	2	N/A	2014/07/23	AB SOP-00023	SM 4110-B
Nitrate + Nitrite-N (calculated)	2	N/A	2014/07/24	AB SOP-00023	SM 4110-B
Nitrogen, (Nitrite, Nitrate) by IC	4	N/A	2014/07/23	AB SOP-00023	SM 4110-B
pH @25°C (Alkalinity titrator)	4	N/A	2014/07/21	AB SOP-00005	SM 4500-H+B
Sulphate by Automated Colourimetry	4	N/A	2014/07/25	AB SOP-00018	SM 4500 SO4-E
Total Dissolved Solids (Calculated)	4	N/A	2014/07/25	AB WI-00065	SM 1030E

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

Attention: JAYMES GOING

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

Your P.O. #: ENVINDO3354-01
Your Project #: AMA 9557
Site Location: 202 MAIN ST BARONS
Your C.O.C. #: A114131

Report Date: 2014/07/28

Report #: R1611014

Version: 1

CERTIFICATE OF ANALYSIS**MAXXAM JOB #: B461484****Received: 2014/07/19, 10:40**

Encryption Key

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

Ioana Stoica, Project Manager

Email: IStoica@maxxam.ca

Phone# (403) 291-3077

=====

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 #: B461484
Report Date: 2014/07/28

TETRA TECH EBA INC.
Client Project #: AMA 9557
Site Location: 202 MAIN ST BARONS
Your P.O. #: ENVINDO3354-01
Sampler Initials: JL

AT1 BTEX AND F1-F2 (WATER)

Maxxam ID		KD2514	KD2514	KD2515	KD2516	KD2517	KD2517		
Sampling Date		2014/07/18 12:30	2014/07/18 12:30	2014/07/18 13:00	2014/07/18 13:30	2014/07/18 14:00	2014/07/18 14:00		
COC Number		A114131	A114131	A114131	A114131	A114131	A114131		
	Units	08MW02	08MW02 Lab-Dup	09MW13	09MW10	08MW07	08MW07 Lab-Dup	RDL	QC Batch

Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	mg/L	1.4	N/A	14	<0.10	0.33	0.34	0.10	7571566
Volatiles									
Benzene	mg/L	0.042	0.038	0.15	0.11	0.0038	N/A	0.00040	7575058
Toluene	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	N/A	0.00040	7575058
Ethylbenzene	mg/L	0.0020	0.0019	0.020	<0.00040	<0.00040	N/A	0.00040	7575058
m & p-Xylene	mg/L	0.0014	0.0013	0.015	0.0010	<0.00080	N/A	0.00080	7575058
o-Xylene	mg/L	<0.00040	<0.00040	0.0024	0.0021	<0.00040	N/A	0.00040	7575058
Xylenes (Total)	mg/L	0.0014	0.0013	0.017	0.0032	<0.00080	N/A	0.00080	7575058
F1 (C6-C10) - BTEX	mg/L	<0.10	0.19	0.59	0.16	<0.10	N/A	0.10	7575058
(C6-C10)	mg/L	0.14	0.23	0.78	0.27	<0.10	N/A	0.10	7575058
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	117	110	109	109	111	N/A	N/A	7575058
4-Bromofluorobenzene (sur.)	%	108	106	109	106	105	N/A	N/A	7575058
D4-1,2-Dichloroethane (sur.)	%	116	109	120	109	108	N/A	N/A	7575058
O-TERPHENYL (sur.)	%	95	N/A	100	98	96	97	N/A	7571566

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

Maxxam Job #: B461484
Report Date: 2014/07/28

TETRA TECH EBA INC.
Client Project #: AMA 9557
Site Location: 202 MAIN ST BARONS
Your P.O. #: ENVINDO3354-01
Sampler Initials: JL

ROUTINE WATER (WATER)

Maxxam ID		KD2514		KD2515		KD2516	KD2517		
Sampling Date		2014/07/18 12:30		2014/07/18 13:00		2014/07/18 13:30	2014/07/18 14:00		
COC Number		A114131		A114131		A114131	A114131		
	Units	08MW02	RDL	09MW13	RDL	09MW10	08MW07	RDL	QC Batch
Calculated Parameters									
Anion Sum	meq/L	28	N/A	110	N/A	93	66	N/A	7570896
Cation Sum	meq/L	29	N/A	100	N/A	86	60	N/A	7570896
Hardness (CaCO ₃)	mg/L	1000	0.50	2400	0.50	2100	1700	0.50	7570902
Ion Balance	N/A	1.0	0.010	0.91	0.010	0.93	0.92	0.010	7570895
Dissolved Nitrate (NO ₃)	mg/L	0.92	0.044	7.2	0.044	3.5	12	0.044	7570903
Nitrate plus Nitrite (N)	mg/L	0.24	0.010	3.9	0.010	4.1	2.8	0.010	7570904
Dissolved Nitrite (NO ₂)	mg/L	0.11	0.033	7.5	0.033	11	0.66	0.033	7570903
Total Dissolved Solids	mg/L	1600	10	7000	10	5700	4000	10	7570897
Misc. Inorganics									
Conductivity	uS/cm	2200	1.0	7700	1.0	6600	4700	1.0	7571199
pH	pH	7.59	N/A	7.56	N/A	7.63	7.71	N/A	7571198
Anions									
Alkalinity (PP as CaCO ₃)	mg/L	<0.50	0.50	<0.50	0.50	<0.50	<0.50	0.50	7571197
Alkalinity (Total as CaCO ₃)	mg/L	680	0.50	1200	0.50	990	770	0.50	7571197
Bicarbonate (HCO ₃)	mg/L	820	0.50	1400	0.50	1200	940	0.50	7571197
Carbonate (CO ₃)	mg/L	<0.50	0.50	<0.50	0.50	<0.50	<0.50	0.50	7571197
Hydroxide (OH)	mg/L	<0.50	0.50	<0.50	0.50	<0.50	<0.50	0.50	7571197
Dissolved Sulphate (SO ₄)	mg/L	680 (1)	5.0	4100 (1)	25	3400 (1)	2300 (1)	20	7578013
Dissolved Chloride (Cl)	mg/L	24	1.0	130	1.0	86	51	1.0	7578011
Nutrients									
Dissolved Nitrite (N)	mg/L	0.034	0.010	2.3	0.010	3.3	0.20	0.010	7572453
Dissolved Nitrate (N)	mg/L	0.21	0.010	1.6	0.010	0.78	2.6	0.010	7572453
Elements									
Dissolved Calcium (Ca)	mg/L	180	0.30	380	0.30	340	300	0.30	7574890
Dissolved Iron (Fe)	mg/L	1.3	0.060	1.1	0.060	<0.060	<0.060	0.060	7574890
Dissolved Magnesium (Mg)	mg/L	130	0.20	360	0.20	290	230	0.20	7574890
Dissolved Manganese (Mn)	mg/L	1.7	0.0040	1.3	0.0040	0.81	1.6	0.0040	7574890
Dissolved Potassium (K)	mg/L	3.9	0.30	9.1	0.30	8.2	6.8	0.30	7574890
Dissolved Sodium (Na)	mg/L	190	0.50	1300 (1)	2.5	1000 (1)	600 (1)	2.5	7574890
RDL = Reportable Detection Limit									
N/A = Not Applicable									
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.									

Maxxam Job #: B461484
Report Date: 2014/07/28

TETRA TECH EBA INC.
Client Project #: AMA 9557
Site Location: 202 MAIN ST BARONS
Your P.O. #: ENVINDO3354-01
Sampler Initials: JL

GENERAL COMMENTS

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

Package 1	14.7°C
Package 2	14.7°C

Results relate only to the items tested.

Maxxam Job #: B461484
Report Date: 2014/07/28

TETRA TECH EBA INC.
Client Project #: AMA 9557
Site Location: 202 MAIN ST BARONS
Your P.O. #: ENVINDO3354-01
Sampler Initials: JL

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7571197	SCC	Spiked Blank	Alkalinity (Total as CaCO ₃)	2014/07/21		96	%	80 - 120
7571197	SCC	Method Blank	Alkalinity (PP as CaCO ₃)	2014/07/21	<0.50		mg/L	
			Alkalinity (Total as CaCO ₃)	2014/07/21	<0.50		mg/L	
			Bicarbonate (HCO ₃)	2014/07/21	<0.50		mg/L	
			Carbonate (CO ₃)	2014/07/21	<0.50		mg/L	
			Hydroxide (OH)	2014/07/21	<0.50		mg/L	
7571198	SCC	Spiked Blank	pH	2014/07/21		100	%	97 - 102
7571199	SCC	Spiked Blank	Conductivity	2014/07/21		100	%	90 - 110
7571199	SCC	Method Blank	Conductivity	2014/07/21	<1.0		uS/cm	
7571566	DR4	Matrix Spike	O-TERPHENYL (sur.)	2014/07/25		99	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/07/25		89	%	50 - 130
7571566	DR4	Spiked Blank	O-TERPHENYL (sur.)	2014/07/25		102	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/07/25		79	%	70 - 130
7571566	DR4	Method Blank	O-TERPHENYL (sur.)	2014/07/25		104	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/07/25	<0.10		mg/L	
7571566	DR4	RPD [KD2517-03]	F2 (C10-C16 Hydrocarbons)	2014/07/25	NC		%	40
7572453	RP0	Matrix Spike	Dissolved Nitrite (N)	2014/07/23		98	%	80 - 120
			Dissolved Nitrate (N)	2014/07/23		102	%	80 - 120
7572453	RP0	Spiked Blank	Dissolved Nitrite (N)	2014/07/23		100	%	80 - 120
			Dissolved Nitrate (N)	2014/07/23		101	%	80 - 120
7572453	RP0	Method Blank	Dissolved Nitrite (N)	2014/07/23	<0.010		mg/L	
			Dissolved Nitrate (N)	2014/07/23	0.014 , RDL=0.010		mg/L	
7574890	KSF	Matrix Spike	Dissolved Calcium (Ca)	2014/07/23		NC	%	80 - 120
			Dissolved Iron (Fe)	2014/07/23		103	%	80 - 120
			Dissolved Magnesium (Mg)	2014/07/23		NC	%	80 - 120
			Dissolved Manganese (Mn)	2014/07/23		100	%	80 - 120
			Dissolved Potassium (K)	2014/07/23		100	%	80 - 120
			Dissolved Sodium (Na)	2014/07/23		NC	%	80 - 120
7574890	KSF	Spiked Blank	Dissolved Calcium (Ca)	2014/07/23		105	%	80 - 120
			Dissolved Iron (Fe)	2014/07/23		107	%	80 - 120
			Dissolved Magnesium (Mg)	2014/07/23		107	%	80 - 120
			Dissolved Manganese (Mn)	2014/07/23		105	%	80 - 120
			Dissolved Potassium (K)	2014/07/23		106	%	80 - 120
			Dissolved Sodium (Na)	2014/07/23		106	%	80 - 120
7574890	KSF	Method Blank	Dissolved Calcium (Ca)	2014/07/23	<0.30		mg/L	
			Dissolved Iron (Fe)	2014/07/23	<0.060		mg/L	
			Dissolved Magnesium (Mg)	2014/07/23	<0.20		mg/L	
			Dissolved Manganese (Mn)	2014/07/23	<0.0040		mg/L	
			Dissolved Potassium (K)	2014/07/23	<0.30		mg/L	
			Dissolved Sodium (Na)	2014/07/23	<0.50		mg/L	
7575058	RSU	Matrix Spike [KD2515-04]	1,4-Difluorobenzene (sur.)	2014/07/28		108	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/07/28		107	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2014/07/28		117	%	70 - 130
			Benzene	2014/07/28		76	%	70 - 130
			Toluene	2014/07/28		81	%	70 - 130
			Ethylbenzene	2014/07/28		80	%	70 - 130
			m & p-Xylene	2014/07/28		79	%	70 - 130
			o-Xylene	2014/07/28		81	%	70 - 130
			(C6-C10)	2014/07/28		73	%	70 - 130
7575058	RSU	Spiked Blank	1,4-Difluorobenzene (sur.)	2014/07/24		105	%	70 - 130

