VILLAGE OF BARONS

UNDERGROUND STORAGE TANK REMOVAL AND MONITORING 202 MAIN STREET BARONS, ALBERTA ALBERTA MUNICIPAL AFFAIRS SITE #9557

REPORT

OCTOBER 2013
ISSUED FOR USE
EBA FILE: L22103112-01

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A TETRA TECH COMPANY

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EBA Engineering Consultants Ltd. operating as EBA, A Tetra Tech Company
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LIMITATIONS OF REPORT

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

1.0 INTRODUCTION

1.1 General

EBA Engineering Consultants Ltd. operating as EBA, A Tetra Tech Company (EBA) was retained by the Village of Barons (Village) to administer a contract for source removal of petroleum hydrocarbon (PHC) impacted soils and the decommissioning of abandoned underground storage tanks (USTs) (if present) at 202 Main Street in the Village of Barons, Alberta. Alberta Municipal Affairs (AMA) provided funding for this project under the Tank Site Remediation Program (AMA Site No. 9557).

The contract, including the source removal of PHC impacted soils, decommissioning of the USTs, and backfilling of the excavation, was awarded to Biantco Environmental Services Inc. (Biantco) of Lethbridge, Alberta.

EBA was on site to monitor Biantco's activities, characterize the soils within the tank nest for potential residual hydrocarbon impacts, and summarize monitoring details in a report. The work was conducted according to EBA's terms and conditions. A copy of these terms and conditions is provided in Appendix A.

EBA has previously conducted a Phase II and Phase III environmental site assessment (ESA), an additional Phase III ESA, and a Risk Management Plan (RMP) for the site. These activities were reported under separate covers as indicated below:

- *Phase II and Phase III Environmental Site Assessment, 202 Main Street, Lot 1 and Lot 2, Block 7, Plan 2605X, Barons, Alberta*, issued in October 2009 (EBA 2009).
- *Phase III ESA, Additional Phase III Environmental Site Assessment, 202 Main Street, Lot 1 and Lot 2, Block 7, Plan 2605X, Barons, Alberta*, issued in December 2011 (EBA 2011).
- *Risk Management Plan Alberta Municipal Affairs Site 9557, 202 Main Street, Barons, Alberta*, issued May 2012 (EBA 2012).

1.2 Objectives

The first step towards management of PHC impacted sites is to remove the primary source. Given the site assessment data previously obtained during the Phase II and Phase III ESAs, complex urban site conditions, and site status, the desired remedial objective was to remove PHC impacted soil, an estimated volume 400 m^3, and the existing USTs, if present.

Additional contamination was anticipated to exist beyond the proposed limits of the excavation. However, this material was not removed given the existing urban infrastructure (buildings to the south and east, and sidewalks and roadways to the north and west).

1.3 Scope of Work

The scope of work for the PHC impacted soil and UST removal and monitoring program was as follows:

- Retained Biantco as the tank removal contractor upon authorization from the Village and the AMA.
- Administered the contract on behalf of the Village.
- Advised Biantco to make necessary arrangements for utility locates and any other notification required.
- Conducted a preconstruction meeting with Biantco.
- Attended an on-site tailgate safety meeting and pre-job hazard assessment prior to the commencement of any fieldwork.
- Observed and documented on-site activities conducted by Biantco.
- Conducted soil sampling within the tank nest to assess the presence of subsurface vapours, potential free-phase liquids, and soil quality.
- Collected bulk soil samples from the base and sidewalls of the tank nest in order to field screen for combustible vapour concentrations (CVCs).
- Submitted 10 confirmatory soil samples (including 1 duplicate sample) for laboratory analysis of benzene, toluene, ethylbenzene, and xylene (BTEX), and PHC fractions F1 to F4 from the excavation and one sample from the import fill material for laboratory analysis of BTEX, PHC fractions F1 to F4, metals, and particle size analysis (PSA).
- Prepared a summary report of the site activities and findings.

1.4 Qualifications of Assessors

Ms. Amy Kennerley, C.E.T., monitored site activities and conducted the field screening and sampling. Ms. Kennerley is an environmental technologist for EBA's geo-environmental discipline and has more than five years of experience in the environmental and geotechnical industry.

Mr. Jaymes Going, B.Sc., EPt, was the project manager, conducted the analytical review, and prepared this report. Mr. Going is an environmental scientist for EBA's geo-environmental discipline and has more than five years of experience in the environmental industry.

Mr. Thomas Dance, M.Sc., P.Geo., assisted with the interpretation of the findings and conducted the final review of the report. Mr. Dance is a Principal Hydrogeologist in EBA's environment practice in Calgary and has more than 34 years of experience in the environmental industry.

2.0 BACKGROUND INFORMATION

There were two ESAs and a RMP previously conducted at the subject site by EBA. The following environmental reports were available for the site and are summarized below.

Previous Reporting Summary

Title	Prepared by	Prepared for	Date	File Number
Phase II and Phase III Environmental Site Assessment	EBA Engineering Consultants Ltd.	Village of Barons	October 2009	L22101182.001
Additional Phase III Environmental Site Assessment	EBA Engineering Consultants Ltd.	Village of Barons	December 2011	L22101182.002
Risk Management Plan	EBA Engineering Consultants Ltd.	Village of Barons	May 2012	L22101490

The previous ESAs identified PHC concentrations in the soil and groundwater exceeding the applicable guidelines. The Additional Phase III ESA and the RMP recommended to remediate the source area on site and to remove the USTs, if present.

3.0 TENDER/CONTRACTOR AWARD

EBA prepared and issued the UST removal tender document on behalf of the Village.

Three bids were received by EBA. EBA prepared a letter recommending the award of the contract to Biantco which was issued to the Village and the AMA on May 9, 2013.

The contract between the Village and Biantco was awarded and the project commenced on July 15, 2013.

4.0 FIELDWORK

This section summarizes field observations during the UST excavation, removal, and excavation backfilling activities. Figures 1 (Site Location Plan), Figure 2 (Detailed Site Plan), and Figure 3 (Confirmatory Sampling of Excavation Limits) are provided in the Figures section of this report and site photographs (Photos) are provided in Appendix B.

4.1 Project Safety

A pre-job hazard assessment and safe work form were completed prior to the initiation of the fieldwork and applicable safe work procedures were reviewed. The safe work form was reviewed on site by EBA representatives. At that time, emergency shut-offs were identified, site conditions were discussed, and a safe meeting location was chosen.

4.2 Excavation and Underground Storage Tank [UST] Removal

Non-impacted material above the suspected USTs location (a volume of approximately 140 m^3), to an approximate depth of 1.5 m below grade (mbg), was segregated from the impacted material using the trackhoe and stockpiled on the north side of the excavation. Underground piping was encountered along the southern boundary of the excavation at an approximate depth of 1.0 mbg (see Photo 1).

Below the non-impacted material, debris material (concrete, bricks, wood) was encountered. During the excavation of the PHC impacted material, the two USTs were encountered approximately 1.5 mbg at the southeast corner of the excavation and were located partially beneath the sidewalk of the site building (see Photo 3). The USTs (both with a holding volume of approximately 500 L) were then removed from the tank nest using a trackhoe and placed on the west side of the excavation for inspection. The tanks were visually inspected by Mr. Knelson of Biantco. Both USTs had numerous holes and tears and were significantly corroded (see Photo 4). Labels were not present on the tanks.

Biantco loaded the USTs onto a flatbed trailer using the trackhoe and disposed of them at Marshall Metals Scrap Recycling Ltd. located on Highway No. 3 east of the City of Lethbridge. A Statue of Declaration was provided by Biantco stating that the storage tanks were removed according to all required and applicable Petroleum Tank Management Association of Alberta (PTMAA) standards. A copy of the Statue of Declaration can be found in Appendix C and the PTMAA petroleum storage tank closure report is included in Appendix D.

Following removal of the USTs, excavation of the PHC impacted soil commenced to a depth of approximately 4.5 m (depth to bedrock in the area of the excavation). Impacted soil was stockpiled along the west side of the excavation, and 340 m^3 (approximately 550 tonnes) were later hauled to Shaughnessy Soil Services located within SW ¼ 30-010-21 W4M. Characterization for acceptance to Shaughnessy Soil Services was obtained during the previous assessments prior to the excavation of PHC impacted material.

The boundaries of the excavation were limited due to urban infrastructure (Figure 2). The north and west boundaries of the excavation were established by existing sidewalks and roadways, and the south and east excavation limits were bound by existing buildings.

4.3 Confirmatory Sampling Program

Due to the depth and slope of the excavation, the trackhoe was used to collect the required soil samples from the excavation. Samples were collected from the north, south, east, and west walls, as well as the base of the excavation. Samples were collected for vapour screening, which included placing samples into plastic bags and allowing the samples to volatilize for a minimum of 15 minutes. Bagged samples were measured for CVCs using a RKI Eagle portable gas monitor. CVC measurements obtained from the excavation are included on Table 1.

Ten soil samples, plus one duplicate sample were submitted for chemical analysis. Soil samples were placed in bags and laboratory-supplied 250 mL glass jars with Teflon™-lined lids, and kept cool in coolers. The samples were transported to Maxxam in Calgary under chain-of-custody (COC) for chemical analysis of BTEX and PHC fractions F1 to F4. An additional composite sample from the import fill material was submitted for chemical analysis of BTEX, PHC fractions F1 to F4, metals, and PSA.

4.4 Backfilling Excavation

Backfilling of the excavation began on July 20, 2013 beginning with the non-impacted soil from the excavation using the trackhoe. Material was placed in 30 cm to 40 cm lifts and then packed using the bucket of the trackhoe. An additional 340 m^3 of clay fill, obtained from a source located south of Shaughnessy, Alberta, was used to complete the backfilling of the excavation. Above the clay fill, crushed gravel was placed and packed to the existing grade. A geotechnical technologist from EBA was on site periodically to observe the backfill and compaction. Vibratory equipment was not used to pack the material due to structural concerns of the building to the east.

Density measurements (using a Troxler®) were taken of the material and were compared to a Standard Proctor value for that material. Twenty locations at various depths were subjected to field density measurements. Compaction of the fill material to a depth of 0.5 mbg achieved 95% or greater of the maximum proctor density. The upper 0.5 m of fill material (gravel) achieved a 90% of the maximum proctor density. Some future ground settlement should be expected. The density test locations and results are included in Appendix D.

5.0 COMPARATIVE GUIDELINES

To assist in assessing the quality of the soil analyzed during the environmental assessment at the site, the Alberta Tier 1 Soil and Groundwater Remediation Guidelines were applied (Alberta Environment[1] 2010). To apply these guidelines, the previous report information summarized in Section 2.0 was used to assess the land use and sensitivity of the site.

The site is located within an area of commercial buildings and residential dwellings. Therefore, the most sensitive land use within 30 m of the site is residential. Previous drilling at the site demonstrated that the underlying soils are predominantly fine-grained. Under the residential land use scenario for fine-grained soils, the Alberta Tier 1 Guidelines for aromatic hydrocarbons include the exposure pathway for the protection of drinking water. However, for the F1 to F4 hydrocarbons, the Tier 1 criteria is based on the protection of ecological receptors and that is the pathway for direct soil contact by ecological organisms.

During the previous site investigations, testing of the shallow groundwater yielded a hydraulic conductivity value of 5×10^{-6} m/s, with a saturated soil thickness greater than 2.5 m. These values were obtained from the wells completed within the impacted zones in the surficial till material and upper impacted bedrock material. The estimated hydraulic conductivity values are at the margin of the values as being representative of the domestic use aquifer. The conditions suggest that the shallow impacted saturated soils may yield sufficient water for domestic use. An average vertical hydraulic conductivity of the core samples collected from bedrock is 1.5×10^{-10} m/sec. The laboratory estimated values represents the vertical component of the hydraulic conductivity, which is one or two order of magnitude less than the horizontal hydraulic conductivity.

Considering that the shallow impacted saturated soils and bedrock may yield sufficient water for domestic use and keeping with the conservation nature of the Alberta Tier 1 Guidelines, we have applied the protection of drinking water pathway guidelines for BTEX and the protection of direct soil contact by

[1] Currently Alberta and Sustainable Resource Development.

ecological organisms pathway (most stringent pathway) for PHC fractions F1 to F4. Metals from the import fill material were compared to the most stringent of the guidelines for protection of direct soil contact.

6.0 RESULTS

This section summarizes analytical results for the confirmatory samples for BTEX and PHC fractions F1 to F4. Laboratory analytical results, including methods of analyses, are attached as Appendix F of this report. A summary table of soil analytical results is provided in Table 1.

All soil samples submitted from the excavation walls at a depth of 1.5 mbg yielded concentrations of the BTEX and PHC compounds less than the laboratory detection limits and/or the applied guidelines.

Concentrations of benzene (0.38 mg/kg) and ethylbenzene (1.30 mg/kg) on the north wall of the excavation at 4.9 mbg were greater than the applicable guidelines.

Concentrations of ethylbenzene (0.21 mg/kg) on the south wall of the excavation at 4.9 mbg were greater than the applicable guideline.

Concentrations of benzene (0.42 mg/kg), ethylbenzene (10.0 mg/kg), and PHC fraction F2 (1,600 mg/kg) on the east wall of the excavation at 4.9 mbg were greater than the applicable guidelines.

Concentrations of ethylbenzene (0.13 mg/kg) on the west wall of the excavation at 4.9 mbg were greater than the applicable guideline.

The concentrations of BTEX and PHC compounds in the soil sample submitted from the base of the excavation at a depth of 5.0 mbg were less than the laboratory detection limits and/or the applicable guidelines.

The composite sample from the import fill was less than the laboratory detection limits for BTEX and PHC fractions F1 to F4 and less than the laboratory detection limits and/or applied guidelines for metals.

7.0 QUALITY ASSURANCE/QUALITY CONTROL [QA/QC] DUPLICATE AND BLANK RESULTS

A duplicate sample was collected from the west wall at 1.5 mbg and analyzed for BTEX and PHC fractions F1 to F4. The relative percent difference (RPD) for the duplicate sample was not calculated as all results were less than the laboratory detection limits.

8.0 DISCUSSION

The USTs were removed and soil practical to excavate in regards to PHC impacted material was also removed and landfilled. However, impacted material was left in place due to existing urban infrastructure.

Soil analytical results show that PHC affected soils (with concentrations of one or more of BTEX and PHC fraction F2 greater than the applicable guidelines) remain unexcavated along the north, south, east, and west wall of the excavation. Fill was imported to replace the contaminated soils removed from the excavation and to fill the void left from the removal of the USTs.

9.0 RECOMMENDATIONS

Based on the collected information, the RMP developed for the site in May of 2012 should be implemented.

10.0 CLOSURE

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

Respectfully submitted,
EBA Engineering Consultants Ltd.

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PERMIT TO PRACTICE
EBA ENGINEERING CONSULTANTS LTD.

Signature _____

Date October 29, 2013

PERMIT NUMBER: P245
The Association of Professional Engineers and Geoscientists of Alberta

REFERENCES

Alberta Environment, 2010. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Environmental Policy Branch. Edmonton, Alberta.

EBA Engineering Consultants Ltd. 2009. Phase II and Phase III Environmental Site Assessment. 202 Main Street, Lot 1 and 2, Block 7, Plan 2605X, AMA Site 9557, Barons, Alberta. (EBA File No. L22101182.001).

EBA Engineering Consultants Ltd. 2011. Additional Phase III Environmental Site Assessment. 202 Main Street, Lot 1 and 2, Block 7, Plan 2605X, AMA Site 9557, Barons, Alberta. (EBA File No. L22101182.002).

EBA Engineering Consultants Ltd. 2012. Risk Management Plan. AMA Site 9557, 202 Main Street, Barons, Alberta. (EBA File No. L22101490).