Maxxam Job #: B461484
Report Date: 2014/07/28

TETRA TECH EBA INC.
Client Project #: AMA 9557
Site Location: 202 MAIN ST BARONS
Your P.O. #: ENVINDO3354-01
Sampler Initials: JL

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7575058	RSU	Method Blank	4-Bromofluorobenzene (sur.)	2014/07/24		105	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2014/07/24		97	%	70 - 130
			Benzene	2014/07/24		80	%	70 - 130
			Toluene	2014/07/24		79	%	70 - 130
			Ethylbenzene	2014/07/24		82	%	70 - 130
			m & p-Xylene	2014/07/24		82	%	70 - 130
			o-Xylene	2014/07/24		81	%	70 - 130
			(C6-C10)	2014/07/24		86	%	70 - 130
			1,4-Difluorobenzene (sur.)	2014/07/24		111	%	70 - 130
			4-Bromofluorobenzene (sur.)	2014/07/24		107	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2014/07/24		105	%	70 - 130
			Benzene	2014/07/24	<0.00040		mg/L	
			Toluene	2014/07/24	<0.00040		mg/L	
			Ethylbenzene	2014/07/24	<0.00040		mg/L	
			m & p-Xylene	2014/07/24	<0.00080		mg/L	
			o-Xylene	2014/07/24	<0.00040		mg/L	
			Xylenes (Total)	2014/07/24	<0.00080		mg/L	
			F1 (C6-C10) - BTEX (C6-C10)	2014/07/24	<0.10		mg/L	
7575058	RSU	RPD [KD2514-04]	Benzene	2014/07/24	9.1		%	40
			Toluene	2014/07/24	NC		%	40
			Ethylbenzene	2014/07/24	NC		%	40
			m & p-Xylene	2014/07/24	NC		%	40
			o-Xylene	2014/07/24	NC		%	40
			Xylenes (Total)	2014/07/24	NC		%	40
			F1 (C6-C10) - BTEX (C6-C10)	2014/07/24	NC		%	40
				2014/07/24	NC		%	40
7578011	ZI	Matrix Spike	Dissolved Chloride (Cl)	2014/07/25		103	%	80 - 120
7578011	ZI	Spiked Blank	Dissolved Chloride (Cl)	2014/07/25		103	%	80 - 120
7578011	ZI	Method Blank	Dissolved Chloride (Cl)	2014/07/25	<1.0		mg/L	
7578013	ZI	Matrix Spike	Dissolved Sulphate (SO4)	2014/07/25		NC	%	80 - 120
7578013	ZI	Spiked Blank	Dissolved Sulphate (SO4)	2014/07/25		103	%	80 - 120
7578013	ZI	Method Blank	Dissolved Sulphate (SO4)	2014/07/25	<1.0		mg/L	

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 #: B461484
Report Date: 2014/07/28

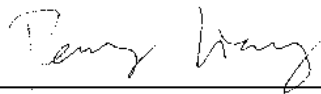
TETRA TECH EBA INC.
Client Project #: AMA 9557
Site Location: 202 MAIN ST BARONS
Your P.O. #: ENVINDO3354-01
Sampler Initials: JL

VALIDATION SIGNATURE PAGE

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



Luba Shymushovska, Senior Analyst, Organic Department



Peng Liang, Analyst II

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.

Company:	Invoice To:	C/O Report Address	☒	Report To:	Same as Invoice	☒	Report Distribution (E-Mail):	REGULATORY GUIDELINES: ☒ AT1 ☐ CCME ☐ Regulated Drinking Water ☐ Other:
Contact:	Tetra Tech EBA					jgong@eba.ca		
Address:								
Contact #s:	Prov:	PC:		Prov:	PC:			
	Ph:	Cell:		Ph:	Cell:			

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: ENVU1003354-01
Project # / Name: AMA 9557
Site Location: 2012 Main Street Burans
Quote #:
Sampled By: TL

SERVICE REQUESTED: ☐ RUSH (Contact lab to reserve)
Date Required: _____
☒ REGULAR (5 to 7 Days)

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	BTEX F	Sieve (7)	Regulation	Salinity	Assessment	Basic C	☐ BTEX F	☒ BTEX F	☒ Heavy	☐ TOC	Total	Dissolve	Mercury	Disso	Disso	HOLD -
1	08MW002	Monitoring area	GW	14/07/14 - 12:00								X	X					X	X	
2	09MW013			- 13:00								X	X					X	X	
3	09MW010			13:30								X	X					X	X	
4	08MW007			14:00								X	X					X	X	
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

19-Jul-14 10:40

Ioana Stoica



B461484

HT4

INS-0004

Please indicate Filtered, Preserved or Both (F, P, F/P)

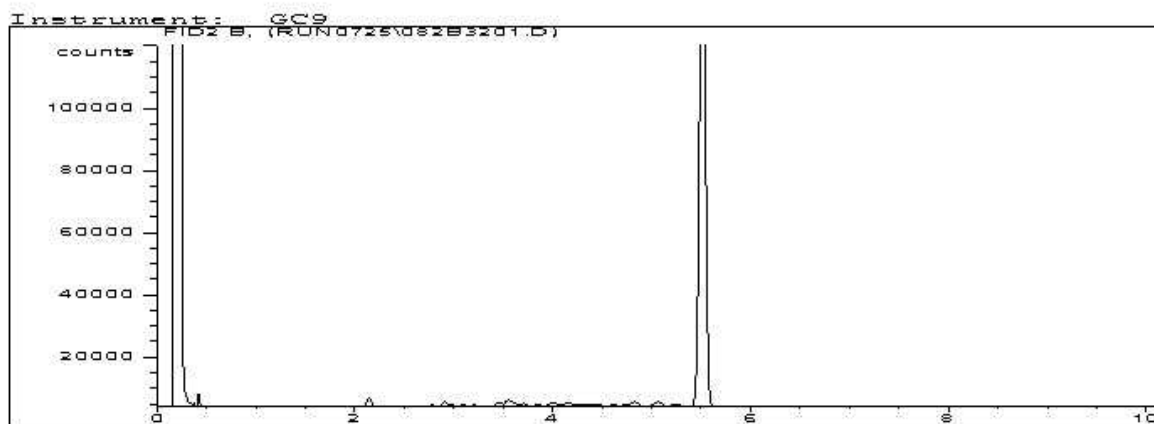
Relinquished By (Signature/Print): <i>JANIE KAMOTANE</i>	Date (YY/MM/DD): <i>14/07/18</i>	Time (24:00): <i>15:00</i>
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Special Instructions: <i>Dissolved metals field filled + preserved</i>	# of Jars Used & Not Submitted	

LAB USE ONLY			
Received By: 	Date: 2014/07/19	Maxvac Job #:	
Jane Musonda	10:40	Custody Seal	Temperature
Lab Comments:		N	14, 15, 15 14, 15, 15

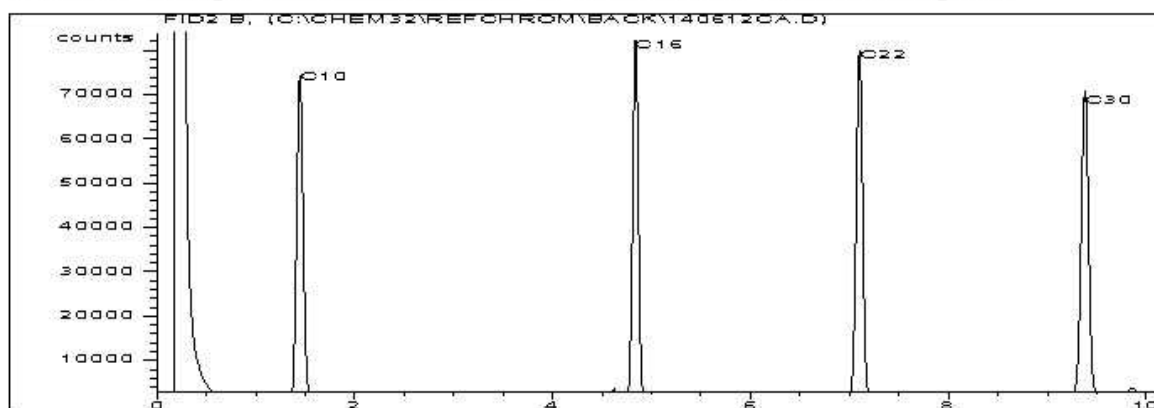
Maxxam Job #: B461484
 Report Date: 2014/07/28
 Maxxam Sample: KD2514

TETRA TECH EBA INC.
 Client Project #: AMA 9557
 Site Reference: 202 MAIN ST BARONS
 Client ID: 08MW02

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



Carbon Range Distribution - Reference Chromatogram

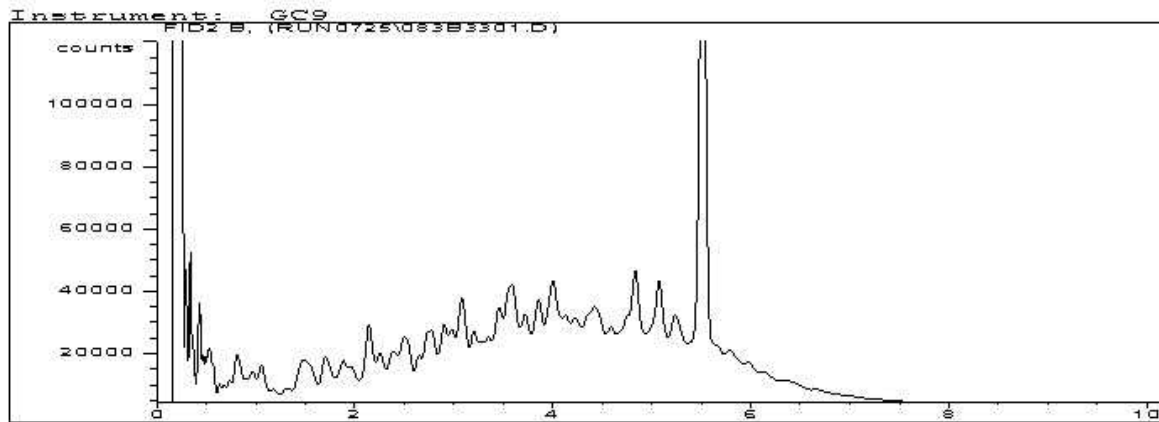


TYPICAL PRODUCT CARBON NUMBER R2

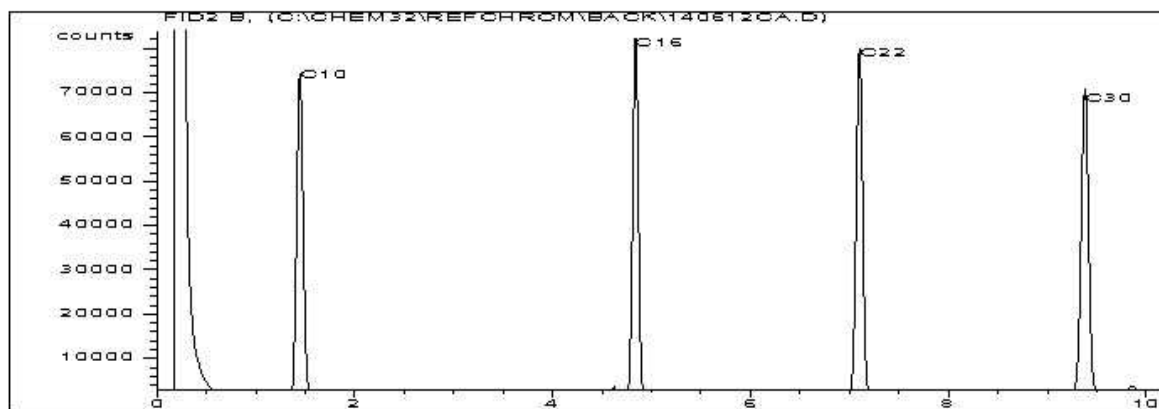
Gasoline:	C04	-	C10	Diesel:
Gasol:	C04	-	C10	Lubricating Oi
Kerosene:	C07	-	C10	Crude Oils:

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



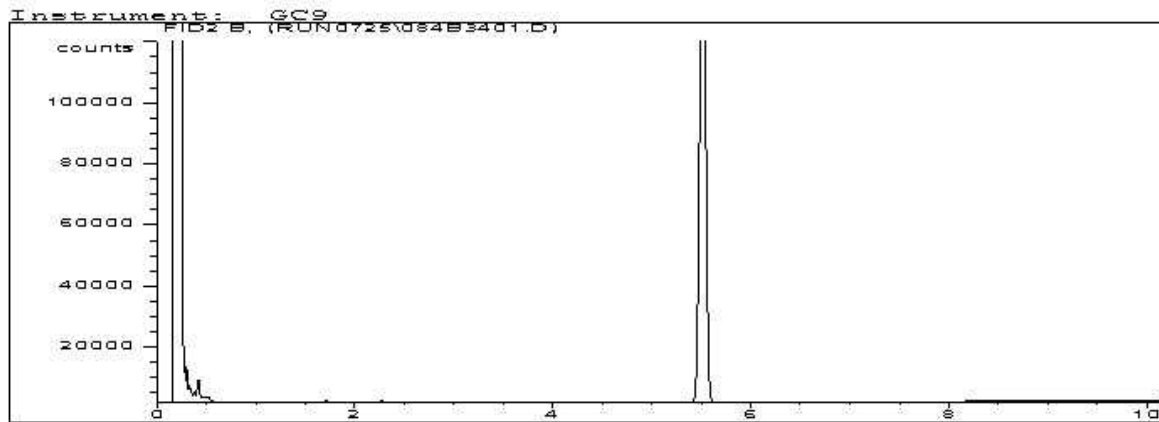
Carbon Range Distribution - Reference Chromatogram



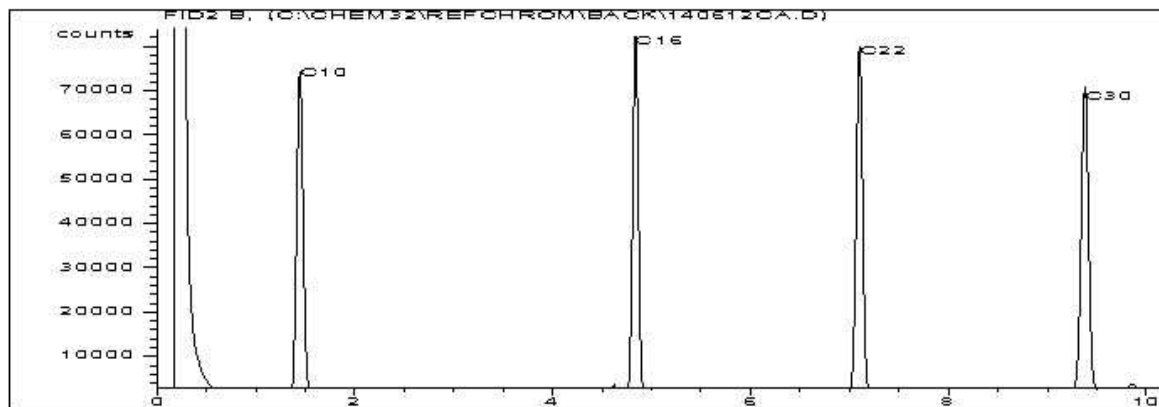
TYPICAL PRODUCT CARBON NUMBER R2

Gasoline:	C04	-	C10	Diesel:
Gasol:	C04	-	C10	Lubricating Oi
Kerosene:	C07	-	C10	Crude Oils:

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



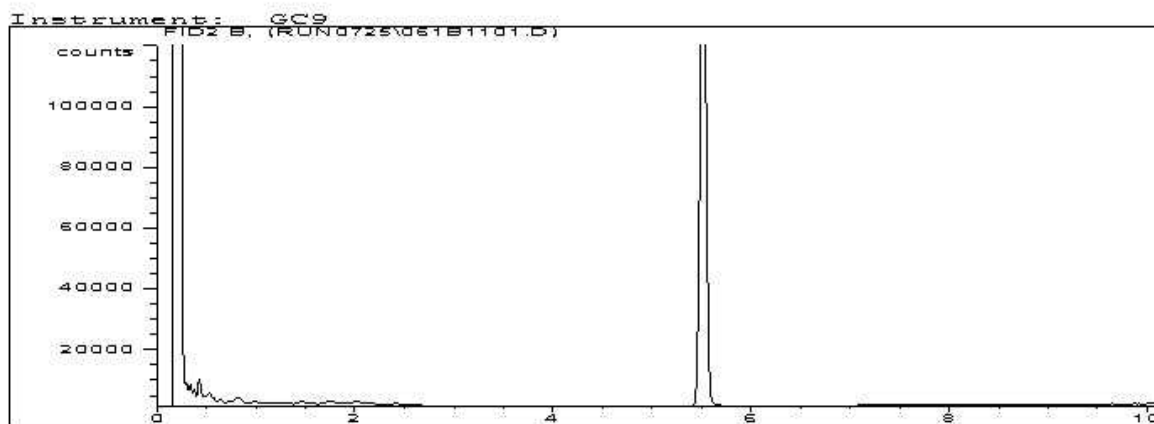
Carbon Range Distribution - Reference Chromatogram



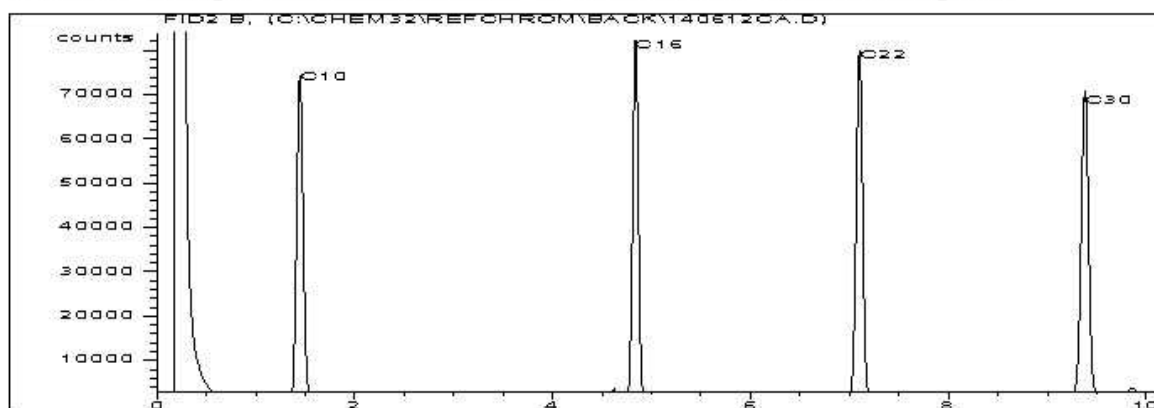
TYPICAL PRODUCT CARBON NUMBER R2

Gasoline:	C04	-	C100	Diesel:
Gasolene:	C04	-	C100	Lubricating Oil
Kerosene:	C07	-	C100	Crude Oils:

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



Carbon Range Distribution - Reference Chromatogram



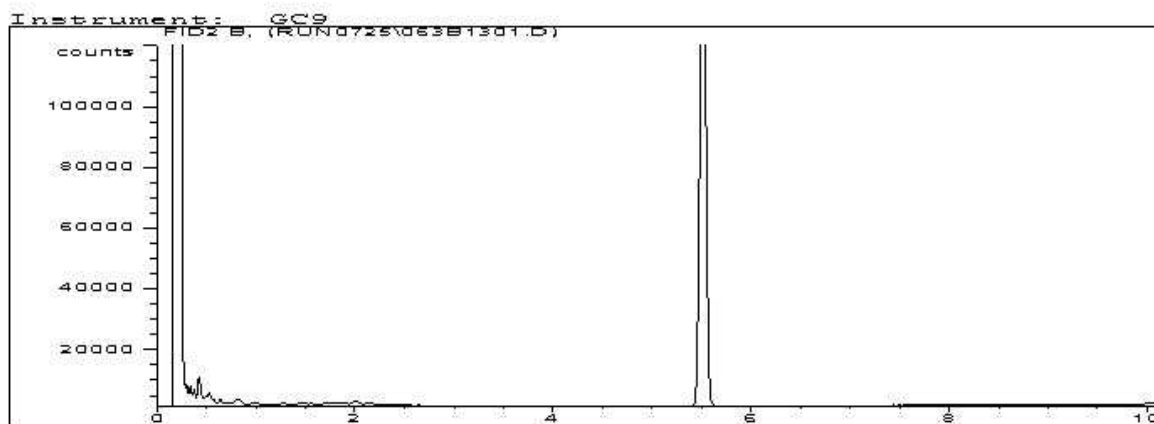
TYPICAL PRODUCT CARBON NUMBER R2

Gasoline:	C04	-	C100	Diesel:
Gasol:	C04	-	C100	Lubricating Oi
Kerosene:	C04	-	C100	Crude Oils:

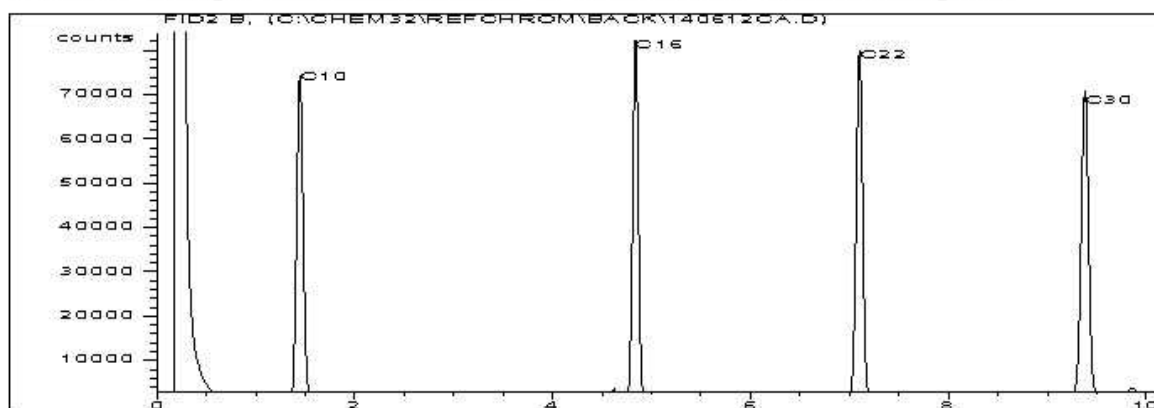
Maxxam Job #: B461484
 Report Date: 2014/07/28
 Maxxam Sample: KD2517 Lab-Dup

TETRA TECH EBA INC.
 Client Project #: AMA 9557
 Site Reference: 202 MAIN ST BARONS
 Client ID: 08MW07

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



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER R2

Gasoline:	C04	-	C10	Diesel:
Gasol:	C04	-	C10	Lubricating Oi
Kerosene:	C07	-	C10	Crude Oils:

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

Your Project #: ENVIND03354, AMA SITE 9557

Site Location: BARONS SHOP - BARONS, AB

Your C.O.C. #: A221679

Attention: JAYMES GOING

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

Report Date: 2014/06/16

Report #: R1586168

Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B446995
Received: 2014/06/07, 10:30

Sample Matrix: Soil
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Bulk Density	2	N/A	2014/06/11	AB SOP-00050	SSMA 2.21
BTEX/F1 by HS GC/MS (MeOH extract)	4	2014/06/09	2014/06/12	AB SOP-00039	CCME, EPA 8260C
CCME Hydrocarbons (F2-F4 in soil)	3	2014/06/10	2014/06/12	AB SOP-00040 AB SOP-00036	CCME PHC-CWS
CCME Hydrocarbons (F2-F4 in soil)	1	2014/06/10	2014/06/13	AB SOP-00040 AB SOP-00036	CCME PHC-CWS
CCME Hydrocarbons (F4G in soil)	1	2014/06/10	2014/06/13	AB SOP-00040 AB SOP-00036	CCME PHC-CWS
Fraction of Organic Carbon	2	N/A	2014/06/14	CAL SOP-00243	LECO # 203-821-170
Moisture	4	N/A	2014/06/10	AB SOP-00002	CCME PHC-CWS
Moisture	2	N/A	2014/06/12	AB SOP-00002	CCME PHC-CWS
Particle Size by Sieve (75 micron)	2	N/A	2014/06/12	AB SOP-00022	SSMA 55.4
Total Organic Carbon LECO Method (1)	2	2014/06/14	2014/06/14	CAL SOP-00243	LECO# 203-821-170

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

(1) Updated the RPD Limits from 50% to 35% as per standards. Updated on 2012/11/26.

Encryption Key

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

Ioana Stoica, Project Manager

Email: IStoica@maxxam.ca

Phone# (403) 291-3077

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 #: B446995
Report Date: 2014/06/16

TETRA TECH EBA INC.
Client Project #: ENVIND03354, AMA SITE 9557
Site Location: BARONS SHOP - BARONS, AB
Sampler Initials: JL

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		JU2561		JU2562	JU2563	JU2564		
Sampling Date		2014/06/06		2014/06/06	2014/06/06	2014/06/06		
COC Number		A221679		A221679	A221679	A221679		
	Units	14VW01 @ 1.6M	QC Batch	14VW02 @ 1.6M	14VW03 @ 1.6M	14VW04 @ 1.0M	RDL	QC Batch
Physical Properties								
Moisture	%	21	7518497	21	16	18	0.30	7518506
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	7519023	<10	24	<10	10	7519023
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	7519023	<50	310	<50	50	7519023
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	7519023	<50	540	<50	50	7519023
Reached Baseline at C50	mg/kg	Yes	7519023	Yes	No	Yes	N/A	7519023
Volatiles								
Benzene	mg/kg	<0.0050	7520352	<0.0050	0.018	<0.0050	0.0050	7520352
Toluene	mg/kg	<0.020	7520352	<0.020	0.14	<0.020	0.020	7520352
Ethylbenzene	mg/kg	<0.010	7520352	<0.010	0.037	<0.010	0.010	7520352
Xylenes (Total)	mg/kg	<0.040	7520352	<0.040	0.49	<0.040	0.040	7520352
m & p-Xylene	mg/kg	<0.040	7520352	<0.040	0.33	<0.040	0.040	7520352
o-Xylene	mg/kg	<0.020	7520352	<0.020	0.16	<0.020	0.020	7520352
F1 (C6-C10) - BTEX	mg/kg	<12	7520352	<12	<12	<12	12	7520352
(C6-C10)	mg/kg	<12	7520352	<12	<12	<12	12	7520352
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	99	7520352	100	102	100	N/A	7520352
4-Bromofluorobenzene (sur.)	%	109	7520352	106	107	108	N/A	7520352
D10-ETHYLBENZENE (sur.)	%	94	7520352	97	97	96	N/A	7520352
D4-1,2-Dichloroethane (sur.)	%	107	7520352	107	103	105	N/A	7520352
O-TERPHENYL (sur.)	%	94	7519023	99	95	105	N/A	7519023
RDL = Reportable Detection Limit N/A = Not Applicable								

Maxxam Job #: B446995
Report Date: 2014/06/16

TETRA TECH EBA INC.
Client Project #: ENVIND03354, AMA SITE 9557
Site Location: BARONS SHOP - BARONS, AB
Sampler Initials: JL

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		JU2565	JU2566	JU2566		
Sampling Date		2014/06/06	2014/06/06	2014/06/06		
COC Number		A221679	A221679	A221679		
	Units	14VW03 @ 0.2-0.4M	14VW03 @ 0.6-0.8M	14VW03 @ 0.6-0.8M Lab-Dup	RDL	QC Batch
Misc. Inorganics						
Fraction of Organic Carbon	g/g	0.011	0.0067	N/A	0.00020	7517262
Physical Properties						
Dry Bulk Density	g/cm3	1.6	1.7	1.7	0.010	7519177
Moisture	%	14	13	N/A	0.30	7522048
Sieve - Pan	%	81	64	N/A	0.20	7522105
Sieve - #200 (>0.075mm)	%	19	36	N/A	0.20	7522105
Grain Size	%	FINE	FINE	N/A	0.20	7522105
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate N/A = Not Applicable						

Maxxam Job #: B446995
Report Date: 2014/06/16

TETRA TECH EBA INC.
Client Project #: ENVIND03354, AMA SITE 9557
Site Location: BARONS SHOP - BARONS, AB
Sampler Initials: JL

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		JU2563		
Sampling Date		2014/06/06		
COC Number		A221679		
	Units	14VW03 @ 1.6M	RDL	QC Batch
Ext. Pet. Hydrocarbon				
F4G-SG (Heavy Hydrocarbons-Grav.)	mg/kg	3800	500	7519051
RDL = Reportable Detection Limit				

Maxxam Job #: B446995
Report Date: 2014/06/16

TETRA TECH EBA INC.
Client Project #: ENVIND03354, AMA SITE 9557
Site Location: BARONS SHOP - BARONS, AB
Sampler Initials: JL

MISCELLANEOUS (SOIL)

Maxxam ID		JU2565	JU2566		
Sampling Date		2014/06/06	2014/06/06		
COC Number		A221679	A221679		
	Units	14VW03 @ 0.2-0.4M	14VW03 @ 0.6-0.8M	RDL	QC Batch
Misc. Inorganics					
Total Organic Carbon (C)	%	1.1	0.67	0.020	7525508
RDL = Reportable Detection Limit					

Maxxam Job #: B446995
Report Date: 2014/06/16

TETRA TECH EBA INC.
Client Project #: ENVIND03354, AMA SITE 9557
Site Location: BARONS SHOP - BARONS, AB
Sampler Initials: JL

GENERAL COMMENTS

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

Package 1	15.3°C
-----------	--------

Results relate only to the items tested.