TABLES

Table 1 Soil Analytical Results – Hydrocarbons and Metals

Table 1: Soil Analytical Results - Hydrocarbons & Metals

Parameters	Units	Detection Limits	Alberta Tier 1 Guidelines[1]	Excavation (July 16, 2013)										July 24, 2013
				North Wall		South Wall		East Wall		West Wall			Base	Import Fill
				1.5 m	4.9 m	1.5 m	4.9 m	1.5 m	4.9 m	1.5 m	Duplicate (1.5 m)	4.9 m	5.0 m	Stockpile
Physical Observations														
Combustible Vapour Concentrations*	ppm	1	--	nd	1,400	nd	193	nd	1,500	nd	nd	192	88	nd
Hydrocarbons														
Benzene	mg/kg	0.0050	0.046[A]	<0.0050	**0.38**	<0.0050	<0.0050	<0.0050	**0.42**	<0.0050	<0.0050	0.034	<0.0050	<0.0050
Toluene	mg/kg	0.020	0.52[A]	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Ethylbenzene	mg/kg	0.010	0.11[A]	<0.010	**1.30**	<0.010	**0.21**	<0.010	**10**	<0.010	<0.010	**0.13**	<0.010	<0.010
Xylenes	mg/kg	0.04	15[A]	<0.040	0.042	<0.040	<0.040	<0.040	12	<0.040	<0.040	0.13	<0.040	<0.040
F1 (C_6 to C_{10})	mg/kg	12	640[B]	<12	<12	<12	<12	<12	260	<12	<12	<12	<12	<12
F2 (C_{10} to C_{16})	mg/kg	10	520[B]	<10	160	<10	160	<10	**1,600**	<10	<10	140	51	<10
F3 (C_{16} to C_{34})	mg/kg	50	5,000[B]	<50	110	<50	110	350	910	<50	<50	110	<50	<50
F4 (C_{34} to C_{50})	mg/kg	50	13,200[B]	<50	<50	<50	<50	520	<50	<50	<50	<50	<50	<50
Soil Moisture Content	%	0.3	--	21	15	20	15	16	23	20	19	14	15	12
Metals[C]														
Antimony (Sb)	mg/kg	1	20	--	--	--	--	--	--	--	--	--	--	<1.0
Arsenic (As)	mg/kg	1	17	--	--	--	--	--	--	--	--	--	--	4.3
Barium (Ba)	mg/kg	10	500	--	--	--	--	--	--	--	--	--	--	280
Beryllium (Be)	mg/kg	0.4	5	--	--	--	--	--	--	--	--	--	--	<0.40
Boron (B)	mg/kg	0.1	2	--	--	--	--	--	--	--	--	--	--	<0.10
Cadmium (Cd)	mg/kg	0.1	10	--	--	--	--	--	--	--	--	--	--	0.4
Chromium (Cr)	mg/kg	1	64	--	--	--	--	--	--	--	--	--	--	11
Cobalt (Co)	mg/kg	1	20	--	--	--	--	--	--	--	--	--	--	4.9
Copper (Cu)	mg/kg	5	63	--	--	--	--	--	--	--	--	--	--	11
Lead (Pb)	mg/kg	1	140	--	--	--	--	--	--	--	--	--	--	6.6
Mercury (Hg)	mg/kg	0.05	6.6	--	--	--	--	--	--	--	--	--	--	<0.050
Molybdenum (Mo)	mg/kg	0.4	4	--	--	--	--	--	--	--	--	--	--	0.51
Nickel (Ni)	mg/kg	1	50	--	--	--	--	--	--	--	--	--	--	16
Selenium (Se)	mg/kg	0.5	1	--	--	--	--	--	--	--	--	--	--	<0.50
Silver (Ag)	mg/kg	1	20	--	--	--	--	--	--	--	--	--	--	<1.0
Thallium (Tl)	mg/kg	0.3	1	--	--	--	--	--	--	--	--	--	--	<0.30
Tin (Sn)	mg/kg	1	5	--	--	--	--	--	--	--	--	--	--	<1.0
Vanadium (V)	mg/kg	1	130	--	--	--	--	--	--	--	--	--	--	18
Zinc (Zn)	mg/kg	10	200	--	--	--	--	--	--	--	--	--	--	44
Physical Properties														
Sieve - Pan	%	0.2	--	--	--	--	--	--	--	--	--	--	--	86
Sieve - #200 (>0.075 mm)	%	0.2	--	--	--	--	--	--	--	--	--	--	--	14
Grain Size	%	0.2	--	--	--	--	--	--	--	--	--	--	--	Fine

Notes:

[1] Alberta Environment, December 2010. Alberta Tier I Soil and Groundwater Remediation Guidelines.

Referenced guidelines are for Residential/Parkland Land Use, fine-grained soils (BTEX and PHC fractions F1 to F4 are for subsoils, >3 mbg).

A - Subsoil remediation guideline for the protection of the domestic use aquifer.

B - Subsoil remediation guideline for the protection of ecological direct soil contact.

C - Most stringent guideline for direct soil contact, fine-grained soils.

* Combustible vapour concentrations measured using an RKI Eagle II [m].

nd - not detected

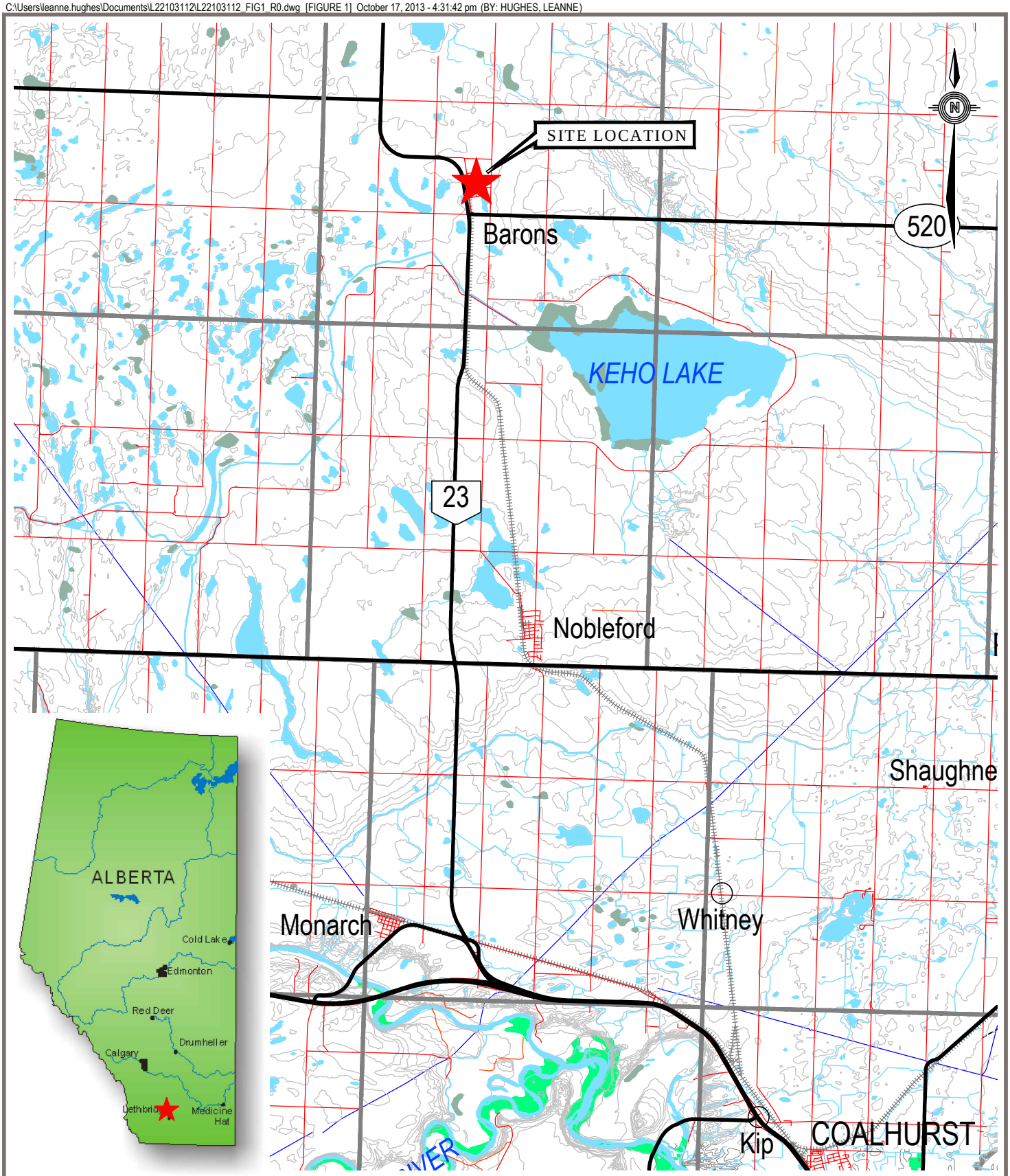
-- No Guideline / Not analyzed

Values that exceed the applicable criteria are in **BOLD and underlined**

FIGURES

Figure 1	Site Location Plan
Figure 2	Detailed Site Plan
Figure 3	Confirmatory Sampling of Excavation Limits

C:\Users\leanne.hughes\Documents\L22103112\L22103112_FIG1_R0.dwg [FIGURE 1] October 17, 2013 - 4:31:42 pm (BY: HUGHES, LEANNE)



NOTES
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0 15,000m

CLIENT
Village of Barons

eba
A TETRA TECH COMPANY

SOURCE REMEDIATION
202 MAIN STREET, BARONS, ALBERTA
AMA SITE 9557

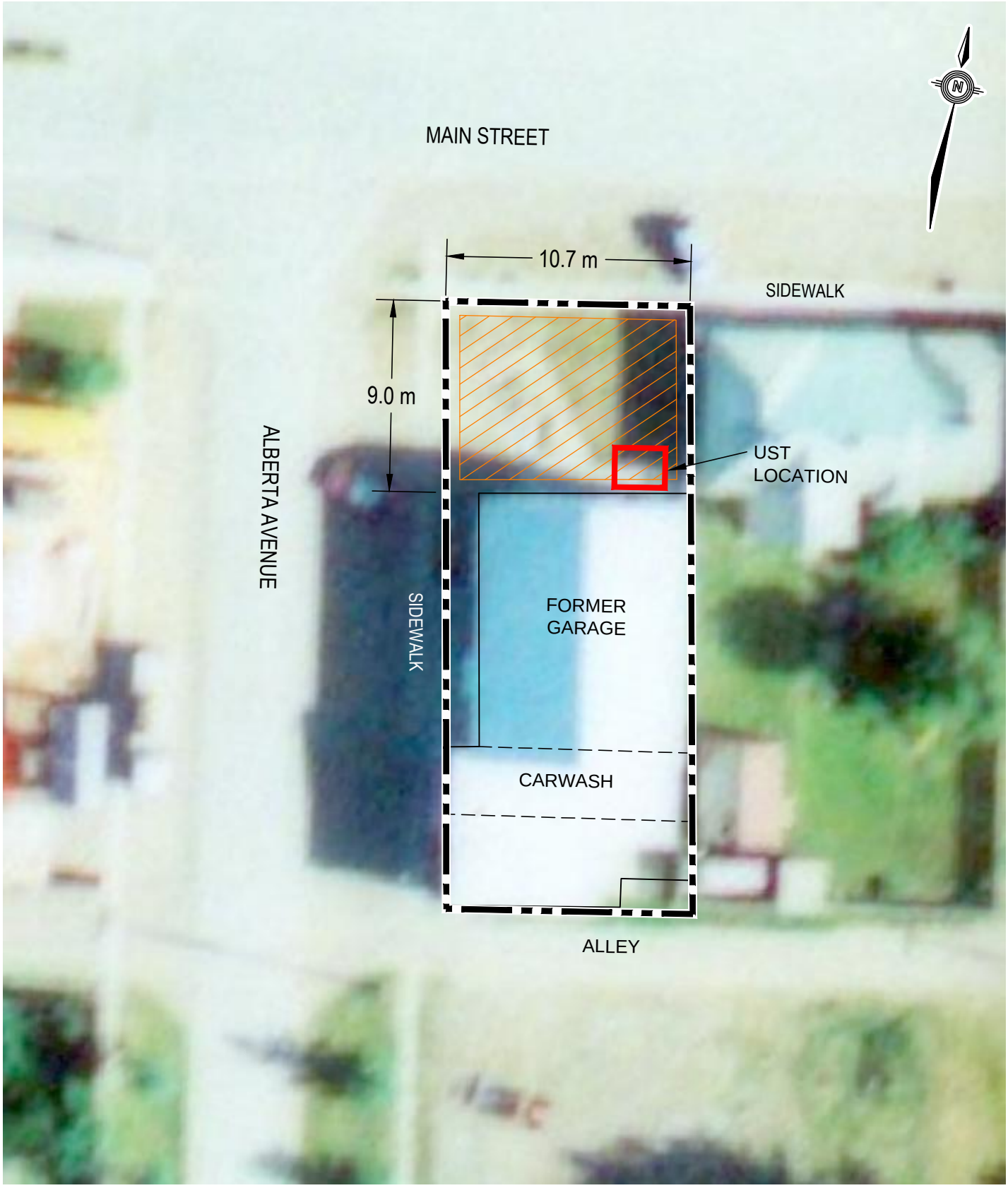
SITE LOCATION PLAN

PROJECT NO.	DWN	CKD	REV
L22103112-01	LCH	JG	0

OFFICE	DATE
EBA-Lethbridge	October 2013

Figure 1

C:\Users\leanne.hughes\Documents\L22103112\L22103112_FIG2_R0.dwg [FIGURE 2] October 17, 2013 - 4:32:42 pm (BY: HUGHES, LEANNE)



LEGEND

SITE BOUNDARY

APPROXIMATE EXCAVATION BOUNDARIES

0 5 10 m

SCALE 1:250

CLIENT

Village of Barons

SOURCE REMEDIATION
202 MAIN STREET, BARONS, ALBERTA
AMA SITE 9557

DETAILED SITE PLAN

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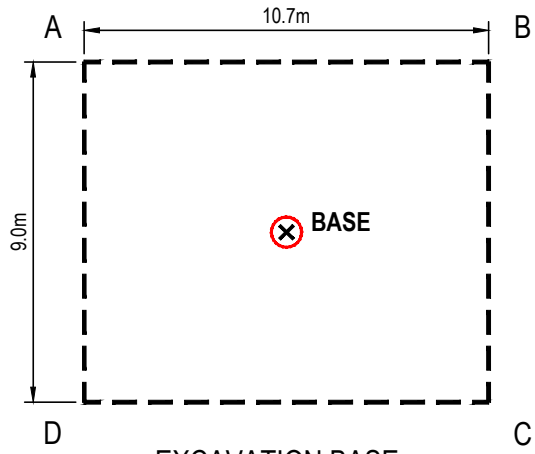
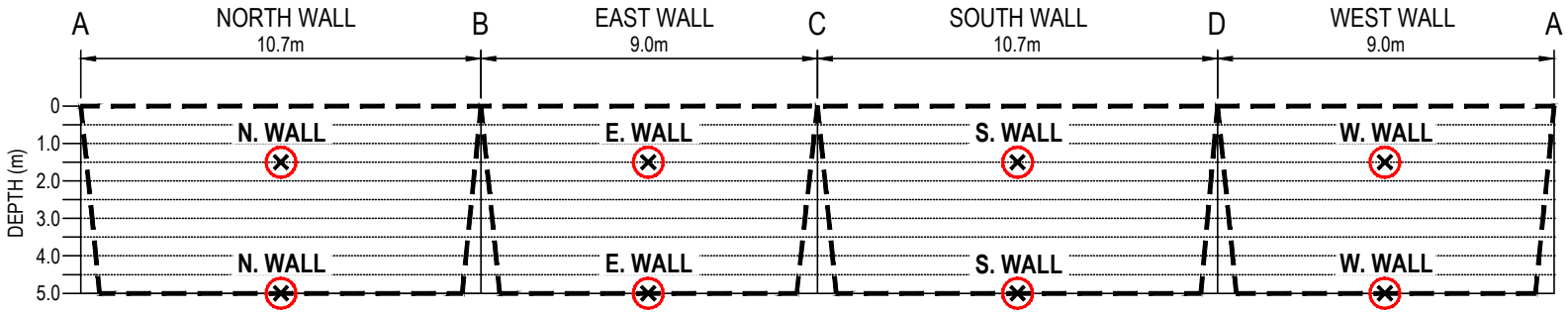
PROJECT NO.	DWN	CKD	REV
L22103112-01	LCH	JG	0
OFFICE: EBA-Lethbridge	DATE: October 2013		

Figure 2

C:\Users\leanne.hughes\Documents\L22103112\L22103112_FIG3_R0.dwg [FIGURE 3] October 17, 2013 - 4:35:00 pm (BY: HUGHES, LEANNE)



EXCAVATION BASE



EXCAVATION PROFILE

LEGEND

× SAMPLE LOCATION SUBMITTED FOR ANALYSIS

⊗ GREATER THAN APPLIED GUIDELINES

0 2 5 10 m

SCALE 1:200

CLIENT

Village of Barons

SOURCE REMEDIATION
202 MAIN STREET, BARONS, ALBERTA
AMA SITE 9557

CONFIRMATORY SAMPLING OF EXCAVATION LIMITS

eba
A TETRA TECH COMPANY

PROJECT NO.	DWN	CKD	REV
L22103112-01	LCH	JG	0

OFFICE	DATE
EBA-Lethbridge	October 2013

Figure 3

APPENDIX A

GEO-ENVIRONMENTAL REPORT - GENERAL CONDITIONS

GENERAL CONDITIONS

GEO-ENVIRONMENTAL 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 EBA’s client. 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 EBA’s Client unless otherwise authorized in writing by 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 EBA. Additional copies of the report, if required, may be obtained upon request.

2.0 ALTERNATE REPORT FORMAT

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

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

Electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. 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 EBA in its reasonably exercised discretion.

4.0 INFORMATION PROVIDED TO EBA BY OTHERS

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

APPENDIX B

PHOTOGRAPHS

Photo 1: View showing southern boundary of excavation limits and underground piping.

Photo 2: View looking northeast at excavation with non-impacted material removed.

Photo 3: View of southeast corner of excavation and location of USTs.

Photo 4: Close up view of UST showing corrosion and holes.

Photo 5: View showing stained soil at an approximate depth of 1.5 mbg.

Photo 6: View looking southwest at the excavation limits. Note the piping and void where the USTs were removed in the left hand side of the photograph.

APPENDIX C

STATUE OF DECLARATION

Adobe Reader 8.0+ is required to complete & save this document.

Government of Alberta

Statutory Declaration of Payment Distribution

Tank Site Remediation Program

To be made by the Contractor as a condition for release of holdback.