Maxxam Job #: B446995
Report Date: 2014/06/16

TETRA TECH EBA INC.
Client Project #: ENVIND03354, AMA SITE 9557
Site Location: BARONS SHOP - BARONS, AB
Sampler Initials: JL

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7518497	AN0	Method Blank	Moisture	2014/06/10	<0.30		%	
7518506	AN0	Method Blank	Moisture	2014/06/10	<0.30		%	
7519023	DR4	Matrix Spike	O-TERPHENYL (sur.)	2014/06/11		76	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/06/11		96	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2014/06/11		102	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2014/06/11		87	%	50 - 130
7519023	DR4	Spiked Blank	O-TERPHENYL (sur.)	2014/06/11		87	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/06/11		95	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2014/06/11		100	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2014/06/11		86	%	70 - 130
7519023	DR4	Method Blank	O-TERPHENYL (sur.)	2014/06/11		102	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2014/06/11	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2014/06/11	<50		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2014/06/11	<50		mg/kg	
7519051		Spiked Blank	F4G-SG (Heavy Hydrocarbons-Grav.)	2014/06/13		91	%	70 - 130
7519051		Method Blank	F4G-SG (Heavy Hydrocarbons-Grav.)	2014/06/13	<500		mg/kg	
7519177	MN0	RPD [JU2566-01]	Dry Bulk Density	2014/06/11	0.6		%	35
7520352	WZ0	Matrix Spike	1,4-Difluorobenzene (sur.)	2014/06/12		97	%	60 - 140
			4-Bromofluorobenzene (sur.)	2014/06/12		104	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2014/06/12		98	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2014/06/12		106	%	60 - 140
			Benzene	2014/06/12		83	%	60 - 140
			Toluene	2014/06/12		85	%	60 - 140
			Ethylbenzene	2014/06/12		86	%	60 - 140
			m & p-Xylene	2014/06/12		86	%	60 - 140
			o-Xylene	2014/06/12		88	%	60 - 140
			(C6-C10)	2014/06/12		86	%	60 - 140
7520352	WZ0	Spiked Blank	1,4-Difluorobenzene (sur.)	2014/06/12		98	%	60 - 140
			4-Bromofluorobenzene (sur.)	2014/06/12		104	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2014/06/12		102	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2014/06/12		109	%	60 - 140
			Benzene	2014/06/12		91	%	60 - 140
			Toluene	2014/06/12		92	%	60 - 140
			Ethylbenzene	2014/06/12		94	%	60 - 140
			m & p-Xylene	2014/06/12		93	%	60 - 140
			o-Xylene	2014/06/12		96	%	60 - 140
			(C6-C10)	2014/06/12		96	%	60 - 140
7520352	WZ0	Method Blank	1,4-Difluorobenzene (sur.)	2014/06/12		102	%	60 - 140
			4-Bromofluorobenzene (sur.)	2014/06/12		102	%	60 - 140
			D10-ETHYLBENZENE (sur.)	2014/06/12		99	%	60 - 130
			D4-1,2-Dichloroethane (sur.)	2014/06/12		106	%	60 - 140
			Benzene	2014/06/12	<0.0050		mg/kg	
			Toluene	2014/06/12	<0.020		mg/kg	
			Ethylbenzene	2014/06/12	<0.010		mg/kg	
			Xylenes (Total)	2014/06/12	<0.040		mg/kg	
			m & p-Xylene	2014/06/12	<0.040		mg/kg	
			o-Xylene	2014/06/12	<0.020		mg/kg	
			F1 (C6-C10) - BTEX	2014/06/12	<12		mg/kg	
			(C6-C10)	2014/06/12	<12		mg/kg	
7522048	PKA	Method Blank	Moisture	2014/06/12	<0.30		%	
7522105	MN0	QC Standard	Sieve - Pan	2014/06/12		100	%	75 - 125
			Sieve - #200 (>0.075mm)	2014/06/12		101	%	75 - 125

Maxxam Job #: B446995
Report Date: 2014/06/16

TETRA TECH EBA INC.
Client Project #: ENVIND03354, AMA SITE 9557
Site Location: BARONS SHOP - BARONS, AB
Sampler Initials: JL

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
7525508	CT6	QC Standard	Total Organic Carbon (C)	2014/06/14		120	%	75 - 125
7525508	CT6	Spiked Blank	Total Organic Carbon (C)	2014/06/14		97	%	75 - 125
7525508	CT6	Method Blank	Total Organic Carbon (C)	2014/06/14	<0.020		%	

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

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

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

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

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

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

Maxxam Job #: B446995
Report Date: 2014/06/16

TETRA TECH EBA INC.
Client Project #: ENVIND03354, AMA SITE 9557
Site Location: BARONS SHOP - BARONS, AB
Sampler Initials: JL

VALIDATION SIGNATURE PAGE

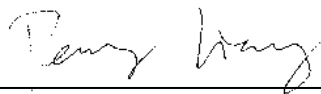
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Janet Gao, Senior Analyst, Organics Department



Luba Shymushovska, Senior Analyst, Organic Department



Peng Liang, Analyst II

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.



Calgary: 4000 19th St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
Edmonton: 9331 - 48 Street, T6B 2R4. Ph: (780) 577-7100, Fax: (780) 450-4187, Toll free: (877) 465-8889
www.maxxamanalytics.com

Chain of Custody

A221679

Page: 1 of 1

Company: **TETRA TECH EBA**
Contact: **JAMES GRING**
Address: **442-10th St. N. LETH.**
Prov: **AB** PC: **TIH2C7**
Contact #s: Ph: **329 9009** Cell: **634 3566**

Report To: Same as Invoice ☐
S/A
Prov: PC:
Ph: Cell:

Report Distribution (E-Mail):
jgring@eba.ca.

REGULATORY GUIDELINES:
☒ AT1
☐ CCME
☐ Regulated Drinking Water
☐ Other:

All samples are held for 60 calendar days after sample receipt, unless specified otherwise.

PO #: **ENVIND03354**
Project # / Name: **AMA SITE 9557 - BARROWS SHOP**
Site Location: **BARROWS, AB**
Quote #: **EBA**
Sampled By: **JAMIE LAUNTAGNE**

SERVICE REQUESTED: ☐ RUSH (Contact lab to reserve)
Date Required:
☒ REGULAR (5 to 7 Days)

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	BTEX F	Sieve (75 micron)	Regulation	Salinity	Assessment	Basic C	FC Bulk Density	☐ BTEX	☐ BTEX	☐ Routine	☐ TOC	Total	Dissolved	Mercury	HOLD - Do not Analyze	# of Containers
1	14VW01	1.6m	Soil	14/06/06 (a.m.)	X															
2	14VW02	1.6m			X															
3	14VW03	1.6m			X															
4	14VW04	1.0m			X															
5	14VW03	0.2-0.4m				X				X	X									
6	14VW03	0.6-0.8m				X				X	X									
7																				
8																				
9																				
10																				
11																				
12																				

7-Jun-14 10:30

Ioana Stoica



B446995

FL5

INS-0046

002

Please indicate Filtered, Preserved or Both (F, P, F/P)

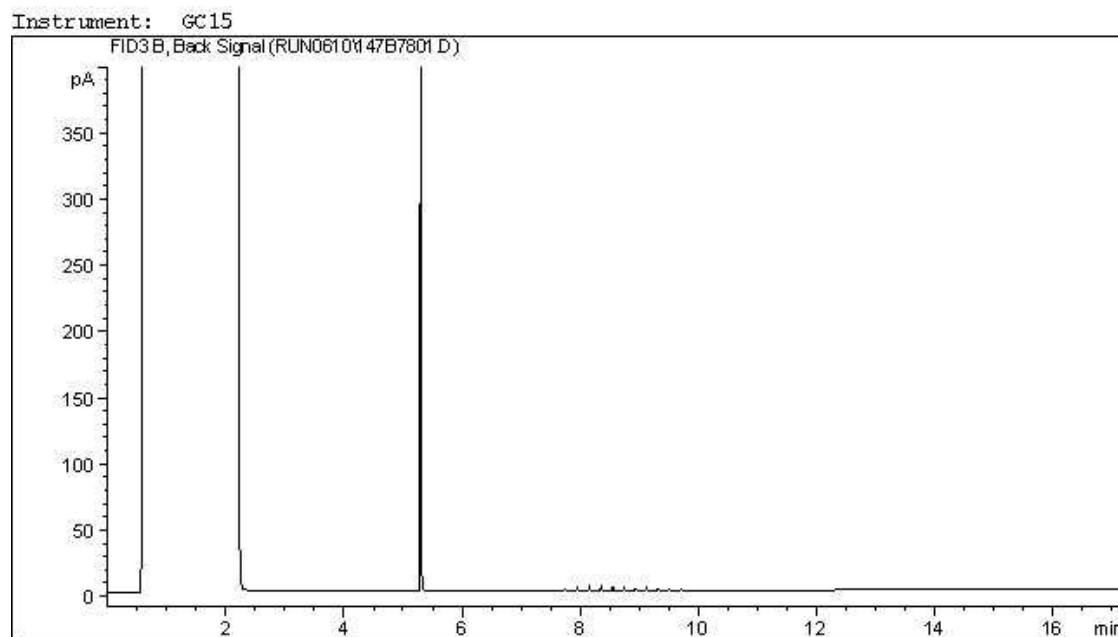
7-Jun-14 10:30
Ioana Stoica
B446995
FL5 INS-0046

Please indicate Filtered, Preserved or Both (F, P, F/P)