Identification of Contract

Contract Name *(site number, location and description of the work as on Bid and Contract form)*
AMA Site #9557, Barons AB
Environmental reclamation; pull/decommission/destroy fuel tank, haul contamination, backfill with unimpacted material

Name of Owner	Date of Contract *(mm/dd/yyyy)*
Village of Barons	06/21/2013

Name of Contractor	Name of Consultant
Biantco Environmental Services Inc	EBA, A Tetratech Company

Identification of Declarant

Full Name of Declarant
Tim Knelsen

Position or Title *(of office held with Contractor)*	Business Name *(Name of Contractor)*
Operations Manager	

Business Address	City or Town	Province/Territory	Postal Code
363 Canyon Blvd W.	Lethbridge	Alberta	T1K6V2

Declaration

I, the undersigned, solemnly declare that as of the date of this declaration, I am an authorized signing officer of the Contractor named in the Contract identified above, and as such have authority to bind the Contractor, and have personal knowledge that all insurance and Worker's Compensation Board premiums, accounts for subcontracts and other costs which have been incurred by the Contractor in the performance of work as required by the Contract, and for which the Owner might in any way be held responsible, have been paid in full.

I make this solemn declaration conscientiously believing it to be true and knowing that it is of the same force and effect as if made under oath.

Signature of Declarant

Making a false or fraudulent declaration is a contravention of the Criminal Code of Canada, and could carry, upon conviction, penalties including fines, imprisonment, or both.

Attestation *(to be completed by a person empowered to receive declarations, e.g., Commissioner of Oaths, Notary Public, etc.)*

Declared before me at Lethbridge
in the Province of Alberta
dated July 24, 2013

x D. Hamilton
Signature of Notary Public or Commissioner for Oaths in and for the Province of Alberta

SH
Shelley Hamilton
Print Name

Jan 22, 2015
Expiry Date of Commission

Any changes or corrections on this Statutory Declaration must be initialed by the person before whom the declaration is made.

PSD 1401 (2011/10)

Reset Form | Save | Print

SHELLEY HAMILTON
COMMISSION EXPIRES JANUARY 22, 2015

APPENDIX D

PETROLEUM STORAGE TANK CLOSURE REPORT

Petroleum Tank Management Association of Alberta
Suite 980, 10303 Jasper Avenue
Edmonton, AB Canada T5J 3N6
PH: 780-425-8265 or 1-866-222-8265
FAX: 780-425-4722 WEBSITE: *www.ptmaa.ab.ca*

Petroleum Storage Tank Closure Report

Underground storage tank systems must be removed from the ground and disposed of in accordance with Section 4.3.16 and 4.3.15.3 of the Alberta Fire Code. Upon completion of the tank(s) removal, complete this form and mail or fax same to the PTMAA. If contamination is encountered during removal of tank(s), notification must be made to the fire authority in accordance with Article 4.1.6.4 of the Alberta Fire Code 2006 and Alberta Environment at 1-800-222-6514 in accordance with Section 110 of the Environmental Protection & Enhancement Act.

FOR PTMAA USE ONLY

Date Received: _____ Municipality #: _____ Site # _____

SECTION 1: FACILITY INFORMATION

Facility Name: N/A (AMA SITE 9557) Site #:

Address: 202 MAIN STREET

City: BARONS Postal Code: Telephone:

Legal Land Description (if available):

LSD ___ ¼ of Sec. 16 /Twp. 012 /Rge. 23 /W of 4 Mer. or Lot 1+2 Block 7 Plan 2605X

SECTION 2: TANK OWNER INFORMATION

Name: VILLAGE OF BARONS

Address: PO BOX 129 City: BARONS

Postal Code: T0L 0G0 Contact Person: LAURIE BECK Telephone: 403 757 3633

SECTION 3: TANK REMOVAL INFORMATION

Tank # (from regist. application)	Capacity (litres)	Tank Age	Product Stored	Tank Material	Date Removed	Reason For Removal (facility closing, facility improvements, tank leaking)	Tank Replaced Yes/No
	500	?	GAS	STEEL	JULY 2013	ABANDONED	NO
	500	?	GAS	STEEL	JULY 2013	ABANDONED	NO

SECTION 4: PIPING REMOVAL INFORMATION

Has underground piping been removed? ☑ Yes ☐ No

Does any underground piping remain on site? ☐ Yes ☑ No

Individuals supervising the removal of underground storage systems must be approved in accordance with the Alberta Fire Code. The PTMAA website includes a list of companies that employ certified removers.

SECTION 5: INFORMATION ON PARTY PERFORMING TANK REMOVAL

Name: BIANCO ENVIRONMENTAL SERVICES INC Telephone #: 403 327 8170

Address: 1812-21 AVENUE NORTH City: LETHBRIDGE

Postal Code: T1H 4B6 Removal Supervisor: BERNHARD KNELSON Certification #: 820

SECTION 6: SITE CONTAMINATION INFORMATION (where applicable)

Was contamination encountered during removal or decommissioning? ☑ Yes ☐ No

Was Alberta Environment notified? ☑ Yes ☐ No PREVIOUS ASSESSMENT - 2012 (YY/MM/DD)

Was the Fire Official notified? ☐ Yes ☑ No _____ (YY/MM/DD)

Was a site subsurface investigation conducted? ☑ Yes ☐ No ☐ Planned

If yes, who did investigation? EBA (Company) LETHBRIDGE (Branch)

Was remediation/clean-up work conducted at the site? ☑ Yes ☐ No ☐ Planned

If remediation/clean-up work was conducted, is it: ☐ Complete ☑ Ongoing

If complete, date completed: _____ (YY/MM /DD)

Remediation supervised by: EBA (Company) LETHBRIDGE (Branch)

Comments:

I certify that the information in this report is true and complete to the best of my knowledge.

Owner/Operator _____ 13/10/08 (YY/MM/DD)

Under the authority of the Safety Codes Act, this information is being collected by the Petroleum Tank Management Association of Alberta (PTMAA) and will be released to the public upon request in compliance with the Freedom of Information and Protection of Privacy (FOIP) Act. If you have any questions, please contact the PTMAA at the address noted on this form.

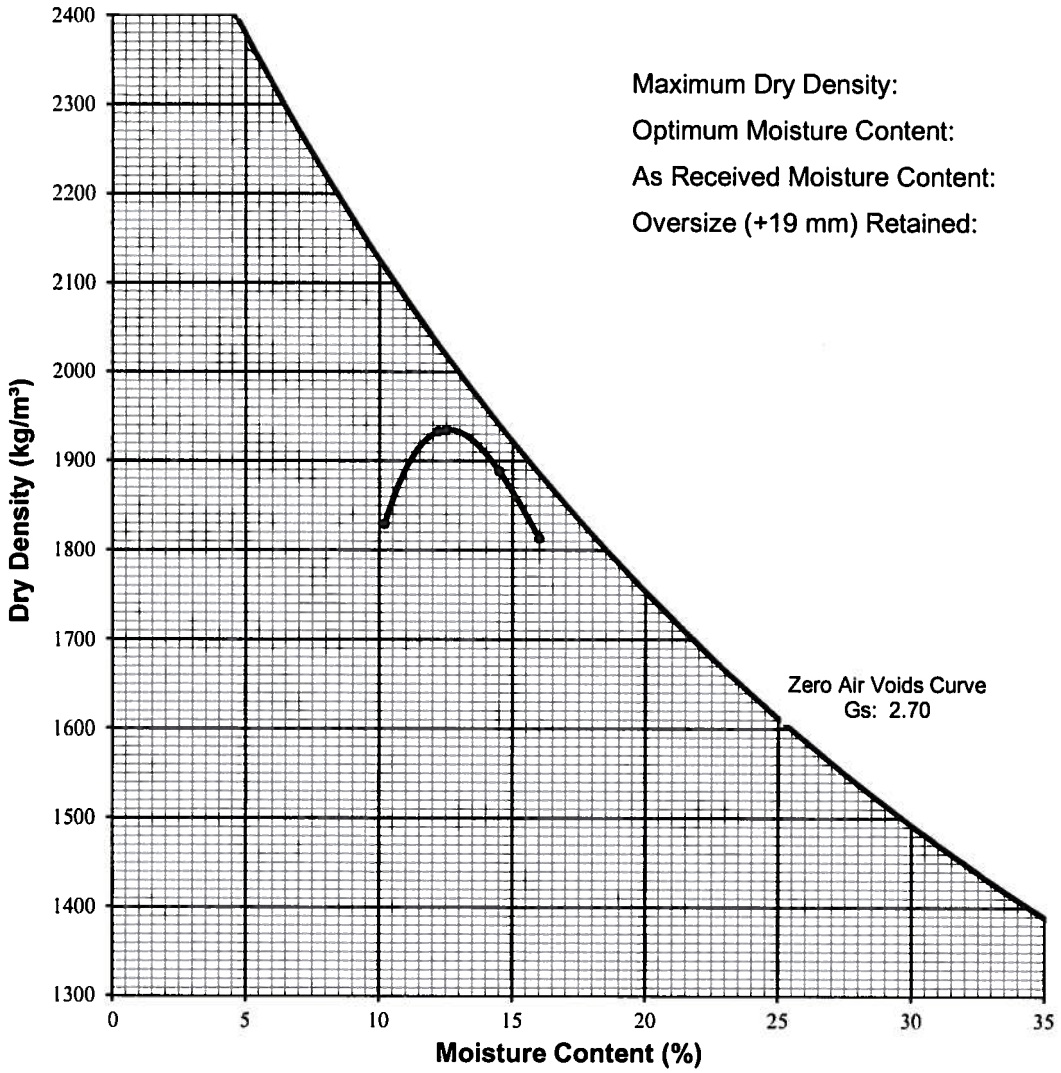
APPENDIX E

DENSITY TEST LOCATIONS AND RESULTS

MOISTURE-DENSITY RELATIONSHIP (Proctor) REPORT

ASTM D698 (Standard Proctor)

Project:	AMA Site #9557 - Remediation	Sample No.:	A-496
Project No.:	L22103112-01	Sampled By:	EBA
Client:	Village of Barons	Date Received:	20-Jul-13
Attention:	Laurie Beck	Test Date:	23-Jul-13
E-mail:	barons@figment.ca	Test Method:	Method A
Source:	Monarch	Compaction:	Manual
Location:	Stockpile		
Description:	Clay, silty, sand		



Maximum Dry Density:	**1935**	kg/m³
Optimum Moisture Content:	**12.5**	%
As Received Moisture Content:	11.0	%
Oversize (+19 mm) Retained:	0.0	%

Remarks:

Reviewed By: _____ C.E.T.

Data presented hereon is for the sole use of the stipulated client. EBA is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of EBA. The testing services reported herein have been performed by an EBA technician to recognized industry standards, unless otherwise noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, EBA will provide it upon written request.

eba
A TETRA TECH COMPANY

COMPACTION DENSITY TEST SUMMARY REPORT

ASTM Designation D6938

Client: Village of Barons
Project No.: L22103112-01
Project: AMA Site #9557 - Remediation

Contractor: Biantco
ConstructionType: Backfill
Date(s) Tested: July 20, 2013
Troxler Serial #: 28008 **Tested By:** AM

Soil Description: 1935 kg/m3 @ 12.5% → Gravel, silty, sandy
→

Compaction Spec: 95 %
M.C. Spec: ± 2 %

Test #	Location	Proctor Density (kg/m³)	Optimum Moisture (%)	Depth to Grade (m)	Probe Depth (mm)	Dry Density (kg/m³)	Moisture Content (%)	Proctor Density (%)
1	1m S & 5m W of NE corner	1935	12.5	-2.5	300	1861	12.2	**96.2**
2	4m S & 1m W of NE corner	1935	12.5	-2.5	300	1854	11.8	**95.8**
3	6m S & 2m W of NE corner	1935	12.5	-2.0	300	1844	12.4	**95.3**
4	2m S & 3m W of NE corner	1935	12.5	-2.0	300	1846	12.3	**95.4**
5	5m S & 3m W of NE corner	1935	12.5	-1.5	300	1848	11.7	**95.5**
6	1m S & 1m W of NE corner	1935	12.5	-1.5	300	1858	11.4	**96.0**
7	3m S & 4m W of NE corner	1935	12.5	-1.0	300	1844	12.0	**95.3**
8	5m S & 1m W of NE corner	1935	12.5	-1.0	300	1852	11.9	**95.7**

Standard Proctor(D-698): X Modified Proctor D-1577):

Remarks:

Attn: Laurie Beck
Village of Barons
P.O. Box 129
Barons, Alberta T0L 0G0

Reviewed By: _____ C.E.T.

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eba
A TETRA TECH COMPANY

COMPACTION DENSITY TEST SUMMARY REPORT

ASTM Designation D6938

Client: Village of Barons
Contractor: Biantco
Project No.: L22103112-01
ConstructionType: Backfill
Project: AMA Site #9557 - Remediation
Date(s) Tested: July 20, 2013
Troxler Serial #: 28008
Tested By: AM
Soil Description: 1935 kg/m3 @ 12.5% → Gravel, silty, sandy
→
Compaction Spec: 95 %
M.C. Spec: ± 2 %

Test #	Location	Proctor Density (kg/m³)	Optimum Moisture (%)	Depth to Grade (m)	Probe Depth (mm)	Dry Density (kg/m³)	Moisture Content (%)	Proctor Density (%)
9	1m S & 5m W of NE corner	1935	12.5	-2.5	300	1861	12.2	**96.2**
10	4m S & 1m W of NE corner	1935	12.5	-2.5	300	1854	11.8	**95.8**
11	6m S & 2m W of NE corner	1935	12.5	-2.0	300	1844	12.4	**95.3**
12	2m S & 3m W of NE corner	1935	12.5	-2.0	300	1846	12.3	**95.4**
13	5m S & 3m W of NE corner	1935	12.5	-1.5	300	1848	11.7	**95.5**
14	1m S & 1m W of NE corner	1935	12.5	-1.5	300	1858	11.4	**96.0**
15	3m S & 4m W of NE corner	1935	12.5	-1.0	300	1844	12.0	**95.3**
16	5m S & 1m W of NE corner	1935	12.5	-1.0	300	1852	11.9	**95.7**

Standard Proctor(D-698): X Modified Proctor D-1577):

Remarks:

Attn: Laurie Beck
Village of Barons
P.O. Box 129
Barons, Alberta T0L 0G0

Reviewed By: _____ C.E.T.

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eba
A TETRA TECH COMPANY

COMPACTION DENSITY TEST SUMMARY REPORT

ASTM Designation D6938

Client: Village of Barons
Project No.: L22103112-01
Project: AMA Site #9557 - Remediation

Contractor: Biantco
ConstructionType: Backfill
Date(s) Tested: July 22, 2013
Troxler Serial #: 28008 **Tested By:** AK

Soil Description: 1935 kg/m3 @ 12.5% → Gravel, silty, sandy
→

Compaction Spec: 98 %
M.C. Spec: ± 3 %

Test #	Location	Proctor Density (kg/m³)	Optimum Moisture (%)	Depth to Grade (m)	Probe Depth (mm)	Dry Density (kg/m³)	Moisture Content (%)	Proctor Density (%)
17	1m S & 3m W of NE corner	1935	12.5	-0.5	300	1907	10.0	**98.6**
18	3m S & 5m W of NE corner	1935	12.5	-0.5	300	1885	10.7	**97.4**

Standard Proctor(D-698): X Modified Proctor D-1577):

Attn: Laurie Beck
Village of Barons
P.O. Box 129
Barons, Alberta T0L 0G0

Remarks:
Area surrounding T18 was not reworked or retested due to equipment limitations

Reviewed By: _____ C.E.T.

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eba
A TETRA TECH COMPANY

COMPACTION DENSITY TEST SUMMARY REPORT

ASTM Designation D6938

Client: Village of Barons
Contractor: Biantco
Project No.: L22103112-01
ConstructionType: Backfill
Project: AMA Site #9557 - Remediation
Date(s) Tested: July 22, 2013
Troxler Serial #: 28008
Tested By: AK

Soil Description: 2240 kg/m3 @ 6.5% → Gravel, sandy, silty, trace clay
→

Compaction Spec: 98 %
M.C. Spec: ± 3 %

Test #	Location	Proctor Density (kg/m³)	Optimum Moisture (%)	Depth to Grade (m)	Probe Depth (mm)	Dry Density (kg/m³)	Moisture Content (%)	Proctor Density (%)
19	2.5m S & 4m E of NW corner	2240	6.5	0.0	300	2036	3.6	**90.9**
20	4m S & 5m E of NW corner	2240	6.5	0.0	300	2018	3.5	**90.1**

Standard Proctor(D-698): X Modified Proctor D-1577):

Remarks:
Estimated Proctor Value

Attn: Laurie Beck
Village of Barons
P.O. Box 129
Barons, Alberta T0L 0G0

Reviewed By: _____ C.E.T.

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eba
A TETRA TECH COMPANY

APPENDIX F

LABORATORY CERTIFICATES

Maxxam

Success Through Science®

Your Project #: L22103112
Site Location: BARONS,,AB
Your C.O.C. #: A077073

Attention: JAYMES GOING

EBA ENGINEERING CONSULTANTS LTD.
LETHBRIDGE
442-10 STREET NORTH
LETHBRIDGE, AB
CANADA T1H 2C7

Report Date: 2013/07/25

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B361403
Received: 2013/07/18, 08:30

Sample Matrix: Soil
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/F1 by HS GC/MS (MeOH extract)	10	2013/07/19	2013/07/21	AB SOP-00039	CCME, EPA 8260C
CCME Hydrocarbons (F2-F4 in soil)	10	2013/07/19	2013/07/23	AB SOP-00040 AB SOP-00036	CCME PHC-CWS
CCME Hydrocarbons (F4G in soil)	1	2013/07/19	2013/07/24	AB SOP-00040 AB SOP-00036	CCME PHC-CWS
Moisture	10	N/A	2013/07/20	AB SOP-00002	CCME PHC-CWS

* 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.

Anna Gordon, Project Manager
Email: AGordon@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.

Total cover pages: 1

Maxxam

Success Through Science®

Maxxam Job #: B361403
Report Date: 2013/07/25

EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Location: BARONS,,AB
Sampler Initials: AK

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		GY3436	GY3437	GY3438	GY3439	GY3440		
Sampling Date		2013/07/16	2013/07/16	2013/07/16	2013/07/16	2013/07/16		
COC Number		A077073	A077073	A077073	A077073	A077073		
	UNITS	**N. WALL @ -4.9M**	**N. WALL @ -1.5M**	**S. WALL @ -4.9M**	**S. WALL @ -1.5M**	**E. WALL @ -4.9M**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	15	21	15	20	23	0.30	7004826
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	500	<10	160	<10	1600	10	7005912
F3 (C16-C34 Hydrocarbons)	mg/kg	380	<50	110	<50	910	50	7005912
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	<50	<50	<50	<50	50	7005912
Reached Baseline at C50	mg/kg	Yes	Yes	Yes	Yes	Yes	N/A	7005912
Volatiles								
Benzene	mg/kg	0.38	<0.0050	<0.0050	<0.0050	0.42	0.0050	7005532
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7005532
Ethylbenzene	mg/kg	1.3	<0.010	0.21	<0.010	10	0.010	7005532
Xylenes (Total)	mg/kg	0.042	<0.040	<0.040	<0.040	12	0.040	7005532
m & p-Xylene	mg/kg	0.042	<0.040	<0.040	<0.040	12	0.040	7005532
o-Xylene	mg/kg	<0.020	<0.020	<0.020	<0.020	0.033	0.020	7005532
F1 (C6-C10) - BTEX	mg/kg	30	<12	<12	<12	260	12	7005532
(C6-C10)	mg/kg	32	<12	<12	<12	280	12	7005532
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	89	91	87	95	99	N/A	7005532
4-BROMOFLUOROBENZENE (sur.)	%	101	103	100	96	102	N/A	7005532
D10-ETHYLBENZENE (sur.)	%	116	115	116	88	87	N/A	7005532
D4-1,2-DICHLOROETHANE (sur.)	%	104	111	107	100	100	N/A	7005532
O-TERPHENYL (sur.)	%	84	106	95	107	93	N/A	7005912

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam

Success Through Science®

Maxxam Job #: B361403
Report Date: 2013/07/25

EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Location: BARONS,,AB
Sampler Initials: AK

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		GY3441	GY3441	GY3442	GY3443	GY3444		
Sampling Date		2013/07/16	2013/07/16	2013/07/16	2013/07/16	2013/07/16		
COC Number		A077073	A077073	A077073	A077073	A077073		
	UNITS	**E. WALL @ -1.5M**	**E. WALL @ -1.5M Lab-Dup**	**W. WALL @ -4.9M**	**W. WALL @ -1.5M**	**BASE @ -5.0M**	**RDL**	**QC Batch**
Physical Properties								
Moisture	%	16	N/A	14	20	15	0.30	7004826
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	N/A	140	<10	51	10	7005912
F3 (C16-C34 Hydrocarbons)	mg/kg	350	N/A	110	<50	<50	50	7005912
F4 (C34-C50 Hydrocarbons)	mg/kg	520	N/A	<50	<50	<50	50	7005912
Reached Baseline at C50	mg/kg	No	N/A	Yes	Yes	Yes	N/A	7005912
F4G-SG (Heavy Hydrocarbons-Grav.)	mg/kg	1000	N/A	N/A	N/A	N/A	500	7005920
Volatiles								
Benzene	mg/kg	<0.0050	<0.0050	0.034	<0.0050	<0.0050	0.0050	7005532
Toluene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7005532
Ethylbenzene	mg/kg	<0.010	<0.010	0.13	<0.010	<0.010	0.010	7005532
Xylenes (Total)	mg/kg	<0.040	<0.040	0.13	<0.040	<0.040	0.040	7005532
m & p-Xylene	mg/kg	<0.040	<0.040	0.13	<0.040	<0.040	0.040	7005532
o-Xylene	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	7005532
F1 (C6-C10) - BTEX	mg/kg	<12	<12	<12	<12	<12	12	7005532
(C6-C10)	mg/kg	<12	<12	<12	<12	<12	12	7005532
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	98	96	98	96	97	N/A	7005532
4-BROMOFLUOROBENZENE (sur.)	%	99	96	94	93	93	N/A	7005532
D10-ETHYLBENZENE (sur.)	%	92	86	86	85	89	N/A	7005532
D4-1,2-DICHLOROETHANE (sur.)	%	105	100	100	100	102	N/A	7005532
O-TERPHENYL (sur.)	%	103	N/A	97	87	95	N/A	7005912

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B361403
Report Date: 2013/07/25

EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Location: BARONS,,AB
Sampler Initials: AK

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		GY3445		
Sampling Date		2013/07/16		
COC Number		A077073		
	UNITS	**DUPLICATE**	**RDL**	**QC Batch**
Physical Properties				
Moisture	%	19	0.30	7004826
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	10	7005912
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	50	7005912
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	50	7005912
Reached Baseline at C50	mg/kg	Yes	N/A	7005912
Volatiles				
Benzene	mg/kg	<0.0050	0.0050	7005532
Toluene	mg/kg	<0.020	0.020	7005532
Ethylbenzene	mg/kg	<0.010	0.010	7005532
Xylenes (Total)	mg/kg	<0.040	0.040	7005532
m & p-Xylene	mg/kg	<0.040	0.040	7005532
o-Xylene	mg/kg	<0.020	0.020	7005532
F1 (C6-C10) - BTEX	mg/kg	<12	12	7005532
(C6-C10)	mg/kg	<12	12	7005532
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	98	N/A	7005532
4-BROMOFLUOROBENZENE (sur.)	%	92	N/A	7005532
D10-ETHYLBENZENE (sur.)	%	87	N/A	7005532
D4-1,2-DICHLOROETHANE (sur.)	%	103	N/A	7005532
O-TERPHENYL (sur.)	%	81	N/A	7005912

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B361403
Report Date: 2013/07/25

EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Location: BARONS,,AB
Sampler Initials: AK

Package 1	9.0°C

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

General Comments

Results relate only to the items tested.

EBA ENGINEERING CONSULTANTS LTD.
Attention: JAYMES GOING
Client Project #: L22103112
P.O. #:
Site Location: BARONS,,AB

Quality Assurance Report

Maxxam Job Number: CB361403

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7004826 PD1	Method Blank	Moisture	2013/07/20	<0.30		%	
	RPD	Moisture	2013/07/20	0		%	20
7005532 MZ	Matrix Spike						
	[GY3441-01]	1,4-Difluorobenzene (sur.)	2013/07/21		94	%	60 - 140
		4-BROMOFLUOROBENZENE (sur.)	2013/07/21		97	%	60 - 140
		D10-ETHYLBENZENE (sur.)	2013/07/21		94	%	60 - 130
		D4-1,2-DICHLOROETHANE (sur.)	2013/07/21		103	%	60 - 140
		Benzene	2013/07/21		96	%	60 - 140
		Toluene	2013/07/21		100	%	60 - 140
		Ethylbenzene	2013/07/21		105	%	60 - 140
		m & p-Xylene	2013/07/21		104	%	60 - 140
		o-Xylene	2013/07/21		109	%	60 - 140
		(C6-C10)	2013/07/21		100	%	60 - 140
	Spiked Blank	1,4-Difluorobenzene (sur.)	2013/07/21		69	%	60 - 140
		4-BROMOFLUOROBENZENE (sur.)	2013/07/21		67	%	60 - 140
		D10-ETHYLBENZENE (sur.)	2013/07/21		84	%	60 - 130
		D4-1,2-DICHLOROETHANE (sur.)	2013/07/21		80	%	60 - 140
		Benzene	2013/07/21		105	%	60 - 140
		Toluene	2013/07/21		98	%	60 - 140
		Ethylbenzene	2013/07/21		105	%	60 - 140
		m & p-Xylene	2013/07/21		106	%	60 - 140
		o-Xylene	2013/07/21		105	%	60 - 140
		(C6-C10)	2013/07/21		117	%	60 - 140
	Method Blank	1,4-Difluorobenzene (sur.)	2013/07/21		88	%	60 - 140
		4-BROMOFLUOROBENZENE (sur.)	2013/07/21		92	%	60 - 140
		D10-ETHYLBENZENE (sur.)	2013/07/21		116	%	60 - 130
		D4-1,2-DICHLOROETHANE (sur.)	2013/07/21		107	%	60 - 140
		Benzene	2013/07/21	<0.0050		mg/kg	
		Toluene	2013/07/21	<0.020		mg/kg	
		Ethylbenzene	2013/07/21	<0.010		mg/kg	
		Xylenes (Total)	2013/07/21	<0.040		mg/kg	
		m & p-Xylene	2013/07/21	<0.040		mg/kg	
		o-Xylene	2013/07/21	<0.020		mg/kg	
		F1 (C6-C10) - BTEX	2013/07/21	<12		mg/kg	
		(C6-C10)	2013/07/21	<12		mg/kg	
	RPD [GY3441-01]	Benzene	2013/07/21	NC		%	50
		Toluene	2013/07/21	NC		%	50
		Ethylbenzene	2013/07/21	NC		%	50
		Xylenes (Total)	2013/07/21	NC		%	50
		m & p-Xylene	2013/07/21	NC		%	50
		o-Xylene	2013/07/21	NC		%	50
		F1 (C6-C10) - BTEX	2013/07/21	NC		%	50
		(C6-C10)	2013/07/21	NC		%	50
7005912 PN0	Matrix Spike	O-TERPHENYL (sur.)	2013/07/23		88	%	50 - 130
		F2 (C10-C16 Hydrocarbons)	2013/07/23		90	%	50 - 130
		F3 (C16-C34 Hydrocarbons)	2013/07/23		93	%	50 - 130
		F4 (C34-C50 Hydrocarbons)	2013/07/23		98	%	50 - 130
	Spiked Blank	O-TERPHENYL (sur.)	2013/07/22		98	%	50 - 130
		F2 (C10-C16 Hydrocarbons)	2013/07/22		96	%	70 - 130
		F3 (C16-C34 Hydrocarbons)	2013/07/22		103	%	70 - 130
		F4 (C34-C50 Hydrocarbons)	2013/07/22		101	%	70 - 130
	Method Blank	O-TERPHENYL (sur.)	2013/07/23		109	%	50 - 130
		F2 (C10-C16 Hydrocarbons)	2013/07/23	<10		mg/kg	
		F3 (C16-C34 Hydrocarbons)	2013/07/23	<50		mg/kg	
		F4 (C34-C50 Hydrocarbons)	2013/07/23	<50		mg/kg	

EBA ENGINEERING CONSULTANTS LTD.
Attention: JAYMES GOING
Client Project #: L22103112
P.O. #:
Site Location: BARONS,,AB

Quality Assurance Report (Continued)

Maxxam Job Number: CB361403

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7005912 PN0	RPD	F2 (C10-C16 Hydrocarbons)	2013/07/23	NC		%	50
		F3 (C16-C34 Hydrocarbons)	2013/07/23	NC		%	50
		F4 (C34-C50 Hydrocarbons)	2013/07/23	NC		%	50
7005920 MX0	Spiked Blank	F4G-SG (Heavy Hydrocarbons-Grav.)	2013/07/24		89	%	70 - 130
	Method Blank	F4G-SG (Heavy Hydrocarbons-Grav.)	2013/07/24	<500		mg/kg	

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 (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

Validation Signature Page

Maxxam Job #: B361403

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

Junzhi Gao

Janet Gao, Senior Analyst, Organics Department

Michael Sheppard, Organics Supervisor

==========

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

Calgary: 4000 19st 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

678

Chain of Custody

A077073

Page: ____ of ____

	Invoice To: C/O Report Address ☐
Company:	EBA A TETRA TECH CO.
Contact:	JAYMES GOING
Address:	442 - 10 ST N. LETHBRIDGE
	Prov: AB PC: T1H 2C7
Contact #s:	Ph: 403(329-9009) Cell:

Report To: Same as Invoice ☒
Prov: PC:
Ph: Cell:

Report Distribution (E-Mail):
jgoing@eba.ca
akennerley@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 #:
Project # / Name: L22103112
Site Location: BARONS, AB
Quote #:
Sampled By: AK

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

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	Sieve (75 micron)	Regulated Metals (CCME / AT1)	Salinity 4	Assessment ICP Metals	Basic Class II Landfill	WATER: ☐VOCs ☐BTEX F1	☐BTEX F1-F4 ☐BTEX F1-F2	☐ Routine Water ☐ Turb ☐ F	☐ TOC ☐ DOC	Regulated Metals (CCME / AT1) Total	Dissolved	☐ Total ☐ Dissolved Mercury	Other Analysis	HOLD - Do not Analyze	# of Containers Submitted
1	N. WALL	-4.9m	SOIL	13/07/16	X															2
2	N. WALL	-1.5m	↓	↓	X															2
3	S. WALL	-4.9m			X															2
4	S. WALL	-1.5m			X															2
5	E. WALL	-4.9m			X															2
6	E. WALL	-1.5m			X															2
7	W. WALL	-4.9m			X															2
8	W. WALL	-1.5m			X															2
9	BASE	-5.0m			X															2
10	DUPLICATE		↓	↓	X															2
11																				
12																				

18-Jul-13 08:30
Anna Gordon
B361403
JB0 INS-0119

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

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Amy Kennerley AMY KENNERLEY	13/07/17	8:30
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:		
			Custody Seal	Temperature	Ice
Lab Comments:					
2013/07/18	0832		N	10/9/8	Y

AB FCD-00331 Rev3 2010/05

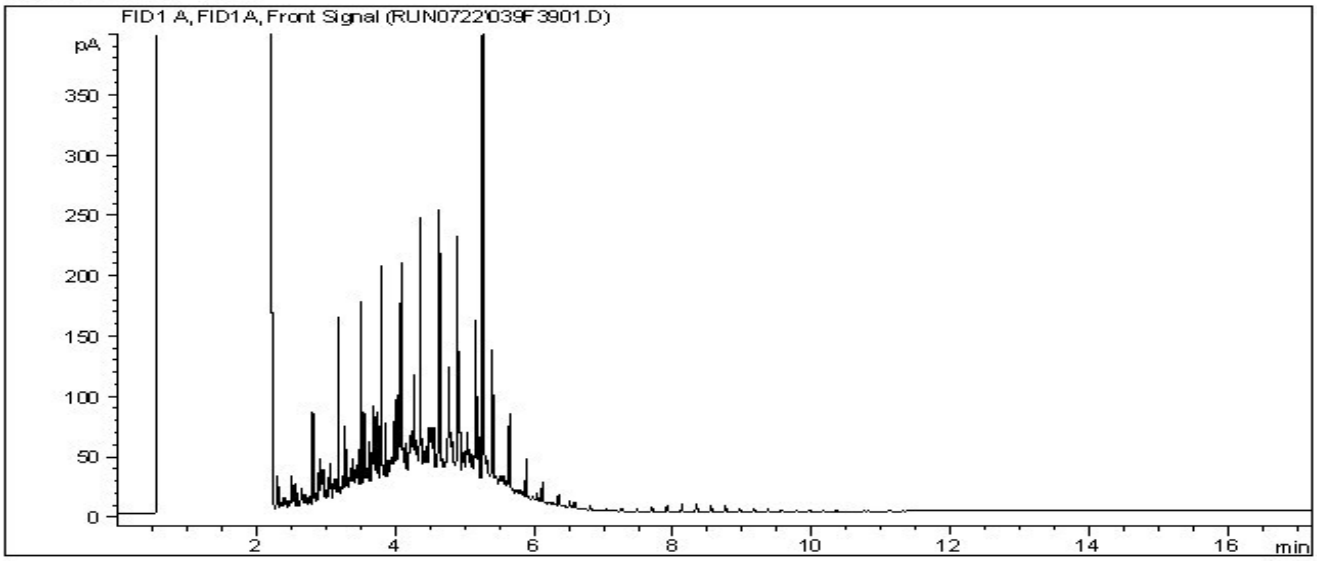
Maxxam Analytics International Corporation o/a Maxxam Analytics