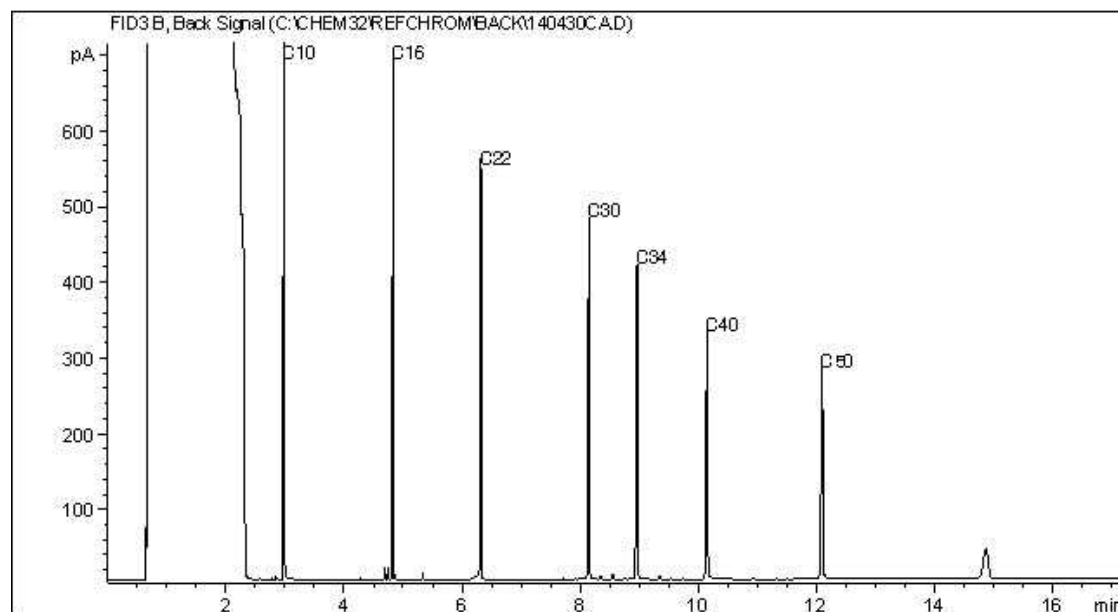
Relinquished By (Signature/Print): **JAMIE LAUNTAGNE** Date (YY/MM/DD): **14/06/06** Time (24:00): **13:00**
Relinquished By (Signature/Print): Date (YY/MM/DD): Time (24:00):
Special Instructions: **2 Jars per B* x F.F. 1 bag per PSA/FOC/BD** # of Jars Used & Not Submitted:

LAB USE ONLY
Received By: **JESSE LUONG** Date: **14/06/07** Time: **12:30** Maxxam Job #:
Custody Seal: Temperature: Ice:
Lab Comments: **15, 15, 16**

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram

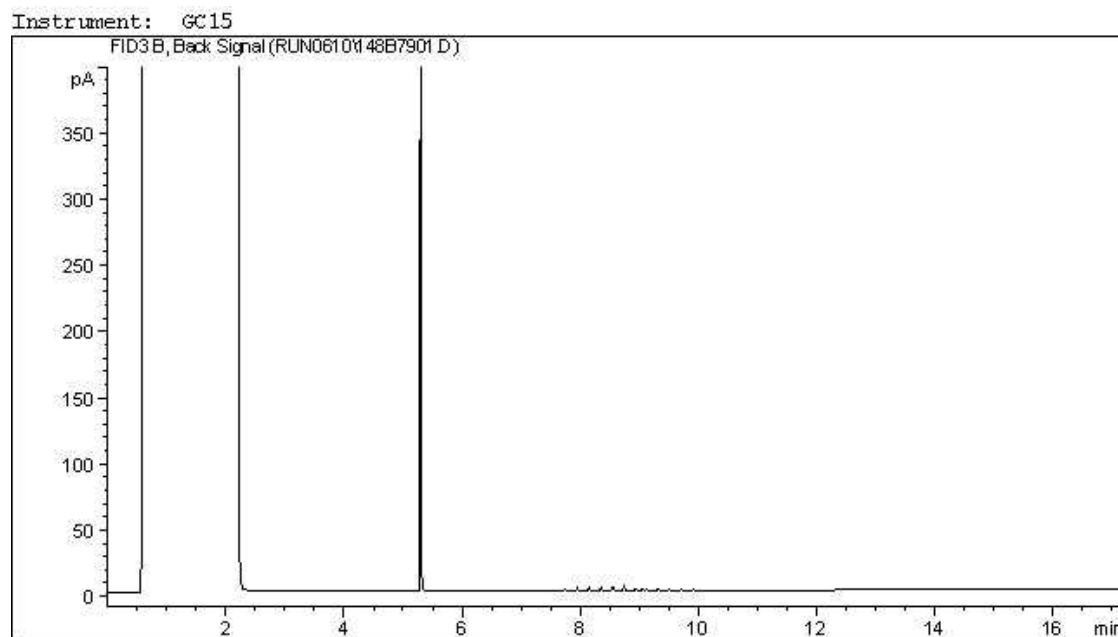


TYPICAL PRODUCT CARBON NUMBER RANGES

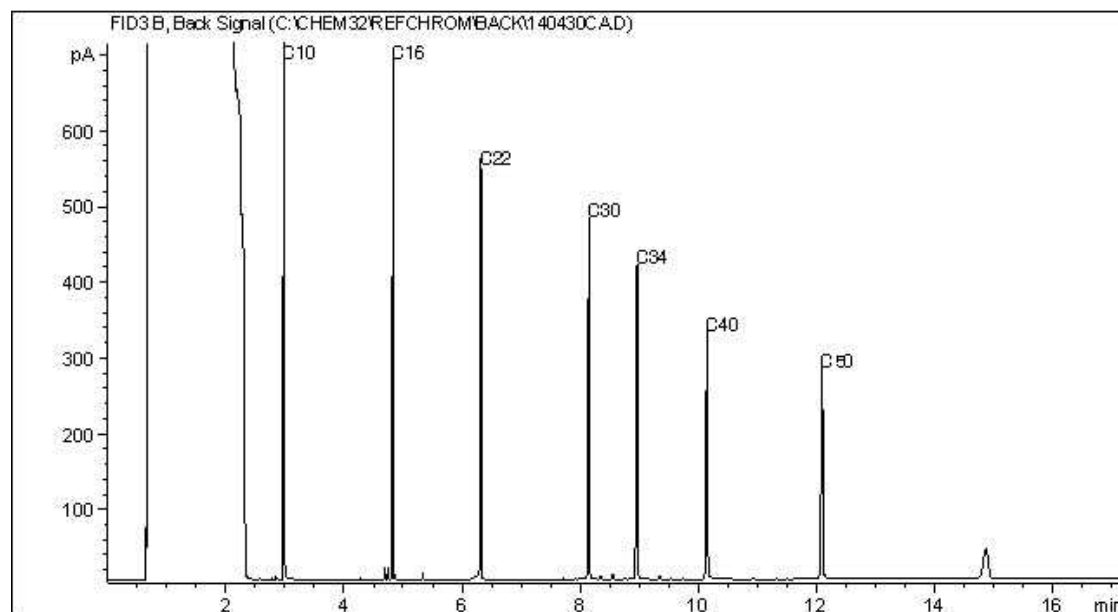
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram

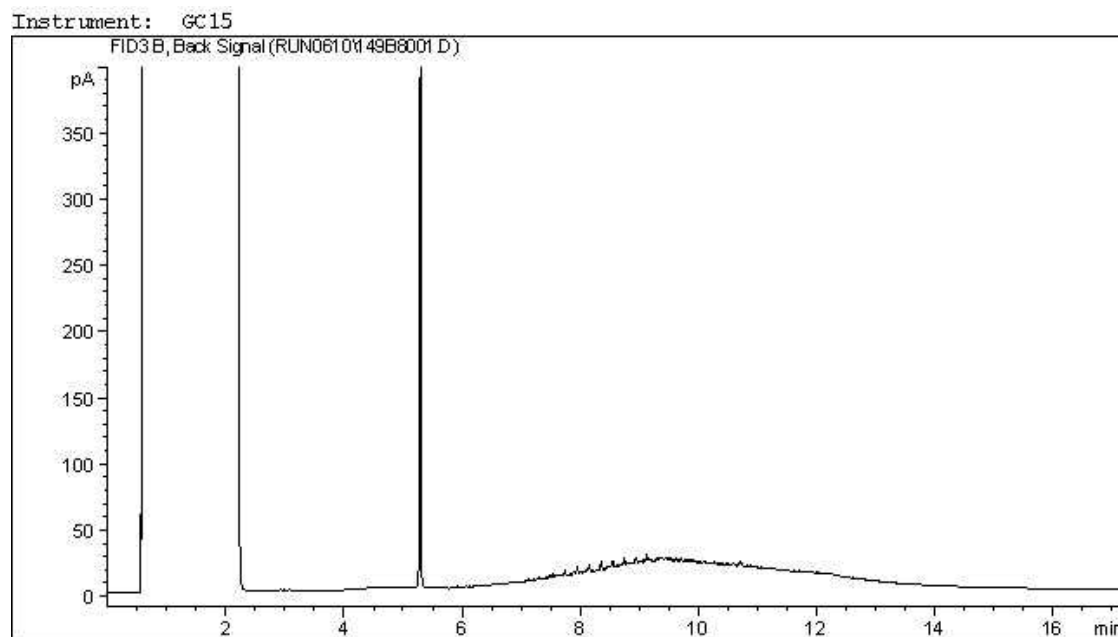


TYPICAL PRODUCT CARBON NUMBER RANGES

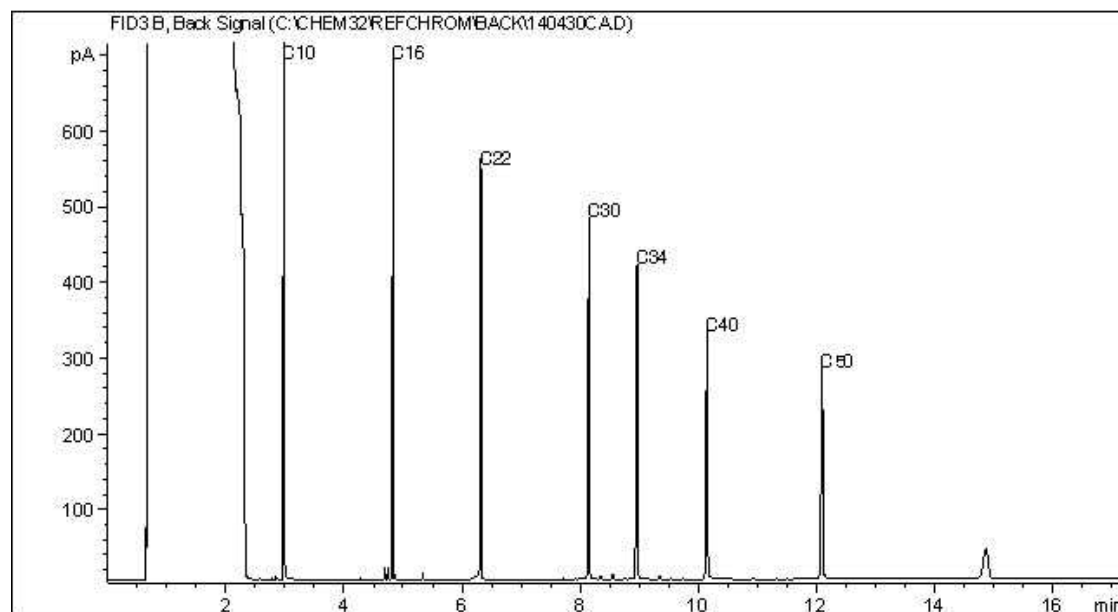
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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