Report Date: 2013/07/25
Maxxam Job #: B361403
Maxxam Sample: GY3436

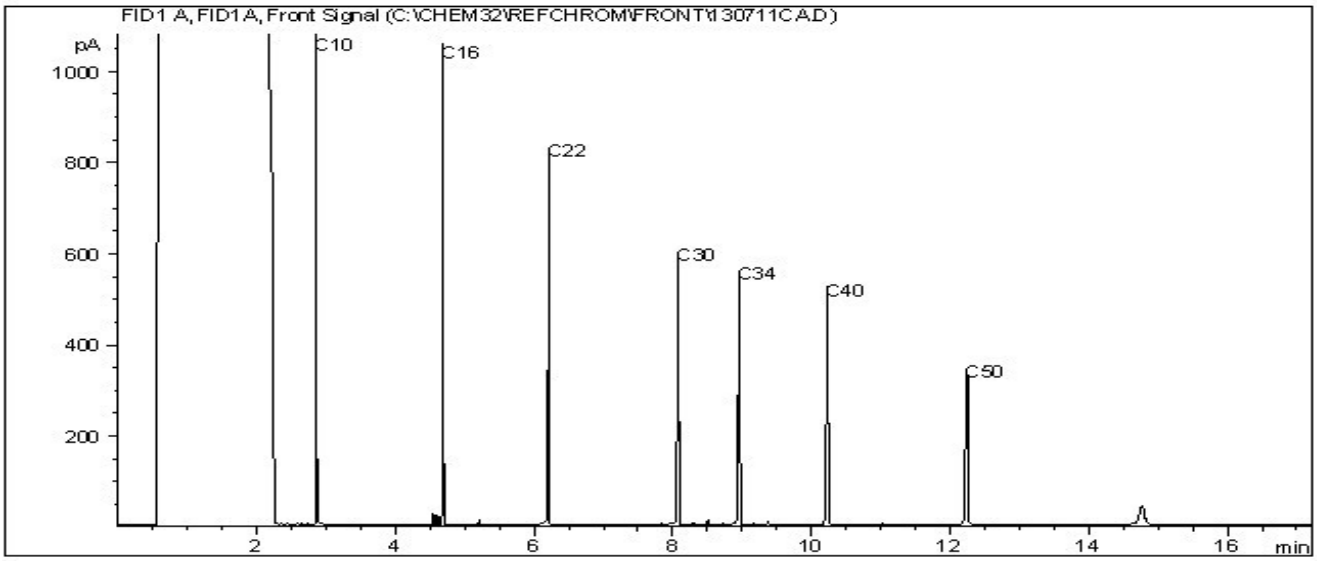
EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Reference: BARONS,,AB
Client ID: N. WALL @ -4.9M

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: GC13



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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

Page 1 of 1

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

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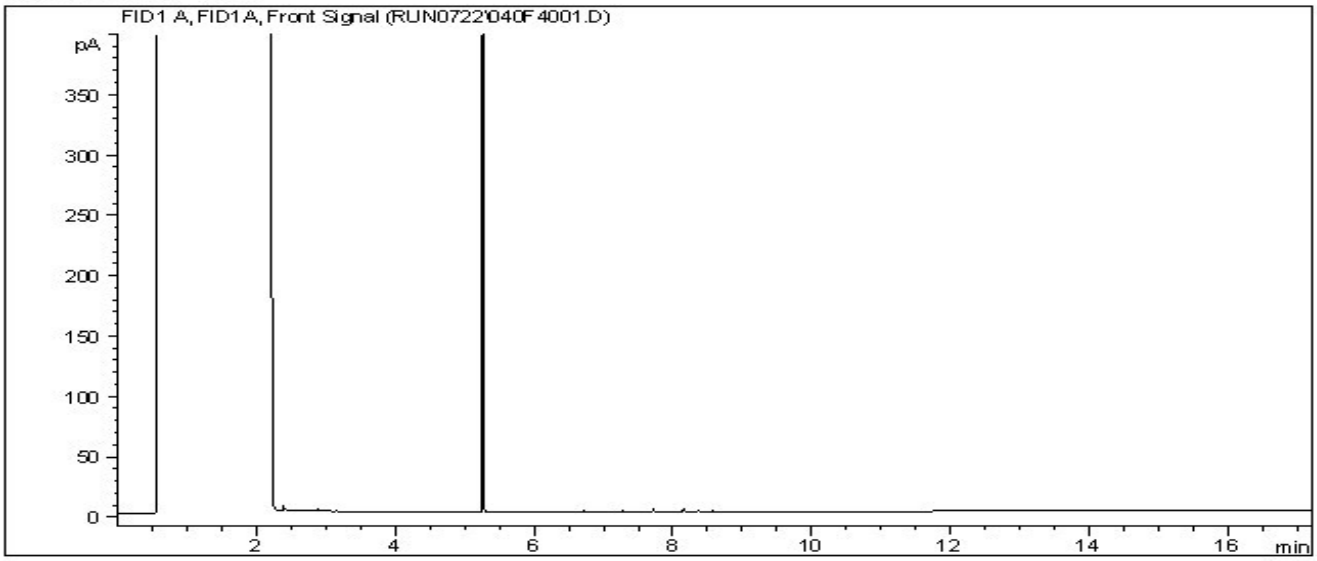
Success Through Science®

Report Date: 2013/07/25
Maxxam Job #: B361403
Maxxam Sample: GY3437

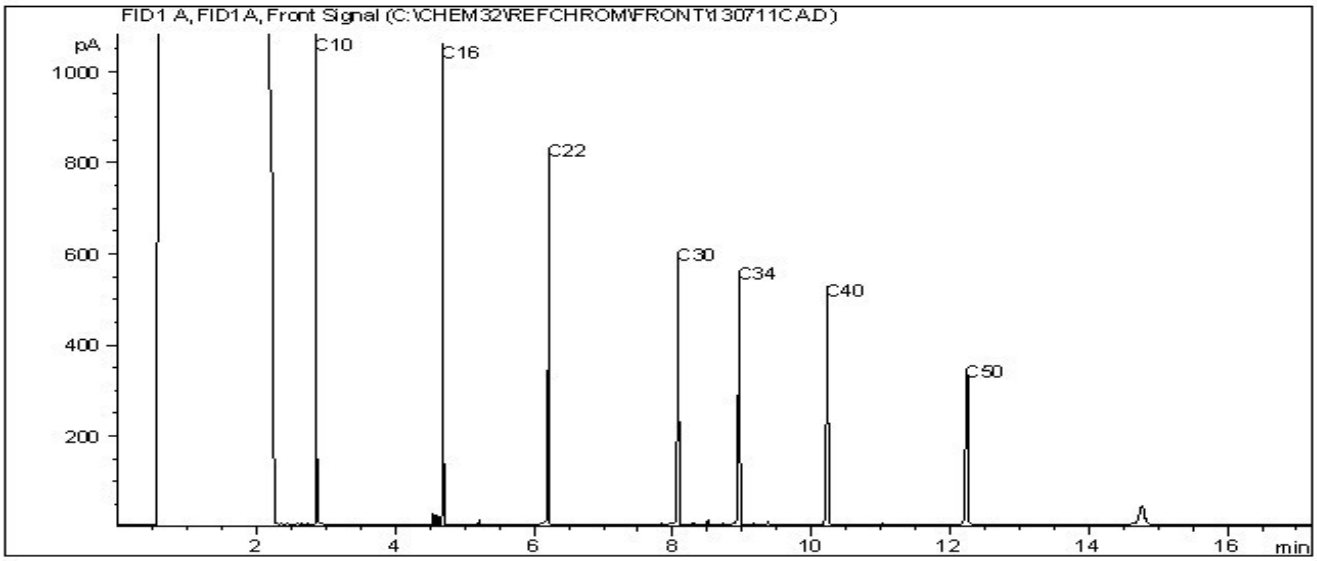
EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Reference: BARONS,,AB
Client ID: N. WALL @ -1.5M

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: GC13



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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

Page 1 of 1

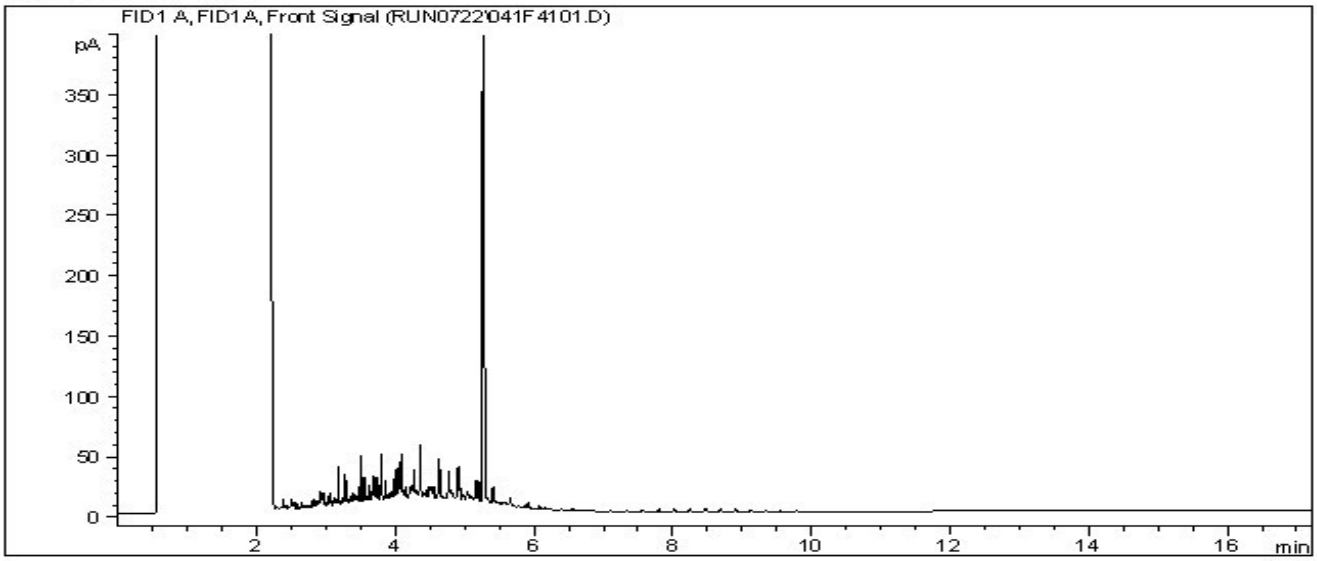
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Report Date: 2013/07/25
Maxxam Job #: B361403
Maxxam Sample: GY3438

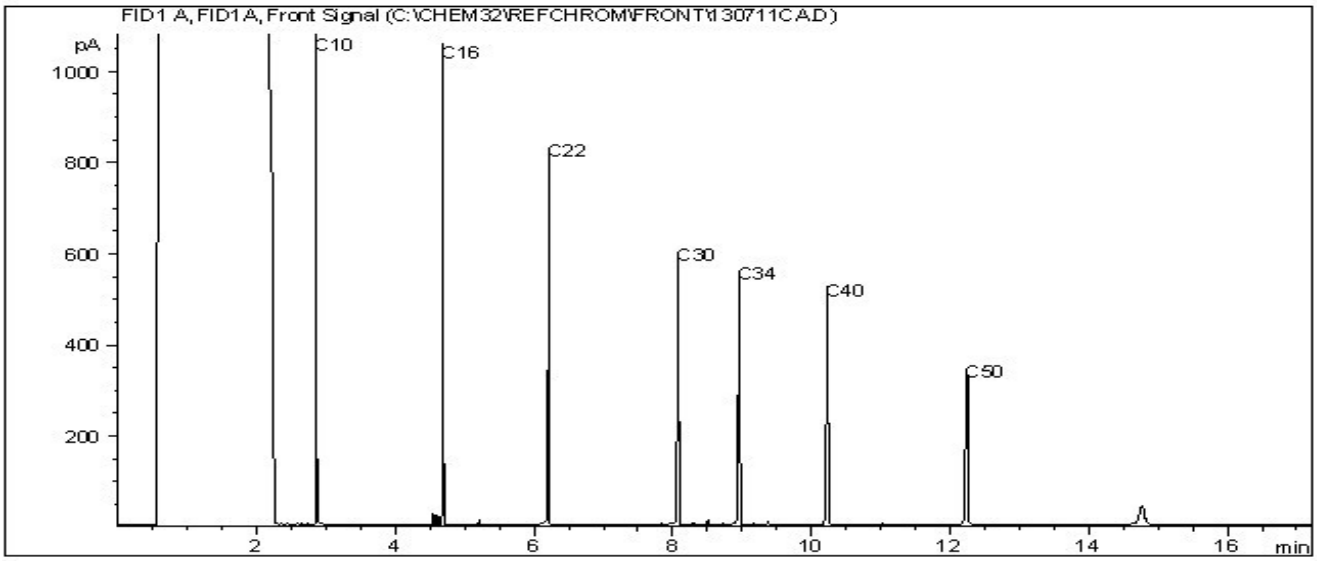
EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Reference: BARONS,,AB
Client ID: S. WALL @ -4.9M

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: GC13



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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

Page 1 of 1

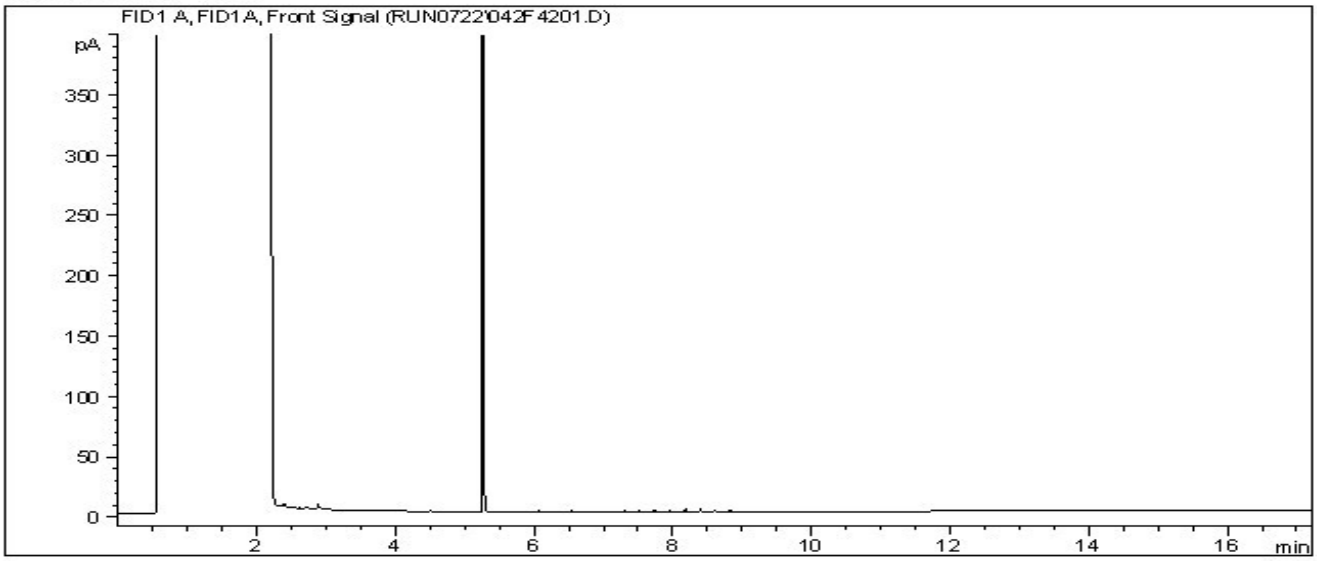
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Report Date: 2013/07/25
Maxxam Job #: B361403
Maxxam Sample: GY3439

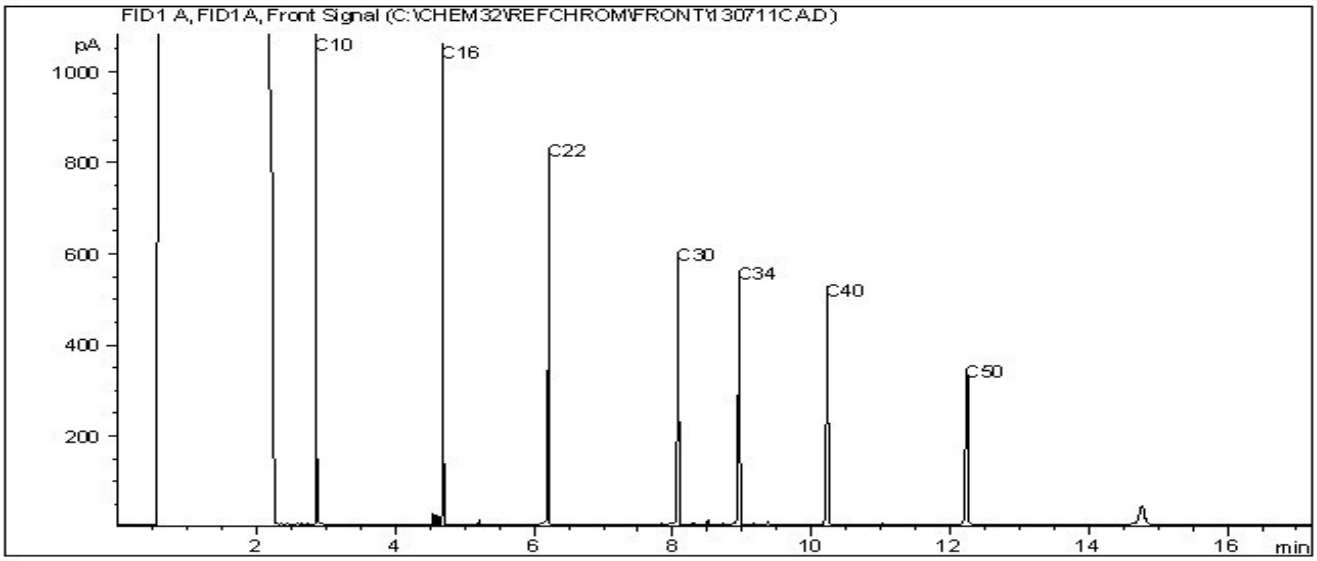
EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Reference: BARONS,,AB
Client ID: S. WALL @ -1.5M

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: GC13



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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

Page 1 of 1

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

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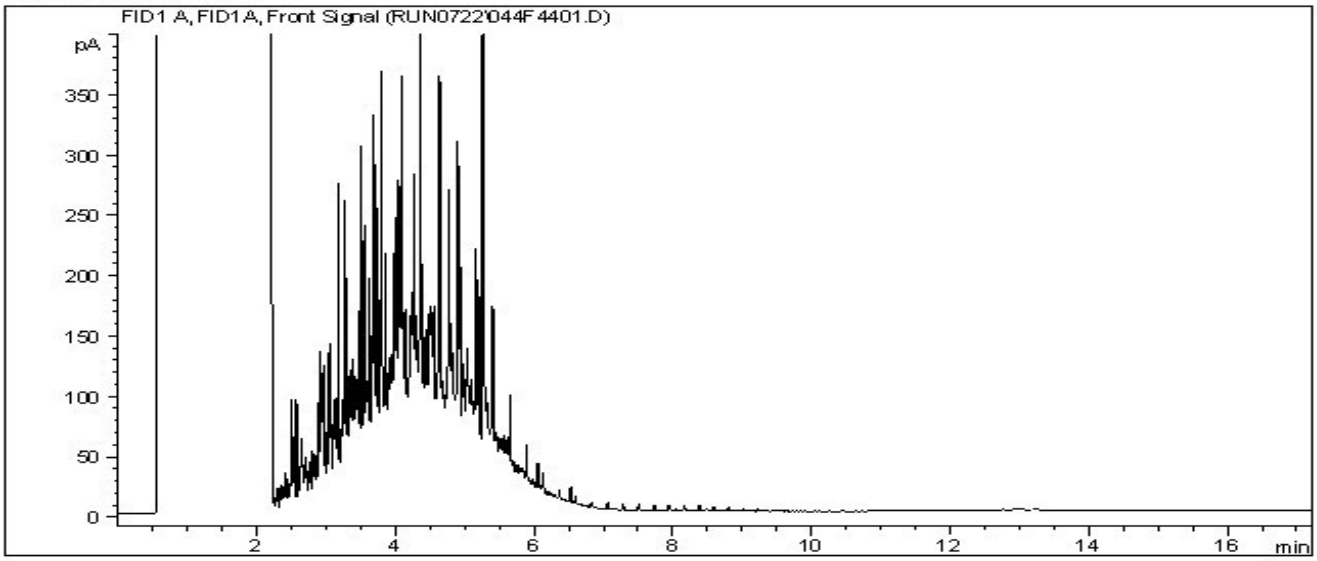
Report Date: 2013/07/25
Maxxam Job #: B361403
Maxxam Sample: GY3440

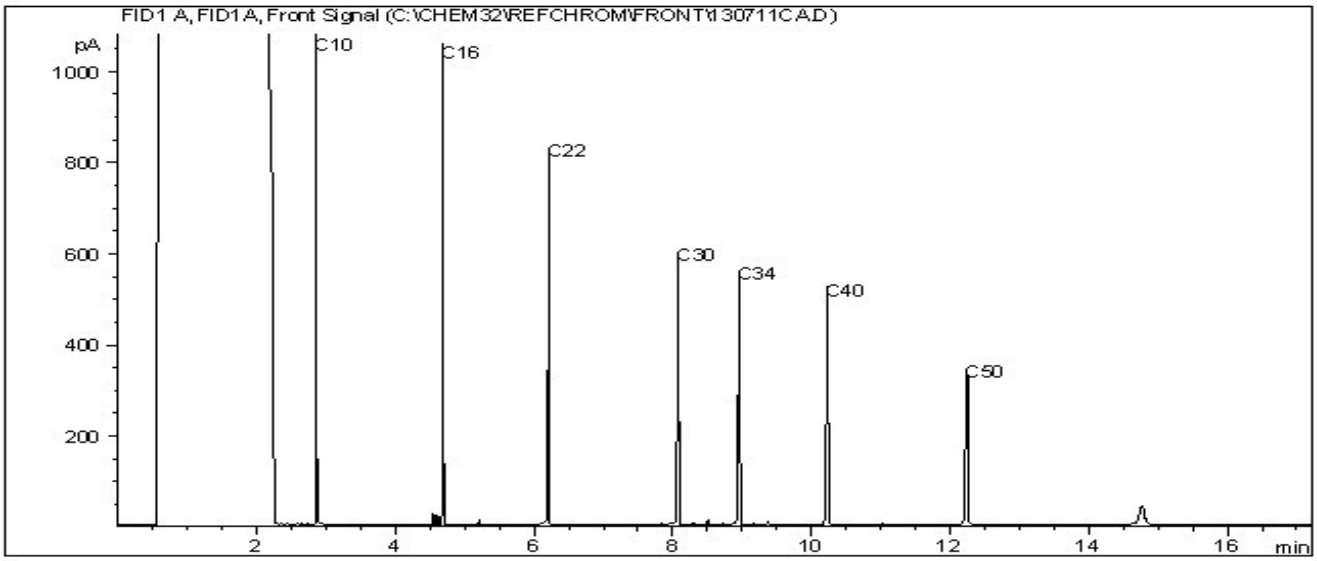
EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Reference: BARONS,,AB
Client ID: E. WALL @ -4.9M

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: GC13



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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

Page 1 of 1

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

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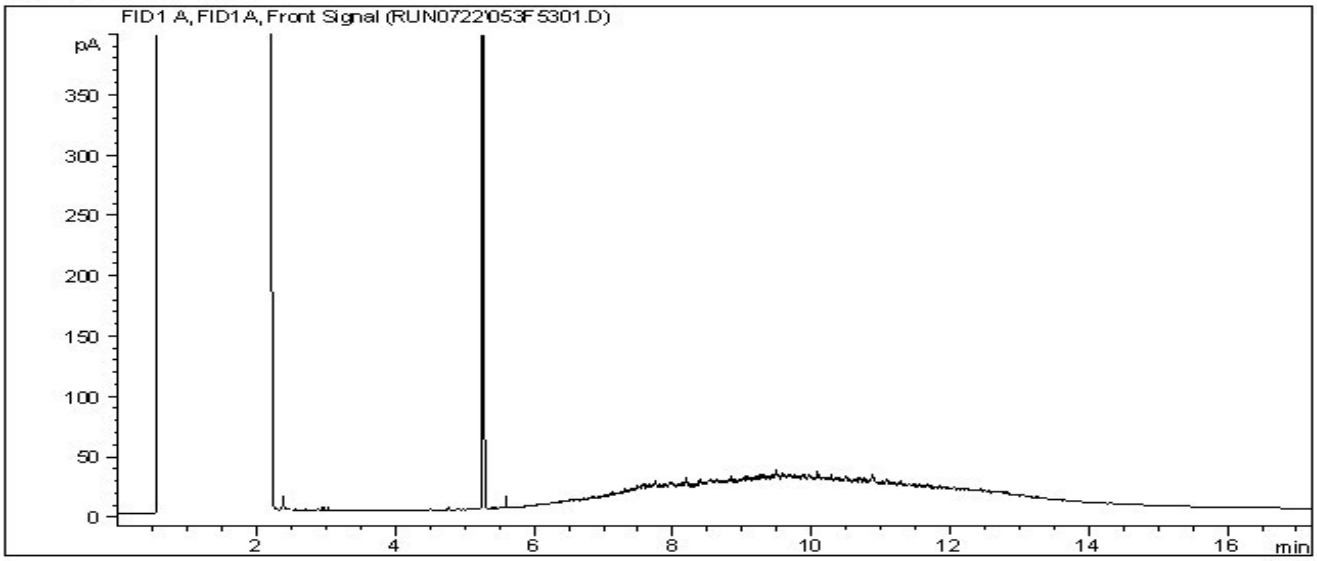
Report Date: 2013/07/25
Maxxam Job #: B361403
Maxxam Sample: GY3441

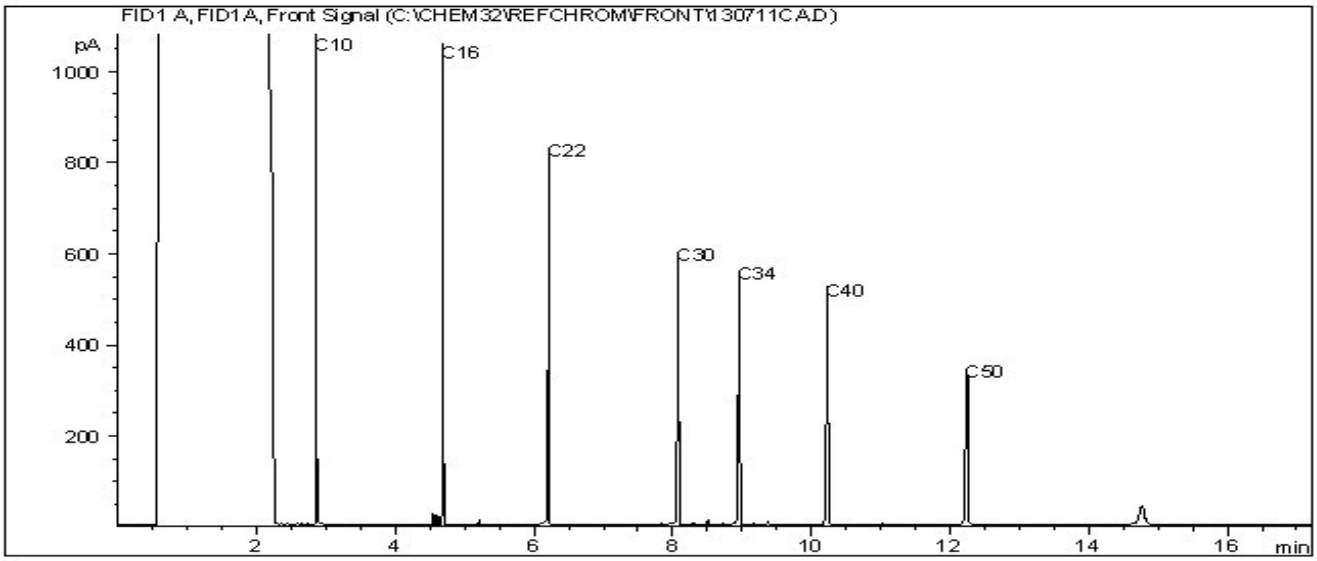
EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Reference: BARONS,,AB
Client ID: E. WALL @ -1.5M

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: GC13



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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

Page 1 of 1

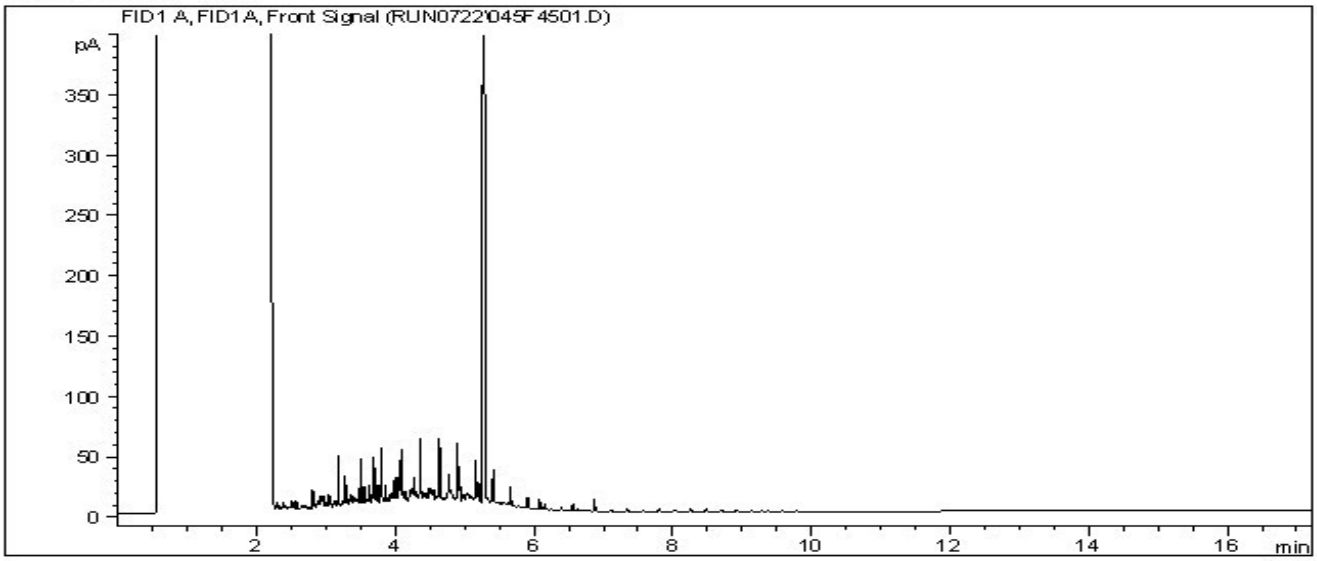
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Report Date: 2013/07/25
Maxxam Job #: B361403
Maxxam Sample: GY3442

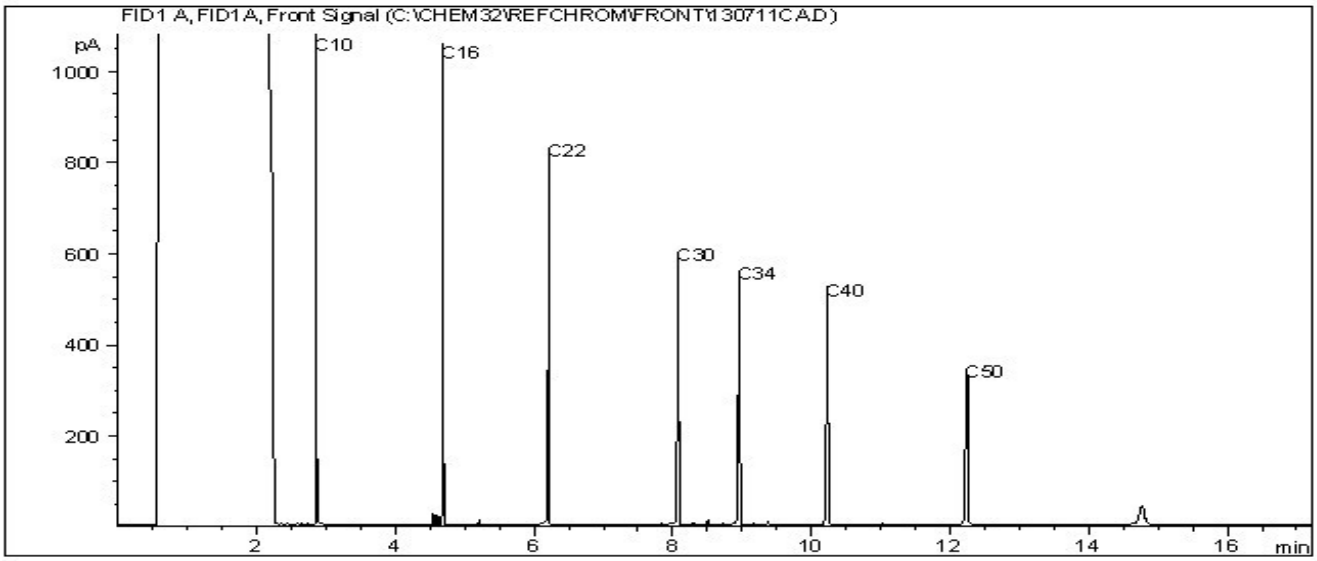
EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Reference: BARONS,,AB
Client ID: W. WALL @ -4.9M

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: GC13



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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

Page 1 of 1

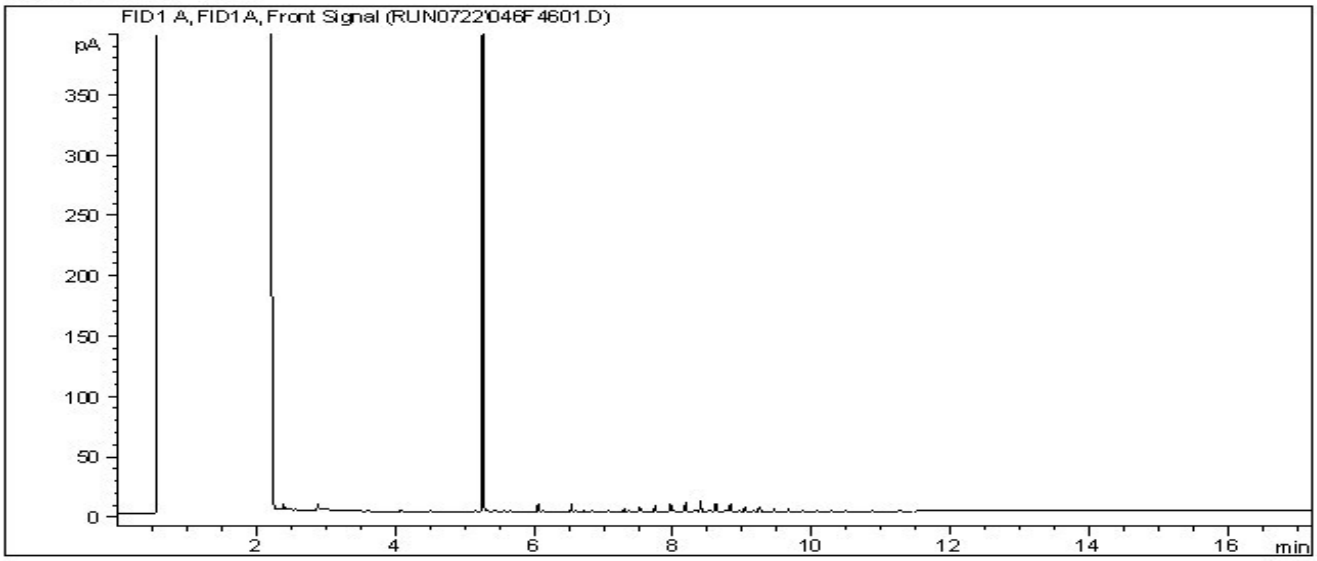
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Report Date: 2013/07/25
Maxxam Job #: B361403
Maxxam Sample: GY3443