CCME Hydrocarbons (F2-F4 in soil) Chromatogram



Carbon Range Distribution - Reference Chromatogram

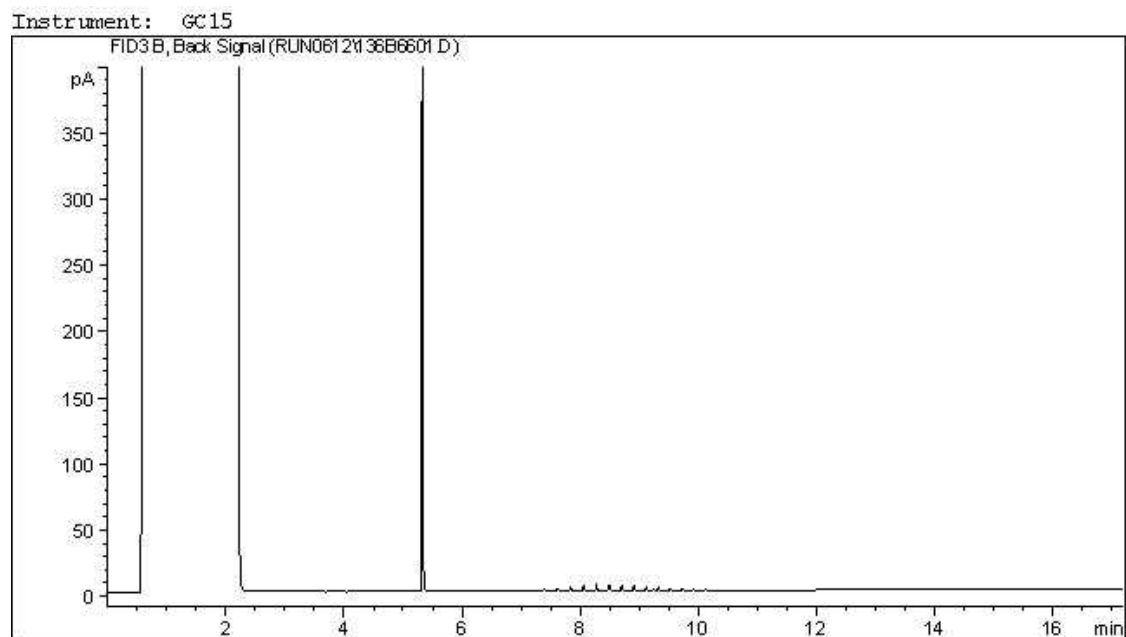


TYPICAL PRODUCT CARBON NUMBER RANGES

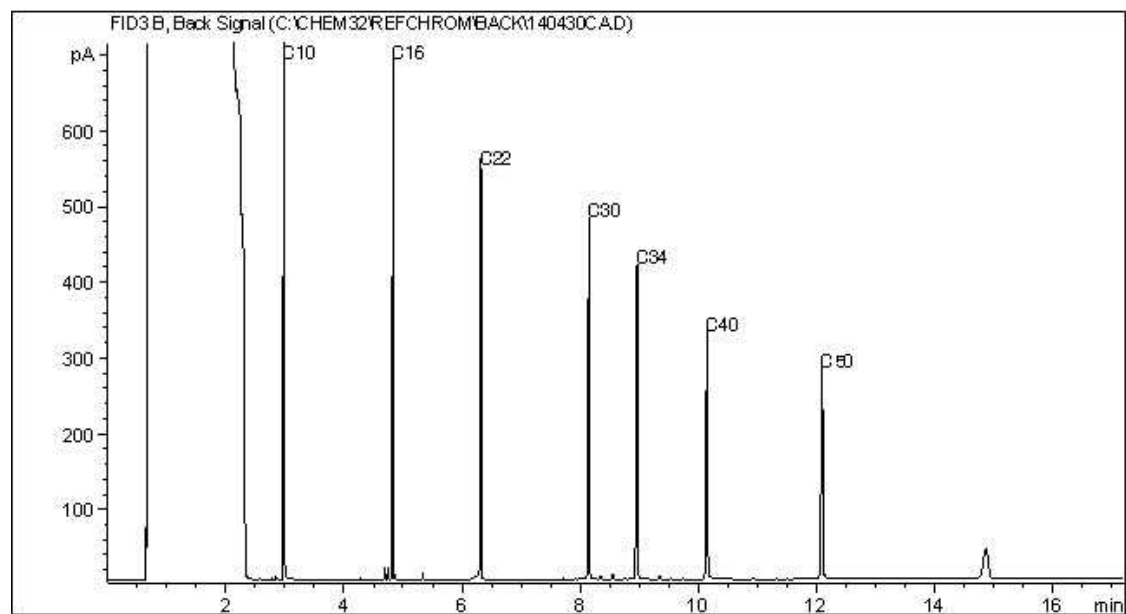
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40
Kerosene:	C7 - C16	Crude Oils:	C3 - C60+

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

CCME Hydrocarbons (F2-F4 in soil) 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.

Your P.O. #: ENVIND03354-01
 Your Project #: 202 MAIN ST. BARONS AB
 Site Location: AMA SITE 9557
 Your C.O.C. #: A091416

Attention: Jaymes Going

Tetra Tech EBA Inc.
 442 - 10 Street North
 Lethbridge, AB
 CANADA T1H 2C7

Report Date: 2014/07/29
Report #: R3105529
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4C8457

Received: 2014/07/22, 09:50

Sample Matrix: AIR
 # Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
BTEX Fractionation in Air (TO-15mod)	4	N/A	2014/07/23	BRL SOP-00304	EPA TO-15 m
Canister Pressure (TO-15)	4	N/A	2014/07/23	BRL SOP-00304	EPA TO-15 m

Remarks:

The lab certifies that the test results meet all requirements of NELAC, where applicable.

* 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.

Theresa Stephenson, Project Manager
 Email: TStephenson@maxxam.ca
 Phone# (905) 817-5763

=====

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

Total cover pages: 1

Page 1 of 8

Maxxam Job #: B4C8457
Report Date: 2014/07/29

Tetra Tech EBA Inc.
Client Project #: 202 MAIN ST. BARONS AB
Site Location: AMA SITE 9557
Your P.O. #: ENVIND03354-01

RESULTS OF ANALYSES OF AIR

Maxxam ID		WT9268	WT9269	WT9270		WT9271	
Sampling Date		2014/07/18 11:00	2014/07/18 11:30	2014/07/18 12:00		2014/07/18 12:30	
COC Number		A091416	A091416	A091416		A091416	
	Units	14VW01	14VW02	14VW03	QC Batch	14VW04	QC Batch

Volatile Organics							
Pressure on Receipt	psig	(-3.7)	(-3.6)	(-5.2)	3686974	(-3.6)	3687121

QC Batch = Quality Control Batch

Maxxam Job #: B4C8457
Report Date: 2014/07/29

Tetra Tech EBA Inc.
Client Project #: 202 MAIN ST. BARONS AB
Site Location: AMA SITE 9557
Your P.O. #: ENVIND03354-01

VOLATILE ORGANIC HYDROCARBONS BY GC/MS (AIR)

Maxxam ID		WT9268		WT9269		WT9270		
Sampling Date		2014/07/18 11:00		2014/07/18 11:30		2014/07/18 12:00		
COC Number		A091416		A091416		A091416		
	Units	14VW01	RDL	14VW02	RDL	14VW03	RDL	QC Batch

Volatile Organics								
Benzene	ug/m3	535	4.8	238	1.2	639	4.8	3686977
Toluene	ug/m3	3.5	1.6	2.3	1.6	6.6	1.6	3686977
Ethylbenzene	ug/m3	<1.6	1.6	<1.6	1.6	<1.6	1.6	3686977
Total Xylenes	ug/m3	5.2	2.2	<2.2	2.2	<2.2	2.2	3686977
Aliphatic >C5-C6	ug/m3	9.8	5.0	<5.0	5.0	<5.0	5.0	3686977
Aliphatic >C6-C8	ug/m3	27.4	5.0	11.5	5.0	31.0	5.0	3686977
Aliphatic >C8-C10	ug/m3	81.4	5.0	10.8	5.0	12.0	5.0	3686977
Aliphatic >C10-C12	ug/m3	98.8	5.0	34.4	5.0	45.9	5.0	3686977
Aliphatic >C12-C16	ug/m3	9.8	5.0	13.3	5.0	35.5	5.0	3686977
Aromatic >C7-C8 (TEX Excluded)	ug/m3	<5.0	5.0	<5.0	5.0	<5.0	5.0	3686977
Aromatic >C8-C10	ug/m3	442	5.0	387	5.0	732	5.0	3686977
Aromatic >C10-C12	ug/m3	264	5.0	149	5.0	268	5.0	3686977
Aromatic >C12-C16	ug/m3	10.2	5.0	10.2	5.0	7.0	5.0	3686977
Surrogate Recovery (%)								
1,4-Difluorobenzene	%	102		101		108		3686977
Bromochloromethane	%	101		102		107		3686977
D5-Chlorobenzene	%	93		91		95		3686977

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B4C8457
Report Date: 2014/07/29

Tetra Tech EBA Inc.
Client Project #: 202 MAIN ST. BARONS AB
Site Location: AMA SITE 9557
Your P.O. #: ENVIND03354-01

VOLATILE ORGANIC HYDROCARBONS BY GC/MS (AIR)

Maxxam ID		WT9271		
Sampling Date		2014/07/18 12:30		
COC Number		A091416		
	Units	14VW04	RDL	QC Batch

Volatile Organics				
Benzene	ug/m3	205	1.2	3687125
Toluene	ug/m3	<1.6	1.6	3687125
Ethylbenzene	ug/m3	<1.6	1.6	3687125
Total Xylenes	ug/m3	<2.2	2.2	3687125
Aliphatic >C5-C6	ug/m3	<5.0	5.0	3687125
Aliphatic >C6-C8	ug/m3	9.0	5.0	3687125
Aliphatic >C8-C10	ug/m3	<5.0	5.0	3687125
Aliphatic >C10-C12	ug/m3	5.4	5.0	3687125
Aliphatic >C12-C16	ug/m3	<5.0	5.0	3687125
Aromatic >C7-C8 (TEX Excluded)	ug/m3	<5.0	5.0	3687125
Aromatic >C8-C10	ug/m3	145	5.0	3687125
Aromatic >C10-C12	ug/m3	18.2	5.0	3687125
Aromatic >C12-C16	ug/m3	<5.0	5.0	3687125
Surrogate Recovery (%)				
1,4-Difluorobenzene	%	83		3687125
Bromochloromethane	%	84		3687125
D5-Chlorobenzene	%	72		3687125

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B4C8457
Report Date: 2014/07/29

Tetra Tech EBA Inc.
Client Project #: 202 MAIN ST. BARONS AB
Site Location: AMA SITE 9557
Your P.O. #: ENVIND03354-01

GENERAL COMMENTS

Sample WT9268-01: Benzene was analyzed at a 4X dilution. The DL was adjusted accordingly.