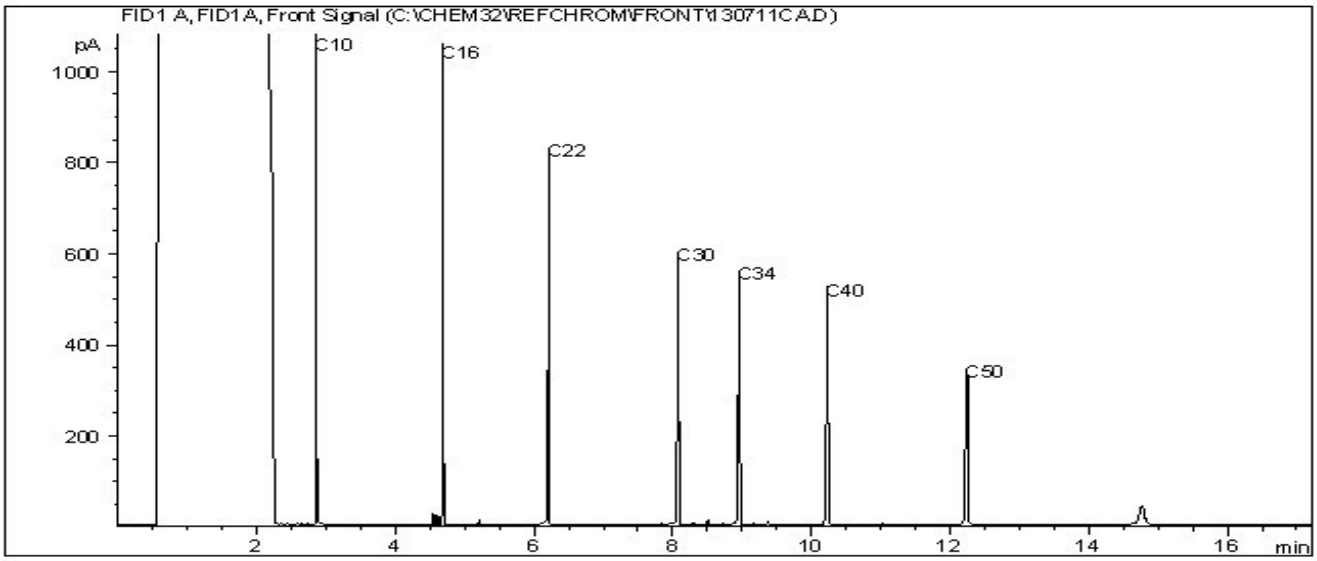
EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Reference: BARONS,,AB
Client ID: W. WALL @ -1.5M

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: GC13



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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

Page 1 of 1

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

Maxxam

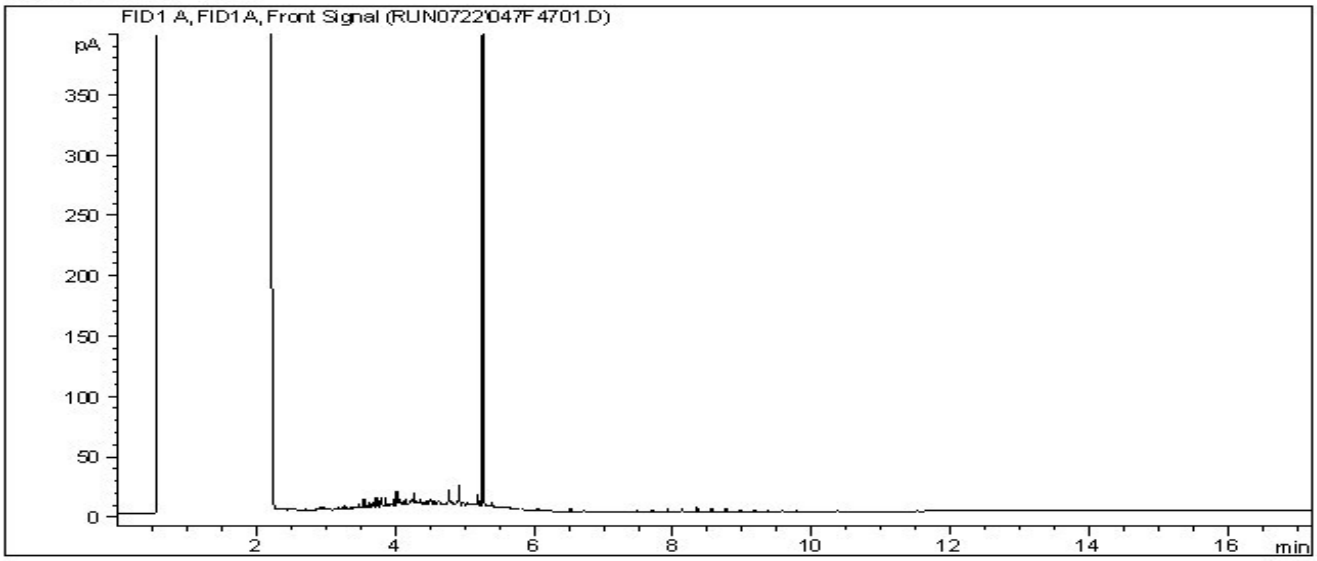
Success Through Science®

Report Date: 2013/07/25
Maxxam Job #: B361403
Maxxam Sample: GY3444

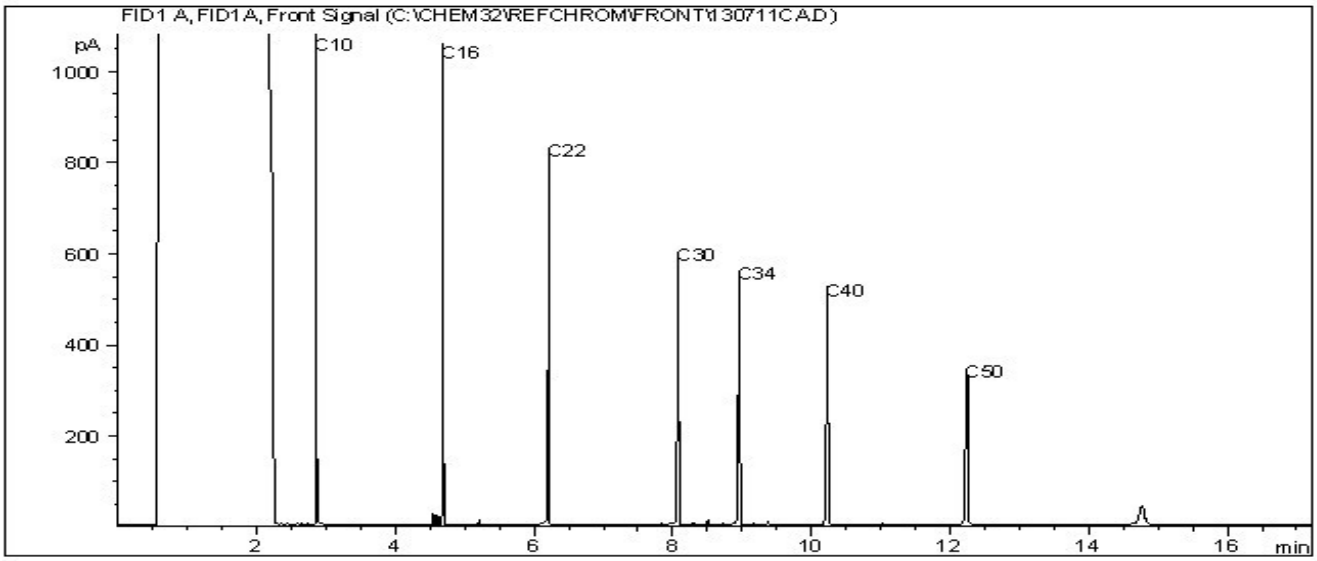
EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Reference: BARONS,,AB
Client ID: BASE @ -5.0M

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: GC13



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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

Page 1 of 1

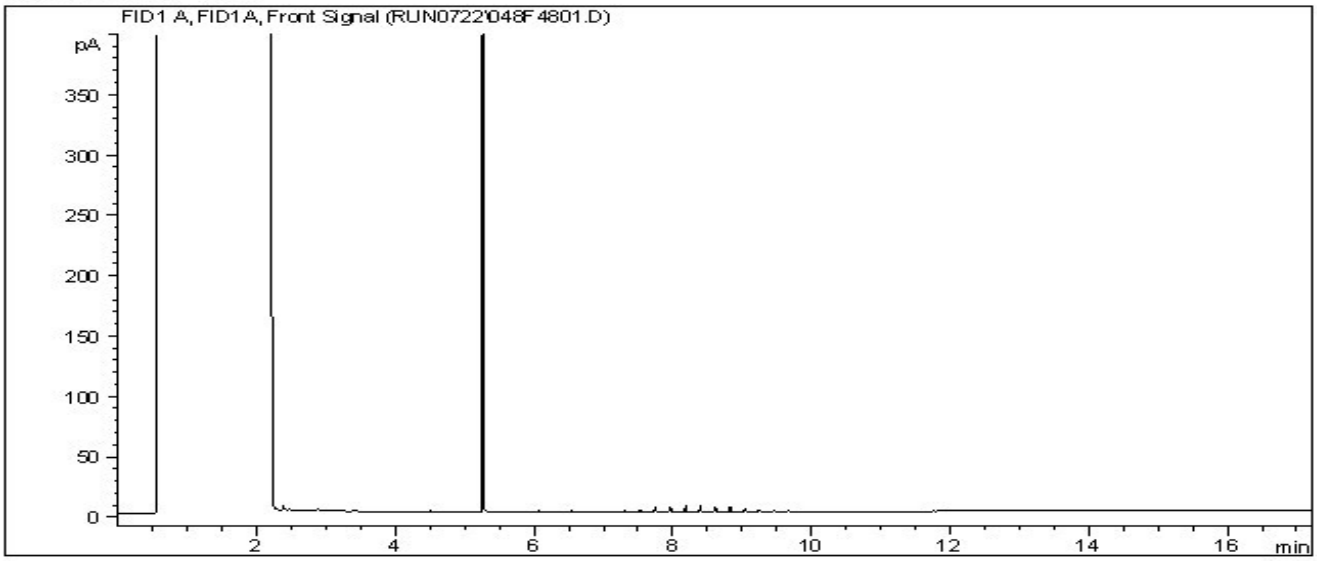
Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Report Date: 2013/07/25
Maxxam Job #: B361403
Maxxam Sample: GY3445

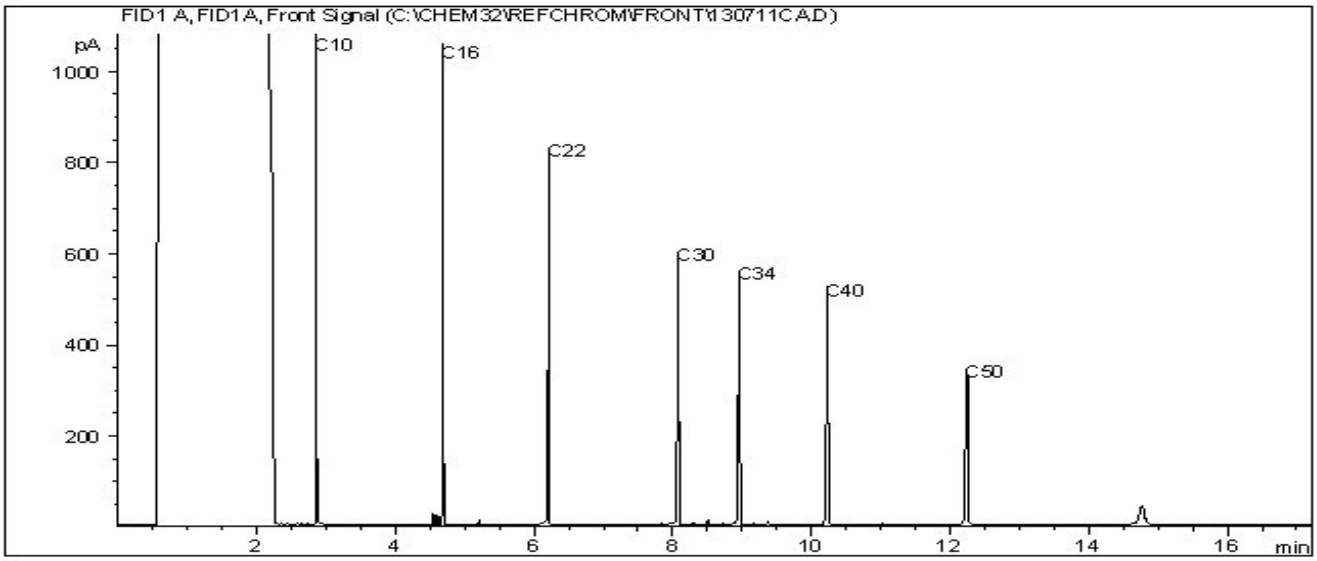
EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Reference: BARONS,,AB
Client ID: DUPLICATE

CCME Hydrocarbons (F2-F4 in soil) Chromatogram

Instrument: GC13



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

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

Page 1 of 1

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

Maxxam

Success Through Science®

Your Project #: L22103112
Site Location: BARONS, AB
Your C.O.C. #: A205552

Attention: JAYMES GOING

EBA ENGINEERING CONSULTANTS LTD.
LETHBRIDGE
442-10 STREET NORTH
LETHBRIDGE, AB
CANADA T1H 2C7

Report Date: 2013/07/30

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B363454
Received: 2013/07/24, 08:30

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Boron (Hot Water Soluble)	1	2013/07/29	2013/07/30	AB SOP-00042	EPA 200.7
BTEX/F1 by HS GC/MS (MeOH extract)	1	2013/07/24	2013/07/25	AB SOP-00039	CCME, EPA 8260C
Hexavalent Chromium	1	2013/07/26	2013/07/26	CAL SOP-00056	SM 3500-Cr B
CCME Hydrocarbons (F2-F4 in soil)	1	2013/07/24	2013/07/27	AB SOP-00040 AB SOP-00036	CCME PHC-CWS
Elements by ICPMS - Soils	1	2013/07/29	2013/07/30	AB SOP-00043	EPA 200.8
Moisture	1	N/A	2013/07/25	AB SOP-00002	CCME PHC-CWS
Particle Size by Sieve (75 micron)	1	N/A	2013/07/26	AB SOP-00022	SSMA 55.4

* 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.

Anna Gordon, Project Manager
Email: AGordon@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.

Total cover pages: 1

Maxxam Job #: B363454
Report Date: 2013/07/30

EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Location: BARONS, AB

AT1 BTEX AND F1-F4 IN SOIL (SOIL)

Maxxam ID		GZ7427		
Sampling Date		2013/07/20		
COC Number		A205552		
	UNITS	**IMPORT FILL STOCKPILE**	**RDL**	**QC Batch**
Physical Properties				
Moisture	%	12	0.30	7019380
Ext. Pet. Hydrocarbon				
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	10	7021419
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	50	7021419
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	50	7021419
Reached Baseline at C50	mg/kg	Yes	N/A	7021419
Volatiles				
Benzene	mg/kg	<0.0050	0.0050	7019392
Toluene	mg/kg	<0.020	0.020	7019392
Ethylbenzene	mg/kg	<0.010	0.010	7019392
Xylenes (Total)	mg/kg	<0.040	0.040	7019392
m & p-Xylene	mg/kg	<0.040	0.040	7019392
o-Xylene	mg/kg	<0.020	0.020	7019392
F1 (C6-C10) - BTEX	mg/kg	<12	12	7019392
(C6-C10)	mg/kg	<12	12	7019392
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	91	N/A	7019392
4-BROMOFLUOROBENZENE (sur.)	%	99	N/A	7019392
D10-ETHYLBENZENE (sur.)	%	79	N/A	7019392
D4-1,2-DICHLOROETHANE (sur.)	%	90	N/A	7019392
O-TERPHENYL (sur.)	%	101	N/A	7021419

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B363454
Report Date: 2013/07/30

EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Location: BARONS, AB

REGULATED METALS (CCME/AT1) - SOILS

Maxxam ID		GZ7427		
Sampling Date		2013/07/20		
COC Number		A205552		
	UNITS	**IMPORT FILL STOCKPILE**	**RDL**	**QC Batch**
Elements				
Soluble (Hot water) Boron (B)	mg/kg	<0.10	0.10	7032200
Hex. Chromium (Cr 6+)	mg/kg	<0.15	0.15	7023902
Total Antimony (Sb)	mg/kg	<1.0	1.0	7030793
Total Arsenic (As)	mg/kg	4.3	1.0	7030793
Total Barium (Ba)	mg/kg	280	10	7030793
Total Beryllium (Be)	mg/kg	<0.40	0.40	7030793
Total Cadmium (Cd)	mg/kg	0.40	0.10	7030793
Total Chromium (Cr)	mg/kg	11	1.0	7030793
Total Cobalt (Co)	mg/kg	4.9	1.0	7030793
Total Copper (Cu)	mg/kg	11	5.0	7030793
Total Lead (Pb)	mg/kg	6.6	1.0	7030793
Total Mercury (Hg)	mg/kg	<0.050	0.050	7030793
Total Molybdenum (Mo)	mg/kg	0.51	0.40	7030793
Total Nickel (Ni)	mg/kg	16	1.0	7030793
Total Selenium (Se)	mg/kg	<0.50	0.50	7030793
Total Silver (Ag)	mg/kg	<1.0	1.0	7030793
Total Thallium (Tl)	mg/kg	<0.30	0.30	7030793
Total Tin (Sn)	mg/kg	<1.0	1.0	7030793
Total Uranium (U)	mg/kg	<1.0	1.0	7030793
Total Vanadium (V)	mg/kg	18	1.0	7030793
Total Zinc (Zn)	mg/kg	44	10	7030793

RDL = Reportable Detection Limit

Maxxam Job #: B363454
Report Date: 2013/07/30

EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Location: BARONS, AB

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		GZ7427		
Sampling Date		2013/07/20		
COC Number		A205552		
	UNITS	**IMPORT FILL STOCKPILE**	**RDL**	**QC Batch**
Physical Properties				
Sieve - Pan	%	86	0.20	7019807
Sieve - #200 (>0.075mm)	%	14	0.20	7019807
Grain Size	%	FINE	0.20	7019807

RDL = Reportable Detection Limit

Maxxam Job #: B363454
Report Date: 2013/07/30

EBA ENGINEERING CONSULTANTS LTD.
Client Project #: L22103112
Site Location: BARONS, AB

Package 1	10.0°C

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

General Comments

Results relate only to the items tested.