Sample WT9270-01: Benzene was analyzed at a 4X dilution. The DL was adjusted accordingly.

Results relate only to the items tested.

Tetra Tech EBA Inc.
Attention: Jaymes Going
Client Project #: 202 MAIN ST. BARONS AB
P.O. #: ENVIND03354-01
Site Location: AMA SITE 9557

Quality Assurance Report

Maxxam Job Number: GB4C8457

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3686977 TRN	Spiked Blank	1,4-Difluorobenzene	2014/07/23		122	%	60 - 140
		Bromochloromethane	2014/07/23		123	%	60 - 140
		D5-Chlorobenzene	2014/07/23		122	%	60 - 140
		Benzene	2014/07/23		86	%	70 - 130
		Toluene	2014/07/23		95	%	70 - 130
		Ethylbenzene	2014/07/23		95	%	70 - 130
	Method Blank	Total Xylenes	2014/07/23		100	%	70 - 130
		1,4-Difluorobenzene	2014/07/23		107	%	60 - 140
		Bromochloromethane	2014/07/23		105	%	60 - 140
		D5-Chlorobenzene	2014/07/23		95	%	60 - 140
		Benzene	2014/07/23	<1.2		ug/m3	
		Toluene	2014/07/23	<1.6		ug/m3	
	RPD	Ethylbenzene	2014/07/23	<1.6		ug/m3	
		Total Xylenes	2014/07/23	<2.2		ug/m3	
		Aliphatic >C5-C6	2014/07/23	<5.0		ug/m3	
		Aliphatic >C6-C8	2014/07/23	<5.0		ug/m3	
		Aliphatic >C8-C10	2014/07/23	<5.0		ug/m3	
		Aliphatic >C10-C12	2014/07/23	<5.0		ug/m3	
		Aliphatic >C12-C16	2014/07/23	<5.0		ug/m3	
		Aromatic >C7-C8 (TEX Excluded)	2014/07/23	<5.0		ug/m3	
		Aromatic >C8-C10	2014/07/23	<5.0		ug/m3	
		Aromatic >C10-C12	2014/07/23	<5.0		ug/m3	
		Aromatic >C12-C16	2014/07/23	<5.0		ug/m3	
		Benzene	2014/07/23	NC		%	25
		Toluene	2014/07/23	NC		%	25
		Ethylbenzene	2014/07/23	NC		%	25
		Total Xylenes	2014/07/23	NC		%	25
		Aliphatic >C5-C6	2014/07/23	NC		%	25
		Aliphatic >C6-C8	2014/07/23	NC		%	25
		Aliphatic >C8-C10	2014/07/23	NC		%	25
		Aliphatic >C10-C12	2014/07/23	NC		%	25
		Aliphatic >C12-C16	2014/07/23	NC		%	25
		Aromatic >C7-C8 (TEX Excluded)	2014/07/23	NC		%	25
		Aromatic >C8-C10	2014/07/23	NC		%	25
		Aromatic >C10-C12	2014/07/23	NC		%	25
		Aromatic >C12-C16	2014/07/23	NC		%	25
3687125 LSY	Spiked Blank	1,4-Difluorobenzene	2014/07/23		98	%	60 - 140
		Bromochloromethane	2014/07/23		97	%	60 - 140
		D5-Chlorobenzene	2014/07/23		98	%	60 - 140
		Benzene	2014/07/23		96	%	70 - 130
		Toluene	2014/07/23		95	%	70 - 130
		Ethylbenzene	2014/07/23		90	%	70 - 130
	Method Blank	Total Xylenes	2014/07/23		90	%	70 - 130
		1,4-Difluorobenzene	2014/07/23		81	%	60 - 140
		Bromochloromethane	2014/07/23		80	%	60 - 140
		D5-Chlorobenzene	2014/07/23		74	%	60 - 140
		Benzene	2014/07/23	<1.2		ug/m3	
		Toluene	2014/07/23	<1.6		ug/m3	
		Ethylbenzene	2014/07/23	<1.6		ug/m3	
		Total Xylenes	2014/07/23	<2.2		ug/m3	
		Aliphatic >C5-C6	2014/07/23	<5.0		ug/m3	
		Aliphatic >C6-C8	2014/07/23	<5.0		ug/m3	
		Aliphatic >C8-C10	2014/07/23	<5.0		ug/m3	
		Aliphatic >C10-C12	2014/07/23	<5.0		ug/m3	
		Aliphatic >C12-C16	2014/07/23	<5.0		ug/m3	

Tetra Tech EBA Inc.
Attention: Jaymes Going
Client Project #: 202 MAIN ST. BARONS AB
P.O. #: ENVIND03354-01
Site Location: AMA SITE 9557

Quality Assurance Report (Continued)

Maxxam Job Number: GB4C8457

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3687125 LSY	Method Blank	Aromatic >C7-C8 (TEX Excluded)	2014/07/23	<5.0		ug/m3	
		Aromatic >C8-C10	2014/07/23	<5.0		ug/m3	
		Aromatic >C10-C12	2014/07/23	<5.0		ug/m3	
		Aromatic >C12-C16	2014/07/23	<5.0		ug/m3	
	RPD [WT9271-01]	Benzene	2014/07/23	3.4		%	25
		Toluene	2014/07/23	NC		%	25
		Ethylbenzene	2014/07/23	NC		%	25
		Total Xylenes	2014/07/23	NC		%	25
		Aliphatic >C5-C6	2014/07/23	NC		%	25
		Aliphatic >C6-C8	2014/07/23	NC		%	25
		Aliphatic >C8-C10	2014/07/23	NC		%	25
		Aliphatic >C10-C12	2014/07/23	NC		%	25
		Aliphatic >C12-C16	2014/07/23	NC		%	25
		Aromatic >C7-C8 (TEX Excluded)	2014/07/23	NC		%	25
		Aromatic >C8-C10	2014/07/23	4.4		%	25
		Aromatic >C10-C12	2014/07/23	NC		%	25
		Aromatic >C12-C16	2014/07/23	NC		%	25

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

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 (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).

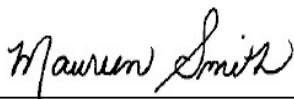
Validation Signature Page

Maxxam Job #: B4C8457

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



Angel Guerrero, Team Leader, VOC Air



Maureen Smith, Supervisor, Volatiles

=====

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.

APPENDIX D

RECORD OF SITE CONDITION

Record of Site Condition



1 REPORT AND FORM INFORMATION			
Title of report	Groundwater and Soil Vapour Monitoring Program. 202 Main Street Barons, AB. Alberta Municipal Affairs Site #9557		
Report date (dd-mon-yyyy)	01-OCT-2014	Record of Site Condition (RSC) ID No. ^ψ	

2 SITE IDENTIFICATION AND PHYSICAL LOCATION								
2.1 Site name		AMA Site #9557						
2.2 Address of site		202 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	7	1						
2605X	7	2						

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 EBA Inc.	Contact person	Jaymes Going
Mailing address	442 - 10 Street North Lethbridge, AB T1H 2C7	Position held	Environmental Consultant
		Business phone No.	403.329.9009
		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 Works Building</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 (<i>specify</i>): _____
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 (<i>specify</i>): _____				

6 SITE CHARACTERIZATION					
6.1 What Environmental Site Assessments (ESA) Have Been Conducted and Completed to Date?					
☒ Phase I ESA ☒ Phase II ESA (<i>check all that apply.</i>) ☒ 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 <i>Alberta Tier 2 Soil and Groundwater Remediation Guidelines</i> (ESRD, 2007 and updates)? (<i>check all that apply in Section 6.2.1.1.</i>)					
☐ Yes ☐ No (<i>→proceed to Section 6.2.2.</i>)					
6.2.1.1 Identify any conditions that require the approaches of the <i>Alberta Tier 2</i> guidelines. (<i>see Alberta Tier 1 Soil and Groundwater Remediation Guidelines</i> (ESRD, 2007 and updates), for details.)					
☒	Contamination within 30 cm of building foundation	☒	Unusual building feature (<i>eg. earthen floor</i>)	☐	Contamination within 10 m distance of surface water body
☒	Fractured bedrock	☐	Potentially high hydraulic conductivity ($> 10^{-5}$ m/sec.)	☐	Other (<i>see Alberta Tier 1 guidelines and specify</i>): _____
6.2.1.2 Did the <i>Alberta Tier 2</i> 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 (<i>→proceed to Section 6.2.2.</i>)					
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 (<i>check all that apply, see Alberta Tier 1 guidelines, Tables 1-4 for detailed listing</i>).					
☐	General and inorganic parameters	☐	Metals		
☐	Hydrocarbons	☐	Halogenated aliphatics		
☐	Chlorinated aromatics	☐	Pesticides		
☐	Other organics	☐	Radionuclides		
☐	Salt	☐	Other (<i>specify</i>): _____		

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: _____)

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): 17-Nov-08; _____

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: 1.4 (m) Deepest: 1.8(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.: South) ☐ TBD ☐ NR

6.5.4 What is the existing land use classification?

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

6.5.5 What is the end land use classification?

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

Record of Site Condition



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) _____			
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) _____			
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) _____			
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.

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 9557 (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	Title of authorized representative (e.g. officer, director)	Signature	Date (dd-mon-yyyy)