EBA ENGINEERING CONSULTANTS LTD.
Attention: JAYMES GOING
Client Project #: L22103112
P.O. #:
Site Location: BARONS, AB

Quality Assurance Report

Maxxam Job Number: CB363454

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7019380 AN0	Method Blank	Moisture	2013/07/25	<0.30		%	
	RPD	Moisture	2013/07/25	3.0		%	20
7019392 GP4	Matrix Spike	1,4-Difluorobenzene (sur.)	2013/07/25		99	%	60 - 140
		4-BROMOFLUOROBENZENE (sur.)	2013/07/25		100	%	60 - 140
		D10-ETHYLBENZENE (sur.)	2013/07/25		87	%	60 - 130
		D4-1,2-DICHLOROETHANE (sur.)	2013/07/25		93	%	60 - 140
		Benzene	2013/07/25		84	%	60 - 140
		Toluene	2013/07/25		93	%	60 - 140
		Ethylbenzene	2013/07/25		99	%	60 - 140
		m & p-Xylene	2013/07/25		92	%	60 - 140
		o-Xylene	2013/07/25		95	%	60 - 140
		(C6-C10)	2013/07/25		82	%	60 - 140
	Spiked Blank	1,4-Difluorobenzene (sur.)	2013/07/25		100	%	60 - 140
		4-BROMOFLUOROBENZENE (sur.)	2013/07/25		92	%	60 - 140
		D10-ETHYLBENZENE (sur.)	2013/07/25		88	%	60 - 130
		D4-1,2-DICHLOROETHANE (sur.)	2013/07/25		91	%	60 - 140
		Benzene	2013/07/25		92	%	60 - 140
		Toluene	2013/07/25		106	%	60 - 140
		Ethylbenzene	2013/07/25		112	%	60 - 140
		m & p-Xylene	2013/07/25		103	%	60 - 140
		o-Xylene	2013/07/25		108	%	60 - 140
		(C6-C10)	2013/07/25		104	%	60 - 140
	Method Blank	1,4-Difluorobenzene (sur.)	2013/07/25		98	%	60 - 140
		4-BROMOFLUOROBENZENE (sur.)	2013/07/25		97	%	60 - 140
		D10-ETHYLBENZENE (sur.)	2013/07/25		86	%	60 - 130
		D4-1,2-DICHLOROETHANE (sur.)	2013/07/25		89	%	60 - 140
		Benzene	2013/07/25	<0.0050		mg/kg	
		Toluene	2013/07/25	<0.020		mg/kg	
		Ethylbenzene	2013/07/25	<0.010		mg/kg	
		Xylenes (Total)	2013/07/25	<0.040		mg/kg	
		m & p-Xylene	2013/07/25	<0.040		mg/kg	
		o-Xylene	2013/07/25	<0.020		mg/kg	
		F1 (C6-C10) - BTEX	2013/07/25	<12		mg/kg	
		(C6-C10)	2013/07/25	<12		mg/kg	
	RPD	Benzene	2013/07/25	NC		%	50
		Toluene	2013/07/25	NC		%	50
		Ethylbenzene	2013/07/25	NC		%	50
		Xylenes (Total)	2013/07/25	NC		%	50
		m & p-Xylene	2013/07/25	NC		%	50
		o-Xylene	2013/07/25	NC		%	50
		F1 (C6-C10) - BTEX	2013/07/25	NC		%	50
		(C6-C10)	2013/07/25	NC		%	50
7019807 DN6	QC Standard	Sieve - Pan	2013/07/26		100	%	94 - 106
		Sieve - #200 (>0.075mm)	2013/07/26		99	%	86 - 114
	RPD	Sieve - Pan	2013/07/26	5.9		%	35
		Sieve - #200 (>0.075mm)	2013/07/26	7.9		%	35
7021419 GB0	Matrix Spike	O-TERPHENYL (sur.)	2013/07/26		92	%	50 - 130
		F2 (C10-C16 Hydrocarbons)	2013/07/26		91	%	50 - 130
		F3 (C16-C34 Hydrocarbons)	2013/07/26		97	%	50 - 130
		F4 (C34-C50 Hydrocarbons)	2013/07/26		101	%	50 - 130
	Spiked Blank	O-TERPHENYL (sur.)	2013/07/26		91	%	50 - 130
		F2 (C10-C16 Hydrocarbons)	2013/07/26		89	%	70 - 130
		F3 (C16-C34 Hydrocarbons)	2013/07/26		95	%	70 - 130
		F4 (C34-C50 Hydrocarbons)	2013/07/26		99	%	70 - 130
	Method Blank	O-TERPHENYL (sur.)	2013/07/26		100	%	50 - 130

EBA ENGINEERING CONSULTANTS LTD.
Attention: JAYMES GOING
Client Project #: L22103112
P.O. #:
Site Location: BARONS, AB

Quality Assurance Report (Continued)

Maxxam Job Number: CB363454

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7021419 GB0	Method Blank	F2 (C10-C16 Hydrocarbons)	2013/07/26	<10		mg/kg	
		F3 (C16-C34 Hydrocarbons)	2013/07/26	<50		mg/kg	
		F4 (C34-C50 Hydrocarbons)	2013/07/26	<50		mg/kg	
	RPD	F2 (C10-C16 Hydrocarbons)	2013/07/26	NC		%	50
		F3 (C16-C34 Hydrocarbons)	2013/07/26	NC		%	50
		F4 (C34-C50 Hydrocarbons)	2013/07/26	NC		%	50
7023902 RW8	Matrix Spike	Hex. Chromium (Cr 6+)	2013/07/26		95	%	75 - 125
	Spiked Blank	Hex. Chromium (Cr 6+)	2013/07/26		99	%	75 - 125
	Method Blank	Hex. Chromium (Cr 6+)	2013/07/26	<0.15		mg/kg	
	RPD	Hex. Chromium (Cr 6+)	2013/07/26	NC		%	35
7030793 ST4	Matrix Spike	Total Antimony (Sb)	2013/07/29		88	%	75 - 125
		Total Arsenic (As)	2013/07/29		92	%	75 - 125
		Total Barium (Ba)	2013/07/29		NC	%	75 - 125
		Total Beryllium (Be)	2013/07/29		98	%	75 - 125
		Total Cadmium (Cd)	2013/07/29		94	%	75 - 125
		Total Chromium (Cr)	2013/07/29		97	%	75 - 125
		Total Cobalt (Co)	2013/07/29		86	%	75 - 125
		Total Copper (Cu)	2013/07/29		87	%	75 - 125
		Total Lead (Pb)	2013/07/29		92	%	75 - 125
		Total Mercury (Hg)	2013/07/29		103	%	75 - 125
		Total Molybdenum (Mo)	2013/07/29		94	%	75 - 125
		Total Nickel (Ni)	2013/07/29		NC	%	75 - 125
		Total Selenium (Se)	2013/07/29		90	%	75 - 125
		Total Silver (Ag)	2013/07/29		87	%	75 - 125
		Total Thallium (Tl)	2013/07/29		93	%	75 - 125
		Total Tin (Sn)	2013/07/29		96	%	75 - 125
		Total Uranium (U)	2013/07/29		85	%	75 - 125
		Total Vanadium (V)	2013/07/29		100	%	75 - 125
		Total Zinc (Zn)	2013/07/29		NC	%	75 - 125
	QC Standard	Total Arsenic (As)	2013/07/29		103	%	50 - 150
		Total Barium (Ba)	2013/07/29		100	%	69 - 131
		Total Chromium (Cr)	2013/07/29		89	%	41 - 159
		Total Cobalt (Co)	2013/07/29		92	%	75 - 125
		Total Copper (Cu)	2013/07/29		88	%	73 - 127
		Total Lead (Pb)	2013/07/29		98	%	54 - 146
		Total Nickel (Ni)	2013/07/29		99	%	61 - 139
		Total Vanadium (V)	2013/07/29		109	%	50 - 150
		Total Zinc (Zn)	2013/07/29		96	%	72 - 128
	Spiked Blank	Total Antimony (Sb)	2013/07/29		102	%	75 - 125
		Total Arsenic (As)	2013/07/29		98	%	75 - 125
		Total Barium (Ba)	2013/07/29		95	%	75 - 125
		Total Beryllium (Be)	2013/07/29		116	%	75 - 125
		Total Cadmium (Cd)	2013/07/29		99	%	75 - 125
		Total Chromium (Cr)	2013/07/29		92	%	75 - 125
		Total Cobalt (Co)	2013/07/29		92	%	75 - 125
		Total Copper (Cu)	2013/07/29		94	%	75 - 125
		Total Lead (Pb)	2013/07/29		100	%	75 - 125
		Total Mercury (Hg)	2013/07/29		108	%	75 - 125
		Total Molybdenum (Mo)	2013/07/29		98	%	75 - 125
		Total Nickel (Ni)	2013/07/29		94	%	75 - 125
		Total Selenium (Se)	2013/07/29		100	%	75 - 125
		Total Silver (Ag)	2013/07/29		92	%	75 - 125
		Total Thallium (Tl)	2013/07/29		100	%	75 - 125
		Total Tin (Sn)	2013/07/29		97	%	75 - 125
		Total Uranium (U)	2013/07/29		103	%	75 - 125

EBA ENGINEERING CONSULTANTS LTD.
Attention: JAYMES GOING
Client Project #: L22103112
P.O. #:
Site Location: BARONS, AB

Quality Assurance Report (Continued)

Maxxam Job Number: CB363454

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
7030793 ST4	Spiked Blank	Total Vanadium (V)	2013/07/29		95	%	75 - 125
		Total Zinc (Zn)	2013/07/29		99	%	75 - 125
	Method Blank	Total Antimony (Sb)	2013/07/29	<1.0		mg/kg	
		Total Arsenic (As)	2013/07/29	<1.0		mg/kg	
		Total Barium (Ba)	2013/07/29	<10		mg/kg	
		Total Beryllium (Be)	2013/07/29	<0.40		mg/kg	
		Total Cadmium (Cd)	2013/07/29	<0.10		mg/kg	
		Total Chromium (Cr)	2013/07/29	<1.0		mg/kg	
		Total Cobalt (Co)	2013/07/29	<1.0		mg/kg	
		Total Copper (Cu)	2013/07/29	<5.0		mg/kg	
		Total Lead (Pb)	2013/07/29	<1.0		mg/kg	
		Total Mercury (Hg)	2013/07/29	<0.050		mg/kg	
		Total Molybdenum (Mo)	2013/07/29	<0.40		mg/kg	
		Total Nickel (Ni)	2013/07/29	<1.0		mg/kg	
		Total Selenium (Se)	2013/07/29	<0.50		mg/kg	
		Total Silver (Ag)	2013/07/29	<1.0		mg/kg	
		Total Thallium (Tl)	2013/07/29	<0.30		mg/kg	
		Total Tin (Sn)	2013/07/29	<1.0		mg/kg	
		Total Uranium (U)	2013/07/29	<1.0		mg/kg	
		Total Vanadium (V)	2013/07/29	<1.0		mg/kg	
		Total Zinc (Zn)	2013/07/29	<10		mg/kg	
	RPD	Total Antimony (Sb)	2013/07/29	NC		%	35
		Total Arsenic (As)	2013/07/29	5.8		%	35
		Total Barium (Ba)	2013/07/29	5.7		%	35
		Total Beryllium (Be)	2013/07/29	NC		%	35
		Total Cadmium (Cd)	2013/07/29	NC		%	35
		Total Chromium (Cr)	2013/07/29	12.9		%	35
		Total Cobalt (Co)	2013/07/29	1.7		%	35
		Total Copper (Cu)	2013/07/29	NC		%	35
		Total Lead (Pb)	2013/07/29	2.5		%	35
		Total Mercury (Hg)	2013/07/29	NC		%	35
		Total Molybdenum (Mo)	2013/07/29	NC		%	35
		Total Nickel (Ni)	2013/07/29	8.8		%	35
		Total Selenium (Se)	2013/07/29	NC		%	35
		Total Silver (Ag)	2013/07/29	NC		%	35
		Total Thallium (Tl)	2013/07/29	NC		%	35
		Total Tin (Sn)	2013/07/29	NC		%	35
		Total Uranium (U)	2013/07/29	NC		%	35
		Total Vanadium (V)	2013/07/29	4.2		%	35
		Total Zinc (Zn)	2013/07/29	6.7		%	35
7032200 STI	Matrix Spike	Soluble (Hot water) Boron (B)	2013/07/30		96	%	75 - 125
	Spiked Blank	Soluble (Hot water) Boron (B)	2013/07/30		96	%	75 - 125
	Method Blank	Soluble (Hot water) Boron (B)	2013/07/30	<0.10		mg/kg	
	RPD	Soluble (Hot water) Boron (B)	2013/07/30	NC		%	35

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

EBA ENGINEERING CONSULTANTS LTD.
Attention: JAYMES GOING
Client Project #: L22103112
P.O. #:
Site Location: BARONS, AB

Quality Assurance Report (Continued)

Maxxam Job Number: CB363454

reliable calculation.

Maxxam Analytics International Corporation o/a Maxxam Analytics Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone(403) 291-3077 Fax(403) 291-9468

Validation Signature Page

Maxxam Job #: B363454

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

Ghayasuddin Khan, M.Sc., B.Ed., P.Chem, Scientific Specialist

Janet Gao, Senior Analyst, Organics Department

Lisa Thum, Inorganic Manager

Michael Sheppard, Organics Supervisor

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

Maxxam

Calgary: 4000 19st St. NE, T2E 6P8. Ph: (403) 291-3077, Fax: (403) 735-2240, Toll free: (800) 386-7247
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961

Chain of Custody

A205552

Page: ____ of ____

	Invoice To: C/O Report Address ☐	Report To: Same as Invoice ☒	Report Distribution (E-Mail):
Company:	EBA, A TETRA TECH CO.		jgoing@eba.ca
Contact:	JAYMES GOING		akennerley@eba.ca
Address:	442-10 ST N. LETHBRIDGE		
	Prov: AB PC: T1H 2C7	Prov: PC:	
Contact #s:	Ph: (403) 329-9009 Cell:	Ph: Cell:	

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

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

PO #:
Project # / Name: L22103112
Site Location: BARONS, AB
Quote #:
Sampled By: AARON MILOS

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

See reverse for package specifics

	Sample ID	Depth (unit)	Matrix GW / SW Soil	Date/Time Sampled YY/MM/DD 24:00	SOIL: BTEX F1-F4	SOIL: Sieve (75 micron)	SOIL: Regulated Metals (CCME / AT1)	SOIL: Salinity 4	SOIL: Assessment ICP Metals	SOIL: Basic Class II Landfill	WATER: ☐VOCs ☐BTEX F1	WATER: ☐BTEX F1-F4 ☐BTEX F1-F2	WATER: ☐ Routine Water ☐ Turb ☐ F	WATER: ☐ TOC ☐ DOC	WATER: Regulated Metals (CCME / AT1) Total	WATER: Regulated Metals (CCME / AT1) Dissolved	WATER: Mercury ☐ Total ☐ Dissolved	HOLD - Do not Analyze	# of Containers Submitted
1	IMPORT FILL	STOCKPILE	SOIL	13/07/20	X	X	X												3
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			

24-Jul-13 08:30
Anna Gordon
B363454
KMR INS-0037

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

Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):
Amy Kennerley AMY KENNERLEY	13/07/23	16:00
Relinquished By (Signature/Print):	Date (YY/MM/DD):	Time (24:00):

Special Instructions:

# of Jars Used & Not Submitted

LAB USE ONLY

Received By:	Date:	Time:	Maxxam Job #:		
Helen Duy			Custody Seal	Temperature	Ice
Lab Comments:	2013/07/24	0830	N	10/10/10	Y

AB FCD-00331 Rev3 2010/05

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